ROHM

Short Form Catalog '94

ROHM CO.,LTD

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SHORT FORM CATALOG **'94-1**st. Issued.

ELECTRONIC COMPONENTS AND DEVICES

- IC Monolithic ICs
- Hy Hybrid ICs
- Tr Transistors
- Di Diodes
- LED Light Emitting Diodes
- S Sensors
- LD Laser Diodes
- LCD Liquid Crystal Displays
- PH Print Heads
- R Resistors
- C Capacitors

ROHM CO., LTD.

'94-1

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Contents

Notices

[On the *New* mark]

New products included in this catalog are identified by a *New* mark.

SMD mark on the pages which list surface mounted devices.

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Monolithic ICs

Part No. List

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Part No. List

Monolithic ICs

Monolithic ICs

ICs for Audio Applications —— 26

ICs for Video Applications —— 34

Monolithic ICs

■Product Designation

The product designations for ROHM's monolithic ICs consist of a Type name followed by two suffixes, as shown in Examples 1 and 2 below.

●Memory ICs

(Example 1) BR93CS46F - EZ T1
① ② ③

①Type name
②Characteristics selection code (access time, temperature range)
③Package and/or forming code

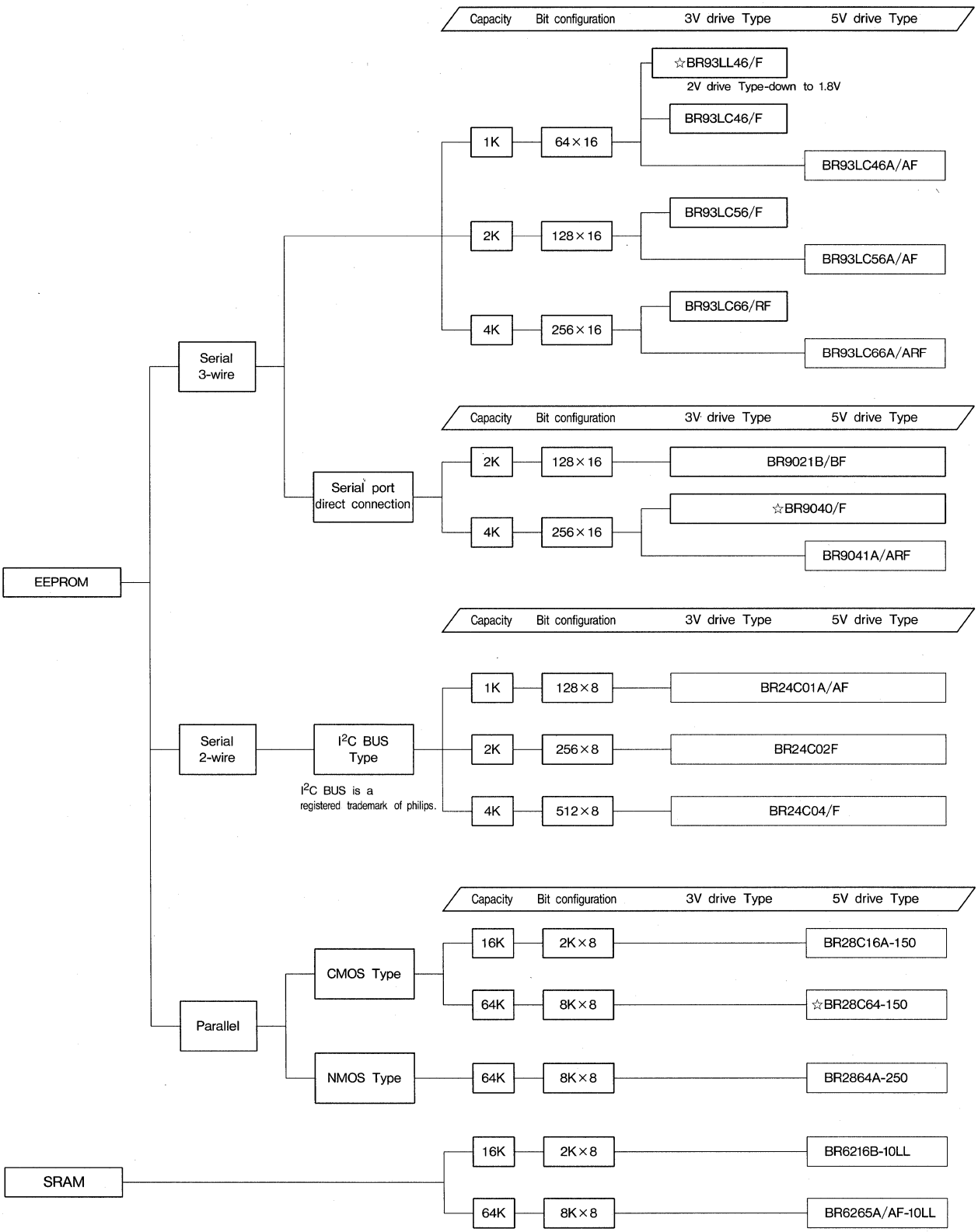
●Monolithic ICs (other than memories)

(Example 2) BA4558F - DX T1
① ② ③

①Type Name
②Special selection code
③Package and/or forming code

Note : Suffixes ② and ③ are usually two digits each. For some products, however, suffix ② may be more or less than two

Line-up


EEPROM
Serial 3-wire
Capacity
Bit configuration
3V drive Type
5V drive Type
1K
64×16
☆BR93LL46/F
2V drive Type-down to 1.8V
BR93LC46/F
BR93LC46A/AF
2K
128×16
BR93LC56/F
BR93LC56A/AF
4K
256×16
BR93LC66/RF
BR93LC66A/ARF
Serial port direct connection
Capacity
Bit configuration
3V drive Type
5V drive Type
2K
128×16
BR9021B/BF
4K
256×16
☆BR9040/F
BR9041A/ARF
Serial 2-wire
I²C BUS Type
I²C BUS is a registered trademark of philips.
Capacity
Bit configuration
3V drive Type
5V drive Type
1K
128×8
BR24C01A/AF
2K
256×8
BR24C02F
4K
512×8
BR24C04/F
Parallel
CMOS Type
Capacity
Bit configuration
3V drive Type
5V drive Type
16K
2K×8
BR28C16A-150
64K
8K×8
☆BR28C64-150
NMOS Type
64K
8K×8
BR2864A-250
SRAM
16K
2K×8
BR6216B-10LL
64K
8K×8
BR6265A/AF-10LL

EEPROM

●Serial 3-wire

Capacity (Bit)	Part No.	Organization (Word×Bit)	Power supply(V)	Operating voltage Read(V)	Operating voltage Write(V)	Current consumption (Max) Active (mA)	Current consumption (Max) Stand-by (μA)	Write cycle time(Max) (ms)	Write cycle time(Max) Vcc	Operating temp (°C)	Rewritability (×10⁴)	Data retention (Year)	Package
1K	☆BR93LL46/F	64×16	2	1.8~4.0	1.8~4.0	2	1	20	2V	−40~85	10	10	DIP8 SOP8
	BR93LC46/F		3	2.0~5.5	2.7~5.5	2	3	25	3V				
	BR93LC46A/AF		5	2.0~5.5	4.5~5.5	3	5	10	5V				
2K	BR93LC56/F	128×16	3	2.0~5.5	2.7~5.5	2	3	25	3V				
	BR93LC56A/AF		5	2.0~5.5	4.5~5.5	3	5	10	5V				
4K	BR93LC66/RF	256×16	3	2.0~5.5	2.7~5.5	2	3	25	3V				
	BR93LC66A/ARF		5	2.0~5.5	4.5~5.5	3	5	10	5V				

Note: .☆:Under development

●Serial 3-wire(Serial port direct connection)

Capacity (Bit)	Part No.	Organization (Word×Bit)	Power supply(V)	Operating voltage Read(V)	Operating voltage Write(V)	Current consumption (Max) Active (mA)	Current consumption (Max) Stand-by (μA)	Write cycle time(Max) (ms)	Write cycle time(Max) Vcc	Operating temp (°C)	Rewritability (×10⁴)	Data retention (Year)	Package
2K	BR9021B/BF	128×16	3~5	2.0~5.5	2.7~5.5	2 3	3 5	20 10	3V 5V	−40~85	10	10	DIP8 SOP8
4K	☆BR9040/F	256×16	3~5	2.0~5.5	2.7~5.5	1.5 2	2 3	15 10	3V 5V				
	BR9041A/ARF		5	2.0~5.5	4.5~5.5	3	5	10	5V				

Note: .☆:Under development

●Serial 2-wire(IC²BUS compatible)

Capacity (Bit)	Part No.	Organization (Word×Bit)	Power supply(V)	Operating voltage Read(V)	Operating voltage Write(V)	Current consumption (Max) Active (mA)	Current consumption (Max) Stand-by (μA)	Write cycle time(Max) (ms)	Write cycle time(Max) Vcc	Operating temp (°C)	Rewritability (×10⁴)	Data retention (Year)	Package
1K	BR24C01A/AF	128×8	3~5	2.7~5.5	2.7~5.5	1	2	25 10	3V 5V	−40~85	10	10	DIP8 SOP8
2K	BR24C02/F	256×8	3~5	2.7~5.5	2.7~5.5	1	2	25 10	3V 5V				
4K	BR24C04/F	512×8	3~5	2.7~5.5	2.7~5.5	1	2	25 10	3V 5V				

Note:1.I²C BUS is a registered trademark of Philips

●Parallel(CMOS Type)

Capacity (Bit)	Part No.	Organization (Word×Bit)	Access time Max(ns)	Power supply(V)	Operating voltage Read(V)	Operating voltage Write(V)	Current consumption (Max) Active (mA)	Current consumption (Max) Stand-by (μA)	Operating temp (°C)	Rewritability (×10⁴)	Data retention (Year)	Package
16K	BR28C16A-150	2K×8	150	5	4.5~5.5	4.5~5.5	30	0.1	0~70	1	10	DIP24
64K	☆BR28C64-150	8K×8	150		4.5~5.5	4.5~5.5	30	0.1				DIP28

Note: .☆:Under development

●Parallel(NMOS Type)

Capacity (Bit)	Part No.	Organization (Word×Bit)	Access time Max(ns)	Power supply(V)	Operating voltage Read(V)	Operating voltage Write(V)	Current consumption (Max) Active (mA)	Current consumption (Max) Stand-by (μA)	Operating temp (°C)	Rewritability (×10⁴)	Data retention (Year)	Package
64K	BR2864A-250	8K×8	250	5	4.5~5.5	4.5~5.5	110	50	0~70	1	10	DIP28

SRAM

Capacity (Bit)	Part No.	Organization (Word×Bit)	Access time Max(ns)	Power supply(V)	Current consumption(Max) Active(mA)	Current consumption(Max) Stand-by(μA) Vcc=5V	Current consumption(Max) Stand-by(μA) Vcc=3V	Package
16K	BR6216B-10LL	2K ×8	100	5	40	20	10	SK-DIP24(300mil)
64K	BR6265A-10LL BR6265AF-10LL	8K ×8	100	5	40	50	20	DIP28 SOP-W28(450mil)

Memory backup IC

Part No.	Power supply(V)	Output voltage (backup)(V)	Current (backup)(μA)	Detect voltage (V)	Switching voltage (V)	Feature	Package
BA6129F	5	4.95	0.5	3.5	3.3	Outputs CS, CSB and reset signals below detect signal	SOP8
BA6162/F	5	4.95	0.5	4.2	3.3	Same as BA6129F but different detect voltage	DIP8/SOP8

8-bit single chip microcontroller

●RAMICS-8

Microcomputer for easy-to-use, high speed controller

Features

●Intermemory instructions (transfer, operation and bit maniplation) which best make use of memory mapped I/O's.
All RAMs and I/O's can be used as accumulator for effective use of ROM and easier programming.

●Pipeline and bus division for short instruction time
Fast interrupt response and short instruction, best suitable for real time control applications.

●RAMICS-8

Series	BU38101	BU38701/BU38703
ROM	2048×8	24576×8/16384×8
RAM	96×8	512×8
Supply voltage	5V	5V
Execution time	0.33μSec(#1)/0.25μSec(#2)	0.33μSec(#1)/0.25μSec(#2)
External interrupt	4(programmable edge selection)	2
Internal interrupt	1(timer interrupt)	13 (Free-running counter capture, timer interrupt, SIO interrupt, etc.)
Timer, counter	16bit×1 Free-run/modulo	19bit×1 Free-running timer (capture×4) 8bit×2 (internal interval timer)
Inputs	4	A/D input can be used as parallel input by mask option
Output	–	6
I/O	16	32
SIO	software SIO	8bit×1
High current outputs	4	–
A/D input	–	8ch×8bit
D/A output	–	PWM 12bit×2
LED driver	High current output for direct drive	–
Standby	HALT/STOP	HALT/STOP
Package	QFP32	QFP80
Development support tools	Assembler/in-circuit emulator	
MTP microcomputer	BU39101	BU39703
Debug board	EV38101	EV38701
Features	Real time control with pulses	speed and phase control of 2 motors. Incorporating high performance OP amp.

Notes : 1.Execution time-clock freg. at #1=6MHz
#2=8MHz
2.For information on development tools (in-circuit emulator, etc.), call.

4-bit single chip microcontroller

●RAMICS-4

4-bit microcomputer with versatile

Features

1. Operating voltage peripherals for easier expansion

●2.0-4.0V for 3.0 μs minimum instruction time (@ 2MHZ)

●4.5-5.5V for 1.0 μs minimum instruction time (@ 6MHZ)

Low voltage and fast process make this chip best suitable to fit on battery powered equipment.

2. MTP(EE) microcomputer series

●MTP microcomputer for each product

●Program can be repeatedly overwritten for system reviewing.

Program area is located in EEPROM to allow quick exchange of programs.

●All functions including those in masked options are compatible with those in masked ROM. No additional components are required.

Masked option can be set by the user to make it

Compatible with the masked ROM. Evaluation can be conducted without using any additional component.

These features facilitate functional evaluation to keep the development with the schedule.

●RAMICS-4

Series	BU24421 (BU24407)	☆BU24821 (BU24807)	BU24422 (BU24410)	BU24822 (BU24810)	☆BU24823 (BU24805)	☆BU34224 (BU34204)	☆BU34424 (BU34404)	☆BU34671
ROM	4096×8	8192×8	4096×8	8192×8	8192×8	2048×8	4096×8	6144×8
RAM	128×4		256×4		256×4	128×4	256×4	128×4
Power supply	3V		3V		3V	5V		5V
Run time	6.0 μsec(#1)		3.0 μsec(#2)		3.0 μsec(#2)	1.5 μsec(#3)		1.0 μsec(#4)
External interrupt	2		2		2	1		2
Internal interrupt	2		3		4	3		4
Timer counter	1+1(clock)		1+1(clock)		2+1(clock)	8bit×2		8bit×2
Inputs	8		8		4			
Outputs					8			2
I/O's	10		12		20	10		12
SIO			8bit×1		8bit×1	8bit×1		
High current output	1(15mA)		1(15mA)		8(15mA)			2(15mA)
A/D input					8bit×8	8bit×8		4bit×4
D/A output								14bit×1、6bit×6
LCD driver	28seg×4com		36seg×4com		8seg×3com	24seg×4com		
Display RAM	28×4		36×4		8×4	24×4		
Generator	Dual clock main/sub		Dual clock main/sub		Dual clock main/sub	Dual clock main/sub		Main clock
Standby	HALT/STOP							
Package	QFP64		SQFP80		SQFP80	QFP64		QFP44/SDIP42
Development support tool	Assembler/in-circuitemulator							
MTP microcomputer	BU26821		BU26822		BU26823	BU36824		☆BU35671
Debug board	EV24407		EV24410		EV24805	EV34204		EV34671
Feature	Internal carrier generator for remote controller. Internal counter for clock.		Internal carrier generator for remote controller. Internal counter for clock. Communication with the main microcomputer through SIO.		Internal counter for clock various I/O functions	Can configure an audio spectram analyzer in conjunction with Rohm BA3830.		Microcomputer on small TV set. OSD 16 character×2, 12×18 dot Remote controller timer

Notes : 1.☆: Under development
2.Run time:when clock is -#1=1MHZ;#2=2MHZ;#3=4MHZ;#4=6MHZ
3.For development support tools (debug board,in-circuit emulator),call.
4.For optionals (pull up or pull down), call for further information.
5.( ):old base.

4-bit single chip microcontroller

●S.RAMICS Compact microcomputer featuring excellent cost performance

Features

●High cost performance
I/O blocks (8-bit A/D,etc.) and other components (OSC capacitor, etc.) can be effectively built in to reduce the costof the set.

●Available in selected package
DID, SOP, QFP, etc.-select the best suitable for the mounting configuration.

●S.RAMICS (1)

Series	BU2458/BU2459/BU2460 (BU2418/BU2419/BU2422)	BU3458/BU3459/BU3460	BU2461/BU2462 (BU2430/BU2431)	BU3461/BU3462	BU2456	BU3456
ROM	1024×8	1024×8	1024×8	1024×8	1024×8	1024×8
RAM	32×4	32×4	32×4	32×4	32×4	32×4
Power supply	3V	5V	3V	5V	3V	5V
Run time	6.0μsec(#1)	1.5μsec(#3)	6.0μsec(#1)	1.5μsec(#3)	6.0μsec(#1)	1.5μsec(#3)
Inputs	4	4	4	4	4	4
Outputs	8	8	8	8	8	8
I/O's	4	4	2	2	4	4
High current output	1(8mA)	1(8mA)	1(8mA)	1(8mA)	1(8mA)	1(8mA)
Generator	Ceramic resonator	Ceramic resonator	Ceramic resonator	Ceramic resonator	Ceramic resonator	Ceramic resonator
Standby	○(STOP)					
Package	SOP22/DIP22/SDIP22	SOP22/DIP22/SDIP22	SOP20/DIP20	SOP20/DIP20	SSOP24	SSOP24
Development support tools	RDS-BU2					
Evaluation board	EV2418B					
Features	Internal remote control carrier generator		Internal OSC capacitor for ceramic generator			

●S.RAMICS (2)

Series	BU2463/BU2464/BU2465 (BU2403/BU2404/BU2402)	BU3463/BU3464/BU3465	BU2466 (BU2428)	BU3466	☆BU3434	BU3437/BU3447 (BU2421/BU2425)
ROM	640×8	640×8	640×8	640×8	2048×8	1024×8
RAM	16×4	16×4	16×4	16×4	96×4	64×4
Power supply	3V	5V	3V	5V	5V	5V
Run time	6.0μsec(#1)	1.5μsec(#3)	6.0μsec(#1)	1.5μsec(#3)	1.5μsec(#3)	1.5μsec(#3)
Timer counter						8bit×1
Inputs	4	4	4	4	4	4
Outputs	8	8	6	6	4	1
I/O's					4	4
Analog inputs					COMP×4	AD(8bit×2)
High current output	1(8mA)	1(8mA)	1(8mA)	1(8mA)	4(10mA)	8(15mA)
Generator	Ceramic resonator	Ceramic resonator	Ceramic resonator	Ceramic resonator	Ceramic resonator/CR	Ceramic resonator/CR
Standby	○(STOP)					
Package	SOP18/DIP18/SDIP18	SOP18/DIP18/SDIP18	SOP16	SOP16	SOP24	SDIP32/QFP32
Development support tools	RDS-BU2					
MTP microcomputer					☆BU23534	
Evaluation board	EV2403C				☆EV3434	EV2421B
Features	Internal remote control carrier generator Internal OSC capacitor for ceramic generator				Internal capacitor for ceramic OSC	Internal LED controller/driver (8seg×3com) Buzzer driver out put

●S.RAMICS (3)

Series	BU2405/BU2406/BU2407	BU3405/BU3406/BU3407	BU2408/BU2409	BU3408/BU3409	BU3411/BU3417
ROM	512×8	512×8	512×8	512×8	1024×8
RAM	16×4	16×4	16×4	16×4	64×4
Power supply	3V	5V	3V	5V	5V
Run time	6.0μSec(#1)	1.5μSec(#3)	6.0μSec(#1)	1.5μSec(#3)	1.5μSec(#3)
Inputs			4	4	6
Outputs	2	2	7	7	17
Inputs/outputs	8	8	1	1	
Generator	Ceramic resonator/CR	Ceramic resonator/CR	Ceramic resonator/CR	Ceramic resonator/CR	Ceramic resonator/CR
Standby	○(STOP)				
Package	DIP16/SOP18/ZIP18	DIP16/SOP18/ZIP18	SOP18/DIP18	SOP18/DIP18	SDIP30/QFP32
Development support tool	RDSBU2				
Evaluation board	EV2405B		EV2408B		EV2400B

Notes : 1.☆: Under development
2.Run time:when clock is,#1=1MHZ,#2=2MHZ,#3=4MHZ
3.For development support tools(RD2-BU2 evaluation chip and board, etc.), call.
4.For optionals(pull up,pull down, etc.),call.

COMS Gate array/BU12100 Series

●BU12100 Series

Parameter		BU12101	BU12102	BU12103	BU12104	BU12105	BU12106	BU12107	BU12108	BU12109	BU12110	BU12111
Integrated counts	Row gates(2 input NAND)	1224	2496	3240	4352	5616	9200	14616	21280	31280	39140	66960
	Usable gates(55%)	673	1372	1782	2393	3088	5060	8038	11704	17204	21527	36828
	No. of inputs/output	32	44	48	56	72	88	108	128	152	168	216
Function	Supply voltage range	5.0±10%										
	Delay time	0.9nsec(5.0V,FO=2,AL=2mm)										
	Input/output level	CMOS、TTL										
	Toggle frequency	250MHz										
Features		High current output 48mA(Triple buffer) Internal RAM. possible Low power library										

●Package

	VDD,GND pin		BU12101	BU12102	BU12103	BU12104	BU12105	BU12106	BU12107	BU12108	BU12109	BU12110	BU12111
	GND	VDD											
SDIP30	15	30	●	●	●	●	●	●					
SDIP32	16	32	●	●	●	●	●	●					
DIP40				●	●	●	●						
SOP20	10	20	●										
SSOP-A20	10	20	●	●	●								
SSOP-A24	12	24	●	●	●								
QFP32	12	28	●	●	●	●	●						
QFP44	17	39		●	●	●	●	●	●	●			
VQFP48	18	42			●	●	●	●					
SQFP56	22	49				●	●	●	●	●			
QFP64	24	56					●	●	●	●			
VQFP64	24	56						●	●	●	●	●	
QFP80	3,22,33,49,62	2,23,42,63						●	●	●			
SQFP80	1,20,30,41,60	21,40,61,80						●	●	●	●	●	●
VQFP80	1,20,30,41,60	21,40,61,80						●	●	●			
SQFP100	1,28,40,53,80	2,29,52,79							●	●	●	●	●
VQFP100	Under development	Under development							○	○	○	○	
QFP120	15,31,60,75, 91,120	1,30,61,90								●	●	●	●
SQFP144	19,37,55,72,91, 109,127,144	1,36,73,108									●	●	●
SQFP160	21,41,42,79,80,101 121,122,159,160	1,20,40,81, 100,120										●	●

●Mass-production is possible : ○Under Development : △Under planning

Parenthesized number is the max. number of signal pins. Non-connection pins are identified on request.

Notes : About GND and V_{DD}

1.For multi pin type packages GND and V_{DD} pins may be added to improve operation by reducing effects of noise.(GND and V_{DD} pins are selectable)

2.If simultaneous changes occur on the bus line frequently, we can present the best pin assignment after consultation.

CMOS Gate array/BU12000 Series

●BU 12000 Series

Parameter		BU12000 Series						
		BU12001	BU12002	BU12003	BU12004	BU12005	BU12006	BU12007
Integrated counts	No. of gates (2 inputs NAND gate conversion)	2300	3960	6068	8256	14616	21560	31620
	No. of inputs/outputs	38	50	62	82	111	135	163
Function	Supply voltage	5V±10%						
	Delay time (Internal gate)	1.3ns (5V、Fo=3、AL=2mm)						
	Input／output level	CMOS and TTL						
	Toggle frequency	250MHz						

●BU 12010 Series

Parameter		BU12010 Series						
		BU12011	BU12012	BU12013	BU12014	BU12015	BU12016	BU12017
Integrated counts	No. of gates (2 inputs NAND gate conversion)	2300	3960	6068	8256	14616	21560	31620
	No. of inputs/outputs	38	50	62	82	111	135	163
Function	Supply voltage	2.0V～5.5V						
	Delay time (Internal gate)	2.17ns (3.0V、Fo=2、Al=2mm)						
	Input／output level	CMOS						
	Toggle frequency	125MHz						

Package

Package, No.of pins			V_{DD},GND pin		BU12001/BU12011	BU12002/BU12012	BU12003/BU12013	BU12004/BU12014	BU12005/BU12015	BU12006/BU12016	BU12007/BU12017
			GND	V_{DD}							
	DIP	28	14	28	●	●	○	●			
			4,11,14,18,25	3,12,17,26,28					●	○	
	SDIP	30	15	30	●	●	○				
		32	16	32	●	●	○				
		42	21	42	●(38)	●	●	●			
			6,16,21,27,37	5,17,26,38,42					○	△	
	QFP	32	12	28	●	●					
		44	17	39	●(38)	●	●	●			
			1,11,17,23,33	12,22,34,39,44					●	△	△
		64	2,18,25,34,50	1,19,33,51,58			△ (Unscheduled)	△	●	△	△
		80	12	52			●(58)	●(74)			
			3,22,33,43,62	2,23,42,63					●	○	●
		120	15,31,60,75,91,120	1,30,61,90					●(108)	●	△
	SQFP	56	22	49		●(50)	●	●			
			1,14,22,29,42	15,28,43,49,56					●	△	
		80	11,33	50,72			●(60)	●(76)			
			1,20,30,41,60	80,21,40,61					●	●	●
		100	1,28,40,53,80	2,29,52,79					●(89)	●(89)	●
			15,40,66,90	3,28,53,78						●(BU12006)	
			3,15,53,66	41,91						●(BU12006)	
		144	19,37,55,72,91,109,127,144	1,36,73,108					△ (Unscheduled)	●	○
			2,6,20,37,42,47,52, 56,60,65,70,74,84, 92,99,109,113,118,123, 128,133,138	1,7,26,38,46 59,73,77,91, 106,110,124,134						●(BU12006)	
		160	21,41,42,79,80,101, 121,122,159,160	1,20,40,81,100,120							○
	SSOP-A	24	12	24	●						
	VOFP	48	18	42	●(38)	●	●				
		64									
		100									

●Mass-production is possible : ○Under Development : △Under planning

Parenthesized number is the max. number of signal pins. Non-connection pins are identified on request.

Notes : About GND and V_{DD}

1.For multi pin type packages GND and V_{DD} pins may be added to improve operation by reducing effects of noise.(GND and V_{DD} pins are selectable)

2.If simultaneous changes occur on the bus line frequently, we can present the best pin assignment after consultation.

Cell library

I/O buffer cell		Primitive cell		Macro cell	
Function	Number	Function	Number	Function	Number
Input buffer	10	Logic gate		Decoder	9
Output buffer	9	NAND	8	Encoder	1
Bi-directional buffer	5	NOR	8	Register	6
Oscillation cell	2	EX-OR	2	Shift register	9
Direct input	1	EX-NOR	2	Register file	1
		Complex gate	4	Counter	16
		Inverter	2	ADDER	3
		Buffer	4	Flip-flop	10
				Latch	3
				Comparator	2
				MPX	1
				Data selector/Multiplexer	11
				Parity generator	1
				Function generator	1
				Carrier generator	1

CMOS Gate array/BU1200 Series

●BU1200 Series

Parameter		BU1200 Series					
		BU1205	**BU1206**	**BU1201**	**BU1202**	**BU1203**	**BU1204**
Integration number	No. of gates (2 inputs gate conversion)	156	288	460	793	1548	3025
	No. of bondings	24	32	40	52	72	100
	No. of I/O cells	22	30	38	50	70	98
Function	Supply voltage	Single 5V					
	Delay time (Internal gate)	3ns Typ. (Fo=3 Al=3mm)					
	Input-output level	CMOS / TTL					
	Toggle frequency	50MHz					

●BU1210 Series

Parameter		BU1210 Series					
		BU1215	**BU1216**	**BU1211**	**BU1212**	**BU1213**	**BU1214**
Integration number	No. of gates (2 inputs gate conversion)	156	288	460	793	1548	3025
	No. of bondings	24	32	40	52	72	100
	No. of I/O cells	22	30	38	50	70	98
Function	Supply voltage	Single 3V					
	Delay time (Internal gate)	6ns Typ. (Fo=3 Al=3mm)					
	Input-output level	CMOS					
	Toggle frequency	25MHz					

Package

			GND pin		**BU1205/BU1215**	**BU1206/BU1216**	**BU1201/BU1211**	**BU1202/BU1212**	**BU1203/BU1213**	**BU1204/BU1214**
			GND	V_{DD}						
Package, No. of pins	SIP	10	9	2	●					
	DIP	16	8	16	●					
		18	9	18	●	●				
		20	10	20	●					
		28	14	28		●	●	●	●	
	SDIP	18	9	18	●	●				
		22	11	22	●	●				
		24	12	24	●	●				
		30	15	30		●(24)	●	●		
		32	16	32		●	●	●		
		42	21	42		●(30)	●(38)	●	●	
	QFP	32	12	28	●(22)	●	●			
		44	17	39			●(38)	●	●	
		64	25	53				●(50)	●(59)	●(59)
		80	12	52					●(70)	△
	SQFP	56	22	49				△	△	
		80	33	72					△	
		100	Undecided	Undecided						△
	SOP	18	9	18	●					
		20	10	20	●					
		28	14	28	●(22)	●(22)	●(22)	●		
	SSOP-A	20	10	20	●	●				
		24	12	24	●	●				
	SZIP	24	19	5	△(20)					

●△:Development starts after receiving the order.
Parenthesized number is the maximum number of signal pins.Non-connection pins are identified on request.

Notes : About GND and V_{DD}

1. For multi pin type packages GND and V_{DD} pins may be added to improve operation by reducing effects of noise.(GND and V_{DD} pins are sélectable)
2. If simultaneous changes occur on the bus line frequently, we can present the best pin assignment after consultation.

Cell library

I/O buffer cell		Primitive cell		Macro cell	
Function	Number	Function	Number	Function	Number
Input buffer	9	Logic gate		Decoder	6
Output buffer	4	NAND	8	Encoder	2
Bi-directional buffer	2	NOR	8	Shift resistor	2
Oscillation cell	1	EX-OR	2	ADDER	2
Monostable multivibrator	1	EX-NOR	2	Counter	7
		Complex gate	4	Comparator	1
		Inverter	2	Flip-flop	4
		Buffer	5	Data selector/Multiplexer	6

CMOS Standard cell/ S2PCS Series

●S2PCS Series

Parameter	Contents
Technology	Silicon gate CMOS
I/O level	TTL. CMOS. Schmitt
Delay time (Internal gate)	2ns Typ
Input mode	TTL CMOS, Pull-up/pull-down resistor (5KΩ,10KΩ, 50KΩ) , schmitt trigger
Output mode	Normal, 3 state, bi-direction, N-channel open drain,P-channel open drain, 10L-0.6mA 4mA 6mA 10mA 12mA 24mA 36mA 48mA

Package

Package	Pin pitch (mm)	Number of pins																							
		5	7	8	9	10	12	14	16	18	20	22	24	28	30	32	42	44	48	56	64	80	100	120	144	160
SIP	2.54	●	●	●	●	●																				
ZIP	1.27				●		●		●	●																
SZIP	0.887												●													
DIP	2.54			●				●	●	●	●	●		●												
SDIP	1.778									●		●	●		●	●	●									
SOP	1.27			●				●	●	●	●	●	●	●												
SSOP-A	0.8								●		●		●													
SSOP-B	0.65			△				●	●		△		△		△	△										
QFP	0.8															●		●			●	●		●		
SQFP	0.65																			●		●	●		●	△
VQFP	0.5																		●		●	●				

Note : 1.△ : Under planning

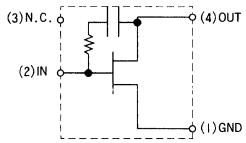
Cell library

I/O buffer cell		Primitive cell		Macro cell		Analog cell
Function	Number	Function	Number	Function	Number	Function
Input buffer	4	NAND	8	Flip-flop	5	Analog Switch
Output buffer	12	NOR	8	Latch	4	Timer
Bi-directional buffer	3	EX-OR	2			Operational amplifier
Oscillation cell	2	EX-NOR	2			Comparator
Monostable multivibrator	1	Complex gate	4			Power on clear
		Inverter	2			
		Buffer	4			

●High frequency IC (Wide-band low-noise amplifiers)

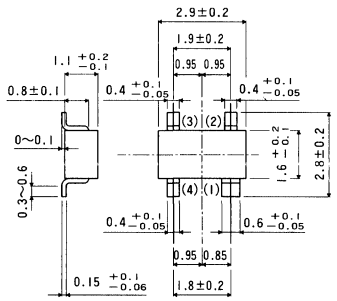
Part No.	Application	Absolute maximum ratings (Ta=25°C)				Electrical characteristics (Ta=25°C)				
		VDS(V)	VGS(V)	PT(mW)	Tch(°C)	PG Typ.(dB)	NF Typ.(dB)	f(GHz)	f(GHz)	Input/Output VSWR @1GHz
BG2011SM-B	CATV,DBS IF	6	-4	200	125	10	2.1	1.0	0.2~1.5	less than 2.0

●Circuit



●Dimensions

(Unit : mm)

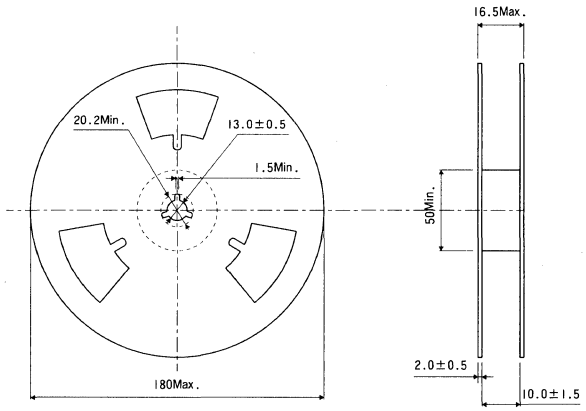


Packing condition

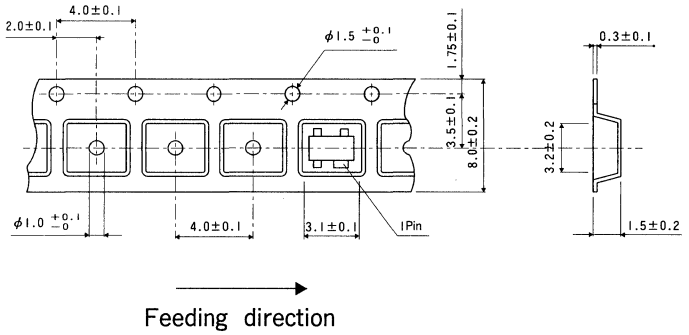
Packing type	Ordering code	Quantity (pcs)
Embossed taping	BG2011SM-B TR	3000

Packing

Reel



Tape



Feeding direction

Operational amplifier / comparator

●Operational amplifier

Part No.	Supply voltage range (V)	Classification	No. of circuits 1	2	4	Common-mode input voltage range (V)	Offset voltage (mV)	Offset current (nA)	Slew rate (V/μS)	Feature	Package
BA10324A/AF/AFV	3~30	LOW POWER			○	0~Vcc−1.5	2	5	0.2	Ground sense operation	DIP14/SOP14/SSOP-B14
BA10358/F/N	3~30			○		0~Vcc−1.5	2	5	0.2	Ground sense operation	DIP8/SOP8/SIP8
BA14741/F	±2~±18	LOW NOISE			○	VEE+1.5~Vcc−1.5	1	10	1	Phase compensation circuit	DIP14/SOP14
BA4558/F/N	±4~±18			○		VEE+1~Vcc−1	0.5	5	1.0	High stability	DIP8/SOP8/SIP8
BA728/F/N	±1.7~±9			○		VEE+1.5~Vcc−1.5	2	1	0.7	Low voltage operation	DIP8/SOP8/SIP8
BA15218/F/N	±2~±16	HIGH SLEW RATE		○		VEE+1~Vcc−1	0.5	5	2	High slew rate	DIP8/SOP8/SIP8
BA15532/F/N	±3~±20			○		VEE+2~Vcc−2	0.5	10	8	High slew rate	DIP8/SOP8/SIP8
BA4510F	±1~±3.5			○		VEE+1~Vcc−1	0.5	5	5	Low voltage operation	SOP8
BA4560/F/N	±4~±18			○		VEE+1~Vcc−1	0.5	5	4	High stability	DIP8/SOP8/SIP8

Note : 1.Offset voltage and current are typical value.

●Voltage control operational amplifier

Part No.	Supply voltage range (V)	Classification	No. of circuits 1	2	4	Feature	Package
BA6110/FS	±2~±15	Current control type	○			Gain can be controlled by control current. Built-in bias diode for decreasing distortion.	SIP9/SSOP-A16

●Operational amplifier with output select switch

Part No.	Supply voltage range (V)	Function	Number of circuits 1	2	3	Select switch	Synchronous input voltage range (V) VEE=−15V,Vcc=15V	Offset voltage (mV)	Offset current (nA)	Slew rate (V/μS)	Package
BA3128F/N	5~32	With output select switch	○			2 contacts	VEE+1~Vcc−1	0.5	5.0	3.0	SOP8/SIP8
BA3129/F	5~32			○		2 contacts	VEE+1~Vcc−1	0.5	5.0	2.4	DIP14/SOP14
New BA3131FS	6~18				○	2 contacts	0~Vcc−1	0.5	5.0	2.0	SSOP-A20

●Comparator

Part No.	Supply voltage range (V)	Number of circuits 1	2	4	Common-mode input voltage range (V) Vcc=5V	Offset voltage (mV)	Offset current (nA)	Low current consumption	Output circuit type	Package
BA10393/F/N	±1~±18		○		0~Vcc−1.5	1	5	○	Open collector	DIP8/SOP8/SIP8
BA10339/F/FV	±1.5~±18			○	0~Vcc−1.5	2	5	○	Open collector	DIP14/SOP14/SSOP-B14

●Comparator array

Part No.	Supply voltage range (V)	Output current (mA)	Number of circuits	Comparator level(V) Condiction(Vcc=3V RL=560Ω) COMP 1	COMP 2	COMP 3	COMP 4	COMP 5	Feature	Package
BA3818F	1.6~3.6	5	5	1.52	1.74	1.97	2.20	2.42	It is possible to use it as a level meter L of a dot display. 2-wire system of remote control is available.	SOP8
BA3819F	2.0~5.0	5	5	1.52	1.74	1.97	2.20	2.42	2-wire system of remote control is available. Auto power-off function enables stand-by with no input.	SOP8

Voltage regulator

●3 terminal regulator

Part No.	Supply voltage range (V)	Output voltage (V) Rated voltage	5	6	7	8	9	10	12	15	18	20	24	Output current (mA)	Feature	Package
BA704	3.3~10	2.65												10	Wide input voltage range. Good line regulation.	TO-92
BA707	4.3~10	3.3												10		TO-92
BA714	4~7	3.3												0.3	Suitable for LCD driver.	FTR
BA178M○○ Series	−		○	○	○	○	○	○	○	○	○	○	○	500	Built-in short circuit current protection and thermal shut down circuit.	TO-220FP
BA178○○ Series	−		○	○	○	○	○	○	○	○	○	○	○	1000		TO-220FP

●Switching regulator

Part No.	Supply voltage (V)	Function	Feature	Package
BA6122A/AF	8~16	2ch switching regulator	It is available to output 5V power supply only, with 9V stop function.	ZIP16/SOP16
BA6149LS	8~18	6ch switching regulator	Frequncy of triangle wave generation circuits is accurate because of using ceramic resonator.	SZIP24
BA6161N/F	4.5~16	DC-DC converter for electronic tuning	Built-in temperature compensation circuit.good output voltage stability	SIP5/SOP8
BA9700A/AF	3.55~24	1ch switching regulator controller	Permits desired output voltage such as Step-up,Step-down,Inverting,etc.	DIP14/SOP14
BA9701/F	2.5~7.5	1ch switching regulator controller for slave	Composed of error amplifier, PWM comparator and output driver.	DIP8/SOP8
BA9702FS	3.6~23	3ch switching regulator controller	Buit-in independent short circuit protections for each channel. Power saving pin.	SSOP-A24
BA9703K	3.6~18	3ch switching regulator controller	Output block is push-pull type (psuedo-totem pole type) , so value of On and off currents can be set independently.	QFP32
New BA9705AK	3.6~18	3ch switching regulator controller	Compatible with BA9703K. Built-in reference voltage which is highly accurate as ±1%.	QFP32
New BA9706K	3.6~18	3ch switching regulator controller	Same as BA9705AK but enhanced current capacity at output off.	QFP32
☆BA9707KV	3.5~12	4ch switching regulator controller	High switching frequency (1MHz). Synchronizable with 3.58 MHz.	VQFP48

RC timer

Part No.	Supply voltage range (V)	Feature		Package
BA222	4.5~16	Timing range from microseconds to hours Maximum load current of 200mA.		SIP7
BA223	4.5~16			SIP8
BA225/F	4~16	Timing range from several milliseconds to minutes. Low current consumption. (Icc 0.75mA.pertimer) Two fundions can be configured as a delay timer.	Rising edge trigger type	DIP8/SOP8
BA235	4~16			SIP9
BA226/F	4~16		Falling edge trigger type	DIP8/SOP8
BA236	4~16			SIP9
BU2302/F	1.8~6	SET pin: Reset when low; timer on when high		DIP8/SOP8
BU2305/F	1.8~6	SET pin: Triggers timer when low, Built-in chattering prevention circuit.		DIP8/SOP8

D/A converter

Part No.	Supply voltage range(V)		Resolution (Bit)	Settling time (nS)	Reference voltage	Feature	Package
	Vcc	VEE					
BA9201	5	−7	8	500	Built-in	Input data latch. Multiplication type.	DIP18
BA9211/F	5	−12	10	250	Built-in	Multipling operation is possible.	DIP20/SOP22
BA9221/F	5	−15	12	250		Multipling operation is possible.Differential current output.	DIP20/SOP22

Transistor array driver

Part No.	Number of CHS	Output Max.voltage (V)	Output current (mA)	Input imp. (kΩ)	Input/output type	Input active level	Output current type	Circuit construction	Feature	Package
BA612	5	24	450	25	Invert	H	Sink	Darlington		DIP14
BA614	6	24	100	25	Invert	H	Sink	Darlington		DIP14
BA6256		11	450	25	Invert	H	Sink	Single	With strobe terminal.	DIP16
BA664		27	100	25	Invert	H	Sink	Darlington	Built-in clamp diode.	DIP14
BA13001F		10	320	20	Invert	H	Sink	Single	Built-in diode to absorb surge.	SOP16
BA13002F		10	320	1.6	Invert	H	Sink	Single	With strobe terminal.	SOP16
BA12001	7	50	500	-	Invert	H	Sink	Darlington	Built-in diode to absorb surge.	DIP16
BA12002		50	500	10.5(7VTzDi)	Invert	H	Sink	Darlington		DIP16
BA12003		50	500	2.7	Invert	H	Sink	Darlington		DIP16
BA12004		50	500	10.5	Invert	H	Sink	Darlington		DIP16
BA618		16	100	12	Buffer	H	Source	Darlington		DIP16
BA6139L		35	15	-	Invert	L	Source	Darlington		ZIP16
BA6250/F		30	30	28	Invert	H	Sink	Darlington		DIP16/SOP16
BA6251/F		30	30	28	Invert	H	Sink	Single		DIP16/SOP16
BA6257		24	100	25	Invert	H	Sink	Darlington	Built-in clamp diode.	DIP16
BA6212	8	7	400	6.6	Buffer	L	Sink	Single	With strobe terminal.	DIP20

Driver

●LCD driver

Part No.	Supply voltage range (V)	LCD drive voltage (V)	Type	No. of outputs	Duty ratio	Data transfer	Data transfer rate (MHz)	Bi-directional Shift register	Package
BU9706KS	3.5~6.5	3~6	STN segment	40	−	Serial	3.3	−	SQFP56
☆**BU9732KS**	3.5~6.5	32	STN common	80	1/240	Serial	1.0	○	SQFP100
☆**BU9742KS**	3.5~6.5	32	STN segment	80	1/240	4bit parallel	8.0	−	SQFP100
☆**BU9745ST**	2.7~6.5	30	STN segment	80	1/240	4bit parallel	8.0	○	TAB

Notes : 1.☆: Under development

Standard ICs

Driver

●Serial in/parallel out driver

Part No.	Power supply (V)	Output current (mA)	Output	Output bits	Strobe pin	Feature	Package
BU2040/F	5	20	open drain	12		Output is high Z at power-on.	DIP16/SOP16
BU2042/F	5	20		12		Output is high Z at power-on. Output inhibit terminal is provided. Shift register and storage register can be clocked independent of the other.	DIP18/SOP18
New **BU2090/F**	3~5	20		12		High voltage (25V) output version of BU2040/F Output is high Z at power-on.	DIP16/SOP16
New **BU2092/F**	3~5	20		12		High voltage (25V) output version of BU2040/F Output is high Z at power-on. Output inhibit terminal is provided. Shift register and storage register can be clocked independent of the other.	DIP18/SOP18
BU2114/F	8	36		8		Provided with transparent latch and enable terminals	DIP18/SOP16
BA823/F	8	200	open collector	8	○	Can be connected in series.	DIP16/SOP16
BA829	8	300		8	○	Standby function. Can be connected in series.	DIP18

●Logic with driver

Part No.	Power supply (V)	Function	Feature	Package
BA6266/F	5	6ch inverter	Output withstand voltage 30V. Output current 40mA.	DIP14/SOP14
BA6267/F	5	6ch buffer	Output withstand voltage 18V. Output current 40mA.	DIP14/SOP14
BA6268	5	4ch 2-input NAND buffer	Output withstand voltage 7V. Output current 40mA.	DIP14
BA634/F	−12	T-F/F with reset	Low current(1mA). Reset pin	SIP5/SOP8

CMOS logic

●BU4S Series

Part No.	Supply voltage range(V)	Classification	Function	Feature	Package
BU4S01	3~16	Standard CMOS logic	Single NOR gate	Compatible with TC4SO1F	SMP5
BU4S11			Single NAND gate	Compatible with TC4S11F	SMP5
BU4SU69			Single unbuffer inverter	Compatible with TC4SU69F	SMP5
BU4S71			Single OR gate	Compatible with TC4S71F	SMP5
BU4S81			Single AND gate	Compatible with TC4S81F	SMP5
BU4S584			Single schmitt trigger	Compatible with TC4S584F	SMP5
BU4S66			Single analog switch	Compatible with TC4S66F	SMP5

●BU4000B Series

Part No.	Supply voltage range(V)	Classification	Function	Feature	Package
BU4016B	3~16	Analog switch	Quad analog switch	Low power dissipation Wide operating voltage range:3 to 16V High input impedance Fan-out Direct drive of 2 L-TTL inputs and 1 LS-TTL input	DIP14
BU4066BC/BCF/BL/BFV			Quad analog switch		DIP14/SOP14/ZIP16/SSOP-B14
BU4051BC/BCF/BFV			8ch analog multiplexer		DIP16/SOP16/SSOP-B16
BU4052BC/BCF/BFV			Dual 4ch analog multiplexer		DIP16/SOP16/SSOP-B16
BU4053BC/BCF/BFV			Triple 2ch analog multiplexer		DIP16/SOP16/SSOP-B16
BU4551B/F			Quad 2ch analog multiplexer		DIP16/SOP16
BU4001B/F		Gate	Quad 2-input NOR gate		DIP14/SOP14
BU4011B/F/L			Quad 2-input NAND gate		DIP14/SOP14/ZIP16
BU4030B/F			Quad exclusive OR gate		DIP14/SOP14
BU4070B/F			Quad exclusive OR gate		DIP14/SOP14
BU4081B/F			Quad 2-input AND gate		DIP14/SOP14
BU4093B/F			Quad 2-input NAND schmitt trigger		DIP14/SOP14
BU4069UB/F			Hex inverter		DIP14/SOP14
BU4503B/F			Hex 3-state buffer		DIP16/SOP16
BU4584B/F			Hex schmitt trigger		DIP14/SOP14
BU4013B/F		Flip-flop	Dual type D flip-flop		DIP14/SOP14
BU4015B/F		Register	Dual 4-bit static shift register		DIP16/SOP16
BU4021B/F			8-stage static shift register		DIP16/SOP16
BU4094B/F			8-stage shift/store register (3states)		DIP16/SOP16
BU4528B/F		Monostable multivibrator	Dual monostable multivibrator		DIP16/SOP16
BU4538B			Dual high accurate monostable multivibrator		DIP16
BU4028B		Decoder	BCD to decimal decoder		DIP16
BU4042B		Latch	Quad latch		DIP16

●Dual inverter for crystal/ceramic ocsillator

Part No.	Supply voltage range(V)	Classification	Function	Feature	Package
BU2007F	2~6	Inverter	Dual unbuffer inverter	Dual inverter version of standard logic 74HCU04.	SOP8

Motor driver

DC motor driver

Part No.	Supply voltage range(V) Control block	Supply voltage range(V) Output block	Power dissipation (mW)	Maximum output current (mA)	Channel	Output mode	TSD	Stand-by mode	Output voltage setting	Electronic governor	Package
BA6109	6~18		2200	800	For 1 motor	FRB			○		HSIP10
BA6208/F	4.5~15		700/ 450	500		FRSB					SIP9/SOP8
BA6209/N	6~18		2200/1000	1600		FRB			○		HSIP10/SIP10
BA6218	4.5~15		800	700		FRSB		○		○	SIP9
BA6219B/BFP-Y	8~18		2200/1450	2200		FRSB	○		○		HSIP10/HSOP25
BA6222	8~18		2000	2200		FRSB	○		○		HSIP10
BA6229	8~23		2200	1200		FRSB			○		HSIP10
BA6285FS/FP	4.5~15		800/1500	1000		FRSB	○	○	○	○	SSOP-A16/HSOP24
BA6286/N	4.5~15		2000/1050	1000		FRSB	○	○	○	○	HSIP10/SIP10
BA6287F	4.5~15		650	1000		FRSB	○	○	○		SOP8
BA6288FS	3.5~15	0~15	800	1000		FRSB	○	○	○	○	SSOP-A16
BA6289F	3.5~15		650	600		FRSB	○	○	○		SOP8
BA6417F	3.5~15	0~15	650	1000		FRSB	○	○	○	○	SOP8
BA6418N	4.5~15		800	700		FRSB	○			○	SIP9
BA6419F	4.5~16		650	700		FRSB	○			○	SOP8
BA6885FP/FS	6.5~28		1500/ 800	1000		FRSB	○	○	○	○	HSOP24/SSOP-A16
BA6886/N	6.5~28		2000/1050	1000		FRSB	○	○	○	○	HSIP10/SIP10
BA6238A/AN	8~18		2200/1000	1600	For 2 motor	FRSB	○		○		HSIP10/SIP10
BA6239A/AN	8~18		2200/1000	1200		FRSB	○		○		HSIP10/SIP10
BA6246/N	8~18		2000/1000	1000		FRSB	○		○		HSIP10/SIP10
BA6247/N/FP-Y	8~18		2000/1000/1450	1000		FRB	○		○		HSIP10/SIP10/HSOP25
☆**BA6249/N**	8~18		2000/1000	1000		FRSB	○		○		HSIP10/SIP10
BA6259N	8~18		1000	1000		FRSB	○		○		SIP10

Note : 1.☆: Under development 2.F : Forward, R : Reverse, S : Stop, B : Brake 3.Power dissipation depends on mounting PCB. Evaluation is required(especially when SOP).

Electronic governor

Part No.	Supply voltage range (V)	Power dissipation (mW)	Control system	Current ratio	Application	Package
BA6220	3.5~16	1400 (on PCB)	Current proportion	20	6V to 12V electronic governor	DIP8
BA6240				40		DIP8
BA6227/F	2.0~3.6	500 350		35	3V electronic governor	DIP8 SOP8
BA6235/F	1.8~5.0	500 350		50		DIP8 SOP8

Note : 1.Power dissipation should be evaluated under actual mounting condition (especially when SOP package).

Single phase full wave motor driver (for fan motor)

Part No.	Supply voltage range (V)	Power dissipation (mW)	Output current (mA)	Lock detector	Lock detector output	Rotating automatic restart	Rotating output pulse	Output power Tr	Output spike killer diode	Thermal shut down circuit	Package
BA6424FS	6~28	850	1000	○	○	○	○	○	○	○	SSOP-A16

Note : 1.Power dissipation should be evaluated under actual mounting condition (especially when SOP package).

2 phase half-wave motor driver (for fan motor)

Part No.	Supply voltage range (V)	Power dissipation (mW)	Output current(mA)	Current source for hall element	Hall input hystersis	Lock detector	Lock detector output	Rotating automatic restart	Rotating pulse output	Output block power Tr	Output spike killer diode	Thermal shut down circuit	Package
BA6402F	4~28	450	70	○	○	○							SOP8
BA6412	4~28	900	70	○	○	○							DIP8
BA6404/F	4~28	900/450	70	○	○	○		○					DIP8/SOP8
BA6406/F	4~28	900/550	70		○	○	○	○					DIP8/SOP8
BA6407/F	5~14.5	900/550	1200			○	○	○		○	○	○	DIP8/SOP8
BA6408FS	5~14.5	850	1200			○	○	○	○	○	○	○	SSOP-A16
BA6807	5~15	900	1200			○	○	○		○	○	○	DIP8
☆**BA6808FS**	5~15	850	1200			○	○	○	○	○	○	○	SSOP-A16
☆**BA6816FS**	5~15	850	1200			○	○	○	○	○	○	○	SSOP-A16

Note : 1.Power dissipation should be evaluated under actual mounting condition (especially when SOP package).

Motor driver

2 phase full wave motor driver (for cylinder)

Part No.	Supply voltage range (V)	Power dissipation (mW)	Maxium output current (mA)	Current drive system	Control input		TSD	Regulator for hall element	Rotating change input	Amplifier hys Amp.	Package
					Current	Voltage					
BA6411FP	9~18	1700	1200	Linear	○			○	○		HSOP28
BA6414FS/FP-Y	8~20	1000/1450	1200	Linear	○	○	○	○		2	SSOP-A24/HSOP25
BA6825FS	8~20	1200	1200	Linear	○		○	○			SSOP-A24
BA6826FS	8~20	1000	1200	Linear	○		○	○			SSOP-A20
New **BA6827FS**	8~20	1000	1200	Linear	○	○	○	○		2	SSOP-A24

Note : 1.Power dissipation should be evaluated under actual mounting condition (especially when SOP package).

3 phase full wave motor driver (for cylinder)

Part No.	Supply voltage range(V)		Power dissipation (mW)	Maximum output current (mA)	Current drive system	TSD	Current limit terminal	Switching regulator	Amp.	Hys amp.	Brake	Package
	Control block	Output block										
BA6450F	4.5~5.5		600	800	Switching	○		○	1	2	○	SOP24
BA6455FS	4.5~5.5		1000	800	Switching	○	○	○				SSOP-A24
BA6456FS	4.5~5.5		1000	1300	Switching	○	○	○	2			SSOP-A24
BA6458FP-Y	4.25~5.5		1450	1300	Pseudo linear	○	○		2	2		HSOP25
BA6459FS	4.5~5.5		1000	1300	Switching	○		○	2		○	SSOP-A24
BA6462FP	4.25~5.5		1500	1300	Pseudo linear	○	○					HSOP24
BA6463FP-Y	7.5~23		1450	1000	Pseudo linear	○	○					HSOP25

Note : 1.Power dissipation should be evaluated under actual mounting condition (especially when SOP package).

3 Phase full wave motor driver (for capstan)

Part No.	Supply voltage range(V)		Power dissipation (mW)	Maximum output current (mA)	Motor drive system	TSD	Rotation direction change	Reverse brake	Short brake	Regulator for hall element	Ripple cancel	Switching regulator	Series regulator	Package
	Control block	Output block												
BA6432S	4~6	3~23	2000	1200	Pseudo linear	○	○	○		○	○			SDIP-M24
BA6435S	4~6	3~23	2000	1500		○	○	○		○	○			SDIP-M24
BA6436P	4~6	3~23	2000	1500		○	○	○		○	○			SDIP-P24
BA6437S	4~6	3~23	2000	1500		○	○	○		○	○		○	SDIP-M24
BA6438S	4~6	3~23	2000	1700		○	○	○		○	○	○		SDIP-M24
BA6439P/S	4~6	3~23	1600/2000	1500		○	○	○			○		○	SDIP-P24/SDIP-M24
BA6440FP	4~6	3~20	1700	1500		○	○		○		○			HSOP28
BA6441FP	4~6	3~20	1700	1500		○	○		○		○			HSOP28
☆**BA6870P**	4~6	3~32	1600	1500		○	○	○			○		○	SDIP-P24

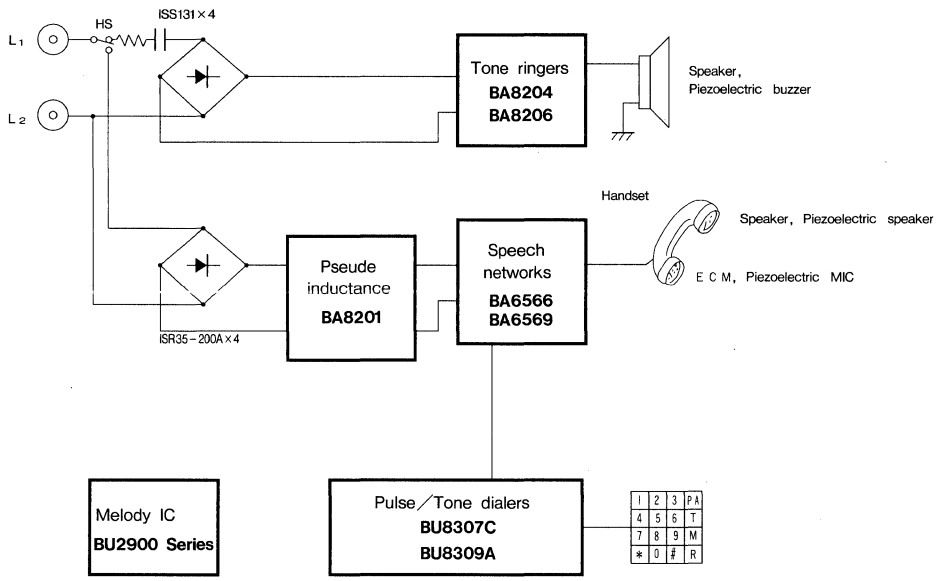
Note : 1.Power dissipation should be evaluated under actual mounting condition (especially when SOP package).
2.☆は開発中

3 phase full wave motordriver (for CD-ROM)

Part No.	Supply voltage range(V)		Power dissipation (mW)	Maximum output current (mA)	Motor drive system	TSD	Rotation direction change	Reverse brake	Feature	Package
	Control block	Output block								
New **BA6840AFS**	4.25~5.5	3~20	930	1300	Pseudo linear	○	○	○	Selection between forward/reverse by pin change and EC-ECR. Power save and current limit features.	SSOP-A20

Phones

Block Diagram of Typical Applications



●Digital cordless telephone ADPCM transcoder

Part No.	Supply voltage range (V)	Function/Feature	Package
☆**BU8710KS**	3~5.5	4 channel ADPCM transcoder designed to '88 G721 recommendation. Space saver at digital telephone base station.	SQFP80

●Speech network

Part No.	Line current (mA)	Receiver	Microphone	Pad control	DTMF amp.	Key tone amp.	Loud speaker	Muting	Hold muting	Feature	Package
BA6566/F/FP	5~100	Dynamic /Ceramic	ECM/ Dynamic	AGC	○	○		○		Wide range dynamic receiver RF radiation protection	DIP18/SOP18 /HSOP24
BA6567K	5~135	Ceramic		Pad			○	○	○	Built-in switching BN circuit	QFP44
BA6569FP/S	5~100	Dynamic /Ceramic		AGC Manual pad	○	○		○		Receiver pre amp. and power amp. are independent.	HSOP24/SDIP22
BA8215/L	2~100				○	○		○		Excellent branch characteristics. Complies with slandard of U.S.A.	DIP14/ZIP16
BA8216	2~100				○	○		○		Receiver noise further reduced from the BA8215.	DIP14

●Tone ringer

Part No.	Adjustable starting current	Adjustable starting voltage	Withstand voltage (V)	Power-supply circuit with hysteresis	Feature		Remarks	Package
BA8204/F		○	40	○	High voltage	Low power consumption	Successor products of BA6564A/F	DIP8/SOP8
BA8205/F	○		40	○			Successor products of BA6565A/F	DIP8/SOP8
BA8206/F	○		40	○		Low power consumption	Successor products of BA6565A/F	DIP8/SOP8

●Pulse tone dialer

Part No.	Supply voltage range(V)	Pulse rate (PPS)	break ratio (%)	Redial memory digits	Hooking	Feature		Package
BU8307CS/CF	2.5~5.5	10/20	67/60	32	○	Complies with standards of Japan,USA, Canada,U.K.,Korea,Taiwan,and Australia.		SDIP22/SOP24
New **BU8309AS/AK**	2.0~5.5	10/20	67/60	32	○		CPU interface Transmitable in power failures.	SDIP32/QFP32
New **BU8325S/K**	2.0~5.5	10/20	67/60	32	○	Complies with standards of Japan,USA,Canada,Korea, Taiwan,Australia.	Supports CPU common BUS. Transmitable in power failures.	SDIP32/QFP32

●Pseude inductance

Part No.	Supply voltage range (V)	Features	Package
New **BA8201/F**	2~18	DC voltage is output from telephone line. High input impedance and low input/output voltage difference for easier power supply design.	DIP8/SOP8

Phone

●DTMF receiver

Part No.	Supply voltage range (V)	Interface	Dynamic range	Power down function	Oscillator	Features	Package
BU8871/F	4.75~5.25	Serial 3-wire	45dB		Crystal	Wide dynamic range	DIP8/SOP18
New **BU8872/FS**	4.5~5.5	Serial 3-wire	45dB		Crystal/Ceramic	Wide dynamic range	DIP8/SSOP-A16
BU8874/F	4.75~5.25	Serial 3-wire	45dB	○	Crystal	Wide dynamic range	DIP8/SOP18

●Tone decoder

Part No.	Supply voltage range (V)	Function / Feature	Package
BA1604/F	4.75~9	1ch PLL tone decoder.	DIP8/SOP8

●Cross point mixer

Part No.	Supply voltage range (V)	Cross point switch	Input buffer amp	Output mixer amp	Features	Package
BA8240F/FS	4.5~5.5	8×8	○	○	Suitable for voice signel changeover mixing of cordless answering phone.	SOP24/SSOP-A24
BU8241F/FS	2.7~5.5	8×8	○	○	Suitable for voice signel changeover mixing of cordless answering phone. Power saving Low noise	SOP24/SSOP-A24
New **BU8242F**	2.7~5.5	6×6	○	○		SOP20
New **BU8244F**	2.7~5.5	4×4	○	○		SOP16

●Panel interface

Part No.	Supply voltage range (V)	key	LED driver	Key scanning	Feature	Package
New **BU8310AK**	1.8~5.5	7×7	32	○	CPU interface	QFP64
New **BU8311KS**	1.8~5.5	7×7	24	○	Transmitable in power failures	SQFP56
New **BU8313K**	1.8~5.5	6×5	14	○	Serial data transfer	QFP44
☆**BU8315F**	2.0~5.5	–	14	–	With CPU interface, serial data transfer	SOP24

Melody IC

●For telephone

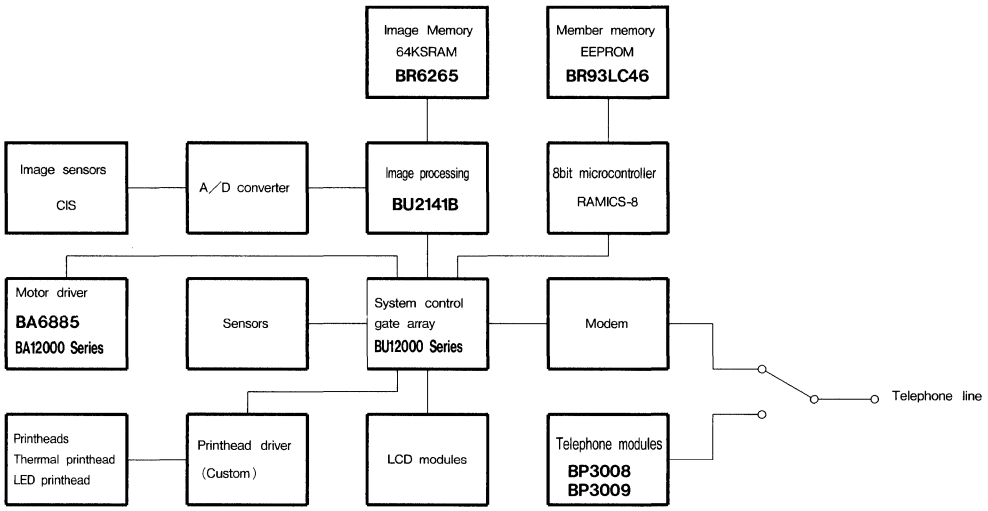
Part No.	Supply voltage range (V)	Stand-by function	On hook dial	Hook switch	Hold switch	Tone	Sound source	Music title		Package
BU2906F	2~4	○	○	○	○	Temperate	Unison	My heart is a Violin		SOP18
BU2907F	2~4	○	○	○	○	Temperate	Unison	There's no place like home	Green Sleeves	SOP18
BU2908/F	2~4	○	○	○	○	Temperate	Unison	Hey Jude	Yesterday	DIP18/SOP18

●For door chime

Part No.	Supply voltage range (V)	Function / Feature	Package
BU2911	2~4	Two melodies. Six different chime sounds.Hold play and one shot play selectable.	DIP18
BU2913F	5	Eight different chime sounds. RC oscillation and ceramic oscillation. Suitable for door chime.	SOP18

FAX

Block Diagram of Typical Applications



●Image processing ASSP

Part No.	Supply voltage range (V)	Error distribution	Dithering	Simple binary	Image Sensor interface	A/D converter	Shading correction	γ Correction	Reduction	Remarks	Package
BU2130K1	5	6bit	32 graduations	○				○	optional		QFP80
New BU2140KS	5	6bit	64 graduations	○					optional	Expandable	SQFP100
BU2141BKS	5	5bit	32 graduations	○	○		○	○	selection		SQFP100
New BU2133KS	5	5bit	32 graduations	○	○		○	○	selection	Digital ABC	SQFP100
☆BU2134K	5	5bit	32 graduations	○	○	○(6bit)	○	○	optional		QFP64
☆BU2136KS	5	6bit	64 graduations	○	○	○(8bit)	○	○	optional		SQFP100

Note : 1.6-bit error distribution is equivalent of 64 tone halftone and 5-bit, 32-tone.

Communications equipment

●FM-IF system

Part No.	Supply voltage range (V)	IF	DET	OSC	Squelch	Center meter	AFC	Feature	Package
BA4112	4~8	○	○	○	○				DIP16
BA4113	4~9	○	○	○	○	○	○	Few external components.	DIP18
BA4114	1.8~7	○	○	○	○			Low voltage operation.	DIP16

●Microphone amplifier

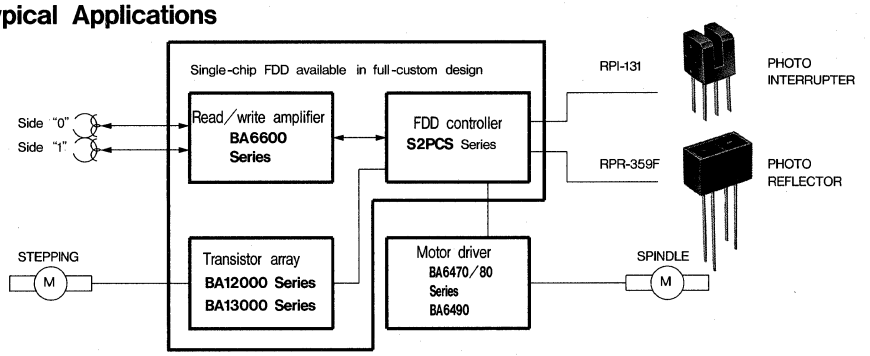
Part No.	Supply voltage range (V)	Function / Feature	Package
BA3414L	3.5~14	Microphone amplifier for FM communication equipment. Built-in transmit/receive switch. Pre-amplifier with limitter.	ZIP16

●FM intercommunication

Part No.	Supply voltage range (V)	PLL system	Squelch	Function / Feature	Package
BA1602L	6~10	○	○	Full duplex communication and press-to-talk system possible.	ZIP18

FDD

Block Diagram of Typical Applications



●Read/write amplifier

Part No.	Supply voltage range (V)	voltage to head	Power save	Filter	Writing current select	Feature		Package
BA6580DK	5	5/12			Inner/Outer track 2 stages	TDF type		QFP44
BA6587K	5	5	○		1M/2M 2 stages			QFP44
BA6589K	5	12	○		Inner/Outer track 2 stages			QFP44
BA6600K	5	5	○	Built-in	1M/1.6M/2M 3 stages Inner/Outer track 2~4 stages	Level slice type		QFP44
BA6607K	5	5	○	Built-in	1M/2M 2 stages Inner/Outer track 2~4 stages			QFP32
New BA6608K	5	5	○	Built-in	1M/1.6M/2M 3 stages Inner/Outer track 2~4 stages	TDF type	1MB、1MB(F2)、1.6MB、2MB(4Mode)	QFP32
BA6610K	5	5	○	Built-in	1M/2M 2 stages Inner/Outer track 2~4 stages	TDF type	1MB、1.6MB、2MB(3Mode)	QFP32
New BA6612K	5	5	○	Built-in	1M/2M/4M 3 stages Inner/Outer track 2~4 stages	TDF type	1MB、1.6MB、4MB(3Mode)	QFP32

●Controller

Part No.	Supply voltage range (V)	Function/ Feature	Package
BU9500K	5	Includes all functions required for an FDD controller. 3.5″, 5″ and 8″ versions.	QFP64

●Motor driver for spindle

Part No.	Supply voltage range (V)	Power dissipation Pd (mW)	Output current Io (A)	Stand-by circuit	Hole bias switch	digital servo	Index amplifier mono multivibrator	Clock frequency (KHz)	Rotation speed select pin (rpm) L	M	H	Package
BA6465FP-Y	Control block 4.25~5.5 Output block 3.0~20.0	1450	1.3	L:start	○			–	–	–	–	HSOP25
BA6473FP-Y	4.25~ 6.5	1450	1.0	L:start	○	○		460.8	300	600	360	HSOP25
BA6474FP-Y	4.25~ 6.5	1450	1.0	L:start	○	○		491.52	300	–	360	HSOP25
BA6476AFP-Y	4.2 ~ 6.5	1450	1.0	L:start	○	○		1000.8	300	–	360	HSOP25
BA6479AFP-Y	4.2 ~ 6.5	1450	1.0	L:start	○	○		491.52	300	–	360	HSOP25
BA6485FP-Y	4.2 ~ 6.5	1450	1.0	H:start	○	○		1000.8	300	–	360	HSOP25
BA6487FP-Y	9.0 ~13.2	1450	1.0	H:start	○	○		1000.8	300	–	360	HSOP25
BA6488FP-Y	9.0 ~13.2	1450	1.0	L:start	○	○		1000.8	300	–	360	HSOP25
BA6490FS	4.2 ~ 6.5	600※	1.0	L:start	○	○	○	1000.8	300	–	360	SSOP-P32
BA6491FS	4.2 ~ 6.5	600※	1.0	L:start	○	○	○	1000.8	300	–	360	SSOP-P32
BA6493K	2.6 ~ 6.5	400※	1.0	H:start	○	–	Only index amplifier	–	–	–	–	QFP32
BA6494K	2.6 ~ 6.5	400※	1.0	H:start	○	○	○	1000.8	300	–	360	QFP32
BA6495K	2.6 ~ 6.5	400※	1.0	L:start	○	○	Only index amplifier	983	330	–	360	QFP32
BA6496K	2.6 ~ 6.5	400※	1.0	L:start	○	○	○	1000.8	330	–	360	QFP32
BA6497K	2.6 ~ 6.5	400※	1.0	L:start	○	○	Only index amplifier	1000.8	300	–	360	QFP32
New BA6498FS	2.6 ~ 6.5	600※	1.0	L:start	○	○	○	1000.8	300	–	360	SSOP-A32
BA6499K	2.6 ~ 6.5	400※	1.0	L:start	○	○	○	1000.8	300	–	360	QFP32

Notes : 1.The power dissipation data of BA6495K/BA6496K are measured in single unit.

●Spindle stepper motor driver

Part No.	Supply voltage range (V)	Function／Feature	Package
BA6480K	4.5～5.5	For 2″FDD. Holeless spindle motor driver and stepper are integrated on a single chip. Stand-by mode.	QFP44

ODD

●Laser power controller

Part No.	Supply voltage range (V)	Function	Feature	Package
BH9610K	12	Laser power controller	High and low recording signal levels can be preset by the user. Includes an error detection circuit.	QFP44

●Spindle motor driver

Part No.	Supply voltage range (V)		Power dissipation (mW)	Output current (A)	digital servo	Stand-by circuit	Reverse brake	Switching accuracy of revolutions locking			Package
	Vcc	VM						L	M	H	
BA6850FP-Y	4.2～6.5	4.2～13.3	1450	1.0	○	L start	○	±0.5	±1.2	±2.5	HSOP25
BA6851FP-Y	4.2～6.5	4.2～13.3	1450	1.0	○	L start	○	±2.5	±3.75	±5.0	HSOP25

SCSI active terminator

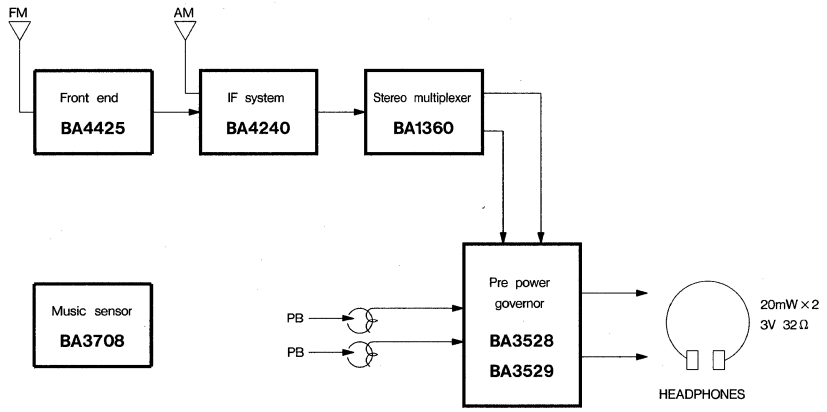
Part No.	Supply voltage range (V)	Function／Feature	Package
New **BH9590FP-Y**	4.0～5.5	18 circuits, built-in constant current supply, compatible with SCSI- Ⅰ and Ⅱ	HSOP25

Special function

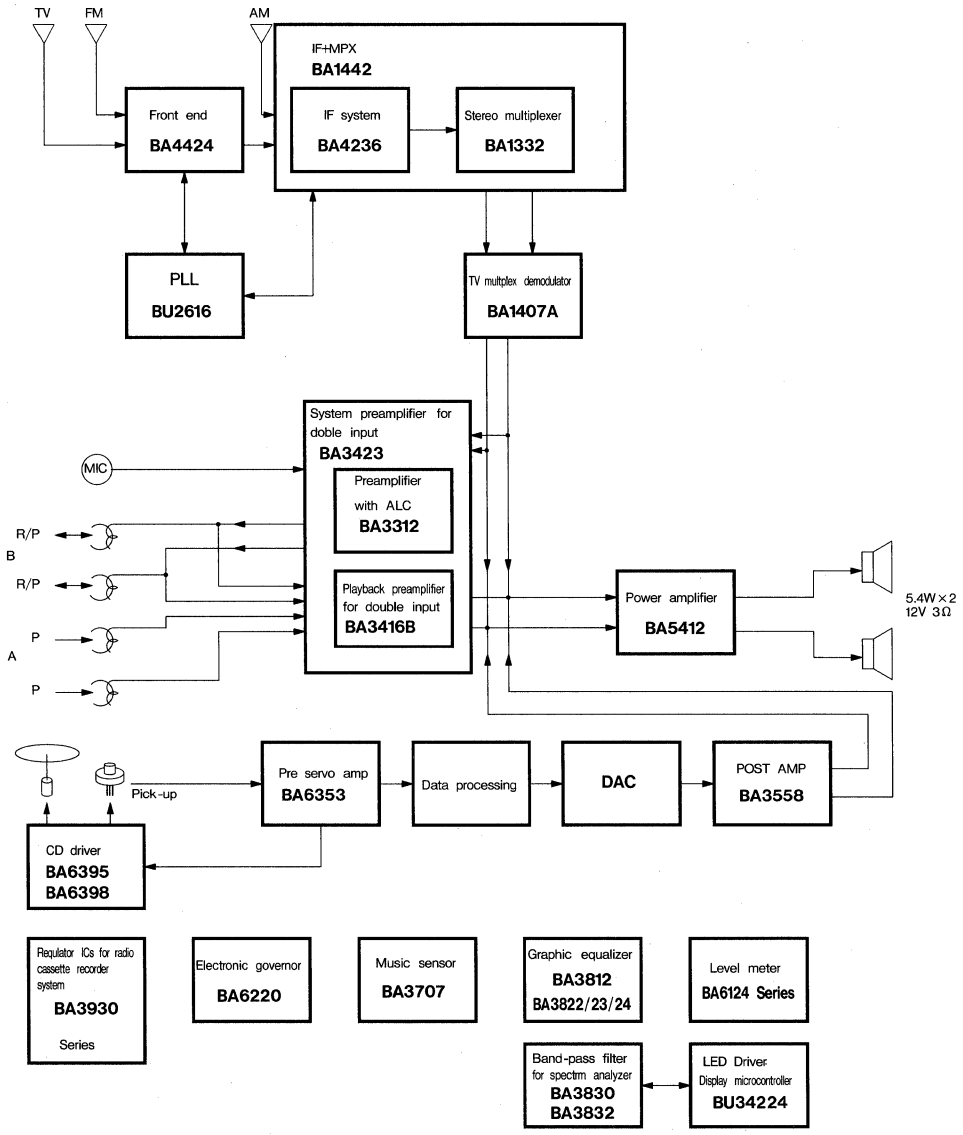
Part No.	Supply voltage range (V)	Function	Feature	Package
BA7042	5	VCO with sensitivity adjustment	Center frequency can externally be set. Sensitivity to control frequency can be set by external constant (Built-in sensitivity control amp.) .	DIP8

Block Diagram of Typical Applications

3V FM/AM stereo headphone system



Stereo double cassette recorder system with radio and CD player



High frequency signal process

●Front end

Part No.	Application		Function			Gain (dB)	Feature		Supply voltage range (V)	Package
	Headphone stereo	Radio cassette recorder / car audio	FM F/E	FM IF	FM MPX	fIN 100MHz				
BA4402	■3V	■	○			32	Built-in varicap diode for AFC. Low power consumption.		1.5~9	SIP9
BA4403	■3V	■	○			32	Low power consumption.		1.5~6	SIP7
BA4404	■3V	■	○			38	Built-in varicap diode for AFC. Low power consumption.		1.5~9	SIP9
BA4405	■3V	■	○			38	Low power consumption.		1.5~9	SIP7
BA4408F	■1.5V		○			39	Built-in varicap diode for AFC. Low operating voltage. Built-in IF amplifier.		0.9~2	SOP14
BA4412		■	○			28	Double balance mixing system. Built-in varicap diode for AFC Built-in IF amplifier.		2~8	SIP9
BA4413		■	○			32			2~8	SIP9
BA4424N	■3V	■	○			36	TV receiving is available (1~12)	Built-in varicap diode for AFC. Excellent 2 signal characteristics	1.7~6	SIP9
BA4425F	■3V	■	○			36		Excellent 2 signal characteristics	1.7~6	SOP8

●IF system

Part No.	Application		Function				Feature		Supply voltage range (V)	Package
	Headphone stereo	Radio cassette recorder / car audio	FM F/E	FM IF	FM MPX	AM				
BA402				○			Gain is high. Gv=60dB (10.7MHz)		12	SIP7
BA403				○			FM peak detector system. Few external components.		8~15	SIP7
BA4110		■		○			Sound soft muting function.		6~12	ZIP16
BA4230AF/AFS	■1.5V			○		○	FM mute, Tuning indicator, Low operating voltage.		1~2	SOP18/SSOP-A20
BA4236L		■		○		○	Quardrature detector system. AM audio control pin. Built-in tuning	For reverse S curve (upper heterodyne)	2.7~12	ZIP18
BA4237L		■		○		○		For normal S curve (lower heterodyne)	2.7~12	ZIP18
BA4240L/F	■3V			○		○	FM mute. AM audio control pin. Built-in tuning indicator.		1.7~4.5	ZIP18/SOP18

●Stereo multiplexer

Part No.	Application		Function			Feature			Supply voltage range (V)	Package
	Headphone stereo	Radio cassette recorder / car audio	FM F/E	FM IF	FM MPX					
BA1320		■			○	Muting pin. Separation control pin.			4.5~15	DIP16
BA1332/L/F		■			○	Forced monaural pin.	Low power consumption.		3~14	DIP16/ZIP16/SOP16
BA1335		■			○		Internal power supply muting function.		3.3~9	DIP16
BA1350		■			○		Soft muting Built-in function	Wide dynamic range. Low distortion.	6~12	ZIP16
BA1351		■			○				6~12	DIP16
BA1355/F		■			○				5~12	DIP16/SOP16
BA1356		■			○				5~12	ZIP16
BA1360/F	■3V				○		Wide dynamic range. Low distortion.		1.8~4	ZIP16/SOP16
BA1362F/FS	■1.5V				○		Low operating voltage.		1~2.5	SOP16/SSOP-A16

●IF+MPX

Part No.	Application		Function				Feature		Supply voltage range (V)	Package
	Headphone stereo	Radio cassette recorder / car audio	FM F/E	FM IF	FM MPX	AM				
BA1402	■3V			○	○		Low power consumpting.Sound muting by IF level.		1.8~4.5	DIP22
BA1440		■		○	○	○	No AM. IFT required. Adjustment-free FM quardrature detector. Few external components.	For reverse S curve (upper heterodyne)	3.5~7.0	DIP18
BA1441		■		○	○	○		For normal S curve (lower heterodyne)	3.5~7.0	DIP18
BA1442		■		○	○	○	Adjustment-free VCO Less external components	For reverse S curve (upper heterodyne)	3.8~8.0	DIP20
BA1443		■		○	○	○		For normal S curve (lower heterodyne)	3.8~8.0	DIP20

High frequency signal processor

●PLL frequency synthesizer

Part No.	Supply voltage range (V)		Maximum operating frequency(MHz)	Standard frequency (KHz)				Feature	Package
	VDD1	VDD2							
BU2611/F	4.0~6.0	3.5~6.0	130	100 9	50 5	25 1	10	Easier interfacing to microcomputer 3 ports	DIP16/SOP16
New BU2614/F/FS	2.7~6.0	4.0~6.0	130	25 5	125 3	6.25 1	3.25	Low spurious output, 75KHZ X'tal, w/Ih counts 7 ports 3 ports	DIP16/SOP16/SSOP16
New BU2615/F/FS	2.7~6.0	4.0~6.0	130	25 5	12.5 3	6.25 1	3.25	Low spurious output, 75KHZ X'tal, w/Ih counts, 7 ports	DIP16/SOP16/SSOP16
BU2616/F	4.0~6.0		130	25 6.25	12.5 5	10 1	9	Internal IF count detector 4 ports	DIP18/SOP18
BU2619/F	2.7~6.0	4.0~6.0	130	25 6.25	12.5 5	10 1	9	With IF counts 7 ports	DIP20/SOP20
☆BU2620/F	2.7~6.0	4.0~6.0	130	25 6.25	12.5 5	10 1	9	With IF counts 6 ports, 8Hz output	DIP20/SOP20

Note : 1.☆ Under development

●TV multiplex

Part No.	Supply voltage range (V)	Function	Feature	Package
BA1407AL/AF	4~11	TV multiplex demodulator IC	On-chip mode selector(STEREO, MAIN, SUB, MAIN/SUB).Built-in display driver.	ZIP18/SOP20

●FM transmitter

Part No.	Supply voltage range (V)	Function	Feature	Package
BA1404/F	1~2	IC for FM stereo transmitter	Built-in stereo modulator and RF oscillator. Constant voltage output for frequency adjustment.	DIP18/SOP18
BA1405F	4~6	FM stereo modulator	Stereo modulator can be easily fabricated.	SOP18

Low frequency amplifier

●Pre amplifier

Part No.	Application			Function								Feature	Supply voltage range (V)	Package
	Radio cassette recorder	Car audio	Headphone stereo	Circuits	Microphone amplifier	Line amplifier	ALC circuit	Input switch	AUX SW	Equalizer switch	Muting			
BA301	■	■		1								Low distortion.	6~20	SIP7
BA311	■			1								Low distortion.	20~42	SIP7
BA313	■			1			○						3~12	SIP9
BA328/F	■	■		2									6~16	SIP8/SOP8
BA3304/F			■	2									1.2~4	ZIP16/SOP16
BA3306	■			2			○						4.5~14	SIP9
BA3308/F	■			2			○					Built-in rectifier diode.	4.5~14	SIP9/SOP14
BA3310N	■			2			○						4~12	SIP10
BA3312N	■			2			○					Built-in rectifier diode.	4~12	SIP10
BA333	■			1			○						2.5~16	SIP9
BA3402		■		2				○				For auto-reverse.	6~13	ZIP16
BA3404F/FS/L			■	2				○			○	Built-in LED driver for display.	1.8~4	SOP16/SSOP-A16/ZIP16
BA3406AL/AF		■		2						○	○		6~14	ZIP16/SOP16
BA3408/F		■		2				○				For auto-reverse.Built-in LED driver.	6~14	DIP16/SOP16
BA3410AF	■			1	○	○	○						1.8~3.5	SOP16
BA3412K			■	2		○	○	○				Built-in LED driver for display.	1.8~3.3	QFP32
BA3413F/FS			■	2				○		○			0.9~2.0	SOP16/SSOP-A16
BA3416BL	■			2				○		○		For double cassette.	3.5~12	ZIP18
BA3420AL	■			2	○	○			○		○		5~16	ZIP18
BA3423S	■			2	○	○	○	○	○	○	○	For double cassette.	4.5~7	SDIP32
BA3424F/FS/S		■		2				○		○	○	For auto-reverse L/R MIX OUT.	7~18	SOP20/SSOP-A24/ /SDIP22
BA3430F/FS/S		■		2				○		○	○	Blank detection. Sensitivity switching circuit	7~18	SOP24/SSOP-A24/ /SDIP24
BA343	■			2			○						4.5~10	DIP16

●ALC

Part No.	Supply voltage range (V)	Feature	Package
New BA8221AN	12	2ch transistor array of level control with desable pin.	SIP8

●Line amplifier

Part No.	Application		Number of circuit	Gvc (dB)	Remarks	Supply voltage range (V)	Package
	Radio cassette recorder	Car audio					
BA3112	■	■	2	10	Fixed gain type. Low cross talk : 65dB. THD : 0.07%	6～16	SIP8
BA3113	■	■	2	15			
BA3114	■	■	2	20			
BA3118L	■	■	2	6～20	Gain setting without external resister.	4～16	ZIP18

●Pre power amplifier for headphone stereo

Part No.	Application	Function							Feature	Supply voltage range (V)	Package
		Pre amplifier	Power amplifer			EVR	Input switch	Equalizer switch			
			Output (RL=16Ω)	Output (RL=32Ω)	GAIN (dB)						
BA3506A/AF	3V headphone stereo	2ch	69mW×2	–	36					1.8～3.8	DIP16/SOP18
BA3513AF/AFS			40mW×2	–	26.7		○	○	Noise reduction.	1.8～3.6	SOP24/SSOP-A24
BA3514AF			40mW×2	–	36		○	○		1.8～3.6	SOP24
BA3516/F			40mW×2	–	36					1.8～3.6	DIP16/SOP18
BA3518/F			31mW×2	18mW×2	30				Output coupling cap. is not required.	1.8～4.0	DIP16/SOP16
BA3519F/FS			31mW×2	18mW×2	30		○		Output coupling cap. is not required.	1.8～4.0	SOP22/SSOP-A24
BA3520/F			30mW×2	18mW×2	36	○			Output coupling cap. is not required.	1.8～4.0	DIP18/SOP18
BA3521			30mW×2	18mW×2	65 (Pre+Power)	○			In/out coupling cap. are not required.	1.8～4.0	DIP18

●Headphone stereo pre power governor

Part No.	Application	Function							Feature	Supply voltage range (V)	Package
		Pre amplifier	Power amplifier			EVR	Input switch	Equalizer switch	Governor		
			Output(RL=16Ω)	Output(RL=32Ω)	GAIN(dB)						
BA3528FP	3V headphone stereo	2ch	34mW×2	20mW×2	36			○	○		1.8～6.0	HSOP28
BA3529FP			34mW×2	20mW×2	27			○	○	Applying noise reduction.	1.8～6.0	HSOP28

●Power amplifier

Part No.	Application		Function							Feature	Supply voltage range (V)	Package
	Radio cassette recorder	Headphone stereo	Number of circuit	Output power	Vcc (V)	RL (Ω)	TSD	Stand-by switch	Muting			
BA5152F		■1.5V	2	15mW	1.5	16		○	○	Gain 21dB.Built-in power switch circuit.	1～1.8	SOP16
BA5204/F		■3.0V	2	35mW	3	32				Gain 35dB.	1.8～6	ZIP16/SOP16
BA5214		■3.0V	2	35mW	3	32				Gain 35dB.	1.8～6	DIP16
BA5206BF		■3.0V	2	64mW	3	16			○	Gain 35dB.	1.8～4.5	SOP16
BA526	■		1	0.43W	6	8				Low noise.	2～9	SIP9
BA527	■		1	0.8W	6	4				High ripple rejection.	2.8～9	SIP9
BA534	■		1	2.3W	9	4					4.5～14	HSIP10
				2.8W		3						
BA5404	■		1	0.36W	12	32			○	Low power ON/OFF noise.	7～15	SIP9
BA5406	■		2	5W	12	3				Built-in capacitor for phase adjustment.	5～15	SIP-M12
BA5410	■		2	2.9W	9	3	○	○		Fixed gain 4.75dB	6～14	HSIP10
				5.2W	12							
BA5412	■		2	2.5W	9	4	○	○			5～18	SIP-M12
				5.4W	12	3						
BA5413	■		2	5.4W	12	3	○	○			5～15	HSIP-B12
BA546	■		1	0.33W	6	8				Low power consumption.	2～9	SIP9

CD/CD-ROM

●CD driver

Part No.	Supply voltage range (V)	Power dissipation (W)	Output	Condition	Output system	Number of circuit	TSD	Muting pin	Operation amplifier	Regulator	Feature	Package
BA6280AF	5.5~12	0.55	Io=0.5A		PWM	2	○	○			Low power consumption	SOP22
BA6290A	5~16	3.0				2	○	○			Large package power	SIP-M12
BA6292	5~16	3.0				2	○	○			Large package power	SIP-M12
BA6294	5~16	2.0				2	○	○			Large package power	HSIP10
BA6295AFP	7.5~18	1.7★	6.2Vpp	10V,8Ω	BTL	2	○	○			Few external components. Suitable for car audio.	HSOP28
BA6296FP	6~9※1	1.7★	3.8Vpp			4	○	○	○	○	Few external components.	HSOP28
BA6297AFP	6~9	1.7★	4.5Vpp			4	○	○			Applycable digital servo.	HSOP28
BA6298FP	6~9※1	1.7★	4.5Vpp			4	○	○	○	○	Few external components.	HSOP28
BA6299FP	6~9	1.7★	6.0Vpp		H bridge	4	○	○	○	○	Few external components. Suitable for car audio.	HSOP28
New BA6392FP	6~9	1.7★	4.5Vpp		BTL	4	○	○			Applycable digital servo. Few external components	HSOP28
New BA6394FP	3.1~11	1.7★	4.5Vpp	8V 8Ω	H bridge	4	○	○	○		Low operating voltage: 3.5V	HSOP28
New BA6395FP	4.8~9	1.7★	4.5Vpp		BTL	5	○	○		○	5-CH driver, Loading capability	HSOP28
New BA6396FP	6~9	1.7★	4.5Vpp		BTL	4	○	○	○	○	Independent muting	HSOP28
New BA6397FP	5~9※2	1.7★	4.5Vpp		BTL	4	○	○	○		BA6398FP w/o VCC muting	HSOP28
New BA6398FP	6~9	1.7★	4.5Vpp		BTL	4	○	○	○	○	General purpose	HSOP28
New BA6399FP	4~11	1.7★	4.5Vpp		H bridge	4	○	○		○	Few external components	HSOP28
New BA6790FP	6~9	1.7★	5.4Vpp		BTL	4	○	○	○	○	Wide dynamic range	HSOP28
New BA6890FP	1.5~9	1.7★	6Vpp		BTL	4	○	○			Low voltage, Brake mode	HSOP28

Notes : 1.※1.Driver can operate at 5.5V.
2.※2.Driver cam operate at 4.5V.
3.★:Value measured under actual operating condition.

●CD-ROM driver

Part No.	Supply voltage range (V)	Power dissipation (W)	Output	Condition	Output system	Number of circuit	TSD	Muting pin	Operation amplifier	Regulator	Feature	Package
New BA6799	6~9	3.1	4.5	8V 8Ω	BTL	4	○	○		○	Large package power	SDIP24

●Loading motor driver

Part No.	Supply voltage range (V)	Power dissipation (W)	Output	Condition	Output system	Number of circuit	TSD	Muting pin	Operation amplifier	Regulator	Feature	Package
New BA6191	−7~−16	2.2	6	8V 8Ω	BTL	2	○	○			2 CH independent FWD/REV Negative supply	HSIP-B12
BA6192	7~16	2.2	6	8V 8Ω	BTL	2	○	○			2 CH independent FWD/REV Positive supply	HSIP-B12

●Pre servo amplifier

Part No.	Supply voltage range (V)	Drive amplifier				Servo circuit		Feature	Package
		Focus	Feed	Disk	Tracking		SW		
BA6353S	±5	○	○	○	○	○	○	Built-in all amplifiers and switches for CD servo system	SDIP42

●Post amplifier

Part No.	Supply voltage range (V)	Function				Feature	Package
			Ripple filter of power supply	Muting	LPF		
BA3558K	1.8~6.0 5.5~7.5	Amplifier for CD which has built-in de-emphasis and headphone amplifier.	○	○	○	Auto ON/OFF. Stand-by supply system.	QFP32

●Peripheral IC of portable CD

Part No.	Supply voltage range (V)	Function	Feature	Package
New BA3124F	1.7~7.0	Line output muting	4 channels, 63dB muting attenuation	SOP8
New BA3890F	2.9~3.6	Pulse width control	Controls pulse width in proportion to battery voltage	SOP8
New BA3990F	2.5~4.5	Ripple filter	I_O=0~18mA RR=38dB	SOP8
New BA9709F	1.7~4.5	Power switch	Power transmission efficiency 83%	SOP8

Accessories

●Electronic volume

Part No.	Supply voltage range (V)	Function	Number of circuits	Built-in reference voltage	PRE IN/OUT	Feature	Package
BA3852FP	7.0~9.5	Electronic volume control for car audio. Volume, Balance, Fader, Tone (bass, treble,) Loudness	2	○	–	Control by DC voltage.	HSOP28
BA3853FS	7.0~9.5		2	○	○		SSOP-A24

●IC for graphic equalizer

Part No.	Supply voltage range (V)	Format	Number of band	Circuit current(mA)	Control range (dB)	THD (%)	Output noise voltage (μVrms)	Ripple rejection	Input buffer	Output buffer	Package
BA3812L/F	3.5~16	monaural	5	5.0	±12	0.01	5	–	○	○	ZIP18/SOP18
BA3822LS/FS	3.5~14	stereo	5	7.0	±11	0.1	10	–			SZIP24/SSOP-A24
BA3823LS	3.5~14	stereo	5	6.7	±10	0.01	3	50			SZIP24
BA3824LS	3.5~14	stereo	5	7.0	±8.5	0.1	10	–			SZIP24

●Preset graphic equaliger

Part No.	Supply voltage range (V)	Format	Circuit current(mA)	No. of positions	Feature	Package
New **BA3840KV**	1.7~3.6	stereo	2.2	4	Prevention sound leak from head set. Auto boost control.	VQFP48

●Bass boost system

Part No.	Supply voltage range (V)	Function		Driver Output		Power muting switch	Bias amplifier	Center amp	Feature	Package
		Boost circuit		Condition R_L=16Ω						
		Bass	Treble		Vcc					
BA3570F/FS	2.0~7.2	25dB.Max.	4dB Fixed	30mW	3.0	○	○	–	Built-in 30mW power amplifier	SOP22/SSOP-A24
New **BA3572FS**	1.8~3.6	25dB.Max.	4dB Fixed	18mW	2.4	–	○	○(OCL)	On-chip S-BBS and AVC	SSOP-A24
BA3870	3.0~7.0	20dB.Max.	4dB Fixed	–		–	–	–	Low switching noise at BBS ON/OFF	DIP20

●Band-pass filter for spectrum analyzer

Part No.	Supply voltage range (V)	Format	Number of band	Input MIX AMP	Input mix. amp	Feature	Package
BA3826S	±4.0~±6.5	Stereo	7			Built-in capacitor for time constant and filter	SDIP18
BA3830S/F	4.5~8.0	Monaural	6	○	○		SDIP18/SOP18
BA3832F	4.5~8.0	Monaural	6	○	○		SOP18

●Display microcontroller for spectrum analyzer

Part No.	Supply voltage range (V)	ROM	RAM	Function/Feature	MTP icon	Package
☆**BU34424**	4.5~5.5	4K×8	256×4	24-seg×4-com LCD driver, 24×4 LCD display RAM, SI, PIO Makes an audio spectrum analyger when used with BA3830 series.	**BU36824**	QFP64

Note : 1☆Under Development

Accessories

●Level meter

Part No.	Supply voltage range (V)	Display	Dot	Function	Scale	Feature			Package
BA6104	9～15	LED	5	Bar	Linear	Built-in rectifier amplifier and reference regulator. Low current consumption of LED.	Operating voltage range 9～15V.		SIP9
BA6125	3.5～16						Wide operating voltage range 3.5～16V.		SIP9
BA6124/F	3.5～16				VU				SIP9/SOP14
BA6137	3.5～16						For red LED driver.		SIP9
BA6144	3.5～16						Wide comparate level -13～+13 dB		SIP9
BA6154	3.5～16						High amplifier gain.		SIP9
BA684A	6.5～14		8	Bar	Linear	Built－in two half wave rectifier amps. The level of the largest one of the two inputs is displayed.			DIP16
BA682A/AF	10～14		12	Dot／Bar	VU	Built-in half wave rectifier amplifier. LED direct drive.	External setting of LED current.	Turn on and off periods of LED can be controlled by adjusttting external resistor and capacitor.	DIP18/SOP18
BA681A	10～14				Power				DIP18
BA683A	10～14								DIP18
BA689	10～14				Linear				DIP18
BA6820F	4.5～5.5		12×2	Bar／Peak hold	VU	2ch display by dynamic drive system. 2 mode display by independent AC and DC display. Peak hold function -7 ～10dB and cancel function. Muting function.		RIN=3kΩ	SOP22
BA6822S/F	4.5～5.5							RIN=300Ω	SDIP22/SOP22
BA668A	15～17	FL	12	Peak hold	VU	Built-in rectifier circuit. Peak hold function -1～8 dB. High input impedance.			DIP18
BA6146	7.5～20			Bar		Built in input rectifer amplifier meeting both AC and DC input signals.			DIP16
BA6148	7.5～20				Power	Wide operatingvoltage range 7.5 to 20 V. Buit-in power supply muting function.			DIP16
BA6810S/F	4.5～5.5		12×2	Bar／Peak hold	VU	2ch display by dynamic drive system. Peak hold function -7 ～10 dB. Muting function Square - law compression amplifier.	Level adj. pin		SDIP30/SOP28
BA6800A/AS/AF	4.5～5.8		16×2	Bar／Peak hold			Available to 2 mode display by independent AC and DC display	Duty cycle : 1/8	DIP28/SDIP30/SOP28
BA6803S	4.5～5.8								SDIP30
BA6805A	4.5～5.8							Duty cycle : 1/4	DIP28
BA6806S	4.5～5.8							Duty cycle : 1/16	SDIP30

●Ground isolation amplifier for car stereo

Part No.	Supply voltage range (V)	Number of circuits	CMRR (dB)	THD (%)	Output noise voltage (μVrms)	Feature	Package
BA3121/F/N	4～18	2	57	0.002	3.5	High CMRR. Small external capacitor.	DIP8/SOP8/SIP8

●High voltage head switch

Part No.	Supply voltage range (V)	Function／Feature	Package
BA3126F/N	4.5～15	2 high voltage head switches for play back and 2 switches for record.	SOP14/SIP9

●Auto scan meter

Part No.	Supply voltage range (V)	Display	Dot	Function		Feature	Package
				FM	AM		
BA695	4.5～14	LED	3	Tuning/detuning direction indication	Level meter		SIP9
BA685	6.5～15	LED	5			Bar display at AM receiving. High drive current 25 mA／dot.	DIP16

●Square-law compression amplifier

Part No.	Supply voltage range (V)	Circuit	Function	Feature	Package
BA6138/F	8.5～16	2ch	1/2 square-law compression amplifier with good linearity.	Built-in stabilized power supply muting.	SIP9/SOP14

Sensor amplifiers

●Tape end detector

Part No.	Supply voltage range (V)	Output current (mA)	Plunger drive	Input amplifier Built-in	Output regulator	Remarks	Package
BA337	4.2～16.0	200	Direct	○		Direct connection with magnetic／electric conversion element.	SIP9
BA3712	7.0～16.0	20	Direct	○	○		SIP9

●Blank detector

Part No.	Supply voltage range (V)	Output current (mA)	Number of tune	Blank detection time	Output pulse width	Forced stop	Protection circuit	Plunger drive	Package
BA335	4.5～14.5	600	–	Settable	Settable		○	Direct	SIP9
BA336	4.2～12.0	150	–					Pow Tr needed	SIP9
BA338/L	4.2～12.0	150	–					Pow Tr needed	SIP9/ZIP9
BA3702	4.5～14.0	120	5				○	Pow Tr needed	DIP16
BA3707	3.0～14.0	300	–			○		Direct	SIP9
BA3708F	2.0～5.0	100	–			○		Direct	SOP8
BA3714F	0.8～4.5	7	–					Direct	SOP8

Control

●Deck key control

Part No.	Supply voltage range (V)	Function	Feature	Package
BA843	5	Key control of tape deck	Control through non lock input. All functions that are necessary for control of tape deck are on-chip.	DIP16

VSC processor

Part No.	Supply voltage range (V)	Function	Feature	Package
BA1701	4.5~14.0	VSC system processer IC	Capable of compress play rate by ratio of 1/1 to 1/2.5, Built-in motor speed control PLL circuit.	DIP16

Note : 1."VSC" is a trademark of the Variable speech Control Company. This product has been specially manufactured for use in the VSC system under licence of VSC Ltd.

System power supply

●System power supply for radio cassete recorder system

Part No.	Supply voltage range (V)	Standard supply voltage (V)	Output voltage (V)						Stand-by function	Reference voltage	Mode switch	Reset output	Package
			A	B	C	D	E	F					
BA3920	6.5~22	16	15	5	–	5	8	5	○		○	○	SIP-M12
BA3922	5.0~22	15	12	5	7.5	–	7.5	–	○	○	○	○	SIP-M12
BA3924	5.0~22	12	9	5	7.5	–	7.5	–	○	○	○	○	SIP-M12
BA3926	5.0~22	15	13.5	5.6	8	–	12	–	○	○	○	○	SIP-M12
BA3928	6.5~22	16	9	5	–	5	8.5	6.5	○		○	○	SIP-M12
BA3930	6.5~22	16	14.5	5	9	5	8	5	○		○		SIP-M12
BA3932	6.5~22	16	15	5	9	5	8	5	○		○		SIP-M12
BA3933	6.5~22	16	9	5	7.5	5	7.5	5	○		○		SIP-M12
BA3935	6.5~22	16	9.5	5	9	5	7.5	5	○		○		SIP-M12
☆**BA3936**	6.5~22	12	–	5	8	5	8	5	○		○		SIP-M12
☆**BA3938**	6.5~22	15	11	5	9	14.7	8.5	–	○	○			HSIP-B12
☆**BA3962**	6.5~22	12	17	5	–	–	–	–	○	○	○	○	HSIP-10

Note : 1.When operated from lower voltage than output voltages listed above,the output is the input supply voltage minus the drop voltage across output transistors.
2.☆:Under development

●System power supply for car audio system

Part No.	Supply voltage BACK UP (V)	Standard supply voltage BACK UP (V)	Output voltage (V)						Stand-by current(mA)	Muting	Output switch pin	Chip enable output	Package
			A	B	C	D	E	F					
BA3900	10~16	13.2	5.6	9.0	8.8	8.8	–	–	2.7	○	○	○	SIP-M12
BA3902	10~16	13.2	5.0	9.0	8.5	8.5	–	–	0.7	○	○	○	SIP-M12
BA3904A	10~16	13.2	5.6	9.0	8.55	8.55	–	–	0.7	○	○	○	SIP-M12
BA3906	9.2~16	13.2	5.6	8.3	8.3	8.3	–	–	0.7	○	○	○	SIP-M12
BA3908B	10~16	15	5.6	12.5	14.5	8.2	8.2	8.4	0.65		○		SIP-M12
BA3910A	9.6~24	13.2	5.6	8.7	8.7	8.7	12.8	12.8	0.65		○		SIP-M12
BA3912	9.6~24	13.2	5.6	9.0	8.55	8.55	12.7	12.7	0.65		○		SIP-M12
New **BA3913**	9.6~24	13.2	5.6	8.3	8.3	8.3	12.7	12.7	0.65		○		SIP-M12
New **BA3914A**	9.6~24	13.2	5.7	8.5	8.5	8.5	12.7	–	0.8	○	○		SIP-M12
New **BA3916**	9.6~24	13.2	5.2	8.7	8.3	8.3	12.7	–	0.4		○	○	SIP-M12

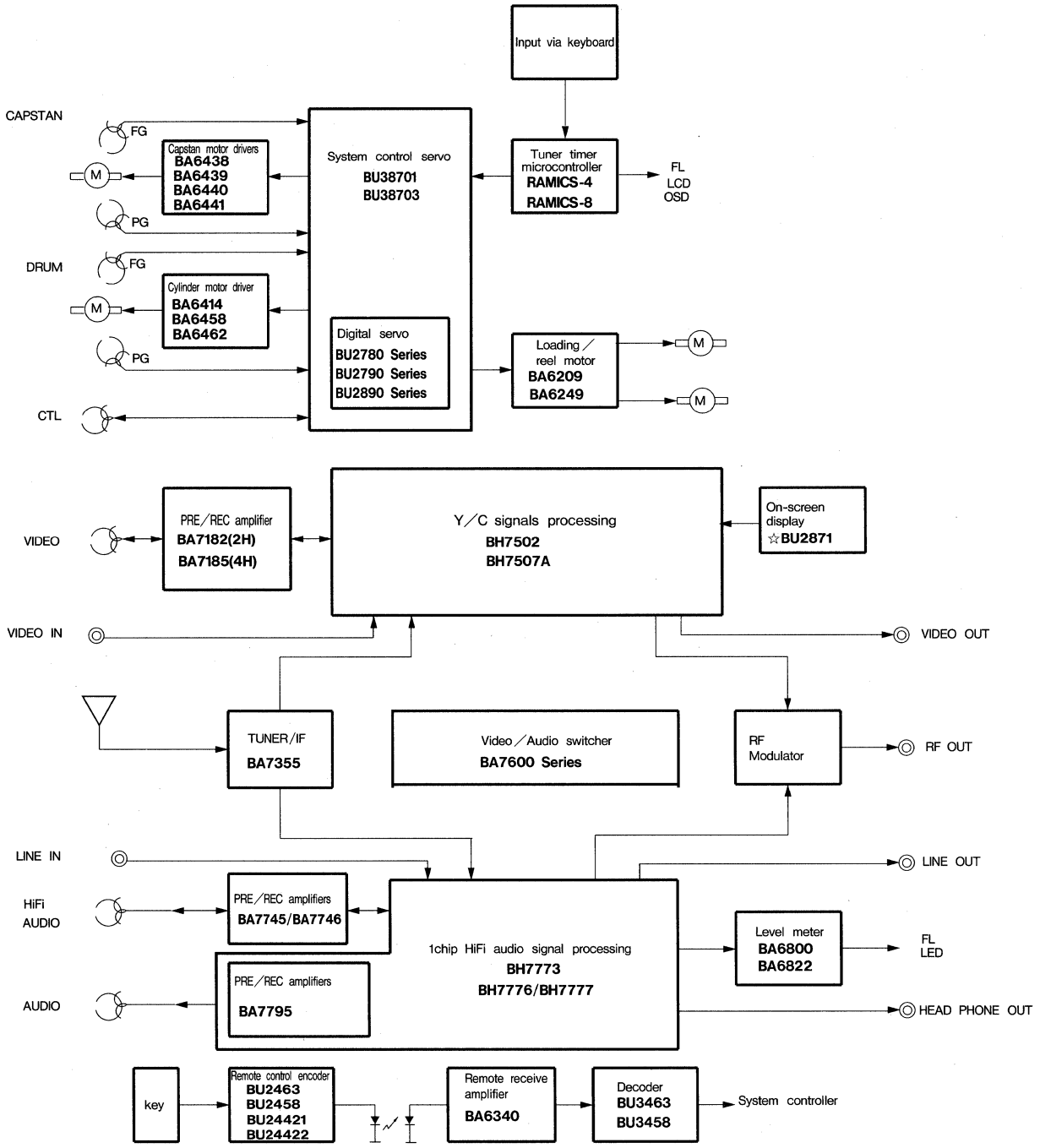
Notes : 1.When operated from lower voltage than output voltages listed above,the output is the input supply voltage minus the drop voltage across output transistors

●Variable output supply voltage

Part No.	Supply voltage range (V)	Number of circuit	Output voltage (V)	Stand-by function	Output voltage switch pin	Feature	Package
New **BA3960**	4.5~22	2	1.5~21	○	○	Output voltage can be set by external resistor. Built-in output current control circuit and temperature protect circuit. Low saturation PNP output.	HSIP-B12

VTR System

Block diagram of typical application



TV signal processor

●Single-chip TV signal processor

Part No.	Suppy voltage (V)	Format	VIF	SIF	Circuits			Feature	Package
					Video signal	Chroma signal	V/H signals		
BA7306S	8~13.5	NTSC	○	○	○	○	○	All filters included	SDIP42

RF signal processor

●IF signal processor

Part No.	Suppy voltage (V)	Format	Function	Circuit	Feature	Package
BA401/F	1.8~15	–	IFamp	single differential amp	Wide operating voltage range Voltage gain 32dB(Vcc=12V,RL=1kΩ)	SIP5/SOP8
☆**BA7355S**	8~13.5	NTSC	VIF/SIF processor	PLL full-sync Det.	On-chip IF filter and audio Det. Circuit	SDIP24

Note : 1.☆Under Development

Video signal processor

●Y/C signals processor

Part No.	Supply voltage range (V)	Format			Function	Full HQ		S-VHS	Block filter	Y/C separate input	Feature	Package
		NTSC	PAL	SECAM		Y-NR	C-NR					
BH7502K1	5	○			Integrated processing of chroma signal and luminance signal on a single chip	○	○	Quasi playback	○		Apply PAL-M format	QFP80
BH7507AK1	5	Pseudo	○	Pseudo		○	○	Quasi playback	○		Apply ME-SECAM format	QFP80
BH7513AKV	5	○				○		Quasi playback	○	○	Lower power	VQFP80
BH7518AKV	5	Pseudo	○	Pseudo		○		Quasi playback	○	○	Lower power	VQFP80

●Y signals processor

Part No.	Supply voltage range (V)	Format			HQ	Y/C separate input	S-VHS	Copy guard	Muting	Dummy-V insertion	75Ω driver	Package
		NTSC	PAL	SECAM								
BA7258AS/AK	5	○	◎	◎	○				○	○	○	SDIP32/QFP44
BA7280AS	5	◎	○	○	○			○	○	○	○	SDIP32
BA7281BS	5	◎	○	○			○	○	○	○	○	SDIP32
BA7288K	5	◎	○	○	○	○		○	○	○	○	QFP44

●C signals processor

Part No.	Supply voltage range (V)	Format			Function	Feature	Package
		NTSC	PAL	SECAM			
BA7107/F/S	5			○	SECAM chroma signal processor	PB/REC can be switched by changing supply voltage.	DIP28/SOP28/SDIP30
BU2763S/F	5	○	○	Pseudo	Chrominance signal processor for AFC	Phase synchronized HP by digital PLL.	SDIP18/SOP18
BA7267S/F	5	Pseudo	○	Pseudo	Chrominance signal processor for APC	Processes chroma signal in combination with BU2763S/F	SDIP22/SOP22

●NTSC/PAL format converter

Part No.	Supply voltage range(V)	Function	Feature	Pakage
BA7045/FS	5	4.43MHz NTSC signal Converts into regular PAL signal	Compatible with PAL-M format. B.M gain and burst gate pluse adjustment.	DIP16/SSOP-A16
BA7049S/FS	5	Chroma subcarrier conversion for multi format.	PAL chroma processor capable of processing both NTSC and PAL-M format REC/playback.	SDIP24/SSOP-A24

●PRE/REC Amplifier

Part No.	Supply voltage (V)		Number of head ch	Auto tracking interface	Playback AGC	REC amp constant current drive	Recording Y/C MIX	Feature	Package
	PRE	REC							
BA7172S/FS	5	9	2	○log	○	○	○	Quasi S playback	SDIP22/SSOP-A24
☆**BA7180FS**	5	5		○log	○	○		Built-in REC AGC	SSOP20
New **BA7182AS**	5	5		○Integrating hold	○	○		Built-in REC AGC	SDIP22
☆**BA7185S**	5	5	4	○log	○	○		Built-in REC AGC	SDIP22
BA7274S	5	12		○linear	○	○			SDIP32
BA7279S	5	9		○log	○	○			SDIP32

Note : 1.☆Under Development

Video signal processor

●PAL/SECAM discriminator

Part No.	Supply voltage (V)	System	Burst input SW	Forced SECAM	Feature	Package
BA7007/F	9	PWM integration			High discrimination performance. High noise margin.	ZIP16/SOP16
BA7025L	5	PWM integration	○	○	High discrimination performance. High noise margin.	ZIP18
BA7106LS	5	FM guardrature detection $1/2f_H$ digital detection		○	High discrimination as 20~200mVpp. Built-in delay line amplifier and M.M. for BGP.	SZIP24

●Auto tracking interface

Part No.	Supply voltage (V)	Detector output		Output waveform			Detection gain switch	Audio level down detection	Feature	Package
		Audio	Video	Peak detection	Integral	Peak hold				
BA7039	5	○	○		○	○	○		Integral output 0 ~ 5 V. Wide input range because of built-in VCA and level compressing circuit.	DIP16
BA7043FS	5	○	○	○	○	○	○	○	Integral output 0 ~ 5 V. Wide input range because of built-in VCA and level compressing circuit.	SSOP-A20
BA7047S	5	○	○	○			○	○	Detection output is 0 ~ 5V. Gain and frequency characteristics can be adjusted by external components.	SDIP22
BA7048N	5		○	○			○		Detection output is 0 ~ 5V. Gain and frequency characteristics can be adjusted by external components.	SIP10

●Skew correction

Part No.	Supply voltage range (V)	Function	Feature	Package
BA7022A	4.75~5.25	Detection and adjustment of 0.5H skew distortion.	V signal eliminate circuit. Sample/hold PLL phase comparison system. SYNC separator is durable against level fluctuation and noise. SYNC separator detector has positive and negative output.	DIP22

●SYNC and separation IC

Part No.	Supply voltage range (V)	Function	Output signal (μsec)			AFC circuit	Feature	Package
			HD pulse width	VD pulse width				
BA7046/F	5	Video signal SYNC separation circuit	5.1	230	Composite SYNC pulse.	○	Phase difference between HD and VD is guaranteed.	DIP8/SOP8
BA7062F	5	Video signal SYNC separation circuit	11.5	260		○		SOP8

●OSD

Part No.	Supply voltage range (V)	Function				Feature	Application	Format	Package
		Number of characters	Output signal	SYNC sep.	Microcontroller interface				
BU2801S	5	128	Composite	○	16 bit serial	Built-in APC, AFC. Color superimposing is available.	CATV	NTSC	SDIP32
BU2848FS	3~5	128	RGB		8 bit serial	With RESET terminal. Small package.	Camcorder	NTSC/PAL	SSOP-A20
New **BU2870FS**	3~5	256	RGB		8 bit serial	With RESET terminal. Small package.	Camcorder	NTSC/PAL	SSOP-A20
☆**BU2871FS**	5	64	Composite	○	16 bit serial	Digital AFC, Surperimpose	VTR	NTSC/PAL-M	SSOP-A20
BU2873FS	3~5	64	RGB		8 bit serial	With RESET terminal. Small package.	Camcorder	NTSC/PAL	SSOP-A20

Note : 1.☆Under Development

●Blue back

Part No.	Supply voltage range (V)	Function	Package
BU2762AL	5	Generates NTSC/PAL composite color signals and black-white test patterns. Bilt-in Y/VTR signals selector switch.	ZIP18
BU2841AFS	5	Generates NTSC/PAL composite color signals and black-white test patterns. Bilt-in composite/chroma signals and VTR/Y signals selector switch.	SSOP-A20

●Test pattern generator

Part No.	Supply voltage range (V)	Function	Feature	Package
BA7004/F	8~13	Test pattern generator.	Few external components.	SIP5/SOP8
BA7024	4.5~6.0	Integrated test pattern generation circuit and VTR/pattern switch on single chip.	Built-in video switch.	SIP7

●Titler

Part No.	Supply voltage range (V)	Format	Function	SRAM capacity	Number of titles			Outline	Inversion	Package
					NTSC	PAL	SECAM			
BU2728K	5	All format	Superimposing	256K	4	3	3	Upper-bottom-left-right	○	QFP44
				64K	1	1	1			
BU2846AKV	5	All format	Superimposing Background color is selectable. Scrolling and wiping function.	64K	1	1	1	Left-right	○	VQFP48

●RGB encoder

Part No.	Supply voltage range (V)	Function	Feature	Package
BA7230LS	5	NTSC format RGB composite encoder	RGB signal can be converted into NTSC composite signal. Video signal from outside can be superimposed on composite signal from RGB.	SZIP24
BA6591AF	5	NTSC/PAL format RGB composite encoder	RGB signal can be converted into NTSC/PAL composite signal.	SOP24

●VCA for video signal

Part No.	Supply voltage range (V)	Maxium output voltage (Vpp)	Circuit current(mA)		Feature	Power saving mode	Package
			Single Ch	Dual Ch			
BA7655A/F	4.5~5.5	2.8	5.4	7.8	Gain can be set within the range −6 dB and +6 dB. Small gain drift against temperature changes.	○	DIP8/SOP8

●75Ω Driver

Part No.	Supply voltage range (V)	Maximum output level (Vpp)	Circuit current (mA)	ch	Circuit configuration	Feature	Package
☆**BA7622/F**	4.5~5.5	3.1	24	3	2 input circuits include sink chip clamp. 1 input circuit terminated with 20 kΩ.	Two 75Ω loads can be driven by a single driver. Sync chip clamp at the input interfaces with the pre-stage.	DIP8/SOP8
☆**BA7623/F**	4.5~5.5	3.1	24	3	Direct couple of input to base.	Two 75Ω leads can be driven by a single driver. Input can be directly applied to the base : no coupling capacitor required.	DIP8/SOP8

Note : 1.☆Under Development

Camera

●EVF

Part No.	Supply voltage range (V)	Function	Feature	Package
BA7148F	5	Deflection of video camera EVF	Built-in horizontal AFC, vertical drive and inverted 6dB video amplifier. Compatible with models having flyback pulse width of 6 μsec.	SOP16
BA7149F	5	Deflection of video camera EVF	Built-in horizontal AFC, vertical drive and inverterd 6dB video amplifier. Compatible with models having flyback pulse width of 10 μsec.	SOP16

●SSG

Part No.	Supply voltage range (V)	Application	Function	Featuer	Package
BU2701F	5	PAL/SECAM system camera	SYNC signal generator	5V single power-supply.	SOP28

●Mic amp. for comcoder

Part No.	Supply voltage range (V)	EXT mic input	Zoom function	Wind detect	EXT power supply	Featuer	Package
☆**BA7780KV**	3~5	○	○	Manual	○	Line out:1Vrms Low power consumption	VQFP64
☆**BA7781K**	3~5	○	×	Automatic	×		QFP32

Note : 1.☆Under Development

VTR audio signal processor

●Single chip HiFi audio signal processing

Part No.	Supply voltage range (V)	Hi-Fi signal processing						Standard audio signal processing	Remarks	Regulator	Package
		Input switch	Output switch	Line volume	FM BPF	PNR	MODEM				
New **BH7773KS**	±8~±13	○	○	○	○	○	○	○	Parallel control	○	SQFP100
New **BH7776K**	±8~±13		○	○	○	○	○	−	Serial control	○	QFP64
New **BH7777K**	±8~±13	○	○	○	○	○	○	−	Parallel control	○	QFP64

●PRE/REC amplifier of Hi-Fi audio

Part No.	Supply voltage range (V)	Recording			Playback			Feature	Package
		REC muting	OVER REC	REC AGC	EP gain UP	VCA	Head switch		
New **BA7745FS**	5/11	○	○	○	○	○	○	Internal FE OSC	SSOP-P32
New **BA7746FS**	5	○	○	○	○	○	○		SSOP-A24

VTR audio signal processor

●PRE/REC amplifier of standard audio

Part No.	Supply voltage range (V)	Function						Feature	Package
		Input switch	MIC amplifier	Equalizer	Head switch	Ripple filter	REC power supply		
BA7751ALS/AFS	4~12.5			2 mode	Only PB	○		Types are different at the point of control logic.	SZIP24/SSOP-A24
BA7752LS/FS	4~12.5			2 mode	Only PB	○			SZIP24/SSOP-A24
BA7757BK	4~6	○		2 mode	Only PB	○		Suitable for camcoder	QFP32
BA7790LS	7.5~12.5	○		Quasi 3 mode	○	○			SZIP24
New BA7792LS	7.5~12.5			3 mode	○	○			SZIP24
New BA7795LS	7.5~12.5	○		Quasi 3 mode	○	○			SZIP24

●High voltage head switch

Part No.	Supply voltage range (V)	Function/Feature	Package
BA7755A/AF	4 ~ 13	DC maximum withstand voltage ±65V, AC maximum withstand voltage : 120Vpp. 2 control-terminal as current-control type and voltage-control type.	SIP5/SOP8

●VTR KARAOKE echo system

Part No.	Supply voltage range(V)	Function	Feature	Package
BA7760/F	6~14	MIC amplifier	Built-in low noise dual mic amplifier, muting function.	DIP14/SOP14
BA7725S/FS	8~12.8	Analog compand	Built-in echo mix circuit with anti echo EVR; line mix amplifier; mic muting function; buffer amplifier for composing LPF.	SDIP22/SSOP-A20
BU9250S/F	4.5~5.5	Digital delay	8-bit ADC/DAC, delay memory, delay time selector, Delay time:120ms(fosc=375KHz)	SDIP18/SOP18
BU9251S/F	4.5~5.5	Digital delay	8-bit ADC/DAC, delay memory, delay time selector, Delay time:150ms(fosc=455KHz)	SDIP18/SOP18

Video/Audio switch

●VTR signal switch

Part No.	Supply voltage range(V)	Circuit		Clamp	6dB amplifier	75Ω driver	Muting	Remarks	Package
BA7001	8~13	2 inputs	1 circuit					Small difference in output DC.	SIP8
BA7131F	5			○			○	Good low voltage characteristics.	SOP8
BA7605N	5		2 circuits	○				Good frequency characteristics.	SIP10
BA7603/F	5		3 circuits	○				Good frequency characteristics.	DIP16/SOP16
BA7606/F	5			○				Pedestal clamp.	DIP16/SOP16
BA7021	5	3 inputs	1 circuit	○			○	Good low voltage characteristics.	SIP9
BA7611AN	4.5~13			○	○		○	Wide dynamic range.	SIP8
BA7612N	4.5~13				○	○	○	Wide dynamic range.	SIP8
BA7613N	4.5~13			○	○	○	○	Wide dynamic range.	SIP8
BA7645N	4.5~13	4 inputs		○			○	Wide dynamic range.	SIP10
BA7649A/AF	4.5~13	5 inputs		○				Wide dynamic range.	DIP14/SOP14
BA7625	5	5 inputs (in 2 circuits)1 monitor output		○	○			For AV amplifier.	DIP16
BA7626	5	and 5 same normal outputs.			○			For AV amplifier.	DIP16

●Video/audio signal switch

Part No.	Supply voltage range(V)	Internal circuits		Clamp	6dB amplifier	75Ω driver	Muting	Remarks	Package
BA7604N	5	2 inputs	2 circuits					Good frequency characteristics. Wide dynamic range. Small distortion rate. Low power consumption.	SIP10
BA7608N	5			1 circuit					SIP10
BA7609/F	5		3 circuits	1 circuit					DIP16/SOP16
BA7607/F	5			2 circuits					DIP16/SOP16
BA7602/F	5								DIP16/SOP16
BA7644AN	4.5~13	4 inputs	1 circuit						SIP10
BA7026L	8~13	4 inputs	2 circuits					Applying DIN standard	ZIP16
BA7028A	8~13		3 circuits					Applying DIN standard	DIP22

●Audio signal switch

Part No.	Supply voltage range(V)	Function	Format	Internal circuits	Simul cast	Second audio program	Muting	Package
BA7056LS	7~13	Output switch	2ch	2 lines 3 inputs and 2 lines 4 outputs			○	SZIP24
BA7057S	7~14	Input switch	2ch	4 lines 8 inputs and 2 lines 4 outputs	○			SDIP22
BA7058LS	7~13	Output switch	2ch	2 lines 3 inputs and 2 lines 4 outputs			○	SZIP24
BA7730S/31S	7~12.5 ±5	In/out switch	2ch	3 lines 5 inputs and 2 lines 4 outputs 2 lines 4 inputs and 2 lines 4 outputs	○	○	○	SDIP32
BH7733S	9V, ±5	Input switch	2ch	6 lines 10 inputs and 2 lines 4 outputs	○	○	○	SDIP24

●Signal switch for Canalplus broadcast (For video signal)

Part No.	Supply voltage range (V)	Internal circuits	Clamp	6dB amplifer	75Ω driver	Muting	Remarks	Package
BA7630S/F	5	VTR switch meeting scramble broadcasting decorder.	○	○			Built-in 9 bit serial/parallel converter	SDIP22/SOP28

●Signal switch for Canalplus broadcast (For audio signal)

Part No.	Supply voltage range (V)	Function	Feature	Package
BA7631/F	12	VTR audio switch meeting scramble broadcasting decoder.	Wide dynamic range. Small distortion. Audio signals can be switched by a single chip.	DIP16/SOP16
New BA7632F	12		BA7631F with 140KΩ input impedance	SOP16

Servo system controller

●System control servo

Part No.	Supply voltage range (V)	Function	CPU	Min. instruction time	ROM (bytes)	RAM (bytes)	Servo hardware				Package
BU38701	4.5~5.5	Software servo containing DFG,CPG, CFG and CTL volume sensor amp. Real time servo block is configured in dedicated hardware.	RAMICS-8	0.25/0.33μSec	24K	512	Pseudo H	Reat time counter	VISS VASS	CTL amp with AGC	QFP80
New BU38703					16K						

●Digital servo

Part No.	Supply voltage range (V)	Function	Dummy V pulse generation	Capstan gain adjustment	Tape speed discrimination	FM audio head switching	VISS/VASS	CTL amplifier	Mix amplifier	Package
BU2780 Series	5	Integrate servo circuit of cylinder and capstan into on a single chip.	3 value output	○	○	○		○	ΔOnly capstan	SDIP30
BU2790 Series	5		3 value output	○	○	○	○	○W/AGC	○	SDIP42/QFP44
BU2890 Series	5		3 value output	○	○	○	○	○W/AGC	○	SDIP42/QFP44

●FG servo

Part No.	Supply voltage range (V)	System	Speed set	Built-in inverter	FV conversion polarity	Feature	Package
BA6301/F	4.5~13.0	FG	RC		+/−	F/V convertion is settable by external RC. Shaped FG waveform out.put. The difference between BA6301 and BA6321 is in F/V frequency.	DIP16/SOP16
BA6321	4.5~13.0	FG	RC		+/−		DIP16
BA6302A/AF	4.5~13.0	FG	RC	○	+		DIP16/SOP16
BA6303/F	4.5~13.0	FG	RC	○	−		DIP16/SOP16
BA860	9.0~13.0	Motor speed phase control IC				Switching speed pin. Ideal for VHD.	DIP16

●Special playback

Part No.	Supply voltage range (V)	Function	Feature	Package
BA857	9	Fine slow	Incorporates the reset circuit that resets system if CTL signal is not reproduced. Time setting can be adjusted by tailoring the external components connected to the monostable multi vibrator.	DIP18
BA867	9	Fine slow	Compatible with BA8657/BA857F but with different frame feed timing.	DIP18
BA8420	5	Fine slow	Compatible with three heads. Provided with pseudo V, rotary selection, head selection, lateral jitter correction output terminals.	DIP22
BU2767S	5	Fine slow	Generates fine slow and still function signals for VTR. Compatible with DA3 and DA4 sets.	SDIP32

●Dummy V-pulse generator

Part No.	Supply voltage range (V)	Function	Feature	Package
BAL6309	4.0~13	Dummy V-pulse generator.	Lag of H-pulse is corrected automatically.	ZIP16
BA6309F	4.0~13	Defective H-pulse correcting processing.	switchless mode selection by sensing tape speed.	SOP18

●Reel motor controller

Part No.	Supply voltage range (V)	Function	Feature	Package
BAL872	9.6~14.4	VTR reel motor controller	Outputs 10 mode reference voltage for motor drive and current control at ±5% accuracy. Buit-in LED driver for display.	ZIP16

●FG/CTL amplifier

Part No.	Supply voltage range (V)	Channel	Feature	Package
BA6305/F	4.5~13.0	1ch	Built-in high speed response PRE amplifier and hysteresis amplifier which outputs rectangular CTL signal.	SIP8/SOP8
BA6405F	4.5~6.0	2ch	Built-in high open gain FG, CTL amplifier, schmitt trigger amplifier and comparator.	SOP14

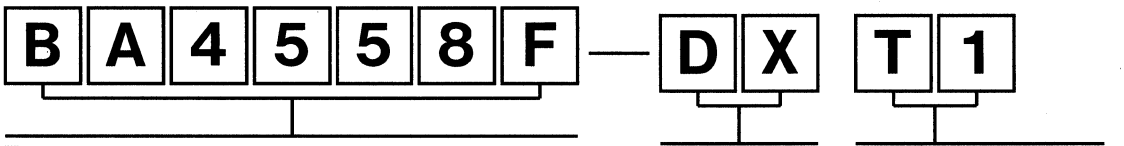
●Rotate-direction detection (reel sensor)

Part No.	Supply voltage range (V)	Function	Feature	Package
BA873	4.2~12	Reel motor rotating direction is detected by hall effect element.	Dividing ratio is selectable from 1/1, 1/2, 1/4, and 1/8.	DIP16

Packaging

Package	Packaging type	Packaging code
DIP/SDIP	Tube	—
SIP/HSIP/ZIP/SZIP	Tube	—
SOP/SSOP/HSOP	Tube	—
	Paper taping	T1, T2 (Difference in taping direction)
	Embossed taping	E1, E2 (Difference in taping direction)
QFP/SQFP/VQFP	Tray	—
FTR/TO-92/TO-220/TO-220FP	Bulk	—
SMP5	Embossed taping	TL, TR (Difference in taping direction)

●Product Designation



Type name

Characteristics selection code (blank for most standard types)

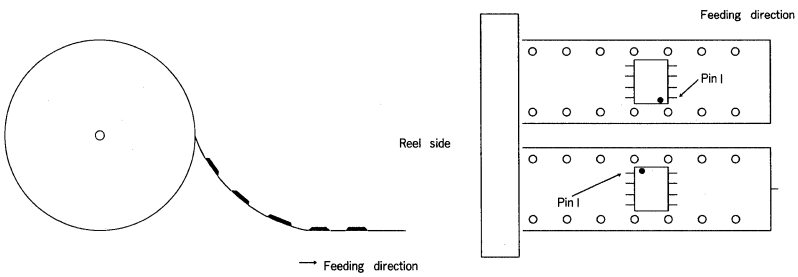
Package and/or forming code

Ordering information

1.Exclusion of package-code suffix for SOP, SSOP, and HSOP package will default to tube package.
(Example) BA4558F or BA4558F-DX.

2.Specification of package is necessary to order SOP taping.
(Example) Paper taping T1 direction
BA4558F-T1 or BA4558F-DXT1

●Taping specifications



T1	Paper Tape reel	Pin 1 at the front end of leading side
T2	Paper Tape reel	Pin 1 at the near of leading side
E1	Embossed tape reel	Pin 1 at the front end of leading side
E2	Embossed tape reel	Pin 1 at the near of leading side
TL	Embossed tape reel	Pin 1 at the front end of leading side
TR	Embossed tape reel	Pin 1 at the near of leading side

●Standard packaging condition

DIP/SDIP

Package	Packing type	Material	Tube (mm) a×b×c	Quantity (pcs)	Tube (pcs)	Case (pcs)	Case dimensions(mm) A×B×C
DIP8	Tube	PVC clear	11.6×13×505	50	40	2000	130×70×510
		PS carbon	11.6×13×505	50	40	2000	130×70×510
DIP 14,16 SDIP 18,22,24	Tube	PVC clear	11.6×13×505	25	40	1000	130×70×510
		PS carbon	11.6×13×505	25	40	1000	130×70×510
DIP 18	Tube	PVC clear	11.6×13×505	20	50	1000	130×70×510
		PS carbon	11.6×13×505	20	50	1000	130×70×510
DIP28	Tube	PVC clear	12×21.8×550	14	20	280	130×60×555
		PS carbon	12×21.8×550	14	20	280	130×60×555
SDIP30,32	Tube	PVC clear	12×15×505	17	40	680	130×70×510
		PS carbon	12×15×505	17	40	680	130×70×510
DIP20,22 SK-DIP24	Tube	PVCb clear	11.6×13×505	15	40	600	130×70×510
		PS clear	11.6×13×505	15	40	600	130×70×510
SDIP-M24,SDIP-24	Tube	PVC clear	12×20×505	20	25	500	130×70×510
SDIP42	Tube	PVC clear	12×21.8×550	14	20	280	130×60×555
		PS carbon	12×21.8×550	14	20	280	130×60×555

SIP/HSIP/ZIP/SZIP

Package	Package type	Material	Tube (mm) a×b×c	Quantity (pcs)	Tube (pcs)	Case(pcs)	Case dimensions (mm) A×B×C
SIP5,ZIP9	Tube	PVC clear	12.9×5.3×460	30	50	1500	130×40×470
SIP7,ZIP12	Tube	PVC clear	12.9×5.3×460	25	40	1000	130×40×470
SIP8,9 ZIP16,18 SZIP24	Tube	PVC clear	12.9×5.3×460	20	50	1000	130×40×470
		PS carbon	12.9×5.3×460	20	50	1000	130×40×470
SIP10	Tube	PVC clear	12.9×5.3×460	15	40	600	130×40×470
		PS carbon	12.9×5.3×460	15	40	600	130×40×470
SIP-M12	Tube	PVC clear	28×7.8×505	15	20	300	130×70×510
HSIP10	Tube	PVC clear	30.5×6.3×554	20	25	500	130×60×555
HSIP-B12	Tube	PVC clear	28×7.8×505	15	20	300	130×70×510

SOP/SSOP/HSOP

Package	Packaging type	Material	Tube (mm) a×b×c	Quantity (pcs)	Tube (pcs)	Case (pcs)	Case dimensions (mm) A×B×C
SOP8	Tube	PVC clear	8×4×280	50	40	2000	130×40×285
		PS carbon	8.2×4×280	50	40	2000	130×40×285
SOP14,16	Tube	PVC clear	8×4×280	25	80	2000	130×40×285
SSOP-A16		PS carbon	8.2×4×280	25	80	2000	130×40×285
SOP18,20,22,24 SSOP-A20,A24,A32,P32 HSOP25	Tube	PVC clear	9.6×4.5×400	25	80	2000	130×40×470
		PS carbon	9.6×4.5×400	25	80	2000	130×40×470
SOP28	Tube	PVC clear	12.6×5×400	20	50	1000	130×40×470
HSOP28		PS carbon	12.6×5×400	20	50	1000	130×40×470

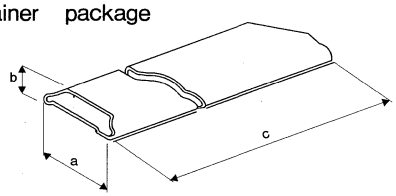
QFP/SQFP/VQFP

Package	Packaging type	Tray (mm) d×e	Quantiy(pcs)	Tray(pcs)	Case(pcs)	Case dimensions (mm) A×B×C
QFP32,QFP44 VQFP48,SQFP56 VQFP64,VQFP80	Tray	216×166	50	20	1000	130×70×510
QFP-A64 QFP80,QFP-T80 SQFP80,SQFP-T80 SQFP100,SQFP-T100 VQFP100	Tray	256×166	50	10	500	175×50×530
QFP120 SQFP144,SQFP160	Tray	200×141	12	20	240	149×82×412

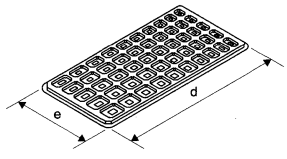
FTR/TO-92/TO-220/TO-220FP

Package	Packaging type	Material	Quantity(pcs)	Bag(pcs)	Case(pcs)
FTR	Bulk	Polyethylene bag	200	10	2000
TO-92	Bulk	Polyethylene bag	50	4	200
TO-220,TO220FP	Bulk	Polyethylene bag	50	4	200

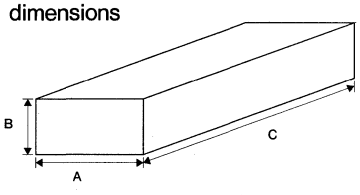
Tube container package



Tray package



Case dimensions



Packaging

●SOP taping packaging

Paper taping

Package	Quantity
SOP8, 14, 16, 18, 20, 22, 24, W28	2,000
SSOP-A16, A20, A24, A32, P32	2,000
HSOP25, 28	2,000

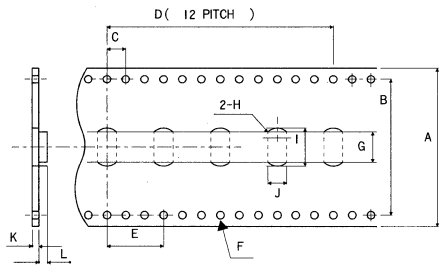
Embossed taping

Package	Quantity	Package	Quantity	Package	Quantity
SOP8	2,500	SOP 24	2,000	SSOP-P32	2,000
SOP 14	2,500	SOP-W28	1,000	SSOP-B14	2,500
SOP 16	2,500	SSOP-A16	2,500	SSOP-B16	2,500
SOP 18	2,000	SSOP-A20	2,000	HSOP25	2,000
SOP 20	2,000	SSOP-A24	2,000	HSOP28	1,500
SOP 22	2,000	SSOP-A32	2,000	SMP5	3,000

(Unit : mm)

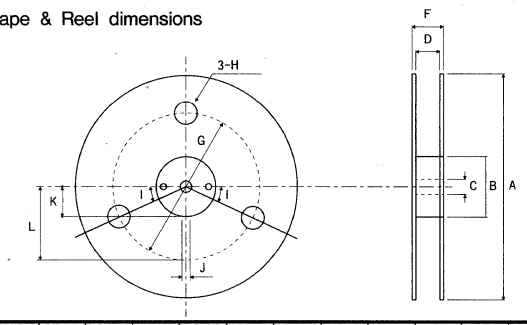
Paper taping specification

Taping Dimensions



Symbol	A	B	C	D	E	F	G	H	I	J	K	L
Size	32 $^{+0}_{-0.4}$	26 ±0.1	4.0 ±0.1	48 ±0.3	12 ±0.1	ϕ1 $^{+0.1}_{-0}$	6 ±0.2	2R	8	4	0.15	0.18

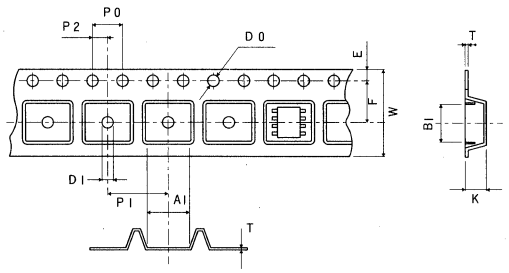
Tape & Reel dimensions



Symbol	A	B	C	D	F	G	H	I	J	K	L
Size	300 ±2	80 ±2	16 ±0.5	33 Min.	38 Max.	200	ϕ30 ±0.5	30°	10 ±0.5	40 ±0.5	100 ±0.5

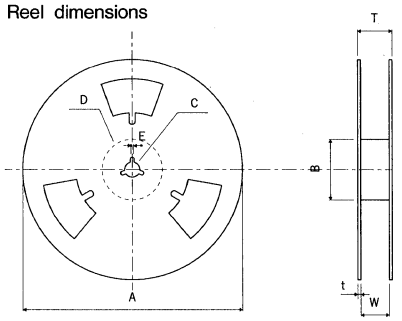
Embossed taping specifications

Taping dimensions



Package \ Symbol	A1	B1	D0	D1	E	F	P0	P1	P2	T	K	W
SOP8	7.0 ±0.1	5.7 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ1.5 Min.	1.75 ±0.1	5.5 ±0.1	4.0 ±0.1	8.0 ±0.1	2.0 ±0.1	0.3	2.0 ±0.1	12.0 ±0.3
SOP14	7.0 ±0.1	9.5 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ1.5 Min.	1.75 ±0.1	7.5 ±0.1	4.0 ±0.1	8.0 ±0.1	2.0 ±0.1	0.3	2.1 ±0.1	16.0 ±0.3
SOP16	7.0 ±0.1	10.8 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ1.5 Min.	1.75 ±0.1	7.5 ±0.1	4.0 ±0.1	8.0 ±0.1	2.0 ±0.1	0.3	2.1 ±0.1	16.0 ±0.3
SOP18	8.4 ±0.1	12.0 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ2.0 Min.	1.75 ±0.1	11.5 ±0.1	4.0 ±0.1	12.0 ±0.1	2.0 ±0.1	0.3	2.1 ±0.1	24.0 ±0.3
SOP20	8.4 ±0.1	12.95 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ2.0 Min.	1.75 ±0.1	11.5 ±0.1	4.0 ±0.1	12.0 ±0.1	2.0 ±0.1	0.3	2.15 ±0.1	24.0 ±0.3
SOP22	8.4 ±0.1	14.5 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ2.0 Min.	1.75 ±0.1	11.5 ±0.1	4.0 ±0.1	12.0 ±0.1	2.0 ±0.1	0.3	2.3 ±0.1	24.0 ±0.3
SOP24	8.5 ±0.1	15.6 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ2.0 Min.	1.75 ±0.1	11.5 ±0.1	4.0 ±0.1	12.0 ±0.1	2.0 ±0.1	0.3	2.15 ±0.1	24.0 ±0.3
SOP-W28	12.4 ±0.1	18.5 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ2.0 Min.	1.75 ±0.1	11.5 ±0.1	4.0 ±0.1	16.0 ±0.1	2.0 ±0.1	0.3	2.6 ±0.1	24.0 ±0.3
SSOP-A16	6.8 ±0.1	6.8 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ1.5 Min.	1.75 ±0.1	7.5 ±0.1	4.0 ±0.1	8.0 ±0.1	2.0 ±0.1	0.3	2.1 ±0.1	16.0 ±0.3
SSOP-A20	8.4 ±0.1	9.3 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ1.5 Min.	1.75 ±0.1	7.5 ±0.1	4.0 ±0.1	12.0 ±0.1	2.0 ±0.1	0.3	2.1 ±0.1	16.0 ±0.3
SSOP-A24	8.2 ±0.1	10.5 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ1.5 Min.	1.75 ±0.1	7.5 ±0.1	4.0 ±0.1	12.0 ±0.1	2.0 ±0.1	0.3	2.3 ±0.1	16.0 ±0.3
SSOP-A32	8.4 ±0.1	14.5 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ2.0 Min.	1.75 ±0.1	11.5 ±0.1	4.0 ±0.1	12.0 ±0.1	2.0 ±0.1	0.3	2.3 ±0.1	24.0 ±0.3
SSOP-P32	8.4 ±0.1	14.5 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ2.0 Min.	1.75 ±0.1	11.5 ±0.1	4.0 ±0.1	12.0 ±0.1	2.0 ±0.1	0.3	2.3 ±0.1	24.0 ±0.3
SSOP-B14	6.95 ±0.1	5.4 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ1.5 Min.	1.75 ±0.1	5.5 ±0.1	4.0 ±0.1	8.0 ±0.1	2.0 ±0.1	0.3	1.95 ±0.1	12.0 ±0.3
SSOP-B16	6.95 ±0.1	5.4 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ1.5 Min.	1.75 ±0.1	5.5 ±0.1	4.0 ±0.1	8.0 ±0.1	2.0 ±0.1	0.3	1.95 ±0.1	12.0 ±0.3
HSOP25	8.4 ±0.1	14.5 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ2.0 Min.	1.75 ±0.1	11.5 ±0.1	4.0 ±0.1	12.0 ±0.1	2.0 ±0.1	0.3	2.3 ±0.1	24.0 ±0.3
HSOP28	10.7 ±0.1	18.9 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ2.0 Min.	1.75 ±0.1	11.5 ±0.1	4.0 ±0.1	16.0 ±0.1	2.0 ±0.1	0.3	3.0 ±0.1	24.0 ±0.3
SMP5	3.2 ±0.1	3.1 ±0.1	ϕ1.5 $^{+0.1}_{-0}$	ϕ1.1 ±0.1	1.75 ±0.1	3.5 ±0.05	4.0 ±0.1	4.0 ±0.1	2.0 ±0.05	0.3	1.35 ±0.2	8.0 ±0.2

Tape & Reel dimensions



Tape width	A	B	C	D	E	W	t	T Max.
8mm	180 Max.	50 Min.	13.0±0.5	20.2 Min.	1.5 Min.	10.0±1.0	2.0±0.5	16.0
12mm	330 Max.	50 Min.	13.0±0.2	20.2 Min.	1.5 Min.	12.4 $^{+2.0}_{-0}$	2.0±0.5	20.4
16mm	330 Max.	50 Min.	13.0±0.2	20.2 Min.	1.5 Min.	16.4 $^{+2.0}_{-0}$	2.0±0.5	24.4
24mm	330 Max.	50 Min.	13.0±0.2	20.2 Min.	1.5 Min.	24.4 $^{+2.0}_{-0}$	2.0±0.5	32.4

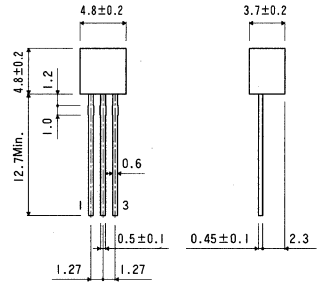
MEMO

Dimensions

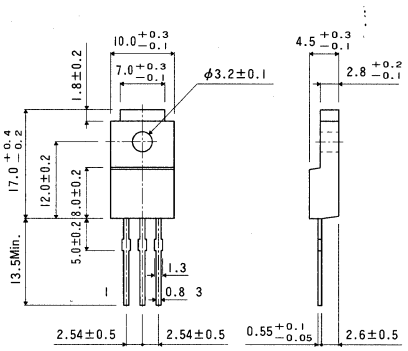
●SIP/SIP(POWER TYPE)/ZIP/SZIP

(Unit : mm)

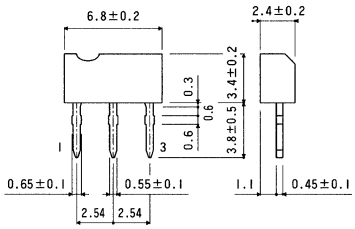
TO-92



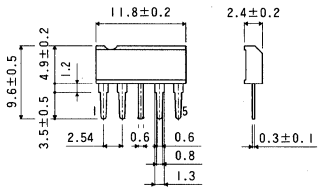
TO-220FP



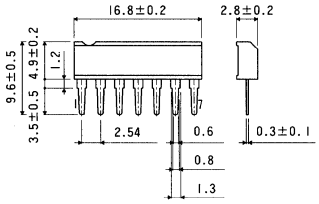
FTR



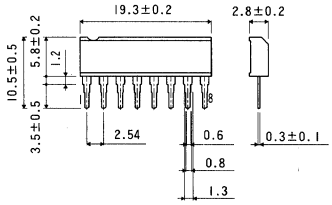
SIP5



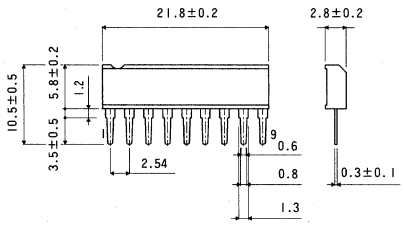
SIP7



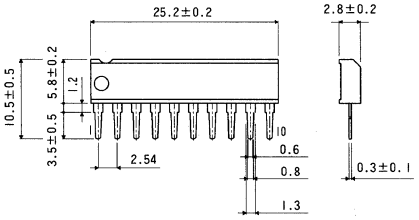
SIP8



SIP9

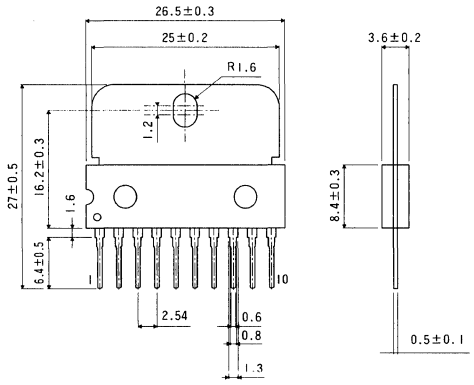


SIP10

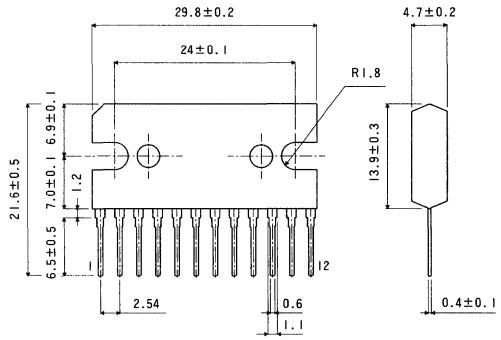


(Unit : mm)

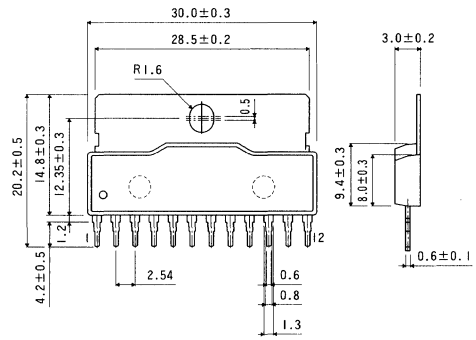
HSIP 10



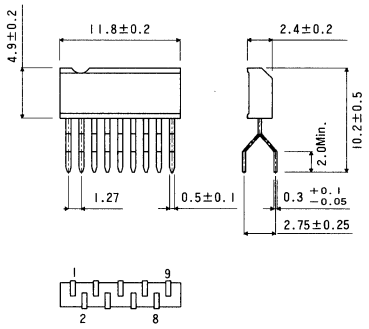
SIP-M12



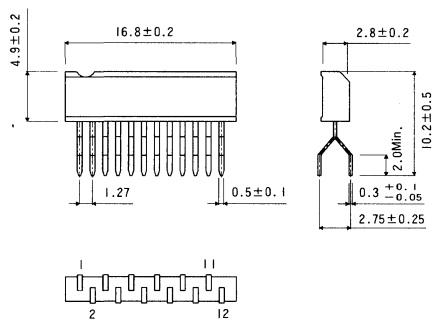
HSIP-B12



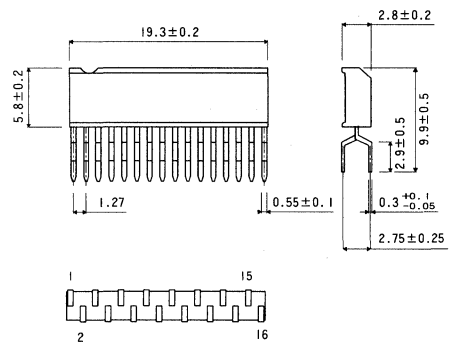
ZIP9



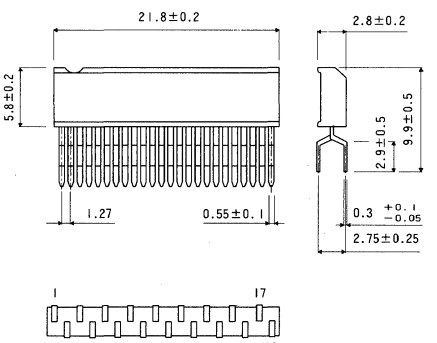
ZIP12



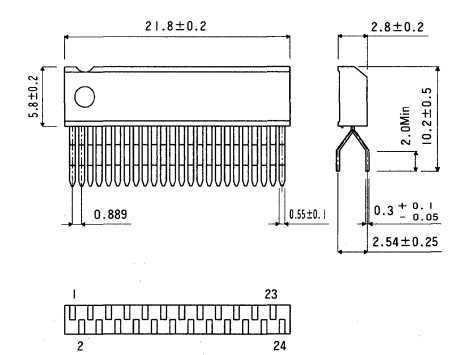
ZIP16



ZIP18



SZIP24

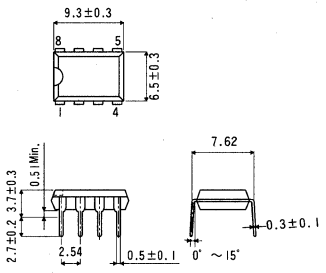


Dimensions

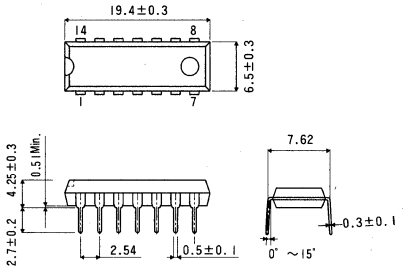
●DIP/SDIP/SK-DIP

(Unit : mm)

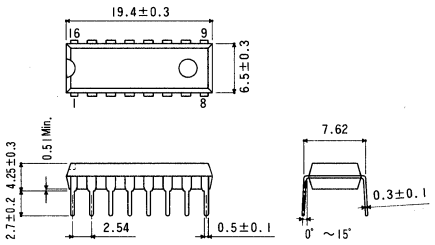
DIP8



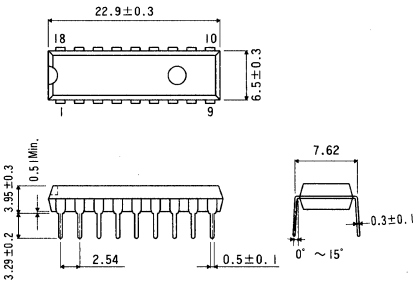
DIP 14



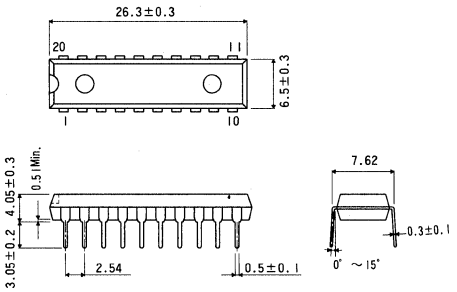
DIP 16



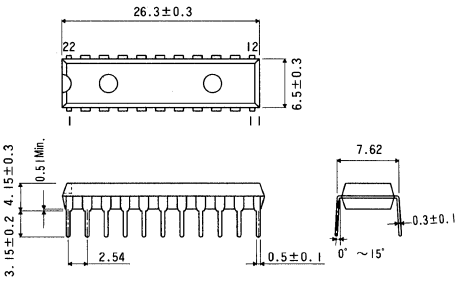
DIP 18



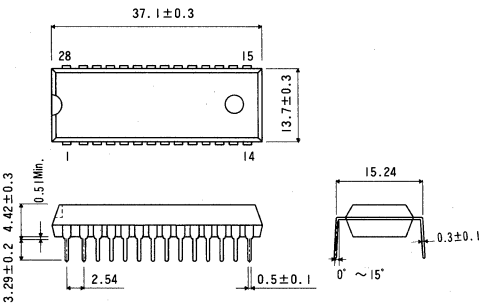
DIP20



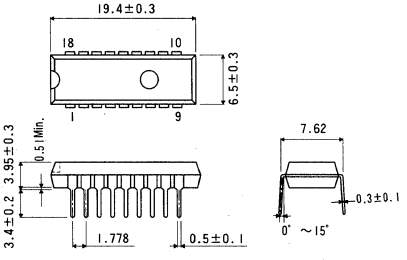
DIP22



DIP28

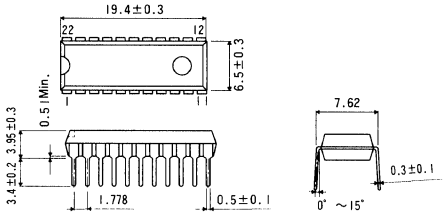


SDIP 18

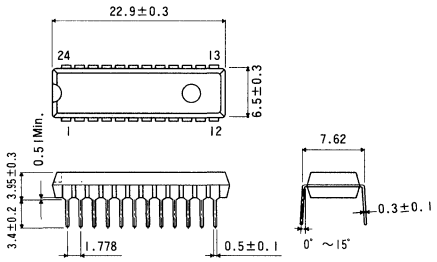


(Unit : mm)

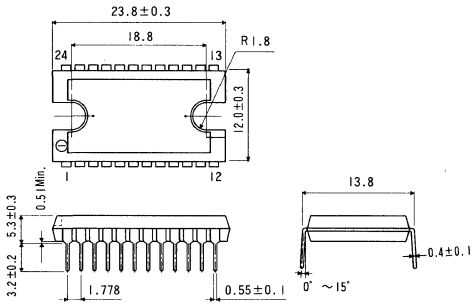
SDIP22



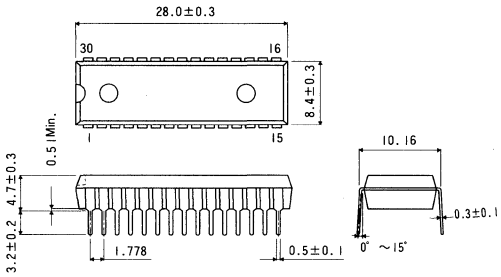
SDIP24



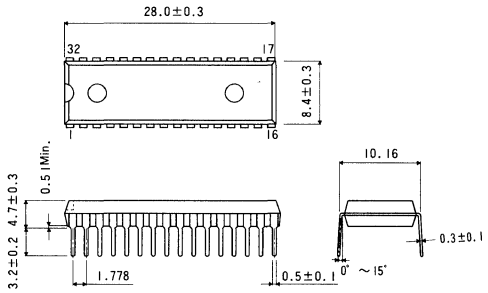
SDIP-P24 SDIP-M24



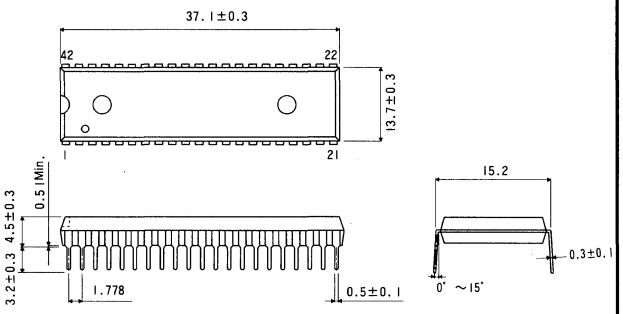
SDIP30



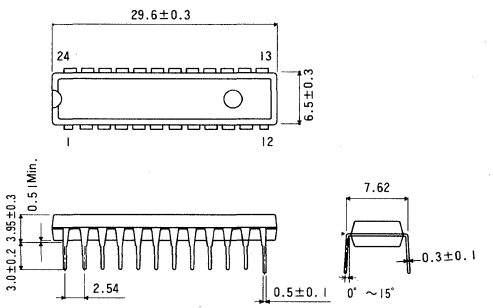
SDIP32



SDIP42



SK-DIP24

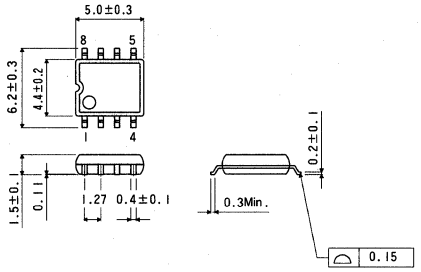


Dimensions

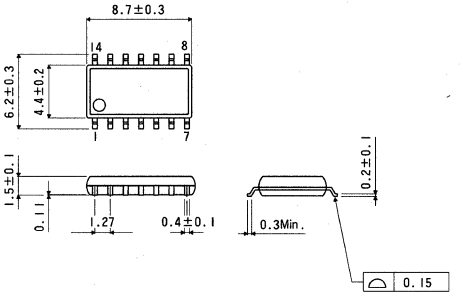
●SOP/SSOP-A(P=0.8mm)/SSOP-B(P=0.65mm)/HSOP(POWER TYPE)/SMP

(Unit : mm)

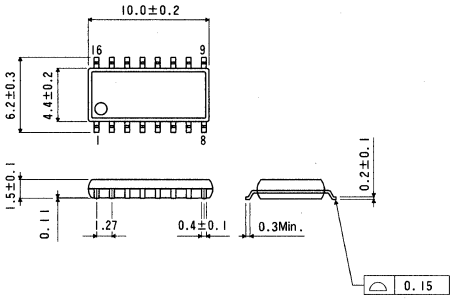
SOP8



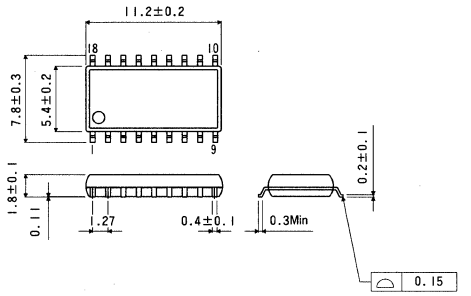
SOP14



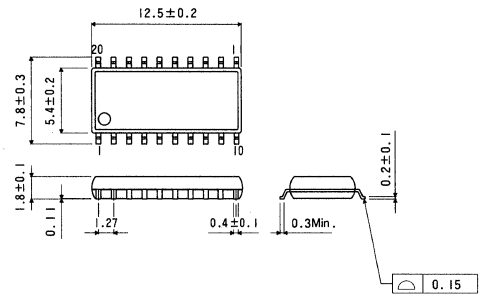
SOP16



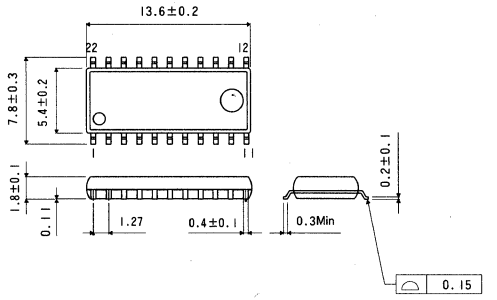
SOP18



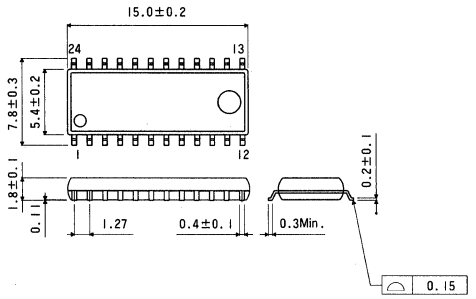
SOP20



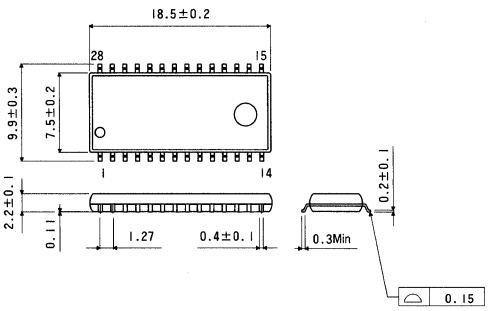
SOP22



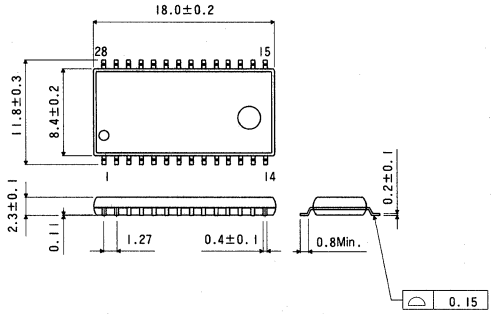
SOP24



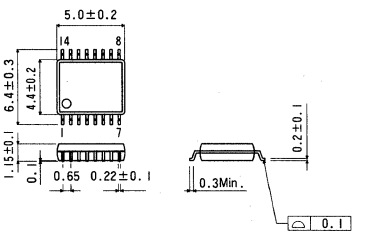
SOP28



SOP-W28

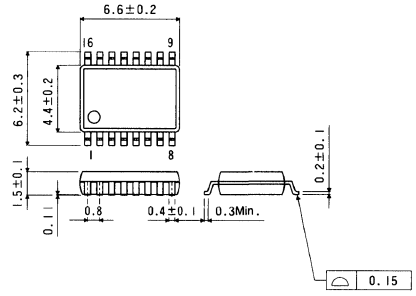


SSOP-B14

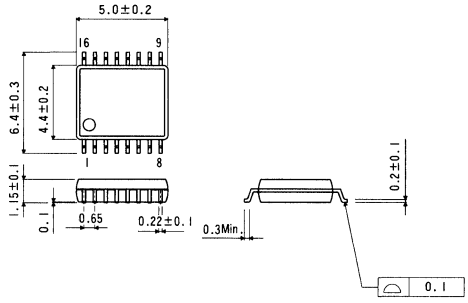


(Unit:mm)

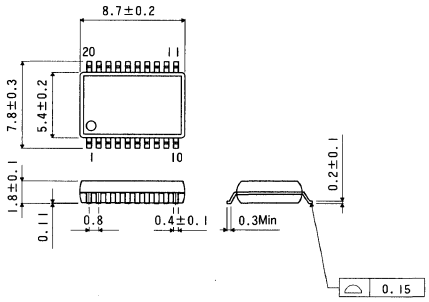
SSOP-A16



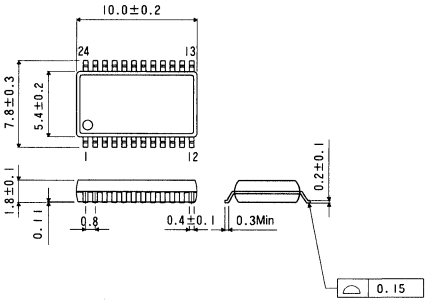
SSOP-B16



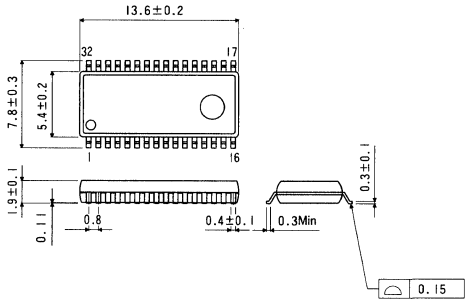
SSOP-A20



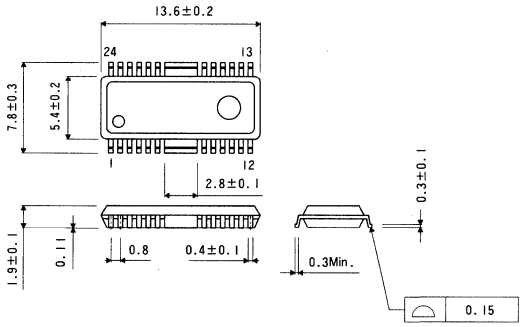
SSOP-A24



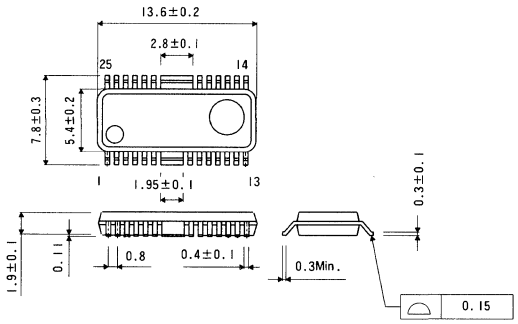
SSOP-P32



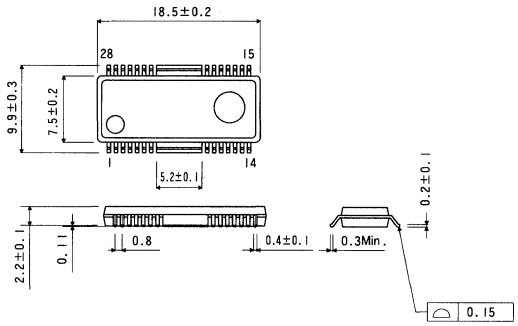
HSOP24



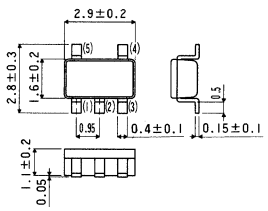
HSOP25



HSOP28



SMP5

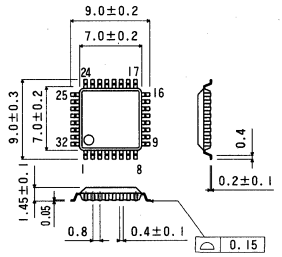


Dimensions

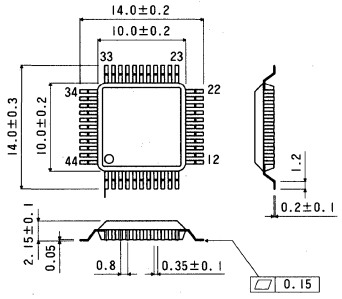
●QFP/SQFP(P=0.65mm)/VQFP(P=0.5mm)/UQFP(P=0.4mm)

(Unit : mm)

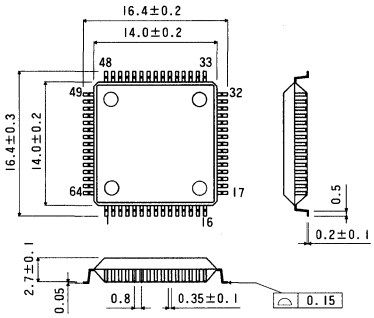
QFP32



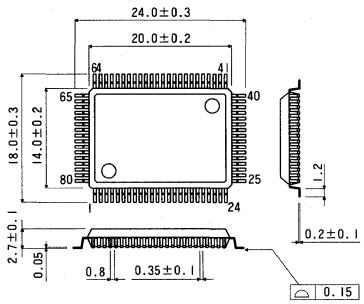
QFP44



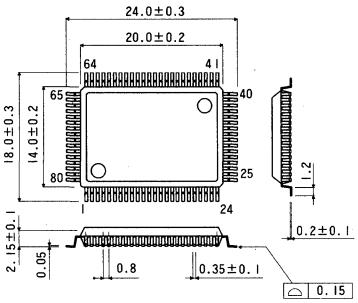
QFP-A64



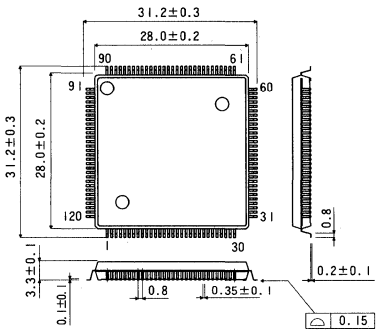
QFP80



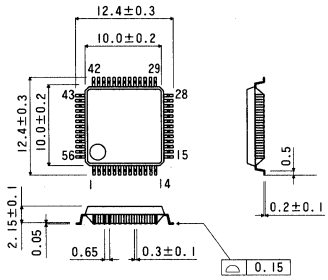
QFP-T80



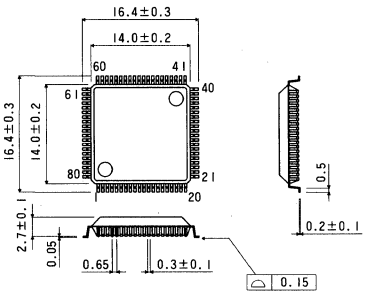
QFP 120



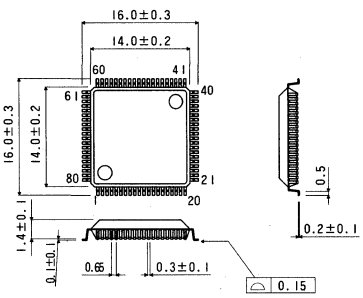
SQFP56



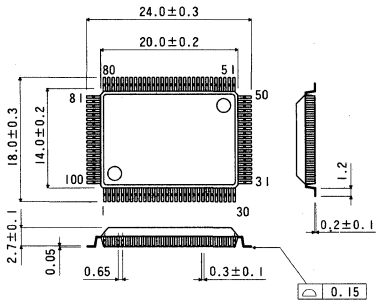
SQFP80



SQFP-T80

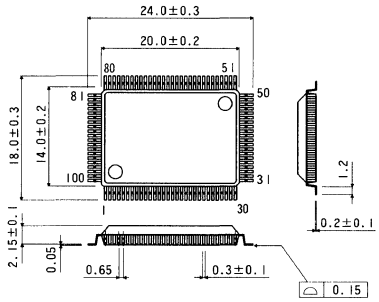


SQFP 100

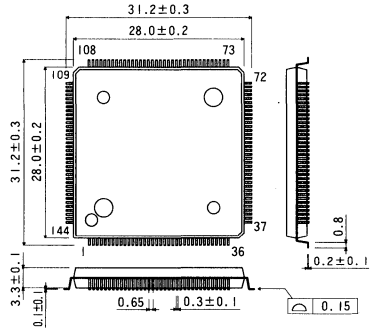


(Unit : mm)

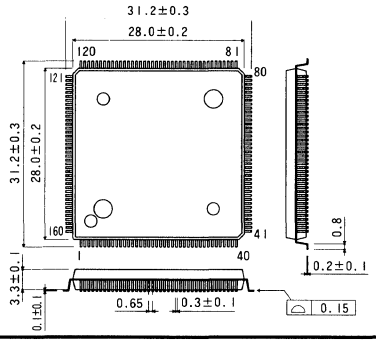
SQFP-T 100



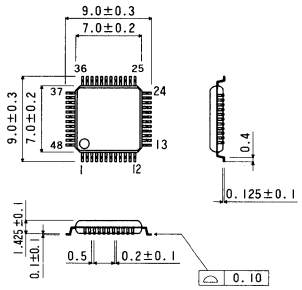
SQFP 144



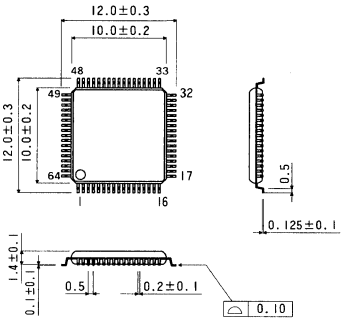
SQFP 160



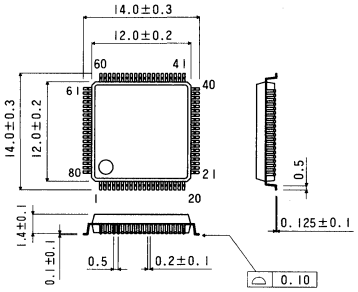
VQFP48



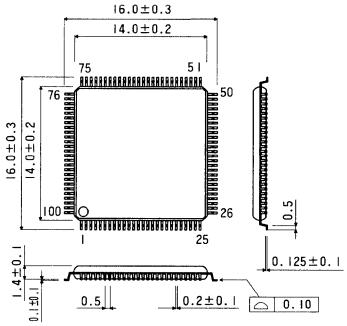
VQFP64



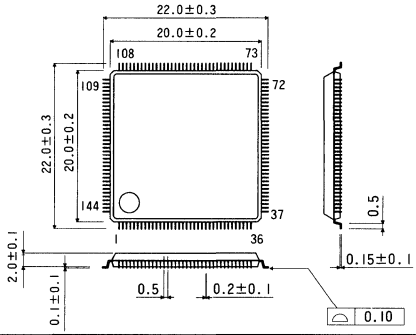
VQFP80



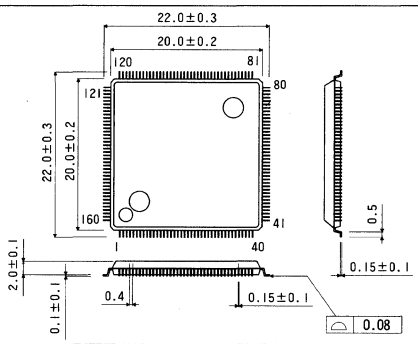
VQFP 100



VQFP144



UQFP160



MEMO

Hybrid ICs

■Product designation

ROHM Hybrid ICs are identified as follows :

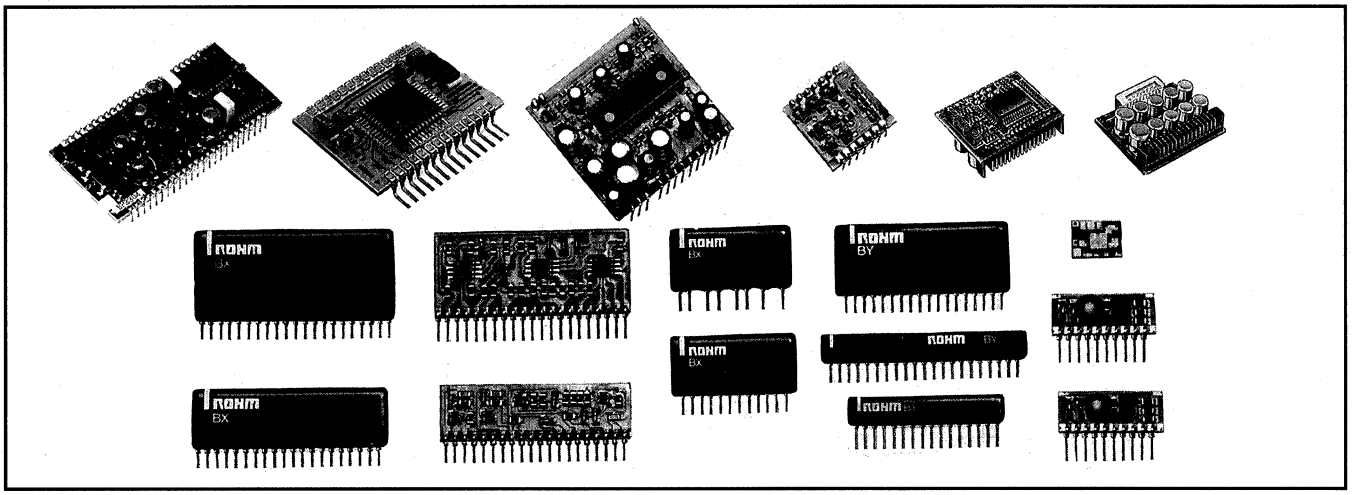
(Example)

BP3004	W	A	F	-	4
①	②	③	④		⑤

① Type name
② Pin shape code
③ Revision history code
④ Pin forming code
⑤ Custom code
Note : Some of suffixes ②~⑤ may not be used for some devices.

Hybrid ICs

(ROHM Hybrid ICs)



ROHM hybrid ICs are of five types so that the customer can make a selection depending on the necessary degree of integration, operating conditions, price, and time for delivery:

1) **BX series**
   ICs, transistors, diodes, resistors and capacitors are mounted on a printed circuit board. This type of hybrid IC can be available in the shortest amount of time.
2) **BY series**
   Conductors and resistors are printed as a thick film on an alumina substrate.
   ICs, transistors, diodes and capacitors are mounted on this film.
3) **BZ series**
   Conductors and resistors are printed as a thick film on an alumina substrate and semiconductor die are mounted on this film(COB). This is a highly integrated type of hybrid IC.
4) **BW series**
   In this IC series, hybrid technology is applied in order to mount any type of component the customer requests, such as chip components or normal discrete components, on the set circuit board.
5) **BP series**
   General purpose hybrid ICs which can be tailored to semi custom ICs.

●Features

1) **Availability of components and materials**
   ROHM mass produces transistors, resistors, diodes, bipolar ICs, MOS ICs. LEDs and LCDs in house. This is why we can deliver products on time. Our purchasing division can also obtain components from other manufacturers.
2) **Production engineering**
   ◆Product sizes range from 7mm × 10mm to 330mm × 250mm.
   ◆Chips of 1.0mm × 0.5mm and 0.4mm pitch QFP ICs can mount either side of PCB.
   ◆Standard configurations are SIP and DIP and pitches are 2.54mm, 2.0mm and 1.8mm.
   ◆Other special specifications can be met.
   ◆Laser function trimming.
   ◆Powder coating or liquid coating is possible depending on product shape and components.
3) **Quality assurance**
   ROHM produces 700 thousand high reliable hybrid ICs every month for use in automotive equipment (air bag, ABS, AT control, etc.) as of Oct. 1991.
   These ICs are shipped after undergoing exact screening consisting of 1000 cycles for thermal shock test (−55°C to 125°C, 30 minutes each). (Actually, they can withstand 2000 cycles.)
   ◆The copper patterns are free from migration.
   ◆Whole product performance can be assured by I/O terminal test.
   ◆High temperature measurement (85°C), thermal cycle measurement (−30°C to 125°C) and burn in measurement (85°C, 12H, 24H) will be conducted as required by the customer.
4) **Circuit design and pattern design**
   Various circuits, from low frequency to high frequency, analog, digital, and PCB pattern are quickly designed using CAE and CAD (Zuken CR2000 and CR3000).

●Product Designation

	No revision
A	Except "F" move to same line as With revision

Serial number | **Revision history** | **Special specification**

B X 1 2 3 4 W A F — 1

Type

BW	Glass epoxy base on-board chip components without pins
BX	Glass epoxy base on-board chip components
BY	Alumina base resistance material thick film printing
BZ	Alumina base on-board pair-chip
BP	General purpose hybrid IC, custom ICs are also available

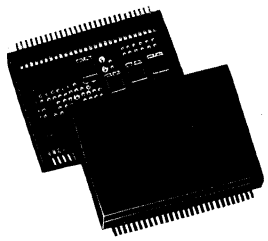
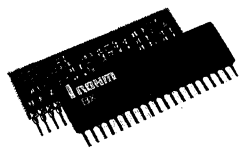
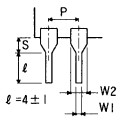
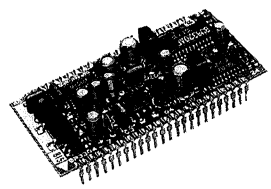
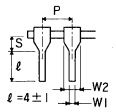
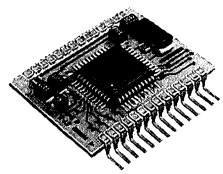
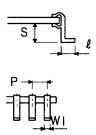
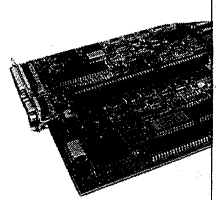
Pin configuration code

	Single in-line
W	Dual in-line

Pin forming code

	No forming
F	With forming

●Package Available

	Appearance	Lead specs. (mm)	Board length (mm)	Board width (mm)	Features
Standard SOP Package		Pin-to pin pitch: 0.8mm Pins 28 and 52	—	—	Compatible with automatic placement and reflow soldering Chip-on-board available.
Single in-line (SIP)		 P 2.54 1.8 S (2.0) (0.8) W1 0.5±0.1 0.4±0.1 W2 1.4±0.2 1.1±0.2	10Min. 〜 90Max.	7Min. 〜 38Max.	Small on-board space requirement allows for function-intensive equipment design. Epoxy coated packages are available to assure reliable use in industrial and automobile equipment.
Dual in-line (DIP)		 P 2.54 1.8 1.27 S (4.0) (4.0) None W1 0.5±0.1 0.5±0.1 0.5±0.1 W2 1.4±0.2 1.0±0.2 –	15Min. 〜 90Max.	14Min. 〜 48Max.	Accommodates increased number of I/Os associated with function-intensitive module designs. Low-profile package design minimizes dead spaces in the set.
Surface Mount-ing		 S=2.0±0.5 ℓ=1.5±0.5 Refer to DIP for P,W1	15Min. 〜 80Max.	18Min. 〜 45Max.	Designed for surface mounting on holeless boards while maintaining the advantages of DIP. ※Not compatible with reflow soldering.
Leadless assem-bly			〜 180Max.	〜 140Max.	Available with the BW series. The leadless assembly system fully exploits ROHM's composite assembly technology,including high-density packing.

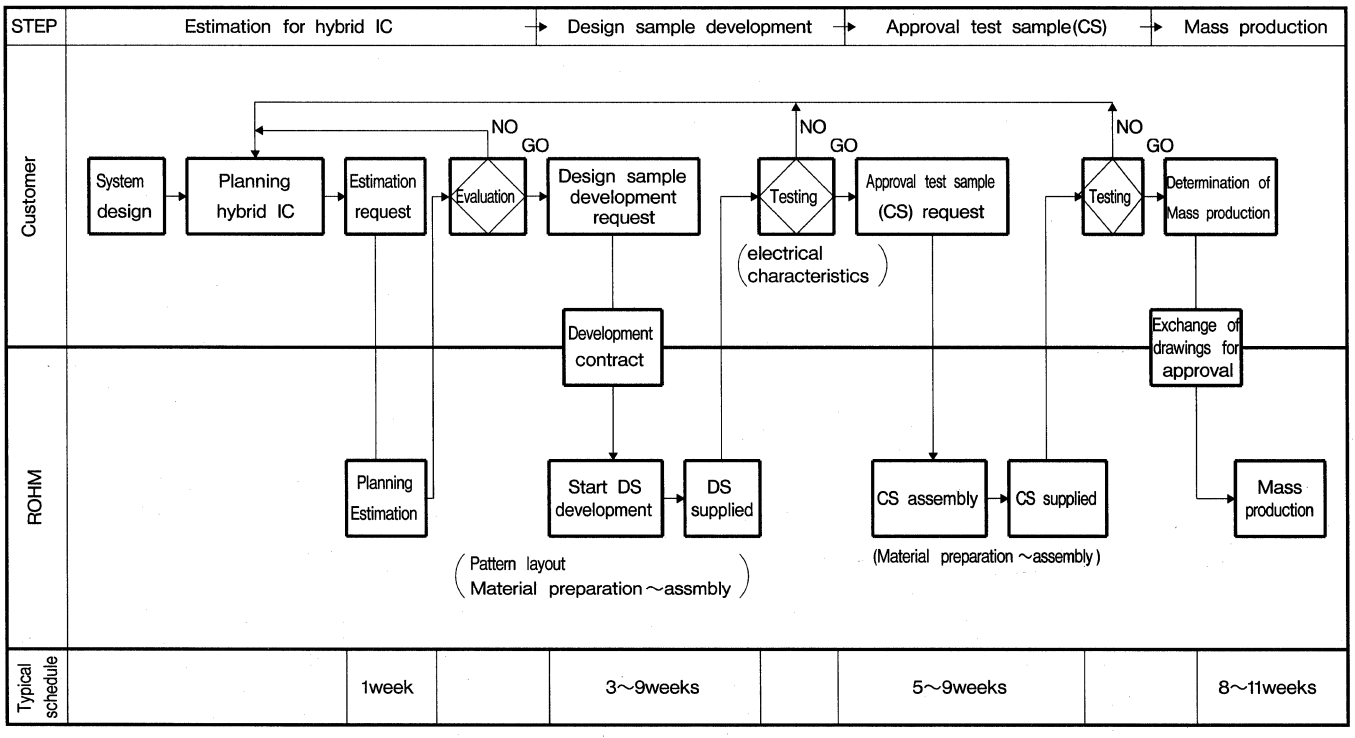
Note : 1.The lead specs are for standard leads.
2.Contact us regarding special lead specs.

Custom Hybrid ICs

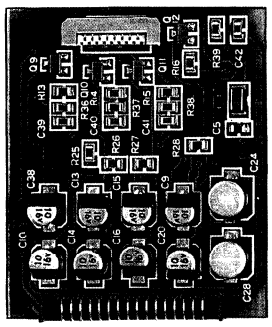
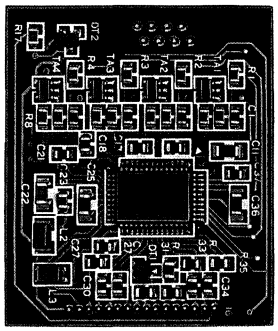
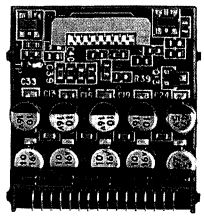
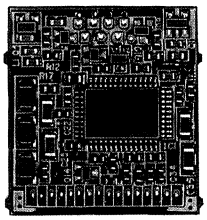
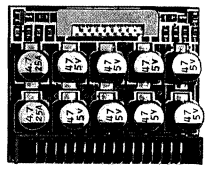
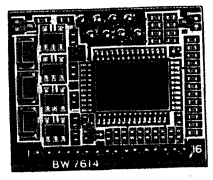
●Representative Products

Use	Circuit
Automobile devices	Various meter peripheral circuits Door-lock control circuits Fuel control circuit Control circuits for air conditioners
Office automation equipment	Motor control circuits for copiers Photocopier main board Motor control circuits for facsimile machines Telephone unit for fascimiles Hybrid ICs for floppy discs Hybrid ICs for office computers CCD driver circuits
Wireless devices	Filter circuits
Computers	Hybrid ICs for computer terminals Computer board
Telephones	PBX modem circuits Single-chip unit for telephone handsets
Electronic musical instruments	D/A converters for electronic organs Filter circuits Sound source circuits
Audio equipment	Multiplex sound circuits Noise reduction circuits Graphic equalizer circuits Echo circuits Program selection circuits Tuner circuits
Video eqiupment	Audio record/playback circuits Noise reduction circuits Hi-fi PNR circuits Hi-fi modem circuits Pre-recording circuit Head amplifier circuits Servo peripheral circuits Chroma processing circuits Luminance processing circuit
Industrial-use electronic equipment	Circuits for vending machines Control circuits for air conditioners Control circuits for sewing machines Inverter control circuits Encoder circuits Switching regulators Control circuits for water heaters Hybrid ICs for sensors

●Development Flow



●Hybrid IC Fabrication Process (BX Series)

Item			BX-Ⅰ (general process)	BX-Ⅱ (high-density process)	BX-Ⅲ (high-density process)
Process			Double side through-holes	0.8t 4 layers	0.8t 4 layers,6 layers
Chip size			2125	1608	1005
Density			15chips/cm²	36chips/cm²	50chips/cm²
Full scale ※Sample products shown at the right are of the same circuit, function and No. of components.			Front  Rear 	Front  Rear 	Front  Rear 
Components used	Resistors	Resistance	2.2Ω～3.3MΩ (10Ω～1MΩ Typ.)	2.2Ω～3.3MΩ (10Ω～1MΩ Typ.)	2.2Ω～3.3MΩ (10Ω～1MΩ Typ.)
		Power	0.1W～1.0W	0.063W～1.0W	0.063W～1.0W
		Tolerance	±1%,±2%,±5%,±10% (+/−5% typ.)	±1%,±2%,±5%,±10% (+/−5% typ.)	±5%,±10%,±20%,$^{+80\%}_{-20\%}$ (+/−5% typ.)
	Capacitors (ceramic)	Capacitance	1pF～2.2μF	1pF～2.2μF	1pF～2.2μF
		Tolerance	±5%,±10%,±20%,$^{+80\%}_{-20\%}$	±5%,±10%,±20%,$^{+80\%}_{-20\%}$	±5%,±10%,±20%
		Temperature	0±60ppm/℃,+350～1000ppm/℃, ±10% (−25℃～+85℃), ±15% (−55℃～+125℃), $^{+30\%}_{-80\%}$ (−25℃～+85℃)	0±60ppm/℃,350～1000ppm/℃ ±10% (−25℃～+85℃), ±15% (−55℃～+125℃), $^{+30}_{-80\%}$ (−25℃～+85℃)	0±60ppm/℃,+350～1000ppm/℃, ±10% (−25℃～+85℃), ±15% (−55℃～+125℃), $^{+30\%}_{-80\%}$ (−25℃～+85℃)
	Capacitors (polarized)	Capacitance	0.047μF～200μF	0.047μF～200μF	0.047μF～220μF
		Withstand Voltage	4V～50V	4V～50V	4V～50V
		Tolerance	±20%	±20%	±20%
	Transistors		SMT,MPT,CPT,FMT	UMT,SMT,FMT,IMD,MPT,CPT	EM3,UMT,SMT,FMT,IMD,MPT,CPT
	Diodes		SMD,MPD,LL−41,LL−34,DMM	UMD,SMD,MPD,LL−41,LL−34,DMM	UMD,SMD,MPD,LL−41,LL−34,DMM
	ICs		SOP8pin～28pin QFP32pin～QFP44pin	SOP8pin～28pin QFP32pin～128pin PLCC SMP5pin	SOP8pin～28pin QFP32pin～128pin.PLCC Minimum lead pitch 0.4mm SMP5pin
	Others	Radial components	Available	Not available	Not available
		Axial components	Not available	Not available	Not available
PC boards	Material	Glass epoxy	Single-sided,double-sided,throughholes	Double-sided,multilayered,through holes	Double-sided,multilayered,through holes
		Paper phenol	Single-sided,double-sided	Not available	Not available
		Paper epoxy	Not available	Not available	Not available
	Foil Pattern	Conductor width	Min.0.25mm	Min.0.15mm	Min.0.125mm
		Conductor spacing	Min.0.25mm	Min.0.15mm	Min.0.125mm
	Thickness		0.8mm	0.8mm	0.8mm (Typ.)
Package	Painting (SIP only)	Powder Liquid	Available Available	Available Available	Available Available
	Lead	Dimension	4+/−1mm Typ. (from standoff) ; other dimensions require custom order.	4+/−1mm Typ. (from standoff) ; other dimensions require custom order.	4+/−1mm Typ. (from standoff) ; other dimensions require custom order.
		Pitch	2.54mm, 1.8mm	2.54mm,1.8mm	2.54mm,1.8mm,1.27mm
	Package	DIP SIP	Available Available	Available Available	Available Available (Also available for the BW Series)
	Outer dimensions (thickness not specified)	Max.	L=92mm, H=38mm	L=75mm,H=30mm	L=75mm,H=30mm
		Min.	L=12mm, H=10mm	L=12mm,H=10mm	L=12mm,H=10mm
	Integ. density		15chips/cm²	36chips/cm²	50chips/cm²
Miscellaneous	Development term	Sample	4 weeks Typ.	5 weeks Typ.	5 weeks Typ.
		Mass production	8 weeks Typ.	9 weeks Typ.	9 weeks Typ.
	Hand-mounting of components		Available	Not available	Not available
	Hand-soldering of components		Available	Not available	Not available

Custom Hybrid ICs

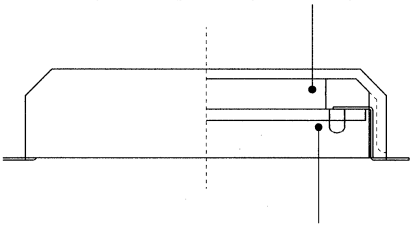
●BX－Ⅳ New product

Can be mounted using different mounters. Compatible with reflow soldering.
Available in 4 packages. Detailed information available upon request.

●Components on BX－Ⅳ (example)

N28、N52

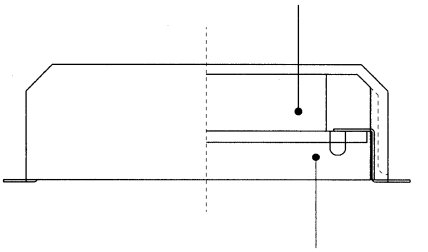
Chip resistors ---------- MCR01～MCR100 and MVR series network
Multilayer chip capacitors ---------- 1005～3216type
Tantalum capacitors ------ Low profile up to 6.8 μF
Film capacitors ---------- Up to 0.027 μF
Multilayer inductors ---------- Up to 56 μH
Mini-molded components ---------- EM3～SMT
Other components (profile up to 1.5mm)



Chip resistors
Multilayer chip capacitors
Tantalum capacitors ---------- Case A up to 10 μF
Film capacitors ---------- Up to 0.068 μF
Multilayer inductors ---------- Up to 56 μH
Mini-molded components ---------- EM3～MPT
Trimpot chip ---------- MVR series
Trimming chip resistor
Other components (profile up to 1.8mm)

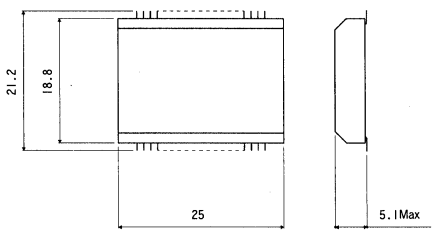
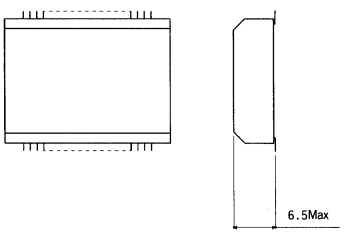
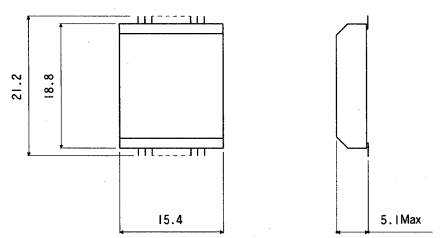
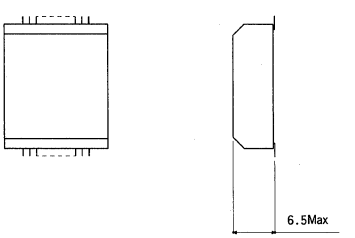
E28、E52

Chip resistors
Multilayer chip capacitors
Tantalum electro capacitors Case C up to 68 μF
Film capacitors ---------- Up to 0.1 μF
Inductor coils up to 220 μH ---------- Up to 220 μH
Mini-molded components ---------- EM3～CPT
Other components (profile up to 2.9mm)



Bottom:same as N28 and N52

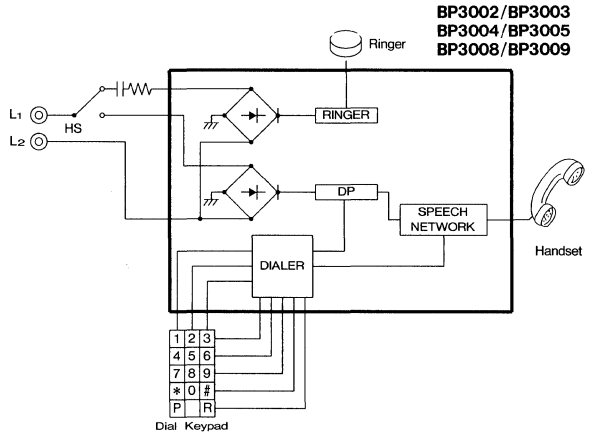
●BX－Ⅳ standard package

	Normal Package	Expansion Package
52Pin 0.8mm pitch	**N52** 	**E52** 
28Pin 0.8mm pitch	**N28** 	**E28** 

●For Telephone Units (BP3000 Series)

Part No.	Function		Package	Dimensions (mm)	Features
BP3002	Japan model	Redial,pause,piezoelectric ringer and ECM／dynamic SP	DIP28pin	56×38×14	Add only a handset,keypad,and ringer speaker to build up a complete telephone. Compatible with FAX, low DC resistance. (BP3008／BP3009) Complies with the Technical Standards for Telecommunication Terminal Equipment (BP3002／BP3004／BP3008) Compatible with Bell standards (BP3003／BP3005／BP3009)
BP3003	North America model				
BP3004	Japan model	Redial,pause,piezoelectric ringer and ECM／piezoelectric MIC／dynamic SP／piezoelectric SP	DIP28pin	48×38×14	
BP3005	North America model				
BP3008	Japan model	Redial,pause,mixed dial,Flash, piezoelectric ringer and ECM／piezoelectric MIC／dynamic SP／piezoelectric SP	DIP28pin	48×36.5×16	
BP3009	North America model				

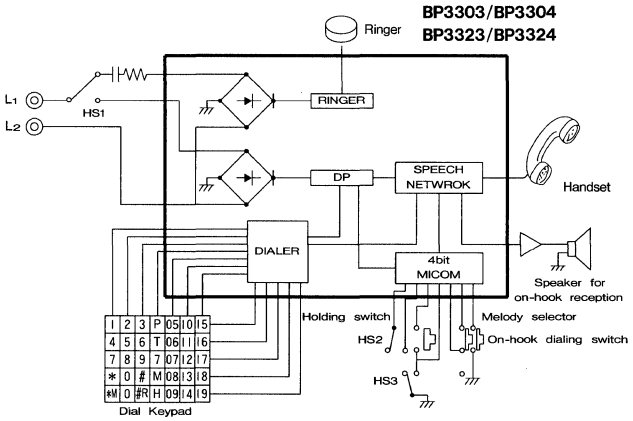
Application Telephone



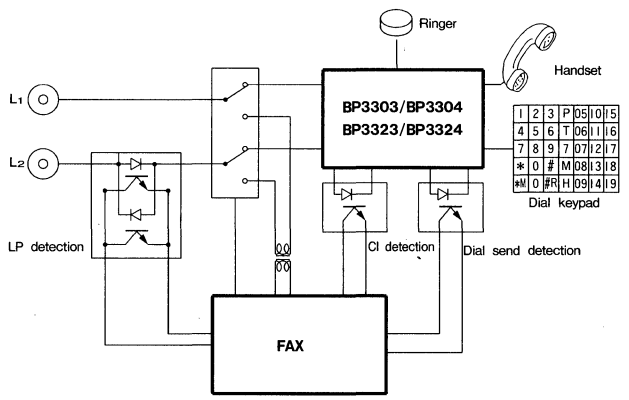
●For Multifunction Telephone Units (BP3300 Series)

Part No.	Function		Package	Dimensions (mm)	Features
BP3303	North America model	Redial,pause,mixed dial, hooking,piezoelectric ringer,dial memory,hold,holding tone, on-hook dial,on-hook reception, CI detection,dial output detection.	DIP48pin	73×35×16	Dial memory stores 20 numbers of 16 digits each. Holding tone is selectable from two melodies. (BP3303, BP3304, BP3324) Compatible with FAX with low DC resistance, CI and dial output signal detection. Telecommunication Teminal Equipment (BP3304, BP3324) Compatible with Bell standards (BP3303, BP3323)
BP3304	Japan model				
New BP3323	North America model		DIP46pin	70×36×16	
New BP3324	Japan model				

Multifunction telephone



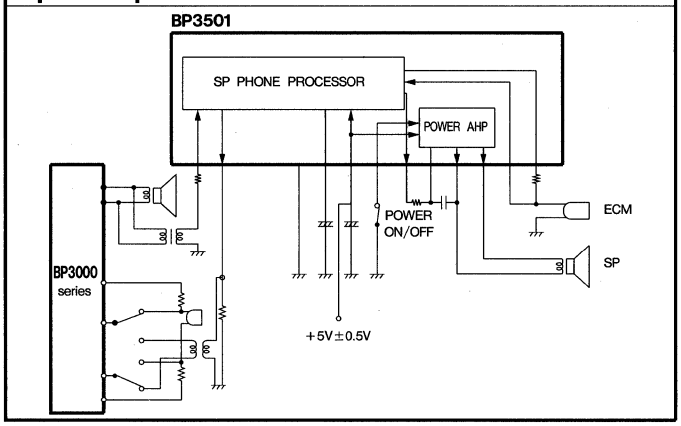
FAX terminal telephone



●Speakerphone Unit (BP3501)

Part No.	Function	Package	Dimensions (mm)	Features
BP3501	Speakerphone processor and power amplifier	SIP20pin	55×26.5×10	Single 5V power supply. Can drive telephone handset microphone and speaker. No howling.

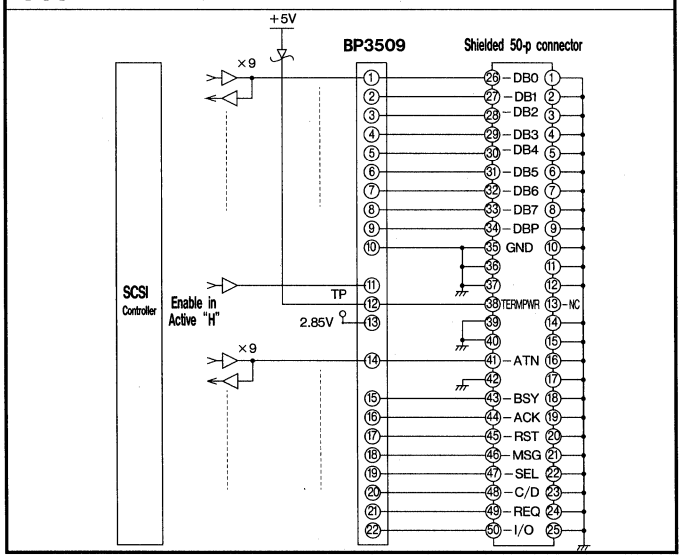
Speaker phone



●SCSI Active Terminator(BP3500 Series)

Part No.	Function	Package	Dimensions	Features
BP3507Z	SCSI Active Terminator	Surface Mounted 52pin (BX-IV N52)	25×21.2×5.1	Compatible with SCSI-Ⅰ and Ⅱ, 18 circuits, internal power supply, internal enable circuit
BP3509	SCSI Active Terminator	SIP22pin	42.5×12×5.3	Compatible with SCSI-Ⅰ and Ⅱ, 18 circuits, internal power supply, internal enable circuit

SCSI Active Terminator

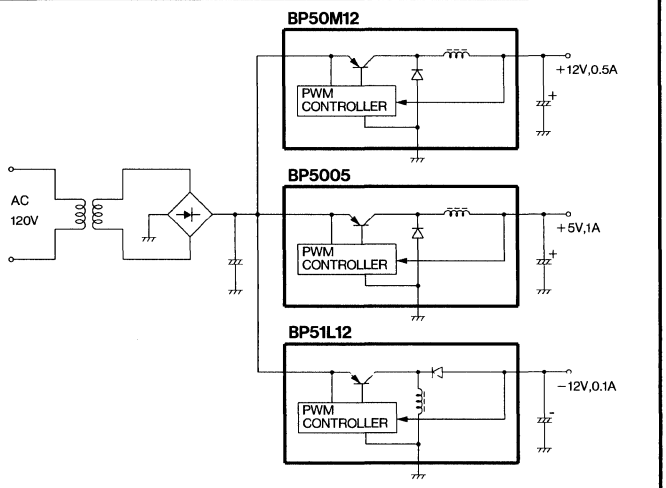


●DC-DC Converters (BP5000/BP5100 Series)

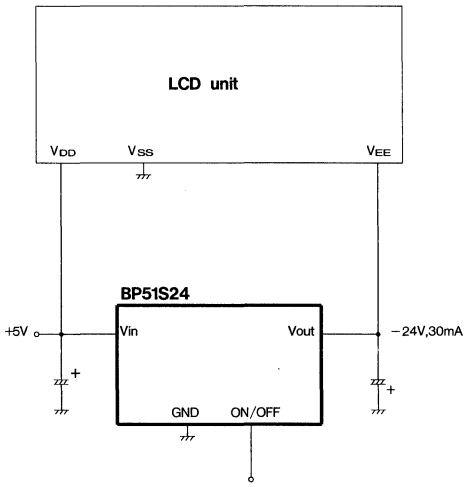
Part No.	Function	Package	Dimensions (mm)	Features
☆**BP51S24**	DC-DC converter for driving LCD −24V,30mA	SIP9pin	27×15.2×7	Overcurrent protection Requires only input and output capacitors. Variable output voltage small size
BP51L05	DC-DC converter with negative output: −5V,0.1A	SIP9pin	30×29×13	Wide input voltage range (8~20V) Requires only input/output capacitors. Compact design
BP51L12	DC-DC converter with negative output: −12V,0.1A	SIP9pin	30×29×13	
BP50M05	DC-DC converter 5V,0.5A	SIP9pin	32×29×15	Wide input voltage range (8~30V) Requires only input/output capacitors. Compact design
BP50M12	DC-DC converter 12V,0.5A	SIP9pin	32×29×15	Wide input voltage range (15~30V) Requires only input/output capacitors. Compact design
BP5005	DC-DC converter 5V,1A	SIP9pin	33×29×15	Wide input voltage range (8~30V) Requires only input/output capacitors. Compact disign

Note : 1.☆Under Development

FAX Power Circuit



LCD Power Circuit



●Multi Output DC-DC Converters (BP5400 Series)

Part No.	Function	Package	Dimensions (mm)	Features
☆BP5401	DC-DC converter,5V／1A,12V／1A,−12V／0.1A	DIP36pin	50×50×20	Wide input voltage range (15~30V) . A complete device requiring no external components at all. High-precision versions available with function trimming.

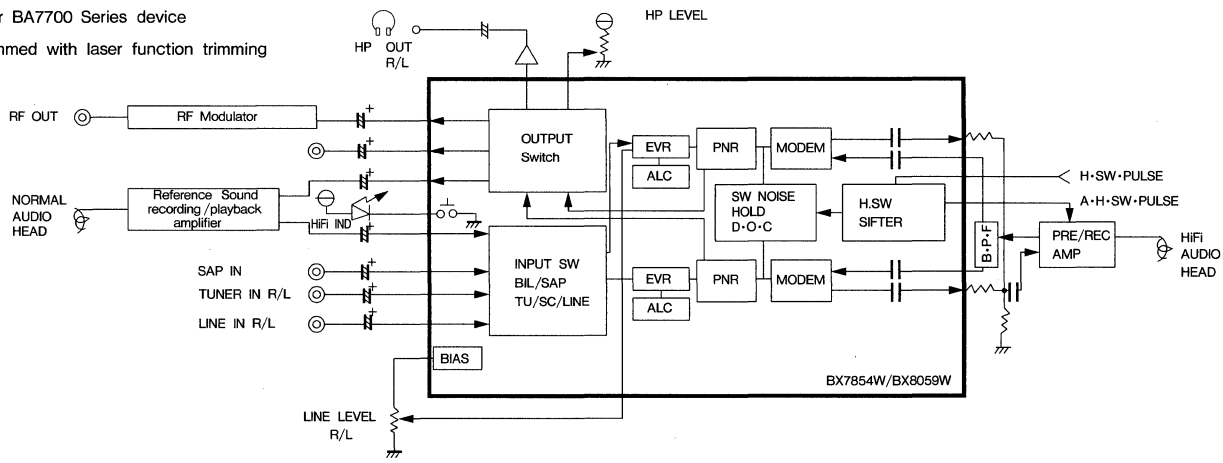
●VHS Hi-Fi Audio Processor Unit (BX7854W)

Part No.	Function	Package	Dimensions (mm)	Features
BX7854W (NTSC) BX8059W (PAL)	PNR,MODEM INPUT, output switcher, mixer amplifier for RF converter, automatic FM detection circuit, audio head pulse shifter, swiching noise differential compensation circuit.	DIP42pin	55.9×46.6×17.0	Contains all the time constants needed for major Hi-Fi audio blocks that include the BA7703K. A complete Hi-Fi block can be implemented with very few external components. A built-in tertiary active filter for audio band passing; Switching noise compensation by differential hold dual time constants provides efficient holding against delays due to BPF and maintains high sound quality. A semicustom device whit PAL compatibility, NTSC／PAL compatibility, or using a BA7700 Seriesdevice can be developed based on this product (NTSC compatible).

Hi-Fi Audio

●Uses our BA7700 Series device

●Fully trimmed with laser function trimming

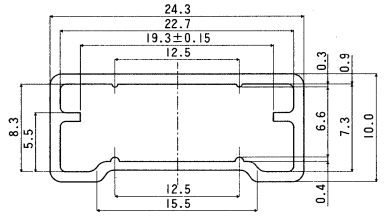


Packaging

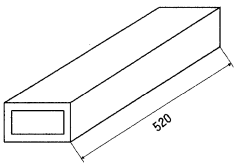
●Surface mounted high density reflow solderring-BX-Ⅳ

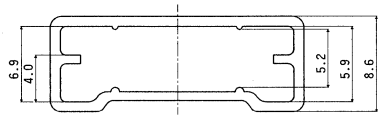
(Unit : mm)

Stick dimensions



Common magazine in E28,E52

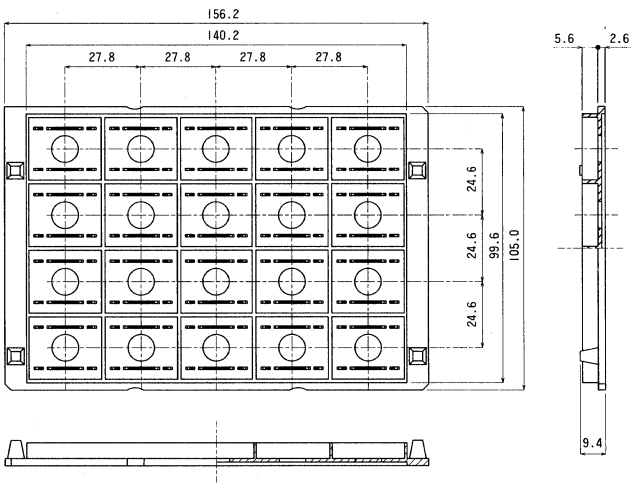




Common magazine in E28,E52

(Unit : mm)

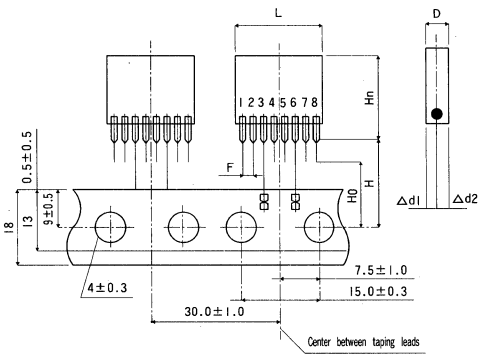
Common tray dimensions



●Radial mounting flow soldering-SIL

(Unit : mm)

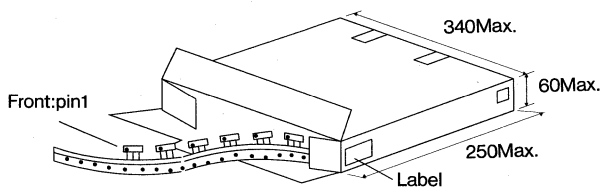
Taping Specifications



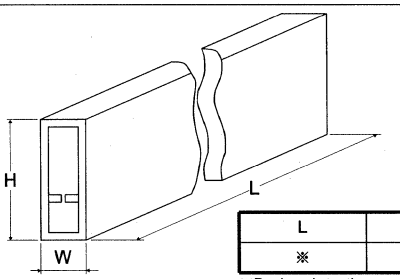
RHU						
F	H	H o	Hn	L	D	△d1△d2
2.54±0.2	18.0～20.0	16.0Min.	26.0Max.	22.5Max.	10Max.	5.0Max.
RH・RH6						
F	H	H o	Hn	L	D	△d1△d2
2.54±0.2	18.0～20.0	16.0Min.	16.0Max.	18.0Max.	10.0Max.	5.0Max.
RHB・RH6B						
F	H	H o	Hn	L	D	△d1△d2
2.54±0.2	18.0～20.0	16.0Min.	21.0Max.	18.0Max.	10Max.	5.0Max.

Flat box taping packing

Specified quantity in zigzag form in the following case.



Stick dimensions



L	W	H
※	※	※

※Produced to the custom specification .

Transistors

Surface Mounted

Leaded

Transistor Pakage Available

●Mini mold type

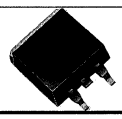
(Unit : mm)

Body dimension	1.6 × 0.8 1608 (0603)	2.0 × 1.25 2125 (0805)	2.9 × 1.3 2913 (1105)	2.9 × 1.6 2916 (1106)
Actual size				
3-Pin Enlarged (×3.0)	**EM3** 	**UMT** 	**SST (U. S. /European SOT-23)** 	**SMT (SC-59/Japanese SOT-23)** 
4-Pin Enlarged (×3.0)		**UM4** 		**SM4** 
5-Pin Enlarged (×3.0)		**UM5** 		**FMT (SOT-25)** 
6-Pin Enlarged (×3.0)		**UM6** 		**IMD (SOT-36)** 

Note : 4-digit number in dimensions column are sizes in mm and parenthetically in inches.

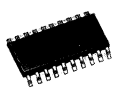
●Power type

(Unit : mm)

	MPT (MP4) (SOT-89)	CPT F5 (D PAK)	PSD (D^2 PAK)
Body dimension	4.5 × 2.5	6.5 × 5.5	10.1 × 9.9
Actual size			
External dimensions (×1.0)			

●Multi Devices

(Unit : mm)

	MFW10	MFW14	MF16	MF16N	MF20
Body dimension	6.5 × 5.5	6.5 × 5.5	10.0 × 4.4	8.2 × 4.6	12.5 × 5.4
Actual size					
External dimensions (×1.0)					

POWER MOSFET

Excellent switching capability with low on resistance, suitable for switching power supply or DC-DC converter.
Taping prducts for use on an automatic mounting machine are also available.

Quick reference

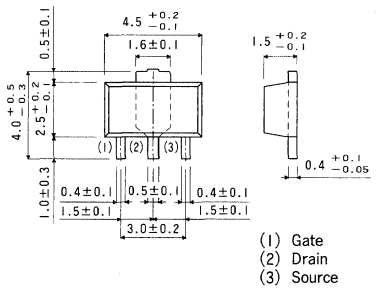
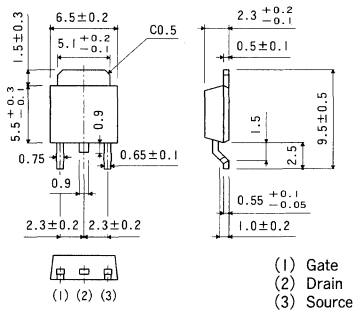
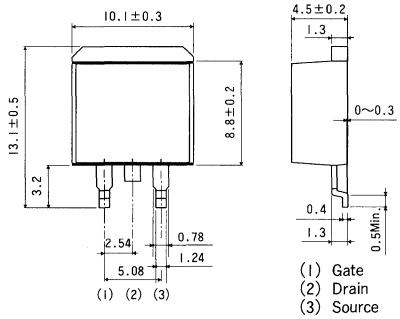
V_{DSS} (V) / I_D (A)	30	60	450
2	2SK2103 (MPT)	2SK1973 (CPT F5) 2SK2094 (CPT F5)	
5		2SK2104 (CPT F5)	2SK2042 (PSD)
10		2SK2041 (PSD)	

MPT • CPT F5 • PSD

Application	Package MPT	Package CPT F5	Package PSD	V_{DSS} (V)	I_D (A)	P_D (W)	V_{GS} (th) (V)	V_{DS} (V)	I_D (mA)
	Part No.								
Switching	–	2SK1973	–	60	2	10	2.0~4.0	10	1
	–	2SK2094	–	60	2	10	1.0~2.5	10	1
	–	☆2SK2104	–	60	5	10	1.0~2.5	10	1
	2SK2103	–	–	30	2	2★	1.0~2.5	10	1
	–	–	☆2SK2041	60	10	35	1.0~2.5	10	1
	–	–	☆2SK2042	450	5	35	2.0~4.0	10	1

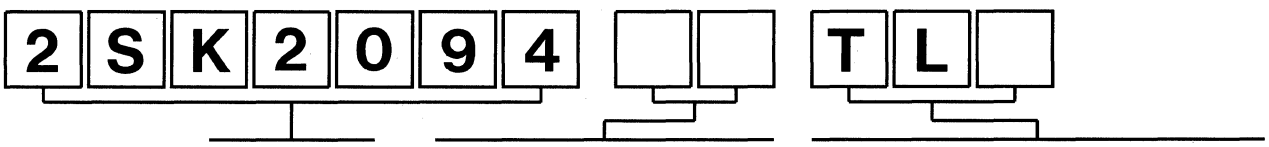
Notes : 1. ☆Under development 2. ※ F5 denotes surface mount version of CPT (SC-64) 3. ★Package mounted on ceramic 40×40×0.7mm

(Unit : mm)

Package	MPT (SOT-89)	CPT F5 (D PAK)	PSD (D^2 PAK)
Dimensions			
Actual size			
External dimensions (×1.0)			

●Product Designation

Specify part No, packaging specification code.



Package	MPT	CPT F5	PSD
Code	T101	TL	TL
	T100	TR	TR

MPT • CPT F5 • PSD

●Packaging

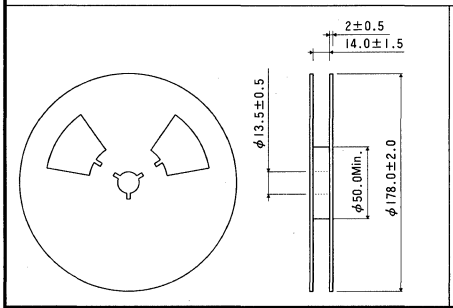
Package	Packaging type	Packaging style	Direction	Code	Quantity /Package (pcs)	Quantity /Unit (pcs)
MPT	Taping	Embossed reel tape	Pin 3 side on sprocket hole side	T100	1,000	–
			Fin on sprocket hole side	T101		
CPT F5	Taping	Embossed reel tape	Fin on sprocket hole side	TL	2,500	–
			Pin 3 side on sprocket hole side	TR		
	Bulk	Polyethylene bag	–	–	2,000	200
PSD	Taping	Embossed reel tape	Fin on sprocket hole side	TL	1,000	–
			Pin 3 side on sprocket hole side	TR		
	Bulk	Polyethylene bag	–	–	500	100

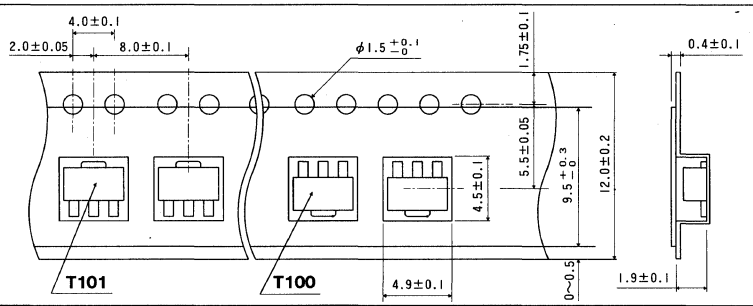
●Packaging Specifications

(Unit : mm)

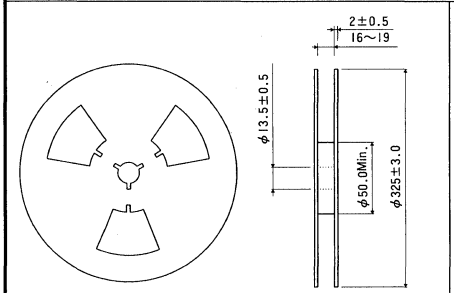
Reel | **Tape**

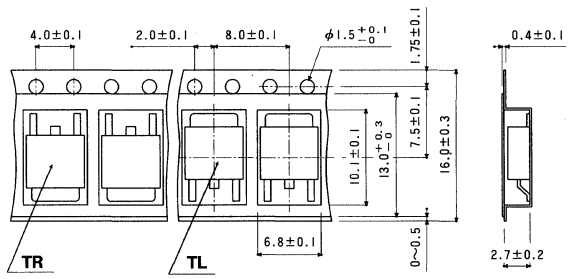
MPT (SOT-89)



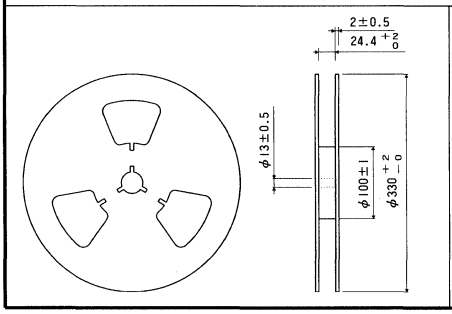


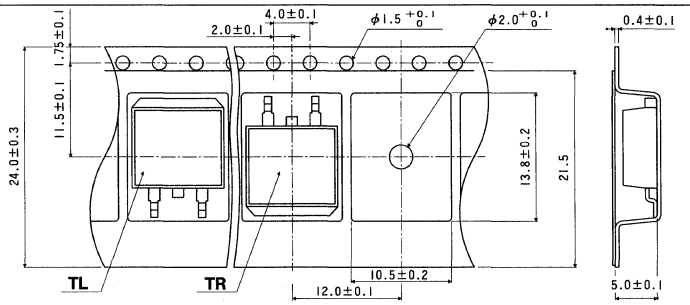
CPT F5 (D PAK)





PSD (D^2 PAK)





Transistor Quick reference

Leaded Page116

Package-Application

Application	※ V_{CEO} (V) ※※ V_{CES} ※※※ V_{CER} ※※※ V_{DSS}	Package					
		EM3	UMT	SMT	MPT	CPT F5	PSD
		Part No.					
Low Noise	40			2SA1037AKLN(E) 2SC2412KLN(E)			
	50			2SA1037AKLN(RS) 2SC2412KLN(RS)			
	120			2SA1455K 2SC3722K			
Pre Amp	25		2SC4723	2SC4642K			
	50	2SA1774 2SC4617	2SA1576A 2SC4081	2SA1037AK 2SC2412K			
	120		2SA1579 2SC4102	2SA1514K 2SC3906K			
Driver	31±4				2SD2167		
	32		2SA1577 2SC4097	2SA1036K 2SC2411K 2SB1197K 2SD1781K 2SB1051K	2SB1132 2SD1664 2SB1188 2SD1766	2SB1182 2SD1758	
	50		2SD1949	2SD1484K	2SA1900 2SC5053	2SB1184 2SD1760	
	80			2SB1198K 2SD1782K	2SB1189 2SD1767 2SB1260 2SD1898	2SB1181 2SD1733 2SB1516	
	100					2SB1535	
	120				2SC4132		
	160				2SD2211	2SB1275 2SD1918	
Low V_{CE}(sat)	15			2SD1757K			
	20				2SB1424 2SD2150		
	50				2SA1797 2SC4672		
	60				2SB1561 2SD2391		☆2SA1870 ☆2SC4939
Strobo Flash Low V_{CE}(sat)	20				2SB1308 2SD1963 2SB1386 2SD2098	2SA1834 2SB1412 2SD2118	
Darlington	※ 32			2SB852K 2SD1383K			
	※※ 40					2SB1183 2SD1759	
	※ 60				2SD1834		
	60±10				2SD2212	2SD2143	
	80					2SB1474	
	90^{+20}_{-10}				2SD2170		
	100				2SD2195	2SB1316 2SD1980	
Chroma	300			2SC4061K			
High h_{FE} High V_{EBO}	20			2SD2114K	2SB1427		
	25				2SD2153		
	50		2SD2351	2SD2226K			
	60					2SD2318	
SW	※ 20		2SC4700	2SC4699K			
Switching	※※※ 30				2SK2103		
	※※※ 60					2SK1973 2SK2094	☆2SK2041
	※※※ 450						☆2SK2042
FM IF AM RF	20	2SA1821	2SA1808	2SA1733K			
	25	2SC4618	2SC4098	2SC2413K			
	32		2SC4128	2SC4018K			
FM RF Mix. OSC.	20	2SC4649	2SC4099	2SC2059K			
RF SW	6		2SC4773 2SC4774	2SC4326LK 2SC4713K			
	10	2SA1885 2SC4997	2SA1886 2SC4998				
TV Tuner Mix. OSC.	11	2SC4726	2SC4083	2SC3838K			
	18	2SC4725	2SC4082	2SC3837K			
	19	2SC4619	2SC4100	2SC3082K			
	20		2SC4084	2SC3839K			
	25		2SC4103	2SC3802K			
Tuner IF	25		2SC4772	2SC4771K			
High Voltage SW	400				2SA1690 2SA1759 2SA1812 2SC4505	2SA1727 2SA1862	☆2SC4937 ☆2SC4938
	600					2SA1807	

Notes : 1. ☆Under development

3. Complementary pairs (PNP/NPN) are represented by symbol (to the left of the part numbers.

Transistor Quick reference

V_{CEO}-Ic

EM3 (1608 Type)

Ic (mA) \ V_{CEO} (V)	10	11	18	19	20	25	50
20					2SC4649		
30					2SA1821		
50		2SC4726	2SC4725	2SC4619		2SC4618	
100	2SA1885 2SC4997						
150							2SA1774 2SC4617

Ref. Page EM3 Page 76

UMT (2125 Type/SC-70)

Ic (mA) \ V_{CEO} (V)	6	10	11	18	19	20	25	32	50	120
20						2SC4099				
30						2SA1808	2SC4103			
50	2SC4773 2SC4774		2SC4083	2SC4082	2SC4100	2SC4084	2SC4098 2SC4772			2SA1579 2SC4102
100		2SA1886 2SC4998					2SC4723	2SC4128		
150									2SA1576A 2SC4081 2SD2351	
200						2SC4700				
500								2SA1577 2SC4097	2SD1949	

Ref. Page UMT Page 76

SMT (2916 Type/SC-59)

Ic (mA) \ V_{CEO} (V)	6	11	15	18	19	20	25	32	40	50	80	120	300
20						2SC2059K							
30						2SA1733K	2SC3802K						
50	2SC4326LK 2SC4713K	2SC3838K		2SC3837K	2SC3082K	2SC3839K	2SC2413K 2SC4771K					2SA1455K 2SA1514K 2SC3722K 2SC3906K	
100							2SC4642K	2SC4018K					2SC4061K
150									2SA1037AKLN(E) 2SC2412KLN(E)	2SA1037AKLN(RS) 2SC2412KLN(RS) 2SA1037AK 2SC2412K 2SD2226K			
200						2SC4699K							
300								2SB852K 2SD1383K					
500			2SD1757K			2SD2114K		2SA1036K 2SC2411K		2SD1484K	2SB1198K 2SD1782K		
800								2SB1197K 2SD1781K					
1000								2SB1051K					

Ref. Page SMT Page 76

Notes : 1. Letter(s) in the ( ) to the right of the part number represents available h_{FE} ranking codes.
2. [ ] : Darlington

MPT (SC-62/SOT-89)

Ref. Page EM3 Page 79

Ic(A) / V_{CEO}(V) V_{DSS}(V) I_D(A)	20	25	31±4	30	32	50	60	60±10	80	90 $^{+20}_{-10}$	100	120	160	400
0.1														2SA1690 2SA1759 2SC4505
0.5														2SA1812
0.7									2SB1189 2SD1767					
1					2SB1132 2SD1664	2SA1900 2SC5053	2SD1834		2SB1260 2SD1898					
1.5													2SD2211	
2	2SB1427	2SD2153	2SD2167	2SK2103	2SB1188 2SD1766	2SA1797 2SC4672	2SB1561 2SD2391	2SD2212		2SD2170	2SD2195	2SC4132		
3	2SB1308 2SB1424 2SD1963 2SD2150													
5	2SB1386 2SD2098													

Notes : 1. ▭ : MOSFET
2. ┈┈ : Darlington

CPT F5* (SC-63)

Ref. Page EM3 Page 79

Ic(A) / V_{CEO}(V) V_{DSS}(V) I_D(A)	20	32	40	50	60	60±10	80	100	160	400	600
0.5										2SA1727	
1							2SB1181 2SD1733				2SA1807
1.5									2SB1275 2SD1918		
2		2SB1182 2SD1758	2SB1183 2SD1759		2SK1973 2SK2094	2SD2143		2SB1316 2SD1980		2SA1862	
3				2SB1184 2SD1760	2SD2318		2SB1516				
4							2SB1474				
5	2SB1412 2SD2118				2SC5103						
6								2SB1535			
10	2SA1834 2SC5001										

Notes : 1. *CPT F5 is the surface mount version of CPT (leaded) with F5 added to the part number.
2. ▭ : MOSFET
3. ┈┈ : Darlington

PSD

Ref. Page EM3 Page 79

Ic(A) / V_{CEO}(V) V_{DSS}(V) I_D(A)	60	400	450
2		☆2SC4937	
5		☆2SC4938	☆2SK2042
10	☆2SK2041		
12	☆2SA1870 ☆2SC4939		

Notes : 1. ▭ : MOSFET
2. ☆Under development

Transistors

SST (U. S. /European SOT-23) • SMT (SC-59/Japanese SOT-23)

●NPN Transistors

General purpose small signal amplifiers

SST	SMT	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} @VCB Max.	h_{FE} Min.	Max.	@Ic & V_{CE}	V_{CE} (sat) Max.	& V_{BE} (sat) Max.	@ Ic	Cob Max.	f_T Min.	@ Ic	NF	Ic Max.	DIE NO.	MARKING
SST1130	MMST1130	30V	25V	5V	50nA 20V	120	360	2mA 1V	0.3V	0.95V	50mA	4pF				200mA	C22	R1C
						60		50mA 1V										
SST5088	MMST5088	35V	30V	4.5V	100nA 30V	300	900	100μA 5V	0.3V	0.8V	10mA	4pF	50MHz	0.5mA	3dB	200mA	C22	R1Q
						350		1.0mA 5V		($V_{BE\ (on)}$)								
						300		10mA 5V										
SST5089	MMST5089	30V	25V	4.5V	100nA 25V	400	1200	0.1mA 5V	0.5V	0.8V	10mA	4pF	50MHz	0.5mA		200mA	C22	R1R
						450		1mA 5V		($V_{BE\ (on)}$)								
						400		10mA 5V										
SST5210	—	50V	50V	4.5V	50nA 35V	200	600	100μA 5V	0.7V	0.85V	10mA	4pF	30MHz	0.5mA	2dB	200mA	C22	RSR
						250		1.0mA 5V		($V_{BE\ (on)}$)								
						250		10mA 5V										
SST6428	MMST6428	60V	50V	6V	100nA 30V	250		0.01mA 5V	0.2V		10mA	3pF	100MHz	1mA		200mA	C22	R1K
						250		0.1mA 5V										
						250	650	1mA 5V	0.6V		100mA							
						250		10mA 5V										
SST6838	MMST6838	50V	40V	5V	0.5μA 30V	200		1mA 5V	0.4V		50mA	3.5pF	50MHz	2mA		200mA	C22	RBR
						150		10mA 5V										
SST7208	—	60V	60V	5V	0.2μA 60V (CER)	75		10mA 5V	0.5V	1.2V	100mA		180MHz	Typ.		100mA	C22	RBQ
						100		1mA 5V	0.4V	1.0V	10mA							
									0.3V	0.95V	1mA							
SSTTIS97	—	60V	40V	6V	50nA 40V	250	700	0.1mA 5V		0.65V	0.1mA	4pF			2dB	200mA	C22	R97
										($V_{BE\ (on)}$)								
SSTA20	MMSTA20	40V	40V	5V	100nA 30V	120		2mA 1V	0.25V	0.95V	10mA	4pF	125MHz	5mA		200mA	C22	R1C

General purpose amplifiers and switches

SST	SMT	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} @VCB Max.	h_{FE} Min.	Max.	@Ic & V_{CE}	V_{CE} (sat) Max.	& V_{BE} (sat) Max.	@ Ic	Cob Max.	f_T Min.	@ Ic	t_{off} Max.	Ic Max.	DIE NO.	MARKING
SST2222	MMST2222	60V	30V	5V	100nA 50V	35		0.1mA 10V				8pF	250MHz	20mA		600mA	C31	R1B
						50		1.0mA 10V										
						75		10mA 10V	0.4V	1.3V	150mA							
						100	300	150mA 10V	1.6V	2.6V	500mA							
						50		150mA 1V										
						30		500mA 10V										
SST2222A	MMST2222A	75V	40V	6V	100nA 60V	35		0.1mA 10V				8pF	250MHz	20mA	285ns	600mA	C31	R1P
						50		1.0mA 10V										
						75		10mA 10V	0.3V	1.2V	150mA							
						100	300	150mA 10V	1V	2V	500mA							
						50		150mA 1V										
						30		500mA 10V										
SST3904	MMST3904	60V	40V	6V	50nA 30V (CEX)	40		0.1mA 1V				4pF	300MHz	10mA	250ns	200mA	C37	R1A
						70		1.0mA 1V										
						100	300	10mA 1V	0.2V	0.85V	10mA							
						60		50mA 1V	0.3V	0.95V	50mA							
						30		100mA 1V										
SST4124	MMST4124	30V	25V	5V	50nA 20V	120	360	2.0mA 1V	0.3V	0.95V	50mA	4pF	300MHz	10mA		200mA	C37	RZC
						60		50mA 1V										
SST4400	—	60V	40V	6V	100nA 35V	20		1.0mA 1V			150mA	6.5pF	200MHz	20mA	255ns	600mA	C31	R2Z
						40		10mA 1V	0.4V	0.95V								
						50	150	150mA 1V	0.75V	1.2V								
						20		500mA 2V			500mA							
SST4401	MMST4401	60V	40V	6V	100nA 35V	20		0.1mA 1V			150mA	6.5pF	250MHz	20mA	225ns	600mA	C31	R2X
						40		1mA 1V	0.4V	0.95V								
						80		10mA 1V	0.75V	1.2V								
						100	300	150mA 1V			500mA							
						40		500mA 2V										

Medium power amplifiers

SST	SMT	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} @VCB Max.	h_{FE} Min.	Max.	@Ic & V_{CE}	V_{CE} (sat) Max.	& V_{BE} (sat) Max.	@ Ic	Cob Max.	f_T Min.	@ Ic	t_{off} Max.	Ic Max.	DIE NO.	MARKING
SSTA05	–	60V	60V	4V	100nA 60V	100		10mA 1V	0.25V	1.2V ($V_{BE(on)}$)	100mA		100MHz	10mA		500mA	D16	R1H
						100		100mA 1V										
SSTA06	MMSTA06	80V	80V	4V	100nA 80V	100		10mA 1V	0.25V	1.2V ($V_{BE(on)}$)	100mA		100MHz	10mA		500mA	D16	R1G
						100		100mA 1V										

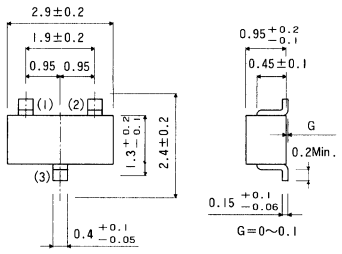
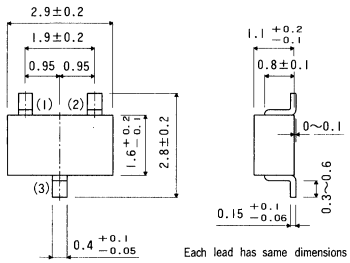
Darlington amplifiers

SST	SMT	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} @VCB Max.	h_{FE} Min.	Max.	@Ic & V_{CE}	V_{CE} (sat) Max.	& V_{BE} (sat) Max.	@ Ic	Cob Max.	f_T Min.	@ Ic	NF	Ic Max.	DIE NO.	MARKING
SST6426	–	40V	40V	12V	50nA 30V	20K	200K	10mA 5V	1.2V		5mA	7pF			10dB	500mA	D25	RX7
						30K	300K	100mA 5V	1.5V	2.0V	500mA							
						20K	200K	500mA 5V										
SST6427	–	40V	40V	12V	50nA 30V	10K	100K	10mA 5V	1.2V		50mA	7pF			10dB	500mA	D25	R1J
						20K	200K	100mA 5V	1.5V	2.0V	500mA							
						14K	140K	500mA 5V										
SSTA13	MMSTA13	(CES) 30V		10V	100nA 30V	5K		10mA 5V	1.5V		100mA	10pF	125MHz	10mA		500mA	D25	R1M
						10K		100mA 5V										
SSTA14	MMSTA14	(CES) 30V		10V	100nA 30V	10K		10mA 5V	1.5V		100mA	10pF	125MHz	10mA		500mA	D25	R1N
						20K		100mA 5V										
SSTA28	MMSTA28	(CES) 80V		12V	100nA 60V	10K		10mA 5V	1.5V		100mA	8pF	125MHz	10mA		500mA	D69	RAT
						10K		100mA 5V										
SSTA29	–	(CES) 100V		12V	100nA 80V	10K		10mA 5V	1.2V		10mA	8pF	125MHz	10mA		500mA	D69	RAF
						10K		100mA 5V										

RF／UHF／VHF amplifiers

SST	SMT	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} @VCB Max.	h_{FE} Min.	Max.	@Ic & V_{CE}	V_{CE} (sat) Max.	& V_{BE} (sat) Max.	@ Ic	Cob Max.	f_T Min.	@ Ic	NF	Ic Max.	DIE NO.	MARKING
SST1139	MMST1139	30V	25V	3V	100nA 25V	60		4mA 10V	0.5V		4mA	1pF	850MHz	4mA		30mA	C104	R39
SST5424	MMST5424	30V	20V	3V	100nA 18V (CES)	60	150	2.5mA 4V	0.4V	1.0V	10mA	1.2pF	600MHz	2.5mA		50mA	C33	R24
SST8245	MMST8245	30V	20V	3V	100nA 18V (CES)	60	150	2.5mA 4V	0.4V	1.0V	10mA	1.2pF	600MHz	2.5mA		50mA	C33	R3B
SST918	–	30V	15V	3V	100nA 15V	20		3mA 1V	0.4V	1.0V	10mA	1.7pF	600MHz	4mA	6dB	50mA	C33	R3B
SST918S	MMST918S	30V	15V	3V	100nA 15V	75		3mA 1V	0.4V	1.0V	10mA	1.7pF	600MHz	4mA		50mA	C33	RVY

(Unit : mm)

Package	SST (U. S. ／European SOT-23)	SMT (SC-59／Japanese SOT-23)
Dimensions	 (1) Emitter (2) Base (3) Collector	 (1) Emitter (2) Base (3) Collector
Actual size		
Enlarged (×3.0)		

Transistors

SST (U. S. /European SOT-23) • SMT (SC-59/Japanese SOT-23)

●PNP Transistors

General purpose small signal amplifiers

SST	SMT	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} @VCB Max.	h_{FE} Min.	Max.	@Ic & V_{CE}	V_{CE} (sat) Max.	& V_{BE} (sat) Max.	@ Ic	Cob Max.	f_T Min.	@ Ic	t_{off}/NF Max.	Ic Max.	DIE NO.	MARKING
SST5086	MMST5086	50V	50V	3V	100nA 40V	150	500	100μA 5V	0.3V		10mA	6pF	40MHz	0.5mA	NF 3dB	200mA	A32	R2P
						150		1.0mA 5V										
						150		10mA 5V										
SST5087	MMST5087	50V	50V	3V	100nA 40V	250	800	100μA 5V	0.3V		10mA	6pF	40MHz	0.5mA	NF 2dB	200mA	A32	R2Q
						250		1.0mA 5V										
						250		10mA 5V										
SST5101	MMST5101	60V	40V	6V	100nA 55V	200	400	10mA 5V	0.15V		10mA	8pF	125MHz	2mA		200mA	A32	1T1
SST6839	MMST6839	50V	40V	5V		100		1mA 5V	0.5V		100mA	3.5pF	50MHz	2mA		200mA	A32	RFQ
						100		100mA 5V										
SST7157	MMST7157	60V	60V	5V	100nA 25V	100		1mA 5V	0.25V		100mA					200mA	A32	R2Q
						100		100mA 5V										
SST8598	MMST8598	60V	60V	5V	100nA 60V	100	300	1mA 5V	0.5V		100mA	8pF	150MHz	10mA		200mA	A32	R2K
SSTA70	MMSTA70	60V	60V	5V	100nA 30V	160	400	5mA 10V	0.2V		100mA	5pF	125MHz	5mA		200mA	A32	R2C

General purpose amplifiers and switches

SST	SMT	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} @VCB Max.	h_{FE} Min.	Max.	@Ic & V_{CE}	V_{CE} (sat) Max.	& V_{BE} (sat) Max.	@ Ic	Cob Max.	f_T Min.	@ Ic	t_{off} Max.	Ic Max.	DIE NO.	MARKING
SST2907	MMST2907	60V	40V	5V	100nA 50V	35		0.1mA 10V				8pF	200MHz	50mA	180ns	600mA	A31	R2B
						50		1.0mA 10V	0.4V	1.3V	150mA							
						75		10mA 10V	1.6V	2.6V	500mA							
						100	300	150mA 10V										
						30		500mA 10V										
SST2907A	MMST2907A	60V	60V	5V	100nA 50V	75		0.1mA 10V				8pF	200MHz	50mA	180ns	600mA	A31	R2F
						100		1.0mA 10V										
						100		10mA 10V	0.4V	1.3V	150mA							
						100	300	150mA 10V	1.6V	2.6V	500mA							
						50		500mA 10V										
SST3906	MMST3906	40V	40V	5V	50nA 30V (CES)	60		0.1mA 1V				4.5pF	250MHz	10mA	300ns	200mA	A38	R2A
						80		1.0mA 1V										
						100	300	10mA 1V	0.25V	0.85V	10mA							
						60		50mA 1V	0.4V	0.95V	50mA							
						30		100mA 1V										
SST4126	MMST4126	25V	25V	4V	50nA 20V	120	360	2mA 1V	0.4V	0.95V	50mA	4.5pF	250MHz	10mA		200mA	A38	RVZ
						60		50mA 1V										
SST4403	MMST4403	40V	40V	5V	100nA 35V	30		0.1mA 1V				8.5pF	200MHz	20mA	255ns	600mA	A31	R2T
						60		1mA 1V										
						100		10mA 1V	0.4V	0.95V	150mA							
						100	300	150mA 2V	0.75V	1.3V	500mA							
						20		500mA 2V										
SSTTIS93	–	40V	40V	5V	100nA 20V	100	300	50mA 2V	0.25V		50mA					800mA	A31	R93

Medium power amplifiers

SST	SMT	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} @VCB Max.	h_{FE} Min.	Max.	@Ic & V_{CE}	V_{CE} (sat) Max.	& V_{BE} (sat) Max.	@ Ic	Cob Max.	f_T Min.	@ Ic	t_{off} Max.	Ic Max.	DIE NO.	MARKING
SSTA55	–	60V	60V	4V	100nA 60V	100		10mA 1V	0.25V	1.2V	100mA		50MHz	100mA		500mA	B93	R2H
						100		100mA 1V										
SSTA56	MMSTA56	80V	80V	4V	100nA 80V	100		10mA 1V	0.25V	1.2V	100mA		50MHz	100mA		500mA	B93	R2G
						100		100mA 1V										

Darlington amplifiers

SST	SMT	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} @VCB Max.	h_{FE} Min.	Max.	@Ic & V_{CE}	V_{CE} (sat) Max.	& V_{BE} (sat) Max.	@ Ic	Cob Max.	f_T Min.	@ Ic	t_{off}/NF Max.	Ic Max.	DIE NO.	MARKING
SSTA63	MMSTA63	30V	30V (CES)	10V	100nA 30V	5K		10mA 5V	1.5V		100mA	7pF	125MHz	10mA	3dB	300mA	B25	R2U
						10K		100mA 5V										
SSTA64	MMSTA64	30V	30V (CES)	10V	100nA 30V	10K		10mA 5V	1.5V		100mA	7pF	125MHz	10mA	3dB	300mA	B25	R2V
						20K		100mA 5V										
SSTA65	–	30V	(CES) 30V	8V	100nA 30V	50K		10mA 5V	1.5V		100mA		100MHz	10mA	2dB	300mA	B25	R65
						20K		100mA 5V										

SST (U.S. /European SOT-23)

Function	Part No.	Polarity	BV_{CEO} (V)	Ic (mA)	h_{FE}	@Condition	f_T (MHz)	Cob (pF)
Pre Amp	**BC817-16**	NPN	45	800	110~250	100mA/ 1V	150	6
	BC817-25	NPN	45	800	160~400	100mA/ 1V	150	6
	BC847A	NPN	45	100	110~230	2mA/ 5V	200	3
	BC847B	NPN	45	100	200~450	2mA/ 5V	200	3
	BC847C	NPN	45	100	450~800	2mA/ 5V	200	3
	BC848A	NPN	30	100	110~230	2mA/ 5V	200	3
	BC848B	NPN	30	100	200~450	2mA/ 5V	200	3
	BC848C	NPN	30	100	420~800	2mA/ 5V	200	3
	BC857A	PNP	45	100	110~230	2mA/ 5V	250	4.5
	BC857B	PNP	45	100	210~480	2mA/ 5V	250	4.5
	BC858A	PNP	30	100	110~250	2mA/ 5V	250	4.5
	BC858B	PNP	30	100	210~480	2mA/ 5V	250	4.5
	BC858C	PNP	30	100	420~800	2mA/ 5V	250	4.5
	BCW29	PNP	32	100	110~260	2mA/ 5V		7
	BCW30	PNP	32	100	210~500	2mA/ 5V		7
	BCW31	NPN	32	100	110~230	2mA/ 5V		4
	BCW32	NPN	32	100	200~450	2mA/ 5V		4
	BCW33	NPN	32	100	420~800	2mA/ 5V		4
Low Noise Amp	**BCW60A**	NPN	32	200	110~230	2mA/ 5V	125	4.5
	BCW60B	NPN	32	200	180~310	2mA/ 5V	125	4.5
	BCW60C	NPN	32	200	260~460	2mA/ 5V	125	4.5
	BCW60D	NPN	32	200	380~630	2mA/ 5V	125	4.5
	BCW61A	PNP	32	200	110~230	2mA/ 5V	180	5
	BCW61B	PNP	32	200	180~310	2mA/ 5V	180	5
	BCW61C	PNP	32	200	250~460	2mA/ 5V	180	5
	BCW61D	PNP	32	200	380~630	2mA/ 5V	180	5
Driver	**BCW65A**	NPN	32	800	100~250	100mA/ 1V	100	12
	BCW65B	NPN	32	800	160~400	100mA/ 1V	100	12
	BCW65C	NPN	45	800	250~630	100mA/ 1V	100	12
	BCW68F	PNP	45	800	100~250	100mA/ 1V	100	18
	BCW68G	PNP	45	800	160~400	100mA/ 1V	100	18
Low Noise Amp	**BCW69**	PNP	45	100	110~260	2mA/ 5V		7
	BCW70	PNP	45	100	210~500	2mA/ 5V		7
	BCW71	NPN	45	100	110~230	2mA/ 5V		4
	BCW72	NPN	45	100	200~450	2mA/ 5V		4
Driver	**BCX17**	PNP	45	500	100~600	100mA/ 1V		
	BCX18	PNP	25	500	100~600	100mA/ 1V		
	BCX19	NPN	45	500	100~600	100mA/ 1V		
	BCX20	NPN	25	500	100~600	100mA/ 1V		
Low Noise Amp	**BCX70G**	NPN	45	200	110~220	2mA/ 5V	125	4.5
	BCX70H	NPN	45	200	180~310	2mA/ 5V	125	4.5
	BCX70J	NPN	45	200	250~460	2mA/ 5V	125	4.5
	BCX70K	NPN	45	200	380~630	2mA/ 5V	125	4.5
	BCX71G	PNP	45	200	110~220	2mA/ 5V	180	6
	BCX71H	PNP	45	200	140~310	2mA/ 5V	180	6
	BCX71J	PNP	45	200	250~460	2mA/ 5V	180	6
Mix Osc.	**BFS17**	NPN	15	50	20~150	2mA/ 5V	1000	1.5
TV Tuner	**BFS20**	NPN	20	25	40~	7mA/10V	275	0.8

SST

●Packasing

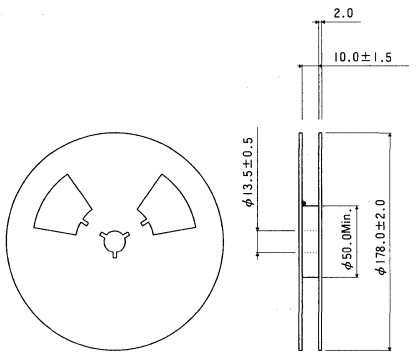
Package	Packaging type	Packaging condition	Direction	Code	Quantity/Package (pcs)	Quantity/Unit (pcs)
SST	Taping	Embossed reel tape	Pin 1 side on sprocket hole side	T116	3,000	–
			Pin 2 side on sprocket hole side	T117		
SMT	Taping	Embossed reel taping	Pin 1 side on sprocket hole side	T146	3,000	–
			Pin 2 side on sprocket hole side	T147		

●Packaging specifications

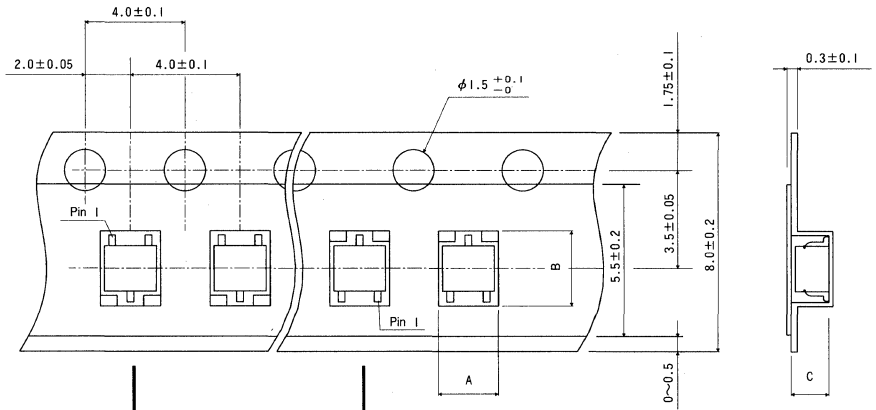
(Unit : mm)

SST · SMT

Reel



Tape



Package	Code
SST	T117
SMT	T147

Package	Code
SST	T116
SMT	T146

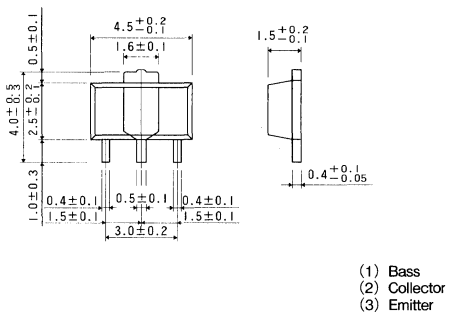
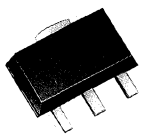
Package	Size		
	A	B	C
SST	3.15±0.1	2.85±0.1	1.4±0.1
SMT	3.1±0.1	3.2±0.1	1.35±0.1

MPT (ST-89) Types for U. S. A.

Part No.	Function	V_{CEO} (V)	I (A)	PC (W)	f_T (MHz)	Cob (pF)	h_{FE}
RXT2907A	Driver	−60	−0.6	1*	200	8	100～300
RXT3906		−40	−0.2	1*	250	4.5	100～400
BCX53		−80	−1	1*	100	20	40～250
RXT2222A		40	0.6	1*	300	8	100～300
RXT3904		40	0.2	1*	300	4	100～300
BCX56		80	1	1*	100	20	40～250
RXT-A64	Darlington Driver	−30	−0.5	1*	125	4	20K～
RXT-A76		−50	−0.5	1*	125	4	20K～
RXT-A14		40	0.5	1*	−	5.4	20K～
RXT-A28		80	0.5	1*	125	5	10K～

Note : 1.*Package mounted on ceramic 14×18×0.7mm

(Unit : mm)

Package	MPT (SOT-89) TYPES for U. S. A.
Dimensions	 (1) Bass (2) Collector (3) Emitter
Actual size	
Enlarged (×3.0)	

●Packaging

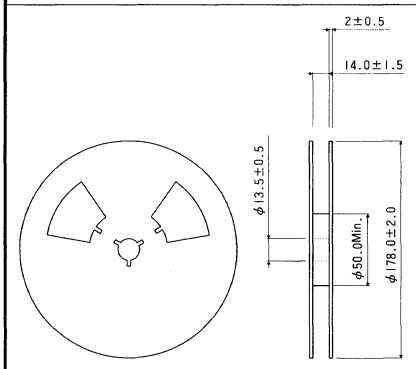
Package	Packaging type	Packaging style	Direction	Code	Quantity / Package (pcs)	Quantity / Unit (pcs)
MPT	Taping	Embossed reel tape	Pin 3 side on sprocket hole side	T100	1,000	−
			Fin on sprocket hole side	T101		

●Packaging Specifications

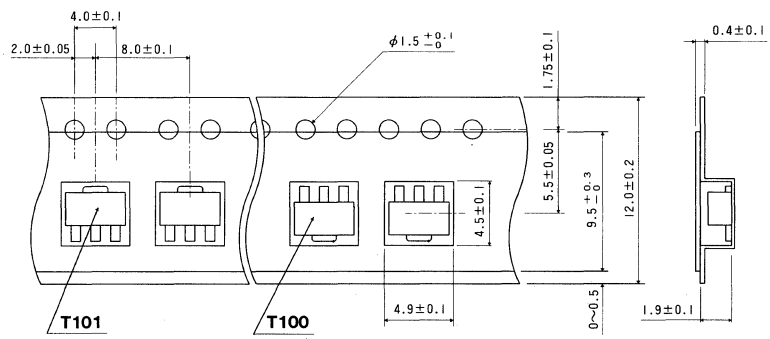
(Unit : mm)

MPT (SOT-89)

Reel



Tape



From very small EM3 type package to high power PSD package (the power dissipation is equivalent to TO-220, Pc=35W) transistors.

EM3 • UMT • SMT

Three types are available to allow the most suitable package depending on size specifications.

Application	Package			V_{CEO} (V) ※V_{CES}	Ic (mA)	Pc (mW) (Ta=25℃)		h_{FE}			Circuit
	EM3 (1608)	UMT (2125)	SMT (2916)			EM3	UMT, SMT		V_{CE} (V)	Ic (mA)	
	Part No.										
Low Noise	–	–	2SA1037AKLN	−40	−150	–	200	390~820	−6	−1	–
				−50	−150	–	200	180~560	−6	−1	–
	–	–	2SA1455K	−120	−50	–	200	180~820	−6	−2	–
	–	–	2SC2412KLN	40	150	–	200	390~820	6	1	–
				50	150	–	200	180~560	6	1	–
	–	–	2SC3722K	120	50	–	200	180~820	6	2	–
Pre Amp	2SA1774	2SA1576A	2SA1037AK	−50	−150	150	200	120~560	−6	−1	–
	–	2SA1579	2SA1514K	−120	−50	–	200	180~820	−6	−2	–
	2SC4617	2SC4081	2SC2412K	50	150	150	200	120~560	6	1	–
	–	2SC4102	2SC3906K	120	50	–	200	180~820	6	2	–
	–	2SC4723	2SC4642K	25	100	–	200	180~560	6	1	–
Driver	–	2SA1577	2SA1036K	−32	−500	–	200	82~390	−3	−10	–
	–	–	2SB1051K	−32	−1000	–	200	82~390	−3	−100	–
	–	–	2SB1197K	−32	−800	–	200	82~390	−3	−100	–
	–	–	2SB1198K	−80	−500	–	200	82~390	−3	−100	–
	–	2SC4097	2SC2411K	32	500	–	200	82~390	3	10	–
	–	2SD1949	2SD1484K	50	500	–	200	82~390	3	100	–
	–	–	2SD1781K	32	800	–	200	82~390	3	100	–
	–	–	2SD1782K	80	500	–	200	82~390	3	100	–
Low V_{CE}(sat)	–	–	2SD1757K	15	500	–	200	120~560	3	100	–
Darlington	–	–	2SB852K	−32※	−300	–	200	5k~	−5	−100	Fig.1
	–	–	2SD1383K	32※	300	–	200	5k~	5	100	Fig.2
Chroma	–	–	2SC4061K	300	100	–	200	39~180	10	10	–
High h_{FE} High V_{EBO}	–	–	2SD2114K	20	500	–	200	560~2700	3	10	–
	–	2SD2351	2SD2226K	50	150	–	200	560~2700	5	1	–

Darlington transistor internal circuit

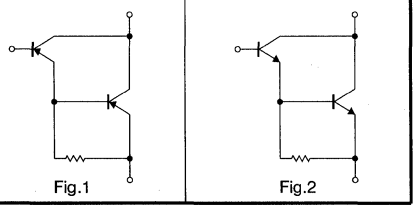


Fig.1 Fig.2

EM3 • UMT • SMT High frequency type

	Application	Package			V_{CEO} (V)	Ic (mA)	f_T (MHz)	Cob (pF)	h_{FE}		
		EM3 (1608)	UMT (2125)	SMT (2916)						V_{CE} (V)	Ic (mA)
		Part No.									
AM	FM IF AM RF	2SA1821	2SA1808	2SA1733K	−20	−30	400	0.85	39~180	−10	−1
		–	2SC4128	2SC4018K	32	100	230	1.8	56~180	6	2
		2SC4618	2SC4098	2SC2413K	25	50	300	1.3	56~270	6	1
	SW	–	2SC4700	2SC4699K	20※1	200	250	2.0	39~180	5	5
FM	FM RF Mix. Osc.	2SC4649	2SC4099	2SC2059K	20	20	500	1.4	39~180	6	1
	Tuner IF	–	2SC4772	2SC4771K	25	50	600	0.95	27~180	10	10
	RF SW	2SA1885	2SA1886	–	−10	−100	650	1.2	180~560	−5	−10
		2SC4997	2SC4998	–	10	100	240	1.4	560~2700	5	10
		–	2SC4773	2SC4326LK	6	50	800	1.1	120~560	5	5
		–	2SC4774	2SC4713K	6	50	800	1.0	120~560	5	5
VHF	TV Tuner Mix. Osc.	–	2SC4103	2SC3802K	25	30	1100	0.8	39~270	10	4
UHF		2SC4619	2SC4100	2SC3082K	19	50	1100	1.0	39~270	10	5
		2SC4725	2SC4082	2SC3837K	18	50	1500	0.9	27~270	10	10
		–	2SC4084	2SC3839K	20	50	2000	0.8	27~270	10	5
		2SC4726	2SC4083	2SC3838K	11	50	3200	0.8	27~270	10	5

Note : ※1 V_{CES}

●Product Designation

Specify part No., packaging specification code and h_{FE} ranking code.

Blank unless otherwise required

2	S	A	1	0	3	7	A	K			T	1	4	6	R

Part No.

Packaging specification code

Package	EM3	UMT	SMT
Code	TL	T106	T146
	TR	T107	T147

h_{FE} Ranking code

Code	h_{FE} Range
L	27～56
M	39～82
N	56～120
P	82～180
Q	120～270
R	180～390
S	270～560
E	390～820
U	560～1200
V	820～1800
W	1200～2700
A	1k～
B	5k～
C	10k～

Transistors
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Land pattern
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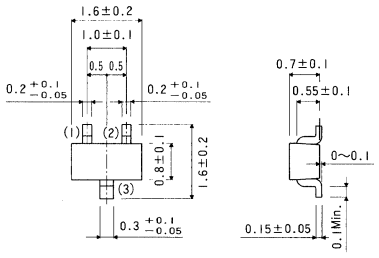
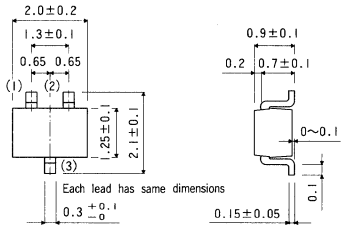
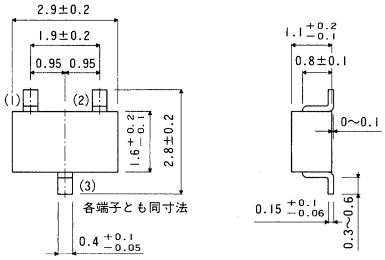
The Class and Basic ordering Units for Standard and Semi-standard Products Units
Page 104
Part Marking
Page 108

(Unit : mm)

Package	EM3	UMT	SMT (SC-59／Japanese SOT-23)
Dimensions	 (1) Emitter (2) Base (3) Collector	 (1) Emitter (2) Base (3) Collector	 (1) Emitter (2) Base (3) Collector
Actual size			
Enlarged (×3.0)			

EM3 • UMT • SMT

●Packaging

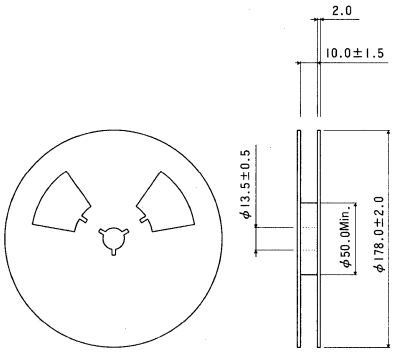
Package	Packaging style	Packaging style	Direction	Code	Quantity/package (pcs)	Quantity/Unit (pcs)
EM3	Taping	Embossed reel tape	Pin 1 side on sprocket hole side	TL	3,000	–
			Pin 2 side on sprocket hole side	TR		
UMT	Taping	Embossed reel tape	Pin 1 side on sprocket hole side	T106	3,000	–
			Pin 2 side on sprocket hole side	T107		
SMT	Taping	Embossed reel tape	Pin 1 side on sprocket hole side	T146	3,000	–
			Pin 2 side on sprocket hole side	T147		

●Packaging Specifications

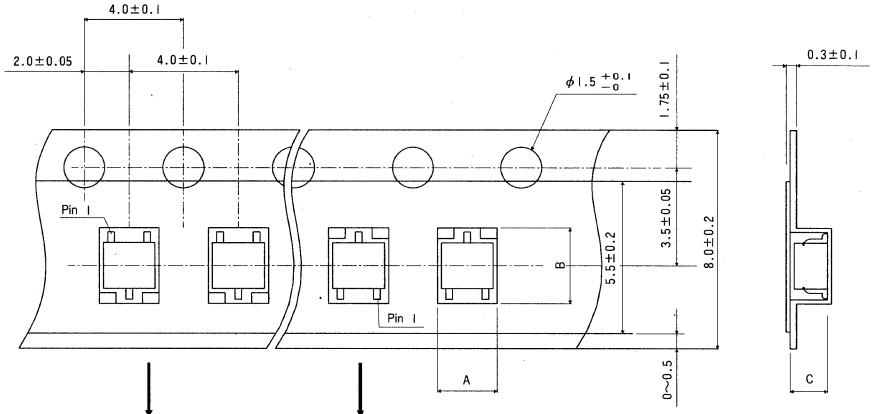
(Unit : mm)

EM3 UMT SMT

Reel



Tape



Package	Code
EM3	TR
UMT	T107
SMT	T147

Package	Code
EM3	TL
UMT	T106
SMT	T146

Package	Size		
	A	B	C
EM3	1.8±0.1	1.8±0.1	0.9±0.2
UMT	2.2±0.1	2.4±0.1	1.15±0.1
SMT	3.1±0.1	3.2±0.1	1.35±0.1

●MOSFET

Application	Package			V_{DSS} (V)	I_D (A)	P_D (W)	V_{GS} (th) (V)	V_{DS} (V)	I_D (mA)
	MPT	**CPT F5**	**PSD**						
	Part No.								
Switching	–	**2SK1973**	–	60	2	10	2.0~4.0		
	–	**2SK2094**	–	60	2	10	1.0~2.5	10	1
	2SK2103	–	–	30	2	2★	1.0~2.5	10	1
	–	–	☆**2SK2041**	60	10	35	1.0~2.5	10	1
	–	–	☆**2SK2042**	450	5	35	2.0~4.0	10	1

MPT • CPT F5 • PSD

Application	Package MPT	Package CPT F5	Package PSD	V_{CEO} (V) ※V_{CES} ※※V_{CER}	Ic (A)	Ic Max. (A)	Pc (W) MPT (Ta=25℃)	Pc (W) CPT PSD (Tc=25℃)	h_{FE}	V_{CE} (V)	Ic (mA)	Circuit
	Part No.											
Driver	2SB1132	–	–	−32	−1	–	2★	–	82~390	−3	−100	–
	New 2SA1900	–	–	−50	−1	−2	2★	–	82~390	−3	−500	–
	–	2SB1184	–	−50	−3	–	–	15	82~390	−3	−500	–
	2SB1188	2SB1182	–	−32	−2	–	2★	10	82~390	−3	−500	–
	2SB1189	–	–	−80	−0.7	–	2★	–	82~390	−3	−100	–
	2SB1260	2SB1181	–	−80	−1	–	2★	10	82~390	−3	−100	–
	–	2SB1275	–	−160	−1.5	–	–	10	56~270	−5	−100	–
	–	2SB1516	–	−80	−3	–	–	10	56~270	−2	−400	–
	–	2SB1535	–	−100	−6	–	–	10	56~270	−1	−550	–
	2SC4132	–	–	120	2	–	2★	–	56~390	5	100	–
	2SD1664	–	–	32	1	–	2★	–	82~390	3	100	–
	New 2SC5053	–	–	50	1	2	2★	–	82~390	3	500	–
	–	2SD1760	–	50	3	–	–	15	82~390	3	500	–
	2SD1766	2SD1758	–	32	2	–	2★	10	82~390	3	500	–
	2SD1767	–	–	80	0.7	–	2★	–	82~390	3	100	–
	2SD1898	2SD1733	–	80	1	–	2★	10	82~390	3	500	–
	2SD2211	2SD1918	–	160	1.5	–	2★	10	56~270	5	100	–
	2SD2167	–	–	31±4	2	3	2★	–	56~270	3	500	–
Low V_{CE}(sat)	2SA1797	–	–	−50	−2	−5	2★	–	82~270	−2	−500	–
	–	–	☆2SA1870	−60	−12	–	–	35	60~320	−2	−2000	–
	2SB1424	–	–	−20	−3	−5	2★	–	82~390	−2	−100	–
	New 2SB1561	–	–	−60	−2	−5	2★	–	82~270	−2	−500	–
	2SC4672	–	–	50	2	5	2★	–	82~270	2	500	–
	–	–	☆2SC4939	60	12	–	–	35	60~320	2	2000	–
	–	2SC5103	–	60	5	10	–	10	82~270	2	1000	–
	2SD2150	–	–	20	3	5	2★	–	120~560	2	100	–
	New 2SD2391	–	–	60	2	5	2★	–	82~270	2	500	–
Strobo Flash Low V_{CE}(sat)	–	New 2SA1834	–	−20	−10	−15	–	10	120~560	−2	−500	–
	2SB1308	–	–	−20	−3	−5	2★	–	82~390	−2	−500	–
	2SB1386	2SB1412	–	−20	−5	−10	2★	10	82~390	−2	−500	–
	–	2SC5001	–	20	10	15	–	10	120~560	2	500	–
	2SD1963	–	–	20	3	5	2★	–	120~560	2	500	–
	2SD2098	2SD2118	–	20	5	10	2★	10	120~560	2	500	–
High h_{FE}	2SB1427	–	–	−20	−2	−3	2★	–	270~1200	−6	−500	–
	2SD2153	–	–	25	2	3	2★	–	390~2700	6	500	–
	–	2SD2318	–	60	3	4.5	–	15	390~1800	4	500	–
Darlington	–	2SB1183	–	−40※※	−2	–	–	10	1k~200k	−3	−500	Fig.1
	–	2SB1316	–	−100	−2	–	–	10	1k~10k	−2	−1000	Fig.3
	–	2SB1474	–	−80	−4	–	–	10	1k~10k	−3	−2000	Fig.2
	–	2SD1759	–	40※※	2	–	–	10	1k~200k	3	500	Fig.5
	2SD1834	–	–	60※	1	–	2★	–	2k~	3	500	Fig.4
	2SD2195	2SD1980	–	100	2	–	2★	10	1k~10k	2	1000	Fig.6
	2SD2170	–	–	90^{+20}_{-10}	2	3	2★	–	1k~10k	2	1000	Fig.7
	2SD2212	2SD2143	–	60±10	2	–	2★	10	1k~10k	2	1000	Fig.7
High Voltage SW	2SA1759	–	–	−400	−0.1	−0.2	2★	–	56~270	−10	−10	–
	2SA1812	2SA1727	–	−400	−0.5	−1	2★	10	56~270	−5	−50	–
	–	2SA1862	–	−400	−2	−4	–	10	56~180	−5	−100	–
	–	2SA1807	–	−600	−1	−2	–	10	56~180	−5	−100	–
	2SC4505	–	–	400	0.1	–	2★	–	56~270	10	10	–
	–	–	☆2SC4937	400	2	–	–	35	16~50	5	0.1	–
	–	–	☆2SC4938	400	5	–	–	35	16~50	5	3	–

Notes : 1. ☆Under development 2. ※ F5 denotes surface mount version of CPT (SC-64) 3. ★Package mounted on ceramic 40×40×0.7mm

Darlington transistor internal circuit

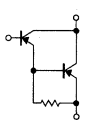


Fig.1

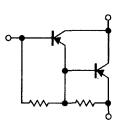


Fig.2

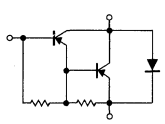


Fig.3

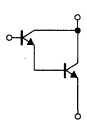


Fig.4

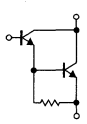


Fig.5

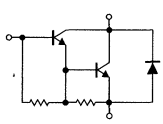


Fig.6

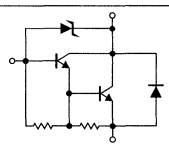


Fig.7

MPT • CPT F5 • PSD

●Product Designation

Specify part No., packaging specification code and h_{FE} ranking code.

Package	MPT	CPT F5	PSD
Code	T101	TL	TL
	T100	TR	TR

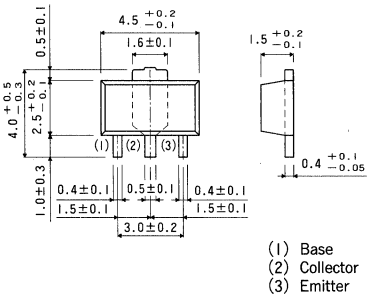
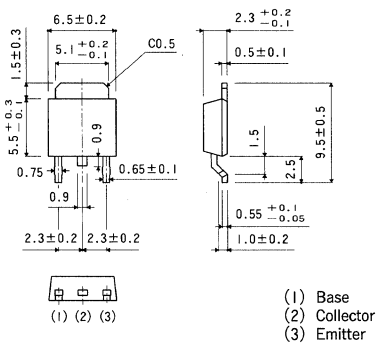
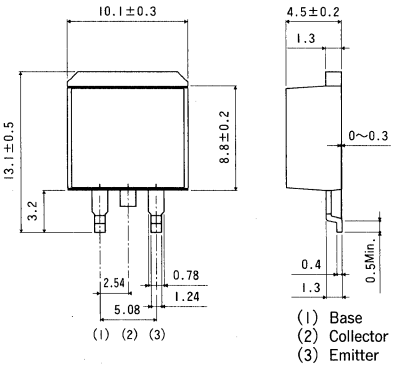
Packaging specification code

2	S	B	1	1	8	8			T	1	0	0	Q

Part No. — **Blank unless otherwise required** — **h_{FE} Ranking code**

Code	h_{FE} Range
L	27~56
M	39~82
N	56~120
P	82~180
Q	120~270
R	180~390
S	270~560
E	390~820
U	560~1200
V	820~1800
W	1200~2700
A	1k~
B	5k~
C	10k~

(Unit : mm)

Package	MPT (SOT-89)	CPT F5 (D PAK)	PSD (D^2 PAK)
Dimensions			
Actual size			
External dimensions (×1.0)			

●Packaging

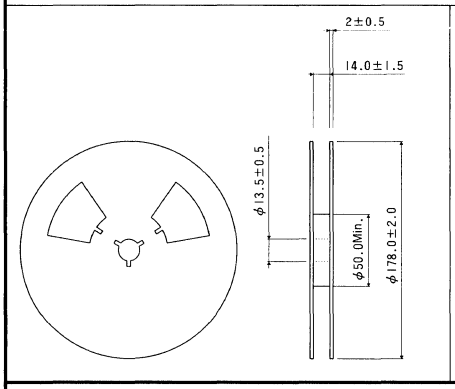
Package	Packaging type	Packaging style	Direction	Code	Quantity / Package (pcs)	Quantity / Unit (pcs)
MPT	Taping	Embossed reel tape	Pin 3 side on sprocket hole side	T100	1,000	–
			Fin on sprocket hole side	T101		
CPT F5	Taping	Embossed reel tape	Fin on sprocket hole side	TL	2,500	–
			Pin 3 side on sprocket hole side	TR		
	Bulk	Polyethylene bag	–	–	2,000	200
PSD	Taping	Embossed reel tape	Fin on sprocket hole side	TL	1,000	–
			Pin 3 side on sprocket hole side	TR		
	Bulk	Polyethylene bag	–	–	500	100

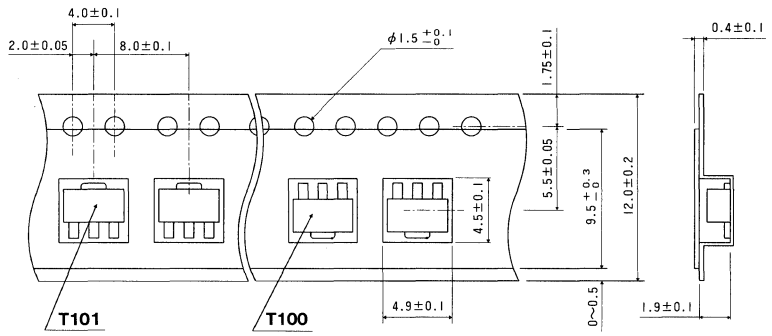
●Packaging Specifications

(Unit : mm)

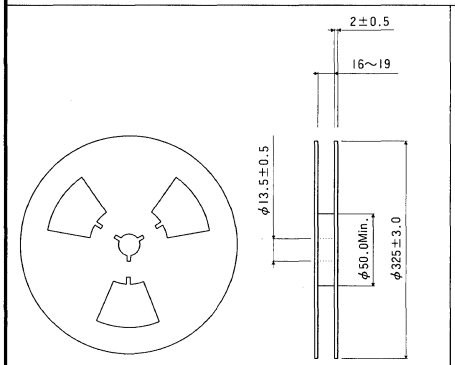
Reel	Tape

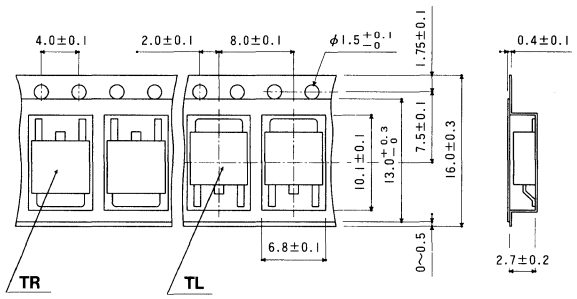
MPT (SOT-89)



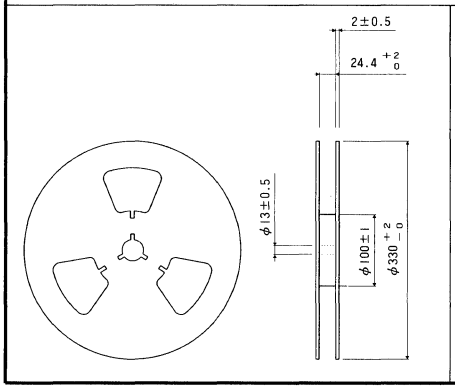


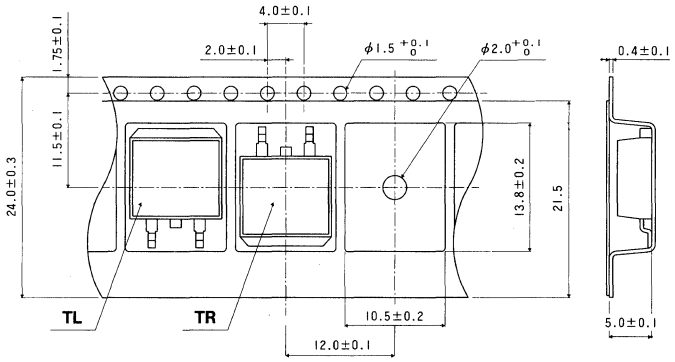
CPT F5 (D PAK)





PSD (D² PAK)

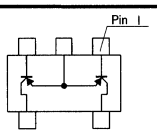
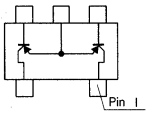
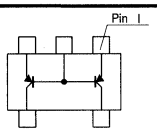
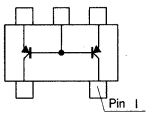
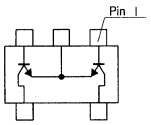
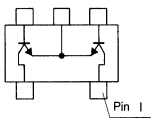
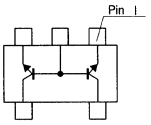
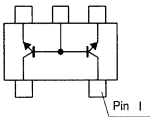
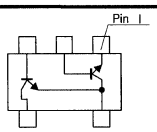
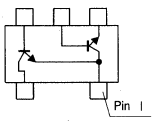
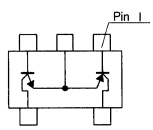
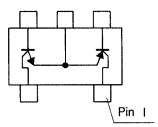
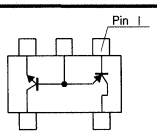
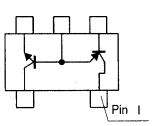
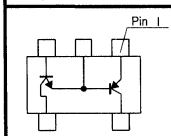
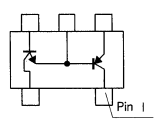
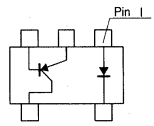
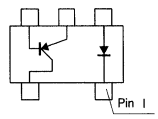
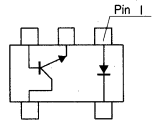
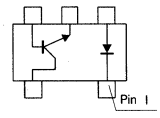




Transistors

UM5 and UM6 packages contain two transistors in one small surface mount package.

UM5 • FMT (5 pin type including 2 circuits)

Equivalent circuit TOP VIEW UM5	Equivalent circuit TOP VIEW FMT	Application	Package Part No. UM5	Package Part No. FMT	Equivalent product	V_{CEO} (V)	Ic (mA)	h_{FE}	V_{CE} (V)	Ic (mA)
		Pre Amp	**UMS1**	**FMS1A**	2SA1037AK×2	−40	−100	120~	−6	−1
			–	**FMS3**	2SA1514K×2	−120	−50	180~	−6	−2
		Pre Amp	**UMS2**	**FMS2A**	2SA1037AK×2	−40	−100	120~	−6	−1
			–	**FMS4**	2SA1514K×2	−120	−50	180~	−6	−2
		Pre Amp	**UMW1**	**FMW1**	2SC2412K×2	40	100	120~	6	1
			–	**FMW3**	2SC3906K×2	120	50	180~	6	2
			UMW5	**FMW5**	2SC2412×2	40	100	250~	6	1
		TV Tuner Mix. Osc.	**UMW8**	**FMW8**	2SC3838K×2	11	50	27~	10	5
			UMW10	**FMW10**	2SC3837K×2	18	50	27~	10	10
		Pre Amp	**UMW2**	**FMW2**	2SC2412K×2	40	100	120~	6	1
			–	**FMW4**	2SC3906K×2	120	50	180~	6	2
		TV Tuner Mix. Osc.	**UMW9**	**FMW9**	2SC3838K×2	11	50	27~	10	5
			UMW11	**FMW11**	2SC3837K×2	18	50	27~	10	10
		New	**UMW13**	**FMW13**	2SC3839K×2	20	50	27~	10	5
		TV Tuner Mix. Osc.	**UMW6**	**FMW6**	2SC3837K×2	18	50	27~	10	10
			UMW7	**FMW7**	2SC3838K×2	11	50	27~	10	5
			UMW12	**FMW12**	2SC2412K×2	40	100	120~	6	1
		Single End	**UMY1**	**FMY1A**	2SA1037AK	−50	−100	120~	−6	−1
					2SC2412K	40	100		6	1
			–	**FMY5**	2SA1514K	−120	−50	180~	−6	−2
					2SC3906K	120	50		6	2
		New	–	**FMY6**	2SA1036K	−32	−500	120~	−3	−10
					2SC2411K	32	500	120~	3	10
		Inverter Driver	**UMY3**	**FMY3A**	2SA1037AK	−40	−100	120~	−6	−1
					2SC2412K	40	100		6	1
		Inverter Driver	**UMY4**	**FMY4A**	2SA1037AK	−40	−100	120~	−6	−1
					2SC2412K	40	100		6	1
		Pre Amp	**UML1**	–	2SA1037AK	−40	−100	120~	−6	−1
					DAN212K	Diode characteristics VR=80V, Io=100mA, C_T=3.5pF, trr=4.0ns				
		Pre Amp	**UML2**	–	2SC2412K	40	100	120~	6	1
					DAN212K	Diode characteristics VR=80V, Io=100mA, C_T=3.5pF, trr=4.0ns				

●Product Designation

Specify part No., packaging specification code and h_{FE} ranking code.

Blank unless otherwise required

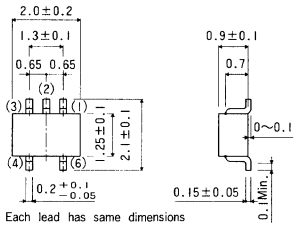
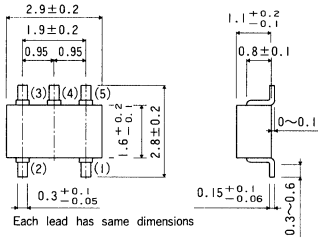
F	M	W	1			T	1	4	9	

Part No. | **Packaging specification code** | **h_{FE} Ranking code**

Package	UM5	FMT
Code	TL	T148
	TR	T149

No classification in h_{FE} ranks.

(Unit : mm)

Package	UM5	FMT (SOT-25)
dimensions		
	Actual size: Enlarged (×3.0): 	Actual size: Enlarged (×3.0): 

Transistors
Land pattern
Page 103
The Class and Basic ordering Units for Standard and Semi-standard Products Units
Page 105
Part Marking
Page 110

●Packaging

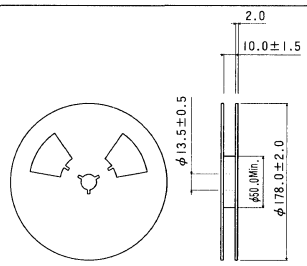
Package	Packaging type	Packaging style	Direction	Code	Quantity/Package (pcs)	Quantity/Unit (pcs)
UM5	taping	Embossed reel tape	Pin 2 side on sprocket hole side	TL	3,000	–
			Pin 3 side on sprocket hole side	TR		
FMT	Taping	Embossed reel tape	Pin 3 side on sprocket hole side	T148	3,000	–
			Pin 2 side on sprocket hole side	T149		

●Packaging Specifications

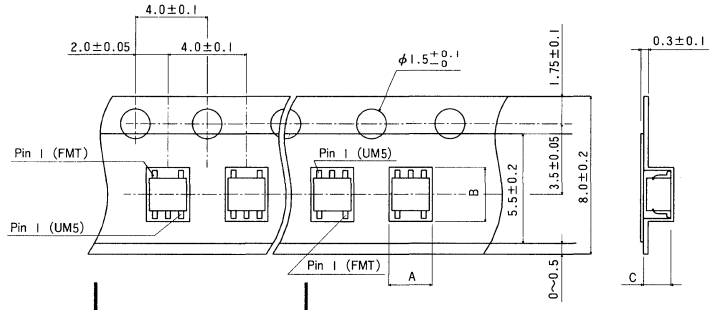
(Unit : mm)

UM5 FMT

Reel



Tape



Package	Code
UM5	TL
FMT	T149

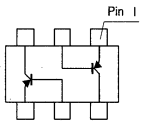
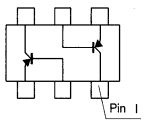
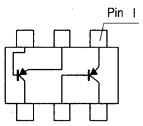
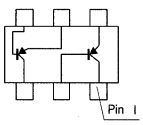
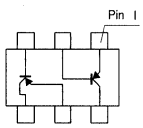
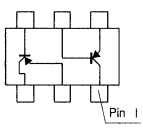
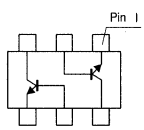
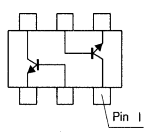
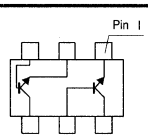
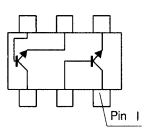
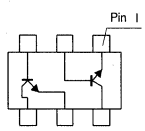
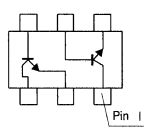
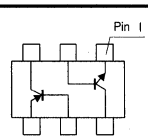
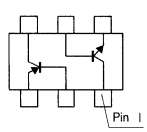
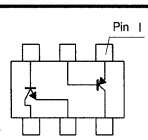
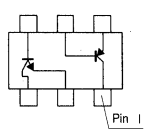
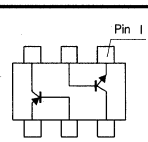
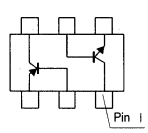
Package	Code
UM5	TR
FMT	T148

Package	Size		
	A	B	C
UM5	2.2±0.1	2.4±0.1	1.15±0.1
FMT	3.1±0.1	3.2±0.1	1.35±0.1

Transistors

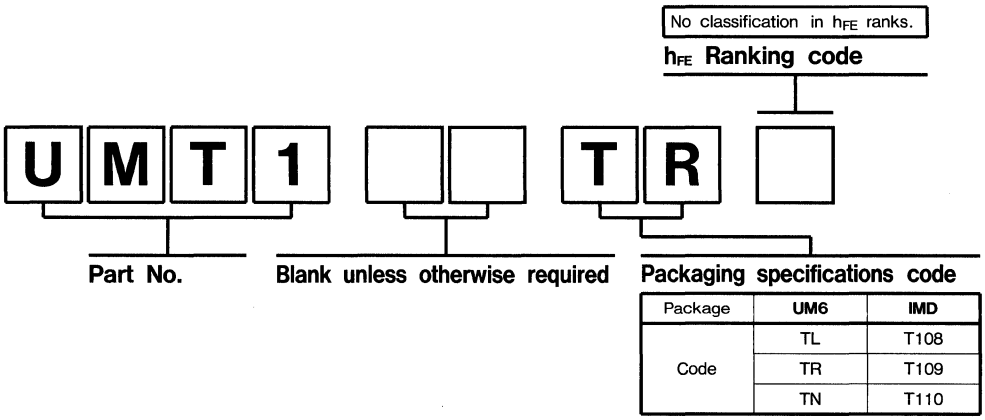
UM6 and IMD packages contain two independent transistors in one small surface mount package.

UM6 • IMD (6 pin type including independent 2 circuits)

Equivalent circuit TOP VIEW UM6	Equivalent circuit TOP VIEW IMD	Application	Package UM6 Part No.	Package IMD Part No.	Equivalent product	V_{CEO} (V)	Ic (mA)	h_{FE}	V_{CE} (V)	Ic (mA)
		Pre Amp	**UMT1**	**IMT1A**	2SA1037AK×2	−40	−100	120~	−6	−1
			–	**IMT5A**	2SA1037AK×2	−25	−100	390~	−6	−1
		Pre Amp	**UMT2**	**IMT2A**	2SA1037AK×2	−40	−100	120~	−6	−1
		Pre Amp	**UMT3**	**IMT3A**	2SA1037AK×2	−40	−100	120~	−6	−1
			–	**IMT4**	2SA1514K×2	−120	−50	180~	−6	−2
		Pre Amp	**UMX1**	**IMX1**	2SC2412K×2	40	100	120~	6	1
			–	**IMX7**	2SC2411K×2	32	500	82~390	3	100
			–	**IMX9**	2SD2114K×2	20	500	560~2700	3	10
		Pre Amp	**UMX2**	**IMX2**	2SC2412K×2	40	100	120~	6	1
			UMX6	**IMX6**	2SC2413K×2	25	50	56~	6	1
		Pre Amp	**UMX3**	**IMX3**	2SC2412K×2	40	100	120~	6	1
			–	**IMX8**	2SC3906K×2	120	50	180~	6	2
		TV Tuner Mix. Osc.	**UMX4**	**IMX4**	2SC3837K×2	18	50	56~180	10	10
			UMX5	**IMX5**	2SC3838K×2	11	50	56~180	10	5
		Switching	**UMX11**	**IMX11**	2SC2059K×2	20	20	39~180	6	1
		Pre Amp	**UMZ1**	**IMZ1A**	2SA1037AK	−40	−100	120~	−6	−1
					2SC2412K	40	100	120~	6	1
		Pre Amp	**UMZ2**	**IMZ2A**	2SA1037AK	−40	−100	120~	−6	−1
					2SC2412K	40	100	120~	6	1
		Pre Amp	–	**IMZ3A**	2SA1037AK	−25	−100	390~	−6	−1
					2SD2226K	50	100	820~2700	5	1

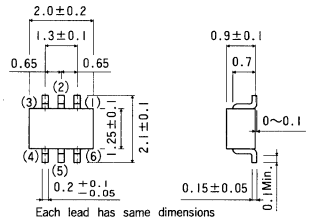
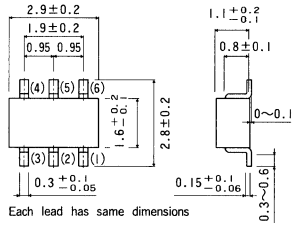
●Product Designation

Specify part No., packaging specification code and h_{FE} ranking code.



Package	UM6	IMD
Code	TL	T108
	TR	T109
	TN	T110

(Unit : mm)

Package	UM6	IMD (SOT-36)
Dimensions		
Actual size		
Enlarged (×3.0)		

●Packaging

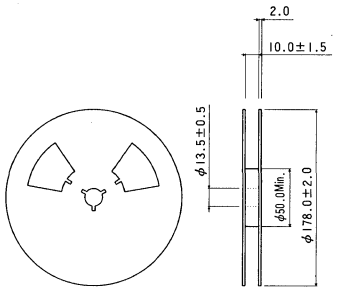
Package	Packaging type	Packaging style	Direction	Code	Quantity/Package (pcs)	Quantity/Unit (pcs)
UM6	Taping	Embossed reel tape	Pin 1 side on sprocket hole side	TL	3,000	–
			Pin 1 mark side opposite of sprocket hole side	TR		
			Non-directional	TN		
IMD	Taping	Embossed reel tape	Pin 1 mark side opposite of sprocket hole side	T108	3,000	–
			Pin 1 side on sprocket hole side	T109		
			Non-directional	T110		

●Packaging Specifications

(Unit : mm)

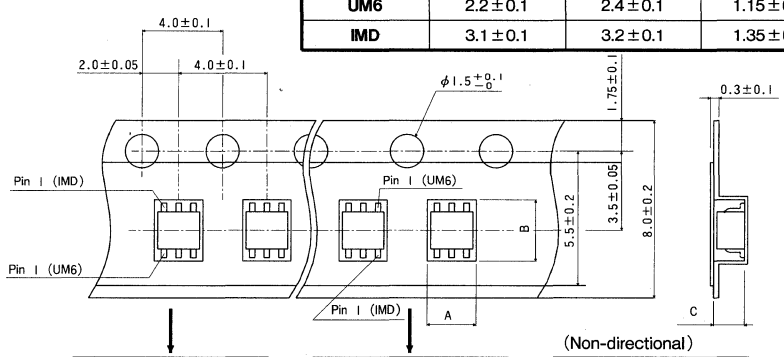
UM6 IMD

Reel



Tape

Package	Size		
	A	B	C
UM6	2.2±0.1	2.4±0.1	1.15±0.1
IMD	3.1±0.1	3.2±0.1	1.35±0.1



Package	Code
UM6	TL
IMD	T109

Package	Code
UM6	TR
IMD	T108

(Non-directional)

Package	Code
UM6	TN
IMD	T110

Digital Transistors

Transistors with built-in resistors.
Available in various packages with a variety of built-in resistors to meet a wide range of needs.

●Product Designation

DTA123E □ A
Part No. — Suffix A (Except EM3)
Package code

EM3 of 100mA version has no suffix " A ".
DTA123E of UMT package should be denoted as DTA123EUA.
See tabe right for package code.

Package code

Package	Code
EM3	E
UMT	U
SST	C
SMT	K
MPT	P

EM3 • UMT • SST • SMT

●100mA Specifications

PNP Type / Fig.1 / Part No.	NPN Type / Fig.2	Resistance value R_1 (kΩ)	R_2 (kΩ)	Package EM3※ Pd=150mW	UMT※ Pd=200mW	SST Pd=200mW	SMT Pd=200mW	Vcc (V)	Io (mA)	G_I	Vo (V)	Io (mA)
DTA123E□A	DTC123E□A	2.2	2.2	○	○	○	○	50	100	20~	5	20
DTA143E□A	DTC143E□A	4.7	4.7	○	○	○	○	50	100	20~	5	10
DTA114E□A	DTC114E□A	10	10	○	○	○	○	50	50	30~	5	5
DTA124E□A	DTC124E□A	22	22	○	○	○	○	50	30	56~	5	5
DTA144E□A	DTC144E□A	47	47	○	○	○	○	50	30	68~	5	5
DTA115E□A	DTC115E□A	100	100	–	○	○	○	50	20	82~	5	5
DTA113Z□A	DTC113Z□A	1.0	10	○	○	○	○	50	100	33~	5	5
DTA123Y□A	DTC123Y□A	2.2	10	○	○	○	○	50	100	33~	5	10
DTA143Y□A	DTC143Y□A	4.7	22	–	○	○	○	50	100	56~	5	5
DTA123J□A	DTC123J□A	2.2	47	○	○	○	○	50	100	80~	5	10
DTA143X□A	DTC143X□A	4.7	10	○	○	○	○	50	100	30~	5	10
DTA143Z□A	DTC143Z□A	4.7	47	○	○	○	○	50	100	80~	5	10
DTA114W□A	DTC114W□A	10	4.7	○	○	○	○	50	100	24~	5	10
DTA114Y□A	DTC114Y□A	10	47	○	○	○	○	50	70	68~	5	5
DTA124X□A	DTC124X□A	22	47	○	○	○	○	50	50	68~	5	5
＊DTA115U□	＊DTC115U□	100	10	–	○	○	○	50	20	27~	5	5
DTA144V□A	DTC144V□A	47	10	–	○	○	○	50	70	33~	5	5
DTA144W□A	DTC144W□A	47	22	○	○	○	○	50	30	56~	5	5
DTA1D3R□A	DTC1D3R□A	2.7	1.0	–	○	○	○	50	30	20~	5	30
□ : Package code				E	U	C	K					

PNP Type / Fig.3 / Part No.	NPN Type / Fig.4	Resistance value R_1 (kΩ)	Package EM3※ Pd=150mW	UMT※ Pd=200mW	SST Pd=200mW	SMT Pd=200mW	V_{CEO} (V)	Ic (mA)	h_{FE} Min.	Typ.	Max.	V_{CE} (V)	Ic (mA)
DTA143T□A	DTC143T□A	4.7	○	○	○	○	50	100	100	250	600	5	1
DTA114T□A	DTC114T□A	10	○	○	○	○	50	100	100	250	600	5	1
DTA124T□A	DTC124T□A	22	○	○	○	○	50	100	100	250	600	5	1
DTA144T□A	DTC144T□A	47	○	○	○	○	50	100	100	250	600	5	1
DTA115T□A	DTC115T□A	100	–	○	○	○	50	100	100	250	600	5	1
＊DTA125T□	＊DTC125T□	200	–	○	○	○	50	100	100	250	600	5	1
DTA113T□A	–	1.0	○	○	○	○	50	100	100	250	600	5	1
□ : Package code			E	U	C	K							

PNP Type / Fig.5 / Part No.	NPN Type / Fig.6	B-E Resistance R_2 (kΩ)	Package EM3※ Pd=150mW	UMT※ Pd=200mW	SST Pd=200mW	SMT Pd=200mW	V_{CEO} (V)	Ic (mA)	h_{FE} Min.	V_{CE} (V)	Ic (mA)
DTA114G□A	DTC114G□A	10	○	○	○	○	50	100	30	5	5
DTA124G□A	DTC124G□A	22	○	○	○	○	50	100	56	5	5
DTA144G□A	DTC144G□A	47	○	○	○	○	50	100	68	5	5
DTA115G□A	DTC115G□A	100	–	○	○	○	50	100	82	5	5
□ : Package code			E	U	C	K					

Notes : 1. ※With recommended land pattern laid out.
2. Specification codes for PNP and NPN are omitted.
3. ＊Not for EM3.
4. EM3 has no suffix " A ".

●Low ON output type

PNP Type / Fig.1 / Part No.	NPN Type / –	Resistance value R_1 (kΩ)	R_2 (kΩ)	Package EM3※ Pd=150mW	UMT※ Pd=200mW	SST Pd=200mW	SMT Pd=200mW	Vcc (V)	Io (mA)	G_I	Vo (V)	Io (mA)	Vo (on) (V)	Io (mA)	I_I (mA)
DTA214Y□	–	10	47	–	○	○	○	30	70	68	5	5	0.3	50	2.5
□ : Package code				–	U	C	K								

Notes : 1. ※With recommended land pattern laid out.
2. Specifiaction codes for PNP and NPN are omitted.

SMT • MPT • SST

●500mA Specifications

PNP Type / Part No.	NPN Type	Resistance value R_1 (kΩ)	Resistance value R_2 (kΩ)	Vcc (V)	Ic Max.※ (mA)	G_I	Vo (V)	Io (mA)	Package
Fig.1	Fig.2								
DTB113E□	**DTD113E□**	1.0	1.0	50	500	33～	5	50	SMT • SST
DTB123E□	**DTD123E□**	2.2	2.2	50	500	39～	5	50	
DTB143E□	**DTD143E□**	4.7	4.7	50	500	47～	5	50	
DTB114E□	**DTD114E□**	10	10	50	500	56～	5	50	
DTB122J□	**DTD122J□**	0.22	4.7	50	500	47～	5	50	
DTB113Z□	**DTD113Z□**	1.0	10	50	500	56～	5	50	
DTB123Y□	**DTD123Y□**	2.2	10	50	500	56～	5	50	
DTB133H□	**DTD133H□**	3.3	10	50	500	56～	5	50	

PNP Type / Part No.	NPN Type	Resistance value R_1 (kΩ)	V_{CEO} (V)	Ic (mA)	h_{FE} Min.	h_{FE} Typ.	h_{FE} Max.	V_{CE} (V)	Ic (mA)	Package
Fig.3	Fig.4									
DTB123T□	**DTD123T□**	2.2	40	500	100	250	600	5	50	SMT • SST
DTB143T□	**DTD143T□**	4.7	40	500	100	250	600	5	50	
DTB163T□	**DTD163T□**	6.8	40	500	100	250	600	5	50	
DTB114T□	**DTD114T□**	10	40	500	100	250	600	5	50	

PNP Type / Part No.	NPN Type	BE Resistance R_2 (kΩ)	V_{CEO} (V)	Ic (mA)	h_{FE} Min.	V_{CE} (V)	Ic (mA)	Package
Fig.5	Fig.6							
DTB114G□	**DTD114G□**	10	50	500	56	5	100	SMT • SST

Notes : 1. ※Characteristics of component transistors.
2. Specification codes for PNP and NPN are omitted.

●For Muting

PNP Type / Part No.	NPN Type	Resistance value R_1 (kΩ)	Resistance value R_2 (kΩ)	Vcc (V)	Ic Max.※ (mA)	G_I	Vo (V)	Io (mA)	Ron (Ω) Typ.	Package
–	Fig.2									
–	**DTC363E□**	6.8	6.8	20	600	70～	5	50	1.0	SMT • SST

PNP Type / Part No.	NPN Type	Resistance value R_1 (kΩ)	V_{CEO} (V)	Ic (mA)	h_{FE} Min.	h_{FE} Typ.	h_{FE} Max.	V_{CE} (V)	Ic (mA)	Ron (Ω) Typ.	Package
–	Fig.4										
–	**DTC323T□**	2.2	15	600	100	250	600	5	50	0.65	SMT • SST
–	**DTC343T□**	4.7	15	600	100	250	600	5	50	0.95	
–	**DTC363T□**	6.8	15	600	100	250	600	5	50	1.25	
–	**DTC314T□**	10	15	600	100	250	600	5	50	1.5	

Note : ※Characteristics of component transistors.

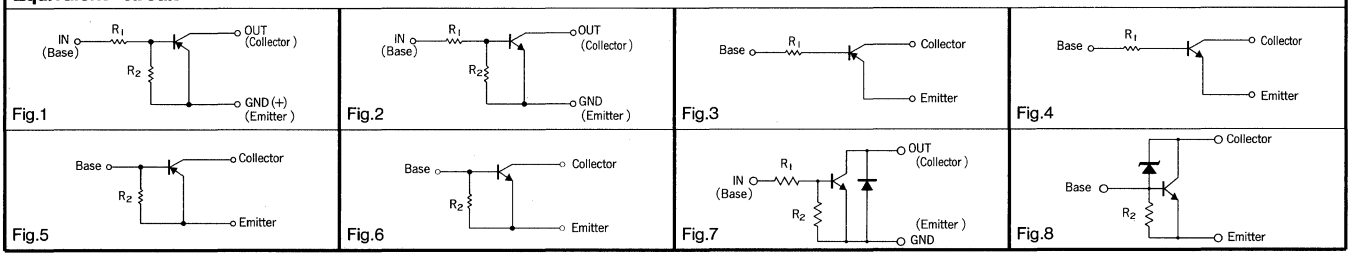
●For Semipower

Fig.7 / Part No.	Resistance value R_1 (Ω)	Resistance value R_2 (kΩ)	Vcc (V)	Ic (A)	Pd★ (W)	G_I	Vo (V)	Io (A)	Package
DTDM12ZP	100	1	30	3	1.5	68～	2	0.5	MPT

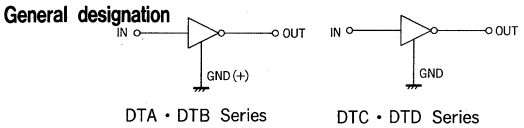
Fig.8 / Part No.	BE Resistance R_2 (kΩ)	V_{CEO} (V)	Ic (A)	Pd★ (W)	h_{FE}	V_{CE} (V)	Ic (A)	Package
DTDG14GP	10	60±10	1	1.5	300～	2	0.5	MPT

Note : ※Characteristics of component transistors.

Equivalent circuit



General designation



●Product Designation

Specify part No., package specification code and h_{FE} ranking code.

Part No. | **Blank unless otherwise required**

D	T	A	1	2	4	E	K	A			T	1	4	6

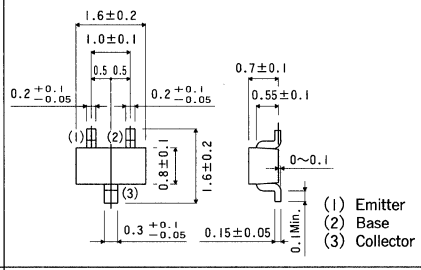
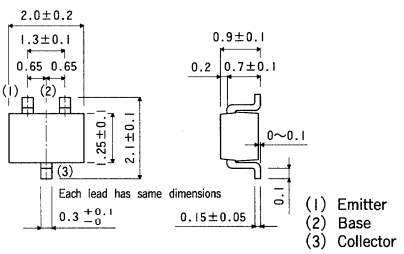
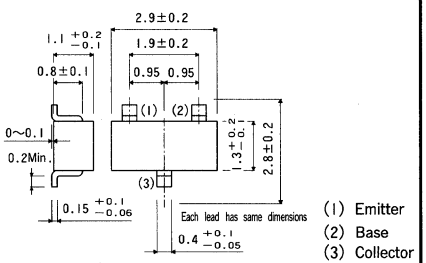
Package code

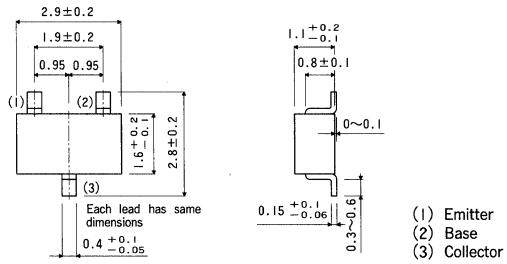
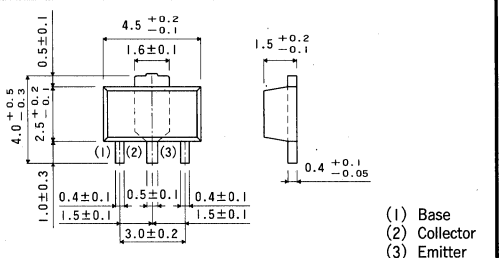
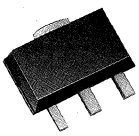
Package	EM3	UMT	SST	SMT	MPT
Code	E	U	C	K	P

Packaging specification code

Package	EM3	UMT	SST	SMT	MPT
Code	TL	T106	T116	T146	T100
	TR	T107	T117	T147	T101

(Unit : mm)

Package	EM3	UMT	SST (U. S. /European SOT-23)
	Package code E	Package code U	Package code C
Dimensions			
Actual size			
Enlarged (×3.0)			

Package	SMT (SC-59/Japanese SOT-23)	MPT (SOT-89)
	Package code K	Package code P
Dimensions		
Actual size		
Enlarged (×3.0)		

●Packaging

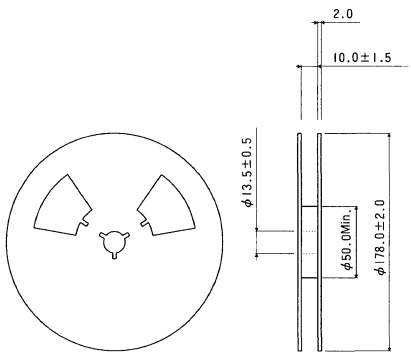
Package	Packaging type	Packaging style	Direction	Code	Quantity/Package (pcs)	Quantity/Unit (pcs)
EM3	Taping	Embossed reel tape	Pin 1 side on sprocket hole side	TL	3,000	–
			Pin 2 side on sprocket hole side	TR		
UMT	Taping	Embossed reel tape	Pin 1 side on sprocket hole side	T106	3,000	–
			Pin 2 side on sprocket hole side	T107		
SST	Taping	Embossed reel tape	Pin 1 side on sprocket hole side	T116	3,000	–
			Pin 2 side on sprocket hole side	T117		
SMT	Taping	Embossed reel tape	Pin 1 side on sprocket hole side	T146	3,000	–
			Pin 2 side on sprocket hole side	T147		
MPT	Taping	Embossed reel tape	Pin 3 side on sprocket hole side	T100	1,000	–
			Fin on sprocket hole side	T101		

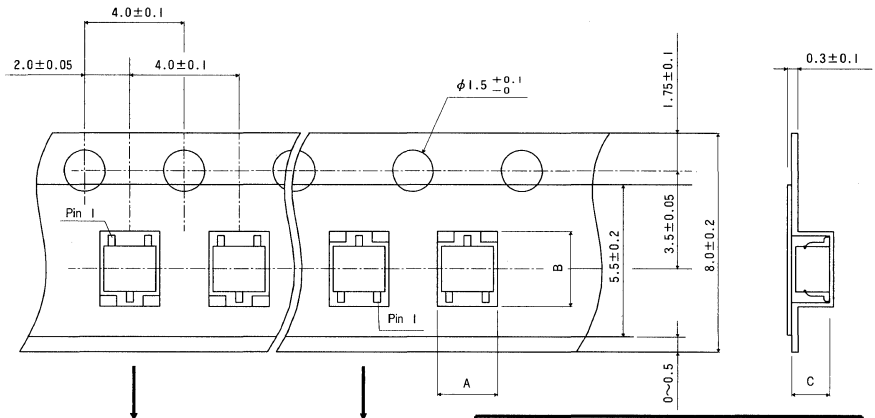
●Packaging Specifications

(Unit : mm)

Reel | **Tape**

EM3 • UMT • SST • SMT



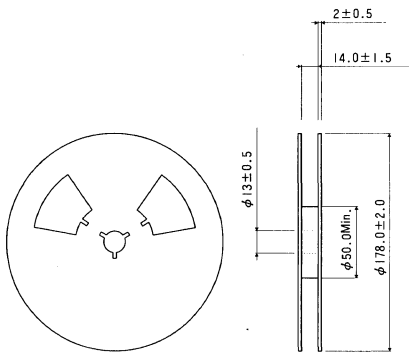


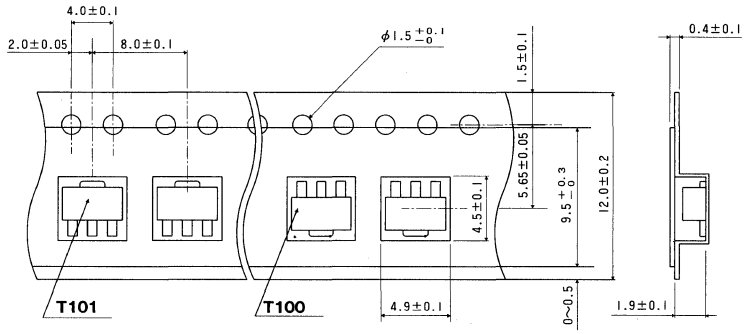
Package	Code
EM3	TR
UMT	T107
SST	T117
SMT	T147

Package	Code
EM3	TL
UMT	T106
SST	T116
SMT	T146

Package	Size		
	A	B	C
EM3	1.8±0.1	1.8±0.1	0.9±0.2
UMT	2.2±0.1	2.4±0.1	1.15±0.1
SST	3.15±0.1	2.85±0.1	1.4±0.1
SMT	3.1±0.1	3.2±0.1	1.35±0.1

MPT (SOT-89)



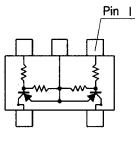
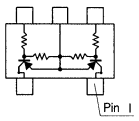
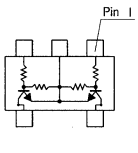
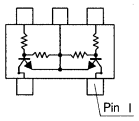
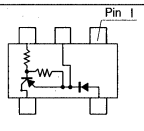
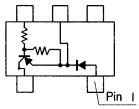
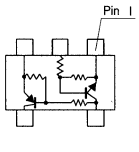
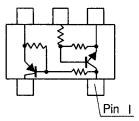


Digital Transistors

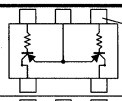
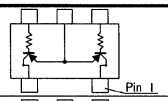
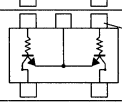
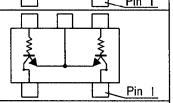
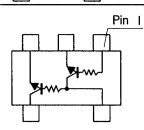
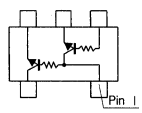
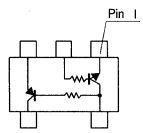
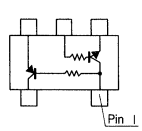
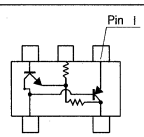
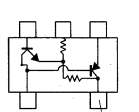
Two transistors with built-in resistors (digital transistors) are packed into UM5 and FMT type packages.
Being wired internally they require minimum space.

UM5 • FMT [5 pin type including 2 circuits]

●Built-in 2 resistors

Equivalent circuit TOP VIEW UM5	Equivalent circuit TOP VIEW FMT	Application	Package UM5 Part No.	Package FMT Part No.	Equivalent product	Resistance value R_1 (kΩ)	Resistance value R_2 (kΩ)	Vcc (V)	Io (mA)	G_I	Vo (V)	Io (mA)
		Inverter Driver	**UMA1**	**FMA1A**	DTA124EK×2	22	22	−50	−30	56~	−5	−5
			UMA2	**FMA2A**	DTA144EK×2	47	47	−50	−30	68~	−5	−5
			UMA5	**FMA5A**	DTA123JK×2	2.2	47	−50	−100	80~	−5	−10
			UMA7	**FMA7A**	DTA143XK×2	4.7	10	−50	−100	30~	−5	−10
			UMA8	**FMA8A**	DTA114YK×2	10	47	−50	−100	68~	−5	−5
			UMA9	**FMA9A**	DTA114EK×2	10	10	−50	−50	30~	−5	−5
			UMA10	**FMA10A**	DTA113ZK×2	1.0	10	−50	−100	33~	−5	−5
			UMA11	**FMA11A**	DTA143ZK×2	4.7	47	−50	−100	80~	−5	−10
			**UMG1**	**FMG1A**	DTC124EK×2	22	22	50	30	56~	5	5
			UMG2	**FMG2A**	DTC144EK×2	47	47	50	30	68~	5	5
			UMG5	**FMG5A**	DTC114YK×2	10	47	50	70	68~	5	5
			UMG8	**FMG8A**	DTC143ZK×2	4.7	47	50	100	80~	5	10
			UMG9	**FMG9A**	DTC114EK×2	10	10	50	50	30~	5	5
			UMG10	—	DTC113ZK×2	1	10	50	100	33~	5	5
			UMG11	**FMG11A**	DTC123JK×2	2.2	47	50	100	80~	5	10
			—	**FMJ1A**	DTA144EK	47	47	−50	−30	68~	−5	−5
					DA119	Diode characteristics		V_R=80V, Io=100mA C_T=3.5pF, trr=4.0ns				
		Switching Circuit	**UMC2**	**FMC2A**	DTA124EK DTC124EK	22 22	22 22	−50 50	−30 30	56~ 56~	−5 5	−5 5
			UMC3	**FMC3A**	DTA114EK DTC114EK	10 10	10 10	−50 50	−50 50	30~ 30~	−5 5	−5 5
			UMC4	**FMC4A**	DTA114YK DTC144EK	10 47	47 47	−50 50	−70 30	68~ 68~	−5 5	−5 5
			UMC5	**FMC5A**	DTA143XK DTC144EK	4.7 47	10 47	−50 50	−100 30	30~ 68~	−5 5	−5 5
			—	**FMC6A**	DTA115EK DTC115EK	100 100	100 100	−50 50	−20 20	82~ 82~	−5 5	−5 5

●Built-in 1 resistor

Equivalent circuit TOP VIEW UM5	Equivalent circuit TOP VIEW FMT	Application	Package UM5 Part No.	Package FMT Part No.	Equivalent product	Resistance value R_1 (kΩ)	V_{CEO} (V)	Ic (mA)	h_{FE}	V_{CE} (V)	Ic (mA)
		Inverter Driver	**UMA3**	**FMA3A**	DTA143TK×2	4.7	−50	−100	100~600	−5	−1
			UMA4	**FMA4A**	DTA114TK×2	10	−50	−100	100~600	−5	−1
			UMA6	**FMA6A**	DTA144TK×2	47	−50	−100	100~600	−5	−1
			**UMG3**	**FMG3A**	DTC143TK×2	4.7	50	100	100~600	5	1
			UMG4	**FMG4A**	DTC114TK×2	10	50	100	100~600	5	1
			UMG6	**FMG6A**	DTC144TK×2	47	50	100	100~600	5	1
			**UMG7**	**FMG7A**	DTC114TK×2	10	50	100	100~600	5	1
		Switching Circuit	**UMC1**	**FMC1A**	DTA143TK	4.7	−50	−100	100~600	−5	−1
					DTC143TK	4.7	50	100	100~600	5	1
		Pre Amp (6dB Amp)	—	**FMQ1A**	2SA1037AK	R_1 (Ω) 470	R_2 (Ω) 470	−20	−50	120~560	−6	−1
					2SC2412K			20	30	120~560	6	1

●Product Designation

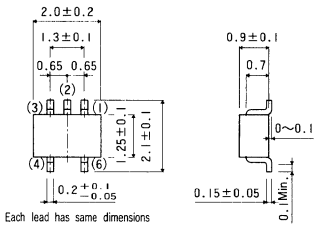
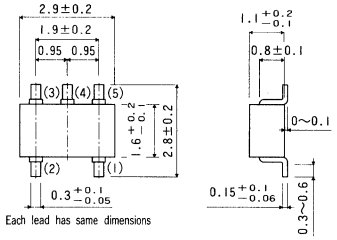
Specify part No., packaging specification code and h_{FE} ranking code.

F	M	G	2	A			T	1	4	9

Part No. | Blank unless otherwise repuired | Packaging specificaton code

Package	UM5	FMT
Code	TL	T149
	TR	T148

(Unit : mm)

Package	UM5		FMT (SOT-25)	
Dimensions				
	Actual size	Enlarged (×3.0)	Actual size	Enlarged (×3.0)
				

●Packaging

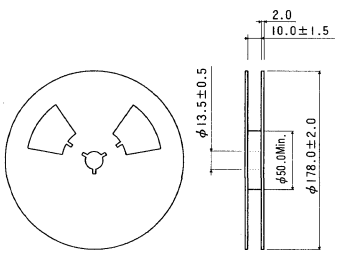
Package	Packaging type	Packaging style	Direction	Code	Quantity/Package (pcs)	Quantity/Unit (pcs)
UM5	Taping	Embossed reel tape	Pin 2 side on sprocket hole side	TL	3,000	–
			Pin 2 side on sprocket hole side	TR		
FMT	Tapiong	Embossed reel tape	Pin 3 side on sprocket hole side	T148	3,000	–
			Pin 2 side on sprocket hole side	T149		

●Packaging Specifications

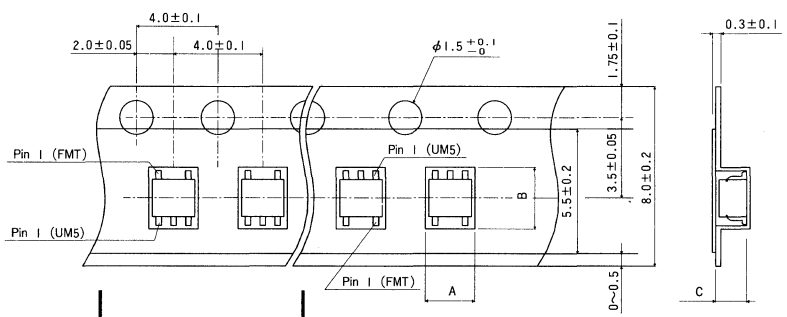
(Unit : mm)

UM5 FMT

Reel



Tape



Package	Code
UM5	TL
FMT	T149

Package	Code
UM5	TR
FMT	T148

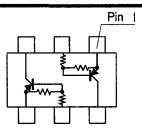
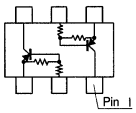
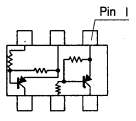
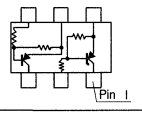
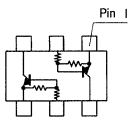
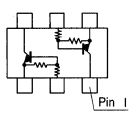
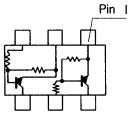
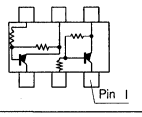
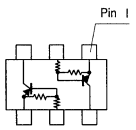
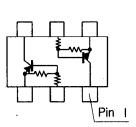
Package	Size		
	A	B	C
UM5	2.2±0.1	2.4±0.1	1.15±0.1
FMT	3.1±0.1	3.2±0.1	1.35±0.1

Digital Transistors

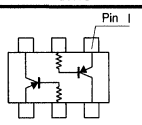
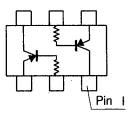
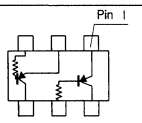
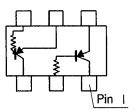
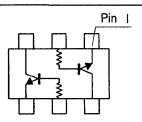
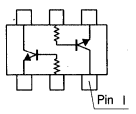
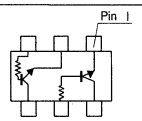
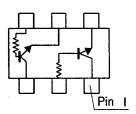
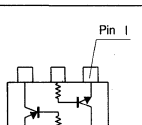
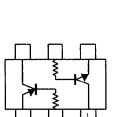
Two transistors with built-in resistors (digital transistors) in UM6 type and IMD type packages. The two digital transistors are completely independent from each other. By making use of element saving feature, external circuit can be in any configuration.

UM6 • IMD (6 pin type including 2 independent circuits)

●Built-in 2 resistors

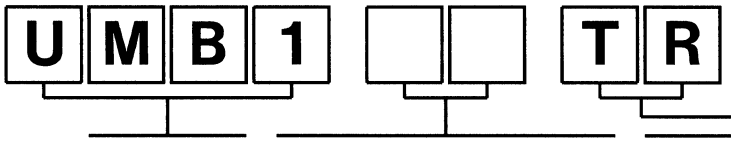
Equivalent circuit TOP VIEW UM6	Equivalent circuit TOP VIEW IMD	Application	Package UM6 Part No.	Package IMD Part No.	Equivalent product	Resistance value R_1 (kΩ)	Resistance value R_2 (kΩ)	Vcc (V)	Io (mA)	G_I	Vo (V)	Io (mA)
		Inverter Driver	UMB1	IMB1A	DTA124EK×2	22	22	−50	−30	56～	−5	−5
			UMB2	IMB2A	DTA144EK×2	47	47	−50	−30	68～	−5	−5
			UMB9	IMB9A	DTA114YK×2	10	47	−50	−70	68～	−5	−5
			UMB10	IMB10A	DTA123JK×2	2.2	47	−50	−100	80～	−5	−10
			UMB11	IMB11A	DTA114EK×2	10	10	−50	−50	30～	−5	−5
			UMB5	IMB5A	DTA124EK×2	22	22	−50	−30	56～	−5	−5
			UMB6	IMB6A	DTA144EK×2	47	47	−50	−30	68～	−5	−5
			UMH1	IMH1A	DTC124EK×2	22	22	50	30	56～	5	5
			UMH2	IMH2A	DTC144EK×2	47	47	50	30	68～	5	5
			UMH9	IMH9A	DTC114YK×2	10	47	50	70	68～	5	5
			UMH10	IMH10A	DTC123JK×2	2.2	47	50	100	80～	5	10
			UMH11	IMH11A	DTC114EK×2	10	10	50	50	30～	5	5
			UMH5	IMH5A	DTC124EK×2	22	22	50	30	56～	5	5
			UMH6	IMH6A	DTC144EK×2	47	47	50	30	68～	5	5
			UMD2	IMD2A	DTA124EK DTC124EK	22 22	22 22	−50 50	−30 30	56～ 56～	−5 5	−5 5
			UMD3	IMD3A	DTA114EK DTC114EK	10 10	10 10	−50 50	−50 50	30～ 30～	−5 5	−5 5
			–	IMD9A	DTA114YK DTC114YK	10 10	47 47	−50 50	−70 70	68～ 68～	−5 5	−5 5

●Built-in 1 resistor

Equivalent circuit TOP VIEW UM6	Equivalent circuit TOP VIEW IMD	Application	Package UM6 Part No.	Package IMD Part No.	Equivalent product	Resistance value R_1 (kΩ)	V_{CEO} (V)	Ic (mA)	h_{FE}	Vo (V)	Io (mA)
		Inverter Driver	UMB3	IMB3A	DTA143TK×2	4.7	−50	−100	100～600	−5	−1
			UMB4	IMB4A	DTA114TK×2	10	−50	−100	100～600	−5	−1
			UMB7	IMB7A	DTA143TK×2	4.7	−50	−100	100～600	−5	−1
			UMB8	IMB8A	DTA114TK×2	10	−50	−100	100～600	−5	−1
			–	IMB14A	DTA144TK×2	47	−50	−100	100～600	−5	−1
			UMH3	IMH3A	DTC143TK×2	4.7	50	100	100～600	5	1
			UMH4	IMH4A	DTC114TK×2	10	50	100	100～600	5	1
			–	IMH15A	DTC144TK×2	47	50	100	100～600	5	1
			UMH7	IMH7A	DTC143TK×2	4.7	50	100	100～600	5	1
			UMH8	IMH8A	DTC114TK×2	10	50	100	100～600	5	1
			–	IMH14A	DTC144TK×2	47	50	100	100～600	5	1
			–	IMD1A	DTA124TK DTC124TK	22 22	−50 50	−100 100	100～600 100～600	−5 5	−1 1
			UMD6	IMD6A	DTA143TK DTC143TK	4.7 4.7	−50 50	−100 100	100～600 100～600	−5 5	−1 1
			–	IMD8A	DTA144TK DTC144TK	47 47	−50 50	−100 100	100～600 100～600	−5 5	−1 1

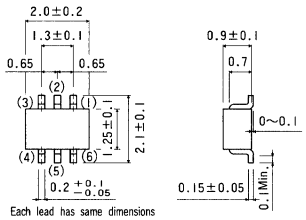
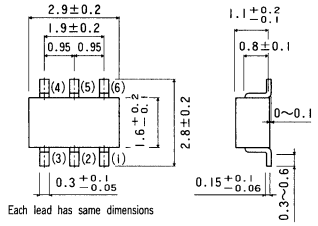
●Product Designation

Specify part No., packaging specification code and h_{FE} ranking code.



Package	UM6	IMD
Code	TL	T109
	TR	T108
	TN	T110

(Unit : mm)

Package	UM6	IMD (SOT-36)
Dimensions		
Actual size		
Enlarged (×3.0)		

●Packaging

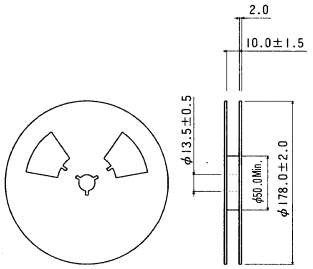
Package	Packaging type	Packaging style	Direction	Code	Quantity/Package (pcs)	Quantity/Unit (pcs)
UM6	Taping	Embossed reel tape	Pin 1 side on sprocket hole side	TL	3,000	–
			Pin 1 mark side opposite of sprocket hole side	TR		
			Non-directional	TN		
IMD	Taping	Embossed reel tape	Pin 1 mark side opposite of sprocket hole side	T108	3,000	–
			Pin 1 side on sprocket hole side	T109		
			Non-directional	T110		

●Packaging Specifications

(Unit : mm)

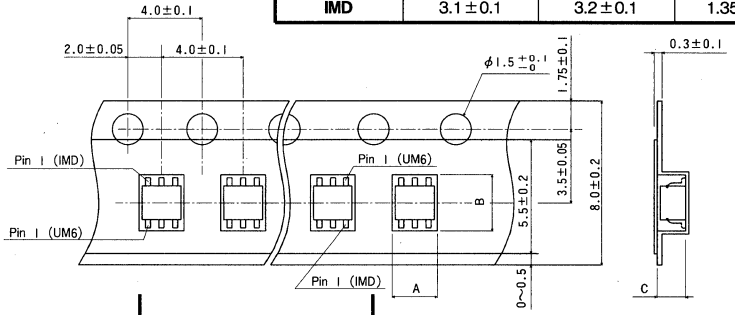
UM6 IMD

Reel



Tape

Package	Size		
	A	B	C
UM6	2.2±0.1	2.4±0.1	1.15±0.1
IMD	3.1±0.1	3.2±0.1	1.35±0.1



(Non-directional)

Package	Code
UM6	TL
IMD	T109

Package	Code
UM6	TR
IMD	T108

Package	Code
UM6	TN
IMD	T110

Composite Transistor Arrays

Multi Devices

Being housed in a miniaturized flat package, suitable for camera and VIDEO motor drive application.
Can be configured as motor forward and reverse bridge circuit and help to reduce motor drive section.
Tape and reel assists automated insertion.

●MFW10 (SOP Type)

Part No.	Device	V_{CEO} (V)	Ic (A)	Pd (mW)	h_{FE}	V_{CE} (V)	Ic (A)	Diode V_F (V)	Diode I_F (A)
MDJ01	1, 4	−10	−3	500	200~	−1	−0.5	~−1.5	−1
	2, 3	10	3		200~	1	0.5	~ 1.5	1

●Product Designation

When ordering specify the part No. and packaging specification code.

M	D	J	0	1			T	L

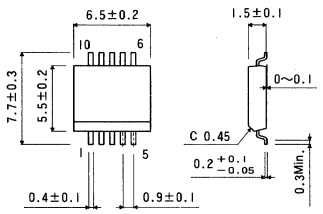
Part No. — Blank unless otherwise required — Packaging specification code

Packaging specification code	Package specifications	Quantity/Package (pcs)
TL	Pin 1 toward tape leading side	2,500
TR	Pin 1 opposite tape leading side	

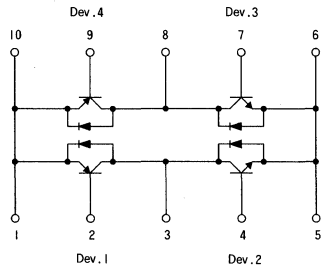
(Unit : mm)

MFW10

(×1.0)



Equivalent circuit

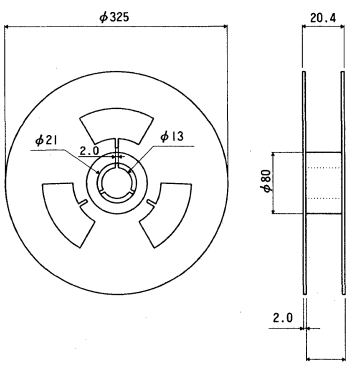


●Packaging Specifications

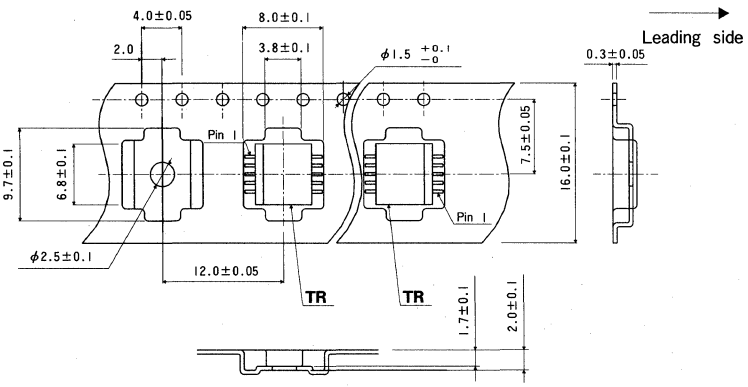
(Unit : mm)

MFW10

Reel



Tape

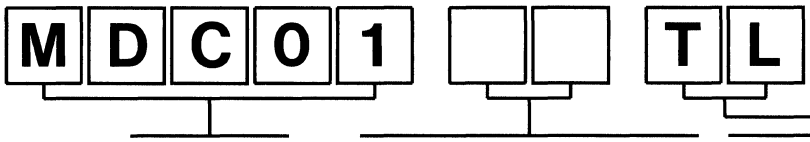


●MFW14 (SOP type)

Part No.	Device	V_{CEO} (V)	Ic (A)	Pd (mW)	h_{FE}	V_{CE} (V)	Ic (A)	Diode V_F (V)	Diode I_F (A)	Resistance value R_B (kΩ)	Resistance value R_{BE} (kΩ)
MDC01	1, 2, 3	−10	−3	500	200∼	−1	−0.5	∼−1.5	−1	−	−
	4, 5, 6	10	3		200∼	1	0.5	∼ 1.5	1	−	−
MDC02	1, 2, 3	−20	−3	500	120∼270	−2	−0.1	−	−	−	−
MDC03	1, 2, 3	−10	−3	500	200∼	−1	−0.5	∼−1.5	−1	−	10
	4, 5, 6	10	3		200∼	1	0.5	∼ 1.5	1	−	10

●Product Designation

When ordering specify the part No. and packaging specification code.

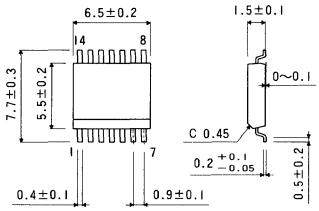


Package specifications		Quantity/Package (pcs)
TL	Pin 1 toward tape leading side	2,500
TR	Pin 1 opposite tape leading side	

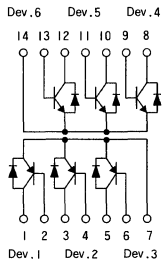
(Unit : mm)

MFW14

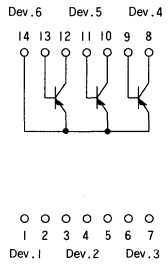
(×1.0)



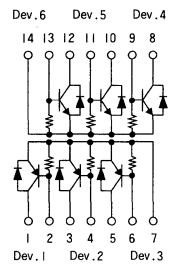
Equivalent circuit



MDC01



MDC02



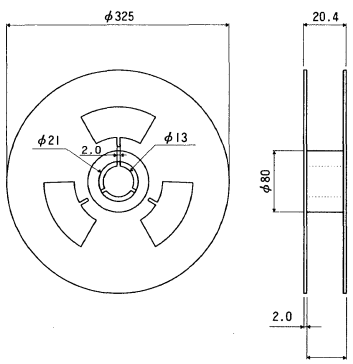
MDC03

●Packaging Specifications

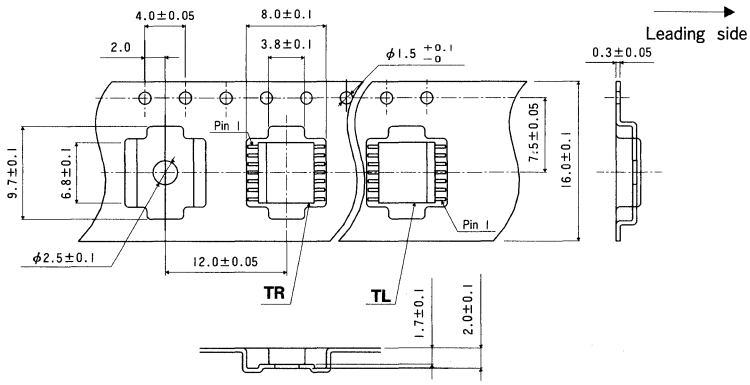
(Unit : mm)

MFW14

Reel



Tape



Composite Transistor Arrays

Multi Devices

●MF16 (SOP Type)

Part No.	Device	V_{CEO} (V)	Ic (A)	Pd (mW)	h_{FE}	V_{CE} (V)	Ic (A)	Diode V_F (V)	Diode I_F (A)	Resistance value R_B (kΩ)	Resistance value R_{BE} (kΩ)
MDA01	1, 2	10	2	490	120~560	2	0.5	~ 0.6	1	–	10
	3, 4	−10	−2		120~560	−2	−0.5	~−0.6	−1	–	10

●Product Designation

When ordering specify the part No. and packaging specification code.

M	D	A	0	1			T	1

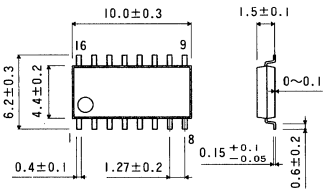
Part No. — Blank unless otherwise required — Packaging specification code

Package specifications		Quantity/Package (pcs)
T1	Pin 1 toward tape leading side	2,500
T2	Pin 1 opposite tape leading side	

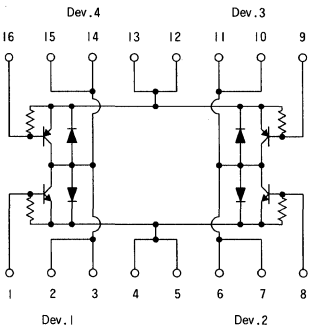
(Unit : mm)

MF16

(×1.0)



Equivalent circuit



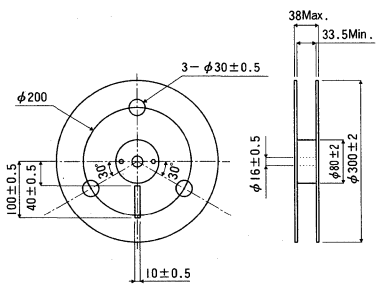
MDA01

●Packaging Specifications

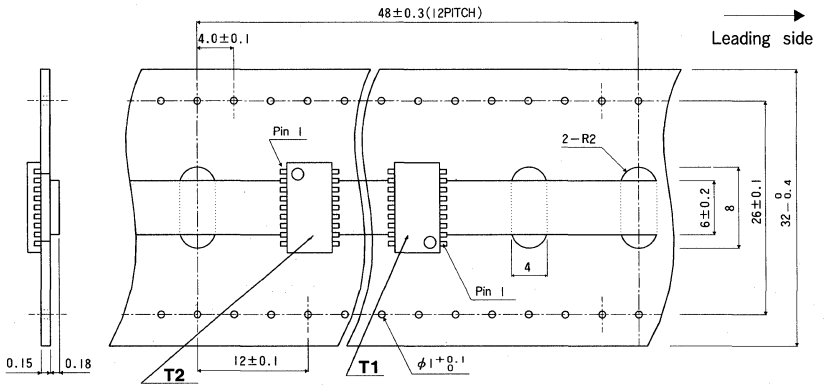
(Unit : mm)

MF16

Reel



Tape

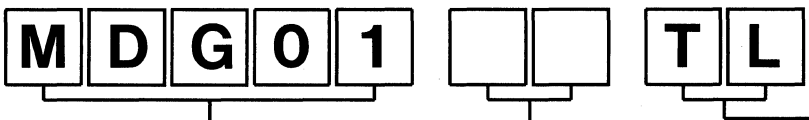


●MF16N (SOP Type)

Part No.	Device	V_{CEO} (V)	Ic (A)	Pd (mW)	h_{FE} (G_I)	V_{CE} (V_O) (V)	Ic (I_O) (A)	Diode V_F (V)	Diode I_F (A)	Resistance value R_B (kΩ)	Resistance value R_{BE} (kΩ)
MDG01	1, 2	10	2	490	120~560	1	0.5	~ 1.5	1	–	10
	3, 4	−10	−2		120~560	−1	−0.5	–	–	–	10
	5, 6	−10	−2		120~560	−1	−0.5	–	–	0.47	10
MDG02	1, 2	10	2	490	120~560	1	0.5	~ 1.5	1	–	10
	4	−10	−2		120~560	−1	−0.5	–	–	–	10
	3, 5, 6	−10	−2		120~560	−1	−0.5	–	–	0.47	10
MDG06	1, 2, 3	10	2	490	120~560	1	0.5	~ 1.5	1	–	10
	4, 5, 6	−10	−2		120~560	−1	−0.5	~−1.5	−1	–	10
MDG07	1, 2	10	2	490	120~560	1	0.5	~ 1.5	1	–	10
	3, 4	50	0.5		56~	5	0.05	–	–	2.2	10
	5, 6	−10	−2		120~560	−1	−0.5	–	–	0.47	10

●Product Designation

When ordering specify the part No. and packaging specification code.

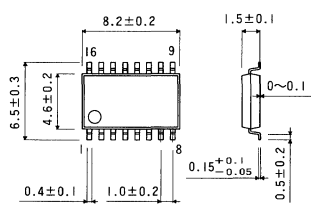


Package specifications		Quantity/Package (pcs)
TL	Pin 1 toward tape leading side	2,500
TR	Pin 1 opposite tape leading side	

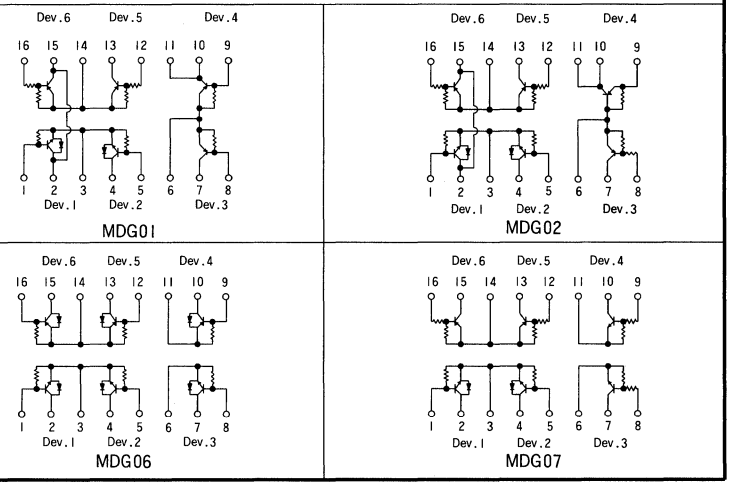
(Unit : mm)

MF16N

(×1.0)



Equivalent circuit

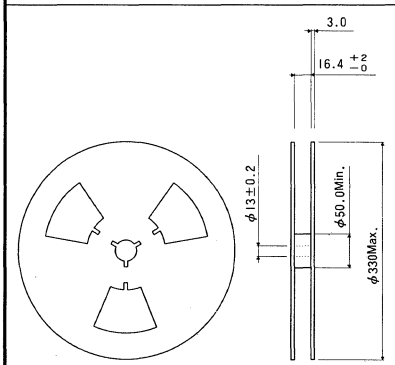


●Packaging Specifications

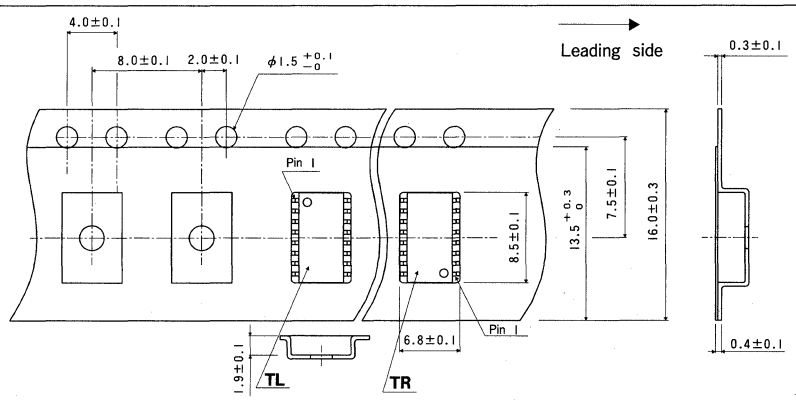
(Unit : mm)

MF16N

Reel



Tape



Composite Transistor Arrays

Multi Devices

●MF20 (SOP Types)

Part No.	V_{CEO} (V)	R_{BE} (kΩ)	Ic (A/circuit)	Pd (mW)	h_{FE}	V_{CE} (V)	Ic (mA)
TA6270F	−25	None	−1.5	800/TOTAL	150~	−3	−100
	25		−1.5		150~	3	100

Part No.	Device No.	V_{CEO} (V)	Ic (A)	Pd (mW)	h_{FE}	V_{CE} (V)	Ic (A)	Diode V_F (V)	Diode I_F (A)	Resistance value R_B (kΩ)	Resistance value R_{BE} (kΩ)
MDE01	1, 8	−50	−0.1	500	80~	−5	−0.01	−	−	4.7	47
	2, 4, 7	−10	−2		120~560	−2	−0.5	~−1.2	−0.2	−	10
	3, 5, 6	10	2		120~560	2	0.5	~ 1.2	0.2	−	10
MDE02	1, 4, 5, 8	−10	−3	500	200~	−1	−0.5	~−1.5	−1	−	10
	2, 3, 6, 7	10	3		200~	1	0.5	~ 1.5	1	−	10

●Product Designation

When ordering specify the part No. and packaging specification code.

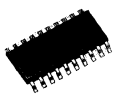
T	A	6	2	7	0	F			T	1

Part No. — Blank unless otherwise required — Packaging specification code

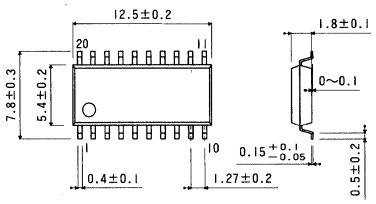
Package specifications		Quantity/Package (pcs)
T1	Pin 1 at the front end of leading side.	2,500
T2	Pin 1 at the rear end of leading side.	

(Unit : mm)

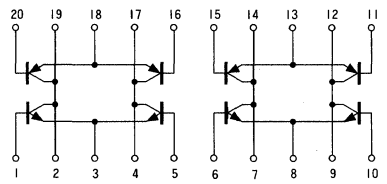
MF20



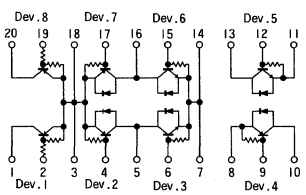
(×1.0)



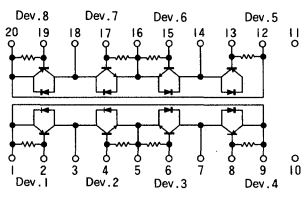
Equivalent circuit



TA6270F



MDE01



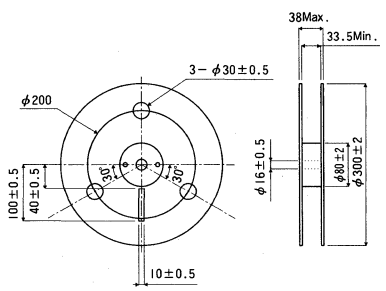
MDE02

●Packaging Specifications

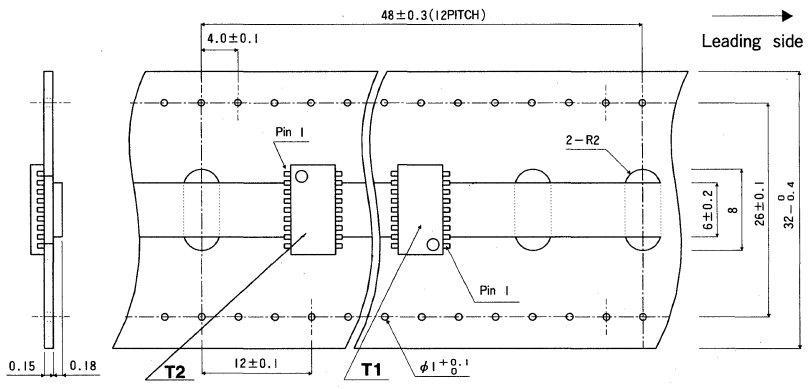
(Unit : mm)

MF20

Reel



Tape



● MP4 (SC62/SOT-89)

Contains Schottky barrier diode and transistor configured as DC/DC converter to reduce mounting and assembly and component costs.

Part No.	Transistor					Diode			
	V_{CEO} (V)	Ic (A)	h_{FE}	V_{CE} (V)	Ic (A)	V_R (V)	Io (A)	C_T (p_F)	Pd (mW)
MPL1	−20	−3	180~390	−2	−0.1	25	0.5	20	500
MPL2	−15	−1	180~390	−2	−0.05	25	0.5	20	500

●Product Designation

When ordering specify the part No. and packaging speficication code.

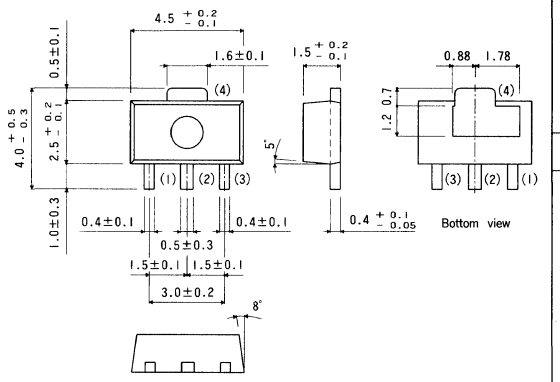
M P L 1 □ □ T L

Part No. | **Blank unless otherwise required** | **Packaging specification code**

Packaging type		Quantity/Package (pcs)
TL	Pin 3 side on sprocket hole side	1,000
TR	Fin on sprocket hole side	

(Unit : mm)

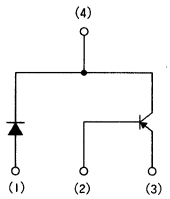
MP4



Actual size

Enlarged (×1.0)

Equivalent circuit



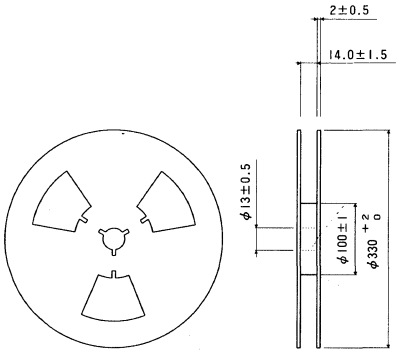
(1) Anode
(2) Base
(3) Emitter
(4) Collector , Cathode

●Packaging Specifications

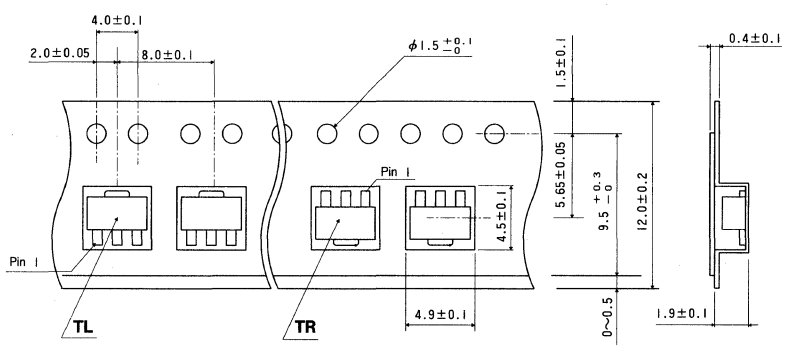
(Unit : mm)

MP4

Reel



Tape



Composite Transistor

Transistor Unit

●Piezoelectric Buzzer Driver

Part No.	Resistance value		V_{CES} (V)	Ic (mA)	Pd (mW)	h_{FE}				
	R_1 (kΩ)	R_2 (kΩ)				Min.	Typ.	Max.	V_{CE} (V)	Ic (mA)
RU101	10	180	35	50	200	150	330	820	3	50

●Product Designation

When ordering specify the part No. and packaging specification code.

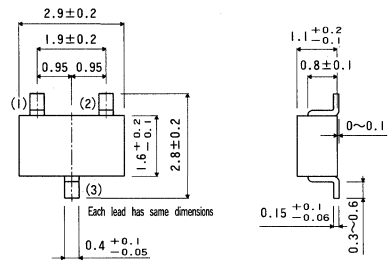
R	U	1	0	1			T	1	4	6

Part No. — **Blank unless otherwise required** — **Packaging specification code**

Code	Package specifications	Quantity / Package
T146	Pin 1 side on sprocket hole side	3,000
T147	Pin 2 side on sprocket hole side	

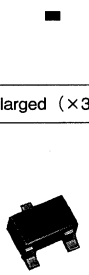
(Unit : mm)

SMT



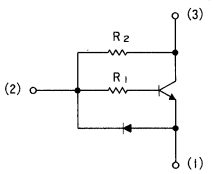
(1) Emitter
(2) Base
(3) Collector

Actual size



Enlarged (×3.0)

Equivalent circuit



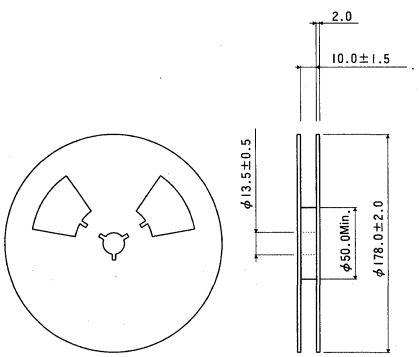
(1) Emitter
(2) Base
(3) Collector

●Packaging Specifications

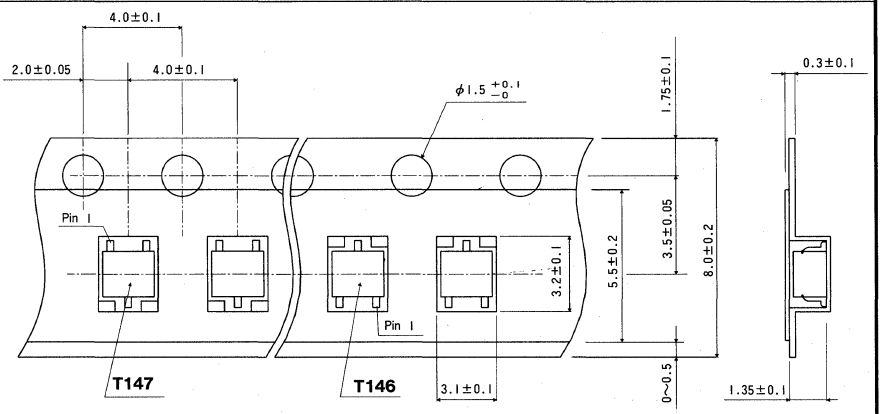
(Unit : mm)

SMT

Reel



Tape



●For Emitter Followers

Part No.	Resistance value			Vcc (V)	Pd (mW)	h_{FE}(measured across pins 1, 2, and 3)				
	R_1 (kΩ)	R_2 (kΩ)	R_3 (kΩ)			Min.	Typ.	Max.	V_{CE} (V)	Ic (mA)
RU201	47	47	1.5	15	200	100	470	1000	3	50

●Product Designation

When ordering specify the part No. and packaging specification code.

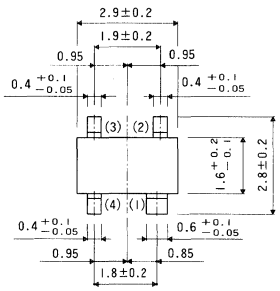
R	U	2	0	1			T	L

Part No. — **Blank unless otherwise required** — **Packaging specification code**

Package specifications		Quantity /Package (pcs)
TR	Pin 1 mark side opposite of sprocket hole side	3,000
TL	Pin 1 mark side on sprocket hole side	

(Unit : mm)

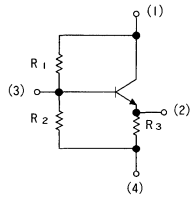
SM4



Actual size

Enlarged (×3.0)

Equivalent circuit



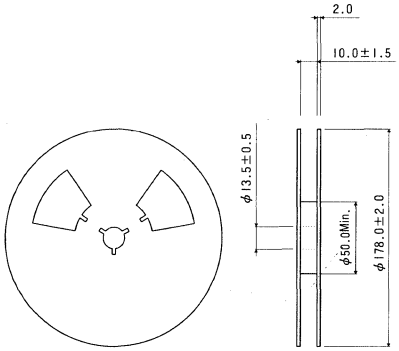
(1) Vcc
(2) OUT
(3) IN
(4) GND

●Packaging Specifications

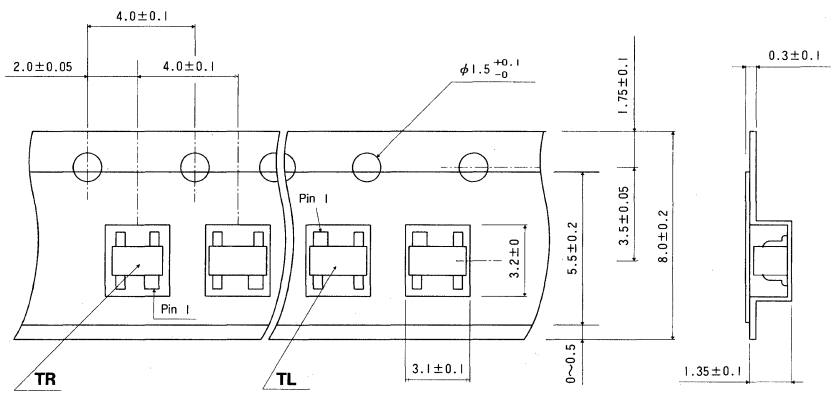
(Unit : mm)

SM4

Reel



Tape



Composite Transistor

Transistor Unit

●Emitter Followers with 2 Built-in circuits

Part No.	Resistance value		Vcc (V)	V_{EE} (V)	Pd (mW)	h_{FE}				
	R_1, R_4 (Ω)	R_2, R_3 (kΩ)				Min.	Typ.	Max.	V_{CE} (V)	Ic (mA)
RU901	200	2	15	−15	200	82	270	560	5	10

●Product Designation

When ordering specify the part No. and packaging specification code.

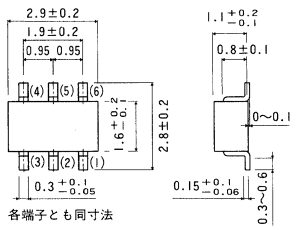
R	U	9	0	1			T	1	0	8

Part No. — **Blank unless otherwise required** — **Packaging specification code**

Package specifications		Quantity / Package (pcs)
T108	Pin 1 mark side opposite of sprocket hole side.	3,000
T109	Pin 1 mark side on sprocket hole side.	

(Unit : mm)

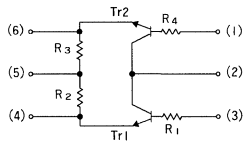
IMD



Actual size

Enlarged (×3.0)

Equivalent circuit



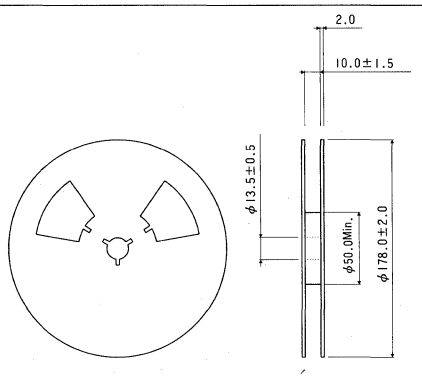
(1) V_{IN2}
(2) Vcc
(3) V_{IN1}
(4) V_{OUT1}
(5) V_{EE}
(6) V_{OUT2}

●Packaging Specifications

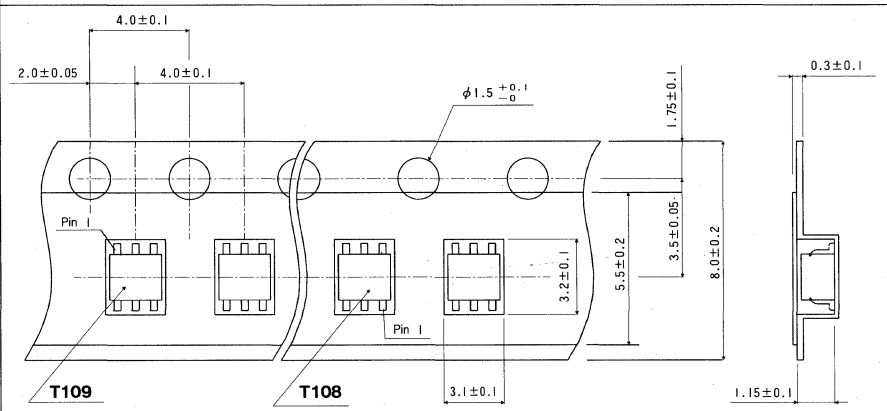
(Unit : mm)

IMD

Reel



Tape



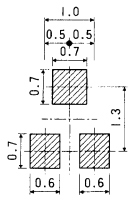
Land pattern

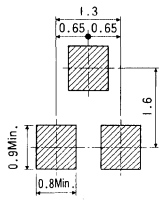
Table below show, recommended land pattern for hybrid IC and high density mounting.
Provide large pad for collector fin of power transistors of MPT, CPTF5 and PSD for effective heat dissipation.

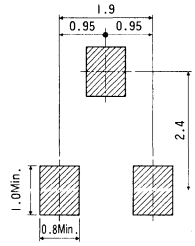
●Mini mold type

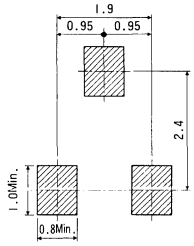
(Unit : mm)

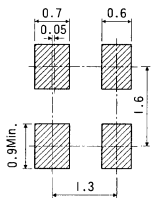
Body dimensions	1608 (0603)	2125 (0805)	2913 (1105)	2916 (1106)
Land pattern 3-Pin	EM3	UMT	SST	SMT
Land pattern 4-Pin		UM4		SM4
Land pattern 5-Pin		UM5		FMT
Land pattern 6-Pin		UM6		IMD

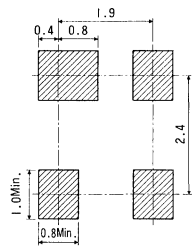


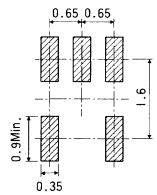


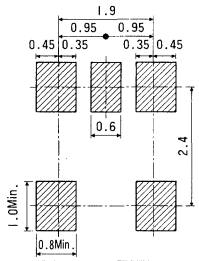


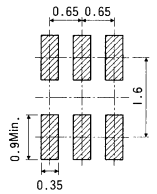


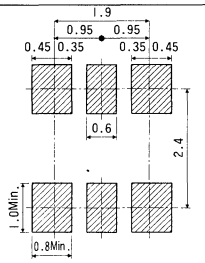






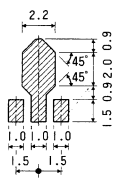


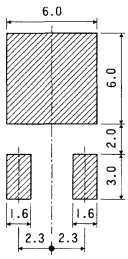


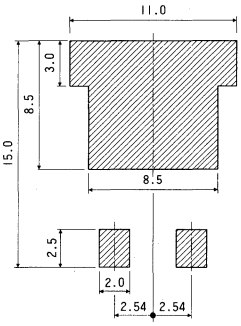


●Power type

	MPT	CPT F5	PSD
Body dimensions	4.5 × 2.5	6.5 × 5.5	10.1 × 9.9
Land pattern			







The Class and Basic Ordering Units for Standard and Semi-standard Products

To make it easier for the customer to select the type of product best suited to specific applications, we offer transistors in three types : (1) standard, (2) semi-standard, and (3) custom.

(1) Standard products

An inventory of these products is maintained so we can responed to customer orders quickly.

(2) Semi-standard products

These differ from standard products in that an inventory is not maintained, and therefore, a certain amount of time is required to fill an order. Please consult us before ordering these products.

(3) Custom

Special specifications are developed and manufactured based on the customer specifications.

Since these custom products, require more time to deliver than semi-standard products, please consult us before ordering.

●Please note the following when ordering.

The amount of an order must be in multiples of the basic order unit.

●Introductory remarks

◎ : Standard products
○ : Semi-standard products
△ : Custom

●h_{FE} Ranking Indication

Code	h_{FE} Ranking	Code	h_{FE} Ranking
L	27～56	U	560～1200
M	39～82	V	820～1800
N	56～120	W	1200～2700
P	82～180	X	1800～3900
Q	120～270	Y	1800～5600
R	180～390	A※	1000～
S	270～560	B※	5000～
E	390～820	C※	10000～

※h_{FE} for darlington transistor

Package	Packaging	Embossed tape reel	
EM3	Feed hole side	Pin 2 side	Pin 1 side
	Code	TR	TL
h_{FE}	Basic ordering unit (pcs)	3,000	3,000
2SA1774	QRS	○	◎
2SA1821	MNP	○	○
2SA1885	–	○	○
2SC4617	QRS	○	◎
2SC4618	NPQ	○	○
2SC4619	MNPQ	○	○
2SC4649	MNP	○	○
2SC4725	LMNPQ	○	○
2SC4726	LMNPQ	○	○
2SC4997	–	○	○
DTA113ZE		○	○
DTA113TE		○	○
DTA114EE		○	◎
DTA114TE		○	◎
DTA114WE		○	○
DTA114YE		○	◎
DTA115EE		○	○
DTA115GE		○	○
DTA115TE		○	○
DTA123EE		○	○
DTA123JE		○	○
DTA123YE		○	○
DTA124EE		○	◎
DTA124TE		○	○
DTA124XE		○	○
DTA143EE		○	◎
DTA143TE		○	○
DTA143XE		○	◎
DTA143YE		○	○
DTA143ZE		○	○
DTA144EE		○	◎
DTA144TE		○	○
DTA144VE		○	○
DTA144WE		○	○
DTA1D3RE		○	○
DTC113ZE		○	○
DTC114EE		○	◎
DTC114TE		○	◎
DTC114WE		○	○
DTC114YE		○	◎
DTC115EE		○	○
DTC115GE		○	○
DTC115TE		○	○
DTC123EE		○	○
DTC123JE		○	○
DTC123YE		○	○
DTC124EE		○	◎
DTC124TE		○	○
DTC124XE		○	○
DTC143EE		○	◎
DTC143TE		○	○
DTC143XE		○	○
DTC143YE		○	○
DTC143ZE		○	○
DTC144EE		○	◎
DTC144TE		○	○
DTC144VE		○	○
DTC144WE		○	◎
DTC1D3RE		○	○

Package	Packaging	Embossed tape reel	
UMT	Feed hole side	Pin 1 side	Pin 2 side
	Code	T106	T107
h_{FE}	Basic ordering unit (pcs)	3000	3000
2SA1576A	QRS	○	○
2SA1577	P	○	○
	QR	◎	◎
2SA1579	RS	○	○
2SA1808	MNP	○	○
2SA1886	–	○	○
2SC4081	QRS	◎	◎
2SC4082	LMNPQ	○	○
2SC4083	LMNPQ	○	○
2SC4084	LMNPQ	○	○
2SC4097	PQR	○	○
2SC4098	NPQ	○	○
2SC4099	NP	○	○

Package	Packaging	Embossed tape reel	
UMT	Feed hole side	Pin 1 side	Pin 2 side
	Code	T106	T107
h_{FE}	Basic ordering unit (pcs)	3,000	3,000
2SC4100	MNPQ	○	○
2SC4102	RSE	○	○
2SC4103	LMNPQ	○	○
2SC4128	NP	○	○
2SC4700	MNP	○	○
2SC4723	RS	○	○
2SC4772	LMNP	○	○
2SC4773	QRS	○	○
2SC4774	QRS	○	○
2SC4998	–	○	○
2SD1949	PQR	○	○
2SD2351	UVW	○	○
DTA113TUA		○	○
DTA113ZUA		○	○
DTA114EUA		◎	◎
DTA114GUA		○	○
DTA114TUA		◎	◎
DTA114WUA		○	○
DTA114YUA		◎	◎
DTA115EUA		○	○
DTA115GUA		○	○
DTA115TUA		○	○
DTA115UU		○	○
DTA123EUA		○	○
DTA123JUA		○	○
DTA123YUA		○	○
DTA124EUA		◎	◎
DTA124GUA		○	○
DTA124TUA		○	○
DTA124XUA		○	○
DTA125TU		○	○
DTA143EUA		◎	◎
DTA143TUA		○	○
DTA143XUA		○	○
DTA143YUA		○	○
DTA143ZUA		○	○
DTA144EUA		◎	◎
DTA144GUA		○	○
DTA144TUA		○	○
DTA144VUA		○	○
DTA144WUA		○	○
DTA1D3RUA		○	○
DTA214YU		○	○
DTC113ZUA		○	○
DTC114EUA		◎	◎
DTC114GUA		○	○
DTC114TUA		◎	◎
DTC114WUA		○	○
DTC114YUA		◎	◎
DTC115EUA		○	○
DTC115GUA		○	○
DTC115TUA		○	○
DTC115UU		○	○
DTC123EUA		○	○
DTC123JUA		○	○
DTC123YUA		○	○
DTC124EUA		◎	◎
DTC124GUA		○	○
DTC124TUA		○	○
DTC124XUA		○	○
DTC125TU		○	○
DTC143EUA		◎	◎
DTC143TUA		○	○
DTC143XUA		○	○
DTC143YUA		○	○
DTC143ZUA		○	○
DTC144EUA		◎	◎
DTC144GUA		○	○
DTC144TUA		○	○
DTC144VUA		○	○
DTC144WUA		◎	◎
DTC1D3RUA		○	○

Package	Packaging	Embossed tape reel	
SMT	Feed hole side	Pin 1 side	Pin 2 side
	Code	T146	T147
h_{FE}	Basic ordering unit (pcs)	3,000	3,000
2SA1036K	P	○	○
	QR	○	○
2SA1037AK	QRS	◎	◎
2SA1037AKLN	RSE	○	○
2SA1455K	RSE	○	○
2SA1514K	RSE	○	○
2SA1733K	MNP	○	○
2SB852K	B	○	○
2SB1051K	PQR	○	○
2SB1197K	PQR	○	○
2SB1198K	PQR	○	○
2SC2059K	MNP	○	○
2SC2411K	PQR	○	○
2SC2412K	QRS	◎	◎
2SC2412KLN	RSE	○	○
2SC2413K	NPQ	○	○
2SC3082K	MNPQ	○	○
2SC3722K	RSE	○	○
2SC3802K	MNPQ	○	○
2SC3837K	LMNPQ	○	○
2SC3838K	LMNPQ	○	○
2SC3839K	LMNPQ	○	○
2SC3906K	RSE	○	○
2SC4018K	NP	○	○
2SC4061K	MNP	○	○
2SC4326LK	QRS	○	○
2SC4642K	RS	○	○
2SC4699K	MNP	○	○
2SC4713K	QRS	○	○
2SC4771K	LMNP	○	○
2SD1383K	B	○	○
2SD1484K	PQR	○	○
2SD1757K	QRS	○	○
2SD4781K	PQR	○	○
2SD1782K	PQR	○	○
2SD2114K	UVW	○	○
2SD2226K	UVW	○	○
DTA113ZKA		○	○
DTA113TKA		○	○
DTA114EKA		◎	◎
DTA114TKA		◎	◎
DTA114GKA		○	○
DTA114YKA		◎	◎
DTA114WKA		○	○
DTA115EKA		○	○
DTA115GKA		○	○
DTA115TKA		○	○
DTA115UK		○	○
DTA123EKA		○	○
DTA123JKA		○	○
DTA123YKA		○	○
DTA124EKA		◎	◎
DTA124GKA		○	○
DTA124TKA		○	○
DTA124XKA		◎	◎
DTA125TK		○	○
DTA143EKA		◎	◎
DTA143TKA		○	○
DTA143XKA		◎	◎
DTA143YKA		○	○
DTA143ZKA		○	○
DTA144EKA		◎	◎
DTA144GKA		○	○
DTA144TKA		○	○
DTA144VKA		○	○
DTA144WKA		◎	◎
DTA1D3RKA		○	○
DTB113EK		○	○
DTB113ZK		○	○
DTB114EK		○	○
DTB114GK		○	○
DTB114TK		○	○
DTB122JK		○	○
DTB123EK		○	○
DTB123TK		○	○
DTB123YK		○	○
DTB133HK		○	○
DTB143EK		○	○
DTB143TK		○	○
DTB163TK		○	○

Package	Packaging	Embossed tape reel	
SMT	Feed hole side	Pin 1 side	Pin 2 side
	Code	T146	T147
h_{FE}	Basic ordering unit (pcs)	3,000	3,000
DTC113ZKA		○	○
DTC114EKA		◎	◎
DTC114GKA		○	○
DTC114TKA		◎	◎
DTC114YKA		◎	◎
DTC114WKA		○	○
DTC115EKA		○	○
DTC115GKA		○	○
DTC115TKA		○	○
DTC115UK		○	○
DTC123EKA		○	○
DTC123JKA		○	○
DTC123YKA		○	○
DTC124EKA		◎	◎
DTC124GKA		○	○
DTC124TKA		○	○
DTC124XKA		◎	◎
DTC125TK		○	○
DTC143EKA		◎	◎
DTC143TKA		◎	◎
DTC143XKA		◎	◎
DTC143YKA		○	○
DTC143ZKA		○	○
DTC144EKA		◎	◎
DTC144GKA		○	○
DTC144TKA		○	○
DTC144VKA		○	○
DTC144WKA		◎	◎
DTC1D3RKA		○	○
DTC314TK		○	○
DTC323TK		○	○
DTC343TK		○	○
DTC363EK		○	○
DTC363TK		○	○
DTD113EK		○	○
DTD113ZK		○	○
DTD114EK		○	○
DTD114GK		○	○
DTD114TK		○	○
DTD122JK		○	○
DTD123EK		○	○
DTD123TK		○	○
DTD123YK		○	○
DTD133HK		○	○
DTD143EK		○	○
DTD143TK		○	○
DTD163TK		○	○
RU101		○	○

Package	Packaging	Embossed tape reel	
SM4	Pin 1 side	Opposite of sprocket	Sprocket
	Code	TR	TL
h_{FE}	Basic ordering unit (pcs)	3,000	3,000
RU201		○	○

Package	Packaging	Embossed tape reel	
FMT	Feed hole side	Pin 3 side	Pin 2 side
	Code	T148	T149
	Basic ordering unit (pcs)	3,000	3,000
FMA1A		○	○
FMA2A		○	○
FMA3A		○	○
FMA4A		○	○
FMA5A		○	○
FMA6A		○	○
FMA7A		○	○
FMA8A		○	○
FMA9A		○	○
FMA10A		○	○
FMA11A		○	○
FMC1A		○	○
FMC2A		○	○
FMC3A		○	○
FMC4A		○	○
FMC5A		○	○
FMC6A		○	○
FMG1A		○	○
FMG2A		○	◎
FMG3A		○	○
FMG4A		○	○
FMG5A		○	○
FMG6A		○	○
FMG7A		○	○
FMG8A		○	○
FMG9A		○	○
FMG11A		○	○
FMJ1A		○	○
FMQ1		○	○
FMS1A		○	○
FMS2A		○	○
FMS3		○	○
FMS4		○	○
FMW1		○	◎
FMW2		○	○
FMW3		○	○
FMW4		○	○
FMW6		○	○
FMW7		○	○
FMW8		○	○
FMW9		○	○
FMW10		○	○
FMW11		○	○
FMW12		○	○
FMW13		○	○
FMY1A		○	○
FMY3A		○	○
FMY4A		○	○
FMY5		○	○

The Class and Basic Ordering Units for Standard and Semi-standard Products

Package	Packaging	Embossed tape reel		
IMD	Pin 1 side	Sprocket hole side	Opposite of sprocket	Non-directional
	Code	T108	T109	T110
	Basic ordering unit (pcs)	3,000	3,000	3,000
IMB1A		／	／	○
IMB2A		／	／	○
IMB3A		／	／	○
IMB4A		／	／	○
IMB5A		○	○	／
IMB6A		○	○	／
IMB7A		○	○	／
IMB8A		○	○	／
IMB9A		／	／	○
IMB10A		／	／	○
IMB11A		／	／	○
IMB14A		○	○	／
IMD1A		○	○	／
IMD2A		○	○	／
IMD3A		○	○	／
IMD6A		○	○	／
IMH1A		／	／	○
IMH2A		／	／	○
IMH3A		／	／	○
IMH4A		／	／	○
IMH5A		○	○	／
IMH6A		○	○	／
IMH7A		○	○	／
IMH8A		○	○	／
IMH9A		／	／	○
IMH10A		／	／	○
IMH11A		／	／	○
IMH14A		○	○	／
IMH15A		○	○	／
IMT1A		／	／	○
IMT2		○	○	／
IMT3		○	○	／
IMT4		○	○	／
IMT5A		○	／	／
IMX1		／	／	○
IMX2		○	○	／
IMX3		○	○	／
IMX4		○	○	／
IMX5		○	○	／
IMX8		○	○	／
IMX11		○	○	／
IMZ1A		○	○	／
IMZ2A		○	○	／
IMZ3A		○	○	／
RU901		○	○	／

Package	Packaging	Embossed tape reel	
UM5	Sprocket hole side	Pin 3 side	Pin 2 side
	Code	TR	TL
	Basic ordering unit (pcs)	3,000	3,000
UMA1		○	○
UMA2		○	○
UMA3		○	○
UMA4		○	○
UMA5		○	○
UMA6		○	○
UMA7		○	○
UMA8		○	○
UMA9		○	○
UMA10		○	○
UMA11		○	○
UMC1		○	○
UMC2		○	○
UMC3		○	○
UMC4		○	○
UMC5		○	○
UMG1		○	○
UMG2		○	○
UMG3		○	○
UMG4		○	○
UMG5		○	○
UMG6		○	○
UMG7		○	○
UMG8		○	○
UMG9		○	○
UMG11		○	○
UML1		○	○
UML2		○	○
UMS1		○	○
UMS2		○	○
UMW1		○	○
UMW2		○	○
UMW6		○	○
UMW7		○	○
UMW8		○	○
UMW9		○	○
UMW10		○	○
UMW11		○	○
UMW12		○	○
UMW13		○	○
UMY1		○	○
UMY3		○	○
UMY4		○	○

Package	Packaging	Embossed tape reel		
UM6	Pin 1 side	Opposite of sprocket	Sprocket hole side	Non-directional
	Code	TR	TL	TN
	Basic ordering unit (pcs)	3,000	3,000	3,000
UMB1		／	／	○
UMB2		／	／	○
UMB3		／	／	○
UMB4		／	／	○
UMB5		○	○	／
UMB6		○	○	／
UMB7		○	○	／
UMB8		○	○	／
UMB9		／	／	○
UMB10		／	／	○
UMB11		／	／	○
UMD2		○	○	／
UMD3		○	○	／
UMD6		○	○	／
UMH1		／	／	○
UMH2		／	／	○
UMH3		／	／	○
UMH4		／	／	○
UMH5		○	○	／
UMH6		○	○	／
UMH7		○	○	／
UMH8		○	○	／
UMH9		／	／	○
UMH10		／	／	○
UMH11		／	／	○
UMT1		／	／	○
UMT2		○	○	／
UMT3		○	○	／
UMX1		／	／	○
UMX2		○	○	／
UMX3		○	○	／
UMX4		○	○	／
UMX5		○	○	／
UMX11		○	○	／
UMZ1		○	○	／
UMZ2		○	○	／

Package	Packaging	Embossed tape reel	
MPT	Sprocket hole side	Pin 3 side	Fin
	Code	T100	T101
h_{FE}	Basic ordering unit (pcs)	1,000	1,000
2SA1690	NPQ	○	○
2SA1759	NPQ	○	○
2SA1812	NPQ	○	○
2SA1900	PQR	○	○
2SB1132	P	○	○
	QR	◎	◎
2SB1188	P	○	○
	QR	◎	◎
2SB1189	PQR	○	○
2SB1260	PQR	○	○
2SB1308	PQR	○	○
2SB1386	PQR	○	○
2SB1561	PQ	○	○
2SB1580	1k～10k	○	○
2SC4132	NPQR	○	○
2SC5053	PQR	○	○
2SD1664	P	○	○
	QR	◎	◎
2SD1766	P	○	○
	QR	◎	◎
2SD1767	PR	○	○
	Q	◎	◎
2SD1834	2k～	○	○
2SD1898	PQR	○	○
2SD2391	PQ	○	○

Package	Packaging	Bulk	Embossed tape reel	
CPT・F5	Sprocket hole side	—	Pin 3 side	Fin
	Code	F5	TR	TL
h_{FE}	Basic ordering unit (pcs)	1,000	2,500	2,500
2SA1727	NPQ	○	○	○
2SA1807	NP	○	○	○
2SA1834	QRS	○	○	○
2SA1862	NP	○	○	○
2SB1181	PQR	○	○	○
2SB1182	PQR	○	○	○
2SB1183	1k～200k	○	○	○
2SB1184	PQR	○	○	○
2SB1275	NPQ	○	○	○
2SB1316	1k～10k	○	○	○
2SB1516	NPQ	○	○	○
2SB1535	NPQ	○	○	○
2SC5001	QRS	○	○	○
2SD1733	PQR	○	○	○
2SD1758	PQR	○	○	◎
2SD1759	1k～200k	○	○	○
2SD1760	PQR	○	○	○
2SD1918	NPQ	○	○	○
2SD1980	1k～10k	○	○	○

※CPT F5 is bulk 2000PCS

Package	Packaging	Carried taping		Embossed tape reel	
MF	Pin 1 side	Pull side front	Pull side back	Pull side back	Pull side front
	Code	T1	T2	TR	TL
	Basic ordering unit (pcs)	2,500	2,500	2,500	2,500
TA6270F	Basic ordering unit (200pcs)	○	○	／	／
MDA01		○	○	／	／
MDC01		／	／	○	○
MDC02		／	／	○	○
MDC03		／	／	○	○
MDE01		○	○	／	／
MDE02		○	○	／	／
MDG01		／	／	○	○
MDG02		／	／	○	○
MDG06		／	／	○	○
MDG07		／	／	○	○
MDJ01		／	／	○	○

Part Marking

□Marks are filled with h_{FE} ranks

●h_{FE} Ranking Indication

Code	h_{FE} Ranking	Code	h_{FE} Ranking
L	27～56	U	560～1200
M	39～82	V	820～1800
N	56～120	W	1200～2700
P	82～180	X	2700～5600
Q	120～270	Y	2700～5600
R	180～390	A★	1000～
S	270～560	B★	5000～
E	390～820	C★	10000～

★h_{FE} Item for darlington transistor

Package	Part Marking	Part No.
EM3	A□	**2SC4618**
	AC□	**2SC4725**
	AD□	**2SC4726**
	B□	**2SC4617**
	BD□	**2SA1821**
	CA	**2SA1885**
	CB	**2SC4997**
	F□	**2SA1774**
	J□	**2SC4649**
	S□	**2SC4619**
	03	**DTC143TE**
	04	**DTC114TE**
	05	**DTC124TE**
	06	**DTC144TE**
	12	**DTA123EE**
	13	**DTA143EE**
	14	**DTA114EE**
	15	**DTA124EE**
	16	**DTA144EE**
	19	**DTA115EE**
	22	**DTC123EE**
	23	**DTC143EE**
	24	**DTC114EE**
	25	**DTC124EE**
	26	**DTC144EE**
	29	**DTC115EE**
	33	**DTA143XE**
	35	**DTA124XE**
	43	**DTC143XE**
	45	**DTC124XE**
	52	**DTA123YE**
	53	**DTA143YE**
	54	**DTA114YE**
	62	**DTC123YE**
	63	**DTC143YE**
	64	**DTC114YE**
	69	**DTC115TE**
	74	**DTA114WE**
	76	**DTA144WE**
	84	**DTC114WE**
	86	**DTC144WE**
	91	**DTA113TE**
	93	**DTA143TE**
	94	**DTA114TE**
	95	**DTA124TE**
	96	**DTA144TE**
	99	**DTA115TE**
	E11	**DTA113ZE**
	E13	**DTA143ZE**
	E21	**DTC113ZE**
	E23	**DTC143ZE**
	E32	**DTA123JE**
	E42	**DTC123JE**
	E56	**DTA144VE**
	E66	**DTC144VE**
	K4B	**DTC1D3RE**
	K3B	**DTA1D3RE**
	K19	**DTA115GE**
	K29	**DTC115GE**

Package	Part Marking	Part No.
UMT	1C□	**2SC4082**
	1D□	**2SC4083**
	1E□	**2SC4084**
	1L□	**2SC4103**
	1M□	**2SC4128**
	1T□	**2SC4773**
	A□	**2SC4098**
	B□	**2SC4081**
	BD□	**2SA1808**
	BF□	**2SC4723**
	BH□	**2SC4700**
	BJ□	**2SD2351**
	BL□	**2SC4772**
	BM□	**2SC4774**
	CA	**2SA1886**
	CB	**2SC4998**
	C□	**2SC4097**
	F□	**2SA1576A**
	H□	**2SA1577**
	J□	**2SC4099**
	R□	**2SA1579**
	S□	**2SC4100**
	T□	**2SC4102**
	Y□	**2SD1949**
	03	**DTC143TUA**
	04	**DTC114TUA**
	05	**DTC124TUA**
	06	**DTC144TUA**
	09	**DTC115TUA**
	0A	**DTC125TU**
	12	**DTA123EUA**
	13	**DTA143EUA**
	14	**DTA114EUA**
	15	**DTA124EUA**
	16	**DTA144EUA**
	19	**DTA115EUA**
	22	**DTC123EUA**
	23	**DTC143EUA**
	24	**DTC114EUA**
	25	**DTC124EUA**
	26	**DTC144EUA**
	29	**DTC115EUA**
	33	**DTA143XUA**
	35	**DTA124XUA**
	43	**DTC143XUA**
	45	**DTC124XUA**
	52	**DTA123YUA**
	53	**DTA143YUA**
	54	**DTA114YUA**
	62	**DTC123YUA**
	63	**DTC143YUA**
	64	**DTC114YUA**
	74	**DTA114WUA**
	76	**DTA144WUA**
	84	**DTC114WUA**
	86	**DTC144WUA**
	91	**DTA113TUA**
	93	**DTA143TUA**
	94	**DTA114TUA**
	95	**DTA124TUA**
	96	**DTA144TUA**
	99	**DTA115TUA**
	111	**DTA113ZUA**
	113	**DTA143ZUA**
	121	**DTC113ZUA**
	123	**DTC143ZUA**
	132	**DTA123JUA**
	142	**DTC123JUA**
	156	**DTA144VUA**
	166	**DTC144VUA**
	179	**DTA115UU**

Package	Part Marking	Part No.
UMT	183	DTC115UU
	9A	DTA125TUA
	K14	DTA114GUA
	K15	DTA124GUA
	K16	DTA144GUA
	K19	DTA115GUA
	K24	DTC114GUA
	K25	DTC124GUA
	K26	DTC144GUA
	K29	DTC115GUA
	K3B	DTA1D3RUA
	K4B	DTC1D3RUA

Package	Part Marking	Part No.
SMT	A□	2SC2413K
	AA□	2SD1757K
	AC□	2SC3837K
	AD□	2SC3838K
	AE□	2SC3839K
	AF□	2SD1781K
	AH□	2SB1197K
	AJ□	2SD1782K
	AK□	2SB1198K
	AL□	2SC3802K
	AM□	2SC4018K
	AN□	2SC4061K
	AP□	2SC4074K
	AQ□	2SB1051K
	AT□	2SC4326K
	B□	2SC2412K
	BB□	2SD2114K
	BD□	2SA1733K
	BF□	2SC4642K
	BH□	2SC4699K
	BJ□	2SD2226K
	BL□	2SC4771K
	BM□	2SC4713K
	C□	2SC2411K
	D□	2SA1037AKLN
	F□	2SA1037AK
	G□	2SA1455K
	H□	2SA1036K
	I□	2SC3722K
	J□	2SC2059K
	L□	2SC2412KLN
	R□	2SA1514K
	S□	2SC3082K
	T□	2SC3906K
	U□	2SB852K
	W□	2SD1383K
	X□	2SB1051K
	Y□	2SD1484K
	ZA	RU101
	03	DTC143TKA
	04	DTC114TKA
	05	DTC124TKA
	06	DTC144TKA
	09	DTC115TKA
	0A	DTC125TK
	12	DTA123EKA
	13	DTA143EKA
	14	DTA114EKA
	15	DTA124EKA
	16	DTA144EKA
	19	DTA115EKA
	22	DTC123EKA
	23	DTC143EKA
	24	DTC114EKA
	25	DTC124EKA
	26	DTC144EKA
	29	DTC115EKA
	33	DTA143XKA
	35	DTA124XKA
	43	DTC143XKA
	45	DTC124XKA
	52	DTA123YKA
	53	DTA143YKA
	54	DTA114YKA
	62	DTC123YKA
	63	DTC143YKA
	64	DTC114YKA
	74	DTA114WKA
	76	DTA144WKA
	84	DTC114WKA
	86	DTC144WKA

Package	Part Marking	Part No.
SMT	91	DTA113TKA
	93	DTA143TKA
	94	DTA114TKA
	95	DTA124TKA
	96	DTA144TKA
	99	DTA115TKA
	9A	DTA125TK
	E11	DTA113ZKA
	E13	DTA143ZKA
	E21	DTC113ZKA
	E23	DTC143ZKA
	E32	DTA123JKA
	E42	DTC123JKA
	E56	DTA144VKA
	E66	DTC144VKA
	E79	DTA115UK
	E89	DTC115UK
	E92	DTB123TK
	E93	DTB142TK
	E94	DTB114TK
	E97	DTB163TK
	F02	DTD123TK
	F03	DTB143TK
	F04	DTD114TK
	F07	DTD163TK
	F11	DTB113EK
	F12	DTB123EK
	F13	DTB143EK
	F14	DTB114EK
	F21	DTD113EK
	F22	DTD123EK
	F23	DTD143EK
	F24	DTD114EK
	F52	DTB123YK
	F62	DTD123YK
	G08	DTD133HK
	G11	DTB113ZK
	G21	DTD113ZK
	G3C	DTB122JK
	G4C	DTD122JK
	G98	DTB133HK
	H02	DTC323TK
	H03	DTC343TK
	H04	DTC314TK
	H07	DTC363TK
	H27	DTC363EK
	K14	DTA114GKA
	K15	DTA124GKA
	K16	DTA144GKA
	K19	DTA115GKA
	K24	DTC114GKA
	K25	DTC124GKA
	K26	DTC144GKA
	K29	DTC115GKA
	K3B	DTA1D3RKA
	K4B	DTC1D3RKA
	L14	DTB114GK
	L24	DTD114GK

Package	Part Marking	Part No.
SM4	01	RU201

Part Marking

Package	Part Marking	Part No.
FMT	A1	**FMA1A**
	A2	**FMA2A**
	A3	**FMA3A**
	A4	**FMA4A**
	A5	**FMA5A**
	A6	**FMA6A**
	A7	**FMA7A**
	A8	**FMA8A**
	A9	**FMA9A**
	A10	**FMA10A**
	A11	**FMA11A**
	C1	**FMC1A**
	C2	**FMC2A**
	C3	**FMC3A**
	C4	**FMC4A**
	C5	**FMC5A**
	C6	**FMC6A**
	G1	**FMG1A**
	G2	**FMG2A**
	G3	**FMG3A**
	G4	**FMG4A**
	G5	**FMG5A**
	G6	**FMG6A**
	G7	**FMG7A**
	G8	**FMG8A**
	G9	**FMG9A**
	G11	**FMG11A**
	J1	**FMJ1A**
	Q1	**FMQ1**
	S1	**FMS1A**
	S2	**FMS2A**
	S3	**FMS3**
	S4	**FMS4**
	W1	**FMW1**
	W2	**FMW2**
	W3	**FMW3**
	W4	**FMW4**
	W6	**FMW6**
	W7	**FMW7**
	W8	**FMW8**
	W9	**FMW9**
	W10	**FMW10**
	W11	**FMW11**
	W12	**FMW12**
	W13	**FMW13**
	Y1	**FMY1A**
	Y3	**FMY3A**
	Y4	**FMY4A**
	Y5	**FMY5**

Package	Part Marking	Part No.
IMD	01	**RU901**
	B1	**IMB1A**
	B2	**IMB2A**
	B3	**IMB3A**
	B4	**IMB4A**
	B5	**IMB5A**
	B6	**IMB6A**
	B7	**IMB7A**
	B8	**IMB8A**
	B9	**IMB9A**
	B10	**IMB10A**
	B11	**IMB11A**
	B14	**IMB14A**
	D1	**IMD1A**
	D2	**IMD2A**
	D3	**IMD3A**
	D6	**IMD6A**
	H1	**IMH1A**
	H2	**IMH2A**
	H3	**IMH3A**
	H4	**IMH4A**
	H5	**IMH5A**
	H6	**IMH6A**
	H7	**IMH7A**
	H8	**IMH8A**
	H9	**IMH9A**
	H10	**IMH10A**
	H11	**IMH11A**
	H14	**IMH14A**
	H15	**IMH15A**
	T1	**IMT1A**
	T2	**IMT2**
	T3	**IMT3**
	T4	**IMT4**
	T5	**IMT5A**
	X1	**IMX1**
	X2	**IMX2**
	X3	**IMX3**
	X4	**IMX4**
	X5	**IMX5**
	X8	**IMX8**
	X11	**IMX11**
	Z1	**IMZ1A**
	Z2	**IMZ2A**
	Z3	**IMZ3A**

Package	Part Marking	Part No.
UM5	A1	**UMA1**
	A2	**UMA2**
	A3	**UMA3**
	A4	**UMA4**
	A5	**UMA5**
	A6	**UMA6**
	A7	**UMA7**
	A8	**UMA8**
	A9	**UMA9**
	A10	**UMA10**
	A11	**UMA11**
	C1	**UMC1**
	C2	**UMC2**
	C3	**UMC3**
	C4	**UMC4**
	C5	**UMC5**
	G1	**UMG1**
	G2	**UMG2**
	G3	**UMG3**
	G4	**UMG4**
	G5	**UMG5**
	G6	**UMG6**
	G7	**UMG7**
	G8	**UMG8**
	G9	**UMG9**
	G10	**UMG10**
	G11	**UMG11**
	L1	**UML1**
	L2	**UML2**
	S1	**UMS1**
	S2	**UMS2**
	W1	**UMW1**
	W2	**UMW2**
	W6	**UMW6**
	W7	**UMW7**
	W8	**UMW8**
	W9	**UMW9**
	W10	**UMW10**
	W11	**UMW11**
	W12	**UMW12**
	W13	**UMW13**
	Y1	**UMY1**
	Y3	**UMY3**
	Y4	**UMY4**

Package	Part Marking	Part No.
UM6	B1	UMB1
	B2	UMB2
	B3	UMB3
	B4	UMB4
	B6	UMB6
	B7	UMB7
	B8	UMB8
	B9	UMB9
	B10	UMB10
	B11	UMB11
	D2	UMD2
	D3	UMD3
	D6	UMD6
	H1	UMH1
	H2	UMH2
	H3	UMH3
	H4	UMH4
	H5	UMH5
	H6	UMH6
	H7	UMH7
	H8	UMH8
	H9	UMH9
	H10	UMH10
	H11	UMH11
	T1	UMT1
	T2	UMT2
	T3	UMT3
	X1	UMX1
	X2	UMX2
	X3	UMX3
	X5	UMX5
	X11	UMX11
	Z1	UMZ1
	Z2	UMZ2

Package	Part Marking	Part No.
MPT	AC□	2SA1690
	AE□	2SB1424
	AG□	2SA1797
	AH□	2SA1759
	AJ□	2SA1812
	AL□	2SA1900
	BA□	2SB1132
	BC□	2SB1188
	BD□	2SB1189
	BE□	2SB1260
	BF□	2SB1308
	BH□	2SB1386
	BJ□	2SB1427
	BL□	2SB1561
	CB□	2SC4132
	CE□	2SC4505
	CF□	2SD2150
	CG□	2SC5053
	DA□	2SD1664
	DB□	2SD1766
	DC□	2SD1767
	DE	2SD1834
	DF□	2SD1898
	DG□	2SD1963
	DJ□	2SD2098
	DK□	2SC4672
	DL□	2SD2167
	DM	2SD2170
	DN□	2SD2153
	DP	2SD2195
	DQ□	2SD2211
	DR	2SD2212
	DT	2SD2391
	E01	DTDG14GP
	N01	DTDM12ZP

POWER MOSFET

Excellent switching capability with low on resistance, suitable for switching power supply or DC-DC converter.
Taping products for use on an automatic insert machine are also available.

Quick reference

V_{CEO} [V] / I_D [A]	60	450	500
2	**2SK1973 (CPT)** **2SK2094 (CPT)** **2SK2261 (MRT)** **2SK2262 (MRT)**		
5	**2SK2104 (CPT)**	**2SK1976 (TO-220FP)**	**2SK2176 (TO-220FP)**
10	**2SK1974 (TO-220FP)** **2SK2095 (TO-220FP)**	**2SK1975 (TO-247)**	

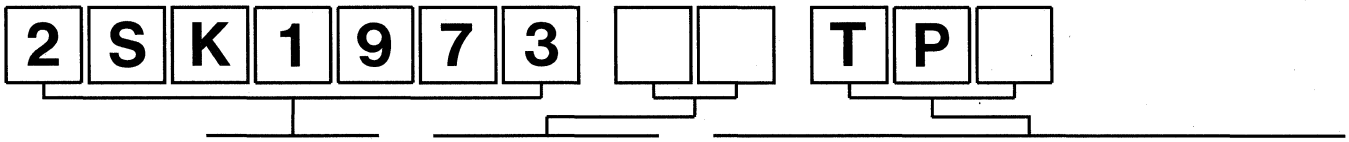
CPT • TO-220FP • TO-247

Application	Package				V_{DSS} (V)	I_D (A)	P_D (W) (Tc=25℃) ( ) =MRT (Ta=25℃)	V_{GS} (th) (V)		
	CPT	MRT	TO-220FP	TO-247					V_{DS} (V)	I_D (mA)
	Part No.									
Switching	**2SK1973**	**2SK2261**	–	–	60	2	10 (1.2)	2.0~4.0	10	1
	2SK2094	**2SK2262**	–	–	60	2	10 (1.2)	1.0~2.5	10	1
	☆**2SK2104**	–	–	–	60	5	10	1.0~2.5	10	1
	–	–	**2SK1974**	–	60	10	30	2.0~4.0	10	1
	–	–	**2SK1976**	–	450	5	30	2.0~4.0	10	1
	–	–	**2SK2095**	–	60	10	30	1.0~2.5	10	1
	–	–	–	**2SK1975**	450	10	80	2.0~4.0	10	1
	–	–	**2SK2176**	–	500	5	30	2.0~4.0	10	1

Note : ☆Under development

●Product Designation

Specify part No., packaging specification code.



Part No.

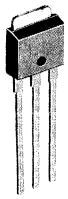
Blank unless otherwise required

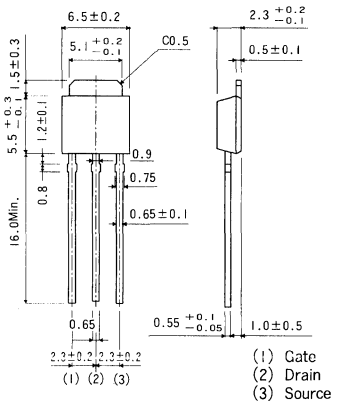
Packaging specification code

Code	Package	Packaging specifications	Quantity/Package (pcs)
–	**CPT**	Bulk	1,000
T105	**MRT**	Ammo box	2,000
–	**TO-220FP**	Bulk	500
C7		Tube	1,000 (50pcs × 20)
–	**TO-247**	Bulk	200
F31		Packed in forming tray	500

(Unit : mm)

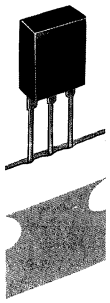
CPT

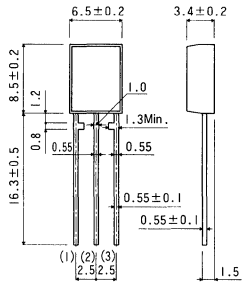




(1) Gate
(2) Drain
(3) Source

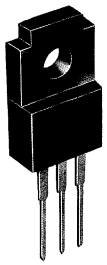
MRT

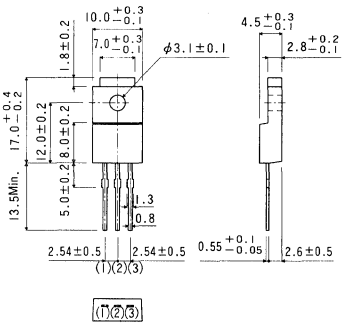




(1) Gate
(2) Drain
(3) Source

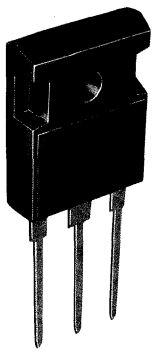
TO-220FP

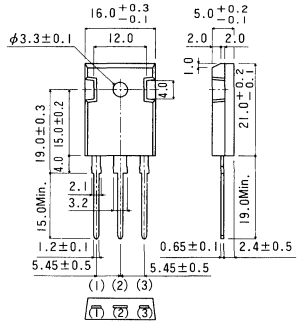




(1) Gate
(2) Drain
(3) Source

TO-247

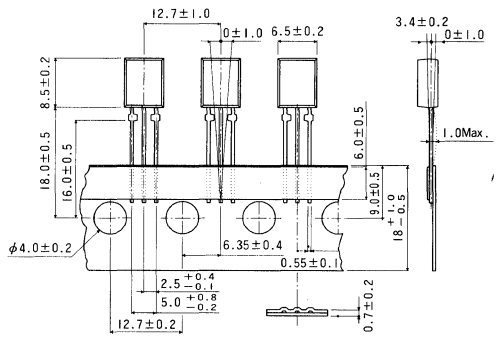




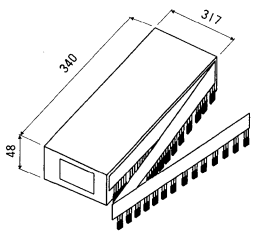
(1) Gate
(2) Drain
(3) Source

●Packaging

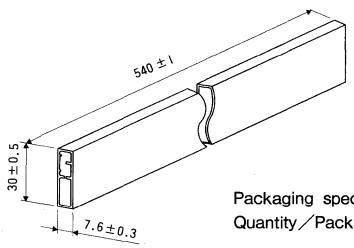
MRT Taping



MRT Ammo box



TO-220FP Container tube

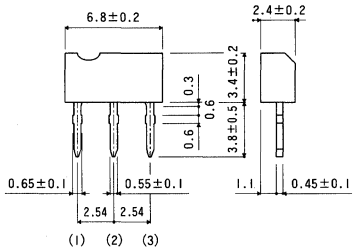


Packaging specification code : C7
Quantity／Package : 50pcs

Transistor Package Available

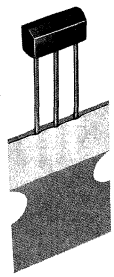
(Unit : mm)

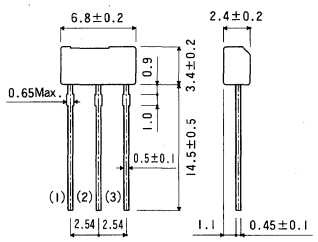
FTR



(1) Emitter
(2) Collector
(3) Base

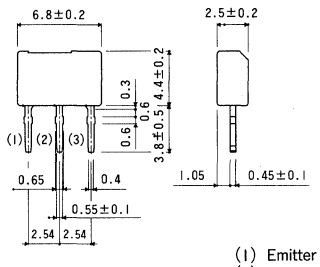
FTL





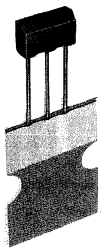
(1) Emitter
(2) Collector
(3) Base

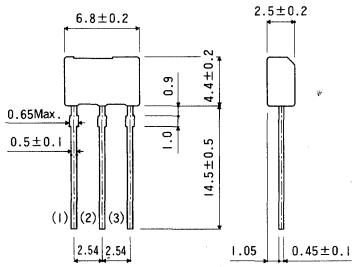
ATR



(1) Emitter
(2) Collector
(3) Base

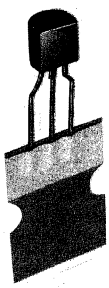
ATV

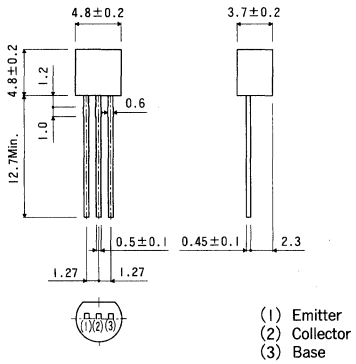




(1) Emitter
(2) Collector
(3) Base

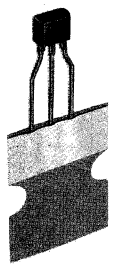
TO-92

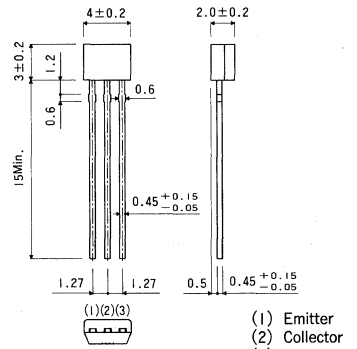




(1) Emitter
(2) Collector
(3) Base

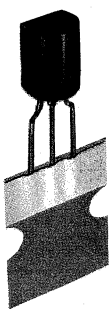
SPT

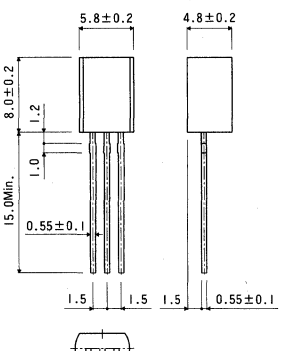




(1) Emitter
(2) Collector
(3) Base

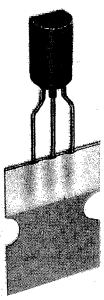
TO-92L

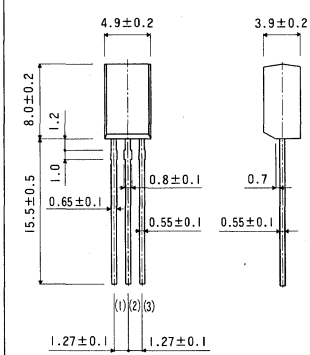




(1) Emitter
(2) Collector
(3) Base

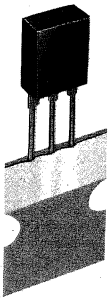
TO-92LS

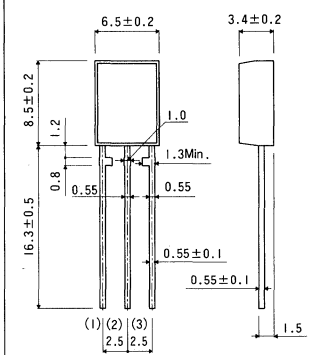




(1) Emitter
(2) Collector
(3) Base

MRT

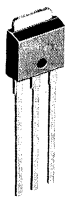


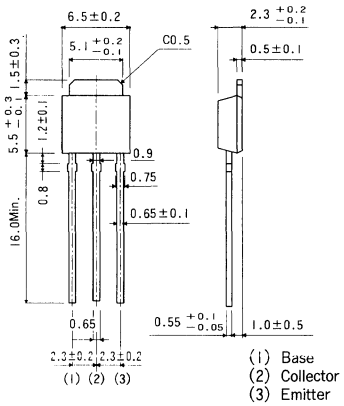


(1) Emitter
(2) Collector
(3) Base

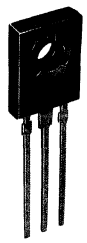
(Unit : mm)

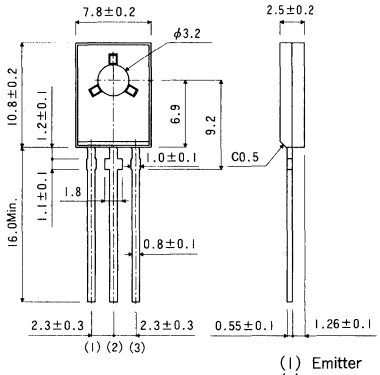
CPT



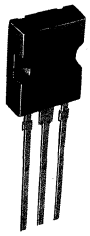


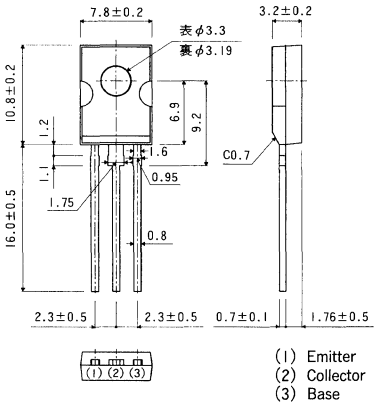
TO-126



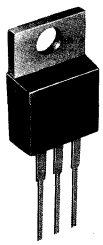


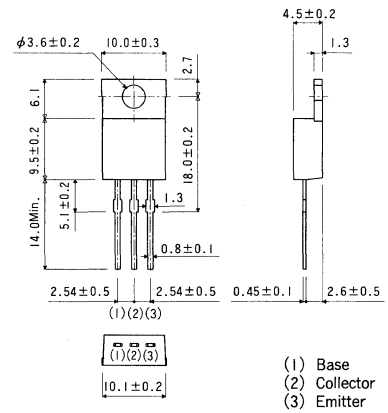
TO-126FP





TO-220





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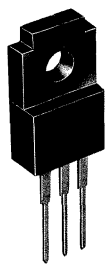
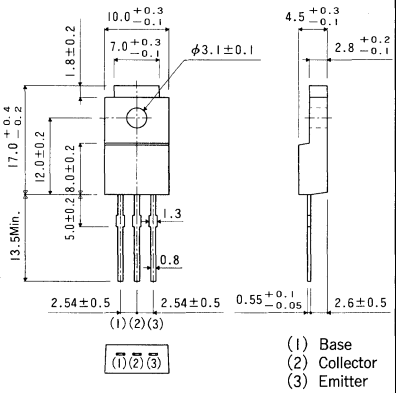
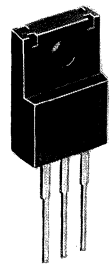
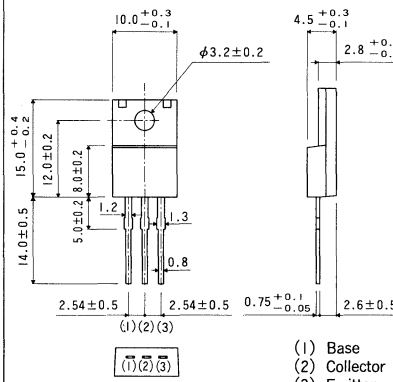


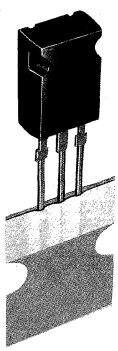


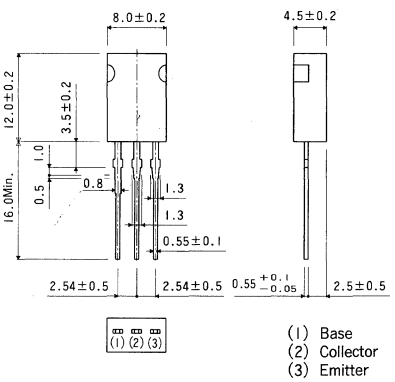
TO-220FN



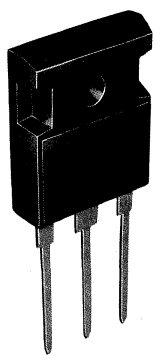


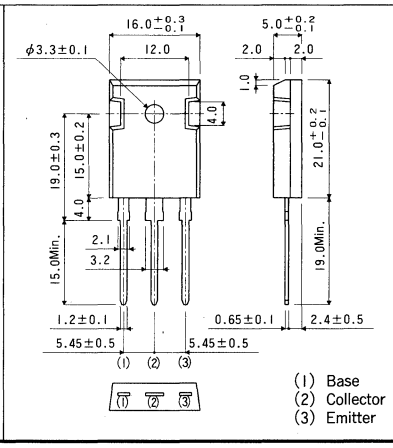
HRT





TO-247





Transistor Quick reference

Package-Application

Application	V_{CEO} (V) ※V_{CES} ※※V_{CER}	Package								
		FTR	FTL	ATR	ATV	TO-92	SPT	TO-92L	TO-92LS	MRT
		Part No.								
Low rbb' Head Amp	40					(2SB737 2SD786	2SD786S			
	80					2SA1137				
Low Noise	40	2SC2021LN(E) 2SB821	2SB1276	2SC2021MLN(E)		2SC1740(E) 2SC1740LN(E)	2SC1740S(E) 2SC1740SLN(E)			
	50	(2SA937ALN 2SC2021LN(RS)		2SA937AM (2SA937AMLN 2SC2021MLN(RS)		(2SA933A 2SC1740(QRS) (2SA933ALN 2SC1740LN(RS)	(2SA933AS 2SC1740S(QRS) (2SA933ASLN 2SC1740SLN(RS)			
	80	2SC1613A	2SC4034			2SA1039 (2SA1198 2SC2390	2SA1198S			
	80※※					2SA825	2SA825S			
	100					2SC2808	2SC2808S			
	120					2SA1038 2SC2389	2SC2389S			
	150								(2SA1819 2SC4720	
Pre Amp	25	2SC4775	2SC4777	2SC4776M	2SC4778		2SC4779S			
	40	2SC2021(E)	2SC4038(E)	2SC2021M(E)	2SC4010(E)					
	50	(2SA937A 2SC2021(QRS)	(2SA1561A 2SA4038(QRS)	2SC2021M(QRS)	(2SA1547A 2SC4010(QRS)					
	80※※	2SA785	2SA1554							
Driver	15	2SB1199	2SB1279							
	31±4	2SD2168	2SD2169							
	32	(2SA874 2SC1652 2SA881 2SC2673 2SB882 2SD1055	(2SA1559 2SC4037 2SA1560 2SC4040 2SB1277 2SD1919	(2SA874M 2SC1652M 2SB909M 2SD1225M 2SB911M 2SD1227M	(2SA1548 2SC4016 2SB1237 2SD1858 2SB1240 2SD1862	(2SA854 2SC1741 2SA1515 2SC3377	(2SA854S 2SC1741S 2SA1515S	(2SA934 2SC2060 2SB1010 2SB1425 2SD1384	(2SA1818 2SC4719 2SB1595 2SD2450	(2SB1329 2SD2005 2SB1331 2SD2007
	40					(2SA1199 2SC2872	(2SA1199S 2SC2872S			
	50	2SD1787	2SD1921	2SB1044M 2SB1066M (2SD1507M 2SD1228M	2SB1242 (2SB1243 2SD1864 2SD1860	2SC1741A	2SC1741AS	2SB1043		(2SB1517 2SD2146
	60									
	80	2SB851	(2SB1278 2SD2175	(2SB910M 2SD1226M (2SB1042M 2SD1293M	(2SB1238 2SD1859 (2SB1241 2SD1863	2SC3359	2SC3359S 2SD1768S	(2SA935 2SC2061 (2SB1041 2SD1292	(2SA1902 2SC5061	(2SB1330 2SD2006 (2SB1332 2SD2008
	100									
	120			(2SB1130M 2SD1665M	(2SB1236 2SD1857					
	160			(2SB1130AM 2SD1665AM	(2SB1236A 2SD1857A			(2SB1212 2SD1812	(2SB1596 2SD2451	(2SB1328 2SD2004
Strobo Flash Low V_{CE}(sat)	15					2SD1960				
	20			(2SB1307M 2SD1962M	(2SB1326 2SD2097			(2SB1306 2SD1961		2SB1482

Notes : 1. V_{CEO} specification codes for PNP and NPN are omitted.
2. (: Complementary pairs
3. ☆Under development
4. Letter(s) in the ( ) to the right of the part number represents available h_{FE} ranking codes.

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Package								V_{CEO} (V) ※V_{CES} ※※V_{CER}	Application
CPT	TO-126	TO-126FP	TO-220	TO-220FP	TO-220FN	HRT	TO-247		
Part No.									
								40	Low rbb' Head Amp
								80	
								40	Low Noise
								50	
								80	
								80※※	
								100	
								120	
								150	
								25	Pre Amp
								40	
								50	
								80※※	
								15	Driver
								31±4	
2SB1182 2SD1758	2SB1009 2SD1380	2SB891F 2SD1189F						32	
								40	
2SB1184 2SD1760	2SB1065 2SD1506		2SB1064 2SD1505	2SB1185 2SD1762	2SB1566 2SD2395	2SB1357 2SD2037		50	
			2SB1369 2SD2023 2SB1334 2SD1778 2SB1291 2SD1720	2SB1370 2SD2061 2SB1335 2SD1855 2SB1292 2SD1832	2SB1565 2SD2394	2SB1496 2SD2096 2SB1355 2SD2035 2SB1358 2SD2038		60	
2SB1181 2SD1733 2SB1516	2SB1007 2SD1378 2SD1382	2SB889F 2SD1200F 2SD1381F	2SA1634 2SC4007 2SB1334A 2SD1778A 2SB1289 2SD1580	2SA1635 2SC4008 2SB1335A 2SD1855A 2SB1290 2SD1833		2SC4355 2SB1356 2SD2036	☆2SB1345 ☆2SD2062	80	
2SB1535			2SB1293 2SD1896	2SB1294 2SD1897		2SB1360 2SD2040	☆2SB1477 ☆2SD2236	100	
	2SB1086 2SD1563	2SD2343	2SB1085 2SD1562 2SD1956	2SB1186 2SD1763 2SD1957	2SB1569 2SD2400	2SB1353 2SD2033		120	
2SB1275 2SD1918	2SB1086A 2SD1563A		2SB1085A 2SD1562A	2SB1186A 2SD1763A	2SB1569A 2SD2400A	2SB1353A 2SD2033A		160	
								15	Strobo Flash Low V_{CE}(sat)
2SA1834 2SB1412 2SD2118	2SB1423 2SD2147	2SB1436 2SD2166						20	

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Transistor Quick reference

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Package-Application

Application	V_{CEO} (V) ※ V_{CES} ※※ V_{CER} ※※※ V_{DSS}	Package								
		FTR	FTL	ATR	ATV	TO-92	SPT	TO-92L	TO-92LS	MRT
		Part No.								
Low V_{CE}(sat)	15	2SD1469	2SD1920	2SD1469M	2SD1865	2SD1468	2SD1468S			
	20		(2SB1428 2SD2154)		2SD2264	(2SB1426 2SD2152)	2SA1585S 2SC4115S	(2SB1374 2SD2069)	(2SA1903 2SC5062)	
	50			(2SB1485M 2SD2197M)	2SB1443 2SD2279				(2SA1820 2SC4721)	
	60									
	120									
Indicator Driver High Voltage SW	210※※	(2SA806 2SC1615)	(2SA1558 2SC4036)			(2SA821 2SC1651)				
SW	40						2SA1835S			
High Voltage Driver	150							(2SA1482 2SC3800)		
Chroma	300			2SC3270M	2SC4015	2SC3415		2SC3269	2SC4722	2SC4243
High h_{FE}	20				2SB1460			2SB1425		2SB1461
	25							2SD2159		
	60									
Darlington	32※	(2SA790 2SC1545)	(2SA1555 2SC4032)	(2SA790M 2SC1545M)	(2SA1549 2SC4017)	(2SA830 2SC1645 2SA936)	(2SA830S 2SC1645S)			
	32					2SC2062				
	40※※			(2SB1076M 2SD1536M)	(2SB1239 2SD1861)					
	60									2SD2309
	60※							2SD1809		2SD2009
	60±10			2SD1661M	2SD1866			2SD1929 2SD1931		2SD2010
	80									(2SB1515 2SD2308)
	90^{+20}_{-10}									2SD2388
	100			2SD1660M	2SD1867			(2SB1256 2SD1930)		(2SB1333 2SD2011 2SC4724)
	120									
Audio Output	120									
	150									
High Voltage SW	400			2SC4295M	2SA1776 2SC4620			2SA1584 2SA1780 2SA1760 2SC4166	2SA1884	2SA1809 2SA1861
	600									
High h_{FE} High V_{EBO}	20	2SD2145	2SD2191	2SD2145M	2SD2192	2SD2132	2SD2144S			
	25							2SD2172		
	50	2SD2312	2SD2314	2SD2313M	2SD2315		2SD2227S			
TV Tuner Mix. Osc.	11	2SC4045					2SC4043S			
	18						2SC4042S			
	19	2SC3080	2SC4041	2SC3080M	2SC4014	2SC2926	2SC2926S			
	20						2SC4044S			
	25					2SC3801★				
FM RF Mix. Osc	20			2SC3079M	2SC4013	2SC1809	2SC1809S			
FM IF AM RF	25	2SC2063	2SC4039	2SC2063M	2SC4011	2SC2058	2SC2058S			
	32			2SC3078M	2SC4012	2SC2410	2SC2410S			
MOSFET	60※※※									
	450※※※									

Notes : 1. V_{CEO} specification codes for PNP and NPN are omitted.
2. (: Complementary pairs
3. ★Emitter center
4. ☆Under development

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Package								V_{CEO} (V) * V_{CES} ** V_{CER} *** V_{DSS}	Application
CPT	TO-126	TO-126FP	TO-220	TO-220FP	TO-220FN	HRT	TO-247		
Part No.									
								15	Low V_{CE}(sat)
								20	
								50	
				2SA1757 2SC4596 2SA1758 2SC4595			☆2SA1789 ☆2SC4653	60	
			2SC4845 2SC4848	2SC4846 2SC4849			☆2SC4847 ☆2SC4850	120	
								210**	Indicator Driver High Voltage SW
								40	SW
								150	High Voltage Driver
	2SC3272	2SC3271F		☆2SC4718		2SC4506		300	Chroma
		2SC4137						20	High h_{FE}
								25	
2SD2318			2SD1943	2SD1944	2SD2396	2SD2044		60	
								32*	Darlington
								32	
2SB1183 2SD1759	2SB1008 2SD1379	2SB786F 2SD947F						40**	
			2SD1986	2SD1987		2SD2306		60	
								60*	
2SD2143	2SD1637		2SD1647 2SC4573 2SD1783	2SD1764 2SC4574 2SD1856	2SD2397	2SD2041 2SC4575 2SD2042		60±10	
2SB1474			2SB1550 2SB1341 2SD1932	2SB1551 2SB1342 2SD1933	2SB1568 2SD2399	2SB1549 2SB1512 2SD2032		80	
				2SD2091		2SD2283		90^{+20}_{-10}	
2SB1316 2SD1980	2SB1272 2SD1638		2SB1286 2SD1646 2SB1343 2SD2024	2SB1287 2SD1765 2SC4895 2SB1344 2SD2025	2SB1567 2SD2398	2SB1359 2SD2039 2SB1514 2SD2307	☆2SB1478 ☆2SD2237	100	
			2SB1339 2SD1888	2SB1340 2SD1889		2SB1513 2SD2043		120	
							☆2SA1788 ☆2SC4652	120	Audio Output
							2SA1633 2SC4278	150	
2SA1727 2SA1862	2SA1775		2SC3968 2SC4205	2SC3969 2SC4129		2SC4354	☆2SC4277	400	High Voltage SW
2SA1807								600	
								20	High h_{FE} High V_{EBO}
								25	
								50	
								11	TV Tuner Mix. Osc.
								18	
								19	
								20	
								25	
								20	FM RF Mix. Osc
								25	FM IF
								32	AM RF
2SK1973 2SK2094				2SK1974 2SK2095				60***	MOSFET
				2SK1976			2SK1975	450***	

Transistor Quick reference

V_{CEO}-Ic

FTR

Ic [mA] \ V_{CEO} [V]	11	15	19	20	25	31±4	32	40	50	80	210
30											2SA806◉ 2SC1615◉
50	2SC4045		2SC3080		2SC2063					2SA785◉ 2SC1613A	
100					2SC4775						
150								2SC2021(E) 2SC2021LN(E)	2SA937A 2SC2021(QRS) 2SA937ALN 2SC2021LN(RS) 2SD2312		
200		2SB1199									
300							2SA790✣ 2SC1545✣	2SB821			
500				2SD2145			2SA874 2SC1652		2SD1787		
700										2SB851	
1000		2SD1469					2SA881 2SC2673				
2000						2SD2168	2SB822 2SD1055				

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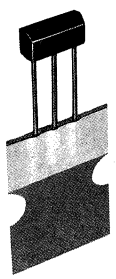
Notes : 1. ✣V_{CES} ◉V_{CER}
2. [ ] : Darlington
3. Letter(s) in the ( ) to the right of the part number represents available h_{FE} ranking codes.

FTL



Ic [mA] \ V_{CEO} [V]	15	19	20	25	31±4	32	40	50	80	210
30										2SA1558◉ 2SC4036◉
50		2SC4041		2SC4039					2SA1554◉ 2SC4034	
100				2SC4777						
150							2SC4038(E)	2SA1561A 2SC4038(QRS) 2SD2314		
200	2SB1279									
300						2SA1555✣ 2SC4032✣	2SB1276			
500			2SD2191			2SA1559 2SC4037		2SD1921		
700									2SB1278 2SD2175	
1000	2SD1920					2SA1560 2SC4040				
2000					2SD2169	2SB1277 2SD1919				
3000			2SB1428 2SD2154							

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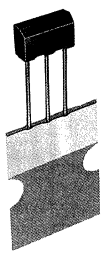
Notes : 1. ✣V_{CES} ◉V_{CER}
2. [ ] : Darlington
3. Letter(s) in the ( ) to the right of the part number represents available h_{FE} ranking codes.

ATR

Ic [A] \ V_{CEO} [V]	15	19	20	25	32	40	50	60±10	80	100	120	160	300	400
0.02		2SC3079M												
0.05		2SC3080M		2SC2063M										
0.1				2SC4776M	2SC3078M								2SC3270M	2SC4295M
0.15						2SC2021M(E) 2SC2021MLN(E)	2SA937AM 2SC2021M(QRS) 2SA937AMLN 2SC2021MLN(RS) 2SD2313M							
0.3					2SA790M✣ 2SC1545M✣									
0.5			2SD2145M		2SA874M 2SC1652M		2SD1228M							
0.7									2SB910M 2SD1226M					
1	2SD1469M				2SB909M 2SD1225M		2SB1044M		2SB1042M 2SD1293M					
1.5											2SB1130M 2SD1665M	2SB1130AM 2SD1665AM		
2					2SB911M 2SD1227M	2SB1076M◉ 2SD1536M◉	2SB1485M 2SD2197M	2SD1661M		2SD1660M				
3							2SB1066M 2SD1507M							
5			2SB1307M 2SD1962M											

Notes : 1. ✣V_{CES} ◉V_{CER}
2. [ ] : Darlington
3. Letter(s) in the ( ) to the right of the part number represents available h_{FE} ranking codes.

ATV



Ic [A] \ V_{CEO} [V]	15	19	20	25	32	40	50	60±10	80	100	120	160	300	400
0.02		2SC4013					2SC4013							
0.05		2SC4014		2SC4011			2SC4011							
0.1				2SC4778	2SC4012								2SC4015	2SC4620
0.15						2SC4010(E)	2SA1547A 2SC4010(QRS) 2SD2315							
0.3					2SA1549✣ 2SC4017✣									
0.5			2SD2192		2SA1548 2SC4016		2SD1860							2SA1776
0.7									2SB1238 2SD1859					
1	2SD1865				2SB1237 2SD1858		2SB1242		2SB1241 2SD1863					
1.5											2SB1236 2SD1857	2SB1236A 2SD1857A		
2			2SB1460		2SB1240 2SD1862	2SB1239◉ 2SD1861◉	2SB1443 2SD2279	2SD1866		2SD1867				
3			2SD2264				2SB1243 2SD1864							
5			2SB1326 2SD2097											

Notes : 1. ✣V_{CES} ◉V_{CER}
2. [ ] : Darlington
3. Letter(s) in the ( ) to the right of the part number represents available h_{FE} ranking codes.

Transistor Quick reference

V_{CEO}-Ic

TO-92

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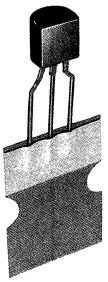
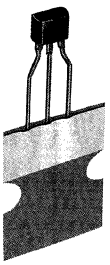


Ic [mA] \ V_{CEO} [V]	15	19	20	25	32	40	50	80	100	120	210	300
20		2SC1809										
30				2SC3801★							2SA821◉ 2SC1651◉	
50		2SC2926		2SC2058				2SA825◉ 2SA1039 2SA1198 2SC2390	2SC2808	2SA1038 2SC2389		
100					2SC2410			2SA1137				2SC3415
150						2SC1740(E) 2SC1740LN(E)	2SA933A 2SC1740(QRS) 2SA933ALN 2SC1740LN(RS)					
300					2SA830✣ 2SA936✣ 2SC1645✣ 2SC2062	2SB737 2SD786		2SC3359				
500			2SD2132		2SA854 2SC1741		2SC1741A					
700						2SA1199 2SC2872						
1000	2SD1468				2SA1515 2SC3377							
3000			2SB1426 2SC2152									
5000	2SD1960											

Notes : 1. ✣V_{CES} ◉V_{CER}
2. [ ] : Darlington
3. ★Emitter Center
4. Letter(s) in the ( ) to the right of the part number represents available h_{FE} ranking codes.

SPT

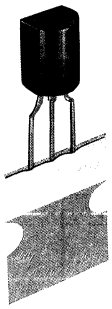
Ref. Page SPT Page 134



Ic [mA] \ V_{CEO} [V]	11	15	18	19	20	25	32	40	50	80	100	120
20			2SC1809S									
50	2SC4043S		2SC4042S	2SC2926S	2SC4044S	2SC2058S				2SA825S◉ 2SA1198S	2SC2808S	2SC2389S
100						2SC4779S	2SC2410S					
150								2SC1740S(E) 2SC1740SLN(E)	2SA933AS 2SC1740S(QRS) 2SA933ASLN 2SC1740SLN(RS) 2SD2227S			
200								2SA1835S				
300							2SA830S✣ 2SC1645S✣	2SD786S		2SC3359S		
500					2SD2144S		2SA854S 2SC1741S		2SC1741AS			
700								2SA1199S 2SC2872S				
1000		2SD1468S					2SA1515S			2SD1768S		
1200												
2000					2SA1585S 2SC4115S							

Notes : 1. ✣V_{CES} ◉V_{CER}
2. [ ] : Darlington
3. Letter(s) in the ( ) to the right of the part number represents available h_{FE} ranking codes.

TO-92L

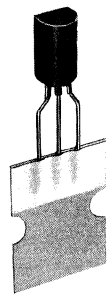


I_C [A] \ V_{CEO} [V]	20	25	32	50	60	60±10	80	100	150	160	300	400
0.05									2SA1482 2SC3800			
0.1											2SC3269	2SA1584 2SA1760 2SC4166
0.5												2SA1780
0.7							2SA935 2SC2061					
1			2SA934 2SC2060	2SB1043	2SD1809+		2SB1041 2SD1292					
1.2		2SD2172										
1.5						2SD1931				2SB1212 2SD1812		
2	2SB1425	2SD2159	2SB1010 2SD1384	2SB1374 2SD2069		2SD1929		2SB1256 2SD1930				
5	2SB1306 2SD1961											

Notes : 1.+V_{CES}
2. [ ] : Darlington

Ref. Page TO-92L Page 138

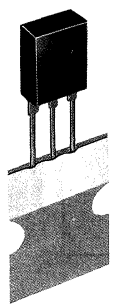
TO-92LS



I_C [A] \ V_{CEO} [V]	20	32	50	80	150	160	300	400
0.05					2SA1819 2SC4720			
0.1							2SC4722	
0.5								2SA1884
0.7				2SA1902 2SC5061				
1		2SA1818 2SC4719						
1.5						2SB1596 2SD2451		
2		2SB1595 2SD2450	2SA1820 2SC4721					
3	2SA1903 2SC5062							

Ref. Page TO-92LS Page 138

MRT



I_C [A] \ V_{CEO} [V]	20	32	50	60	60±10	80	90^{+20}_{-10}	100	160	300	400
0.1										2SC4243	
0.5											2SA1809
0.7						2SB1330 2SD2006					
1		2SB1329 2SD2005		2SD2009+		2SB1332 2SD2008					
1.5									2SB1328 2SD2004		
2	2SB1461	2SB1331 2SD2007			2SD2010		2SD2388	2SB1333 2SD2011			2SA1861
3			2SB1517 2SD2146					2SC4724			
4				2SD2309		2SB1515 2SD2308					
5	2SB1482										

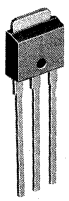
Notes : 1.+V_{CES}
2. [ ] : Darlington

Ref. Page MRT Page 138

Transistor Quick reference

V_{CEO}-Ic

CPT

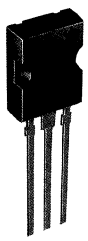


◆I_D [A] / Ic [A] \ V_{CEO} [V] ◆V_{DSS} [V]	20	32	40	50	60	60±10	80	100	160	400	600
0.5										2SA1727	
1							2SB1181 2SD1733				2SA1807
1.5									2SB1275 2SD1918		
2		2SB1182 2SD1758	2SB1183◉ 2SD1759◉		2SK1973◆ 2SK2094◆	2SD2143		2SB1316 2SD1980		2SA1862	
3				2SB1184 2SD1760	2SD2318		2SB1516				
4							2SB1474				
5	2SB1412 2SD2118										
6								2SB1535			
10	2SA1834 2SC5001										

Ref. Page CPT Page 140

Notes : 1. [ ] : MOSFET
2. [ ] : Darlington
3. ◉V_{CER}

TO-126FP



Ic [A] \ V_{CEO} [V]	20	32	40	80	120	300
0.1	2SC4137					2SC3271F
0.7				2SB889F 2SD1200F		
1				2SD1381F		
1.5					2SD2343	
2		2SB891F 2SD1189F	2SB786F◉ 2SD947F◉			
5	2SB1436 2SD2166					

Ref. Page TO-126FP Page 140

Notes : 1. ◉V_{CER}
2. [ ] : Darlington

TO-126

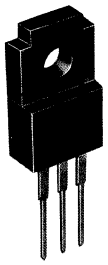
Ic [A] \ V_{CEO} [V]	20	32	40	50	60±10	80	100	120	160	300	400
0.1										2SC3272	
0.5											2SA1775
0.7						2SB1007 2SD1378					
1						2SD1382					
1.5								2SB1086 2SD1563	2SB1086A 2SD1563A		
2		2SB1009 2SD1380	2SB1008◉ 2SD1379◉		2SD1637		2SB1272 2SD1638				
3				2SB1065 2SD1506							
5	2SB1423 2SD2147										

Ref. Page TO-126 Page 140

Notes : 1. ◉V_{CER}
2. [ ] : Darlington

TO-220FP

Ref. Page TO-220FP Page 142

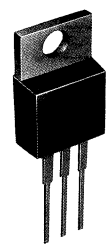


I_D [A] / Ic [A] \ V_{CEO} [V] / V_{DSS} [V]	50	60	60±10	80	90$^{+20}_{-10}$	100	120	160	400	450
1.5							2SB1186 2SD1763	2SB1186A 2SD1763A		
2			2SD1764		2SD2091	2SB1287 2SD1765			2SC3969	
3	2SB1185 2SD1762	2SB1370 2SD2061 2SD1944				2SC4895				
4		2SB1335 2SD1855 2SD1987	2SC4574	2SA1635 2SB1335A 2SB1342 2SC4008 2SD1855A 2SD1933						
5		2SA1757 2SB1292 2SC4596 2SD1832	2SD1856			2SB1294 2SD1897	2SC4846		2SC4129	2SK1976◆
6							2SB1340 2SD1889			
7				2SB1290 2SD1833			2SD1957 2SC4849			
8						2SB1344 2SD2025				
10		2SK1974◆ 2SK2095◆		2SB1551						
12		☆2SA1758 2SC4595								

Notes : 1. [ ] : MOSFET
2. [ ] : Darlington

TO-220

Ref. Page TO-220 Page 142



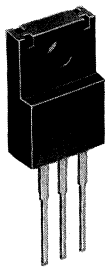
Ic [A] \ V_{CEO} [V]	50	60	60±10	80	100	120	160	400
1.5						2SB1085 2SD1562	2SB1085A 2SD1562A	
2			2SD1647		2SB1286 2SD1646			2SC3968
3	2SB1064 2SD1505	2SB1369 2SD2023 2SD1943		2SB1550				
4		2SB1334 2SD1778 2SD1986	2SC4573	2SA1634 2SB1334A 2SB1341 2SC4007 2SD1778A 2SD1932				
5		2SB1291 2SD1720	2SD1783		2SB1293 2SD1896	2SC4845		2SC4205
6						2SB1339 2SD1888		
7				2SB1289 2SD1580		2SD1956 2SC4848		
8					2SB1343 2SD2024			

Note : [ ] : Darlington

Transistor Quick reference

V_{CEO}-Ic

TO-220FN

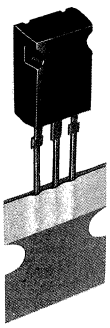


Ic [A] \ V_{CEO} [V]	50	60	60±10	80	100	120	160
1.5						2SB1569 2SD2400	2SB1569A 2SD2400A
2			2SD2397		2SB1567 2SD2398		
3	2SB1566 2SD2395	2SB1565 2SD2394 2SD2396					
4				2SB1568 2SD2399			

Ref. Page TO-220FN Page 142

Note : [ ] : Darlington

HRT

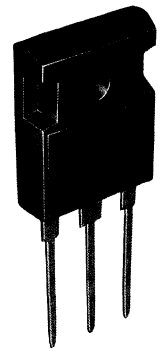


Ic [A] \ V_{CEO} [V]	50	60	60±10	80	90^{+20}_{-10}	100	120	160	300	400
0.1									2SC4506	
1.5							2SB1353 2SD2033	2SB1353A 2SD2033A		
2			2SD2041		2SD2283	2SB1359 2SD2039				2SC4354
3	2SB1357 2SD2037	2SB1496 2SD2044 2SD2096								
4		2SB1355 2SD2035 2SD2306	2SC4575	2SB1512 2SC4355 2SD2032						
5		2SB1358 2SD2038	2SD2042			2SB1360 2SD2040				
6							2SB1513 2SD2043			
7				2SB1356 2SD2036						
8						2SB1514 2SD2307				
10				2SB1549						

Ref. Page HRT Page 142

Note : [ ] : Darlington

TO-247

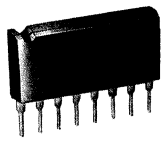


Ic [A] / ◆ID [A] \ VCEO [V] / ◆VDSS [V]	60	80	100	120	150	400	450
5			2SB1477 2SD2236	2SC4847		2SC4277	
7		2SB1345 2SD2062		2SC4850			
8			2SB1478 2SD2237	2SA1788 2SC4652			
10					2SA1633 2SC4278		2SK1975◆
12	2SA1789 2SC4653						

Ref. Page TO-247 Page 144

Notes : 1. [ ] : MOSFET
2. [ ] : Darlington

PSIP8

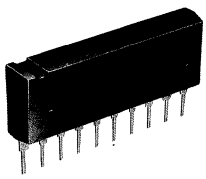


Ic [A] \ VCEO [V]	80	100	120
2		3AA11 3AC11	
4	3AA13 3AC13		
6			3AA12 3AC12

Ref. Page PSIP8 Page 151

Note : [ ] : Darlington

PSIP10



Ic [A] \ VCEO [V]	50	60	60±10	72±10	100	100±15	120	200
2			4AC16	4AC21	4AC20	4AC22		
2.5								4AC19
3	4AE12	4AA11 4AC15 4AC24			4AC18	4AC23		
4			4AC17					
6							4AA12	

Ref. Page PSIP10 Page 151

Note : [ ] : Darlington

FTR • FTL

Low profile flat-pack for limited space applications.
Taped type can be used on automated line. Bulk type is also available.

Application	Package FTR	Package FTL	V_{CEO} (V) ※V_{CES} ※※V_{CER}	Ic (mA)	Ic Max. (A)	Pc (mW) (Ta=25°C)	h_{FE}	V_{CE} (V)	Ic (mA)	Internal circuit
	Part No.									
Low Noise	**2SA937ALN**	–	−50	−150	–	300	180~560	−6	−1	–
	2SB821	☆**2SB1276**	−40	−300	–	250	120~560	−6	−10	–
	2SC1613A	☆**2SC4034**	80	50	–	150	120~560	3	5	–
	2SC2021LN	–	40	150	–	300	390~820	6	1	–
			50	150	–	300	180~560	6	1	–
Pre Amp	**2SA785**	**2SA1554**	−80※※	−50	–	150	82~270	−3	−10	–
	2SA937A	**2SA1561A**	−50	−150	–	300	82~390	−6	−1	–
	2SC2021	**2SC4038**	40	150	–	300	390~820	6	1	–
			50	150	–	300	120~560	6	1	–
	2SC4775	**2SC4777**	25	100	200	400	180~560	6	1	–
Driver	**2SA874**	**2SA1559**	−32	−500	–	300	82~390	−3	−100	–
	2SA881	**2SA1560**	−32	−1000	–	600	82~390	−3	−100	–
	2SB822	**2SB1277**	−32	−2000	−3000	750	82~390	−3	−500	–
	2SB851	**2SB1278**	−80	−700	–	750	82~390	−3	−100	–
	2SB1199	**2SB1279**	−15	−200	–	300	56~	−3	−100	–
	2SC1652	**2SC4037**	32	500	–	400	82~390	3	100	–
	2SC2673	**2SC4040**	32	1000	–	600	82~390	3	100	–
	2SD1055	**2SD1919**	32	2000	2500	750	82~390	3	500	–
	2SD1787	**2SD1921**	50	500	–	400	82~390	3	100	–
	2SD2168	**2SD2169**	31±4	2000	3000	500	82~270	3	500	–
	–	**2SD2175**	80	700	1000	500	82~390	3	100	–
Low V_{CE}(sat)	–	**2SB1428**	−20	−3000	−5000	600	82~390	−2	−100	–
	2SD1469	**2SD1920**	15	1000	–	600	120~560	3	100	–
	–	**2SD2154**	20	3000	5000	600	120~560	2	100	–
Indicator Driver High Voltage SW	**2SA806**	**2SA1558**	−210※※	−30	–	150	56~270	−3	−5	–
	2SC1615	**2SC4036**	210※※	30	–	150	56~270	3	5	–
Darlington	**2SA790**	**2SA1555**	−32※	−300	−1500	300	5k~	−5	−100	Fig. 1
	2SC1545	**2SC4032**	32※	300	1500	300	5k~	5	100	Fig. 2
High h_{FE} High V_{EBO}	**2SD2145**	**2SD2191**	20	500	1000	400	560~2700	3	10	–
	2SD2312	**2SD2314**	50	150	200	400	560~2700	5	1	–

Note : ☆Under development

Darlington transistor Internal circuit

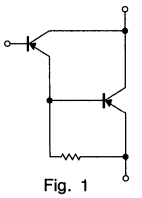


Fig. 1

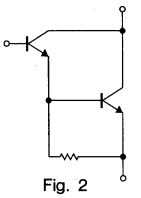


Fig. 2

FTR • FTL High frequency type

Application	Package FTR	Package FTL	V_{CEO} (V)	Ic (mA)	fr (MHz)	Cob (pF)	h_{FE}	V_{CE} (V)	Ic (mA)
	Part No.								
FM IF AM RF	**2SC2063**	**2SC4039**	25	50	300	1.6	56~270	6	1
TV Tuner Mix. Osc.	**2SC3080**	**2SC4041**	19	50	1100	1.2	39~270	10	5
	2SC4045	–	11	50	3200	1.1	27~270	10	5

●Product Designation

Specify part No., packaging specification code and h_{FE} ranking code.

2	S	A	9	3	7	□	□	□	□	R

Part No. **Blank unless otherwise required** **Packaging specification code** **h_{FE} Ranking code**

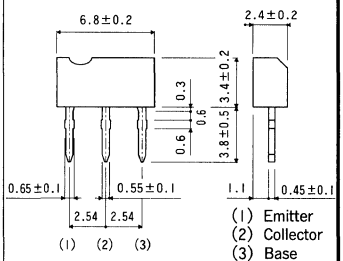
Packaging specification code

Code	Package	Package specifications	Quantity/Package (pcs)
–	FTR	Bulk	2,000
C1		Tube	8,000 (80pcs×100)
TL2	FTL	Ammo box	2,500
TL3			
TL4			

h_{FE} Ranking code

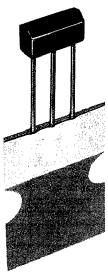
Code	h_{FE} Range	Code	h_{FE} Range
L	27～56	E	390～820
M	39～82	U	560～1200
N	56～120	V	820～1800
P	82～180	W	1200～2700
Q	120～270	A	1k～
R	180～390	B	5k～
S	270～560	C	10k～

FTR

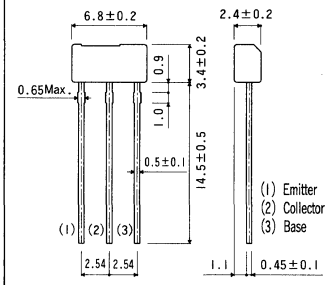


(Unit : mm)

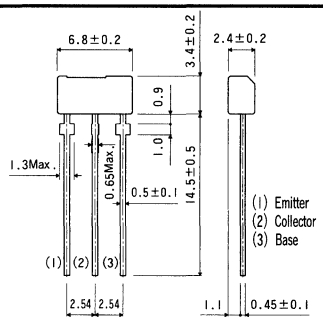
FTL



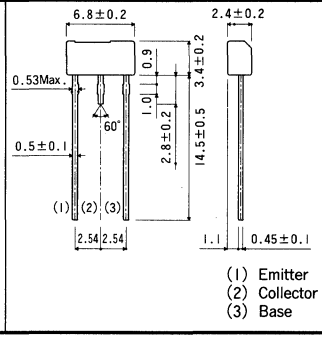
TL2



TL3



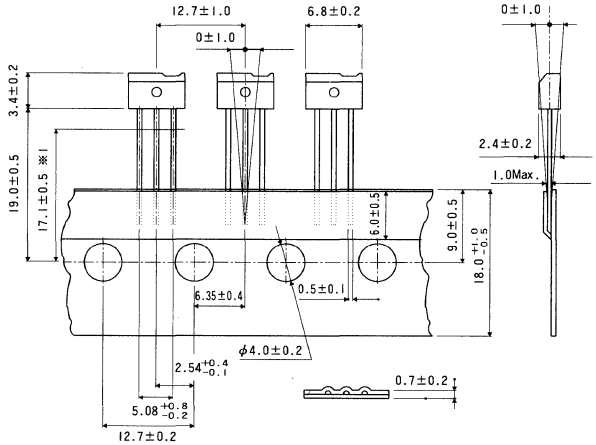
TL4



●Packaging Specifications

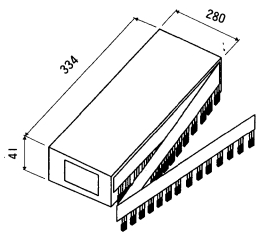
(Unit : mm)

FTL Taping

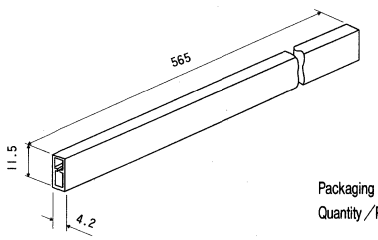


※1 FTL TL4 : 16.5±0.5

FTL Ammo box



FTR Container tube



Packaging specification code : C1
Quantity/Packaging : 80 pcs

TO-92 (JEDEC Standards Numbers)

●NPN Transistors

General purpose small signal amplifiers

Part No.	Package	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} Max.	@VCB	h_{FE} Min.	h_{FE} Max.	@Ic & V_{CE}		V_{CE} (sat) & V_{BE} (sat) Max.		@Ic	Cob Max.	f_T Min.	@ Ic	NF	Ic Max.
2N2925	TO-92 (ECB)	25V	25V	5V	100nA	25V	235	470	2.0mA	10V				10pF	160MHz	Typ.		200mA
2N3711 MPS3711	TO-92 (ECB) (EBC)	30V	30V	6V	100nA	20V	180	660	1.0mA	5V	1.0V		10mA					200mA
2N3860	TO-92 (ECB)	30V	30V	4V	50nA	40V	150	300	2.0mA	4.5V	0.125V		10mA	4pF	90MHz	2.0mA		100mA
2N5088	TO-92 (EBC)	35V	30V	4.5V	100nA	30V	300 350 300	900	100μA 1.0mA 10mA	5V 5V 5V	0.3V	0.8V	10mA	4pF	50MHz	0.5mA	3dB	200mA
2N5172 MPS5172	TO-92 (ECB) (EBC)	25V	25V	5V	100nA	25V	100	500	10mA	10V	0.25V	1.2V	10mA	10pF	200MHz	Typ.		200mA
2N5210	TO-92 (EBC)	50V	50V	4.5V	50nA	35V	200 250 250	600	100μA 1.0mA 10mA	5V 5V 5V	0.7V	0.85V	10mA	4pF	30MHz	0.5mA	2dB	200mA
2N5232A	TO-92 (ECB)	70V	50V	5V	100nA	50V	250	500	2mA	5V	0.125V		10mA	4pF			5dB	100mA
MPS8097	TO-92 (EBC)	60V	40V	6V	30nA 10μA	40V 60V	250	700	100μA	5V	0.65V ($V_{BE(on)}$)		100mA	4pF	200MHz	10mA	2dB	200mA
MPS-A09	TO-92 (EBC)	50V	50V	3V	100nA	25V	100	600	100μA	5V	0.9V		10mA	5pF	30MHz	0.5mA	1.4dB (Typ.)	200mA
MPS-A18	TO-92 (EBC)	45V	45V	6.5V	50nA	30V	400 500 500 500	1500	10μA 100μA 1.0mA 10mA	5V 5V 5V 5V	0.2V 0.3V		10mA 50mA	3pF	100MHz	1mA	4dB (Typ.)	200mA
MPS-A20	TO-92 (EBC)	40V	40V	4V	100nA	30V	40	400	5mA	10V	0.25V		10mA	4pF	125MHz	5mA		100mA

General purpose amplifiers and switches

Part No.	Package	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} Max.	@VCB	h_{FE} Min.	h_{FE} Max.	@Ic & V_{CE}		V_{CE} (sat) & V_{BE} (sat) Max.		@Ic	Cob Max.	f_T Min.	@ Ic	t_{off} Max.	Ic Max.
2N2222 PN2222	TO-92 (ECB) (EBC)	60V	30V	5V	100nA	50V	35 50 75 100 50 30	300	0.1mA 1.0mA 10mA 150mA 150mA 500mA	10V 10V 10V 10V 1V 10V	0.4V 1.6V	1.3V 2.6V	150mA 500mA	8pF	250MHz	20mA		600mA
2N2222A PN2222A	TO-92 (ECB) (EBC)	75V	40V	6V	100nA	60V	35 50 75 100 50 30	300	0.1mA 1.0mA 10mA 150mA 150mA 500mA	10V 10V 10V 10V 1V 10V	0.3V 1V	1.2V 2V	150mA 500mA	8pF	250MHz	20mA	285ns	600mA
2N3704 MPS3704	TO-92 (ECB) (EBC)	50V	30V	5V	100nA	20V	100	300	50mA	2V	0.6V	1.0V	100mA	12pF	100MHz	50mA		800mA
2N3706 MPS3706	TO-92 (ECB) (EBC)	40V	20V	5V	100nA	20V	30	600	50mA	2V	1.0V	1.0V	100mA	12pF	100MHz	50mA		800mA
2N3903	TO-92 (EBC)	60V	40V	6V	50nA (CEX)	30V	20 35 50 30 15	150	0.1mA 1.0mA 10mA 50mA 100mA	1V 1V 1V 1V 1V	0.2V 0.3V	0.85V 0.95V	10mA 50mA	4pF	250MHz	10mA	225ns	200mA

General purpose amplifiers and switches

Part No.	Package	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} Max. @VCB	h_{FE} Min.	h_{FE} Max.	@Ic & V_{CE}	V_{CE} (sat) Max.	V_{BE} (sat) Max.	@ Ic	Cob Max.	f_T Min.	@ Ic	t_{off} Max.	Ic Max.
2N3904	TO-92 (EBC)	60V	40V	6V	50nA 30V (CEX)	40 70 150 60 30	300	0.1mA 1V 1.0mA 1V 10mA 1V 50mA 1V 100mA 1V	0.2V 0.3V	0.85V 0.95V	10mA 50mA	4pF	300MHz	10mA	250ns	200mA
2N4124	TO-92 (EBC)	30V	25V	5V	50nA 20V	120 60	360	2.0mA 1V 50mA 1V	0.3V	0.95V	50mA	4pF	300MHz	10mA		200mA
2N4400	TO-92 (EBC)	60V	40V	6V	100nA 35V	20 40 50 20	150	1.0mA 1V 10mA 1V 150mA 1V 500mA 2V	0.4V 0.75V	0.95V 1.2V	150mA 500mA	6.5pF	200MHz	20mA	255ns	600mA
2N4401	TO-92 (EBC)	60V	40V	6V	100nA 35V	20 40 80 100 40	300	0.1mA 1V 1mA 1V 10mA 1V 150mA 1V 500mA 2V	0.4V 0.75V	0.95V 1.2V	150mA 500mA	6.5pF	250MHz	20mA	225ns	600mA
MPS6515	TO-92 (EBC)	40V	25V	4V	50nA 30V	250 150	500	2mA 10V 100mA 10V	0.5V		50mA	3.5pF	250MHz	10mA	NF 2dB	100mA
MPS6530	TO-92 (EBC)	60V	40V	5V	100nA 40V	30 40 25	120	10mA 1V 100mA 1V 500mA 10V	0.5V	1.0V	100mA	8pF	390MHz	Typ.		600mA
MPS6531	TO-92 (EBC)	60V	40V	5V	50nA 40V	60 90 50	270	10mA 1V 100mA 1V 500mA 10V	0.3V	1.0V	100mA	5pF	390MHz	Typ.		600mA

Medium power amplifiers

Part No.	Package	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} Max. @VCB	h_{FE} Min.	h_{FE} Max.	@Ic & V_{CE}	V_{CE} (sat) Max.	V_{BE} (sat) Max.	@ Ic	Cob Max.	f_T Min.	@ Ic	t_{off} Max.	Ic Max.
MPS-A05	TO-92 (EBC)	60V	60V	4V	100nA 60V	100 100		10mA 1V 100mA 1V	0.25V		100mA		50MHz	10mA		500mA
MPS-A06	TO-92 (EBC)	80V	80V	4V	100nA 80V	100 100		10mA 1V 100mA 1V	0.25V		100mA		50MHz	10mA		500mA

Darlington amplifiers

Part No.	Package	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} Max. @VCB	h_{FE} Min.	h_{FE} Max.	@Ic & V_{CE}	V_{CE} (sat) Max.	V_{BE} (sat) Max.	@ Ic	Cob Max.	f_T Min.	@ Ic	NF	Ic Max.
2N6426	TO-92 (EBC)	40V	40V	12V	50nA 30V	20k 30k 20k	200k 300k 200k	10mA 5V 100mA 5V 500mA 5V	1.2V 1.5V	2.0V	5mA 500mA	7pF			10dB	500mA
2N6427	TO-92 (EBC)	40V	40V	12V	50nA 30V	10k 20k 14k	100k 200k 140k	10mA 5V 100mA 5V 500mA 5V	1.2V 1.5V	2.0V	50mA 500mA	7pF			10dB	500mA
MPS-A13	TO-92 (EBC)	(CES) 30V		10V	100nA 30V	5k 10k		10mA 5V 100mA 5V	1.5V		100mA	10pF	125MHz	10mA		500mA
MPS-A14	TO-92 (EBC)	(CES) 30V		10V	100nA 30V	10k 20k		10mA 5V 100mA 5V	1.5V		100mA	10pF	125MHz	10mA		500mA
MPS-A26	TO-92 (EBC)	(CES) 50V		10V	100nA 40V	10k 10k		10mA 5V 100mA 5V	1.5V		100mA					500mA
MPS-A27	TO-92 (EBC)	(CES) 60V		10V	100nA 50V	10k 10k		10mA 5V 100mA 5V	1.5V		100mA					500mA
MPS-A28	TO-92 (EBC)	(CES) 80V		12V	100nA 60V	10k 10k		10mA 5V 100mA 5V	1.5V		100mA	8pF	125MHz	10mA		500mA
MPS-A29	TO-92 (EBC)	(CES) 100V		12V	100nA 80V	10k 10k		10mA 5V 100mA 5V	1.2V		10mA	8pF	125MHz	10mA		500mA
MPS-D04	TO-92 (EBC)	25V		10V	1.0μA 20V	1k 2k 1k		10mA 5V 100mA 5V 300mA 5V	1.0V		100mA					500mA

Transistors

TO-92 (JEDEC Standards Numbers)

●PNP Transistors

General purpose small signal amplifiers

Part No.	Package	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} Max. @VCB	h_{FE} Min.	Max.	@Ic & V_{CE}	V_{CE} (sat) & V_{BE} (sat) Max.	@ Ic	Cob Max.	f_T Min.	@ Ic	t_{off}/NF Max.	Ic Max.
2N3703 **MPS3703**	TO-92 (ECB) (EBC)	50V	30V	5V	100nA 20V	30	150	50mA 5V	0.25V	1.0V 50mA ($V_{BE\ (on)}$)	12pF	100MHz	50mA		200mA
2N5086	TO-92 (EBC)	50V	50V	3V	100nA 40V	150 150 150	500	100μA 5V 1.0mA 5V 10mA 5V	0.3V	0.85V 10mA ($V_{BE\ (on)}$)	6pF	40MHz	0.5mA	NF 3dB	200mA
2N5087	TO-92 (EBC)	50V	50V	3V	100nA 40V	250 250 250	800	100μA 5V 1.0mA 5V 10mA 5V	0.3V	10mA	6pF	40MHz	0.5mA	NF 2dB	200mA
MPS-A70	TO-92 (EBC)	40V	40V	4V	100nA 30V	40	400	5mA 10V	0.25V	10mA	6pF	125MHz	5mA		100mA

General purpose amplifiers and switches

Part No.	Package	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} Max. @VCB	h_{FE} Min.	Max.	@Ic & V_{CE}	V_{CE} (sat) & V_{BE} (sat) Max.	@ Ic	Cob Max.	f_T Min.	@ Ic	t_{off} Max.	Ic Max.
2N2907 **PN2907**	TO-92 (ECB) (EBC)	60V	40V	5V	100nA 50V	35 50 75 100 30	300	0.1mA 10V 1.0mA 10V 10mA 10V 150mA 10V 500mA 10V	0.4V 1.6V	1.3V 150mA 2.6V 500mA	8pF	200MHz	50mA	180ns	600mA
2N2907A **PN2907A**	TO-92 (ECB) (EBC)	60V	60V	5V	100nA 50V	75 100 100 100 50	300	0.1mA 10V 1.0mA 10V 10mA 10V 150mA 10V 500mA 10V	0.4V 1.6V	1.3V 150mA 2.6V 500mA	8pF	200MHz	50mA	180ns	600mA
2N3906	TO-92 (EBC)	40V	40V	5V	50nA 30V (CES)	60 80 150 60 30	300	0.1mA 1V 1.0mA 1V 10mA 1V 50mA 1V 100mA 1V	0.25V 0.4V	0.85V 10mA 0.95V 50mA	4.5pF	250MHz	10mA	300ns	200mA
2N4125	TO-92 (EBC)	30V	30V	4V	50nA 20V	50 25	150	2mA 1V 50mA 1V	0.4V	0.95V 50mA	4.5pF	200MHz	10mA		200mA
2N4126	TO-92 (EBC)	25V	25V	4V	50nA 20V	120 60	360	2mA 1V 50mA 1V	0.4V	0.95V 50mA	4.5pF	250MHz	10mA		200mA
2N4403	TO-92 (EBC)	40V	40V	5V	100nA 35V	30 60 100 100 20	300	0.1mA 1V 1mA 1V 10mA 1V 150mA 2V 500mA 2V	0.4V 0.75V	0.95V 150mA 1.3V 500mA	8.5pF	200MHz	20mA	255ns	600mA
2N6076	TO-92 (ECB)	25V	25V	5V	100nA 25V (CES)	100	500	10mA 10V	0.25V	0.85V 10mA	13pF	200MHz	Typ.	260ns	100mA
MPS3638	TO-92 (EBC)	25V	(CES) 25V	4V	100nA 15V (CES)	20 30 20		10mA 10V 50mA 1V 300mA 2V	0.25V 1.0V	1.1V 50mA 2.0V 300mA	20pF	100MHz	50mA	170ns	500mA
MPS3638A	TO-92 (EBC)	25V	(CES) 25V	4V	100nA 15V (CES)	80 100 100 20		1.0mA 10V 10mA 10V 50mA 1V 300mA 2V	0.25V 1.0V	1.1V 50mA 2.0V 300mA	10pF	150MHz	50mA	170ns	500mA
MPS4250	TO-92 (EBC)	40V	40V	5V	100nA 40V	250 250 250	700	0.1mA 5V 1mA 5V 10mA 5V	0.25V	10mA	6pF			NF 2.0dB	200mA
MPS6519	TO-92 (EBC)	40V	25V	4V	50nA 20V	250 150	500	2mA 10V 100mA 10V	0.5V	50mA	6pF	200MHz	Typ.	NF 2.0dB	100mA
MPS6534	TO-92 (EBC)	40V	40V	4V	100nA 30V	60 90 50	270	10mA 1V 100mA 1V 500mA 10V	0.5V	1.0V 100mA	8pF	260MHz	Typ.		600mA

●Medium power amplifiers

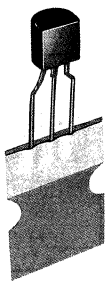
Part No.	Package	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} @VCB Max.	h_{FE} Min.Max. @Ic & V_{CE}	V_{CE} (sat) V_{BE} (sat) Max.Max. @ Ic	Cob Max.	f_T Min. @ Ic	t_{off} Max.	Ic Max.
2N5819	TO-92 (EBC)	50V	40V	5V	100nA25V	150300 2mA 2V 25 500mA 2V	0.75V 1.2V500mA	15pF	135MHz 50mA		750mA
MPS4354	TO-92 (EBC)	60V	60V	5V	100nA50V	25 0.1mA10V 40 1.0mA10V 50500 10mA10V 40 100mA10V 30 500mA10V	0.15V 0.9V150mA 0.50V 1.1V500mA	30pF	100MHz 50mA	400ns	800mA
MPS6562	TO-92 (EBC)	25V	25V	5V	100nA20V	35 10mA 1V 50 100mA 1V 50200 500mA 3V	0.50V 1.2V500mA	30pF	60MHz 10mA		500mA
MPS-A55	TO-92 (EBC)	60V	60V	4V	100nA60V	100 10mA 1V 100 100mA 1V	0.25V 1.2V100mA ($V_{BE\ (on)}$)		50MHz100mA		500mA
MPS-A56	TO-92 (EBC)	80V	80V	4V	100nA80V	50 10mA 1V 50 100mA 1V	0.25V 1.2V100mA ($V_{BE\ (on)}$)		50MHz100mA		500mA

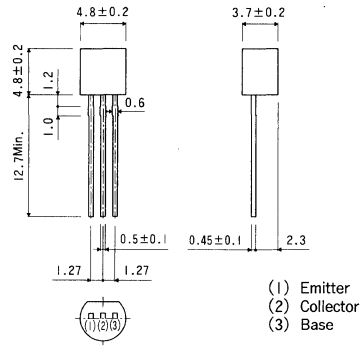
●Darlington amplifiers

Part No.	Package	BV_{CBO} Min.	BV_{CEO} Min.	BV_{EBO} Min.	I_{CBO} @VCB Max.	h_{FE} Min.Max. @Ic & V_{CE}	V_{CE} (sat) V_{BE} (sat) Max.Max. @ Ic	Cob Max.	f_T Min. @ Ic	t_{off}/NF	Ic Max.
MPS-A63	TO-92 (EBC)	30V	30V (CES)	10V	100nA 30V	5K 10mA5V 10K100mA5V	1.5V100mA	7pF	125MHz10mA		500mA
MPS-A64	TO-92 (EBC)	30V	30V (CES)	10V	100nA 30V	10K 10mA5V 20K100mA5V	1.5V100mA	7pF	125MHz10mA		500mA
MPS-A65	TO-92 (EBC)	30V	30V (CES)	8V	100nA 30V	50K 10mA5V 20K100mA5V	1.5V100mA		100MHz10mA	2dB Typ.	500mA

(Unit : mm)

TO-92

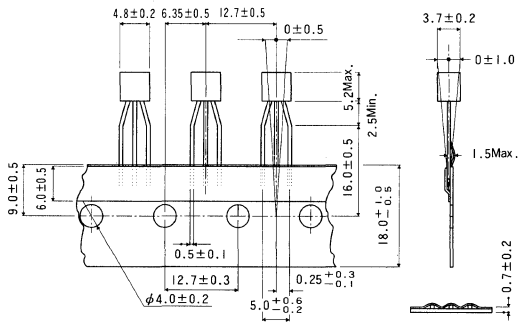




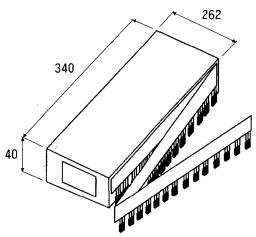
●Packaging specifications

(Unit : mm)

TO-92 Taping



TO-92 Ammo box



TO-92 • SPT

TO-92 and its smaller version, the SPT transistors, have conventional leads that fit into PWB mounting holes. Ammo box taped packaging for automated insertion is standard packaging, however, bulk is also available.

Application	Package TO-92 (Part No.)	Package SPT (Part No.)	V_{CEO} (V) ※V_{CES} ※※V_{CER}	Ic (mA)	Ic Max. (mA)	Pc (mW) (Ta=25°C) TO-92	Pc (mW) (Ta=25°C) SPT	h_{FE}	V_{CE} (V)	Ic (mA)	Internal circuit
Low rbb' Head Amp	2SA1137	–	−80	−100	–	300	–	120~560	−6	−2	–
	2SB737	–	−40	−300	–	250	–	120~560	−6	−10	–
	2SD786	2SD786S	40	300	–	250	250	120~560	6	10	–
Low Noise	2SA825	2SA825S	−80※※	−50	–	250	250	82~270	−3	−10	–
	2SA933A	2SA933AS	−50	−150	–	300	300	120~560	−6	−1	–
	2SA933ALN	2SA933ASLN	−50	−150	–	300	300	180~560	−6	−1	–
	2SA1038	–	−120	−50	–	300	–	180~560	−6	−2	–
	2SA1039	–	−80	−50	–	300	–	180~820	−6	−2	–
	2SA1198	2SA1198S	−80	−50	–	400	300	180~820	−6	−2	–
	2SC1740	2SC1740S	40	150	–	300	300	390~820	6	1	–
			50	150	–	300	300	120~560	6	1	–
	2SC1740LN	2SC1740SLN	40	150	–	300	300	390~820	6	1	–
			50	150	–	300	300	180~560	6	1	–
	2SC2389	2SC2389S	120	50	–	300	300	180~820	6	2	–
	2SC2390	–	80	50	–	300	–	180~820	6	2	–
	2SC2808	2SC2808S	100	50	–	500	300	180~820	6	2	–
Pre Amp	–	2SC4779S	25	100	200	–	300	180~560	6	1	–
Driver	2SA854	2SA854S	−32	−500	–	400	300	82~390	−3	−100	–
	2SA1199	2SA1199S	−40	−700	–	400	300	120~560	−6	−10	–
	2SA1515	2SA1515S	−32	1000	–	500	300	82~390	−3	−100	–
	2SC1741	2SC1741S	32	500	–	400	300	82~390	3	100	–
	2SC1741A	2SC1741AS	50	500	–	400	300	82~390	3	100	–
	2SC2872	2SC2872S	40	700	–	400	300	120~560	6	10	–
	2SC3359	2SC3359S	80	300	–	400	300	82~390	3	100	–
	2SC3377	–	32	1000	–	500	–	82~390	3	100	–
	–	2SD1768S	80	1000	2000	–	300	82~390	3	500	–
Low V_{CE}(sat)	–	2SA1585S	−20	−2000	−5000	–	400	82~390	−2	−100	–
	2SB1426	–	−20	−3000	−5000	750	–	82~390	−2	−100	–
	–	2SC4115S	20	2000	5000	–	400	120~560	2	100	–
	2SD2152	–	20	3000	5000	750	–	120~560	2	100	–
	2SD1468	2SD1468S	15	1000	–	400	300	120~560	3	100	–
	–	2SD2322S	32	800	–	–	300	82~390	3	100	–
Strobo Flash	2SD1960	–	15	5000	8000	750	–	250~	2	2000	–
Indicator Drive	2SA821	–	−210※※	−30	–	250	–	56~270	−3	−5	–
High Voltage SW	2SC1651	–	210※※	30	–	250	–	56~270	3	5	–
SW	–	2SA1835S	−40	−200	–	–	250	56~270	−1	−10	–
Chroma	2SC3415	–	300	100	–	500	–	39~180	10	10	–
Darlington	2SA830	2SA830S	−32※	−300	−1500	300	300	5k~	−5	−100	Fig. 2
	2SA936	–	−32※	−300	–	300	–	10k~	−5	−10	Fig. 1
	2SC1645	2SC1645S	32※	300	1500	300	300	5k~	5	100	Fig. 4
	2SC2062	–	32	300	–	300	–	5k~	3	100	Fig. 3
High h_{FE}	2SD2132	2SD2144S	20	500	1000	625	300	560~2700	3	10	–
High V_{EBO}	–	2SD2227S	50	150	200	–	300	560~2700	5	1	–

Note : ★Emitter center

Darlington transistor Internal circuit

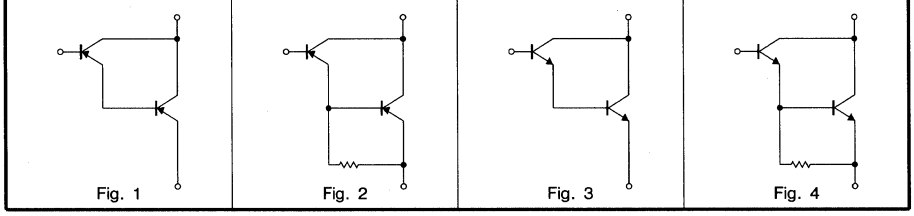


Fig. 1 Fig. 2 Fig. 3 Fig. 4

TO-92 • SPT High frequency type

Application		Package TO-92 (Part No.)	Package SPT (Part No.)	V_{CEO} (V)	Ic (mA)	f_T (MHz)	Cob (pF)	h_{FE}	V_{CE} (V)	Ic (mA)
AM ↓ FM	FM IF AM RF	2SC2410	2SC2410S	32	100	230	1.8	56~180	6	2
		2SC2058	2SC2058S	25	50	300	1.6	56~270	6	1
	FM RF Mix. Osc.	2SC1809	2SC1809S	20	20	500	1.4	39~180	6	1
VHF UHF	TV Tuner Mix. Osc.	2SC3801★	–	25	30	1100	0.8	39~270	10	4
		2SC2926	2SC2926S	19	50	1100	1.2	39~270	10	5
		–	2SC4042S	18	50	1500	1.1	27~180	10	5
		–	2SC4044S	20	50	2000	1.0	27~270	10	5
		–	2SC4043S	11	50	3200	1.0	27~270	10	5

Note : ★Emitter center

●Product Designation

Specify part No., packaging specification code and h_{FE} ranking code.

Blank unless otherwise required

2	S	D	1	4	6	8	S			T	P		R

Part No.

Packaging specification code

Code	Package	Package specifications	Quantity / Package
T93	TO-92	Ammo box	3,000
–		Bulk	1,000
TP	SPT	Ammo box	5,000
–		Bulk	2,000

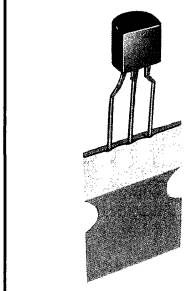
h_{FE} Ranking code

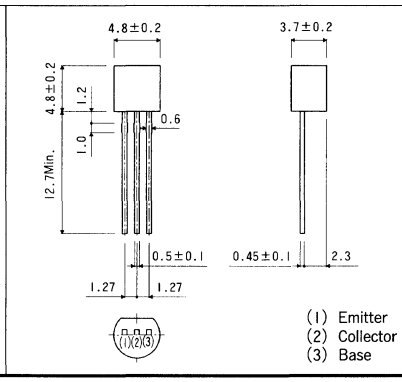
Code	h_{FE} Range
L	27～56
M	39～82
N	56～120
P	82～180
Q	120～270
R	180～390
S	270～560
E	390～820
U	560～1200
V	820～1800
W	1200～2700
A	1k～
B	5k～
C	10k～

Page 157

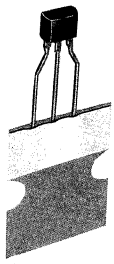
(Unit : mm)

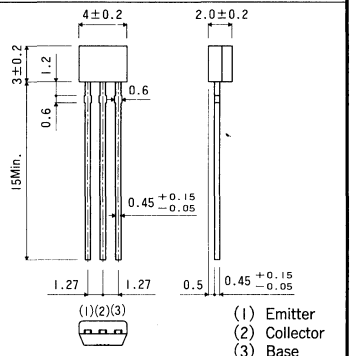
TO-92





SPT



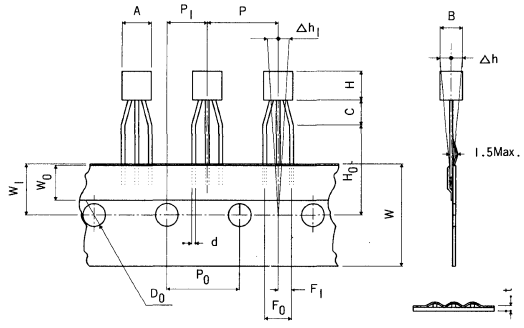


Magazine taping type : lead formed as shown below.

●Packaging Specifications

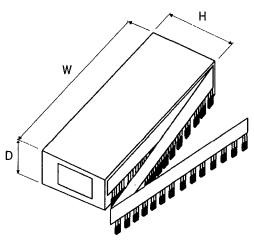
(Unit : mm)

TO-92 • SPT Taping



Code	TO-92	SPT
A	4.8±0.2	4.0±0.2
B	3.7±0.2	2.0±0.2
C	2.5Min.	3.0Min.
H	5.2Max.	3.0±0.2
d	0.5±0.1	$0.45^{+0.15}_{-0.05}$
P	12.7±0.5	12.7±1.0
P_o	12.7±0.3	12.7±0.2
D_o	φ4.0±0.2	φ4.0±0.2
P_1	6.35±0.5	6.35±0.5
F_o	$5.0^{+0.6}_{-0.2}$	$5.0^{+0.6}_{-0.2}$
F_1	$2.5^{+0.3}_{-0.1}$	$2.5^{+0.4}_{-0.1}$
W	$18.0^{+1.0}_{-0.5}$	$18.0^{+1.0}_{-0.1}$
H_o	16.0±0.5	16.0±0.5
W_o	6.0±0.5	6.0±0.5
W_1	9.0±0.5	9.0±0.5
P_{2o}	1.0Max.	1.0Max.
Δh	0±1.0	0±1.0
$Δh_1$	0±0.5	0±1.0
t	0.7±0.2	0.7±0.2

TO-92 • SPT Ammo box



	W	H	D
TO-92	340	262	40
SPT	330	232	40

ATR • ATV

Approximately the same size as the TO-92 with up to 1 W power capability.
Taped type for automated placement or bulk packaging available.

Application	Package ATR	Package ATV	V_{CEO} (V) ※V_{CES} ※※V_{CER}	Ic (A)	Ic Max. (A)	Pc(mW) (Ta=25℃)	h_{FE}	V_{CE} (V)	Ic (mA)	Internal circuit
	Part No.									
Low Noise	2SA937AMLN	–	−50	−0.15	–	300	180~560	−6	−1	–
	2SC2021MLN	–	40	0.15	–	300	390~820	6	1	–
			50	0.15	–	300	180~560	6	1	–
	2SA937AM	2SA1547A	−50	−0.15	–	300	82~390	−6	−1	–
Pre Amp	2SC2021M	2SC4010	40	0.15	–	300	390~820	6	1	–
			50	0.15	–	300	120~560	6	1	–
	2SC4776M	2SC4778	25	0.1	0.2	400	180~560	6	1	–
Driver	2SA874M	2SA1548	−32	−0.5	–	300	82~390	−3	−100	–
	2SB909M	2SB1237	−32	−1	–	1000★	82~390	−3	−100	–
	2SB910M	2SB1238	−80	−0.7	–	1000★	82~390	−3	−100	–
	2SB911M	2SB1240	−32	−2	−3	1000★	82~390	−3	−500	–
	2SB1042M	2SB1241	−80	−1	–	1000★	82~390	−3	−100	–
	2SB1044M	2SB1242	−50	−1	–	1000★	82~390	−3	−100	–
	2SB1066M	2SB1243	−50	−3	–	1000★	56~390	−3	−500	–
	2SB1130AM	2SB1236A	−160	−1.5	−3	1000★	56~270	−5	−100	–
	2SB1130M	2SB1236	−120	−1.5	−3	1000★	56~390	−5	−100	–
	2SC1652M	2SC4016	32	0.5	–	400	82~390	3	100	–
	2SD1225M	2SD1858	32	1	–	1000★	82~390	3	100	–
	2SD1226M	2SD1859	80	0.7	–	1000★	82~390	3	100	–
	2SD1227M	2SD1862	32	2	2.5	1000★	82~390	3	500	–
	2SD1228M	2SD1860	50	0.5	–	600	82~390	3	100	–
	2SD1293M	2SD1863	80	1	2	1000★	82~390	3	500	–
	2SD1507M	2SD1864	50	3	–	1000★	82~390	3	500	–
	2SD1665AM	2SD1857A	160	1.5	3	1000★	56~270	5	100	–
	2SD1665M	2SD1857	120	1.5	3	1000★	56~390	5	100	–
Storobo Flash Low V_{CE}(sat)	2SB1307M	2SB1326	−20	−5	−10	1000★	82~390	−2	−500	–
	2SD1962M	2SD2097	20	5	10	1000★	120~560	2	500	–
Low V_{CE}(sat)	2SB1485M	2SB1443	−50	−2	−5	1000★	82~270	−2	−500	–
	2SD1469M	2SD1865	15	1	–	600	120~560	3	100	–
	–	2SD2264	20	3	5	1000★	120~560	2	100	–
	2SD2197M	2SD2279	50	2	5	1000★	82~270	2	500	–
Chroma	2SC3270M	2SC4015	300	0.1	–	1000★	39~180	10	10	–
High h_{FE}	–	2SB1460	−20	−2	−3	1000★	270~1200	−6	−500	–
High h_{FE} High V_{EBO}	2SD2145M	2SD2192	20	0.5	1	400	560~2700	3	10	–
	2SD2313M	2SD2315	50	0.15	0.2	400	560~2700	5	1	–
Darlington	2SA790M	2SA1549	−32※	−0.3	−1.5	300	5k~	−5	−100	Fig. 1
	2SB1076M	2SB1239	−40※※	−2	–	1000★	1k~	−3	−500	Fig. 1
	2SC1545M	2SC4017	32※	0.3	1.5	300	5k~	5	100	Fig. 2
	2SD1536M	2SD1861	40※※	2	–	1000★	1k~	3	500	Fig. 2
	2SD1660M	2SD1867	100	2	–	1000★	1k~10k	2	1000	Fig. 3
	2SD1661M	2SD1866	60±10	2	–	1000★	1k~10k	2	1000	Fig. 4
High Voltage SW	–	2SA1776	−400	−0.5	−1	1000★	82~270	−5	−50	–
	2SC4295M	2SC4620	400	0.1	–	1000★	56~270	10	10	–

Note : ★PC board (collector's copper foil area, 1cm² or over ; PC board thickness, 1.7mm)

Darlington transistor Internal circuit

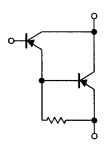


Fig. 1

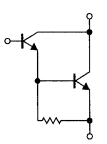


Fig. 2

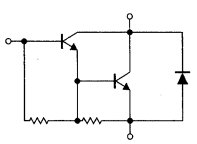


Fig. 3

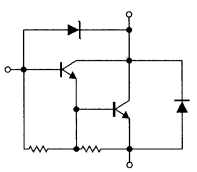


Fig. 4

ATR • ATV High frequency type

Application		Package ATR	Package ATV	V_{CEO} (V)	Ic (mA)	f_T (MHz)	Cob (pF)	h_{FE}	V_{CE} (V)	Ic (mA)
		Part No.								
AM ↓ FM	FM IF AM RF	2SC3078M	2SC4012	32	100	230	1.8	56~180	6	2
		2SC2063M	2SC4011	25	50	300	1.6	56~270	6	1
↓ VHF UHF	FM RF Mix. Osc.	2SC3079M	2SC4013	20	20	500	1.4	39~180	6	1
	TV Tuner Mix. Osc.	2SC3080M	2SC4014	19	50	1100	1.2	39~270	10	5

●Product Designation

Specify part No., packaging specification code and h_{FE} ranking code.

Blank unless otherwise required

2	S	D	1	8	5	8			T	V	2	R

Part No.

Packaging specification code

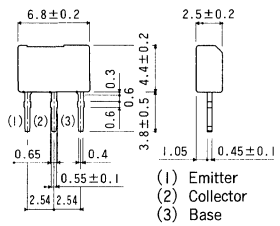
Code	Package	Package specifications	Quantity / Package (pcs)
–	ATR	Bulk	2,000
C2		Tube	8,000 (80pcs × 100)
TV2	ATV	Ammo box	2,500
TV3			
TV4			
TV6			

h_{FE} Ranking code

Code	h_{FE} Range	Code	h_{FE} Range
L	27～56	E	390～820
M	39～82	U	560～1200
N	56～120	V	820～1800
P	82～180	W	1200～2700
Q	120～270	A	1k～
R	180～390	B	5k～
S	270～560	C	10k～

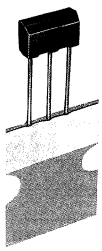
(Unit : mm)

ATR

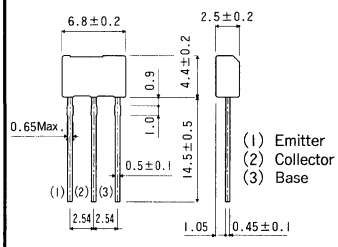


(Unit : mm)

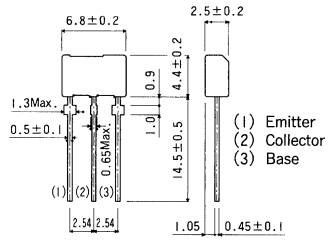
ATV



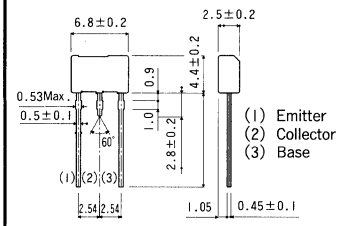
TV2



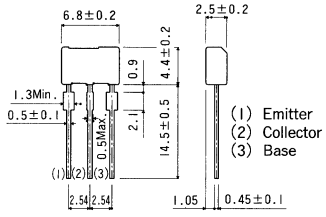
TV3



TV4



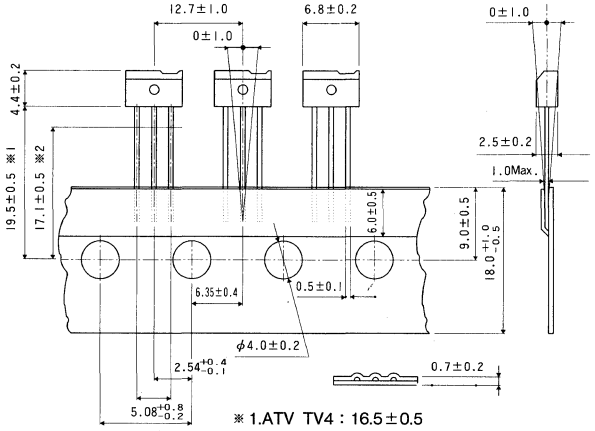
TV6



●Packaging Specifications

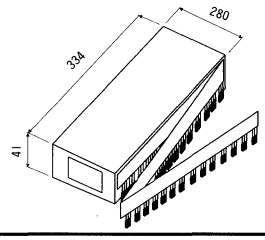
(Unit : mm)

ATV Taping

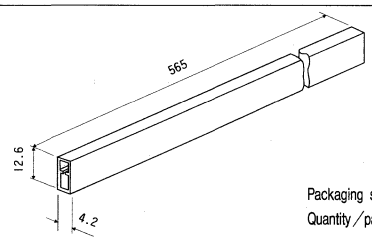


※1.ATV TV4 : 16.5±0.5
※2.Applies to ATV TV3. 16.0±0.5 for ATV TV6

ATV Ammo box



ATR Container tube



Packaging specification code : C2
Quantity / packaging : 80 pcs

TO-92L • TO-92LS • MRT

TO-92L is a high power version of TO-92 and TO-92LS is a slimmed TO-92L.
MRT is a 1.2W package power taped transistor designed for use with an automatic placement machine.

Application	Package			V_{CEO} (V) *V_{CES}	Ic (A)	Ic Max. (A)	Pc (W) (Ta=25°C)			h_{FE}			Internal circuit
	TO-92L	TO-92LS	MRT				TO-92L	TO-92LS	MRT		V_{CE} (V)	Ic (mA)	
	Part No.												
Low Noise	–	2SA1819	–	−150	−0.05	–	–	0.8	–	120~390	−6	−2	–
	–	2SC4720	–	−150	0.05	–	–	0.8	–	120~390	6	2	–
Driver	2SA934	2SA1818	2SB1329	−32	−1	−2	0.75	0.9	1.2	82~390	−3	−100	–
	2SA935	2SA1902	2SB1330	−80	−0.7	–	0.75	0.9	1.2	82~390	−3	−100	–
	2SB1010	2SB1595	2SB1331	−32	−2	−3	0.75	0.9	1.2	82~390	−3	−500	–
	2SB1041	–	2SB1332	−80	−1	–	0.9	–	1.2	82~390	−3	−100	–
	2SB1043	–	–	−50	−1	–	0.9	–	–	82~390	−3	−100	–
	2SB1212	2SB1596	2SB1328	−160	−1.5	–	0.9	0.9	1.2	56~270	−5	−100	–
	2SB1425	–	–	−20	−2	−3	1.0	–	–	270~1200	−6	−500	–
	–	–	2SB1517	−50	−3	–	–	–	1.2	56~390	−3	−500	–
	2SC2060	2SC4719	2SD2005	32	1	2	0.75	0.9	1.2	82~390	3	100	–
	2SC2061	2SC5061	2SD2006	80	0.7	1	0.75	0.9	1.2	82~390	3	100	–
	2SD1292	–	2SD2008	80	1	2	0.9	–	1.2	82~390	3	500	–
	2SD1384	2SD2450	2SD2007	32	2	2.5	0.75	0.9	1.2	82~390	3	500	–
	2SD1812	2SD2451	2SD2004	160	1.5	–	0.9	0.9	1.2	56~270	5	100	–
	–	–	2SD2146	50	3	–	–	–	1.2	56~390	3	500	–
Low V_{CE}(sat)	–	2SA1903	–	−20	−3	–	–	0.9	–	82~390	−2	−100	–
	2SB1374	2SA1820	–	−50	−2	−5	1.0	0.9	–	82~270	−2	−500	–
	–	2SC5062	–	20	3	–	–	0.9	–	120~560	2	100	–
	2SD2069	2SC4721	–	50	2	5	1.0	0.9	–	82~270	2	500	–
High Voltage Driver	2SA1482	–	–	−150	−0.05	–	0.8	–	–	120~390	−6	−2	–
	2SC3800	–	–	150	0.05	–	0.8	–	–	120~390	6	2	–
Strobo Flash Low V_{CE}(sat)	2SB1306	–	2SB1482	−20	−5	−10	1.2	–	1.2	82~390	−2	−500	–
	2SD1961	–	–	20	5	10	1.2	–	–	120~560	2	500	–
Chroma	2SC3269	2SC4722	2SC4243	300	0.1	–	0.75	0.8	1.0	39~180	10	10	–
High h_{FE}	2SB1425	–	2SB1461	−20	−2	−3	1.0	–	1.2	270~1200	−6	−500	–
	2SD2159	–	–	25	2	3	1.0	–	–	390~2700	6	500	–
High h_{FE} High V_{EBO}	2SD2172	–	–	25	1.2	2	1	–	–	560~2700	5	500	–
Darlington	2SB1256	–	2SB1333	−100	−2	–	1.2	–	1.2	1k~10k	−2	−1000	Fig.1
	–	–	2SB1515	−80	−4	–	–	–	1.2	1k~10k	−3	−2000	Fig.1
	2SD1809	–	2SD2009	60*	1	–	0.9	–	1.2	2k~	3	500	Fig.2
	2SD1929	–	2SD2010	60±10	2	–	1.2	–	1.2	1k~10k	2	1000	Fig.5
	2SD1930	–	2SD2011	100	2	–	1.2	–	1.2	1k~10k	2	1000	Fig.4
	–	–	☆2SC4724	100	3	5	–	–	1.2	2k~10k	2	1500	Fig.4
	2SD1931	–	–	60±10	1.5	–	0.9	–	–	1k~30k	2	1000	Fig.6
	–	–	2SD2308	80	4	–	–	–	1.2	1k~10k	3	2000	Fig.4
	–	–	2SD2309	60	4	–	–	–	1.2	1k~10k	3	2000	Fig.3
Darlington Driver	–	–	2SD2388	90^{+20}_{-10}	2	3	–	–	1.2	1k~10k	2	1000	Fig.5
High Voltage SW	2SA1584	–	–	−400	−0.1	−0.2	0.9	–	–	56~270	−10	−10	–
	2SA1780	2SA1884	2SA1809	−400	−0.5	−1	0.9	0.9	1.2	56~270	−5	−50	–
	2SA1760	–	–	−400	−0.1	−0.2	0.9	–	–	56~270	−10	−10	–
	–	–	2SA1861	−400	−2	−4	–	–	1.2	56~180	−5	−100	–
	2SC4166	–	–	400	0.1	–	0.9	–	–	56~270	10	10	–

Note : ☆Under development

Darlington transistor Internal circuit

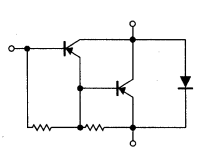


fig.1

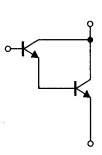


fig.2

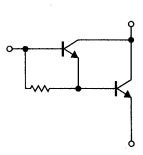


fig.3

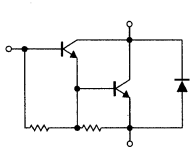


fig.4

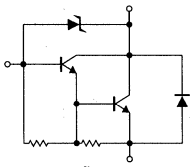


fig.5

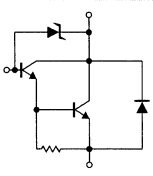


fig.6

●Product Designation

Specify part No., packaging specification code and h_{FE} ranking code.

Blank unless otherwise required

2	S	A	9	3	4			T	1	0	3	R

Part No.

Packaging specification code

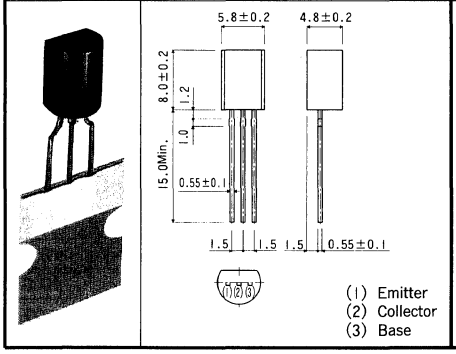
Code	Package	Package specifications	Quantity/Package (pcs)
T103	TO-92L	Ammo box	2,500
–		Bulk	500
TE4	TO-92LS	Ammo box	3,000
–		Bulk	1,000
T105	MRT	Ammo box	2,000

h_{FE} Ranking code

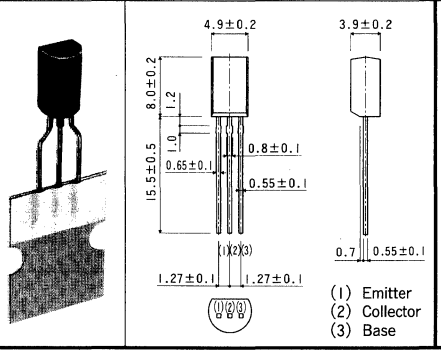
Code	h_{FE} Range	Code	h_{FE} Range
L	27~56	E	390~820
M	39~82	U	560~1200
N	56~120	V	820~1800
P	82~180	W	1200~2700
Q	120~270	A	1k~
R	180~390	B	5k~
S	270~560	C	10k~

(Unit : mm)

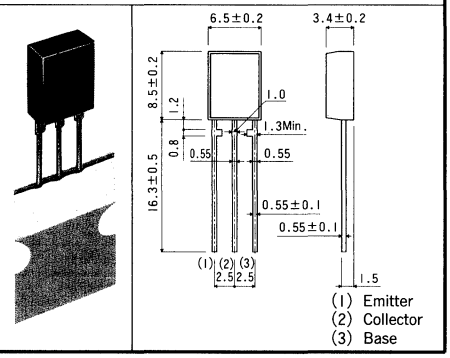
TO-92L



TO-92LS



MRT

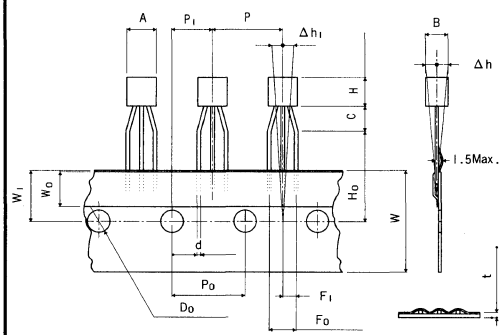


Magazine taping of TO-92L and TO-92LS : lead formed as shown below.

●Packaging Specifications

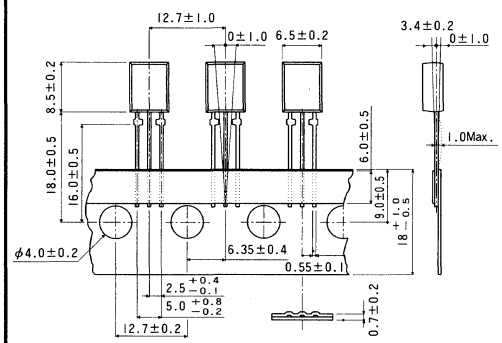
(Unit : mm)

TO-92L • TO-92LS Taping

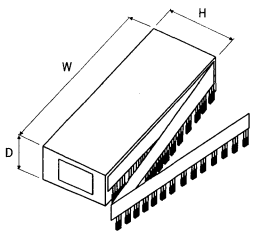


Symbol	TO-92L	TO-92LS	Symbol	TO-92L	TO-92LS
A	5.8±0.2	4.9±0.2	F_0	$5.0^{+0.8}_{-0.4}$	$5.0^{+0.8}_{-0.4}$
B	4.8±0.2	3.9±0.2	F_1	$2.5^{+0.4}_{-0.2}$	$2.5^{+0.4}_{-0.2}$
C	3.0Min.	3.0Min.	W	$18.0^{+1.0}_{-0.5}$	$18.0^{+1.0}_{-0.5}$
H	8.0±0.2	8.0±0.2	H_0	16.0±0.5	16.0±0.5
d	0.55±0.1	0.55±0.1	W_0	6.0±0.5	6.0±0.3
P	12.7±1.0	12.7±1.0	W_1	9.0±0.5	9.0±0.4
P_0	12.7±0.3	12.7±0.3	Δh	0±1.0	0±1.0
D_0	φ4.0±0.2	φ4.0±0.2	Δh_1	0±0.5	0±0.5
P_1	6.35±0.4	6.35±0.4	t	0.7±0.2	0.7±0.2

MRT Taping



TO-92L • TO-92LS • MRT Ammo box



	W	H	D
TO-92L	340	317	48
TO-92LS	340	270	48
MRT	340	317	48

CPT • TO-126 • TO-126FP

CPT (SC-59) is also available as automated, surface mounted type by adding F5 to the part number (see page 77).
TO-126FP is a direct mounting type, allowing simple assembly without additional insulator.

Application	Package			V_{CEO} (V) ※※V_{CER}	Ic (A)	Ic Max. (A)	Pc (W) (Tc=25°C)			h_{FE}			Internal circuit
	CPT	TO-126	TO-126FP				CPT	TO-126	TO-126FP		V_{CE} (V)	Ic (mA)	
	Part No.												
Driver	–	2SB1007	2SB889F	−80	−0.7	–	–	10	5	82~390	−3	−100	–
	2SB1182	2SB1009	2SB891F	−32	−2	–	10	10	5	82~390	−5	−500	–
	–	2SB1065	–	−50	−3	–	–	10	–	56~390	−3	−500	–
	–	2SB1086	–	−120	−1.5	–	–	10	–	56~390	−5	−100	–
	2SB1275	2SB1086A	–	−160	−1.5	–	10	10	–	56~270	−5	−100	–
	2SB1184	–	–	−50	−3	–	15	–	–	82~390	−3	−500	–
	2SB1181	–	–	−80	−1	–	10	–	–	82~390	−3	−100	–
	2SB1516	–	–	−80	−3	–	10	–	–	56~270	−2	−400	–
	2SB1535	–	–	−100	−6	–	10	–	–	56~270	−1	−550	–
	–	2SD1378	2SD1200F	80	0.7	–	–	10	5	82~390	3	100	–
	2SD1758	2SD1380	2SD1189F	32	2	–	10	10	5	82~390	3	500	–
	–	2SD1382	2SD1381F	80	1	2	–	10	5	82~390	3	100	–
	2SD1733	–	–	80	1	–	10	–	–	82~390	3	500	–
	–	2SD1506	–	50	3	–	–	10	–	56~390	5	100	–
	2SD1760	–	–	50	3	–	15	–	–	82~390	3	500	–
	–	2SD1563	2SD2343	120	1.5	–	–	10	5	56~390	5	100	–
	2SD1918	2SD1563A	–	160	1.5	–	10	10	–	56~270	5	100	–
Strobo Flash Low V_{CE}(sat)	2SA1834	–	–	−20	−10	−15	10	–	–	120~560	−2	−500	–
	2SB1412	2SB1423	2SB1436	−20	−5	−10	10	10	5	82~390	−2	−500	–
	2SC5001	–	–	20	10	15	10	–	–	120~560	2	500	–
	2SC5103	–	–	60	5		10	–	–	82~270	2	1000	–
	2SD2118	2SD2147	2SD2166	20	5	10	10	10	5	120~560	2	500	–
Chroma	–	2SC3272	2SC3271F	300	0.1	–	–	10	5	39~180	10	10	–
High h_{FE}	–	–	2SC4137	20	0.1	–	–	–	4	560~2700	3	10	–
	2SD2318	–	–	60	3	4.5	15	–	–	390~1800	4	500	–
Darlington Driver	–	2SB1008	2SB786F	−40※※	−2	–	–	10	5	1k~	−3	−500	Fig.1
	2SB1183	–	–	−40※※	−2	–	10			1k~200k	−3	−500	Fig.1
	2SB1316	2SB1272	–	−100	−2	–	10	10	–	1k~10k	−2	−1000	Fig.3
	2SB1474	–	–	−80	−4	–	10	–	–	1k~10k	−3	−2000	Fig.2
	–	2SD1379	2SD947F	40※※	2	–	–	10	5	4k~	3	500	Fig.4
	2SD1759	–	–	40※※	2		10	–	–	1k~200k	3	500	Fig.4
	2SD2143	2SD1637	–	60±10	2	–	10	10	–	1k~10k	2	1000	Fig.6
	2SD1980	2SD1638	–	100	2	–	10	10	–	1k~10k	2	1000	Fig.5
High Voltage SW	2SA1727	2SA1775	–	−400	−0.5	−1	10	10	–	56~270	−5	−50	–
	2SA1862	–	–	−400	−2	−4	10	–	–	56~180	−5	−100	–
	2SA1807	–	–	−600	−1	−2	10	–	–	56~180	−5	−100	–

Darlington transistor Internal circuit

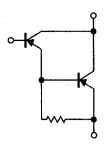


Fig.1

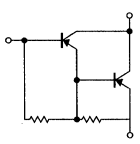


Fig.2

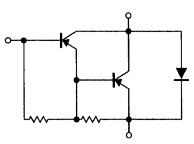


Fig.3

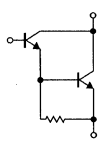


Fig.4

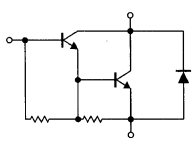


Fig.5

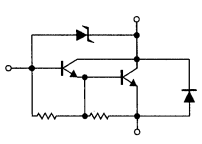


Fig.6

●Product Designation

Specify part No., packaging specification code and h_{FE} ranking code.

Blank unless otherwise required

2	S	B	1	0	0	7					R

Part No.

Packaging specification code

Code	Package	Package specifications	Quantity / Package (pcs)
–	**CPT**	Bulk	1,000
–	**TO-126** **TO-126FP**	Bulk	1,000

h_{FE} Ranking code

Code	h_{FE} Range
L	27~56
M	39~82
N	56~120
P	82~180
Q	120~270
R	180~390
S	270~560
E	390~820
U	560~1200
V	820~1800
W	1200~2700
A	1k~
B	5k~
C	10k~

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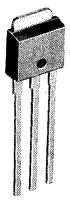
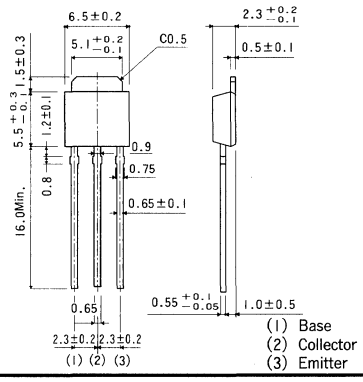
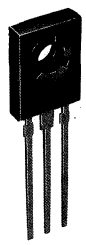
(Unit : mm)

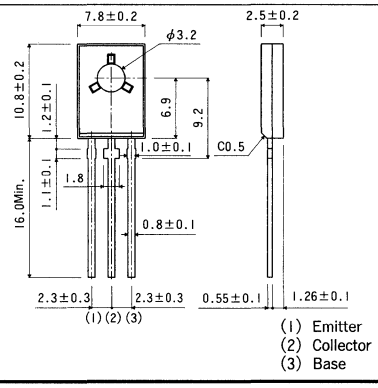
CPT (D PAK)



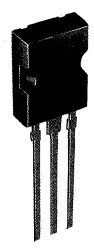


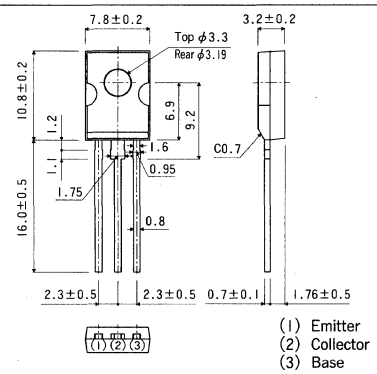
TO-126





TO-126FP





TO-220 • TO-220FP • TO-220FN • HRT

TO-220FP is a TO-220 with mold coated fin for easier mounting and higher PC, 2W. TO-220FN is a low profile (by 2mm) version of TO-220FP without fin support pin, for higher mounting density. HRT is a taped power transistor package for use with an automatic placement machine.

Application	Part No.				V_{CEO} (V)	Ic (A)	Pc (W) Tc=25°C			Pc (W) Ta=25°C	h_{FE}			Internal circuit
	TO-220	TO-220FP	TO-220FN	HRT			TO-220	TO-220FP	TO-220FN	HRT		V_{CE} (V)	Ic (A)	
Driver	2SA1634	2SA1635	–	–	−60	−4	40	30	–	–	60~320	−4	−1	–
	2SB1369	2SB1370	2SB1565	2SB1496	−60	−3	40	30	25	1.8	60~320	−5	−0.5	–
	2SB1064	2SB1185	2SB1566	2SB1357	−50	−3	30	25	25	1.8	60~320	−3	−0.5	–
	2SB1085	2SB1186	2SB1569	2SB1353	−120	−1.5	20	20	20	1.8	60~320	−5	−0.1	–
	2SB1085A	2SB1186A	2SB1569A	2SB1353A	−160	−1.5	20	20	20	1.8	60~200	−5	−0.1	–
	2SB1289	2SB1290	–	2SB1356	−80	−7	40	30	–	1.8	60~320	−5	−1	–
	2SB1291	2SB1292	–	2SB1358	−60	−5	40	30	–	1.8	60~320	−5	−1	–
	2SB1293	2SB1294	–	2SB1360	−100	−5	40	30	–	1.8	60~320	−5	−1	–
	2SB1334	2SB1335	–	2SB1355	−60	−4	40	30	–	1.8	60~320	−5	−1	–
	2SB1334A	2SB1335A	–	–	−80	−4	40	30	–	–	60~320	−5	−1	–
	2SC4007	2SC4008	–	2SC4355	80	4	40	30	–	1.8	60~500	4	1	–
	2SD2023	2SD2061	2SD2394	2SD2096	60	3	40	30	25	1.8	60~320	5	0.5	–
	2SD1505	2SD1762	2SD2395	2SD2037	50	3	30	25	25	1.8	60~320	3	0.5	–
	2SD1562	2SD1763	2SD2400	2SD2033	120	1.5	20	20	20	1.8	60~320	5	0.1	–
	2SD1562A	2SD1763A	2SD2400A	2SD2033A	160	1.5	20	20	20	1.8	60~200	5	0.1	–
	2SD1580	2SD1833	–	2SD2036	80	7	40	30	–	1.8	60~320	5	1	–
	2SD1720	2SD1832	–	2SD2038	60	5	40	30	–	1.8	60~320	5	1	–
	2SD1778	2SD1855	–	2SD2035	60	4	40	30	–	1.8	60~320	5	1	–
	2SD1778A	2SD1855A	–	–	80	4	40	30	–	–	60~320	5	1	–
	2SD1896	2SD1897	–	2SD2040	100	5	40	30	–	1.8	60~320	5	1	–
	2SD1956	2SD1957	–	–	120	7	40	30	–	–	100~500	5	1	–
Low V_{CE}(sat)	–	2SA1757	–	–	−60	−5	–	25	–	–	60~320	−2	−1	–
	–	2SA1758	–	–	−60	−12	–	30	–	–	60~320	−2	−2	–
	–	2SC4595	–	–	60	12	–	30	–	–	60~320	2	2	–
	–	2SC4596	–	–	60	5	–	25	–	–	60~320	2	1	–
	2SC4845	2SC4846	–	–	120	5	40	30	–	–	60~200	5	3	–
	2SC4848	2SC4849	–	–	120	7	40	30	–	–	60~200	5	3	–
Chroma	–	☆2SC4718	–	2SC4506	300	0.1	–	10	–	1.5	40~200	10	0.1	–
High h_{FE}	2SD1943	2SD1944	2SD2396	2SD2044	60	3	40	30	30	1.8	400~2k	4	0.5	–
High Voltage SW	2SC3968	2SC3969	–	2SC4354	400	2	20	20	–	1.8	16~50	5	0.1	–
	2SC4205	2SC4129	–	–	400	5	40	30	–	–	16~50	5	3	–
Darlington	2SB1286	2SB1287	2SB1567	2SB1359	−100	−2	25	20	20	1.8	1k~10k	−2	−1	Fig.1
	2SB1339	2SB1340	–	2SB1513	−120	−6	40	30	–	1.8	2k~20k	−3	−2	Fig.1
	2SB1341	2SB1342	2SB1568	2SB1512	−80	−4	35	30	30	1.8	1k~10k	−3	−2	Fig.1
	2SB1343	2SB1344	–	2SB1514	−100	−8	40	30	–	1.8	1k~20k	−3	−2	Fig.1
	2SB1550	2SB1551	–	2SB1549	−80	−10	40	30	–	1.8	1k~20k	−3	−5	Fig.1
	2SC4573	2SC4574	–	2SC4575	60±10	4	35	30	–	1.8	2k~10k	5	1.5	Fig.4
	–	2SC4895	–	–	100	3	–	30	–	–	2k~10k	2	1.5	Fig.2
	2SD1646	2SD1765	2SD2398	2SD2039	100	2	25	20	20	1.8	1k~10k	2	1	Fig.2
	2SD1647	2SD1764	2SD2397	2SD2041	60±10	2	25	20	20	1.8	1k~10k	2	1	Fig.4
	–	2SD2091	–	2SD2283	90^{+20}_{-10}	2	–	20	–	1.8	1k~10k	2	1	Fig.4
	2SD1783	2SD1856	–	2SD2042	60±10	5	30	25	–	1.8	2k~30k	3	2	Fig.4
	2SD1888	2SD1889	–	2SD2043	120	6	40	30	–	1.8	2k~20k	3	2	Fig.2
	2SD1932	2SD1933	2SD2399	2SD2032	80	4	35	30	30	1.8	1k~10k	3	2	Fig.2
	2SD1986	2SD1987	–	2SD2306	60	4	35	30	–	1.8	1k~10k	3	2	Fig.3
	2SD2024	2SD2025	–	2SD2307	100	8	40	30	–	1.8	1k~20k	3	2	Fig.2

Darlington transistor Internal circuit

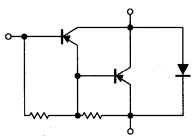


Fig.1

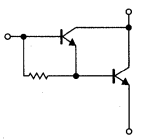


Fig.2

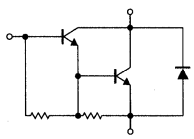


Fig.3

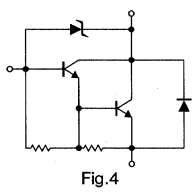


Fig.4

●Product Designation

Specify part No., packaging specification code and h_{FE} ranking code.

2	S	D	2	3	9	5					E

Part No. — **Blank unless otherwise required** — **Packaging specification code** — **h_{FE} Ranking code**

Packaging specification code

Code	Package	Package specifications	Quantity/Package (pcs)
–	TO-220*	Bulk	500
C7		Tube	1,000 (50pcs×20)
–	TO-220FP*	Bulk	500
C7		Tube	1,000 (50pcs×20)
–	TO-220FN	Bulk	500
C7		Tube	1,000 (50pcs×20)
T114	HRT	Ammo box	1,000

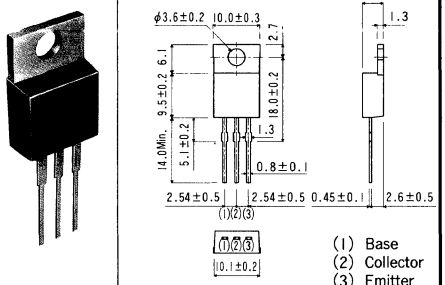
Note : Tray packages with various terminal configurations (forming, pin cut) are also available. Ask for details.

h_{FE} Ranking code

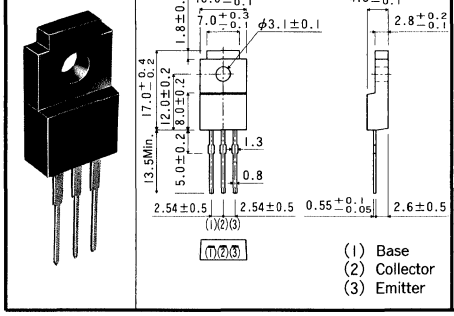
Code	h_{FE} Range
A	16~32
B	25~50
C	40~80
D	60~120
E	100~200
F	160~320
G	250~500
H	400~800
J	600~1200
K	1000~2000

(Unit : mm)

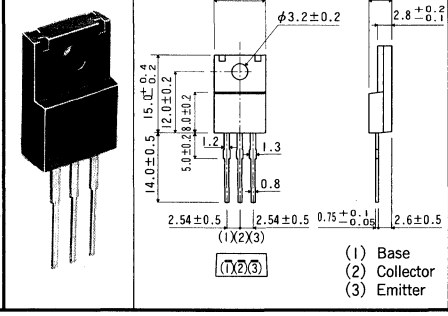
TO-220



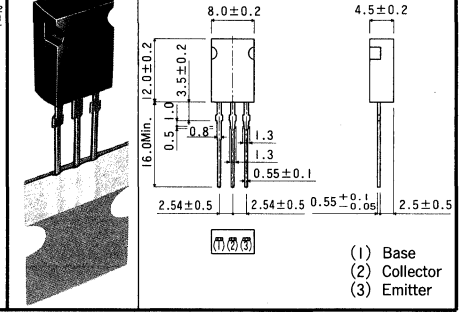
TO-220FP



TO-220FN



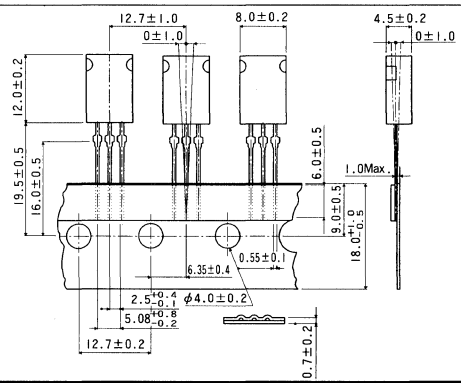
HRT



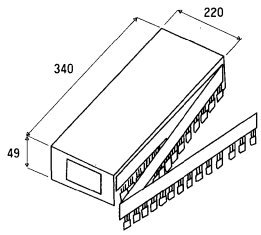
●Packaging Specifications

(Unit : mm)

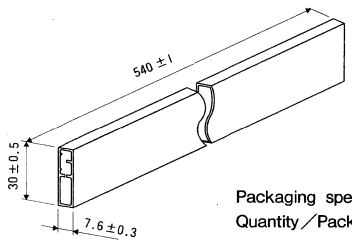
HRT Taping



HRT Ammo box



TO-220 Container tube



TO-247

TO-220 class high output power package with Pc 60 to 100W.

Application	Part No.	V_{CEO} (V)	Ic (A)	Pc (W) Tc=25°C	h_{FE}	V_{CE} (V)	Ic (A)	Internal circuit
Driver	☆2SB1477	−100	−5	60	60~320	−5	−1	−
	☆2SB1345	−80	−7	80	60~320	−5	−1	−
	☆2SD2236	100	5	60	60~320	5	1	−
	☆2SD2062	80	7	80	60~320	5	1	−
AudioOutput	☆2SA1788	−120	−8	80	60~320	−5	−1	−
	2SA1633	−150	−10	100	60~320	−5	−1	−
	☆2SC4652	120	8	80	60~320	5	1	−
	2SC4278	150	10	100	60~320	5	1	−
Low V_{CE} (sat)	☆2SA1789	−60	−12	80	60~320	−2	−2	−
	☆2SC4653	60	12	80	60~320	2	2	−
	☆2SC4847	120	5	60	60~200	5	3	−
	☆2SC4850	120	7	60	60~200	5	3	−
High Voltage SW	☆2SC4277	400	5	80	16~50	5	3	−
Darlington	☆2SB1478	−100	−8	60	2k~20k	−3	−2	Fig.1
	☆2SD2237	100	8	60	2k~20k	3	2	Fig.2

Note : ☆Under development

Darlington transistor Internal circuit

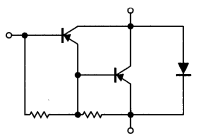


Fig.1

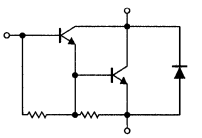
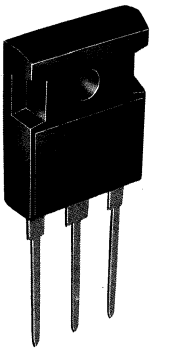


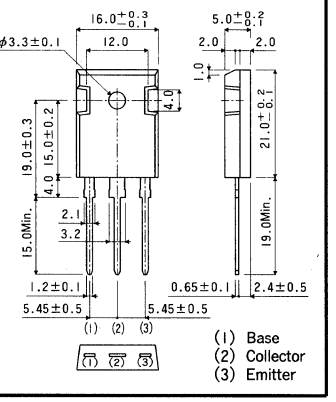
Fig.2

Note : ☆Under development

(Unit : mm)

TO-247





●Product Designation

Specify prat No., packaging specification code and h_{FE} ranking code.

Blank unless otherwise required

2	S	C	4	2	7	8							E

Part No.

Packaging specification code

Code	Package	Package specifications	Quantity /Package (pcs)
−	TO-247	Bulk	200
F31		Packed in forming tray	500

Others package specifications are under consideration. Ask for details.

h_{FE} Ranking code

Code	h_{FE} Range
A	16~32
B	25~50
C	40~80
D	60~120
E	100~200
F	160~320
G	250~500
H	400~800
J	600~1200
K	1000~2000

MEMO

Transistors

Digital Transistors

FTR • FTL • ATR • ATV • SPT

Composite transistors with built-in resistors. In addition to FTR and FTL and ATR and ATV and SPT package variations, internal resistor variations are available for specific applications to meet wide needs.

●Product Designation

DTA124E □ A

Part No. — Suffix

Package code

DAT and DTC of 100mA have suffix "A".
For example, DTA123E of ATR package is expressed as DTA123EAA.
Package codes are shown on the table right.

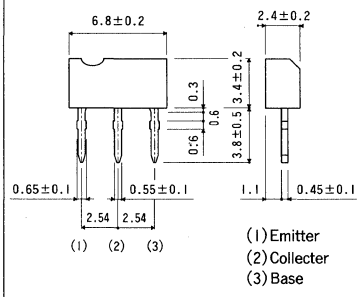
Package code

Package	Code
FTR	F
FTL	L
ATR	A
ATV	V
SPT	S

(Unit : mm)

FTR

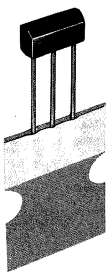
Pcakage code F

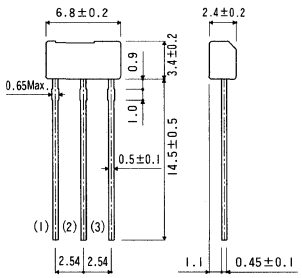


(1) Emitter
(2) Collecter
(3) Base

FTL

Package code L

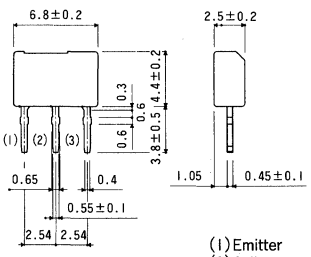




(1) Emitter
(2) Collecter
(3) Base

ATR

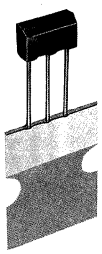
Package code A

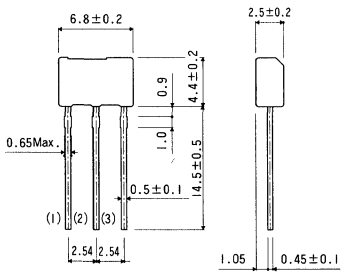


(1) Emitter
(2) Collecter
(3) Base

ATV

Package code V

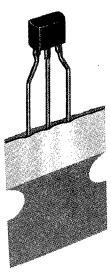


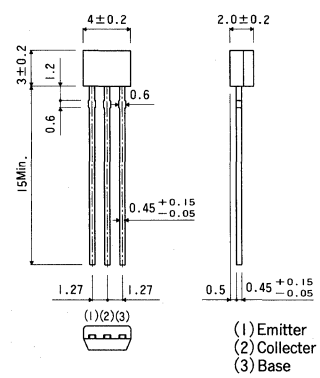


(1) Emitter
(2) Collecter
(3) Base

SPT

Package code S





(1) Emitter
(2) Collecter
(3) Base

●100mA Specifications

PNP Type	NPN Type	Resistance value		Package					Vcc	Io	G_I		
Fig.1	Fig.2	R_1	R_2	FTR	FTL	ATR	ATV	SPT	(V)	(mA)		Vo (V)	Io (mA)
Part No.		(kΩ)	(kΩ)	Pd=300mW									
DTA1D3R□A	DTC1D3R□A	2.7	1.0	○	○	○	○	○	50	30	20~	5	30
DTA113Z□A	DTC113Z□A	1.0	10	○	○	○	○	○	50	100	33~	5	5
DTA114E□A	DTC114E□A	10	10	○	○	○	○	○	50	50	30~	5	5
DTA114W□A	DTC114W□A	10	4.7	○	○	○	○	○	50	100	24~	5	10
DTA114Y□A	DTC114Y□A	10	47	○	○	○	○	○	50	70	68~	5	5
DTA115E□A	DTC115E□A	100	100	○	○	○	○	○	50	20	82~	5	5
DTA115U□	DTC115U□	100	10	○	○	○	○	○	50	20	27~	5	5
DTA123E□A	DTC123E□A	2.2	2.2	○	○	○	○	○	50	100	20~	5	20
DTA123J□A	DTC123J□A	2.2	47	○	○	○	○	○	50	100	80~	5	10
DTA123Y□A	DTC123Y□A	2.2	10	○	○	○	○	○	50	100	33~	5	10
DTA124E□A	DTC124E□A	22	22	○	○	○	○	○	50	30	56~	5	5
DTA124X□A	DTC124X□A	22	47	○	○	○	○	○	50	50	68~	5	5
DTA143E□A	DTC143E□A	4.7	4.7	○	○	○	○	○	50	100	20~	5	10
DTA143X□A	DTC143X□A	4.7	10	○	○	○	○	○	50	100	30~	5	10
DTA143Y□A	DTC143Y□A	4.7	22	○	○	○	○	○	50	100	56~	5	5
DTA143Z□A	DTC143Z□A	4.7	47	○	○	○	○	○	50	100	80~	5	10
DTA144E□A	DTC144E□A	47	47	○	○	○	○	○	50	30	68~	5	5
DTA144V□A	DTC144V□A	47	10	○	○	○	○	○	50	70	33~	5	5
DTA144W□A	DTC144W□A	47	22	○	○	○	○	○	50	30	56~	5	5
□ : Package code				F	L	A	V	S					

PNP Type	NPN Type	Resistance value	V_{CEO}	Ic	Package					h_{FE}				
Fig.3	Fig.4	R_1	(V)	(mA)	FTR	FTL	ATR	ATV	SPT	Min.	Typ.	Max.	V_{CE} (V)	Ic (mA)
Part No.		(kΩ)			Pd=300mW									
DTA113T□A	–	1.0	50	100	○	○	○	○	○	100	250	600	5	1
DTA114T□A	DTC114T□A	10	50	100	○	○	○	○	○	100	250	600	5	1
DTA115T□A	DTC115T□A	100	50	100	○	○	○	○	○	100	250	600	5	1
DTA124T□A	DTC124T□A	22	50	100	○	○	○	○	○	100	250	600	5	1
DTA125T□	DTC125T□	200	50	100	○	○	○	○	○	100	250	600	5	1
DTA143T□A	DTC143T□A	4.7	50	100	○	○	○	○	○	100	250	600	5	1
DTA144T□A	DTC144T□A	47	50	100	○	○	○	○	○	100	250	600	5	1
□ : Package code					F	L	A	V	S					

PNP Type	NPN Type	B-E Resistance	V_{CEO}	Ic	Package					h_{FE}		
Fig.5	Fig.6	R_2	(V)	(mA)	FTR	FTL	ATR	ATV	SPT	Min.	V_{CE} (V)	Ic (mA)
Part No.		(kΩ)			Pd=300mW							
DTA114G□A	DTC114G□A	10	50	100	○	○	○	○	○	5	30	5
DTA115G□A	DTC115G□A	100	50	100	○	○	○	○	○	5	82	5
DTA124G□A	DTC124G□A	22	50	100	○	○	○	○	○	5	56	5
DTA144G□A	DTC144G□A	47	50	100	○	○	○	○	○	5	68	5
□ : Package code					F	L	A	V	S			

Equivalent circuits

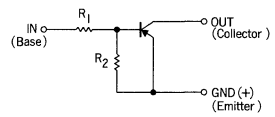


Fig.1

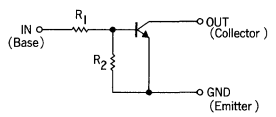


Fig.2

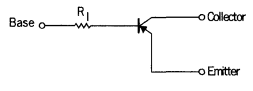


Fig.3

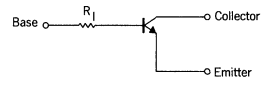


Fig.4

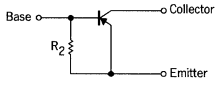


Fig.5

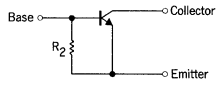
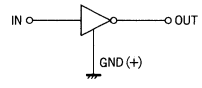
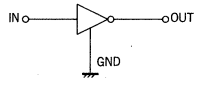


Fig.6

General designation



DTA • DTB Series



DTC • DTD Series

FTR • FTL • ATR • ATV • SPT

●500mA Specifications

PNP Type	NPN Type	Resistance value		Package					Vcc (V)	Ic Max. (mA) ※	Gi	Vo (V)	Io (mA)
Fig.1	Fig.2	R_1 (kΩ)	R_2 (kΩ)	FTR	FTL	ATR	ATV	SPT					
Part No.				Pd=300mW		Pd=600mW		Pd=300mW					
DTB113E□	**DTD113E□**	1.0	1.0	○	○	○	○	○	50	500	33～	5	50
DTB113Z□	**DTD113Z□**	1.0	10	○	○	○	○	○	50	500	56～	5	50
DTB114E□	**DTD114E□**	10	10	○	○	○	○	○	50	500	56～	5	50
DTB122J□	**DTD122J□**	0.22	4.7	○	○	○	○	○	50	500	47～	5	50
DTB123E□	**DTD123E□**	2.2	2.2	○	○	○	○	○	50	500	39～	5	50
DTB123Y□	**DTD123Y□**	2.2	10	○	○	○	○	○	50	500	56～	5	50
DTB133H□	**DTD133H□**	3.3	10	○	○	○	○	○	50	500	56～	5	50
DTB143E□	**DTD143E□**	4.7	4.7	○	○	○	○	○	50	500	47～	5	50
□ : Package code				F	L	A	V	S					

※Characteristics of element transistors

PNP Type	NPN Type	Resistance value	Package					V_{CEO} (V)	Ic (mA)	h_{FE}				
Fig.3	Fig.4	R_1 (kΩ)	FTR	FTL	ATR	ATV	SPT			Min.	Typ.	Max.	V_{CE} (V)	Ic (mA)
Part No.			Pd=300mW		Pd=600mW		Pd=300mW							
DTB114T□	**DTD114T□**	10	○	○	○	○	○	40	500	100	250	600	5	50
DTB123T□	**DTD123T□**	2.2	○	○	○	○	○	40	500	100	250	600	5	50
DTB143T□	**DTD143T□**	4.7	○	○	○	○	○	40	500	100	250	600	5	50
DTB163T□	**DTD163T□**	6.8	○	○	○	○	○	40	500	100	250	600	5	50
□ : Package code			F	L	A	V	S							

PNP Type	NPN Type	B-E Resistance	Package					V_{CEO} (V)	Ic (mA)	h_{FE} Min.	V_{CE} (V)	Ic (mA)
Fig.5	Fig.6	R_2 (kΩ)	FTR	FTL	ATR	ATV	SPT					
Part No.			Pd=300mW		Pd=600mW		Pd=300mW					
DTB114G□	**DTD114G□**	10	○	○	○	○	○	50	500	56	5	100
□ : Package code			F	L	A	V	S					

●For Muting

PNP Type	NPN Type	Resistance value		Package					Vcc (V)	Ic Max. (mA) ※	G_I	Vo (V)	Io (mA)	Ron (Ω) Typ.
–	Fig.2	R_1 (kΩ)	R_2 (kΩ)	FTR	FTL	ATR	ATV	SPT						
Part No.				Pd=300mW		Pd=600mW		Pd=300mW						
–	**DTC363E□**	6.8	6.8	○	○	○	○	○	20	600	50	5	70～	1.1
□ : Package code				F	L	A	V	S						

※Characteristics of element transistors

PNP Type	NPN Type	Resistance value	Package					V_{CEO} (V)	Ic (mA)	h_{FE}					Ron (Ω) Typ.
–	Fig.4	R_1 (kΩ)	FTR	FTL	ATR	ATV	SPT			Min.	Typ.	Max.	V_{CE} (V)	Ic (mA)	
Part No.			Pd=300mW		Pd=600mW		Pd=300mW								
–	**DTC314T□**	10	○	○	○	○	○	15	600	100	250	600	5	50	1.5
–	**DTC323T□**	2.2	○	○	○	○	○	15	600	100	250	600	5	50	0.65
–	**DTC343T□**	4.7	○	○	○	○	○	15	600	100	250	600	5	50	0.95
–	**DTC363T□**	6.8	○	○	○	○	○	15	600	100	250	600	5	50	1.25
□ : Package code			F	L	A	V	S								

Equivalent circuits

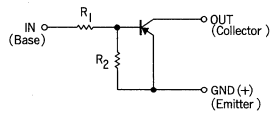


Fig.1

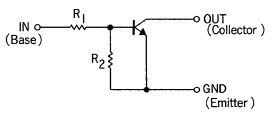


Fig.2

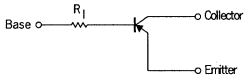


Fig.3

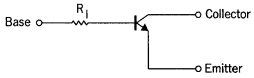


Fig.4

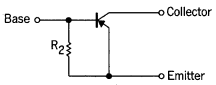


Fig.5

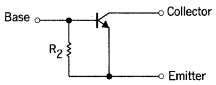
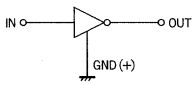
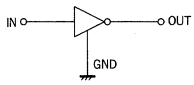


Fig.6

General designation



DTA • DTB Series



DTC • DTD Series

●Product Designation

Specify part No., packaging specifications code and h_{FE} ranking code.

Part No.

D	T	A	1	2	4	E	S	A			T	P

Blank unless otherwise required

Package code

Package	FTR	FTL	ATR	ATV	SPT
Code	F	L	A	V	S

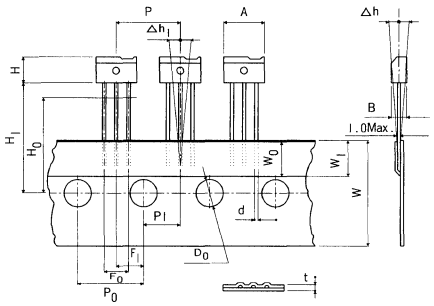
Packaging specification code

Code	Package	Package specifications	Quantity / Package (pcs)
–	FTR	Bulk	2,000
C1		Tube	8,000 (80pcs × 100)
TL2	FTL	Ammo box	2,500
TL3			
TL4			
TP	SPT	Ammo box	5,000
–		Bulk	2,000
–	ATR	Bulk	2,000
C2		Tube	8,000 (80pcs × 100)
TV2	ATV	Ammo box	2,500
TV3			
TV4			
TV6			

●Packaging Specifications

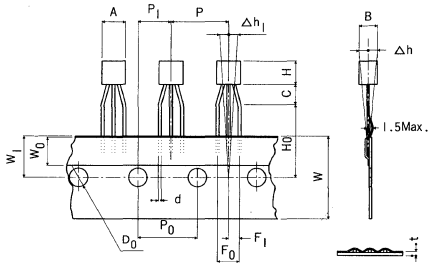
(Unit : mm)

FTL • ATV taping



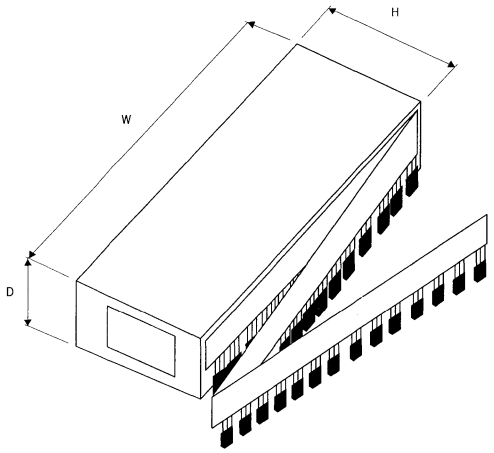
Code	FTL	ATV
A	6.8±0.2	6.8±0.2
B	2.4±0.2	2.5±0.2
C	–	–
H	3.4±0.2	4.4±0.2
d	0.5±0.1	0.5±0.1
P	12.7±1.0	12.7±1.0
P_0	12.7±0.2	12.7±0.2
D_0	φ4.0±0.2	φ4.0±0.2
P_1	6.35±0.4	6.35±0.4
F_0	$5.08^{+0.6}_{-0.2}$	$5.08^{+0.8}_{-0.2}$
F_1	$2.54^{+0.4}_{-0.1}$	$2.54^{+0.4}_{-0.1}$
W	$18.0^{+1.0}_{-0.5}$	$18.0^{+1.0}_{-0.5}$
H_0	17.1±0.5※2	17.1±0.5※2
H_1	19.0±0.5※1	19.0±0.5※1
W_0	6.0±0.5	6.0±0.5
W_1	9.0±0.5	9.0±0.5
P_{20}	1.0Max.	1.0Max.
Δh	0±1.0	0±1.0
$Δh_1$	0±1.0	0±1.0
t	0.7±0.2	0.7±0.2

TO-92 • SPT Taping



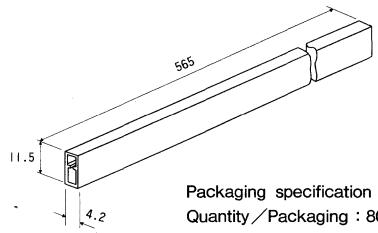
Code	TO-92	SPT
A	4.8±0.2	4.0±0.2
B	3.7±0.2	2.0±0.2
C	2.5Min.	3.0Min.
H	5.2Max.	3.0±0.2
d	0.5±0.1	$0.45^{+0.15}_{-0.05}$
P	12.7±0.5	12.7±1.0
P_0	12.7±0.3	12.7±0.2
D_0	φ4.0±0.2	φ4.0±0.2
P_1	6.35±0.5	6.35±0.5
F_0	$5.0^{+0.6}_{-0.2}$	$5.0^{+0.6}_{-0.2}$
F_1	$2.5^{+0.3}_{-0.1}$	$2.5^{+0.4}_{-0.1}$
W	$18.0^{+1.0}_{-0.5}$	$18.0^{+1.0}_{-0.1}$
H_0	16.0±0.5	16.0±0.5
H_1	–	–
W_0	6.0±0.5	6.0±0.5
W_1	9.0±0.5	9.0±0.5
P_{20}	1.0Max.	1.0Max.
Δh	0±1.0	0±1.0
$Δh_1$	0±0.5	0±1.0
t	0.7±0.2	0.7±0.2

FTL • ATV • TO-92 • SPT Ammo box



	W	H	D
FTL	334	280	41
ATV	334	280	41
TO-92	340	262	40
SPT	330	232	40

FTR Container tube



Packaging specification code : C1
Quantity／Packaging : 80 pcs

Digital Transistors
Transistors
Ref. Page FTR Page 128
Ref. Page FTL Page 128
Ref. Page ATR Page 136
Ref. Page ATV Page 136
Ref. Page SPT Page 134

Transistor Arrays

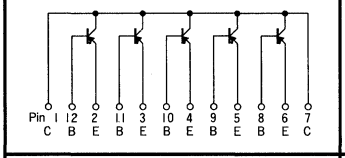
LF 12 Pin (ZIP Type) • SIP 10 Pin

Matched set of 4 or 5 transistors for less space, less labor, less cost with additional feature of uniform circuit characteristics.

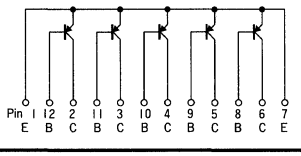
Part No.	V_{CEO} (V)	R_{BE} (kΩ)	Ic (mA/circuit)	Pc (mW/circuit) (Ta=25°C)	h_{FE}	V_{CE} (V)	Ic (mA)	Package
TA54	−70	10	−50	50	56~560	−3	−10	**LF12Pin**
TA57	−70	10	−50	50	56~560	−3	−10	
TA76	40	None	100	50	56~	6	1	
TA78	40	None	100	50	56~	6	1	
TA60	32	0	300	200	1000~	5	100	**SIP10Pin**
TA61	−32	0	−300	200	1000~	−5	−100	
TA64	−32	None	−1000	500	82~	−3	−100	

Equivalent circuits

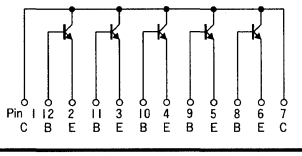
TA54



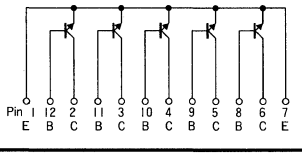
TA57



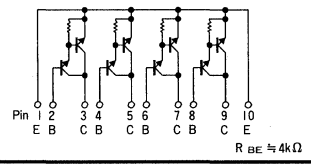
TA76



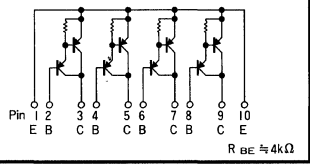
TA78



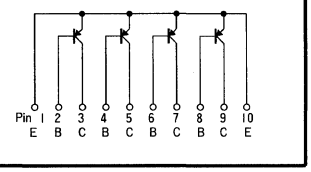
TA60



TA61



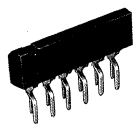
TA64

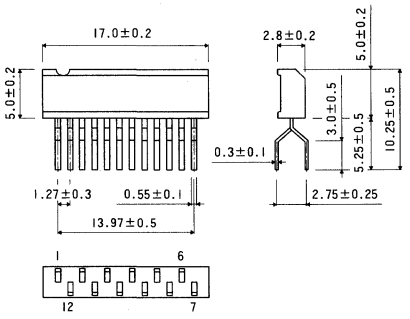


E: Emitter
C: Collector
B: Base

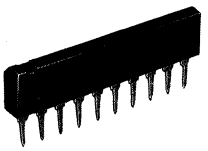
(Unit : mm)

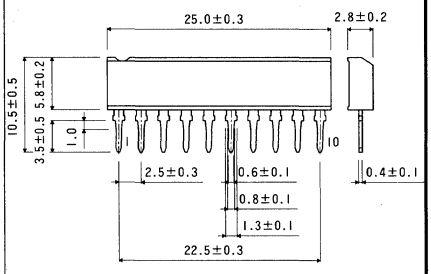
LF12Pin





SIP10Pin

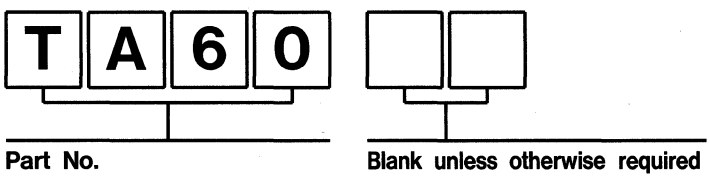




●Product Designation

Packaging specifications

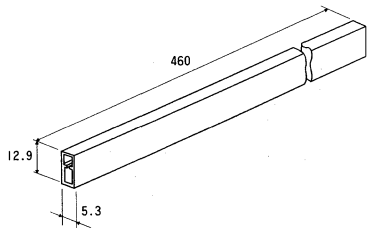
Package	Package specifications	Quantity/package (pcs)
LF12	Tube	1,500 (25pcs×60)
SIP10	Tube	1,020 (17pcs×60)



●Packaging Specifications

(Unit : mm)

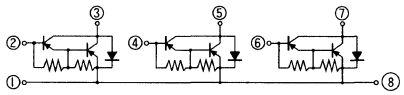
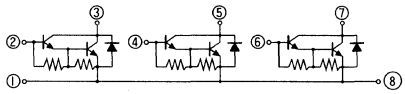
LF12Pin, SIP10Pin Container tube



Power Transistor Arrays

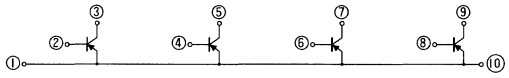
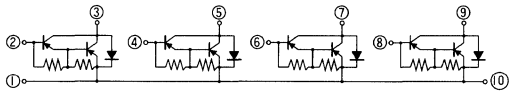
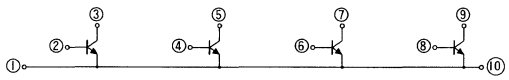
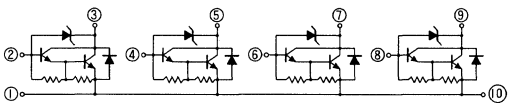
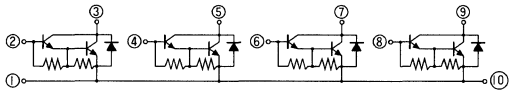
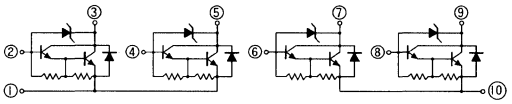
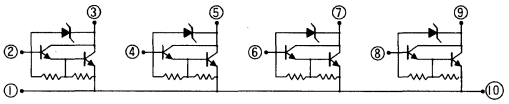
Four 10Pin and three 8Pin TO-220 power transistors are packed in a single package.
Suitable for motor drive and printer dot drive.

PSIP8Pin

Part No.	Equivalent circuits	V_{CEO} (V)	Ic (A)	h_{FE}	V_{CE} (V)	Ic (A)	Pc (W) (Ta=25℃) (1 Circuit)
☆3AA11		−100	−2	1k～10k	−2	−1	2.0
☆3AA12		−120	−6	2k～20k	−3	−2	2.0
☆3AA13		−80	−4	1k～10k	−3	−2	2.0
☆3AC11		100	2	1k～10k	2	1	2.0
☆3AC12		120	6	2k～20k	3	2	2.0
☆3AC13		80	4	1k～10k	3	2	2.0

Note : ☆Under development

PSIP10Pin

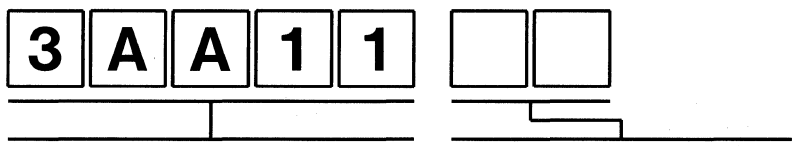
Part No.	Equivalent circuits	V_{CEO} (V)	Ic (A)	h_{FE}	V_{CE} (V)	Ic (A)	Pc (W) (Ta=25℃) (1 Circuit)
4AA11		−60	−3	60～320	−5	−0.5	2.0
☆4AA12		−120	−6	2k～20k	−3	−2	2.0
4AC15		60	3	60～320	5	0.5	2.0
4AC24		60	3	600～2k	4	0.5	2.0
4AC16		60±10	2	2k～10k	2	1.0	2.0
4AC17		60±10	4	2k～10k	5	1.5	2.0
4AC21		72±10	2	2k～10k	2	1.0	2.0
4AC22		100±15	2	1k～10k	2	1.0	2.0
4AC18		100	3	2k～10k	2	1.5	2.0
4AC19		200	2.5	1k～5k	4	1.0	2.0
4AC20		100	2	2k～10k	2	1.0	2.0
☆4AC25		60±10	2	2k～10k	2	1.0	2.0
☆4AC26		100±15	2	1k～10k	2	1.0	2.0
☆4AC23		100±15	3	1k～10k	4	1.5	2.0
☆4AE12		−50	−3	60～320	−3	−0.5	2.0
		50	3	60～320	3	−0.5	

Note : ☆Under development

●Product Designation

Packaging specifications

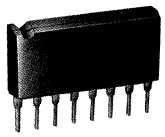
Package	Package specifications	Quantity / Package (pcs)
PSIP8	Tube	625 (25pcs×25)
PSIP10	Tube	500 (20pcs×25)

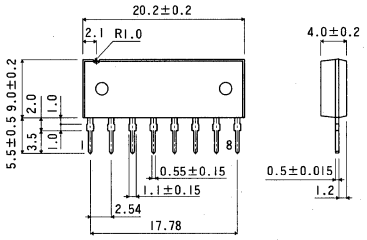


Power Transistor Arrays

(Unit : mm)

PSIP8Pin

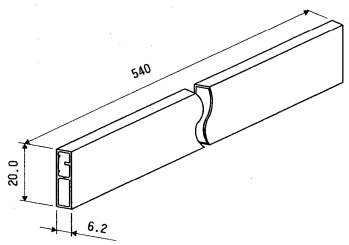




●Packaging Specifications

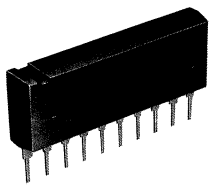
(Unit : mm)

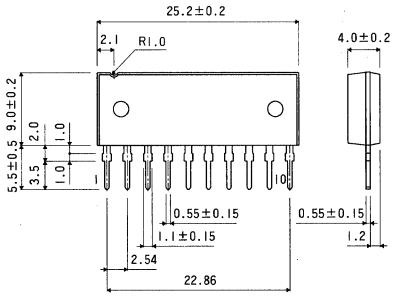
PSIP8Pin Container tubu



(Unit : mm)

PSIP10Pin

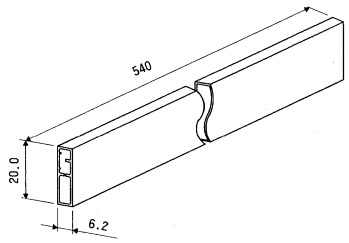




●Packaging Specifications

(Unit : mm)

PSIP10Pin Container tube



Digital Transistors Arrays

LF12Pin • LF9Pin (ZIP type)

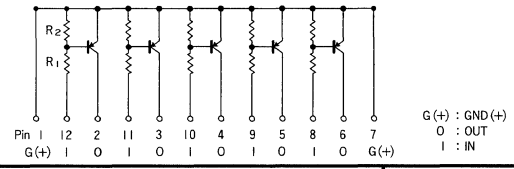
Effectively used when saving of labor, space and cost is critical. Because of uniform characteristics of elements used, minimum difference among circuits can be obtained.

Part No.		Resistance value		Vcc (V)	Io (mA)	Pc (mW/unit) (Ta=25°C)	G_I			Package
PNP Type	NPN Type	R_1 (kΩ)	R_2 (kΩ)					Vo (V)	Io (mA)	
DT5A113ZA	**DT5C113ZA**	1.0	10	50	100	50	33~	5	5	**LF12Pin**
DT5A114EA	**DT5C114EA**	10	10	50	50	50	30~	5	5	
DT5B123E	**DT5D123E**	2.2	2.2	50	500	100	39~	5	50	
DT5A124EA	**DT5C124EA**	22	22	50	30	50	56~	5	5	
DT5A143EA	**DT5C143EA**	4.7	4.7	50	100	50	20~	5	10	
DT5A143XA	**DT5C143XA**	4.7	10	50	100	50	30~	5	10	
DT5A144EA	**DT5C144EA**	47	47	50	30	50	68~	5	5	
–	**DT3C144WA**	47	22	50	30	50	56~	5	5	**LF9Pin**

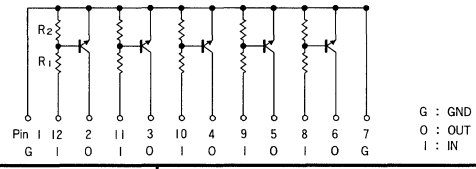
Part No.	Resistance value	V_{CE} (V)	Ic (mA)	Pd (mW/unit) (Ta=25°C)	h_{FE}					Package
	R_1 (KΩ)				Min.	Typ.	Max.	V_{CE} (V)	Ic (mA)	
DT5A143TA	4.7	−50	−100	50	100	250	600	−5	−1	**LF12Pin**
DT5C143TA	4.7	50	100	50	100	250	600	5	1	

Equivalent circuits

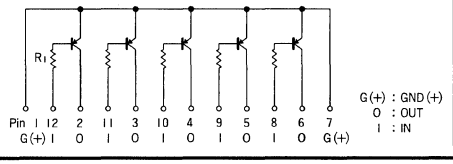
DT5A/DT5B Series



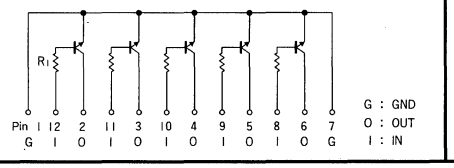
DT5A/DT5B Series



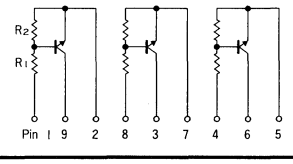
DT5A143T



DT5C143T

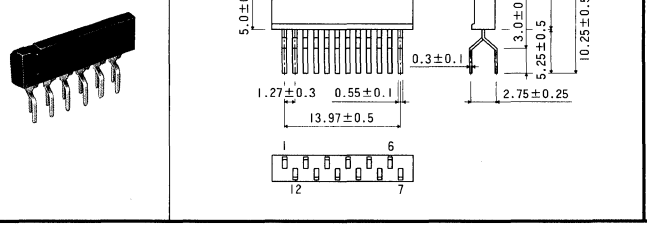


DT3C144W

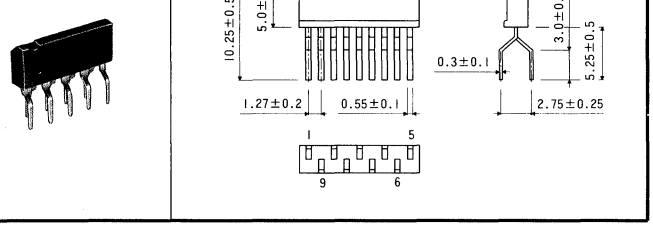


(Unit : mm)

LF12Pin



LF9Pin



●Product Designation

Specify Part No., packaging specification code.

Packaging specifications

Package	Package specifications	Quantity/Package (pcs)
LF12	Tube	1,500 (25pcs×60)
LF9	Tube	2,100 (35pcs×60)

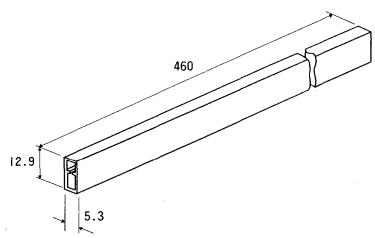
D	T	5	A	1	1	4	E	A		

Part No.

Blank unless otherwise required

●Packaging Specifications (Unit : mm)

LF12pin, LF9pin Container tube



To make it easier for the customer to select the type of product best suited to specific applications, we offer transistors in three types : (1) standard, (2) semi-standard, and (3) custom.

(1) Standard products

An inventory of these products is maintained so we can responed to customer orders quickly.

(2) Semi-standard products

These differ from standard products in that an inventory is not maintained, and therefore, a certain amount of time is required to fill an order. Please consult us before ordering these products.

(3) Custom

Special specifications are developed and manufactured based on the customer specifications.

Since these custom products, require more time to deliver than semi-standard products, please consult us before ordering these products.

●Please note the following when ordering.

The amount of an order must be in multiples of the basic order unit.

●Introductory Remarks

◎ : Standard products
○ : Semi-standard products
△ : Custom

●h_{FE} Ranking code

Code	h_{FE} Ranking	Code	h_{FE} Ranking
L	27～56	U	560～1200
M	39～82	V	820～1800
N	56～120	W	1200～2700
P	82～180	X	1800～3900
Q	120～270	Y	1800～5600
R	180～390	A※	1000～
S	270～560	B※	5000～
E	390～820	C※	10000

※Item for darlington transistor h_{FE}

Package	Packaging	Bulk	Container
FTR	Code		C1
	h_{FE} Basic ordering unit (pcs)	2,000	8,000
2SA785	PQR	○	○
2SA790	A	○	○
	B	○	○
2SA802	NPQ	○	○
2SA805	NPQ	○	○
2SA806	N	○	○
	PQ	◎	○
2SA874	PQR	◎	○
2SA881	PQR	◎	○
2SA937	PQRS	◎	○
2SA937ALN	RS	○	○
2SB821	QRS	○	○
2SB822	PQR	◎	○
2SB851	PQR	◎	○
2SB1199	56～	○	○
2SC1545	A	○	○
	B	◎	○
2SC1613	NPQ	○	○
2SC1613A	QRS	○	○
2SC1614	NPQ	○	○
2SC1615	N	○	○
	PQ	◎	○
2SC1652	PQR	◎	○
2SC2021	QRS	◎	◎
	E	◎	○
2SC2021LN	RSE	○	○
2SC2063	NPQ	◎	○
2SC2673	PQR	◎	○
2SC3080	MNPQ	◎	○
2SC4045	LMNPQ	○	○
2SC4775	RS	○	○
2SD1055	PQR	○	○
2SD1469	QRS	○	○
2SD1787	PQR	○	○
2SD2145	UVW	○	○
2SD2312	UVW	○	○
DTA113TFA		○	○
DTA113ZFA		○	○
DTA114EFA		◎	○
DTA114GFA		○	○
DTA114TFA		◎	○
DTA114WFA		○	○
DTA114YFA		◎	○
DTA115EFA		○	○
DTA115GFA		○	○
DTA115TFA		○	○
DTA115UF		○	○
DTA123EFA		○	○
DTA123JFA		○	○
DTA123YFA		○	○
DTA124EFA		◎	○
DTA124GFA		○	○
DTA124TFA		○	○
DTA124XFA		◎	○
DTA125TF		○	○
DTA143EFA		◎	○
DTA143TFA		○	○
DTA143XFA		◎	○
DTA143YFA		○	○
DTA143ZFA		○	○
DTA144EFA		◎	○
DTA144GFA		○	○
DTA144TFA		◎	○
DTA144VFA		○	○
DTA144WFA		◎	○
DTA1D3RFA		○	○
DTB113EF		○	○
DTB113ZF		○	○
DTB114EF		○	○
DTB114GF		○	○

Package	Packaging	Bulk	Container
FTR	Code		C1
	h_{FE} Basic ordering unit (pcs)	2,000	8,000
DTB114TF		○	○
DTB122JF		○	○
DTB123EF		○	○
DTB123TF		○	○
DTB123YF		○	○
DTB133HF		○	○
DTB143EF		○	○
DTB143TF		○	○
DTB163TF		○	○
DTC113ZFA		○	○
DTC114EFA		◎	○
DTC114YFA		○	○
DTC114TFA		◎	○
DTC114WFA		○	○
DTC114YFA		◎	○
DTC115EFA		○	○
DTC115GFA		○	○
DTC115TFA		○	○
DTC115UF		○	○
DTC123EFA		○	○
DTC123JFA		○	○
DTC123YFA		○	○
DTC124EFA		◎	◎
DTC124GFA		○	○
DTC124TFA		○	○
DTC124XFA		◎	○
DTC125TF		○	○
DTC143EFA		◎	○
DTC143TFA		◎	○
DTC143XFA		◎	○
DTC143ZFA		○	○
DTC143YFA		○	○
DTC144EFA		◎	○
DTC144GFA		○	○
DTC144TFA		◎	○
DTC144VFA		○	○
DTC144WFA		◎	○
DTC1D3RFA		○	○
DTC314TF		○	○
DTC323TF		○	○
DTC343TF		○	○
DTC363EF		○	○
DTC363TF		○	○
DTD113EF		○	○
DTD113ZF		○	○
DTD114EF		○	○
DTD114TF		○	○
DTD123EF		○	○
DTD123TF		○	○
DTD123YF		○	○
DTD133HF		○	○
DTD143EF		○	○
DTD143TF		○	○
DTD163TF		○	○

◎ : Standard products ○ : Semi-standard products

Package	Packaging	Bulk	Container
ATR	Code		C2
	h_{FE} Basic ordering unit (pcs)	2,000	8,000
2SA790M	AB	○	○
2SA874M	PQR	◎	○
2SA937AM	PQRS	◎	○
2SA937AMLN	RS	○	○
2SB909M	PQR	◎	○
2SB910M	PQR	◎	◎
2SB911M	PQR	◎	○
2SB1042M	PQR	○	○
2SB1044M	PQR	○	○
2SB1066M	NPQR	◎	○
2SB1076M	A	◎	○
2SB1130M	NPQR	○	○
2SB1130AM	N	○	○
	PQ	◎	○
2SB1307M	PQR	○	○
2SC1545M	B	○	○
2SC1652M	PQR	○	○
2SC2021M	QRSE	◎	○
2SC2021MLN	RSE	○	○
2SC2063M	NPQ	○	○
2SC3078M	MNP	○	○
2SC3079M	MNP	○	○
2SC3080M	MNPQ	○	○
2SC3270M	MNP	○	○
2SC4776M	RS	○	○
2SD1225M	PQR	◎	○
2SD1226M	PQR	○	○
2SD1227M	PQR	○	○
2SD1228M	PQR	○	○
2SD1293M	PQR	○	○
2SD1469M	QRS	○	○
2SD1507M	NPQR	○	○
2SD1536M	A	○	○
2SD1660M	1k～10k	○	○
2SD1661M	1k～10k	○	○
2SD1665M	NPQR	○	○
2SD2145M	UVW	○	○
2SD2197M	PQ	○	○
2SD2313M	UVW	○	○
DTA1137AA		○	○
DTA113ZAA		○	○
DTA114EAA		◎○	○○
DTA114GAA		○	○
DTA114TAA		○	○
DTA114WAA		○	○
DTA114YAA		◎	○
DTA115EAA		○	○
DTA115GAA		○	○
DTA115TAA		○	○
DTA115UA		○	○
DTA123EAA		○	○
DTA123JAA		○	○
DTA123YAA		○	○
DTA124EAA		◎	○
DTA124GAA		○	○
DTA124TAA		○	○
DTA124XAA		◎	○
DTA125TA		○	○
DTA143EAA		◎	○
DTA143TAA		○	○
DTA143XAA		◎	○
DTA143YAA		○	○
DTA143ZAA		○	○
DTA144EAA		◎	○
DTA144GAA		○	○
DTA144TAA		○	○
DTA144VAA		○	○
DTA144WAA		◎	○
DTA1D3RAA		○	○

Package	Packaging	Bulk	Container
ATR	Code		C2
	h_{FE} Basic ordering unit (pcs)	2,000	8,000
DTB113EA		○	○
DTB113ZA		○	○
DTB114EA		○	○
DTB114GA		○	○
DTB114TA		○	○
DTB122JA		○	○
DTB123EA		○	○
DTB123TA		○	○
DTB123YA		○	○
DTB133HA		○	○
DTB143EA		○	○
DTB143TA		○	○
DTB163TA		○	○
DTC113ZAA		○	○
DTC114EAA		◎	○
DTC114GAA		○	○
DTC114TAA		○	○
DTC114WAA		○	○
DTC114YAA		◎	○
DTC115EAA		○	○
DTC115GAA		○	○
DTC115TAA		○	○
DTC115UA		○	○
DTC123EAA		○	○
DTC123JAA		○	○
DTC123YAA		○	○
DTC124EAA		◎	○
DTC124GAA		○	○
DTC124TAA		○	○
DTC124XAA		◎	○
DTC125TA		○	○
DTC143EAA		◎	○
DTC143TAA		○	○
DTC143XAA		◎	○
DTC143YAA		○	○
DTC143ZAA		○	○
DTC144EAA		◎	○
DTC144GAA		○	○
DTC144TAA		○	○
DTC144VAA		○	○
DTC144WAA		◎	○
DTC1D3RAA		○	○
DTC314TA		○	○
DTC323TA		○	○
DTC343TA		○	○
DTC363EA		○	○
DTC363TA		○	○
DTD113EA		○	○
DTD113ZA		○	○
DTD114EA		○	○
DTD114GA		○	○
DTD114TA		○	○
DTD122JA		○	○
DTD123EA		○	○
DTD123TA		○	○
DTD123YA		○	○
DTD133HA		○	○
DTD143EA		○	○
DTD143TA		○	○
DTD163TA		○	○

Package	Packaging	Taping		
FTL	Code	TL2	TL3	TL4
	h_{FE} Basic ordering unit(pcs)	2,500	2,500	2,500
2SA1554	PQ	○	○	○
2SA1555	B	○	○	○
2SA1558	NPQ	○	○	○
2SA1559	PQR	○	○	○
2SA1560	PQR	○	○	○
2SA1561A	PQR	○	○	○
2SB1276	QRS	○	○	○
2SB1277	PQR	○	○	○
2SB1278	PQR	○	○	○
2SB1279	56～	○	○	○
2SC4032	B	○	○	○
2SC4034	QRS	○	○	○
2SC4036	NPQ	○	○	○
2SC4037	PQR	○	○	○
2SC4038	QRSE	○	○	○
2SC4039	NPQ	○	○	○
2SC4040	PQR	○	○	○
2SC4041	MNPQ	○	○	○
2SC4777	RS	○	○	○
2SD1919	PQR	○	○	○
2SD1920	QRS	○	○	○
2SD1921	PQR	○	○	○
2SD2191	UVW	○	○	○
2SD2314	UVW	○	○	○
DTA113TLA		○	○	○
DTA113ZLA		○	○	○
DTA114ELA		◎	○	○
DTA114GLA		○	○	○
DTA114TLA		◎	○	○
DTA114WLA		○	○	○
DTA114YLA		◎	○	○
DTA115ELA		○	○	○
DTA115GLA		○	○	○
DTA115TLA		○	○	○
DTA115UL		○	○	○
DTA123ELA		○	○	○
DTA123JLA		○	○	○
DTA123YLA		○	○	○
DTA124ELA		◎	○	○
DTA124GLA		○	○	○
DTA124TLA		○	○	○
DTA124XLA		◎	○	○
DTA125TL		○	○	○
DTA143ELA		◎	○	○
DTA143TLA		○	○	○
DTA143XLA		◎	○	○
DTA143YLA		○	○	○
DTA143ZLA		○	○	○
DTA144ELA		◎	○	○
DTA144GLA		○	○	○
DTA144TLA		○	○	○
DTA144VLA		○	○	○
DTA144WLA		◎	○	○
DTA1D3RLA		○	○	○
DTB113EL		○	○	○
DTB113ZL		○	○	○
DTB114EL		○	○	○
DTB114GL		○	○	○
DTB114TL		○	○	○
DTB122JL		○	○	○
DTB123EL		○	○	○
DTB123TL		○	○	○
DTB123YL		○	○	○
DTB133HL		○	○	○
DTB143EL		○	○	○
DTB143TL		○	○	○
DTB163TL		○	○	○
DTC113ZLA		○	○	○
DTC114ELA		◎	○	○

Package	Packaging	Taping		
FTL	Code	TL2	TL3	TL4
	hFE Basic ordering unit(pcs)	2,500	2,500	2,500
DTC114GLA		○	○	○
DTC114TLA		◎	○	○
DTC114WLA		○	○	○
DTC114YLA		◎	○	○
DTC115ELA		○	○	○
DTC115GLA		○	○	○
DTC115TLA		○	○	○
DTC115UL		○	○	○
DTC123ELA		○	○	○
DTC123JLA		○	○	○
DTC123YLA		○	○	○
DTC124ELA		◎	○	○
DTC124GLA		○	○	○
DTC124TLA		○	○	○
DTC124XLA		◎	○	○
DTC125TL		○	○	○
DTC143ELA		◎	○	○
DTC143TLA		◎	○	○
DTC143XLA		◎	○	○
DTC143YLA		○	○	○
DTC143ZLA		○	○	○
DTC144ELA		◎	○	○
DTC144GLA		○	○	○
DTC144TLA		○	○	○
DTC144VLA		○	○	○
DTC144WLA		◎	○	○
DTC1D3RLA		○	○	○
DTC314TL		○	○	○
DTC323TL		○	○	○
DTC343TL		○	○	○
DTC363EL		○	○	○
DTC363TL		○	○	○
DTD113EL		○	○	○
DTD113ZL		○	○	○
DTD114EL		○	○	○
DTD114GL		○	○	○
DTD114TL		○	○	○
DTD122JL		○	○	○
DTD123EL		○	○	○
DTD123TL		○	○	○
DTD123YL		○	○	○
DTD133HL		○	○	○
DTD143EL		○	○	○
DTD143TL		○	○	○
DTD163TL		○	○	○

Package	Packaging	Taping			
ATV	Code	TV2	TV3	TV4	TV6
	hFE Basic ordering unit(pcs)	2,500	2,500	2,500	2,500
2SA1547A	PQR	○	○	○	／
2SA1548	PQR	○	○	○	／
2SA1549	B	○	○	○	／
2SA1776	NPQ	○	○	○	○
2SB1236	NPQR	○	○	○	○
2SB1237	PQR	◎	○	○	○
2SB1238	PQR	◎	○	○	○
2SB1239	A	◎	○	○	○
2SB1240	PQR	◎	○	○	○
2SB1241	PQR	◎	○	○	○
2SB1242	PQR	○	○	○	○
2SB1243	NPQR	◎	○	○	○
2SB1326	PQR	○	○	○	○
2SC4010	QRSE	○	○	○	／
2SC4011	NPQ	○	○	○	／
2SC4012	MNP	○	○	○	／
2SC4013	MNP	○	○	○	／
2SC4014	MNPQ	○	○	○	／
2SC4015	MNP	○	○	○	○
2SC4016	PQR	○	○	○	○
2SC4017	B	○	○	○	／
2SC4778	RS	○	○	○	／
2SD1857	NPQR	○	○	○	○
2SD1858	PQR	◎	○	○	○
2SD1859	PQR	◎	○	○	○
2SD1860	PQR	○	○	○	／
2SD1861	A	◎	○	○	○
2SD1862	PQR	◎	○	○	○
2SD1863	PQR	◎	○	○	○
2SD1864	NPQR	◎	○	○	○
2SD1865	QRS	◎	○	○	○
2SD1866	1k～10k	○	○	○	○
2SD1867	1k～10k	○	○	○	○
2SD2192	UVW	○	○	○	○
2SD2279	PQ	○	○	○	○
2SD2315	UVW	○	○	○	○
DTA113TVA		○	○	○	／
DTA113ZVA		○	○	○	／
DTA114EVA		○	○	○	／
DTA114GVA		○	○	○	／
DTA114TVA		○	○	○	／
DTA114WVA		○	○	○	／
DTA114YVA		○	○	○	／
DTA115EVA		○	○	○	／
DTA115GVA		○	○	○	／
DTA115TVA		○	○	○	／
DTA115UV		○	○	○	／
DTA123EVA		○	○	○	／
DTA123JVA		○	○	○	／
DTA123YVA		○	○	○	／
DTA124EVA		○	○	○	／
DTA124GVA		○	○	○	／
DTA124TVA		○	○	○	／
DTA124XVA		○	○	○	／
DTA125TV		○	○	○	／
DTA143EVA		○	○	○	／
DTA143TVA		○	○	○	／
DTA143XVA		○	○	○	／
DTA143YVA		○	○	○	／
DTA143ZVA		○	○	○	／
DTA144EVA		○	○	○	／
DTA144GVA		○	○	○	／
DTA144TVA		○	○	○	／
DTA144VVA		○	○	○	／
DTA144WVA		○	○	○	／
DTA1D3RVA		○	○	○	／
DTB113EV		○	○	○	／
DTB113ZV		○	○	○	／
DTB114EV		○	○	○	／

Package	Packaging	Taping			
ATV	Code	TV2	TV3	TV4	TV6
	hFE Basic ordering unit(pcs)	2,500	2,500	2,500	2,500
DTB114GV		○	○	○	／
DTB114TV		○	○	○	／
DTB122JV		○	○	○	／
DTB123EV		○	○	○	／
DTB123TV		○	○	○	／
DTB123YV		○	○	○	／
DTB133HV		○	○	○	／
DTB143EV		○	○	○	／
DTB143TV		○	○	○	／
DTB163TV		○	○	○	／
DTC113ZVA		○	○	○	／
DTC114EVA		○	○	○	／
DTC114GVA		○	○	○	／
DTC114TVA		○	○	○	／
DTC114WVA		○	○	○	／
DTC114YVA		○	○	○	／
DTC115EVA		○	○	○	／
DTC115GVA		○	○	○	／
DTC115TVA		○	○	○	／
DTC115UV		○	○	○	／
DTC123EVA		○	○	○	／
DTC123JVA		○	○	○	／
DTC123YVA		○	○	○	／
DTC124EVA		○	○	○	／
DTC124GVA		○	○	○	／
DTC124TVA		○	○	○	／
DTC124XVA		○	○	○	／
DTC125TV		○	○	○	／
DTC143EVA		○	○	○	／
DTC143TVA		○	○	○	／
DTC143XVA		○	○	○	／
DTC143YUA		○	○	○	／
DTC143ZVA		○	○	○	／
DTC144EVA		○	○	○	／
DTC144GVA		○	○	○	／
DTC144TVA		○	○	○	／
DTC144VVA		○	○	○	／
DTC144WVA		○	○	○	／
DTC1D3RVA		○	○	○	／
DTC314TV		○	○	○	／
DTC323TV		○	○	○	／
DTC343TV		○	○	○	／
DTC363EV		○	○	○	／
DTC363TV		○	○	○	／
DTD113EV		○	○	○	／
DTD113ZV		○	○	○	／
DTD114EV		○	○	○	／
DTD114TV		○	○	○	／
DTD123EV		○	○	○	／
DTD123TV		○	○	○	／
DTD123YV		○	○	○	／
DTD133HV		○	○	○	／
DTD143EV		○	○	○	／
DTD143TV		○	○	○	／
DTD163TV		○	○	○	／

◎ : Standard products ○ : Semi-standard products

Package	Packaging	Bulk	Taping
TO-92	Code		T93
	h_{FE} Basic ordering unit(pcs)	1,000	3,000
2SA820	NPQ	○	○
2SA821	NPQ	○	○
2SA825	PQ	○	○
2SA830	B	◎	◎
2SA832	NPQ	○	○
2SA854	P	○	○
	QR	◎	◎
2SA933A	QRS	◎	◎
2SA933ALN	R	○	○
	S	○	○
2SA936	C	○	○
2SA1038	RS	○	○
2SA1039	RSE	○	○
2SA1137	Q	○	○
	RS	○	○
2SA1198	RSE	○	○
2SA1199	QR	○	○
	S	○	○
2SA1515	P	○	○
	QR	◎	◎
2SB737	QRS	○	○
2SC1645	B	◎	◎
2SC1649	NPQ	○	○
2SC1650	NPQ	○	○
2SC1651	NP	○	○
	Q	◎	◎
2SA1740	QRSE	◎	◎
2SC1740LN	RSE	○	○
2SC1741	P	○	○
	QR	◎	◎
2SC1741A	P	○	○
	QR	◎	◎
2SC1809	M	○	○
	NP	◎	◎
2SC2058	NP	◎	◎
	Q	○	○
2SC2062	B	○	○
	C	◎	◎
2SC2389	RSE	◎	◎
2SC2390	RSE	○	○
2SC2410	M P	○	○
	N	◎	◎
2SC2675	RSE	○	○
2SC2808	RSE	○	○
2SC2872	QRS	○	○
2SC2926	MNPQ	○	○
2SC3359	PQR	○	○
2SC3377	P	○	○
	QR	◎	◎
2SC3415	MNP	○	○
2SC3801	MNPQ	○	○
2SD786	QRS	○	○
2SD1468	Q	○	○
	RS	◎	◎
2SD2132	UVW	○	○

Package	Packaging	Bulk	Taping
SPT	Code		TP
	h_{FE} Basic ordering unit(pcs)	2,000	5,000
2SA825S	PQ	○	○
2SA830S	B	○	○
2SA854S	PQR	◎	◎
2SA933AS	QRS	◎	◎
2SA933ASLN	RS	◎	◎
2SA1198S	RSE	○	○
2SA1199S	QRS	○	○
2SA1515S	PQR	○	○
2SC1645S	B	○	○
2SC1740S	QRS	◎	◎
	E	◎	◎
2SC1740SLN	RSE	◎	◎
2SC1741S	PQR	◎	◎
2SC1741AS	PQR	○	○
2SC1809S	MNP	○	○
2SC2058S	NPQ	◎	◎
2SC2410S	MNP	○	○
2SC2872S	QRS	○	○
2SC2926S	MNPQ	○	○
2SC4042S	LMNP	○	○
2SC4043S	LMNPQ	○	○
2SC4044S	LMNPQ	○	○
2SC4779S	RS	○	○
2SD786S	QRS	○	○
2SD1468S	QRS	◎	◎
2SD1768S	PQR	○	○
2SD2144S	UVW	○	○
2SD2227S	UVW	○	○
2SD2322S		○	○
DTA113TSA		○	○
DTA113ZSA		○	○
DTA114ESA		◎	◎
DTA114TSA		◎	◎
DTA114YSA		◎	◎
DTA114WSA		○	○
DTA115ESA		○	○
DTA115GSA		○	○
DTA115TSA		○	○
DTA115US		○	○
DTA123ESA		○	○
DTA123JSA		○	○
DTA123YSA		○	○
DTA124ESA		◎	◎
DTA124GSA		○	○
DTA124TSA		○	○
DTA124XSA		◎	◎
DTA125TS		○	○
DTA143ESA		◎	◎
DTA143TSA		◎	◎
DTA143XSA		◎	◎
DTA143YUA		○	○
DTA143ZSA		○	○
DTA144ESA		◎	◎
DTA144GSA		○	○
DTA144TSA		○	○
DTA144VSA		○	○
DTA144WSA		◎	◎
DTA1D3RSA		○	○
DTB113ES		○	○
DTB113ZS		○	○
DTB114ES		○	○
DTB114GS		○	○
DTB114TS		○	○
DTB122JS		○	○
DTB123ES		○	○
DTB123TS		○	○
DTB123YS		○	○
DTB133HS		○	○
DTB143ES		○	○

Package	Packaging	Bulk	Taping
SPT	Code		TP
	h_{FE} Basic ordering unit(pcs)	2,000	5,000
DTB143TS		○	○
DTB163TS		○	○
DTC113ZSA		○	○
DTC114ESA		◎	◎
DTC114GSA		○	○
DTC114TSA		◎	◎
DTC114YSA		◎	◎
DTC114WSA		○	○
DTC115GSA		○	○
DTC115TSA		○	○
DTC115US		○	○
DTC123ESA		○	○
DTC123JSA		○	○
DTC123YSA		○	○
DTC124ESA		◎	◎
DTC124GSA		○	○
DTC124TSA		○	○
DTC124XSA		◎	◎
DTC125TS		○	○
DTC143ESA		◎	◎
DTC143TSA		◎	◎
DTC143XSA		◎	◎
DTC143YUA		○	○
DTC143ZSA		○	○
DTC144ESA		◎	◎
DTC144GSA		○	○
DTC144TSA		○	○
DTC144VSA		○	○
DTC144WSA		◎	◎
DTC1D3RSA		○	○
DTC314S		○	◎
DTC323TS		○	○
DTC343TS		○	◎
DTC363ES		○	○
DTC363TS		○	○
DTD113ES		○	○
DTD113ZS		○	○
DTD114ES		○	○
DTD114GS		○	○
DTD114TS		○	○
DTD122JS		○	○
DTD123ES		○	○
DTD123TS		○	○
DTD123YS		○	○
DTD133HS		○	○
DTD143ES		○	○
DTD143TS		○	○
DTD163TS		○	○

Package	Packaging	Bulk	Taping
TO-92L	Code		T103
	h_{FE} Basic ordering unit(pcs)	500	2,500
2SA934	PQR	◎	◎
2SA935	PQR	○	◎
2SA1584	NPQ	○	○
2SA1760	NPQ	○	○
2SA1780	NPQ	○	○
2SB1010	PQR	○	◎
2SB1041	PQR	○	○
2SB1043	PQR	○	○
2SB1306	PQR	○	○
2SC2060	PQR	◎	◎
2SC2061	PQR	◎	◎
2SC3269	MNP	○	○
2SC4166	NPQ	○	◎
2SD1292	PQR	◎	◎
2SD1384	P	○	○
	QR	○	◎
2SD1809	2k~	◎	◎
2SD1931	1k~30k	○	◎
2SD2172	UVW	○	○

Package	Packaging	Bulk	Taping
TQ-92LS	Code		TE4
	h_{FE} Basic ordering unit(pcs)	1,000	3,000
2SA1818	PQR	○	○
2SA1819	QR	○	○
2SA1820	PQ	○	○
2SA1884	NPQ	○	○
2SA1902	PQR	○	○
2SA1903	PQR	○	○
2SB1595	PQR	○	○
2SB1596	NPQ	○	○
2SC4719	PQR	○	○
2SC4720	QR	○	○
2SC4721	PQ	○	○
2SC4722	MNP	○	○
2SC5061	PQR	○	○
2SC5062	QRS	○	○
2SD2450	PQR	○	○
2SD2451	NPQ	○	○

Package	Packaging	Bulk
CPT	Code	h_{FE}
	h_{FE} Basic ordering unit(pcs)	1,000
2SA1727	NPQ	○
2SA1807	NP	○
2SA1834	QRS	○
2SA1862	NP	○
2SB1181	PQR	○
2SB1182	PQR	○
2SB1183	1k~200k	○
2SB1184	PQR	○
2SB1275	NPQ	○
2SB1316	1k~10k	○
2SB1412	PQR	○
2SB1474	1k~10k	○
2SB1516	NPQ	○
2SB1535	NPQ	○
2SC5001	QRS	○
2SC5103	PQ	○
2SD1733	PQR	○
2SD1758	PQR	○
2SD1759	1k~200k	○
2SD1760	PQR	○
2SD1918	NPQ	○
2SD1980	1k~10k	○
2SD2118	QRS	○
2SD2143	1k~10k	○
2SD2318	EUV	○

Package	Packaging	Bulk
TO-126	Code	
	h_{FE} Basic ordering unit(pcs)	1,000
2SA1775	NPQ	○
2SB1007	PQR	◎
2SB1008	A	○
2SB1009	PQR	◎
2SB1065	NPQR	◎
2SB1086	NPQR	○
2SB1086A	NPQ	○
2SB1272	1k~10k	◎
2SC3272	MNP	○
2SD1378	PQR	◎
2SD1379	4k~	○
2SD1380	PQR	◎
2SD1382	PQR	○
2SD1506	NPQR	◎
2SD1563	NPQR	◎
2SD1563A	NPQ	◎
2SD1637	1k~10k	○
2SD1638	1k~10k	◎
2SB889F	PQR	○
2SB891F	PQR	◎
2SD1200F	PQR	◎
2SD1189F	PQR	◎
2SD1381F	PQR	○
2SD2343	NPQR	○
2SB1436	PQR	○
2SD2166	QRS	○
2SC4137	UVW	◎
2SB786F	1k~	○
2SD947F	4k~	○
2SC3271F	NP	◎

Package	Packaging	Taping
MRT	Code	T105
	h_{FE} Basic ordering unit(pcs)	2,000
2SA1809	NPQ	○
2SA1861	NP	○
2SB1328	NPQ	○
2SB1329	PQR	○
2SB1330	PQR	○
2SB1331	PQ	○
2SB1332	PQR	○
2SB1333	MN	○
2SB1515	1k~10k	○
2SB1517	NPQR	○
2SC4243	MNP	○
2SC4724	2k~10k	○
2SD2004	NPQ	○
2SD2005	PQR	○
2SD2006	PQR	◎
2SD2007	PQR	○
2SD2008	PQR	◎
2SD2009	2k~	○
2SD2010	MNP	○
2SD2011	MNP	○

◎ : Standard products ○ : Semi-standard products

●h_{FE} Ranking Indication for TO-220, TO-220FN TO-220FP and HRT

Item	h_{FE} Ranking	Item	h_{FE} Ranking
A	16～32	F	160～320
B	25～50	G	250～500
C	40～80	H	400～800
D	60～120	J	600～1200
E	100～200	K	1000～2000

Package	Packaging	Bulk
TO-220	Code	
	h_{FE} \ Basic ordering unit(pcs)	500
2SB1369	DEF	○
2SB1064	DEF	◎
2SB1085	DE	○
	F	○
2SB1085A	DE	○
2SB1286	1k～10k	○
2SB1334	DEF	○
2SB1339	2k～20k	○
2SB1343	1k～20k	○
2SC3968	AB	○
2SC4007	DEFG	○
2SC4205	AB	○
2SC4573	2k～10k	○
2SC4845	DE	○
2SC4848	DE	○
2SD1505	DEF	◎
2SD1562	DEF	○
2SD1562A	DE	○
2SD1580	DEF	○
2SD1646	1k～10k	○
2SD1647	1k～10k	○
2SD1720	DEF	○
2SD1783	2k～30k	◎
2SD1888	2k～20k	○
2SD1932	1k～10k	○
2SD1943	HJK	○
2SD1956	DEF	○
2SD1986	1k～10k	○
2SD2024	1k～20k	○

Package	Packaging	Bulk
TO-220FP	Code	
	h_{FE} \ Basic ordering unit(pcs)	500
2SA1757	DEF	○
2SA1758	DEF	○
2SB1185	D	○
	EF	◎
2SB1186	DEF	○
2SB1186A	D	◎
	E	◎
2SB1370	DEF	◎
2SB1287	1k～5k	◎
2SB1335	DEF	○
2SB1340	2k～20k	◎
2SB1342	1k～20k	◎
2SB1344	1k～20k	◎
2SC3969	AB	○
2SC4008	DEFG	○
2SC4129	AB	○
2SC4574	2k～10k	○
2SC4595	DEF	○
2SC4846	DE	○
2SC4849	DE	◎
2SC4895	2k～10k	○
2SD1762	D	○
	EF	◎
2SD1763	DEF	○
2SD1763A	DE	○
2SD1764	1k～10k	◎
2SD1765	1k～10k	◎
2SD1832	DEF	◎
2SD1833	DEF	○
2SD1856	2k～30k	◎
2SD1889	2k～20k	◎
2SD1933	1k～10k	◎
2SD1944	HJK	◎
2SD1954	DEF	◎
2SD1987	1k～10k	○
2SD2025	1k～20k	◎
2SD2061	DEF	◎
2SD2091	1k～10k	○

Package	Packaging	Taping
HRT	Code	T114
	h_{FE} \ Basic ordering unit(pcs)	1,000
2SB1353	DEF	○
2SB1496	DEF	○
2SB1355	DEF	○
2SB1357	DEF	◎
2SB1359	1k～10k	○
2SC4355	DEFG	○
2SC4575	2k～10k	○
2SC2030	2k～10k	○
2SD2033	DEF	○
2SD2036	DEF	○
2SD2037	DEF	◎
2SD2038	DEF	○
2SD2039	1k～10k	○
2SD2040	DEF	○
2SD2041	1k～10k	○
2SD2042	2k～30k	○
2SD2043	2k～20k	○
2SD2044	HJK	○

Package	Packaging	Container
TA	Code	
	Basic ordering unit(pcs)	1,500
TA54		○
TA57		○
TA60		◎
TA61		◎
TA64		◎
TA76		◎
TA78		◎
DT3C144W (Basic ordering unit 2,100pcs)		○
DT5A113Z		○
DT5A114E		◎
DT5A124E		◎
DT5A143E		◎
DT5A143T		○
DT5A143X		◎
DT5A144E		◎
DT5B123E		○
DT5C113Z		○
DT5C114E		◎
DT5C124E		◎
DT5C143E		◎
DT5C143T		◎
DT5C143X		○
DT5C144E		◎
DT5D123E		○

MEMO

MEMO

MEMO

Diodes

Surfaces Mounted

Leaded

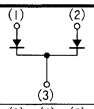
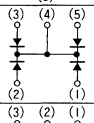
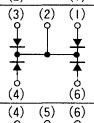
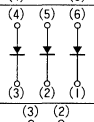
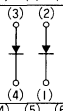
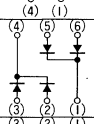
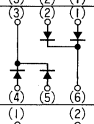
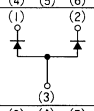
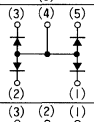
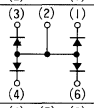
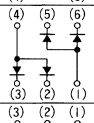
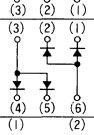
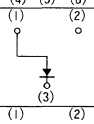
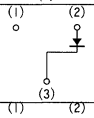
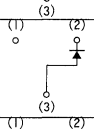
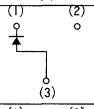
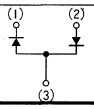
Diodes Quick reference

Application		V_R (V)	Package: Molded types USM	DSM	PSM	EM3	UMD	SMD	FMD	IMDD	MPD	CPD F5	Glass types LL-34	LL-41	Ref. Page
			Part No.												
Switching	High-speed	35	1SS355										RLS-73		168
		50	1SS354										RLS-72		
		80	1SS353										RLS-71		
	Ultra High-speed	35											RLS-94		168
		50											RLS-93		
		80											RLS-92		
	Low-leakage	35											RLS141		168
		50											RLS140		
		80											RLS139		
	High-voltage	220											RLS245		168
	JEDEC Standard	25											RLS4154		169
		30											RLS4152		
													RLS4450		
		50											RLS4150		
													RLS4151		
													RLS4153		
													RLS4454		
		70											RLS4606		
		75											RLS4148		
													RLS4149		
													RLS4446		
													RLS4447		
													RLS4448		
													RLS4449		
Band Switching	Glass sealed types	35											RLS135		170
	Super mini molded types	35	1SS356			New DAN235E	DAN235U	DAN235K							170
							DAP236U	DAP236K							
Rectifying	General purpose	50												RLR4001	171
		100		New 1SR154-100										RLR4002	
		200		New 1SR154-200										RLR4003	
		400		New 1SR154-400										RLR4004	
		600			☆1SR154-600										
		800			☆1SR154-800										
	High speed	100			☆1SR156-100										171
		200			☆1SR156-200										
		400			☆1SR156-400										
	Ultra High speed	200			☆1SR159-200										171
Schottky Barrier	Rectify	20					RB451F	RB400D	RB471E		RB435C New RB035B-20				172
							New	RB401D							
								RB411D							
								RB421D							
								RB425D							
		25					RB450F	RB420D							
		40			☆RB160L-40						RB110C RB111C New RB031B-40				
	Small Signal	20		New RB501H New RB500H			RB715F RB717F	RB705D							172
		25		RB751H					New RB731U						
		40		RB751H-40											
Valiable Capacitance	High-frequency	30		1SV223											174
Pin	High-frequency	50		☆RN711H			☆RN719F New	RN719D							174
Zener		2.0~36		DTZ Series											175
		3.6~24											RLZJ Series		177
		2.0~56											RLZ Series		178
		2.0~43			☆PTZ Series										176
	JEDEC Standard	2.4~24											RLZ5000 Series		179
	Special Zener	6.47~7.14						STZ6.8T							179
		7.76~8.64					UMZ8.2T								

Note : ☆Under development

Diodes Arrays Quick reference

Diode array in various packages which can help for dense mounting and component count reduction.

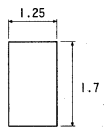
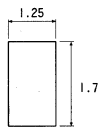
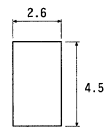
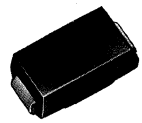
Application	Internal circuit	Package								
		EM3	UMT	SST	SMT	UM4	UM5	UM6	FMT	IMD
		Part No.								
High-Speed Switching		DAN222	DAN202U	DAN202C	DAN202K					
									FMN1	
							UMN1			
										IMN10
						DA227				
										IMN11
								UMN11		
		DAP222	DAP202U	DAP202C	DAP202K					
									FMP1	
							UMP1			
										IMP11
								UMP11		
Special		DA122	DA106U DA115		DA106K DA119					
		DA121	DA114	DAN212C	DAN212K					
		DA120	DA112		DA116					
		DA123	DA113		DA118					
		DA221 DA223	DA204U DA226U	DAN217C	DA204K DAN217 DA223K ☆DA228K					

Note : ☆Under development

Pakage Available

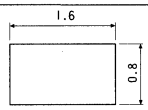
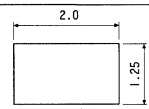
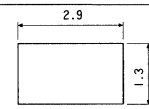
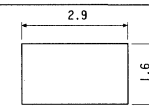
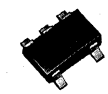
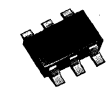
●2 leads type

(Unit : mm)

Package	USM	DSM	PSM
Body dimension			
Actual size			
Enlarged (×3.0)			

●Mini mold type

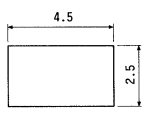
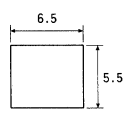
(Unit : mm)

	Package			
Body dimension	 1608 (0603)	 2125 (0805)	 2913 (1105)	 2916 (1206)
Actual size				
Pin 3 Enlarged (×3.0)	**EM3** 	**UMT／UMD** 	**SST (U. S. ／European SOT-23)** 	**SMT／SMD (SC-59／Japanese SOT-23)** 
Pin 4 Enlarged (×3.0)		**UM4** 		
Pin 5 Enlarged (×3.0)		**UM5** 		**FMT／FMD (SOT-25)** 
Pin 6 Enlarged (×3.0)		**UM6** 		**IMD (SOT-36)** 

Note : 4-digit number in the dimensions column are in mm and parenthetically in inches.

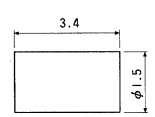
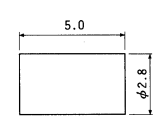
●Power type

(Unit : mm)

Package	MPD	CPD
Body dimension		
Actual size		
Enlarged (×1.5)		

●Glass seal type

(Unit : mm)

Package	LL-34	LL-41
Body dimension		
Actual size		
Enlarged (×3.0)		

MEMO

Switching Diodes

Surface mounted switching diodes are available in leadless MELF style (LL-34) and in 2 lead molded packages (USM/DSM) .
High speed, low leakage and high voltage devices are available for specific applications.

●High-speed Switching Diodes

Part No.	Absolute maximum ratings (Ta=25°C)							Electrical characteristics (Ta=25°C)									Package
	V_{RM} (V)	V_R (V)	I_{FM} (mA)	Io (mA)	Isurge (mA) 1s	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (mA)	I_R (μA) Max.	V_R (V)	C_T (pF) Max.	V_R (V)	f (MHz)	trr (ns) Max.	V_R (V)	I_F (mA)	
1SS353	90	80	225	100	400	125	−55～+125	1.2	100	0.5	80	3	0.5	1	4	6	10	**USM**
1SS354	55	50	225	100	400	125	−55～+125	1.2	100	0.5	50	3	0.5	1	4	6	10	**USM**
1SS355	40	35	225	100	400	125	−55～+125	1.2	100	0.5	35	3	0.5	1	4	6	10	**USM**
RLS-71	90	80	400	130	600	175	−65～+175	1.2	100	0.5	80	2	0.5	1	4	6	10	**LL-34**
RLS-72	55	50	350	120	500	175	−65～+175	1.2	100	0.5	50	2	0.5	1	4	6	10	**LL-34**
RLS-73	40	35	300	110	400	175	−65～+175	1.2	100	0.5	35	3	0.5	1	4	6	10	**LL-34**

●Ultra High-speed Switching Diodes

Part No.	Absolute maximum ratings (Ta=25°C)							Electrical characteristics (Ta=25°C)									Package
	V_{RM} (V)	V_R (V)	I_{FM} (mA)	Io (mA)	Isurge (mA) 1μs	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (mA)	I_R (μA) Max.	V_R (V)	C_T (pF) Max.	V_R (V)	f (MHz)	trr (ns) Max.	V_R (V)	I_F (mA)	
RLS-92	75	65	600	200	4000	175	−65～+175	1.0	100	0.5	65	3	0	1	2	6	10	**LL-34**
RLS-93	55	50	600	200	4000	175	−65～+175	1.0	100	0.5	50	3	0	1	2	6	10	**LL-34**
RLS-94	40	35	600	200	4000	175	−65～+175	1.0	100	0.5	35	3	0	1	2	6	10	**LL-34**

●Low-leakage Switching Diodes

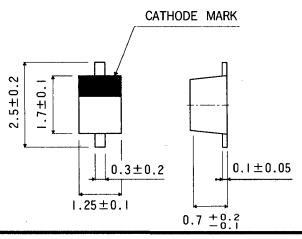
Part No.	Absolute maximum ratings (Ta=25°C)							Electrical characteristics (Ta=25°C)									Package
	V_{RM} (V)	V_R (V)	I_{FM} (mA)	Io (mA)	Isurge (mA) 1s	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (mA)	I_R (nA) Max.	V_R (V)	C_T (pF) Max.	V_R (V)	f (MHz)	trr (ns) Max.	V_R (V)	I_F (mA)	
RLS139	90	80	400	130	600	175	−65～+175	1.2	100	20	30	5	0.5	1	50	6	10	**LL-34**
RLS140	55	50	350	120	500	175	−65～+175	1.2	100	10	25	5	0.5	1	50	6	10	**LL-34**
RLS141	40	35	300	110	400	175	−65～+175	1.2	100	10	20	5	0.5	1	50	6	10	**LL-34**

●High-voltage Switching Diodes

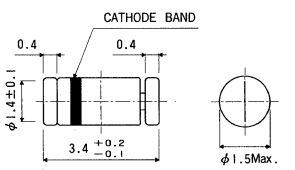
Part No.	Absolute maximum ratings (Ta=25°C)							Electrical characteristics (Ta=25°C)									Package
	V_{RM} (V)	V_R (V)	I_{FM} (mA)	Io (mA)	Isurge (mA) 1s	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (mA)	I_R (μA) Max.	V_R (V)	C_T (pF) Max.	V_R (V)	f (MHz)	trr (ns) Max.	V_R (V)	I_F (mA)	
RLS245	250	220	625	200	1000	175	−65～+175	1.5	200	10	220	3	0	1	75	IF=−IR=20mA		**LL-34**

(Unit : mm)

USM



LL-34



●JEDEC Standard

<Absolute maximum ratings>

Part No.	V_{RM} (V)	V_R (V)	I_{FM} (mA)	Io (mA)	I_F (mA)	I_{FSM} 1 μs (A)	P (mW)	Tj (°C)	Topr (°C)	Tstg (°C)	Package
RLS4148	100	75	450	150	200	2	500	200	−65～+200	−65～+200	**LL-34**
RLS4149	100	75	450	150	200	2	500	200	−65～+200	−65～+200	**LL-34**
RLS4150	50	50	600	200	250	4	500	200	−65～+200	−65～+200	**LL-34**
RLS4151	75	50	450	150	200	2	500	200	−65～+200	−65～+200	**LL-34**
RLS4152	40	30	450	150	200	2	500	200	−65～+200	−65～+200	**LL-34**
RLS4153	75	50	450	150	200	2	500	200	−65～+200	−65～+200	**LL-34**
RLS4154	35	25	450	150	200	2	500	200	−65～+200	−65～+200	**LL-34**
RLS4446	100	75	450	150	200	2	500	200	−65～+200	−65～+200	**LL-34**
RLS4447	100	75	450	150	200	2	500	200	−65～+200	−65～+200	**LL-34**
RLS4448	100	75	450	150	200	2	500	200	−65～+200	−65～+200	**LL-34**
RLS4449	100	75	450	150	200	2	500	200	−65～+200	−65～+200	**LL-34**
RLS4450	40	30	600	200	250	4	500	200	−65～+200	−65～+200	**LL-34**
RLS4454	75	50	450	150	200	2	500	200	−65～+200	−65～+200	**LL-34**
RLS4606	85	70	600	200	250	4	500	200	−65～+200	−65～+200	**LL-34**

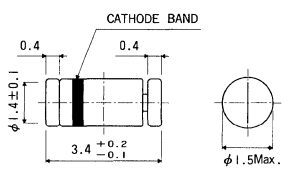
<Electrical characteristics>

Part No.	V_F (V) @ 0.1mA	@ 0.25mA	@ 1mA	@ 2mA	@ 5mA	@ 10mA	@ 20mA	@ 30mA	@ 50mA	@ 100mA	@ 200mA	@ 250mA	BV (V) Min. @ 5 μA	@ 100 μA	I_R (μA) Max. @ 25°C	V_R (V)	@ 150°C	V_R (V)	C_T (pF) V_R=0 f=1MHz	trr (ns) V_R=6V I_F=10mA R=100Ω
RLS4148						1.0							75	100	0.025	20	50.0	20	4	4
															5.0	75				
RLS4149						1.0							–	100	0.025	20	50.0	20	2	4
															5.0	75				
RLS4150			0.54			0.66			0.76	0.82	0.87		–	50	0.1	50	100.0	50	2.5	4
			0.62			0.74			0.86	0.92	1.0									
RLS4151									1.0				75	–	0.05	50	50.0	50	2	2
RLS4152	0.49	0.53	0.59	0.62		0.70	0.74						40	–	0.05	30	50.0	30	2	2
	0.55	0.59	0.67	0.70		0.81	0.88													
RLS4153	0.49	0.53	0.59	0.62		0.70	0.74						75	–	0.05	50	50.0	50	2	2
	0.55	0.59	0.67	0.70		0.81	0.88													
RLS4154								1.0					35	–	0.1	25	100.0	25	4	2
RLS4446							1.0						–	100	0.025	20	50.0	20	4	4
															5.0	75				
RLS4447							1.0						–	100	0.025	20	50.0	20	2	4
															5.0	75				
RLS4448					0.62					1.0			–	100	0.025	20	50.0	20	4	4
					0.72										5.0	75				
RLS4449					0.63			1.0					–	100	0.025	20	50.0	20	2	4
					0.73										5.0	75				
RLS4450	0.42		0.52			0.64			0.80				40	–	0.05	30	50.0	30	4	4
	0.54		0.64			0.72			0.92		1.0									
RLS4454						1.0							75	–	0.1	50	100.0	50	2	2
RLS4606	0.43		0.54			0.65			0.74	0.79	0.86		–	85	0.1	50	25.0	50 (100°C)	2.5	4
	0.55		0.66			0.77			0.86	0.92	1.0	1.1			0.25	70				

Note : V_F ; upper, Min. ; lower, Max.

(Unit : mm)

LL-34



●Product Designation (Ex.)

When ordering specify the part No. and packaging specifications.

1	S	S	3	5	5		T	E	–	1	7

Part No.

Packaging specification code

Package	Code	Sproket hole side	Quantity / Package (pcs)
USM	TE-17	Cathode	3,000
LL-34	TE-11	Cathode	2,500
	TE-12	Anode	
	TE11A	Cathode	10,000
	TE12A	Anode	
	TE-15	Cathode	2,000
	TE-16	Anode	
	TE11C	Cathode	2,500

Band Switching Diodes

Ultraminiature types include three-terminal EMS, UMD and SMD. DSM, USM, and glass sealed leadless are housed in two-terminal package. These packages contains diodes of low high-freguency impedance and small in-terminal capacitance, suitable for use as band switching.

●Super mini molded types

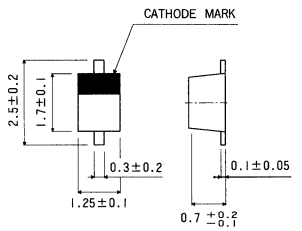
Part No.	Absolute maximum ratings (Ta=25°C)				Electrical characteristics (Ta=25°C)										Package	Circuits
	Pd (mW)	V_R (V)	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (mA)	I_R (nA) Max.	V_R (V)	C_T (pF) Max.	V_R (V)	f (MHz)	r_F (Ω) Max.	I_F (mA)	f (MHz)		
1SS356		35	125	−55~+125	1.0	10	10	25	1.2	6	1	0.9	2	100	**USM**	—
DAN235K	150	35	125	−55~+125	1.0	10	10	25	1.2	6	1	0.9	2	100	**SMD**	Fig.1
DAN235U	150	35	125	−55~+125	1.0	10	10	25	1.2	6	1	0.9	2	100	**UMD**	Fig.1
DAP236K	150	35	125	−55~+125	1.0	10	10	25	1.2	6	1	0.9	2	100	**SMD**	Fig.2
DAP236U	150	35	125	−55~+125	1.0	10	10	25	1.2	6	1	0.9	2	100	**UMD**	Fig.2
New **DAN235E**	150	35	125	−55~+125	1.0	10	10	25	1.2	6	1	0.9	2	100	**EM3**	Fig.1

●Glass-sealed types

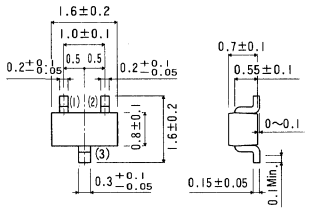
Part No.	Absolute maximum ratings (Ta=25°C)					Electrical characteristics (Ta=25°C)									Package
	Pd (mW)	V_R (V)	Io (mA)	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (mA)	I_R (nA) Max.	V_R (V)	C_T (pF) Max.	V_R (V)	f (MHz)	r_F (Ω) Max.	I (mA)	f (MHz)	
RLS135	150	35	100	150	−55~+150	1.0	10	100	20	1.5	10	1	0.6	10	100	**LL-34**

(Unit : mm)

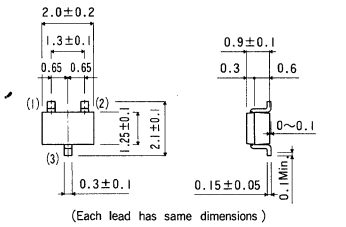
USM



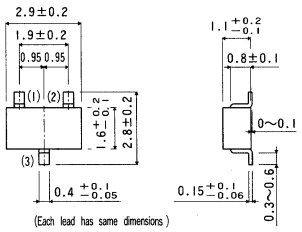
EM3



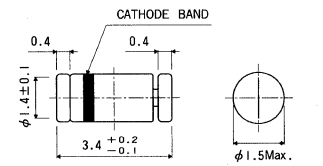
UMD



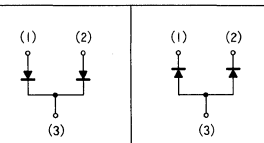
SMD (SC-59/Japanese SOT-23)



LL-34



Internal circuit



●Product Designation (Ex.)

When ordering, specify the part No. and packaging specifications.

1	S	S	3	5	6	T	W	1	1

Part No. | **Packaging specification code**

Package	Code	Sproket hole side	Quantity / Package (pcs)
USM	TW11	Cathode	3,000
EM3	TL	1Pin	
	TR	2Pin	
UMD	T106	1Pin	
	T107	2Pin	
SMD	T146	1Pin	
	T147	2Pin	
LL-34	TE-11	Cathode	2,500
	TE-12	Anode	
	TE11A	Cathode	10,000
	TE12A	Anode	
	TE-15	Cathode	2,000
	TE-16	Anode	
	TE11C	Cathode	2,500

Rectifying Diodes

Various serieses are available in pin 2 mini power molded and glass sealed leadless packages.
1SR154 series will find wide applications on vehicle devices and small power supplies.

●General Purpose Rectifier Diodes

Part No.	Absolute maximum ratings (Ta=25°C)						Electrical characteristics (Ta=25°C)				Package
	V_{RSM} (V)	V_{RRM} (V)	Io (A)	I_{FSM} (A) 60Hz 1∿	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (A)	I_R (μA) Max.	V_R (V)	
New 1SR154-100	150	100	1	30	150	−55～+150	1.1	1	10	100	PSM
New 1SR154-200	250	200	1	30	150	−55～+150	1.1	1	10	200	PSM
New 1SR154-400	500	400	1	30	150	−55～+150	1.1	1	10	400	PSM
☆1SR154-600	700	600	1	30	150	−55～+150	1.1	1	10	600	PSM
☆1SR154-800	900	800	1	30	150	−55～+150	1.1	1	10	800	PSM
RLR4001	60	50	0.8	20	150	−55～+150	1.0	0.8	10	50	LL-41
RLR4002	120	100	0.8	20	150	−55～+150	1.0	0.8	10	100	LL-41
RLR4003	240	200	0.8	20	150	−55～+150	1.0	0.8	10	200	LL-41
RLR4004	480	400	0.8	20	150	−55～+150	1.0	0.8	10	400	LL-41

Note : ☆Under development

●High-speed Rectifier Diodes

Part No.	Absolute maximum ratings (Ta=25°C)						Electrical characteristics (Ta=25°C)							Package
	V_{RSM} (V)	V_{RRM} (V)	Io (A)	I_{FSM} (A) 60Hz 1∿	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (A)	I_R (μA) Max.	V_R (V)	t_{rr} (μS) Max.	I_F (mA)	I_R (mA)	
☆1SR156-100	150	100	0.8	20	150	−55～+150	1.3	0.8	10	100	0.4	10	10	PSM
☆1SR156-200	250	200	0.8	20	150	−55～+150	1.3	0.8	10	200	0.4	10	10	PSM
☆1SR156-400	500	400	0.8	20	150	−55～+150	1.3	0.8	10	400	0.4	10	10	PSM

Note : ☆Under development

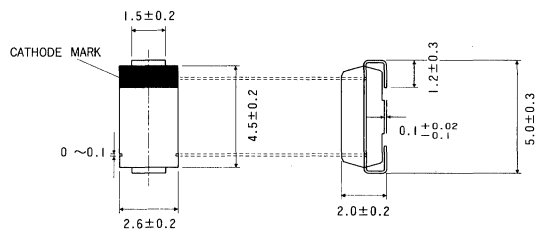
●Ultra High-speed Rectifier Diode

Part No.	Absolute maximum ratings (Ta=25°C)						Electrical characteristics (Ta=25°C)							Package
	V_{RSM} (V)	V_{RM} (V)	Io (A)	I_{FSM} (A) 60Hz 1∿	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_{FM} (A)	I_R (μA) Max.	V_R (V)	trr (ns) Max.	I_F (mA)	I_R (mA)	
☆1SR159-200	200	200	1	20	150	−40～+150	0.98	1.0	10	200	50	100	100	PSM

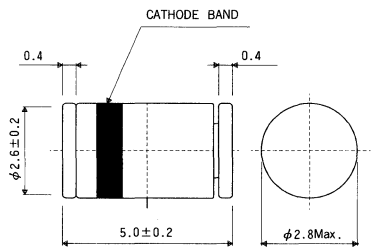
Note : ☆Under development

(Unit : mm)

PSM



LL-41



●Product Designation (Ex.)

When ordering, specify the part No. and packaging specifications.

1	S	R	1	5	4	−	1	0	0	T	E	2	5
Part No.										Packaging specification code			

Packaging specification code

Package	Code	Sproket hole side	Quantity / Package (pcs)
PSM	TE-25	Cathode	1,500
LL-41	TE-21	Cathode	5,000
	TE-22	Anode	
	TE-23	Cathode	1,500
	TE-24	Anode	
	TE21C	Cathode	5,000

Schottky Barrier Diodes

Io=1A to 0.1A, single or array,
low V_F, or low leakage.

●For Rectifier

	Part No.	Absolute maximum ratings (Ta=25℃)					Electrical characteristics (Ta=25℃)				Packge	Circuits
		V_{RM} (V)	Io (A)	I_{FSM} (A) 60Hz1 ∿	Tj (℃)	Tstg (℃)	V_F (V) Max.	I_F (A)	I_R (μA) Max.	V_R (V)		
New	RB035B-20	20	4	30	125	−40～+125	0.55	2	2m	20	CPD F5	Fig.7
New	RB031B-40	40	3	40	125	−40～+125	0.55	3	2m	40	CPD F5	Fig.9
	☆RB160L-40	40	1	30	125	−40～+125	0.55	1	1m	40	PSM	−
	RB110C	40	1	5	125	−40～+125	0.60	1	80	25	MPD	Fig.6
	RB111C	40	1	5	125	−40～+125	0.50	1	100	25	MPD	Fig.6
New	RB401D	40	0.5	3	125	−40～+125	0.50	0.50	70	20	SMD	Fig.4
	RB435C	20	0.5	3	125	−40～+125	0.55	0.50	30	10	MPD	Fig.7
	RB400D	20	0.5	3	125	−40～+125	0.55	0.50	30	10	SMD	Fig.4
	RB411D	20	0.5	3	125	−40～+125	0.50	0.50	30	10	SMD	Fig.4
	RB420D	25	0.1	1	125	−40～+125	0.45	0.01	1	10	SMD	Fig.4
	RB421D	20	0.1	1	125	−40～+125	0.55	0.10	30	10	SMD	Fig.4
	RB425D	20	0.1	1	125	−40～+125	0.55	0.10	30	10	SMD	Fig.1
	RB450F	25	0.1	1	125	−40～+125	0.45	0.01	1	10	UMD	Fig.4
	RB451F	20	0.1	1	125	−40～+125	0.55	0.10	30	10	UMD	Fig.4
	RB471E	20	0.1	1	125	−40～+125	0.55	0.10	30	10	FMD	Fig.5
New	RB500H	25	0.1	1	125	−40～+125	0.45	0.01	1	10	DSM	−
New	RB501H	25	0.1	1	125	−40～+125	0.55	0.10	30	10	DSM	−

Note : ☆Under development

●For Small Signal

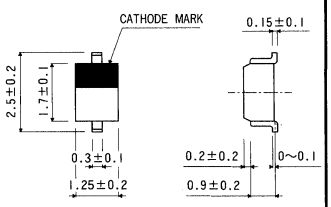
Io=30mA. Applications include memory backup and battery protection against reversal current.xcellent in V_F characteristics.

Part No.	Absolute maximum ratings (Ta=25℃)						Electrical characteristics (Ta=25℃)							Packge	Circuits
	V_{RM} (V)	V_R (V)	Io (mA)	I_{FSM} (A) 60Hz1 ∿	Tj (℃)	Tstg (℃)	V_F (V) Max.	I_F (mA)	I_R (μA) Max.	V_R (V)	C_T (pF) Typ.	V_R (V)	f (MHz)		
RB705D	25	20	30	0.2	125	−40～+125	0.37	1	1	10	2	1	1	SMD	Fig.1
RB715F	25	20	30	0.2	125	−40～+125	0.37	1	1	10	2	1	1	UMD	Fig.1
RB717F	25	20	30	0.2	125	−40～+125	0.37	1	1	10	2	1	1	UMD	Fig.2
RB751H	25	20	30	0.2	125	−40～+125	0.37	1	1	10	2	1	1	DSM	−
New RB731U	25	20	30	0.2	125	−40～+125	0.37	1	1	10	2	1	1	IMD	Fig.8
RB751H-40	40	30	30	0.2	125	−40～+125	0.37	1	0.5	30	2	1	1	DSM	−

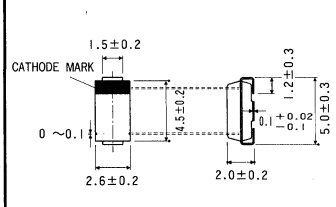
Note☆Under development

(Unit : mm)

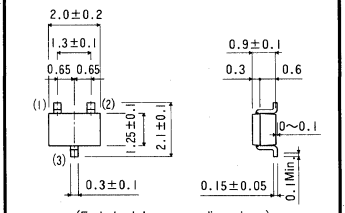
DSM



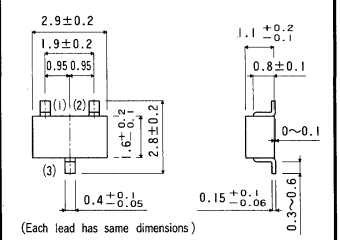
PSM



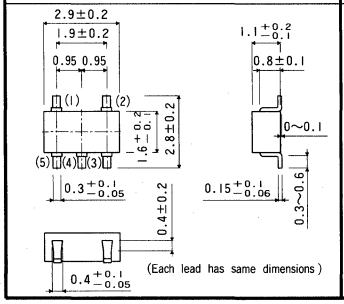
UMD



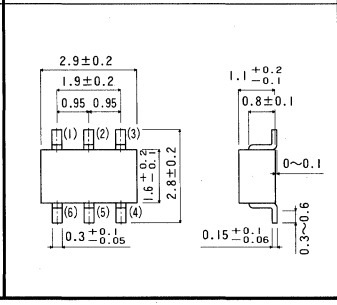
SMD (SC-59/Japanese SOT-23)



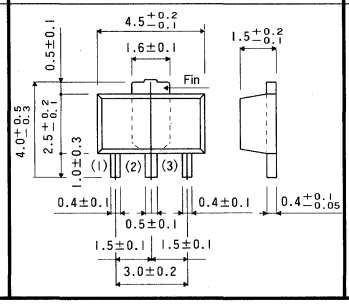
FMD (SOT-25)



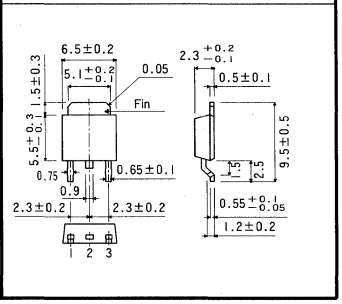
IMDD (SOT-36)



MPD (SOT-89)



CPD F5 (D PAK)



Internal circuit

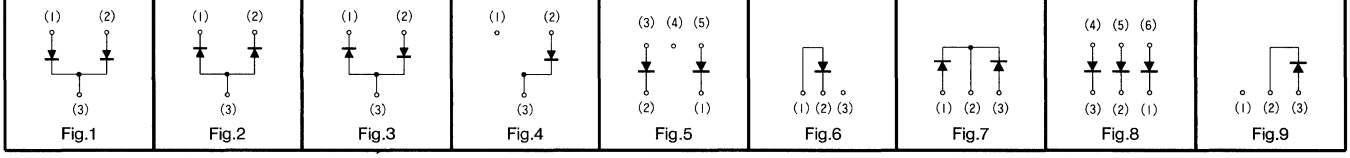


Fig.1 Fig.2 Fig.3 Fig.4 Fig.5 Fig.6 Fig.7 Fig.8 Fig.9

●Product Designation (Ex.)

When ordering, specify the part No. and packaging specifications.

Package	Code	Sproket hole side	Quantity / Package (pcs)
DSM	TT11	Cathode	3,000
	TT12	Anode	
PSM	TE25	Cathode	1,500
UMD	T106	1Pin	3,000
	T107	2Pin	
SMD	T146	1Pin	
	T147	2Pin	
FMD	T148	2Pin	
	T149	3Pin	
IMDD	T109	1Pin	
	T108	6Pin	
MPD	T100	Fin	1,000
	T101	Pin 3 side	
CPD F5	TL	Fin	2,500
	TR	Pin 3 side	

Variable Capacitance Diodes

●Tuning Diodes

Capacitance can be changed linearly and widely as frequency changes. This frequncy responce can be used as tuning element on VHF and UHF circuits. Packaged in pin 2 mini for high density mounting application.

Part No.	Absolute maximum ratings (Ta=25°C)				Electrical characteristics (Ta=25°C)													Package
	V_{RM} (V)	V_R (V)	Tj (°C)	Tstg (°C)	I_R (nA) Max.		C_{T1} (pF)				C_{T2} (pF)				RS (Ω) Max.			
						V_R (V)	Min.	Max.	V_R (V)	f (MHz)	Min.	Max.	V_R (V)	f (MHz)		C_T (pF)	f (MHz)	
1SV223	35	30	120	−30～+120	10	28	13.88	16.04	2	1	2.015	2.385	25	1	0.6	14	470	**DSM**

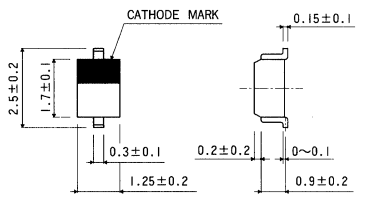
PIN Diodes

Small forward resistance and capacitance. Switable for AGC and attenuator at UHF and VHF. Available in various packages.

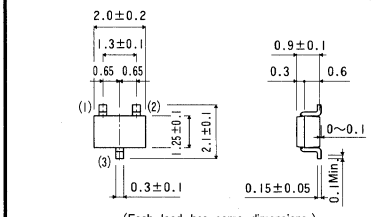
Part No.	Absolute maximum ratings (Ta=25°C)					Electrical characteristics (Ta=25°C)										Package	Circuit
	V_R (V)	I_F (mA)	Pd (mW)	Tj (°C)	Tstg (°C)	V_F (V) Max.		I_R (nA) Max.		C_{T1} (pF) Max.			r_F (Ω) Max.				
							I_F (mA)		V_R (V)		V_R (V)	f (MHz)		I_F (mA)	f (MHz)		
New **RN711H**	50	50	100	125	−55～+125	1.0	10	100	50	0.4	35	1	10	10	100	DSM	-
New **RN719F**	50	50	100	125	−55～+125	1.0	10	100	50	0.4	35	1	10	10	100	UMD	Fig.1
New **RN719D**	50	50	100	125	−55～+125	1.0	10	100	50	0.4	35	1	10	10	100	SMD	Fig.1

(Unit : mm)

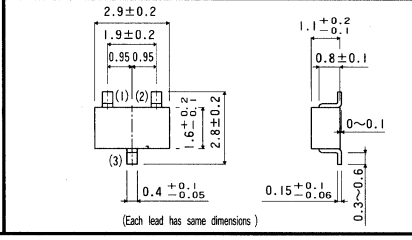
DSM



UMD



SMD (SC-59／Japanese SOT-23)



Internal circuit

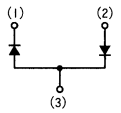


Fig. 1

●Product Designation (Ex.)

When ordering, specify the part No. and packaging specifications.

1	S	V	2	2	3	T	T	1	1

Part No. — **Packaging specification code**

Package	Code	Sproket hole side	Quantity / Package (pcs)
DSM	TT11	Cathode	3,000
	TT12	Anode	
UMD	T106	1Pin	
	T107	2Pin	
SMD	T146	1Pin	
	T147	2Pin	

Zener Diodes

●Line Up

Maximuim power dissipation (Pd) is 200mw to 1000mw (1w).
Selection among these serieses with various packages assures to match specific application and requirement.

Series	Package	P (mW)	Voltage range (V)	Features	
DTZ Series	**DSM**	200	2.0~36	2-pin mini molded	Domestic
☆**PTZ Series**	**PSM**	1000	2.0~43	2-pin power molded, P=1W	
RLZ Series	**LL-34**	400	2.0~56	Glass sealed	
RLZ J Series	**LL-34**	400	3.6~24	Glass sealed	
RLZ5000 Series	**LL-34**	400	2.4~24	JEDEC standard	Export
UMZ8.2T	**UMD**	200	7.76~8.64	Cathode common, Contains 2 devices	Domestic
STZ6.8T	**SMD**	200	6.47~7.14	Cathode common, Contains 2 devices	

Note : ☆Under development

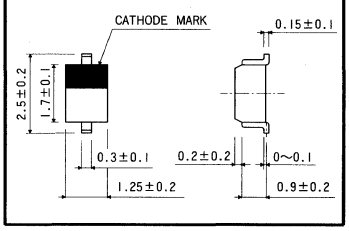
●DTZ Series (Pd=200mW Package : DSM)

Part No.	Vz (V) Ranking A	B	C	Iz (mA)	Zz (Ω) Max.	Iz (mA)	Z_{ZK} (Ω) Max.	Iz (mA)	I_R (μA) Max.	V_R (V)
DTZ2.0	1.880~2.100	2.020~2.200	–	5	100	5	1000	0.5	120	0.5
DTZ2.2	2.120~2.300	2.220~2.410	–	5	100	5	1000	0.5	120	0.7
DTZ2.4	2.330~2.520	2.430~2.630	–	5	100	5	1000	0.5	120	1.0
DTZ2.7	2.540~2.750	2.690~2.910	–	5	110	5	1000	0.5	100	1.0
DTZ3.0	2.850~3.070	3.010~3.220	–	5	120	5	1000	0.5	50	1.0
DTZ3.3	3.160~3.380	3.320~3.530	–	5	120	5	1000	0.5	20	1.0
DTZ3.6	3.455~3.695	3.600~3.845	–	5	100	5	1000	1	10	1.0
DTZ3.9	3.740~4.010	3.890~4.160	–	5	100	5	1000	1	5	1.0
DTZ4.3	4.04~4.29	4.17~4.43	4.30~4.57	5	100	5	1000	1	5	1.0
DTZ4.7	4.42~4.61	4.55~4.75	4.69~4.90	5	100	5	800	0.5	2	1.0
DTZ5.1	4.84~5.04	4.98~5.20	5.14~5.37	5	80	5	500	0.5	2	1.5
DTZ5.6	5.31~5.55	5.49~5.73	5.67~5.92	5	60	5	200	0.5	1	2.5
DTZ6.2	5.86~6.12	6.06~6.33	6.26~6.53	5	60	5	100	0.5	1	3.0
DTZ6.8	6.47~6.73	6.65~6.93	6.86~7.14	5	40	5	60	0.5	0.5	3.5
DTZ7.5	7.06~7.36	7.28~7.60	7.52~7.84	5	30	5	60	0.5	0.5	4.0
DTZ8.2	7.76~8.10	8.02~8.36	8.28~8.64	5	30	5	60	0.5	0.5	5.0
DTZ9.1	8.56~8.93	8.85~9.23	9.15~9.55	5	30	5	60	0.5	0.5	6.0
DTZ10	9.45~9.87	9.77~10.21	10.11~10.55	5	30	5	60	0.5	0.1	7.0
DTZ11	10.44~10.88	10.76~11.22	11.10~11.56	5	30	5	60	0.5	0.1	8.0
DTZ12	11.42~11.90	11.74~12.24	12.08~12.60	5	30	5	80	0.5	0.1	9.0
DTZ13	12.47~13.03	12.91~13.49	13.37~13.96	5	37	5	80	0.5	0.1	10
DTZ15	13.84~14.46	14.34~14.98	14.85~15.52	5	42	5	80	0.5	0.1	11
DTZ16	15.37~16.01	15.85~16.51	16.35~17.09	5	50	5	80	0.5	0.1	12
DTZ18	16.94~17.70	17.56~18.35	18.21~19.03	5	65	5	80	0.5	0.1	13
DTZ20	18.86~19.70	19.52~20.39	20.21~21.08	5	85	5	100	0.5	0.1	15
DTZ22	20.88~21.77	21.54~22.47	22.23~23.17	5	100	5	100	0.5	0.1	17
DTZ24	22.93~23.96	23.72~24.78	24.54~25.57	5	120	5	120	0.5	0.1	19
DTZ27	25.20~26.50	26.19~27.53	27.21~28.61	5	150	5	150	0.5	0.1	21
DTZ30	28.22~29.66	29.19~30.69	30.20~31.74	5	200	5	200	0.5	0.1	23
DTZ33	31.18~32.78	32.15~33.79	33.13~34.83	5	250	5	250	0.5	0.1	25
DTZ36	34.12~35.86	35.07~36.87	36.07~37.91	5	300	5	300	0.5	0.1	27

Notes : 1. Zener voltage (Vz) is measured 40ms after applying the current.
2. When ordering, specify the rank of the diodes. Otherwise, the diodes of rank A, B or C are supplied.

(Unit : mm)

DSM



●Product Designation (Ex.)

When ordering, specify Part No. packaging Code and Zener voltage.

D	T	Z	2	、	0	A	T	T	1	1

Part No. | **Voltage of zener diodes** | **Packaging specification code**

Package	Code	Sproket hole side	Quantity / Package (pcs)
DSM	TT11	Cathode	3,000
	TT12	Anode	

Zener Diodes

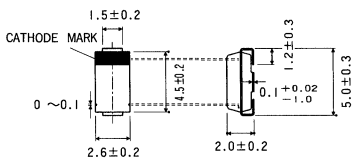
●PTZ Series (P=1W Package : PSM)

Part No.	Vz (V) Ranking A	Vz (V) Ranking B	Iz (mA)	Zz (Ω) Max.	Iz (mA)	I_R (μA) Max.	V_R (V)
☆PTZ2.0	1.88~2.12	2.00~2.24	40	25	40	200	0.5
☆PTZ2.2	2.08~2.33	2.20~2.45	40	20	40	200	0.7
☆PTZ2.4	2.28~2.56	2.40~2.70	40	15	40	200	0.7
☆PTZ2.7	2.50~2.90	2.70~3.10	40	15	40	200	1.0
☆PTZ3.0	2.80~3.20	3.00~3.40	40	15	40	100	1.0
☆PTZ3.3	3.10~3.50	3.30~3.70	40	15	40	80	1.0
☆PTZ3.6	3.40~3.80	3.60~4.00	40	15	40	60	1.0
☆PTZ3.9	3.70~4.10	3.90~4.40	40	15	40	40	1.0
☆PTZ4.3	4.00~4.50	4.30~4.80	40	15	40	20	1.0
☆PTZ4.7	4.40~4.90	4.70~5.20	40	10	40	20	1.0
☆PTZ5.1	4.80~5.40	5.10~5.70	40	8	40	20	1.5
☆PTZ5.6	5.30~6.00	5.60~6.30	40	8	40	20	1.5
☆PTZ6.2	5.80~6.60	6.20~7.00	40	6	40	20	3.0
☆PTZ6.8	6.40~7.20	6.80~7.70	40	6	40	20	3.5
☆PTZ7.5	7.00~7.90	7.50~8.40	40	4	40	20	4.0
☆PTZ8.2	7.70~8.70	8.20~9.30	40	4	40	20	5.0
☆PTZ9.1	8.50~9.60	9.10~10.20	40	6	40	20	6.0
☆PTZ10	9.40~10.60	10.00~11.20	40	6	40	10	7.0
☆PTZ11	10.40~11.60	11.00~12.30	20	8	20	10	8.0
☆PTZ12	11.40~12.60	12.00~13.50	20	8	20	10	9.0
☆PTZ13	12.40~14.10	13.30~15.00	20	10	20	10	10.0
☆PTZ15	13.80~15.60	14.70~16.50	20	10	20	10	11.0
☆PTZ16	15.30~17.10	16.20~18.30	20	12	20	10	12.0
☆PTZ18	16.80~19.10	18.00~20.30	20	12	20	10	13.0
☆PTZ20	18.80~21.20	20.00~22.40	20	14	20	10	15.0
☆PTZ22	20.80~23.30	22.00~24.50	10	14	10	10	17.0
☆PTZ24	22.80~25.60	24.00~27.60	10	16	10	10	19.0
☆PTZ27	25.10~28.90	27.00~30.80	10	16	10	10	21.0
☆PTZ30	28.00~32.00	30.00~34.00	10	18	10	10	23.0
☆PTZ33	31.00~35.00	33.00~37.00	10	18	10	10	25.0
☆PTZ36	34.00~38.00	36.00~40.00	10	20	10	10	27.0
☆PTZ39	37.00~41.00	–	10	50	10	10	30.0
☆PTZ43	40.00~46.00	–	10	50	10	5	33.0

Notes : 1. Zener voltage measured 40ms after application of voltage.
2. When ordering, specify the rank of the diodes. Otherwise, the diodes of rank A, B or C are supplied.
3. ☆Under development

(Unit : mm)

PSM



●Product Designation (Ex.)

When ordering, specify Part No. packaging Code and Zener voltage.

P	T	Z	T	E	2	5	2	、	0	A
Part No.			Packaging specification code				Voltage of zener diodes			

Package	Code	Feed hole side	Quantity / Package (pcs)
PSM	TE25	Cathode	1,500

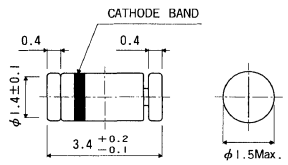
●RLZJ Series (P=400mW Package : LL-34)

Part No.	Vz (V) Ranking A	B	C	Iz (mA)	Zz (Ω) Max.	Iz (mA)	I_R (μA) Max.	V_R (V)
RLZJ3.6	3.40~3.65	3.55~3.80	–	5	130	5	10	1.0
RLZJ3.9	3.70~3.97	3.87~4.10	–	5	130	5	10	1.0
RLZJ4.3	4.00~4.23	4.13~4.35	4.25~4.50	5	130	5	10	1.0
RLZJ4.7	4.40~4.63	4.53~4.76	4.66~4.90	5	130	5	10	1.0
RLZJ5.1	4.80~5.07	4.97~5.24	5.14~5.40	5	130	5	5	1.5
RLZJ5.6	5.30~5.63	5.43~5.81	5.61~6.00	5	80	5	5	2.5
RLZJ6.2	5.80~6.20	6.00~6.39	6.19~6.60	5	50	5	2	3.0
RLZJ6.8	6.40~6.80	6.60~7.02	6.82~7.20	5	30	5	2	3.5
RLZJ7.5	7.00~7.43	7.23~7.66	7.46~7.90	5	30	5	2	4.0
RLZJ8.2	7.70~8.16	7.96~8.43	8.23~8.70	5	30	5	2	5.0
RLZJ9.1	8.50~9.00	8.80~9.30	9.10~9.60	5	30	5	2	6.0
RLZJ10	9.40~9.93	9.73~10.26	10.06~10.60	5	30	5	2	7.0
RLZJ11	10.40~10.98	10.73~11.26	11.06~11.60	5	30	5	2	8.0
RLZJ12	11.40~11.93	11.73~12.26	12.06~12.60	5	35	5	2	9.0
RLZJ13	12.40~13.08	12.88~13.57	13.37~14.10	5	35	5	2	10.0
RLZJ15	13.80~14.63	14.33~15.11	14.81~15.60	5	40	5	2	11.0
RLZJ16	15.30~16.10	15.80~16.60	16.30~17.10	5	40	5	2	12.0
RLZJ18	16.80~17.76	17.46~18.43	18.13~19.10	5	45	5	2	13.0
RLZJ20	18.80~19.78	19.48~20.46	20.16~21.20	5	50	5	2	15.0
RLZJ22	20.80~21.88	21.48~22.56	22.16~23.30	5	55	5	2	17.0
RLZJ24	22.80~24.11	23.61~24.92	24.42~25.60	5	60	5	2	19.0

Notes : 1. Zener voltage measured 40ms after application of voltage.
2. When ordering, specify the rank of the diodes. Otherwise, the diodes of rank A, B or C are supplied.

(Unit : mm)

LL-34



●Product Designation (Ex.)

When ordering, specify Part No. packaging Code and Zener voltage.

R	L	Z	J	T	E	–	1	1	3	、	6	A
Part No.				Packaging specification code					Voltage of zener diodes			

Package	Code	Feed hole side	Quantity / Package (pcs)
LL-34	TE-11	Cathode	2,500
	TE-12	Anode	

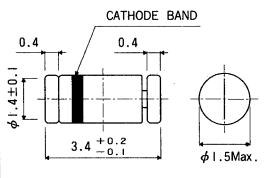
●RLZ Series (Pd=400mW Package : LL-34)

Part No.	Vz (V) Ranking A	B	C	D	Iz (mA)	Zz (Ω) Max.	Iz (mA)	Z_{ZK} (Ω) Max.	Iz (mA)	I_R (μA) Max.	V_R (V)
RLZ2.0	1.880~2.100	2.020~2.200	–	–	20	140	20	2000	1	120	0.5
RLZ2.2	2.120~2.300	2.220~2.410	–	–	20	120	20	2000	1	120	0.7
RLZ2.4	2.330~2.520	2.430~2.630	–	–	20	100	20	2000	1	120	1.0
RLZ2.7	2.540~2.750	2.690~2.910	–	–	20	100	20	1000	1	100	1.0
RLZ3.0	2.850~3.070	3.010~3.220	–	–	20	80	20	1000	1	50	1.0
RLZ3.3	3.160~3.380	3.320~3.530	–	–	20	70	20	1000	1	20	1.0
RLZ3.6	3.455~3.695	3.600~3.845	–	–	20	60	20	1000	1	10	1.0
RLZ3.9	3.74~4.01	3.89~4.16	–	–	20	50	20	1000	1	5	1.0
RLZ4.3	4.04~4.29	4.17~4.43	4.30~4.57	–	20	40	20	1000	1	5	1.0
RLZ4.7	4.44~4.68	4.55~4.80	4.68~4.93	–	20	25	20	900	1	5	1.0
RLZ5.1	4.81~5.07	4.94~5.20	5.09~5.37	–	20	20	20	800	1	5	1.5
RLZ5.6	5.28~5.55	5.45~5.73	5.61~5.91	–	20	13	20	500	1	5	2.5
RLZ6.2	5.78~6.09	5.96~6.27	6.12~6.44	–	20	10	20	300	1	5	3.0
RLZ6.8	6.29~6.63	6.49~6.83	6.66~7.01	–	20	8	20	150	0.5	2	3.5
RLZ7.5	6.85~7.22	7.07~7.45	7.29~7.67	–	20	8	20	120	0.5	0.5	4.0
RLZ8.2	7.53~7.92	7.78~8.19	8.03~8.45	–	20	8	20	120	0.5	0.5	5.0
RLZ9.1	8.29~8.73	8.57~9.01	8.83~9.30	–	20	8	20	120	0.5	0.5	6.0
RLZ10	9.12~9.59	9.41~9.90	9.70~10.20	9.94~10.44	20	8	20	120	0.5	0.2	7.0
RLZ11	10.18~10.71	10.50~11.05	10.82~11.38	–	10	10	10	120	0.5	0.2	8.0
RLZ12	11.13~11.71	11.44~12.03	11.74~12.35	–	10	12	10	110	0.5	0.2	9.0
RLZ13	12.11~12.75	12.55~13.21	12.99~13.66	–	10	14	10	110	0.5	0.2	10
RLZ15	13.44~14.13	13.89~14.62	14.35~15.09	–	10	16	10	110	0.5	0.2	11
RLZ16	14.80~15.57	15.25~16.04	15.69~16.51	–	10	18	10	150	0.5	0.2	12
RLZ18	16.22~17.06	16.82~17.70	17.42~18.33	–	10	23	10	150	0.5	0.2	13
RLZ20	18.02~18.96	18.63~19.59	19.23~20.22	19.72~20.72	10	28	10	200	0.5	0.2	15
RLZ22	20.15~21.20	20.64~21.71	21.08~22.17	21.52~22.63	5	30	5	200	0.5	0.2	17
RLZ24	22.05~23.18	22.61~23.77	23.12~24.31	23.63~24.85	5	35	5	200	0.5	0.2	19
RLZ27	24.26~25.52	24.97~26.26	25.63~26.95	26.29~27.64	5	45	5	250	0.5	0.2	21
RLZ30	26.99~28.39	27.70~29.13	28.36~29.82	29.02~30.51	5	55	5	250	0.5	0.2	23
RLZ33	29.68~31.22	30.32~31.88	30.90~32.50	31.49~33.11	5	65	5	250	0.5	0.2	25
RLZ36	32.14~33.79	32.79~34.49	33.40~35.13	34.01~35.77	5	75	5	250	0.5	0.2	27
RLZ39	34.68~36.47	35.36~37.19	36.00~37.85	36.63~38.52	5	85	5	250	0.5	0.2	30
RLZ39E	37.36~39.29				5	85	5	250	0.5	0.2	30
RLZ39F	38.14~40.11				5	85	5	250	0.5	0.2	30
RLZ39G	38.94~40.80				5	85	5	250	0.5	0.2	30
New **RLZ43**	40.00~45.00				5	90	5	–	–	0.2	33
New **RLZ47**	44.00~49.00				5	90	5	–	–	0.2	36
New **RLZ51**	48.00~54.00				5	110	5	–	–	0.2	39
New **RLZ56**	53.00~60.00				5	110	5	–	–	0.2	43

Notes : 1. Zener voltage (Vz) is measured 40ms after supplying current.
2. When ordering, specify the rank of the diodes. Otherwise, the diodes of rank A, B or C are supplied.

(Unit : mm)

LL-34



●Product Designation (Ex.)

When ordering, specify Part No. packaging Code and Zener voltage.

R	L	Z	T	E	–	1	1	2	、	0	A

Part No.

RLZ Series

Packaging specifications

Package	Code	Feed hole side	Quantity / Package (pcs)
LL-34	TE-11	Cathode	2,500
	TE-12	Anode	

Voltage of zener diodes

●RLZ5000 Series (P=400mW Package : LL-34)

Part No.	Vz (V) Ranking B	Iz (mA)	Zz (Ω) Max.	Iz (mA)	ZZK (Ω) Max.	Iz (mA)	IR (μA) Max.	VR (V)
RLZ5221B	2.28~2.52	20	30	20	1200	0.25	100	1.0
RLZ5222B	2.38~2.63	20	30	20	1250	0.25	100	1.0
RLZ5223B	2.57~2.84	20	30	20	1300	0.25	75	1.0
RLZ5224B	2.66~2.94	20	30	20	1400	0.25	75	1.0
RLZ5225B	2.85~3.15	20	29	20	1600	0.25	50	1.0
RLZ5226B	3.14~3.47	20	28	20	1600	0.25	25	1.0
RLZ5227B	3.42~3.78	20	24	20	1700	0.25	15	1.0
RLZ5228B	3.71~4.10	20	23	20	1900	0.25	10	1.0
RLZ5229B	4.09~4.52	20	22	20	2000	0.25	5.0	1.0
RLZ5230B	4.47~4.94	20	19	20	1900	0.25	5.0	2.0
RLZ5231B	4.85~5.36	20	17	20	1600	0.25	5.0	2.0
RLZ5232B	5.32~5.88	20	11	20	1600	0.25	5.0	3.0
RLZ5233B	5.70~6.30	20	7.0	20	1600	0.25	5.0	3.5
RLZ5234B	5.89~6.51	20	7.0	20	1000	0.25	5.0	4.0
RLZ5235B	6.46~7.14	20	5.0	20	750	0.25	3.0	5.0
RLZ5236B	7.13~7.88	20	6.0	20	500	0.25	3.0	6.0
RLZ5237B	7.79~8.61	20	8.0	20	500	0.25	3.0	6.5
RLZ5238B	8.27~9.14	20	8.0	20	600	0.25	3.0	6.5
RLZ5239B	8.65~9.56	20	10	20	600	0.25	3.0	7.0
RLZ5240B	9.50~10.50	20	17	20	600	0.25	3.0	8.0
RLZ5241B	10.45~11.55	20	22	20	600	0.25	2.0	8.4
RLZ5242B	11.40~12.60	20	30	20	600	0.25	1.0	9.1
RLZ5243B	12.35~13.65	9.5	13	9.5	600	0.25	0.5	9.9
RLZ5244B	13.30~14.70	9.0	15	9.0	600	0.25	0.1	10.0
RLZ5245B	14.25~15.75	8.5	16	8.5	600	0.25	0.1	11.0
RLZ5246B	15.20~16.80	7.8	17	7.8	600	0.25	0.1	12.0
RLZ5247B	16.15~17.85	7.4	19	7.4	600	0.25	0.1	13.0
RLZ5248B	17.10~18.90	7.0	21	7.0	600	0.25	0.1	14.0
RLZ5249B	18.05~19.95	6.6	23	6.6	600	0.25	0.1	14.0
RLZ5250B	19.00~21.00	6.2	25	6.2	600	0.25	0.1	15.0
RLZ5251B	20.90~23.10	5.6	29	5.6	600	0.25	0.1	17.0
RLZ5252B	22.80~25.20	5.2	33	5.2	600	0.25	0.1	18.0

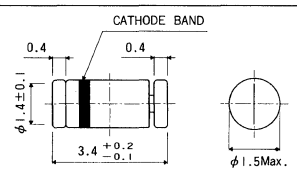
Notes : 1. The Zener voltage (Vz) is measured in a steady state.
2. The ON resistances (Zz,Zzk) are measured by superimposing a small amount of AC.. current on the rated current (Iz) .

●Special Zener Diodes

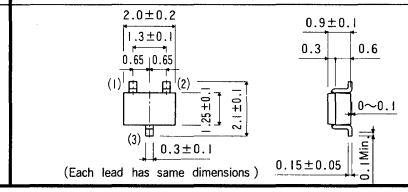
Part No.	P (mW)	Vz (V)	Iz (mA)	Zz (Ω) Max.	Iz (mA)	ZZK (Ω) Max.	Iz (mA)	IR (μA) Max.	VR (V)	Feautures	Package	Circuit
UMZ8.2T	200	7.76~8.64	5	30	5	60	0.5	0.5	5	Cathode common ; 2 diodes	UMD	Fig.1
STZ6.8T	200	6.47~7.14	5	40	5	60	0.5	0.5	3.5	Cathode common ; 2 diodes	SMD	Fig.1

(Unit : mm)

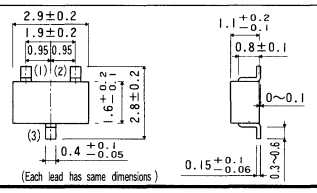
LL-34



UMD



SMD (SC-59/Japanese SOT-23)



Internal circuit

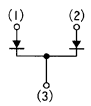


Fig.1

●Product Designation (Ex.)

When ordering, specify Part No. packaging Code and Zener voltage.

R	L	Z	5	2	3	1	B	T	E	−	1	1

Part No.

RLZ5000 Series

Packaging specifications

Package	Code	Feed hole side	Quantity/Package (pcs)
LL-34	TE-11	Cathode	2,500
	TE-12	Anode	

U	M	Z	8	、	2	T	T	1	0	6

Part No.

UMZ8. 2T
STZ6. 8T

Packaging specifications

Package	Code	Feed hole side	Quantity/Package (pcs)
UMD	T106	1Pin	3,000
	T107	2Pin	
SMD	T146	1Pin	
	T147	2Pin	

Diode Arrays

Application	Part No.	V_R (V)	Io (mA)	trr Max. (ns)	C_T Max. (pF)	Package	circuits
High-Speed Switching	**DA227**	80	100	4	–	**UM4**	Fig.4
	DAN202C	80	100	4	–	**SST**	Fig.1
	DAN202K	80	100	4	–	**SMT**	Fig.1
	DAN202U	80	100	4	–	**UMT**	Fig.1
	DAN222	80	100	4	–	**EM3**	Fig.1
	DAP202C	80	100	4	–	**SST**	Fig.6
	DAP202K	80	100	4	–	**SMT**	Fig.6
	DAP202U	80	100	4	–	**UMT**	Fig.6
	DAP222	80	100	4	–	**EM3**	Fig.6
	FMN1	80	25	4	–	**FMT**	Fig.2
	UMN1	80	25	4	–	**UM5**	Fig.14
	FMP1	80	25	4	–	**FMT**	Fig.7
	UMP1	80	25	4	–	**UM5**	Fig.15
	IMN10	80	100	4	–	**IMD**	Fig.3
	IMN11	80	100	4	–	**IMD**	Fig.5
	IMP11	80	100	4	–	**IMD**	Fig.8
	UMP11	80	100	4	–	**UM6**	Fig.17
	UMN11	80	100	4	–	**UM6**	Fig.16
Special	**DA106K**	8	15	–	–	**SMT**	Fig.9
	DA106U	8	15	–	–	**UMT**	Fig.9
	DA112	80	100	4	3.5	**UMT**	Fig.11
	DA113	80	100	4	3.5	**UMT**	Fig.12
	DA114	80	100	4	3.5	**UMT**	Fig.10
	DA115	80	100	4	3.5	**UMT**	Fig.9
	DA116	80	100	4	3.5	**SMT**	Fig.11
	DA118	80	100	4	3.5	**SMT**	Fig.12
	DA119	80	100	4	3.5	**SMT**	Fig.9
	DA120	80	100	4	3.5	**EM3**	Fig.11
	DA121	80	100	4	3.5	**EM3**	Fig.10
	DA122	80	100	4	3.5	**EM3**	Fig.9
	DA123	80	100	4	3.5	**EM3**	Fig.12
	DA204K	20	100	–	4	**SMT**	Fig.13
	DA204U	20	100	–	4	**UMT**	Fig.13
	DA221	20	100	–	4	**EM3**	Fig.13
	DAN212K	80	100	4	3.5	**SMT**	Fig.10
	DAN212C	80	100	4	3.5	**SST**	Fig.10
	DAN217	80	100	–	3.5	**SMT**	Fig.13
	DAN217C	80	100	–	3.5	**SST**	Fig.13
	DA223K	40	100	–	5.0	**SMT**	Fig.13
	DA223	40	100	–	5.0	**EM3**	Fig.13
	DA226U	40	100	–	5.0	**UMT**	Fig.13
	☆**DA228K**	80	100	–	5.0	**SMT**	Fig.13

Note : ☆Under development

Internal circuit

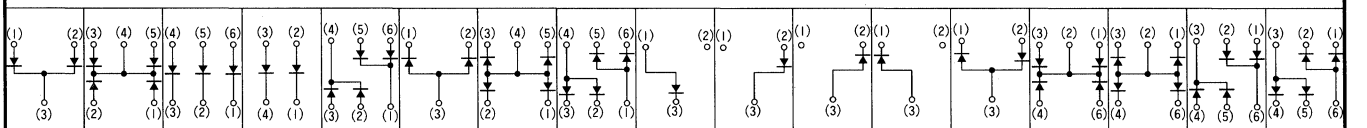


Fig.1 Fig.2 Fig.3 Fig.4 Fig.5 Fig.6 Fig.7 Fig.8 Fig.9 Fig.10 Fig.11 Fig.12 Fig.13 Fig.14 Fig.15 Fig.16 Fig.17

The Class and Basic Ordering Units for Standard and Semi-standard Products

■Standard Products, Semi-standard Products,

To make it easier for customers to select the most suitable product for their needs, we offer diodes in three types : (1) standard, (2) semi-standard.

(1) Standard products

These products are in stock and ready for delivery.

(2) Semi-standard products

Theses products require a certain amount of time to fill an order. Please consult us for delivery term.

●Please note the following when placing an order.

The quantity in an order must be in multiplies of the basic order unit.

●Introductory remarks

◎ : Standard products

○ : Semi-standard products

(USM)

Part No.	Packaging type	Carried taping	
	Feed hole side	Cathode	
	Code	TE-17	TW11
	Basic ordering unit	3,000	3,000
1SS355		◎	–
1SS354		○	–
1SS353		○	–
1SS356		–	◎

(DSM)

Part No.	Packaging type	Carried taping	
	Feed hole side	Cathode	Anode
	Code	TT11	TT12
	Basic ordering unit	3,000	3,000
1SS332		◎	○
1SS318		◎	○
RB751H		◎	○
RB501H		○	○
RB500H		○	○
1SV223		○	○
RN711H		○	○
DTZ [ ]		◎	○

(PSM)

Part No.	Packaging type	Carried taping
	Feed hole side	Cathode
	Code	TE25
	Basic ordering unit	1,500
1SR154-100		○
1SR154-200		○
1SR154-400		○
1SR159-200		○
RB160L-40		○

(EM3)

Part No.	Packaging type	Carried taping	
	Feed hole side	Pin 2	Pin 1
	Code	TR	TL
	Basic ordering unit	3,000	3,000
☆DAN235E		○	○

(UMD)

Part No.	Packaging type	Carried taping	
	Feed hole side	Pin 1	Pin 2
	Code	T106	T107
	Basic ordering unit	3,000	3,000
DAN235U		○	◎
DAP236U		○	◎
RB451F		○	◎
RB450F		○	◎
RB715F		○	◎
RB717F		○	◎

(SMD) (SC-59/Japanese SOT-23)

Part No.	Packaging type	Carried taping	
	Feed hole side	Pin 1	Pin 2
	Code	T146	T147
	Basic ordering unit	3,000	3,000
DAN235K		◎	◎
DAP236K		◎	○
RB400D		◎	◎
RB411D		◎	◎
RB421D		◎	◎
RB425D		◎	◎
RB420D		◎	◎
RB705D		◎	◎
RN719D		○	○
STZ6.8T		◎	○

(FMD) (SOT-25)

Part No.	Packaging type	Carried taping	
	Feed hole side	Pin 2	Pin 3
	Code	T148	T149
	Basic ordering unit	3,000	3,000
RB471E		◎	◎

(IMDD) (SOT-36)

Part No.	Packaging type	Carried taping	
	Feed hole side	Pin 1	Pin 6
	Code	T108	T109
	Basic ordering unit	3,000	3,000
RB731U		○	○

(MPD) (SOT-89)

Part No.	Packaging type	Carried taping	
	Feed hole side	Fin	Pin 3 side
	Code	T100	T101
	Basic ordering unit	1,000	1,000
RB435C		◎	○
RB110C		◎	◎

(CPDF5)

Part No.	Packaging type	Carried taping	
	Feed hole side	Pin 3 side	Fin
	Code	TR	TL
	Basic ordering unit	2,500	2,500
RB031B-40		○	○
RB035B-40		○	○

(LL-34)

Part No.	Packaging type	Bulk	Carried taping						
	Feed hole side		Cathode	Anode	Cathode	Anode	Cathode	Anode	Cathode
	Code		TE-11	TE-12	TE11A	TE12A	TE-15	TE-16	TE11C
	Basic ordering unit	10,000	2,500	2,500	10,000	10,000	2,000	2,000	2,500
RLS-73		◎	◎	◎	○	○	○	○	○
RLS-72		◎	◎	◎	○	○	○	○	○
RLS-71		◎	◎	◎	○	○	○	○	○
RLS-94		○	○	○	○	○	○	○	○
RLS-93		○	○	○	○	○	○	○	○
RLS-92		○	○	○	○	○	○	○	○
RLS141		○	○	○	○	○	○	○	○
RLS140		○	○	○	○	○	○	○	○
RLS139		○	○	○	○	○	○	○	○
RLS245		○	○	○	○	○	○	○	○
RLS135		○	○	○	○	○	○	○	○
RLZJ [ ]		○	○	○	○	○	○	○	○
RLZ [ ]		○	○	○	○	○	○	○	○
RLZ5 [ ]		○	○	○	○	○	○	○	○
RLS4148		○	○	○	○	○	○	○	○
RLS4149		○	○	○	○	○	○	○	○
RLS4150		○	○	○	○	○	○	○	○
RLS4151		○	○	○	○	○	○	○	○
RLS4152		○	○	○	○	○	○	○	○
RLS4153		○	○	○	○	○	○	○	○
RLS4154		○	○	○	○	○	○	○	○
RLS4446		○	○	○	○	○	○	○	○
RLS4447		○	○	○	○	○	○	○	○
RLS4448		○	○	○	○	○	○	○	○
RLS4449		○	○	○	○	○	○	○	○
RLS4450		○	○	○	○	○	○	○	○
RLS4454		○	○	○	○	○	○	○	○
RLS4606		○	○	○	○	○	○	○	○

(LL-41)

Part No.	Packaging type	Bulk	Carried taping				
	Feed hole side		Cathode	Anode	Cathode	Anode	Cathode
	Code		TE-21	TE-22	TE-23	TE-24	TE21C
	Basic ordering unit	2,000	5,000	5,000	1,500	1,500	5,000
RLR4001		◎	◎	◎	○	○	○
RLR4002		◎	◎	◎	○	○	○
RLR4003		◎	◎	◎	○	○	○
RLR4004		◎	◎	◎	○	○	○

Packaging

●Taping

Package	Packaging Type	Code	Remarks	Directions	Quantity (pcs)
USM	USM type taping	TE-17	Reel	Cathod at sprocket hole side	3,000
		◇TW11		Cathod at sprocket hole side	
DSM	DSM type taping	TT11	Reel	Cathod at sprocket hole side	3,000
		TT12		Anede at sprocket hole side	
PSM	PSM type taping	TE25	Reel	Cathod at sprocket hole side	1,500
EM3	EM3 type taping	TL	Reel	–	3,000
		TR		–	
UMD	UMD type taping	T106	Reel	–	3,000
		T107		–	
SMD	SMD type taping	T146	Reel	–	3,000
		T147		–	
FMD	FMD type taping	T148	Reel	–	3,000
		T149		–	
IMDD	IMDD type taping	T108	Reel	–	3,000
		T109		–	
MPD	MPD type taping	T100	Reel	–	1,000
		T101		–	
CPDF5	CPD F5 type taping	TL	Reel	–	2,500
		TR		–	
LL-34	Leadless type taping	TE-11	Reel	Cathod at sprocket hole side	2,500
		TE11C		Cathod at sprocket hole side	
		TE-12		Anede at sprocket hole side	
		TE11A		Cathod at sprocket hole side	10,000
		TE12A		Anede at sprocket hole side	
		TE-15		Cathod at sprocket hole side	2,000
		TE-16		Anede at sprocket hole side	
LL-41	Leadless type taping	TE-21	Reel	Cathod at sprocket hole side	5,000
		TE21C		Cathod at sprocket hole side	
		TE-22		Anede at sprocket hole side	
		TE-23		Cathod at sprocket hole side	1,500
		TE-24		Anede at sprocket hole side	

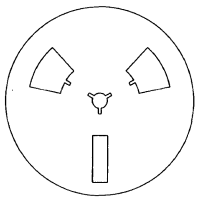
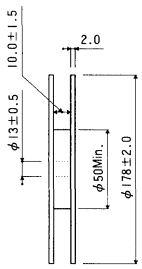
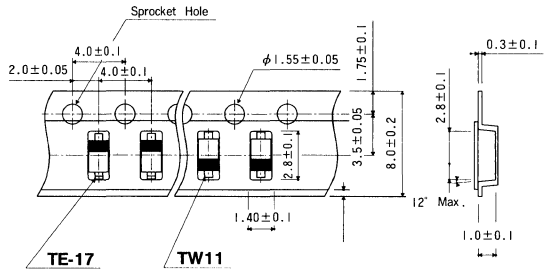
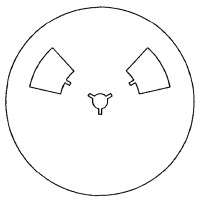
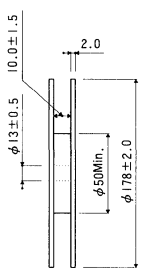
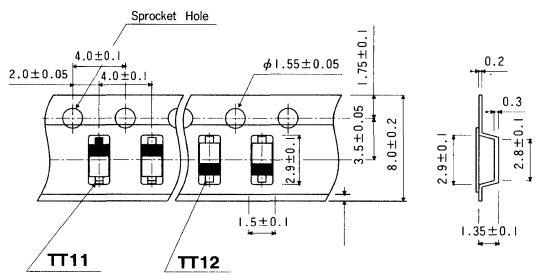
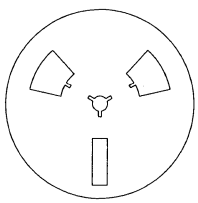
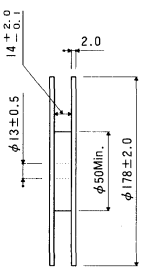
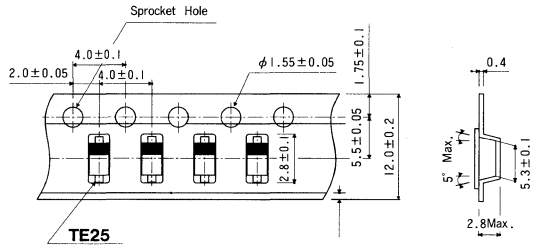
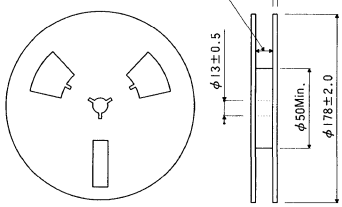
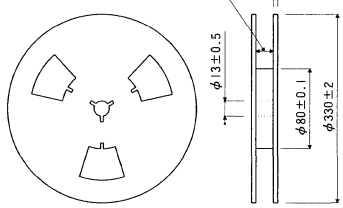
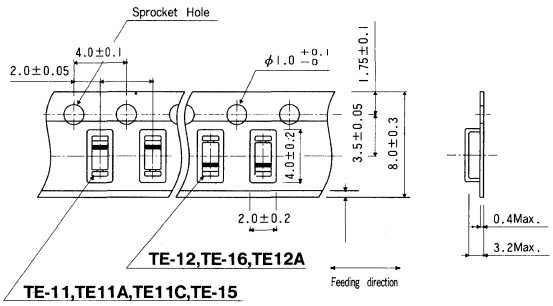
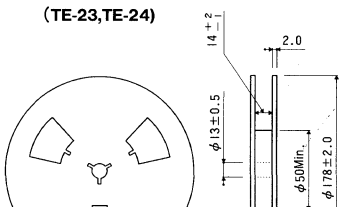
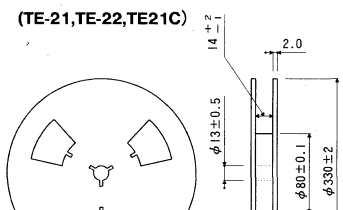
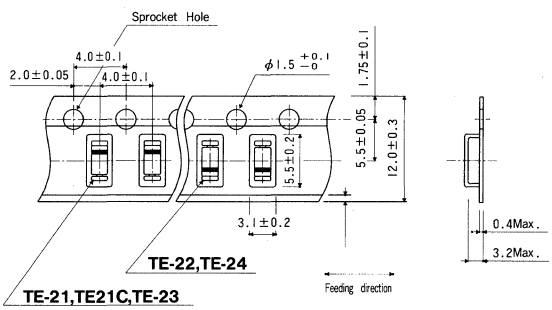
◇TW11 : for 1SS356 only

●Bulk

Package	Packaging type	Quantity/package (pcs)	Quantity/Unit (pcs)
LL-34	Bulk	10,000	1,000
LL-41	Bulk	2,000	200

Packaging Specification

(Unit : mm)

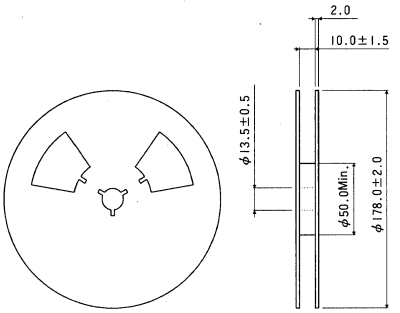
Reel	Tape
USM	
(TE-17,TW11)  	
DSM	
(TT11,TT12)  	
PSM	
(TE25)  	
LL-34	
(TE-11,TE-12,TE-15,TE-16,TE11C)  (TE11A,TE12A) 	
LL-41	
(TE-23,TE-24)  (TE-21,TE-22,TE21C) 	

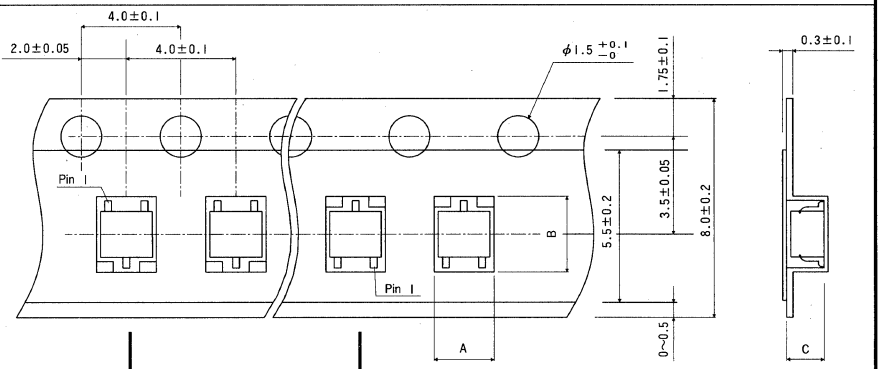
Packaging Specification

(Unit : mm)

Reel	Tape

EM3 UMT/UMD/SST/SMT/SMD



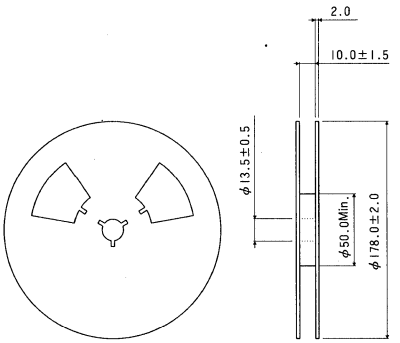


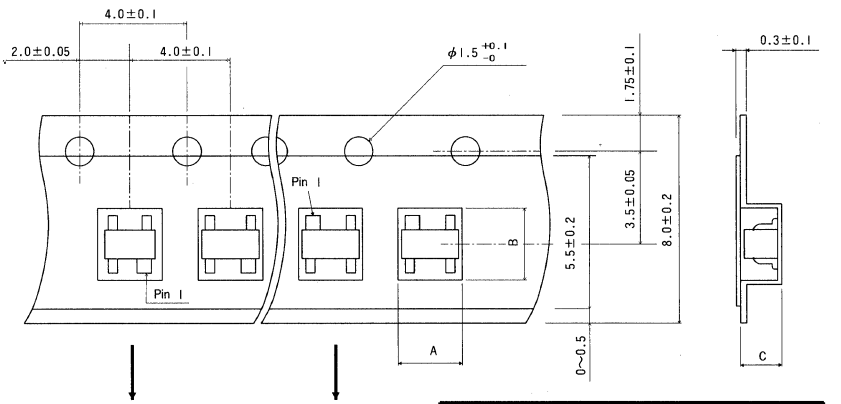
Package	Code
EM3	TR
UMT/UMD	T107
SST	T117
SMT/SMD	T147

Package	Code
EM3	TL
UMT/UMD	T106
SST	T116
SMT/SMD	T146

Package	Dimensions		
	A	B	C
EM3	1.8±0.1	1.8±0.2	0.9±0.2
UMT/UMD	2.2±0.1	2.4±0.1	1.15±0.1
SST	3.1±0.1	2.85±0.1	1.4±0.1
SMT/SMD	3.1±0.1	3.2±0.1	1.35±0.1

UM4



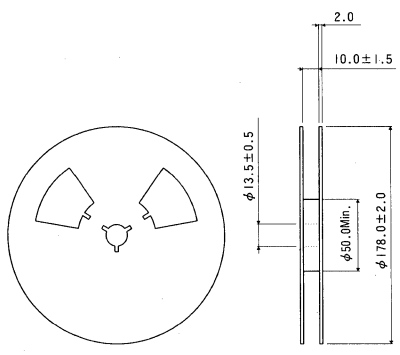


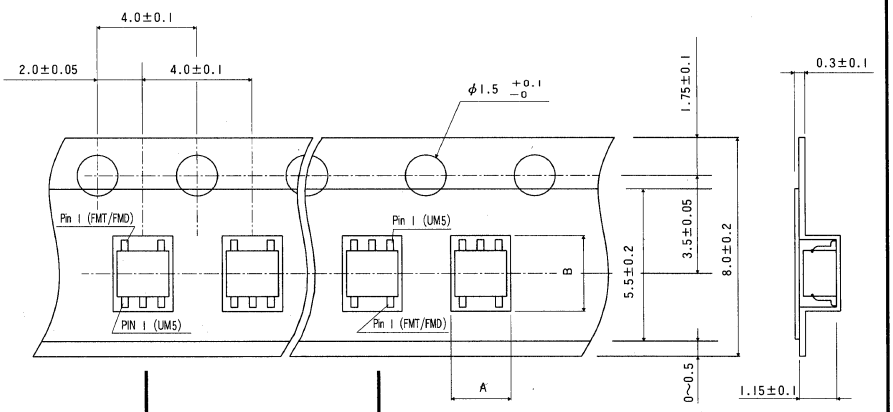
Package	Code
UM4	TR
SM4	TR

Package	Code
UM4	TL
SM4	TL

Package	Dimensions		
	A	B	C
UM4	2.2±0.1	2.4±0.1	1.15±0.1
SM4	3.1±0.4	3.2±0	1.35±0.1

UM5 FMT/FMD





Package	Code
UM5	TL
FMT/FMD	T149

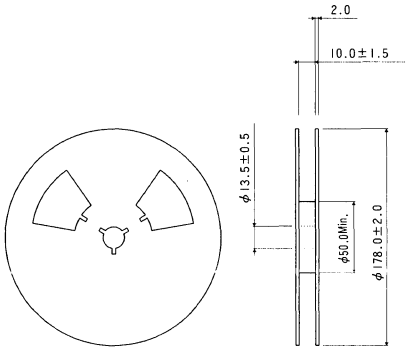
Package	Code
UM5	TR
FMT/FMD	T148

Package	Dimensions	
	A	B
UM5	2.2±0.1	2.4±0.1
FMT/FMD	3.1±0.1	3.2±0.1

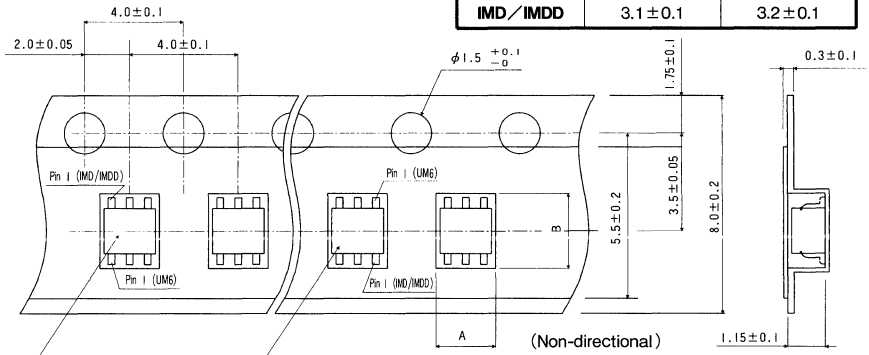
(Unit : mm)

Reel	Tape

UM6 IMD／IMDD



Package	Dimensions	
	A	B
UM6	2.2±0.1	2.4±0.1
IMD／IMDD	3.1±0.1	3.2±0.1

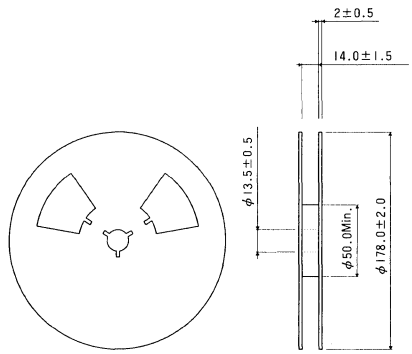


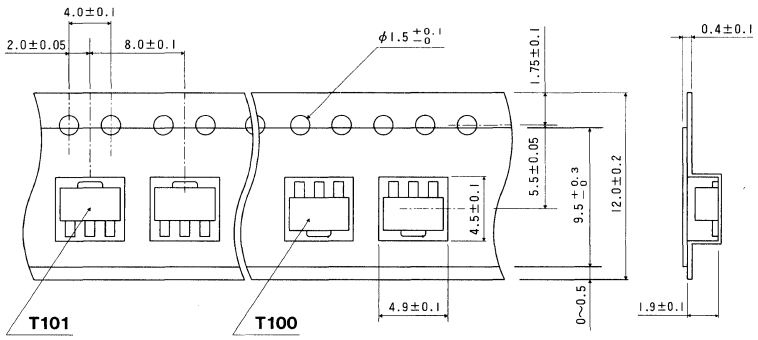
Package	Code
UM6	TL
IMD／IMDD	T109

Package	Code
UM6	TR
IMD／IMDD	T108

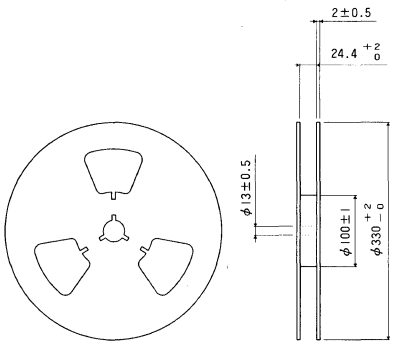
Package	Code
UM6	TN
IMD／IMDD	T110

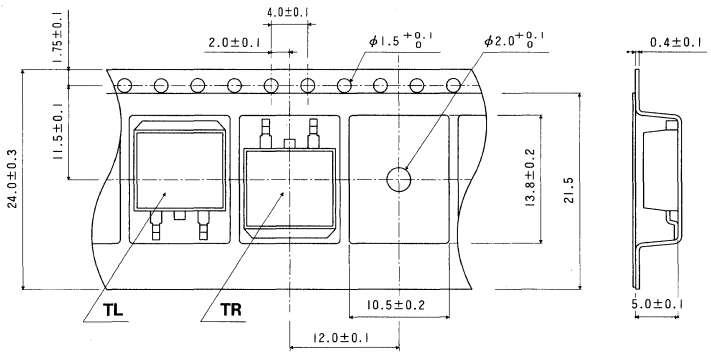
MPD (SOT-89)



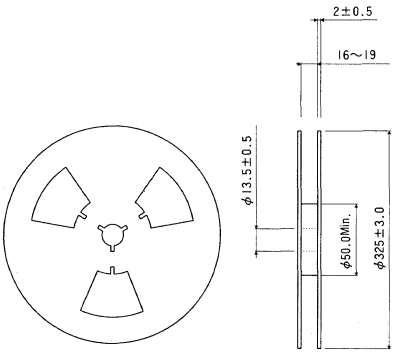


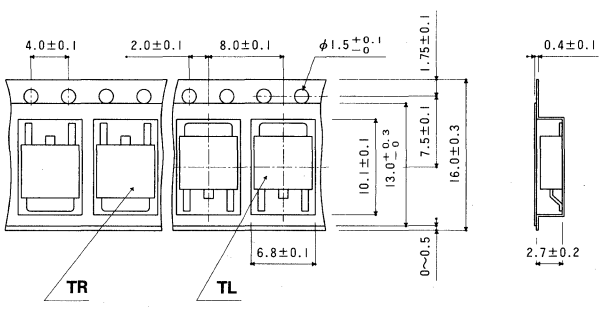
PSD (D² PAK)





CPD F5 (D PAK)





Part Marking

Mold type

●Diodes

Part No.	USM		DSM		PSM		EM3		UMT／UMD		SMT／SMD		FMT/FMD		IMD		MPD		CPD	
	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking
Switching	1SS353	C																		
	1SS354	B																		
	1SS355	A																		
Band Switching	1SS356						DAN235E	M	DAN235U	M	DAN235K	M								
									DAP236U	X	DAP236K	X								
Rectifying					※1SR154−100	12 28														
					※1SR154−200	13 28														
					※1SR154−400	14 28														
					※1SR159−200	63 28														
Schottky barrier			RB500H	6	※RB160L−40	34 28			RB451F	3C	RB400D	D3A	RB471E	D3G	RB731U	D3P	RB435C	S4 A	RB031B−40	RB031
											RB401D	D3U								
			RB501H	3					RB450F	3F	RB411D	D3E					RB110C	S1 A	RB035B−20	RB352
			RB751H	1					RB715F	3D	RB421D	D3C					RB111C	S2 A		
			RB751H−40	5					RB717F	3E	RB425D	D3L								
											RB420D	D3B								
											RB705D	D3H								
											RB706D	D3J								
Valiable capacitance			1SV223	—																
Pin			RN711H	7					RN719F	5A	RN719D	D5A								
Zener			※DTZ Series	22	※PTZ Series	20A 32			UMZ8.2T	6R	STZ6.8T	Z0P								

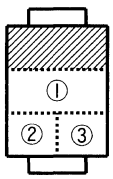
Note : ※See P187 for detait.

Ⓐ Zener Diodes (DTZ Series)

Part No.	①	②	Part No.	①	②
DTZ2.0A	0	1	DTZ10A	0	4
DTZ2.0B	0	2	DTZ10B	0	5
DTZ2.2A	1	1	DTZ10C	0	6
DTZ2.2B	1	2			
DTZ2.4A	2	1	DTZ11A	1	4
DTZ2.4B	2	2	DTZ11B	1	5
DTZ2.7A	3	1	DTZ11C	1	6
DTZ2.7B	3	2	DTZ12A	2	4
DTZ3.0A	4	1	DTZ12B	2	5
DTZ3.0B	4	2	DTZ12C	2	6
DTZ3.3A	5	1	DTZ13A	3	4
DTZ3.3B	5	2	DTZ13B	3	5
DTZ3.6A	6	1	DTZ13C	3	6
DTZ3.6B	6	2	DTZ15A	4	4
DTZ3.9A	7	1	DTZ15B	4	5
DTZ3.9B	7	2	DTZ15C	4	6
DTZ4.3A	8	1	DTZ16A	5	4
DTZ4.3B	8	2	DTZ16B	5	5
DTZ4.3C	8	3	DTZ16C	5	6
DTZ4.7A	9	1	DTZ18A	6	4
DTZ4.7B	9	2	DTZ18B	6	5
DTZ4.7C	9	3	DTZ18C	6	6
DTZ5.1A	A	1	DTZ20A	7	4
DTZ5.1B	A	2	DTZ20B	7	5
DTZ5.1C	A	3	DTZ20C	7	6
DTZ5.6A	C	1	DTZ22A	8	4
DTZ5.6B	C	2	DTZ22B	8	5
DTZ5.6C	C	3	DTZ22C	8	6
DTZ6.2A	E	1	DTZ24A	9	4
DTZ6.2B	E	2	DTZ24B	9	5
DTZ6.2C	E	3	DTZ24C	9	6
DTZ6.8A	F	1	DTZ27A	A	4
DTZ6.8B	F	2	DTZ27B	A	5
DTZ6.8C	F	3	DTZ27C	A	6
DTZ7.5A	H	1	DTZ30A	C	4
DTZ7.5B	H	2	DTZ30B	C	5
DTZ7.5C	H	3	DTZ30C	C	6
DTZ8.2A	J	1	DTZ33A	E	4
DTZ8.2B	J	2	DTZ33B	E	5
DTZ8.2C	J	3	DTZ33C	E	6
DTZ9.1A	L	1	DTZ36A	F	4
DTZ9.1B	L	2	DTZ36B	F	5
DTZ9.1C	L	3	DTZ36C	F	6

Ⓑ Rectifying · Schottky Barrier Diodes (PSM Series)

Part No.	①	②
1SR154−100	1	2
1SR154−200	1	3
1SR154−400	1	4
1SR159−200	6	3
RB160L−40	3	4

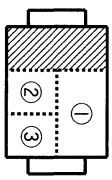


① Type code
② Last digit of manufacturing year
③ Month code

Month	1	2	3	4	5	6	7	8	9	10	11	12
Code	1	2	3	4	5	6	7	8	9	O	A	C

Ⓒ Zener Diodes (PTZ Series)

Part No.	①	②	Part No.	①	②
PTZ2.0A	2.0	A	PTZ9.1A	9.1	A
PTZ2.0B	2.0	B	PTZ9.1B	9.1	B
PTZ2.2A	2.2	A	PTZ10A	10	A
PTZ2.2B	2.2	B	PTZ10B	10	B
PTZ2.4A	2.4	A	PTZ11A	11	A
PTZ2.4B	2.4	B	PTZ11B	11	B
PTZ2.7A	2.7	A	PTZ12A	12	A
PTZ2.7B	2.7	B	PTZ12B	12	B
PTZ3.0A	3.0	A	PTZ13A	13	A
PTZ3.0B	3.0	B	PTZ13B	13	B
PTZ3.3A	3.3	A	PTZ15A	15	A
PTZ3.3B	3.3	B	PTZ15B	15	B
PTZ3.6A	3.6	A	PTZ16A	16	A
PTZ3.6B	3.6	B	PTZ16B	16	B
PTZ3.9A	3.9	A	PTZ18A	18	A
PTZ3.9B	3.9	B	PTZ18B	18	B
PTZ4.3A	4.3	A	PTZ20A	20	A
PTZ4.3B	4.3	B	PTZ20B	20	B
PTZ4.7A	4.7	A	PTZ22A	22	A
PTZ4.7B	4.7	B	PTZ22B	22	B
PTZ5.1A	5.1	A	PTZ24A	24	A
PTZ5.1B	5.1	B	PTZ24B	24	B
PTZ5.6A	5.6	B	PTZ27A	27	A
PTZ5.6B	5.6	B	PTZ27B	27	B
PTZ6.2A	6.2	A	PTZ30A	30	A
PTZ6.2B	6.2	B	PTZ30B	30	B
PTZ6.8A	6.8	A	PTZ33A	33	A
PTZ6.8B	6.8	B	PTZ33B	33	B
PTZ7.5A	7.5	A	PTZ36A	36	A
PTZ7.5B	7.5	B	PTZ36B	36	B
PTZ8.2A	8.2	A	PTZ39A	39	A
PTZ8.2B	8.2	B	PTZ43A	43	A



① Zener voltage
② Last digit of manufacturing year
③ Month code

Month	1	2	3	4	5	6	7	8	9	10	11	12
Code	1	2	3	4	5	6	7	8	9	O	A	C

Part Marking

Mold type

●Diodes Arrays

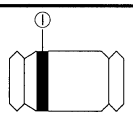
Part No.	EM3		UMT/UMD		UM4		UM5		UM6		SMT／SMD		FMT/FMD		IMD	
	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking
High-Speed switching diode array	DAN222	N	DAN202U	N							DAN202K	N				
	DAP222	P	DAP202U	P							DAP202K	P				
					DA227	N20										
							UMN1	N1					FMN1	N1		
							UMP1	P1					FMP1	P1		
															IMN10	N10
									UMN11	N11					IMN11	N11
									UMP11	P11					IMP11	P11
Special diode array			DA106U	Z							DA106K	Z				
	DA122	AU	DA115	AU							DA119	AU				
	DA121	AV	DAN114	AV							DAN212K	AV				
	DA120	AZ	DA112	AZ							DA116	AZ				
	DA123	AY	DA113	AY							DA118	AY				
	DA221	K	DA204U	K							DA204K	K				
											DAN217	BA				
	DA223	Q	DA226U	Q							DA223K	Q				
											☆DA228K	BT				

Note : ☆Under development

Glass Types

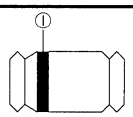
●Diodes

LL-34 (RLS)



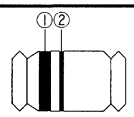
Part No.	Stamping ①
RLS-71	Black
RLS-72	Green
RLS-73	Yellow
RLS-92	Blue
RLS-93	Purple
RLS-94	Gray
RLS245	White

LL-41 (RLR)



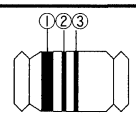
Part No.	Stamping ①	②
RLR4001	Black	Black
RLR4002	White	White
RLR4003	Blue	Blue
RLR4004	Green	Green

LL-34 (RLS4000)



Part No.	Stamping ①	②
RLS135	White	White
RLS139	Gray	Gray
RLS140	Purple	Purple
RLS141	Blue	Blue
RLS4148	Black	Brown
RLS4149	Black	Red
RLS4150	Black	Orange
RLS4151	Black	Yellow
RLS4152	Black	Green
RLS4153	Black	Blue
RLS4154	Black	Purple
RLS4446	Black	Gray
RLS4447	Black	White
RLS4448	Brown	Black
RLS4449	Brown	Brown
RLS4450	Brown	Red
RLS4454	Brown	Orange
RLS4406	Brown	Yellow

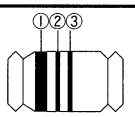
LL-34 (RLZ Series)



Part No.	Stamping ①	②
RLZ2.0	Black	Brown
RLZ2.2	Black	Red
RLZ2.4	Black	Orange
RLZ2.7	Black	Yellow
RLZ3.0	Black	Green
RLZ3.3	Black	Blue
RLZ3.6	Black	Purple
RLZ3.9	Black	Gray
RLZ4.3	Black	White
RLZ4.7	Brown	Black
RLZ5.1	Brown	Brown
RLZ5.6	Brown	Red
RLZ6.2	Brown	Orange
RLZ6.8	Brown	Yellow
RLZ7.5	Brown	Green
RLZ8.2	Brown	Blue
RLZ9.1	Brown	Purple
RLZ10	Brown	Gray
RLZ11	Brown	White
RLZ12	Red	Black
RLZ13	Red	Brown
RLZ15	Red	Red
RLZ16	Red	Orange
RLZ18	Red	Yellow
RLZ20	Red	Green
RLZ22	Red	Blue
RLZ24	Red	Purple
RLZ27	Red	Gray
RLZ30	Red	White
RLZ33	Orange	Black
RLZ36	Orange	Brown
RLZ39(A~D)	Orange	Red
RLZ39(E~G)	Yellow	White
RLZ43	Orange	Orange
RLZ47	Orange	Yellow
RLZ51	Orange	Green
RLZ56	Orange	Blue

Marking ③
Ranks A and E : Yellow
Ranks B and F : Green
Ranks C and G : Blue
Ranks D : White

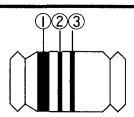
LL-34 (RLZJ Series)



Part No.	Stamping ①	②
RLZJ3.6	Gray	Purple
RLZJ3.9	Gray	Gray
RLZJ4.3	Gray	White
RLZJ4.7	Pink	Black
RLZJ5.1	Pink	Brown
RLZJ5.6	Pink	Red
RLZJ6.2	Pink	Orange
RLZJ6.8	Pink	Yellow
RLZJ7.5	Pink	Green
RLZJ8.2	Pink	Blue
RLZJ9.1	Pink	Purple
RLZJ10	Pink	Gray
RLZJ11	Pink	White
RLZJ12	Light Green	Black
RLZJ13	Light Green	Brown
RLZJ15	Light Green	Red
RLZJ16	Light Green	Orange
RLZJ18	Light Green	Yellow
RLZJ20	Light Green	Green
RLZJ22	Light Green	Blue
RLZJ24	Light Green	Purple

Marking ③
Rank A : Yellow
Rank B : Green
Rank C : Blue

LL-34 (RLZ5000 Series)



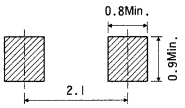
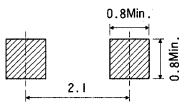
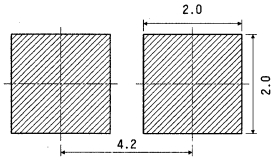
Part No.	Stamping ①	②
RLZ5221B	Black	Brown
RLZ5222B	Black	Red
RLZ5223B	Black	Orange
RLZ5224B	Black	Yellow
RLZ5225B	Black	Green
RLZ5226B	Black	Blue
RLZ5227B	Black	Purple
RLZ5228B	Black	Gray
RLZ5229B	Black	White
RLZ5230B	Brown	Black
RLZ5231B	Brown	Brown
RLZ5232B	Brown	Red
RLZ5233B	Brown	Orange
RLZ5234B	Brown	Yellow
RLZ5235B	Brown	Geen
RLZ5236B	Brown	Blue
RLZ5237B	Brown	Purple
RLZ5238B	Brown	Gray
RLZ5239B	Brown	White
RLZ5240B	Red	Black
RLZ5241B	Red	Brown
RLZ5242B	Red	Red
RLZ5243B	Red	Orange
RLZ5244B	Red	Yellow
RLZ5245B	Red	Green
RLZ5246B	Red	Blue
RLZ5247B	Red	Purple
RLZ5248B	Red	Gray
RLZ5249B	Red	White
RLZ5250B	Orange	Black
RLZ5251B	Orange	Brown
RLZ5252B	Orange	Red

Marking ③
Light green

Recommended land pattern

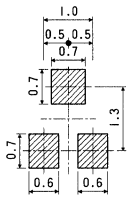
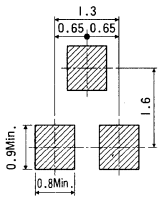
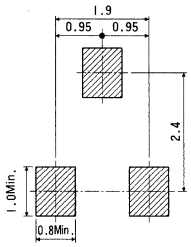
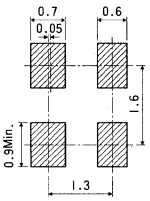
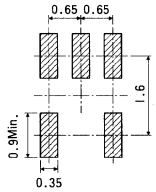
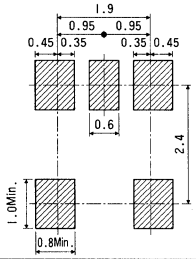
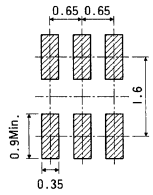
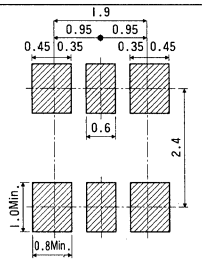
●2 leads type

(Unit : mm)

	USM	DSM	PSM
Land pattern			

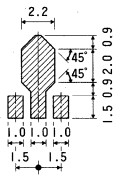
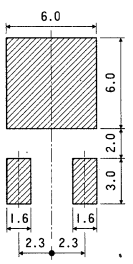
●Mini mold type

(Unit : mm)

Land pattern	EM3	UMT・UMD	SMT・SMD・SST
3-pin			
4-pin		UM4 	
5-pin		UM5 	FMT・FMD 
6-pin		UM6 	IMD・IMDD 

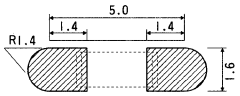
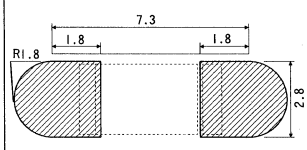
●Power type

(Unit : mm)

Land pattern	MPD	CPD F5
		

●Glass seal type

(Unit : mm)

Land pattern	LL-34	LL-41
		

MEMO

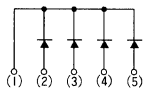
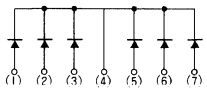
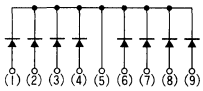
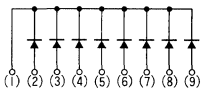
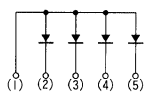
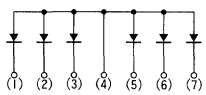
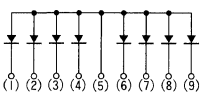
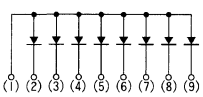
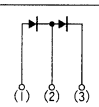
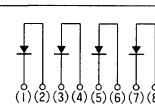
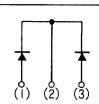
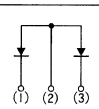
Diodes Quick reference

Application		V_R (V)	Molded			Glass types				Ref. Page
			Package							
			MSR (φ2.5)	SIP9Pin	TO220FD	DO-35 (φ1.8)	DO-34 (φ1.8)	USD (φ1.8)	DO-41 (φ2.7)	
			Part No.							
Switching	High-speed	35				1SS2787	1SS134			196
		50				1S2473	1SS133	1SS254		
		80				1S2472	1SS132	1SS253		
		75				1S2471	1SS131	1SS252		
		35				1SS41	1SS130			
	Ultra High-speed	50				1SS94	1SS138			196
		65				1SS93	1SS137			
	Low-leakage	35				1SS92	1SS136			196
		50				1SS141	1SS292			
		80				1SS140	1SS291			
	High-voltage	150				1SS139	1SS290			196
		200				1SS144	1SS147			
		220				1SS143	1SS146			
		250				1SS245	1SS244			
	JEDEC Standard High-speed	25				1SS142	1SS145			197
		30				1N4154	1N4536			
						1N4152	1N4533			
						1N3605				
		50				1N4151	1N4532			
						1N4153	1N4534			
						1N3604				
						1N3606				
		75				1N4148	1N4531			
						1N4149				
						1N4446				
						1N4447				
						1N4448				
						1N4449				
						1N914				
						1N916				
						1N914A				
						1N916A				
						1N914B				
						1N916B				
		30				1N4450				
		50				1N4150				
						1N4454				
						1N3600				
						1N3064				
		70				1N4606				
Band Switching	Glass sealed type	35					1SS135	1SS265		198
Rectifying	General Purpose	50							1N4001A	198
		100	1SR139-100						1N4002A	
									1SR35-100A	
		200	1SR139-200						1N4003A	
									1SR35-200A	
		400	1SR139-400						1N4004A	
									1SR35-400A	
		600	1SR139-600							
	High-speed	100	New 1SR153-100						1SR124-100A	198
		200	New 1SR153-200						1SR124-200A	
		400	New 1SR153-400						1SR124-400A	
	Ultra High-speed	200			☆R0503C-02					198
					New R0503D-02					
Schottky Barrier	Rectifying	20					RB441Q			199
		40	RB100A		New RB015T-40					
					New RB025T-40					
	Small Signal	20					RB721Q			199
Low-voltage Regulators	Glass sealed LED	5					LTZ-MR15			199
Zener		2.0~20					MTZ Series			200
		2.0~56					MTZJ Series			201
		3.3~12				1N700				203
		4.7~24				1N5000				202
		6.8~24				1N900				202
	Special Zener	5.28~5.91		ITZ5.6H						203

Note : ☆Under development

Diodes Arrays Quick reference

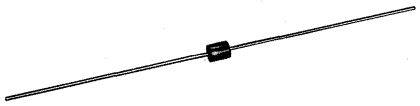
Diode Arrays Page 192

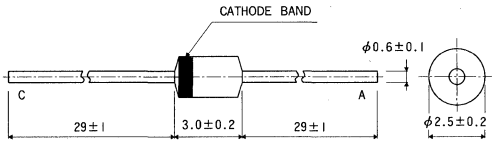
Application	Internal circuit	Package									
		SPT	TO-92	FTR	ATR	SIP5Pin	SIP7Pin	SIP9Pin	LF9Pin	FTL	ATV
		Part No.									
High-Speed Switching	 Fig.1	DAN209S	DAN209	DAN201						DAN215	
	 Fig.2					DAN401					
	 Fig.3						DAN601				
	 Fig.4							DAN801			
	 Fig.5							DAN803			
	 Fig.6	DAP209S	DAP209	DAP201						DAP215	
	 Fig.7					DAP401					
	 Fig.8						DAP601				
	 Fig.9							DAP801			
	 Fig.10							DAP803			
Special	 Fig.11	DA210S		DA203						DA216	
	 Fig.12	DA218S									
	 Fig.13								DAN403		
Rectifying	 Fig.14				DAN208						DAN213
	 Fig.15				DAP208						DAP213

Package Available

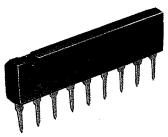
(Unit : mm)

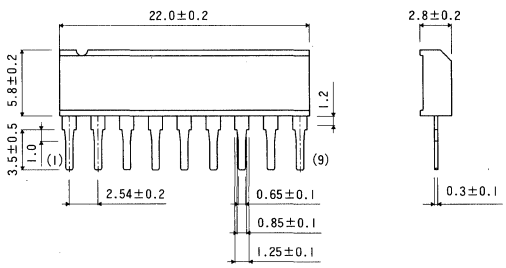
MSR



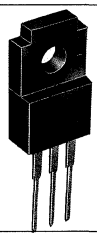


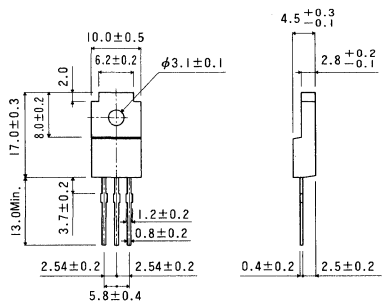
SIP9



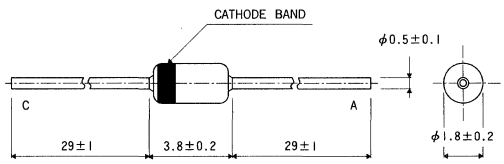


TO-220FD

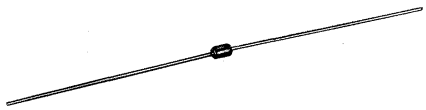


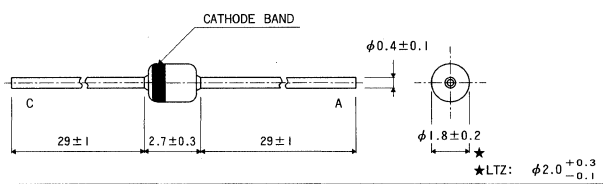


DO-35

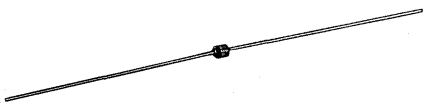


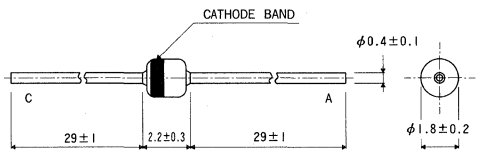
DO-34



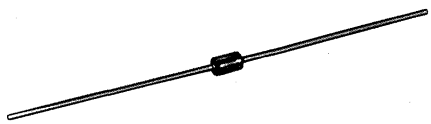


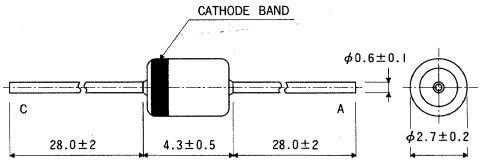
USD





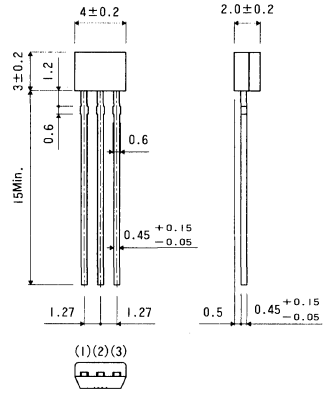
DO-41



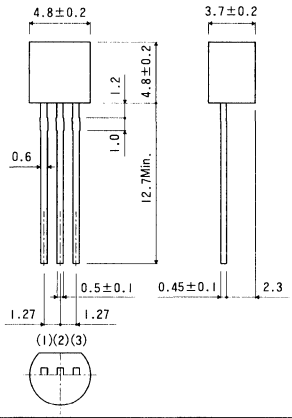


(Unit : mm)

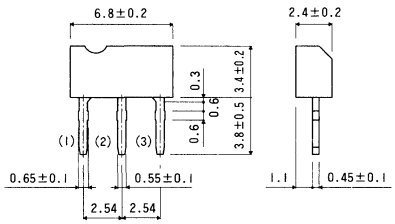
SPT



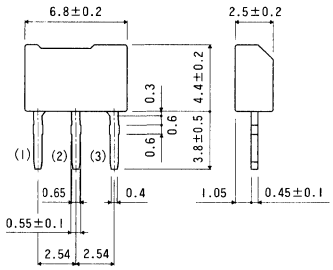
TO-92



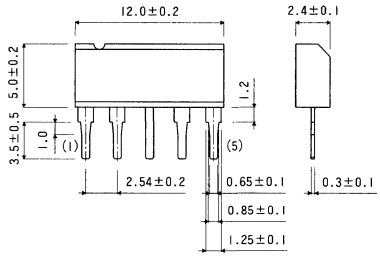
FTR



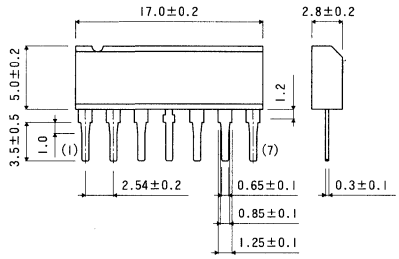
ATR



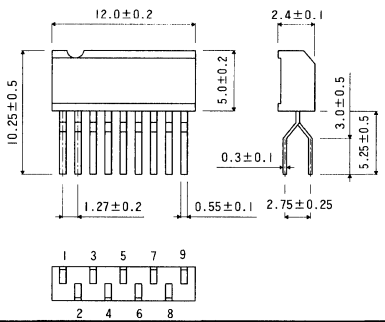
SIP 5 pin



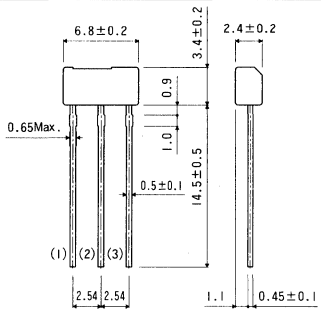
SIP 7 pin



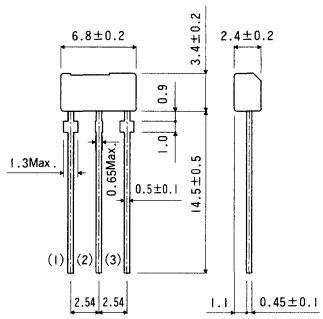
LF 9 pin



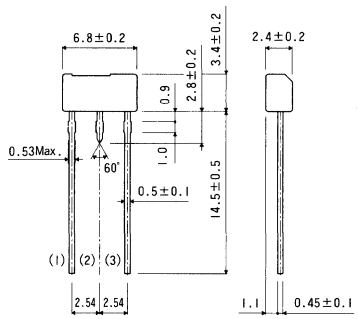
FTL TL2



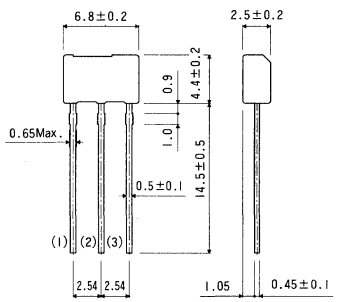
FTL TL3



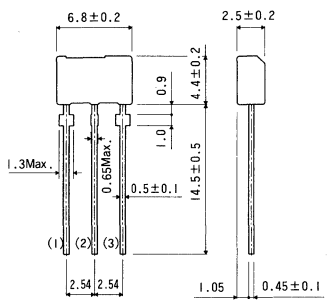
FTL TL4



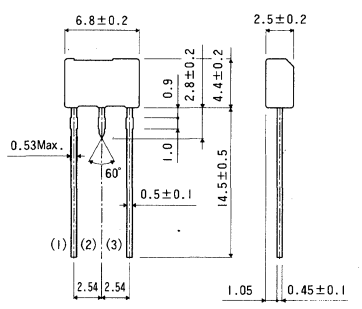
ATV TV2



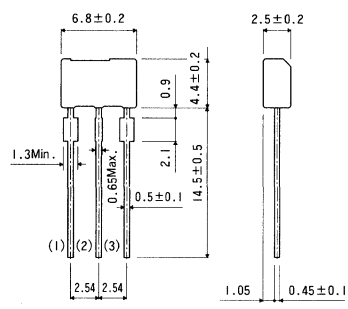
ATV TV3



ATV TV4



ATV TV6



Switching Diodes

High speed, ultra-high speed, high withstand voltage, low leakage and high voltage in DO-35, DO-34 and ultra-mini glass packages help in selecting the package that is most suitable for mounting on the PCB. 1N series for overseas standards is also available.

●High-speed Switching Diodes

Part No.	Absolute maximum ratings (Ta=25°C)							Electrical characteristics (Ta=25°C)										Package
	V_{RM} (V)	V_R (V)	I_{FM} (mA)	Io (mA)	Isurge (mA) 1s	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (mA)	I_R (μA) Max.	V_R (V)	C_T (pF) Max.	V_R (V)	f (MHz)	trr (ns) Max.	V_R (V)	I_F (mA)	
1S2471	90	80	400	130	600	175	−65～+175	1.2	100	0.5	80	2	0.5	1	4	6	10	**DO-35**
1S2472	55	50	350	120	500	175	−65～+175	1.2	100	0.5	50	2	0.5	1	4	6	10	**DO-35**
1S2473	40	35	300	110	400	175	−65～+175	1.2	100	0.5	35	3	0.5	1	4	6	10	**DO-35**
1S2787	40	35	70	50	200	125	−65～+125	0.9	5	1.0	35	3	1	1	3	6	5	**DO-35**
1SS41	100	75	400	130	600	175	−65～+175	1.0	10	0.5	20	4	0	1	4	6	10	**DO-35**
1SS130	100	75	400	130	600	175	−65～+175	1.0	10	0.5	20	4	0	1	4	6	10	**DO-34**
1SS131	90	80	400	130	600	175	−65～+175	1.2	100	0.5	80	2	0.5	1	4	6	10	**DO-34**
1SS132	55	50	350	120	500	175	−65～+175	1.2	100	0.5	50	2	0.5	1	4	6	10	**DO-34**
1SS133	40	35	300	110	400	175	−65～+175	1.2	100	0.5	35	3	0.5	1	4	6	10	**DO-34**
1SS134	40	35	70	50	200	125	−65～+125	0.9	5	1.0	35	3	1	1	3	6	5	**DO-34**
1SS252	90	80	400	130	600	175	−65～+175	1.2	100	0.5	80	2	0.5	1	4	6	10	**USD**
1SS253	55	50	350	120	500	175	−65～+175	1.2	100	0.5	50	2	0.5	1	4	6	10	**USD**
1SS254	40	35	300	110	400	175	−65～+175	1.2	100	0.5	35	3	0.5	1	4	6	10	**USD**

●Ultra High-speed Switching Diodes

Part No.	Absolute maximum ratings (Ta=25°C)							Electrical characteristics (Ta=25°C)										Package
	V_{RM} (V)	V_R (V)	I_{FM} (mA)	Io (mA)	Isurge (mA) 1μs	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (mA)	I_R (μA) Max.	V_R (V)	C_T (pF) Max.	V_R (V)	f (MHz)	trr (ns) Max.	V_R (V)	I_F (mA)	
1SS92	75	65	600	200	4000	175	−65～+175	1.0	100	0.5	65	3	0	1	2	6	10	**DO-35 (SC-40)**
1SS93	55	50	600	200	4000	175	−65～+175	1.0	100	0.5	50	3	0	1	2	6	10	**DO-35 (SC-40)**
1SS94	40	35	600	200	4000	175	−65～+175	1.0	100	0.5	35	3	0	1	2	6	10	**DO-35 (SC-40)**
1SS136	75	65	600	200	4000	175	−65～+175	1.0	100	0.5	65	3	0	1	2	6	10	**DO-34**
1SS137	55	50	600	200	4000	175	−65～+175	1.0	100	0.5	50	3	0	1	2	6	10	**DO-34**
1SS138	40	35	600	200	4000	175	−65～+175	1.0	100	0.5	35	3	0	1	2	6	10	**DO-34**

●Low-leakage Switching Diodes

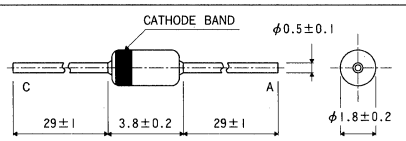
Part No.	Absolute maximum ratings (Ta=25°C)							Electrical characteristics (Ta=25°C)										Package
	V_{RM} (V)	V_R (V)	I_{FM} (mA)	Io (mA)	Isurge (mA) 1s	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (mA)	I_R (μA) Max.	V_R (V)	C_T (pF) Max.	V_R (V)	f (MHz)	trr (ns) Max.	V_R (V)	I_F (mA)	
1SS139	90	80	400	130	600	175	−65～+175	1.2	100	0.02	30	5	0.5	1	50	6	10	**DO-35 (SC-40)**
1SS140	55	50	350	120	500	175	−65～+175	1.2	100	0.01	25	5	0.5	1	50	6	10	**DO-35 (SC-40)**
1SS141	40	35	300	110	400	175	−65～+175	1.2	100	0.01	20	5	0.5	1	50	6	10	**DO-35 (SC-40)**
1SS290	90	80	400	130	600	175	−65～+175	1.2	100	0.02	30	5	0.5	1	50	6	10	**DO-34**
1SS291	55	50	350	120	500	175	−65～+175	1.2	100	0.01	25	5	0.5	1	50	6	10	**DO-34**
1SS292	40	35	300	110	400	175	−65～+175	1.2	100	0.01	20	5	0.5	1	50	6	10	**DO-34**

●High-voltage Switching Diodes

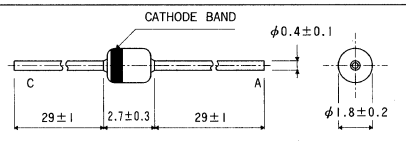
Part No.	Absolute maximum ratings (Ta=25°C)							Electrical characteristics (Ta=25°C)										Package
	V_{RM} (V)	V_R (V)	I_{FM} (mA)	Io (mA)	Isurge (mA) 1s	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (mA)	I_R (μA) Max.	V_R (V)	C_T (pF) Max.	V_R (V)	f (MHz)	trr (ns) Max.	V_R (V)	I_F (mA)	
1SS142	300	250	625	200	1000	175	−65～+175	1.0	100	0.5	250	10	0	1	400	6	10	**DO-35**
1SS143	250	200	625	200	1000	175	−65～+175	1.0	100	0.5	200	10	0	1	400	6	10	**DO-35**
1SS144	200	150	625	200	1000	175	−65～+175	1.0	100	0.5	150	10	0	1	400	6	10	**DO-35**
1SS145	300	250	625	200	1000	175	−65～+175	1.0	100	0.5	250	10	0	1	400	6	10	**DO-34**
1SS146	250	200	625	200	1000	175	−65～+175	1.0	100	0.5	200	10	0	1	400	6	10	**DO-34**
1SS147	200	150	625	200	1000	175	−65～+175	1.0	100	0.5	150	10	0	1	400	6	10	**DO-34**
1SS244	250	220	625	200	1000	175	−65～+175	1.5	200	10	220	3	0	1	75	$I_F=-I_R=20mA$		**DO-34**
1SS245	250	220	625	200	1000	175	−65～+175	1.5	200	10	220	3	0	1	75	$I_F=-I_R=20mA$		**DO-35**

(Unit : mm)

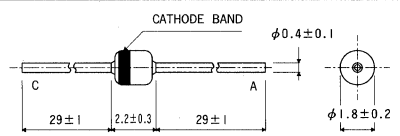
DO-35 (SC-40)



DO-34



USD



●Product Designation (Ex.)

When ordering, specify the part No. and packaging specifications.

1	S	2	4	7	1	T	—	7	7

Part No.

Packaging

Package	Bulk : blank
DO-35	Radial taping
DO-34	Axial taping
USD	Forming

●JEDEC Standard 〈Absolute maximum ratings〉

Absolute maximum ratings (Ta=25℃)

Part No.	V_{RM} (V)	V_R (V)	I_{FM} (mA)	Io (mA)	I_F (mA)	I_{FSM} 1μs (A)	P (mW)	Tj (℃)	Topr (℃)	Tstg (℃)	Package
1N4148 1N914	100	75	450	150	200	2	500	200	−65～+200	−65～+200	**DO-35**
1N4149 1N916	100	75	450	150	200	2	500	200	−65～+200	−65～+200	**DO-35**
1N4150 1N3600	50	50	600	200	250	4	500	200	−65～+200	−65～+200	**DO-35**
1N4151 1N3604	75	50	450	150	200	2	500	200	−65～+200	−65～+200	**DO-35**
1N4152 1N3605	40	30	450	150	200	2	500	200	−65～+200	−65～+200	**DO-35**
1N4153 1N3606	75	50	450	150	200	2	500	200	−65～+200	−65～+200	**DO-35**
1N4154	35	25	450	150	200	2	500	200	−65～+200	−65～+200	**DO-35**
1N4446 1N914A	100	75	450	150	200	2	500	200	−65～+200	−65～+200	**DO-35**
1N4447 1N916A	100	75	450	150	200	2	500	200	−65～+200	−65～+200	**DO-35**
1N4448 1N914B	100	75	450	150	200	2	500	200	−65～+200	−65～+200	**DO-35**
1N4449 1N916B	100	75	450	150	200	2	500	200	−65～+200	−65～+200	**DO-35**
1N4450	40	30	600	200	250	4	500	200	−65～+200	−65～+200	**DO-35**
1N4454 1N3064	75	50	450	150	200	2	500	200	−65～+200	−65～+200	**DO-35**
1N4606	85	70	600	200	250	4	500	200	−65～+200	−65～+200	**DO-35**
1N4531	100	75	450	150	200	2	500	200	−65～+200	−65～+200	**DO-34**
1N4532	70	50	450	150	200	2	500	200	−65～+200	−65～+200	**DO-34**
1N4533	40	30	450	150	200	2	500	200	−65～+200	−65～+200	**DO-34**
1N4534	75	50	450	150	200	2	500	200	−65～+200	−65～+200	**DO-34**
1N4536	35	25	450	150	200	2	500	200	−65～+200	−65～+200	**DO-34**

〈Electrical characteristics〉

Part No.	V_F (V) @ 0.1mA	@ 0.25mA	@ 1mA	@ 2mA	@ 5mA	@ 10mA	@ 20mA	@ 30mA	@ 50mA	@ 100mA	@ 200mA	@ 250mA	BV (V) Min. @ 5μA	@ 100μA	I_R (μA) Max. @ 25℃	V_R (V)	@150℃	V_R (V)	C_T (pF) V_R=0 f=1MHz	t_{rr} (NS) V_R=6V I_F=10mA R_L=100Ω
1N4148 1N914						1.0							75	100	0.025	20	50.0	20	4	4
															5.0	75				
1N4149 1N916						1.0							–	100	0.025	20	50.0	20	2	4
															5.0	75				
1N4150 1N3600			0.54			0.66			0.76	0.82	0.87		–	50	0.1	50	100.0	50	2.5	6
			0.62			0.74			0.86	0.92	1.0									
1N4151 1N3604									1.0				75	–	0.05	50	50.0	50	2	2
1N4152 1N3605	0.49	0.53	0.59	0.62		0.70	0.74						40	–	0.05	30	50.0	30	2	2
	0.55	0.59	0.67	0.70		0.81	0.88													
1N4153 1N3606	0.49	0.53	0.59	0.62		0.70	0.74						75	–	0.05	50	50.0	50	2	2
	0.55	0.59	0.67	0.70		0.81	0.88													
1N4154								1.0					35	–	0.1	25	100.0	25	4	2
1N4446 1N914A							1.0						–	100	0.025	20	50.0	20	4	4
															5.0	75				
1N4447 1N916A							1.0						–	100	0.025	20	50.0	20	2	4
															5.0	75				
1N4448 1N914B					0.62								–	100	0.025	20	50.0	20	4	4
					0.72					1.0					5.0	75				
1N4449 1N916B					0.63								–	100	0.025	20	50.0	20	2	4
					0.73			1.0							5.0	75				
1N4450	0.42		0.52			0.64			0.80				40	–	0.05	30	50.0	30	4	6
	0.54		0.64			0.72			0.92		1.0									
1N4454 1N3064						1.0							75	–	0.1	50	100.0	50	2	2
1N4606	0.43		0.54			0.65			0.74	0.79	0.86		–	85	0.1	50	25.0	50 (100℃)	2.5	6
	0.55		0.66			0.77			0.86	0.92	1.0	1.1			0.25	70				
1N4531※						1.0							75	100	0.025	20	50.0	20	4	4
															5.0	75				
1N4532※						1.0							75	–	0.1	50	100.0	50	2	2
1N4533※	0.49	0.53	0.59	0.62		0.70	0.74						40	–	0.05	30	50.0	30	2	2
	0.55	0.59	0.67	0.70		0.81	0.88													
1N4534※	0.49	0.53	0.59	0.62		0.70	0.74						75	–	0.05	50	50.0	50	2	2
	0.55	0.59	0.67	0.70		0.81	0.88													
1N4536※								1.0					35	–	0.1	25	100.0	25	4	2

Notes : 1. V_F : Upper, Min ; Lower, Max.
2. ※ : Supplied in DO-34 package, No symbol : DO-35 package.

Band Switching Diodes

In DO-34 or ultra-mini package. Ultra-mini package is most suitable for small set. Low high frequency resistance and low capacitance between terminals.

●Glass-sealed Types

Part No.	Absolute maximum ratings (Ta=25°C)					Electrical characteristics (Ta=25°C)										Package
	Pd (mW)	V_R (V)	Io (mA)	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (mA)	I_R (nA) Max.	V_R (V)	C_T (pF) Max.	V_R (V)	f (MHz)	r_F (Ω) Max.	I_F (mA)	f (MHz)	
1SS135	150	35	100	150	−55～+150	1.0	10	100	20	1.3	6	1	0.6	10	100	**DO-34**
1SS265	150	35	100	150	−55～+150	1.0	10	100	20	1.5	10	1	0.6	10	100	**USD**

Rectifier Diodes

Two packages : DO-41 glass and round molded, for 5mm pitch. For reverse surge absorption application, use rectifier diodes having high reverse surge resistance.

●General purpose rectifier diodes

Part No.	Absolute maximum ratings (Ta=25°C)						Electrical characteristics (Ta=25°C)				Package
	V_{RSM} (V)	V_{RM} (V)	Io (A) ※Ta=50°C	I_{FSM} (A) 60Hz 1∿	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (A)	I_R (μA) Max.	V_R (V)	
1SR35-100A	150	100	1※	30	175	−65～+175	1.1	1	10	100	**DO-41**
1SR35-200A	300	200	1※	30	175	−65～+175	1.1	1	10	200	**DO-41**
1SR35-400A	500	400	1※	30	175	−65～+175	1.1	1	10	400	**DO-41**
1SR139-100	150	100	1	40	150	−40～+150	1.1	1	10	100	**MSR**
1SR139-200	250	200	1	40	150	−40～+150	1.1	1	10	200	**MSR**
1SR139-400	500	400	1	40	150	−40～+150	1.1	1	10	400	**MSR**
1SR139-600	750	600	1	40	150	−40～+150	1.1	1	10	600	**MSR**
1N4001A	75	50	1※	30	175	−65～+175	1.1	1	10	50	**DO-41**
1N4002A	150	100	1※	30	175	−65～+175	1.1	1	10	100	**DO-41**
1N4003A	300	200	1※	30	175	−65～+175	1.1	1	10	200	**DO-41**
1N4004A	500	400	1※	30	175	−65～+175	1.1	1	10	400	**DO-41**

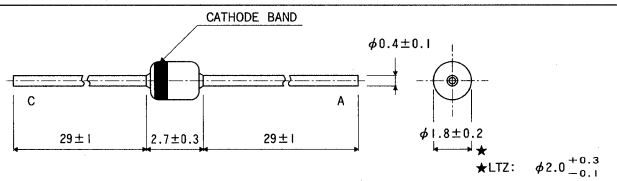
●High-speed rectifier diodes

Part No.	Absolute maximum ratings (Ta=25°C)						Electrical characteristics (Ta=25°C)							Package
	V_{RSM} (V)	V_{RM} (V)	Io (A)	I_{FSM} (A) 60Hz 1∿	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_{FM} (A)	I_R (μA) Max.	V_{RM} (V)	trr (μs) Max.	I_F (mA)	I_R (mA)	
1SR124-100A	150	100	1	30	150	−65～+175	1.3	1	10	100	0.4	10	10	**DO-41**
1SR124-200A	300	200	1	30	150	−65～+175	1.3	1	10	200	0.4	10	10	**DO-41**
1SR124-400A	500	400	1	30	150	−65～+175	1.3	1	10	400	0.4	10	10	**DO-41**
New **1SR153-100**	150	100	0.8	30	150	−40～+150	1.3	0.8	10	100	0.4	10	10	**MSR**
New **1SR153-200**	300	200	0.8	30	150	−40～+150	1.3	0.8	10	200	0.4	10	10	**MSR**
New **1SR153-400**	500	400	0.8	30	150	−40～+150	1.3	0.8	10	400	0.4	10	10	**MSR**

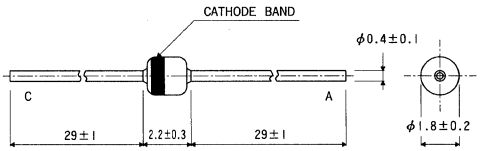
●Ultra High-speed rectifier diodes

Part No.	Absolute maximum ratings (Ta=25°C)						Electrical characteristics (Ta=25°C)							Package
	V_{RSM} (V)	V_{RM} (V)	Io (A)	I_{FSM} (A) 60Hz 1∿	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_{FM} (A)	I_R (μA) Max.	V_{RM} (V)	trr (μs) Max.	I_F (mA)	I_R (mA)	
☆**R0503C-02**	200	200	5	50	150	−40～+150	0.98	5	100	200	35	100	100	**TO-220FP**
New **R0503D-02**	200	200	5	50	150	−40～+150	0.98	2.5	100	200	35	100	100	**TO-220FP**

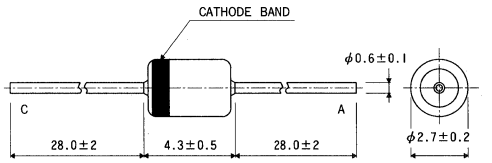
DO-34



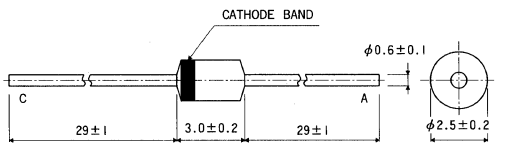
USD



DO-41



MSR



●Packaging (Ex.)

When ordering, specify the part No. and packaging specifications.

1	S	R	3	5	—	1	0	0	A	T	—	8	2

Part No.

Packaging

Bulk : Blank(TO-220FD : Bulk only)

Package	Packaging specifications
DO-34	Radial taping
USD	Axial taping
	Forming
DO-41	Radial taping
MSR	Axial taping
	Forming

Schottky Barrier Diodes

●For Rectifiers

Power diodes capable of carrying 1A to 10A are now under development. Currrent products are in DO-34 (glass) and round molded packages.
Low V_F design helps reducing power loss.

Part No.	Absolute maximum ratings (Ta=25°C)					Electrical characteristics (Ta=25°C)				Package
	V_{RM} (V)	Io (A)	I_{FSM} (A) 60Hz 1∿	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (A)	I_R (mA) Max.	V_R (V)	
New RB015T-40	40	10	60	125	−40～+125	0.55	5	3	40	TO-220FP
New RB025T-40	40	5	60	125	−40～+125	0.55	2.5	2	40	TO-220FP
RB100A	40	1	40	125	−40～+125	0.55	1	1	40	MSR
RB441Q	20	0.1	1	125	−40～+125	0.55	0.10	0.01	10	DO-34

●For Small Signal

Housed in DO-34 glass package and most suitable for small shot signal applicationshott such as detection. V_{OF} of I_{OFP}=1mA has low V_{OF} of 0.3%

Part No.	Absolute maximum ratings (Ta=25°C)						Electrical Optical characteristics (Ta=25°C)							Package
	V_{RM} (V)	V_R (V)	Io (mA)	I_{FSM} (A) 60Hz・1∿	Tj (°C)	Tstg (°C)	V_F (V) Max.	I_F (mA)	I_R (μA) Max.	V_R (V)	C_T (pF) Typ. V_R (V)	C_T (pF) Typ. f (MHz)		
RB721Q	25	20	30	0.2	125	−40～+125	0.37	1	1	10	2	1	1	DO-34

Low-voltage Regulators

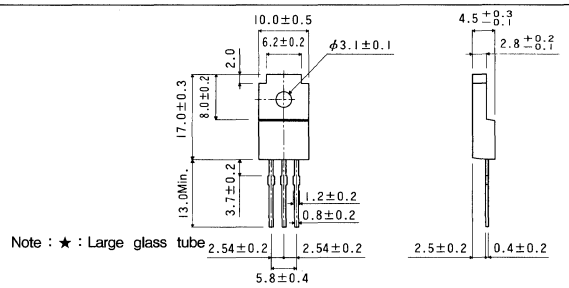
●Glass-sealed LEDs

Zeners of less than 2V using forward characteristics of LED, capable of delivering low regulated voltage.
Glass sealed type with 5mm pitch. Because of LED these regulators can be used also as PCB checking light.

Part No.	Absolute maximum ratings (Ta=25°C)					Electrical Optical characteristics (Ta=25°C)												Emitting Color	Package
	P (mW)	I_F (mA)	V_R (V)	Topr (°C)	Tstg (°C)	V_F (V) Min.	V_F (V) Max.	I_F (mA)	V_F (V) Min.	V_F (V) Max.	I_F (μA)	I_R (μA) Max.	V_R (V)	Luminance (Axial) (μcd) Min.	I_F (mA DC)	Δλ (NM) Typ.	I_F (mA DC)	λp (nm) Typ.	I_F (mA DC)	
LTZ-MR15	25	10	5	−25～80	−25～100	1.70	2.30	10	1.35	1.65	10	10	4	30	5	90	10	700	10	Red	DO-34★

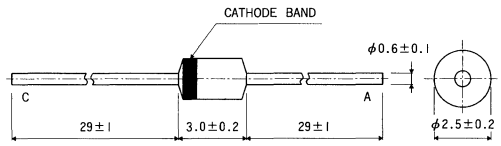
(Unit : mm)

TO-220FP

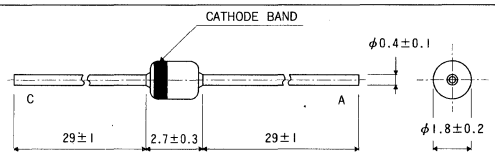


Note : ★ : Large glass tube

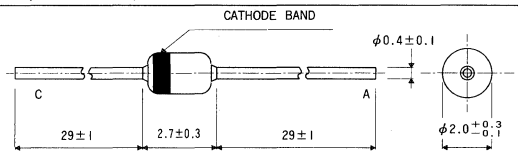
MSR



DO-34



DO-34★ (LTZ-MR15)



●Product Designation (Ex.)

When ordering, specify the part No. and packaging specifications.

R	B	1	0	0	A	T	—	8	2

Part No.

Packaging

Bulk : blank

Package	Packaging specifications
MSR	Radial taping
DO-34	Axial taping
	Forming

RB015T-40, RB025T-40 : Supplied in tray.
LTZ-MR15 : T-77 or T72 only.

Zener Diodes

MTZ series (Iz=20,10mA) and MTZJ series (Iz=5mA) are in DO-34 package and IN5000, IN900 and IN700 serieses are in DO-35 package. MTZJ series ranges from 2.0 to 56V.
ITZ series contains 8 elements in a single 9-pin package, suitable for use as 8-bit data bus line surge absorption.

Series	Package	P (mW)	Voltage range (V)	Features
MTZ Series	**DO-34**	500	2.0~20	Taken at Iz=20, 10mA
MTZ J Series	**DO-34**	500	2.0~56	Taken at Iz=5mA
ITZ5.6H	**SIP 9 pin**	400	5.28~5.91	Cathode common, Contains 8 devices
1N5000 Series	**DO-35**	500	4.7~24	JEDEC Standard
1N900 Series	**DO-35**	400	6.8~24	JEDEC Standard
1N700 Series	**DO-35**	400	3.3~12	JEDEC Standard

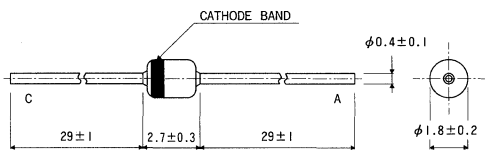
●MTZ Series (P=500mW Package : DO-34)

Part No.	Vz (V) Ranking A	B	C	D	Iz (mA)	Zz (Ω) Max.	Iz (mA)	Z_{ZK} (Ω) Max.	Iz (mA)	I_R (μA) Max.	V_R (V)
MTZ2.0	1.880~2.100	2.020~2.200	–	–	20	140	20	2000	1	120	0.5
MTZ2.2	2.120~2.300	2.220~2.410	–	–	20	120	20	2000	1	120	0.7
MTZ2.4	2.330~2.520	2.430~2.630	–	–	20	100	20	2000	1	120	1.0
MTZ2.7	2.540~2.750	2.690~2.910	–	–	20	100	20	1000	1	100	1.0
MTZ3.0	2.850~3.070	3.010~3.220	–	–	20	80	20	1000	1	50	1.0
MTZ3.3	3.160~3.380	3.320~3.530	–	–	20	70	20	1000	1	20	1.0
MTZ3.6	3.455~3.695	3.600~3.845	–	–	20	60	20	1000	1	10	1.0
MTZ3.9	3.74~4.01	3.89~4.16	–	–	20	50	20	1000	1	5	1.0
MTZ4.3	4.04~4.29	4.17~4.43	4.30~4.57	–	20	40	20	1000	1	5	1.0
MTZ4.7	4.44~4.68	4.55~4.80	4.68~4.93	–	20	25	20	900	1	5	1.0
MTZ5.1	4.81~5.07	4.94~5.20	5.09~5.37	–	20	20	20	800	1	5	1.5
MTZ5.6	5.28~5.55	5.45~5.73	5.61~5.91	–	20	13	20	500	1	5	2.5
MTZ6.2	5.78~6.09	5.96~6.27	6.12~6.44	–	20	10	20	300	1	5	3.0
MTZ6.8	6.29~6.63	6.49~6.83	6.66~7.01	–	20	8	20	150	0.5	2	3.5
MTZ7.5	6.85~7.22	7.07~7.45	7.29~7.67	–	20	8	20	120	0.5	0.5	4.0
MTZ8.2	7.53~7.92	7.78~8.19	8.03~8.45	–	20	8	20	120	0.5	0.5	5.0
MTZ9.1	8.29~8.73	8.57~9.01	8.83~9.30	–	20	8	20	120	0.5	0.5	6.0
MTZ10	9.12~9.59	9.41~9.90	9.70~10.20	9.94~10.44	20	8	20	120	0.5	0.2	7.0
MTZ11	10.18~10.71	10.50~11.05	10.82~11.38	–	10	10	10	120	0.5	0.2	8.0
MTZ12	11.13~11.71	11.44~12.03	11.74~12.35	–	10	12	10	110	0.5	0.2	9.0
MTZ13	12.11~12.75	12.55~13.21	12.99~13.66	–	10	14	10	110	0.5	0.2	10
MTZ15	13.44~14.13	13.89~14.62	14.35~15.09	–	10	16	10	110	0.5	0.2	11
MTZ16	14.80~15.57	15.25~16.04	15.69~16.51	–	10	18	10	150	0.5	0.2	12
MTZ18	16.22~17.06	16.82~17.70	17.42~18.33	–	10	23	10	150	0.5	0.2	13
MTZ20	18.02~18.96	18.63~19.59	19.23~20.22	19.72~20.72	10	28	10	200	0.5	0.2	15

Notes : 1. Zener Voltage (Vz) is measured 40ms after applying in current.
2. When ordering, specify the rank of the diodes. Otherwise, the diodes of rank A, B orC are supplied.
3. Use MTZJ series for application at 22V and over.

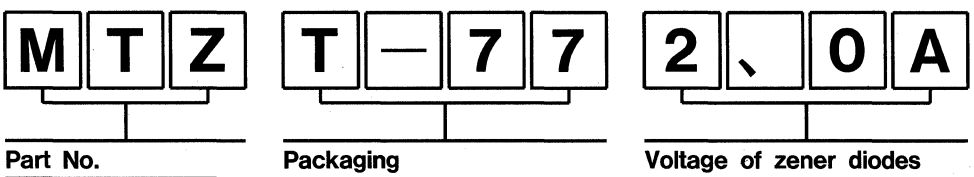
(Unit : mm)

DO-34



●Product Designation (Ex.)

When ordering, specify Part No. packaging Code and Zener voltage.



Part No.
MTZ Series

Packaging
Bulk : blank

Package	Packaging specifications
DO-34	Radial taping

Voltage of zener diodes

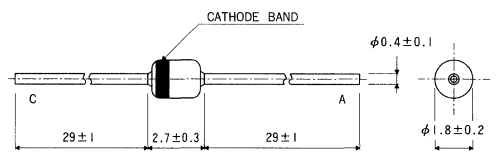
●MTZJ Series (P=500mW Package : DO-34)

Part No.	Vz (V) Ranking A	B	C	D	Iz (mA)	Zz (Ω) Max.	Iz (mA)	Z_{ZK} (Ω) Max.	Iz (mA)	I_R (μA) Max.	V_R (V)
MTZJ2.0	1.880~2.100	2.020~2.200	–	–	5	100	5	1000	0.5	120	0.5
MTZJ2.2	2.120~2.300	2.220~2.410	–	–	5	100	5	1000	0.5	120	0.7
MTZJ2.4	2.330~2.520	2.430~2.630	–	–	5	100	5	1000	0.5	120	1.0
MTZJ2.7	2.540~2.750	2.690~2.910	–	–	5	110	5	1000	0.5	100	1.0
MTZJ3.0	2.850~3.070	3.010~3.220	–	–	5	120	5	1000	0.5	50	1.0
MTZJ3.3	3.160~3.380	3.320~3.530	–	–	5	120	5	1000	0.5	20	1.0
MTZJ3.6	3.455~3.695	3.600~3.845	–	–	5	100	5	1000	1	10	1.0
MTZJ3.9	3.74~4.01	3.89~4.16	–	–	5	100	5	1000	1	5	1.0
MTZJ4.3	4.04~4.29	4.17~4.43	4.30~4.57	–	5	100	5	1000	1	5	1.0
MTZJ4.7	4.44~4.68	4.55~4.80	4.68~4.93	–	5	80	5	900	1	5	1.0
MTZJ5.1	4.81~5.07	4.94~5.20	5.09~5.37	–	5	80	5	800	1	5	1.5
MTZJ5.6	5.28~5.55	5.45~5.73	5.61~5.91	–	5	60	5	500	1	5	2.5
MTZJ6.2	5.78~6.09	5.96~6.27	6.12~6.44	–	5	60	5	300	1	5	3.0
MTZJ6.8	6.29~6.63	6.49~6.83	6.66~7.01	–	5	20	5	150	0.5	2	3.5
MTZJ7.5	6.85~7.22	7.07~7.45	7.29~7.67	–	5	20	5	120	0.5	0.5	4.0
MTZJ8.2	7.53~7.92	7.78~8.19	8.03~8.45	–	5	20	5	120	0.5	0.5	5.0
MTZJ9.1	8.29~8.73	8.57~9.01	8.83~9.30	–	5	25	5	120	0.5	0.5	6.0
MTZJ10	9.12~9.59	9.41~9.90	9.70~10.20	9.94~10.44	5	30	5	120	0.5	0.2	7.0
MTZJ11	10.18~10.71	10.50~11.05	10.82~11.38	–	5	30	5	120	0.5	0.2	8.0
MTZJ12	11.13~11.71	11.44~12.03	11.74~12.35	–	5	30	5	110	0.5	0.2	9.0
MTZJ13	12.11~12.75	12.55~13.21	12.99~13.66	–	5	35	5	110	0.5	0.2	10
MTZJ15	13.44~14.13	13.89~14.62	14.35~15.09	–	5	40	5	110	0.5	0.2	11
MTZJ16	14.80~15.57	15.25~16.04	15.69~16.51	–	5	40	5	150	0.5	0.2	12
MTZJ18	16.22~17.06	16.82~17.70	17.42~18.33	–	5	45	5	150	0.5	0.2	13
MTZJ20	18.02~18.96	18.63~19.59	19.23~20.22	19.72~20.72	5	55	5	200	0.5	0.2	15
MTZJ22	20.15~21.20	20.64~21.71	21.08~22.17	21.52~22.63	5	30	5	200	0.5	0.2	17
MTZJ24	22.05~23.18	22.61~23.77	23.12~24.31	23.63~24.85	5	35	5	200	0.5	0.2	19
MTZJ27	24.26~25.52	24.97~26.26	25.63~26.95	26.29~27.64	5	45	5	250	0.5	0.2	21
MTZJ30	26.99~28.39	27.70~29.13	28.36~29.82	29.02~30.51	5	55	5	250	0.5	0.2	23
MTZJ33	29.68~31.22	30.32~31.88	30.90~32.50	31.49~33.11	5	65	5	250	0.5	0.2	25
MTZJ36	32.14~33.79	32.79~34.49	33.40~35.13	34.01~35.77	5	75	5	250	0.5	0.2	27
MTZJ39	34.68~36.47	35.36~37.19	36.00~37.85	36.63~38.52	5	85	5	250	0.5	0.2	30
New **MTZJ39E**	37.36~39.29				5	85	5	250	0.5	0.2	30
New **MTZJ39F**	38.14~40.11				5	85	5	250	0.5	0.2	30
New **MTZJ39G**	38.94~40.80				5	85	5	250	0.5	0.2	30
New **MTZJ43**	40.00~45.00				5	90	5	–	–	0.2	33
New **MTZJ47**	44.00~49.00				5	90	5	–	–	0.2	36
New **MTZJ51**	48.00~54.00				5	110	5	–	–	0.2	39
New **MTZJ56**	53.00~60.00				5	110	5	–	–	0.2	43

Notes : 1. Zener voltage (Vz) is measured 40ms after applying in current.
2. When ordering, specify the rank of the diodes. Otherwise the diodes of rank A, B or C are supplied.

(Unit : mm)

DO-34



●Product Designation (Ex.)

When ordering, specify Part No. packaging Code and Zener voltage.

M T Z J	T — 7 7	2 、 0 A
Part No.	Packaging	Voltage of zener diodes

Part No.

MTZJ Series

Packaging

Bulk : blank

Package	Packaging specifications
DO-34	Radial taping

Zener Diodes
Diodes
This Class and Basic ordering Units for Standard and Semi-standard Products Units
Page 208
Packaging
Page 206
Part Marking
Page 213

●1N5000 Series (Pd=500mW Package : DO-35)

Part No.	Vz Ranking Non	Vz Ranking A	Vz Ranking B	Iz (mA)	Zz (Ω) Max.	Iz (mA)	Z_{ZK} (Ω) Max.	Iz (mA)
1N5230	3.76~5.64	4.23~5.17	4.47~4.94	20	19	20	1900	0.25
1N5231	4.08~6.12	4.59~5.61	4.85~5.36	20	17	20	1600	0.25
1N5232	4.48~6.72	5.04~6.16	5.32~5.88	20	11	20	1600	0.25
1N5233	4.80~7.20	5.40~6.60	5.70~6.30	20	7.0	20	1600	0.25
1N5234	4.96~7.44	5.58~6.82	5.89~6.51	20	7.0	20	1000	0.25
1N5235	5.44~8.16	6.12~7.48	6.46~7.14	20	5.0	20	750	0.25
1N5236	6.00~9.00	6.75~8.25	7.13~7.88	20	6.0	20	500	0.25
1N5237	6.56~9.84	7.38~9.02	7.79~8.61	20	8.0	20	500	0.25
1N5238	6.96~10.44	7.83~9.57	8.27~9.14	20	8.0	20	600	0.25
1N5239	7.28~10.92	8.19~10.01	8.65~9.56	20	10	20	600	0.25
1N5240	8.00~12.00	9.00~11.00	9.50~10.50	20	17	20	600	0.25
1N5241	8.80~13.20	9.90~12.10	10.45~11.55	20	22	20	600	0.25
1N5242	9.60~14.40	10.80~13.20	11.40~12.60	20	30	20	600	0.25
1N5243	10.40~15.60	11.70~14.30	12.35~13.65	9.5	13	9.5	600	0.25
1N5244	11.20~16.80	12.60~15.40	13.30~14.70	9.0	15	9.0	600	0.25
1N5245	12.00~18.00	13.50~16.50	14.25~15.75	8.5	16	8.5	600	0.25
1N5246	12.80~19.20	14.40~17.6	15.20~16.80	7.8	17	7.8	600	0.25
1N5247	13.60~20.40	15.30~18.7	16.15~17.85	7.4	19	7.4	600	0.25
1N5248	14.40~21.60	16.20~19.8	17.10~18.90	7.0	21	7.0	600	0.25
1N5249	15.20~22.80	17.10~20.9	18.05~19.95	6.6	23	6.6	600	0.25
1N5250	16.00~24.00	18.00~22.0	19.00~21.00	6.2	25	6.2	600	0.25
1N5251	17.60~26.40	19.80~24.2	20.90~23.10	5.6	29	5.6	600	0.25
1N5252	19.20~28.80	21.60~26.4	22.80~25.20	5.2	33	5.2	600	0.25

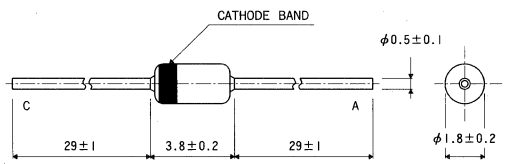
Note : The Zener voltage (Vz) is measured in a steady state.

●1N957~1N970 (Pd=400mW package : DO-35)

Part No.	Vz Ranking Non	Vz Ranking A	Vz Ranking B	Iz (mA)	Zz (Ω) Max.	Iz (mA)	Z_{ZK} (Ω) Max.	Iz (mA)
1N957	5.44~8.16	6.12~7.48	6.46~7.14	18.5	4.5	18.5	700	1.0
1N958	6.00~9.00	6.75~8.25	7.13~7.88	16.5	4.5	16.5	700	0.5
1N959	6.56~9.84	7.38~9.02	7.79~8.61	15.0	6.5	15.0	700	0.5
1N960	7.28~10.92	8.19~10.01	8.65~9.56	14.0	7.5	14.0	700	0.5
1N961	8.00~12.00	9.00~11.00	9.50~10.50	12.5	8.5	12.5	700	0.25
1N962	8.80~13.20	9.90~12.10	10.45~11.55	11.5	9.5	11.5	700	0.25
1N963	9.60~14.40	10.80~13.20	11.40~12.60	10.5	11.5	10.5	700	0.25
1N964	10.40~15.60	11.70~14.30	12.35~13.65	9.5	13.0	9.5	700	0.25
1N965	12.00~18.00	13.50~16.50	14.25~15.75	8.5	16.0	8.5	700	0.25
1N966	12.80~19.20	14.40~17.60	15.20~16.80	7.8	17.0	7.8	700	0.25
1N967	14.40~21.60	16.20~19.80	17.10~18.90	7.0	21.0	7.0	750	0.25
1N968	16.00~24.00	18.00~22.00	19.00~21.00	6.2	25.0	6.2	750	0.25
1N969	17.60~26.40	19.80~24.20	20.90~23.10	5.6	29.0	5.6	750	0.25
1N970	19.20~28.80	21.60~26.40	22.80~25.20	5.2	33.0	5.2	750	0.25

(Unit : mm)

DO-35 (SC-40)



●Product Designation (Ex.)

When ordering, specify Part No. packaging Code and Zener voltage.

1	N	5	2	3	1	B	T	—	7	7

Part No.

1N5000Series
1N900Series

Packaging

Bulk : blank

Package	Packaging specifications
DO-35	Axial taping
	Forming

●1N746~1N759 (Pd=400mW Package : DO-35)

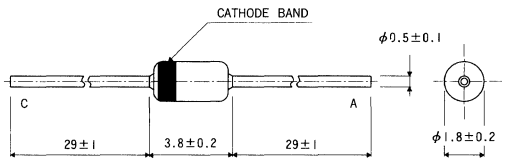
Part No.	Vz Ranking Non	Vz Ranking A	Iz (mA)	Zz (Ω) Max.	Iz (mA)	Z_{ZK} (Ω) Max.	V_R (V)
New 1N746	2.97~3.63	3.14~3.47	20	28	20	10	1
New 1N747	3.24~3.96	3.42~3.78	20	24	20	10	1
New 1N748	3.51~4.29	3.71~4.10	20	23	20	10	1
New 1N749	3.87~4.73	4.09~4.52	20	22	20	2	1
New 1N750	4.23~5.17	4.47~4.94	20	19	20	2	1
1N751	4.59~5.61	4.85~5.36	20	17	20	1	1
1N752	5.04~6.16	5.32~5.88	20	11	20	1	1
1N753	5.58~6.82	5.89~6.51	20	7	20	0.1	1
1N754	6.12~7.48	6.46~7.14	20	5	20	0.1	1
1N755	6.75~8.25	7.13~7.88	20	6	20	0.1	1
1N756	7.38~9.05	7.79~8.61	20	8	20	0.1	1
1N757	8.19~10.01	8.65~9.56	20	10	20	0.1	1
1N758	9.00~11.00	9.50~10.50	20	17	20	0.1	1
1N759	10.80~13.20	11.40~12.60	20	30	20	0.1	1

●Special Zener Diode

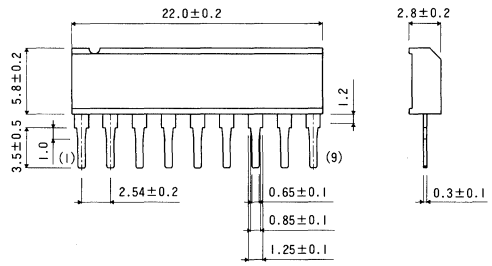
Part No.	Pd (mW)	Vz (V) Min.	Vz (V) Max.	Iz (mA)	Package	Feautures
ITZ5.6H	400	5.28	5.91	20	SIP 9 pin	Cathode common ; 8 built in elements

(Unit : mm)

DO-35 (SC-40)



SIP 9 pin



●Product Designation (Ex.)

When ordering, specify part No. packaging Code and Zener voltage.

1	N	7	5	1	A	T	—	7	7

Part No.

1N700Series

ITZ5, 6H is supplied in tubing and requires no packaging specification in the order sheet.

Packaging

Bulk : blank

Package	Packaging specifications
DO-35	Axial taping
	Forming

Diode Arrays

Application	Part No.	V_R (V)	V_{RM} (V)	Io (mA)	trr Max. (ns)	C_T Max. (pF)	Isurge 60Hz 1∾ (A)	Package	Circuits
High-speed Switching	**DAN201**	80	80	100	4	3.5	–	**FTR**	Fig.1
	DAN209	80	80	100	4	3.5	–	**TO-92**	Fig.1
	DAN209S	80	80	100	4	3.5	–	**SPT**	Fig.1
	DAN215	80	80	100	4	3.5	–	**FTL**	Fig.1
	DAN401	80	80	25	4	3.5	–	**SIP5Pin**	Fig.2
	DAN601	80	80	25	4	3.5	–	**SIP7Pin**	Fig.3
	DAN801	80	80	25	4	3.5	–	**SIP9Pin**	Fig.4
	DAN803	80	80	25	4	3.5	–	**SIP9Pin**	Fig.5
	DAP201	80	80	100	4	3.5	–	**FTR**	Fig.6
	DAP209	80	80	100	4	3.5	–	**TO-92**	Fig.6
	DAP209S	80	80	100	4	3.5	–	**SPT**	Fig.6
	DAP215	80	80	100	4	3.5	–	**FTL**	Fig.6
	DAP401	80	80	25	4	3.5	–	**SIP5Pin**	Fig.7
	DAN403	80	80	100	4	3.5	–	**LF9Pin**	Fig.13
	DAP601	80	80	25	4	3.5	–	**SIP7Pin**	Fig.8
	DAP801	80	80	25	4	3.5	–	**SIP9Pin**	Fig.9
	DAP803	80	80	25	4	3.5	–	**SIP9Pin**	Fig.10
Special	**DA203**	20	20	100	–	4	–	**FTR**	Fig.11
	DA210S	20	20	100	–	4	–	**SPT**	Fig.11
	DA216	20	20	100	–	4	–	**FTL**	Fig.11
	DA218S	80	80	100	–	3.5	–	**SPT**	Fig.12
Rectifying	**DAN208**	100	150	1000	–	20	10.0	**ATR**	Fig.14
	DAN213	100	150	1000	–	20	10.0	**ATV**	Fig.14
	DAP208	100	150	1000	–	20	10.0	**ATR**	Fig.15
	DAP213	100	150	1000	–	20	10.0	**ATV**	Fig.15

Internal circuit

Fig.1

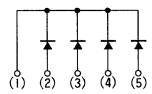


Fig.2

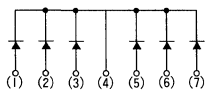


Fig.3

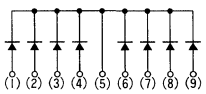


Fig.4

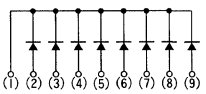


Fig.5

Fig.6

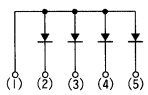


Fig.7

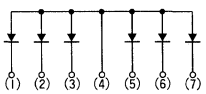


Fig.8

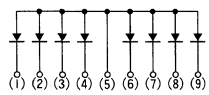


Fig.9

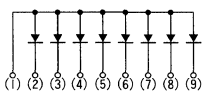


Fig.10

Fig.11

Fig.12

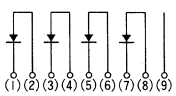


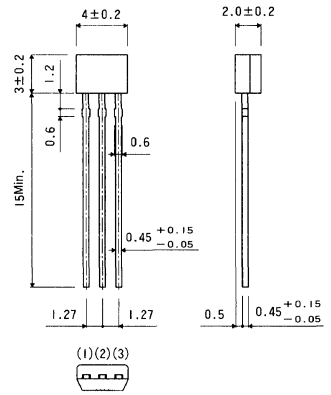
Fig.13

Fig.14

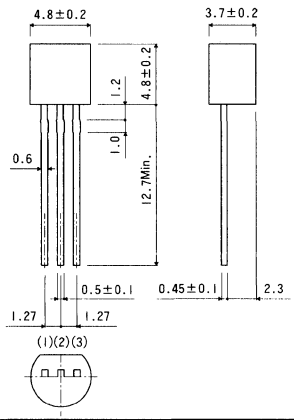
Fig.15

(Unit : mm)

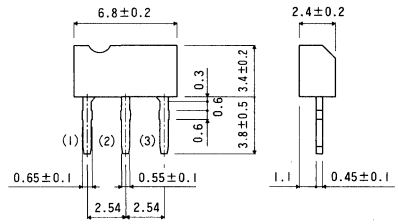
SPT



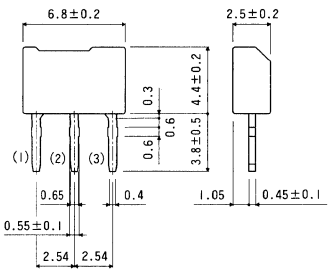
TO-92



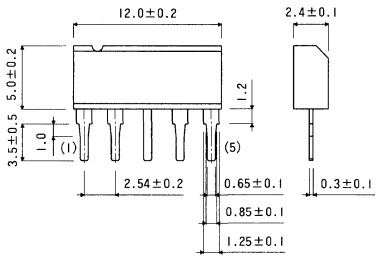
FTR



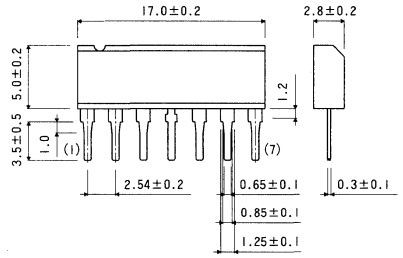
ATR



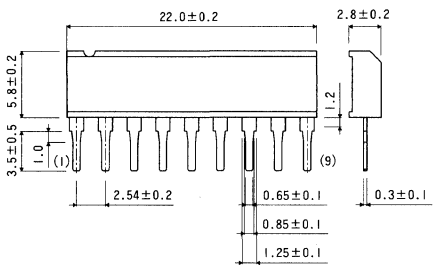
SIP 5 pin



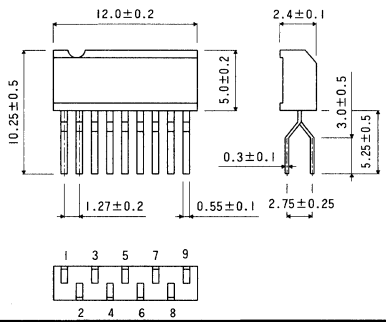
SIP 7 pin



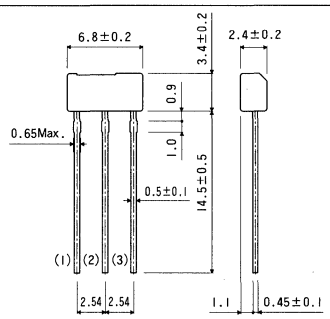
SIP 9 pin



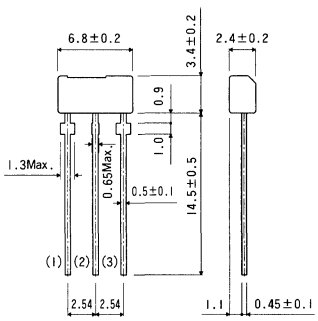
LF 9 pin



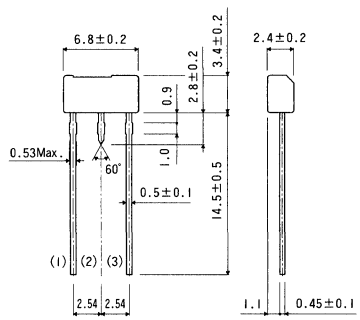
FTL TL2



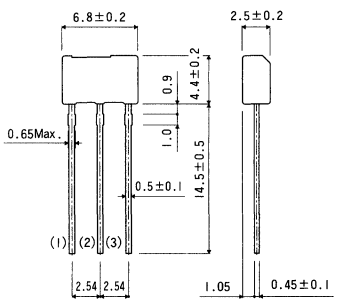
FTL TL3



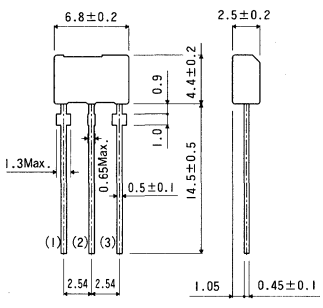
FTL TL4



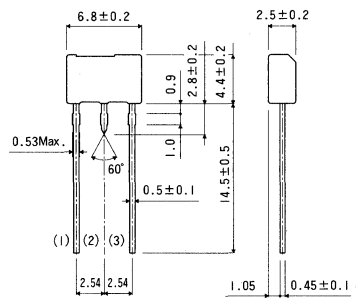
ATV TV2



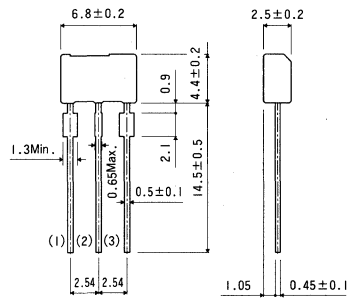
ATV TV3



ATV TV4



ATV TV6



Packaging

●Taping

Package	Packaging condition		Code	Packaging	Direction	Quantity (pcs)	Processed
DO-35	Axial	52mm wide	T-72	Ammo box	–	5,000	Fig.1
			T-73	Tape & reel	–		Fig.1
		26mm wide	T-77	Ammo box	–	5,000	Fig.2
	Radial	5mm pitch lengthwise	※T-84	Ammo box	Cathod at sprocket hole side	2,500	Fig.3
			T-85		Cathod at sprocket hole side		Fig.4
			※T-87		Cathod at sprocket hole side		Fig.4
			※T-87Y		Anode at sprocket hole side		Fig.5
			※T-88		Cathod at sprocket hole side		Fig.6
			T-80	Cassette reel	Cathod at sprocket hole side	2,500	Fig.3
			T-80A		Anode at sprocket hole side		Fig.3
			T-83		Cathod at sprocket hole side		Fig.4
			T-10	Open reel	Cathod at sprocket hole side	2,500	Fig.4
			T-10A		Anode at sprocket hole side		Fig.4
			※T-11		Cathod at sprocket hole side		Fig.4
			※T-11A		Anode at sprocket hole side		Fig.4
			※T-11Y		Anode at sprocket hole side		Fig.5
			※T-12		Cathod at sprocket hole side		Fig.3
			※T-12A		Anode at sprocket hole side		Fig.3
			T-15A		Anode at sprocket hole side		Fig.5
			※T-16A		Anode at sprocket hole side		Fig.5
DO-34	Axial	52mm wide	◆T-72	Ammo box	–	5,000	Fig.1
			T-73	Tape & reel	–		Fig.1
		26mm wide	◆T-77	Ammo box	–	5,000	Fig.2
	Radial	5mm pitch horizontal	T-91	Ammo box	Cathod at sprocket hole side	2,500	Fig.7
			T-90	Cassette reel	Cathod at sprocket hole side		Fig.7
			T-14	Open reel	Cathod at sprocket hole side	2,500	Fig.7
			T-14A		Anode at sprocket hole side		Fig.7
			T-14Y		Anode at sprocket hole side		Fig.8
		2.5mm pitch vertical	T-95	Ammo box	Cathod at sprocket hole side	2,500	Fig.9
			T-94	Cassette reel	Cathod at sprocket hole side		Fig.9
			T-13	Open reel	Cathod at sprocket hole side	2,500	Fig.9
			T-13A		Anode at sprocket hole side		Fig.9
USD	Axial	52mm wide	T-72	Ammo box	–	5,000	Fig.1
			T-73	Tape & reel	–		Fig.1
		26mm wide	T-77	Ammo box	–	5,000	Fig.2
DO-41	Axial	52mm wide	T-81	Ammo box	–	2,500	Fig.1
			T-86	Tape & reel	–		Fig.1
		26mm wide	T-82	Ammo box	–	2,500	Fig.2
	Radial	5mm pitch lengthwise	T-93	Ammo box	Cathod at sprocket hole side	2,000	Fig.4
			※T-93X		Cathod at sprocket hole side		Fig.4
			T-92	Cassette reel	Cathod at sprocket hole side	2,000	Fig.4
			T-92A		Anode at sprocket hole side		Fig.4
			※T-92X		Cathod at sprocket hole side		Fig.4
			※T-92AX		Anode at sprocket hole side		Fig.4
			T-20	Open reel	Cathod at sprocket hole side	2,500	Fig.4
			T-20A		Anode at sprocket hole side		Fig.4
			※T-21		Cathod at sprocket hole side		Fig.4
			※T-21Y		Anode at sprocket hole side		Fig.5
			T-22Y	Cassette reel	Anode at sprocket hole side	2,000	Fig.5
MSR	Axial	52mm wide	T-31	Ammo box	–	2,500	Fig.1
			T-36	Tape & reel	–		Fig.1
		26mm wide	T-32	Ammo box	–	2,500	Fig.2
	Radial	With stopper	T-61	Reel	Cathod at sprocket hole side	2,000	Fig.10
			T-62	Ammo box	Cathod at sprocket hole side		Fig.10
		Without stopper	T-63	Reel	Cathod at sprocket hole side	2,000	Fig.11
			T-64	Ammo box	Cathod at sprocket hole side		Fig.11
			T-63Y	Reel	Anode at sprocket hole side		Fig.12

Notes : 1. ※With Insulating coating
2. Available codes for ◆ are only those prefixed with LTZ-MR15.

(Unit : mm)

Axial taping

Fig.1

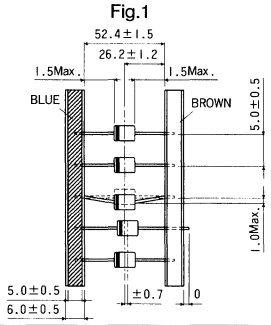
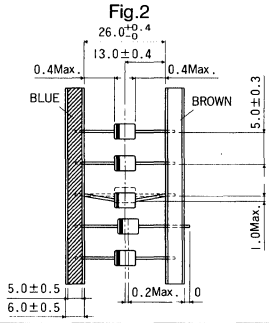


Fig.2



(Unit : mm)

Radial taping (Reference)

Fig.3

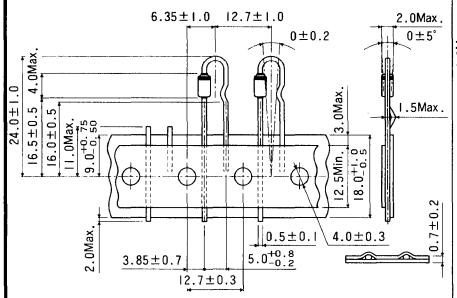


Fig.4

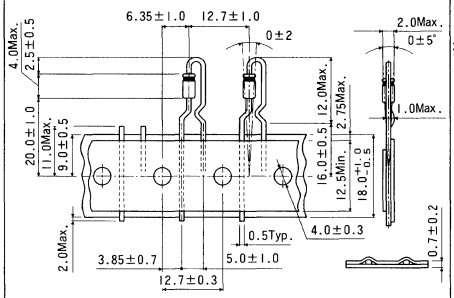


Fig.5

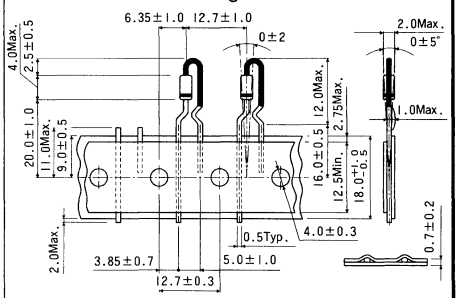


Fig.6

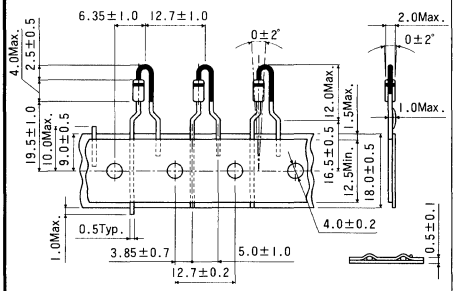


Fig.7

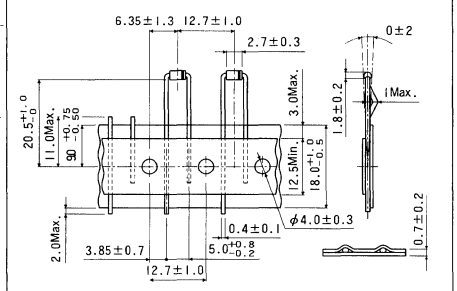


Fig.8

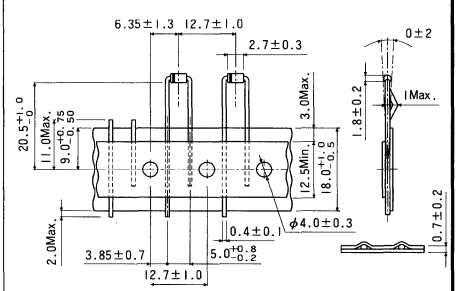


Fig.9

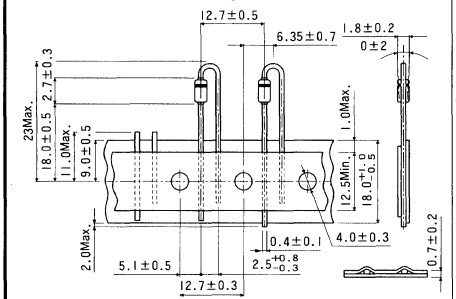


Fig.10

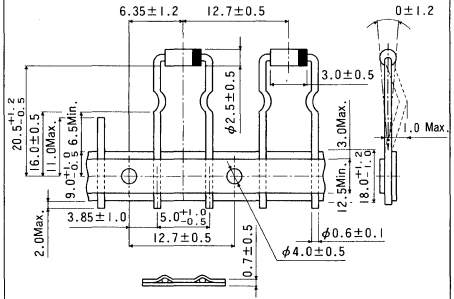


Fig.11

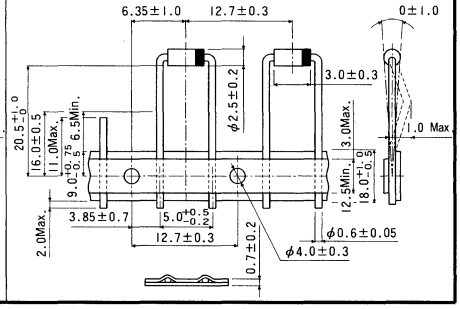
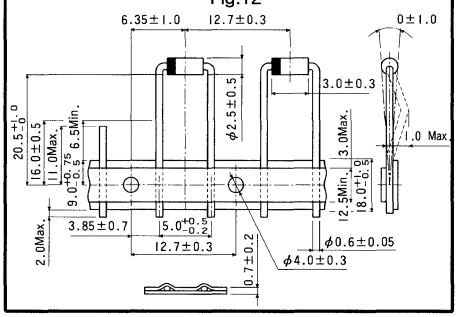


Fig.12



Note : For exact dimensions of packages, consult us.

The Class and Basic Ordering Units for Standard and Semi-standard Products

■Standard Products, Semi-standard Products,

To make it easier for customers to select the most suitable products for their needs, we offer diodes in three types : (1) standard, and (2) semi-standard.

(1) Standard products

These products are in stock and ready for delivery.

(2) Semi-standard products

Theses products require acertain a mount of time to fill an order. Please consult us for delivery term.

●Please note the following when placing an order.

The quantity in an order must be in multiplies of the basic order unit.

●Introductory remarks

◎ : Standard products

○ : Semi-standard products

●Taping

DO-35

Part No.	Packaging type	Axial taping			Radial taping															
		52mm wide		26mm wide	5mm pitch box						5mm pitch cassette reel								5mm open reel	
	Code	T-72	T-73	T-77	T-83	T-85	T-88	T-84	T-87	T-87Y	T-10	T-10A	T-11	T-11A	T-12	T-12A	T-80	T-80A	T-15A	T-16A
	Basic ordering unit (pcs)	5,000	5,000	5,000	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
1S2473		◎	○	◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1S2787		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1S2472		◎	○	◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS41		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1S2471		◎	○	◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS94		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS93		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS92		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS141		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS140		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS139		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS144		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS143		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS245		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS142		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4148		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N914		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4149		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N916		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4150		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N3600		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4151		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N3604		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4152		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N3605		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4153		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N3606		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4154		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4446		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N914A		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4447		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N916A		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4448		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N914B		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4449		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N916B		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4450		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4454		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N3064		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4606		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N7[ ]		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N5[ ]		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N9[ ]		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

◎ : Standard products ○ : Semi-standard products

DO-34

Part No.	Packaging type	Axial taping			Radial taping							
		52mm wide		26mm wide	5mm pitch ammo		2.5mm pitch ammo		5mm pitch cassette reel		2.5mm pitch cassette reel	
	Code	T-72	T-73	T-77	T-90	T-91	T-94	T-95	T-14	T-14Y	T-13	T-13A
	Basic ordering unit (pcs)	5,000	5,000	5,000	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
1SS133		◎	○	◎	○	◎	○	○	○	○	○	○
1SS134		○	○	◎	○	○	○	○	○	○	○	○
1SS132		◎	○	◎	○	◎	○	○	○	○	○	○
1SS130		○	○	○	○	○	○	○	○	○	○	○
1SS131		◎	○	◎	○	○	○	○	○	○	○	○
1SS138		○	○	○	○	○	○	○	○	○	○	○
1SS137		○	○	○	○	○	○	○	○	○	○	○
1SS136		○	○	○	○	○	○	○	○	○	○	○
1SS292		○	○	○	○	○	○	○	○	○	○	○
1SS291		○	○	○	○	○	○	○	○	○	○	○
1SS290		○	○	○	○	○	○	○	○	○	○	○
1SS147		○	○	○	○	○	○	○	○	○	○	○
1SS146		○	○	○	○	○	○	○	○	○	○	○
1SS244		○	○	○	○	○	○	○	○	○	○	○
1SS145		○	○	○	○	○	○	○	○	○	○	○
1SS135		○	○	○	○	○	○	○	○	○	○	○
RB441Q		○	○	◎	–	–	–	–	–	–	–	–
RB721Q		◎	○	◎	–	–	–	–	–	–	–	–
MTZ [ ]		◎	○	◎	○	○	○	○	○	○	○	○
MTZ J [ ]		◎	○	◎	○	○	○	○	○	○	○	○
1N4531		○	○	○	○	○	○	○	○	○	○	○
1N4532		○	○	○	○	○	○	○	○	○	○	○
1N4533		○	○	○	○	○	○	○	○	○	○	○
1N4534		○	○	○	○	○	○	○	○	○	○	○
1N4536		○	○	○	○	○	○	○	○	○	○	○

◎ : Standard products ○ : Semi-standard products

★DO-34

Part No.	Packaging type	Axial taping	
		52mm wide	26mm wide
	Code	T-72	T-77
	Basic ordering unit (pcs)	2,500	2,500
LTZ-MR15		○	◎

◎ : Standard ○ : Semi-standard
★Large glass tube

USD

Part No.	Packaging type	Axial taping		
		52mm wide		26mm wide
	Code	T-72	T-73	T-77
	Basic ordering unit (pcs)	5,000	5,000	5,000
1SS254		◎	○	◎
1SS253		○	○	○
1SS252		○	○	○
1SS265		○	○	○

◎ : Standard products ○ : Semi-standard products

DO-41

Part No.	Packaging type	Axial taping			Radial taping										
		52mm wide		26mm wide	5mm pitch lengthwise										
	Code	T-81	T-86	T-82	T-20	T-20A	T-21	T-21Y	T-22Y	T-92	T-92A	T-92X	T-92AX	T-93	T-93X
	Basic ordering unit (pcs)	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,000	2,000	2,000	2,000	2,000	2,000
1SR35-100A		◎	○	◎	○	○	○	○	○	○	○	○	○	○	○
1SR35-200A		◎	○	◎	○	○	○	○	○	○	○	○	○	○	○
1SR35-400A		◎	○	◎	○	○	○	○	○	○	○	○	○	○	○
1N4001A		○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4002A		○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4003A		○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4004A		○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SR124-100A		◎	○	◎	○	○	○	○	○	○	○	○	○	○	○
1SR124-200A		◎	○	◎	○	○	○	○	○	○	○	○	○	○	○
1SR124-400A		◎	○	◎	○	○	○	○	○	○	○	○	○	○	○

◎ : Standard products ○ : Semi-standard products

MSR

Part No.	Packaging type	Axial taping			Radial taping				
		52mm wide		26mm wide	5mm pitch with hook		5mm pitch without hook		
	Code	T-31	T-36	T-32	T-61	T-62	T-63	T-64	T-63Y
	Basic ordering unit (pcs)	2,500	2,500	2,500	2,000	2,000	2,000	2,000	2,000
1SR139-100		◎	○	◎	○	◎	○	○	○
1SR139-200		◎	○	◎	○	◎	○	○	○
1SR139-400		◎	○	◎	○	○	○	○	○
1SR139-600		○	○	○	○	○	○	○	○
1SR153-100		○	○	○	○	○	○	○	○
1SR153-200		○	○	○	○	○	○	○	○
1SR153-400		○	○	○	○	○	○	○	○
RB100A		◎	○	◎	○	○	○	○	○

◎ : Standard products ○ : Semi-standard products

The Class and Basic Ordering Units for Standard and Semi-standard Products

●Bulk (Forming)

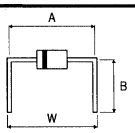
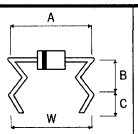
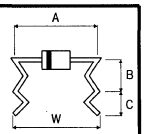
Package	Packaging type	Quantity/Package (pcs)	Quantity/Unit (pcs)
DO-35	Bulk	2,000	200
DO-34	Bulk	2,000	200
DO-41	Bulk	1,000	100
MSR	Bulk	1,000	100
USD	Bulk	2,000	200
SIP9Pin	Cube	1,000	20
TO-220FP	Tray	200	–

DO-35

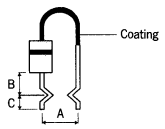
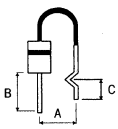
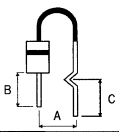
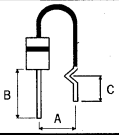
Part No.	Packaging type	Bulk	Forming (H)										Forming (V)					
			Pitch															
			8mm		10mm			12.5mm		15mm	11mm	13mm						
	Code		HO	HE	HC	HS	HJ	HL	HG	HF	HX	HA	VC	FV	VG	VE	VH	VM
	Basic ordering unit (pcs)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	1,000	1,000	2,000	2,000	2,000
1S2473		◎	○	◎	○	◎	◎	○	○	○	○	○	○	◎	○	◎	◎	◎
1S2787		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1S2472		◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS41		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1S2471		◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS94		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS93		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS92		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS141		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS140		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS139		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS144		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS143		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS245		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SS142		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4148		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N914		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4149		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N916		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4150		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N3600		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4151		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N3604		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4152		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

◎ : Standard products ○ : Semi-standard products

<Axial lead>

Form											
Process		HO	HE	HC	HS	HJ	HL	HG	HF	HX	HA
Dimensions (mm)	A	8.0±1.0	8.0±0.5	10.0±0.5	10.0±0.5	10.0±0.5	12.5±0.5	12.5±0.5	15.0±2.0	11.0±0.5	13.0±0.5
	B	5.0±1.0	12.0±0.5	5.0±0.5	6.0±1.0	18.0±1.0	6.0±0.5	18.0±1.0	6.0±1.0	2.5±0.3	5±0.5
	C	–	–	–	–	–	–	–	–	3.0±0.3	3.5±0.5
	W	–	–	–	–	–	–	–	–	10.0±0.5	12.5±1.0

<Radial Lead>

Form							
Process		VC	FV	VG	VE	VH	VM
Dimensions (mm)	A	5.0±0.1	5.0Typ.	9.0Typ.	7.0Typ.	8.0Typ.	8.0Typ.
	B	4.0±1.0	4.9±0.6	4.0±0.5	$5.5^{+1.0}_{-0.5}$	5.0±1.0	27.0Min.
	C	8.0±1.0	3.1±0.6	6.0±0.5	6.5±0.5	13.0±2.0	13.0±2.0
Insulation		No	Yes	Yes	Yes	Yes	Yes

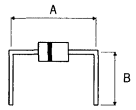
●Bulk (Forming)

DO-34

Part No.	Packaging type	Bulk	Forming (H)		
			Pitch		
			5mm		7.5mm
	Code	–	HJ	HV	HZ
	Basic ordering unit (pcs)	2,000	2,000	1,000	2,000
1SS133		◎	◎	◎	◎
1SS134		○	○	○	○
1SS132		◎	○	○	○
1SS130		◎	○	○	○
1SS131		◎	○	○	○
1SS138		○	○	○	○
1SS137		○	○	○	○
1SS136		○	○	○	○
1SS292		○	○	○	○
1SS291		○	○	○	○
1SS290		○	○	○	○
1SS147		○	○	○	○
1SS146		○	○	○	○
1SS244		○	○	○	○
1SS145		○	○	○	○
1SS135		○	○	○	○
RB441Q		○	–	–	–
RB721Q		○	–	–	–
MTZ Series		◎	○	○	○
MTZ J Series		◎	○	○	○
1N4531		○	○	○	○
1N4532		○	○	○	○
1N4533		○	○	○	○
1N4534		○	○	○	○
1N4536		○	○	○	○

◎ : Standard products ○ : Semi-standard products

<Axial lead>

Form				
Process		HJ	HV	HZ
Dimensions (mm)	A	5.0±0.5	5.0±0.5	7.5±0.5
	B	5.0±0.5	18.0±1.0	5.0±0.5

Note : ※ No radial lead type available

★DO-34

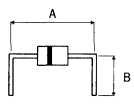
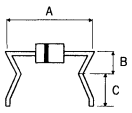
Part No.	Bulk
LTZ-MR15	2,000

MSR

Part No.	Packaging type	Bulk	Forming	
			5mm Pitch	
	Code		H02	H03
	Basic ordering unit (pcs)	1,000	1,000	1,000
1SR139-100		◎	○	○
1SR139-200		◎	○	○
1SR139-400		◎	○	○
1SR139-600		☆	☆	☆
1SR153-100		○	○	○
1SR153-200		○	○	○
1SR153-400		○	○	○
RB100A		◎	○	○

◎ : Standard products ○ : Semi-standardproducts ☆ : Under development

<Axial lead>

Form			
Process		H02	H03
Dimensions (mm)	A	5.0±0.5	14.0±0.8
	B	17.0±1.0	8.2±0.8
	C	–	3.5±0.8

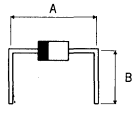
Note : ※ No radial lead type available

USD

Part No.	Packaging type	Bulk	Forming (H)			
			Pitch			
			5mm		4mm	7.5mm
	Code	–	UH01	UH02	UH03	UH05
	Basic ordering unit (pcs)	2,000	1,000	2,000	2,000	2,000
1SS254		◎	◎	◎	◎	◎
1SS253		○	○	○	○	○
1SS252		◎	○	○	○	○
1SS265		○	○	○	○	○

◎ : Standard products ○ : Semi-standard products

<Axial Lead>

Form					
Process		UH01	UH02	UH03	UH05
Dimensions (mm)	A	5.0±1.0	5.0±1.0	4.0±1.0	7.5±1.0
	B	18.0±1.0	5.0±1.0	5.0±1.0	5.0±1.0

Note : ※ No radial lead type available

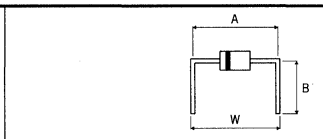
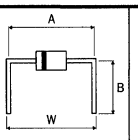
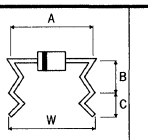
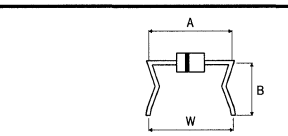
The Class and Basic Ordering Units for Standard and Semi-standard Products

DO-41

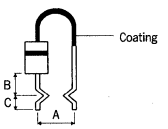
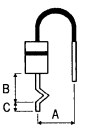
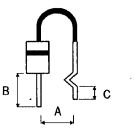
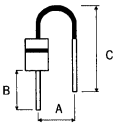
Part No.	Packaging type	Bulk	Axial Lead Forming									Radial Lead Forming				
			Pitch													
			10mm	12.5mm		15mm	11mm	12.5mm	14mm		13.5mm	6.0mm	6.5mm			
	Code		HJ	HO	HL	HT	HN	HP	HM	HD	HR	FV	VL	VJ	VS	VT
	Basic ordering unit (pcs)	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
1SR35-100A		◎	◎	○	○	○	○	○	◎	○	○	○	◎	○	○	○
1SR35-200A		◎	◎	○	○	○	○	○	○	○	○	◎	◎	○	◎	○
1SR35-400A		◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4001A		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4002A		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4003A		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1N4004A		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SR124-100A		◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SR124-200A		◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1SR124-400A		◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○

◎ : Standard products ○ : Semi-standard products

<Axial lead>

Form										
Process		HJ	HO	HL	HT	HN	HP	HM	HD	HR
Dimensions (mm)	A	10.0±1.0	12.5±0.5	12.5±0.5	15.0±0.5	11.0±0.5	12.5±1.0	14.0±1.0	14.0±1.0	13.5±1.0
	B	18.0±1.5	12.0±1.0	5.5±1.0	12.0±1.0	20.0±1.0	9.0±1.0	3.5±1.0	3.5±1.0	6.052Typ.
	C	–	–	–	–	–	4.5±1.0	3.5±0.5	5.5±1.0	4.45±1.0
	W	–	–	–	–	–	14.0±1.0	13.2±1.0	13.0±1.0	12.5±1.0

<Radial lead>

Form						
Process		FV	VL	VJ	VS	VT
Dimensions (mm)	A	6.0Typ.	6.5Typ.	6.5Typ.	6.5Typ.	6.5±1.0
	B	4.0±1.0	5.5±1.0	26.0Min.	26.0Min.	26.0Min.
	C	3.0±0.5	22.5±2.0	8.5±1.0	21±2.0	19±2.0
Insulation		Yes	Yes	Yes	Yes	Yes

Part Marking

〈Switching Diodes〉

DO-35(GSD)		DO-34(MSD)		USD	
Part No.	Marking	Part No.	Marking	Part No.	Marking
1SS41	White	1SS130	White		
1S2471	Black	1SS131	Black	1SS252	Black
1S2472	Green	1SS132	Green	1SS253	Green
1S2473	Yellow	1SS133	Yellow	1SS254	Yellow
1S2787	Brown	1SS134	Brown		
		1SS136	Violet		
		1SS137	Red		
1SS92	92 2T	1SS138	Blue		
1SS93	93 2T				
1SS94	94 2T				
Black		1SS290	W／Y		
		1SS291	W／V		
1SS139	W／W	1SS292	W／B		
1SS140	V／V	1SS145	BLK／BLK		
1SS141	BLU／BLU	1SS146	G／G		
1SS142	BLK／BLK	1SS147	BLU／BLU		
1SS143	G／G	1SS244	LB／LB		
1SS144	Y／Y	1SS135	GRY／GYR	1SS265	GRY
1SS245	LB／LB				
		1NSeries	A		
1Nseries	A				

〈Rectifier Diodes〉

DO-41(GSR)		MSR		TO220FP	
Part No.	Marking	Part No.	Marking	Part No.	Marking
1N4001A	1N4001 R	1SR139-100	2R1	R0503C-40	R0503C
1N4002A	1N4002 R	1SR139-200	2R2	R0503D-40	R0503D
1N4003A	1N4003 R	1SR139-400	2R4		
1N4004A	1N4004 R	Green			
Black		1SR153-100	2R1		
1SR35-100A	Black 2T	1SR153-200	2R2		
1SR35-200A	Blue 2T	1SR153-400	2R4		
1SR35-400A	Green 2T	Silver			
1SR124-100A	BLK／BLK				
1SR124-200A	BLU／BLU				
1SR124-400A	G／G				

〈Schottky Barrier Diodes〉

	Part No.	Marking
DO-34(MSD)	RB441Q	S 3
	RB721Q	S 1
	Black	
MSR	RB100A	2R4
	Blue	
TO220FP	RB015T-40	RB015T
	RB025T-40	RB025T

〈Zener Diodes〉

	Part No.	Marking
DO-35(GSD)	1N5000	B
	1N700	C
	1N900	D
DO-34(MSD)	MTZ Series	E
	MTZJ Series	F
	LTZ-MR15	Red
SIP9Pin	ITZ5.6H	ITZ5.6H 231

Month code

Month	1	2	3	4	5	6	7	8	9	10	11	12
Code	O	P	Q	R	S	T	U	V	W	X	Y	N

Ⓐ 1NSeries

DO-35				DO-34	
Part No.	Marking	Part No.	Marking	Part No.	Marking
1N4148	1N 41 48 R	1N914	1N 91 4 R	1N4531	3 1 R
1N4149	1N 41 49 R	1N916	1N 91 6 R	1N4532	3 2 R
1N4150	1N 41 50 R	1N3600	1N 36 00 R	1N4533	3 3 R
1N4151	1N 41 51 R	1N3604	1N 36 04 R	1N4534	3 4 R
1N4152	1N 41 52 R	1N3605	1N 36 05 R	1N4536	3 6 R
1N4153	1N 41 53 R	1N3606	1N 36 06 R		
1N4154	1N 41 54 R			Black	
1N4446	1N 44 46 R	1N914A	1N 91 4A R	3 1 R	
1N4447	1N 44 47 R	1N916A	1N 91 6A R		
1N4448	1N 44 48 R	1N914B	1N 91 4B R		
1N4449	1N 44 49 R	1N916B	1N 91 6B R		
1N4450	1N 44 50 R				
1N4454	1N 44 54 R	1N3064	1N 30 64 R		
1N4606	1N 46 06 R				
Black		IN 41 48 R			

Ⓑ 1N5000Series (DO-35)

Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking
1N5230	52 30 R	1N5230A	52 30 AR	1N5230B	52 30 BR	1N5246	52 46 R	1N5246A	52 46 AR	1N5246B	52 46 BR
1N5231	52 31 R	1N5231A	52 31 AR	1N5231B	52 31 BR	1N5247	52 47 R	1N5247A	52 47 AR	1N5247B	52 47 BR
1N5232	52 32 R	1N5232A	52 32 AR	1N5232B	52 32 BR	1N5248	52 48 R	1N5248A	52 48 AR	1N5248B	52 48 BR
1N5233	52 33 R	1N5233A	52 33 AR	1N5233B	52 33 BR	1N5249	52 49 R	1N5249A	52 49 AR	1N5249B	52 49 BR
1N5234	52 34 R	1N5234A	52 34 AR	1N5234B	52 34 BR	1N5250	52 50 R	1N5250A	52 50 AR	1N5250B	52 50 BR
1N5235	52 35 R	1N5235A	52 35 AR	1N5235B	52 35 BR	1N5251	52 51 R	1N5251A	52 51 AR	1N5251B	52 51 BR
1N5236	52 36 R	1N5236A	52 36 AR	1N5236B	52 36 BR	1N5252	52 52 R	1N5252A	52 52 AR	1N5252B	52 52 BR
1N5237	52 37 R	1N5237A	52 37 AR	1N5237B	52 37 BR						
1N5238	52 38 R	1N5238A	52 38 AR	1N5238B	52 38 BR						
1N5239	52 39 R	1N5239A	52 39 AR	1N5239B	52 39 BR						
1N5240	52 40 R	1N5240A	52 40 AR	1N5240B	52 40 BR						
1N5241	52 41 R	1N5241A	52 41 AR	1N5241B	52 41 BR						
1N5242	52 42 R	1N5242A	52 42 AR	1N5242B	52 42 BR						
1N5243	52 43 R	1N5243A	52 43 AR	1N5243B	52 43 BR						
1N5244	52 44 R	1N5244A	52 44 AR	1N5244B	52 44 BR						
1N5245	52 45 R	1N5245A	52 45 AR	1N5245B	52 45 BR						
						Black		52 3O AR			

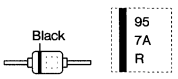
Ⓒ 1N700Series (DO-35)

Part No.	Marking	Part No.	Marking
1N746	74 6 R	1N746A	74 6A R
1N747	74 7 R	1N747A	74 7A R
1N748	74 8 R	1N748A	74 8A R
1N749	74 9 R	1N749A	74 9A R
1N750	75 0 R	1N750A	75 0A R
1N751	75 1 R	1N751A	75 1A R
1N752	75 2 R	1N752A	75 2A R
1N753	75 3 R	1N753A	75 3A R
1N754	75 4 R	1N754A	75 4A R
1N755	75 5 R	1N755A	75 5A R
1N756	75 6 R	1N756A	75 6A R
1N757	75 7 R	1N757A	75 7A R
1N758	75 8 R	1N758A	75 8A R
1N759	75 9 R	1N759A	75 9A R
Black		74 6A R	

Part Marking

Ⓓ 1N900Series

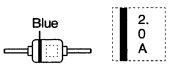
Part No.	Marking	Part No.	Marking	Part No.	Marking
1N957	95 7 R	1N957A	95 7A R	1N957B	95 7B R
1N958	95 8 R	1N958A	95 8A R	1N958B	95 8B R
1N959	95 9 R	1N959A	95 9A R	1N959B	95 9B R
1N960	96 0 R	1N960A	96 0A R	1N960B	96 0B R
1N961	96 1 R	1N961A	96 1A R	1N961B	96 1B R
1N962	96 2 R	1N962A	96 2A R	1N962B	96 2B R
1N963	96 3 R	1N963A	96 3A R	1N963B	96 3B R
1N964	96 4 R	1N964A	96 4A R	1N964B	96 4B R
1N965	96 5 R	1N965A	96 5A R	1N965B	96 5B R
1N966	96 6 R	1N966A	96 6A R	1N966B	96 6B R
1N967	96 7 R	1N967A	96 7A R	1N967B	96 7B R
1N968	96 8 R	1N968A	96 8A R	1N968B	96 8B R
1N969	96 9 R	1N969A	96 9A R	1N969B	96 9B R
1N970	97 0 R	1N970A	97 0A R	1N970B	97 0B R



Ⓔ MTZSeries

Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking
MTZ 2.0A	2.0 A	MTZ 2.0B	2.0 B			MTZ 12A	12 A	MTZ 12B	12 B	MTZ 12C	12 C		
MTZ 2.2A	2.2 A	MTZ 2.2B	2.2 B			MTZ 13A	13 A	MTZ 13B	13 B	MTZ 13C	13 C		
MTZ 2.4A	2.4 A	MTZ 2.4B	2.4 B			MTZ 15A	15 A	MTZ 15B	15 B	MTZ 15C	15 C		
MTZ 2.7A	2.7 A	MTZ 2.7B	2.7 B			MTZ 16A	16 A	MTZ 16B	16 B	MTZ 16C	16 C		
MTZ 3.0A	3.0 A	MTZ 3.0B	3.0 B			MTZ 18A	18 A	MTZ 18B	18 B	MTZ 18C	18 C		
MTZ 3.3A	3.3 A	MTZ 3.3B	3.3 B			MTZ 20A	20 A	MTZ 20B	20 B	MTZ 20C	20 C	MTZ 20D	20 D
MTZ 3.6A	3.6 A	MTZ 3.6B	3.6 B										
MTZ 3.9A	3.9 A	MTZ 3.9B	3.9 B										
MTZ 4.3A	4.3 A	MTZ 4.3B	4.3 B	MTZ 4.3C	4.3 C								
MTZ 4.7A	4.7 A	MTZ 4.7B	4.7 B	MTZ 4.7C	4.7 C								
MTZ 5.1A	5.1 A	MTZ 5.1B	5.1 B	MTZ 5.1C	5.1 C								
MTZ 5.6A	5.6 A	MTZ 5.6B	5.6 B	MTZ 5.6C	5.6 C								
MTZ 6.2A	6.2 A	MTZ 6.2B	6.2 B	MTZ 6.2C	6.2 C								
MTZ 6.8A	6.8 A	MTZ 6.8B	6.8 B	MTZ 6.8C	6.8 C								
MTZ 7.5A	7.5 A	MTZ 7.5B	7.5 B	MTZ 7.5C	7.5 C								
MTZ 8.2A	8.2 A	MTZ 8.2B	8.2 B	MTZ 8.2C	8.2 C								
MTZ 9.1A	9.1 A	MTZ 9.1B	9.1 B	MTZ 9.1C	9.1 C								
MTZ 10A	10 A	MTZ 10B	10 B	MTZ 10C	10 C	MTZ 10D	10 D						
MTZ 11A	11 A	MTZ 11B	11 B	MTZ 11C	11 C								

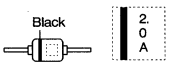
MTZSeries



Ⓕ MTZJSeries

Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking	Part No.	Marking
MTZJ 2.0A	2.0 A	MTZJ 2.0B	2.0 B			MTZJ 12A	12 A	MTZJ 12B	12 B	MTZJ 12C	12 C		
MTZJ 2.2A	2.2 A	MTZJ 2.2B	2.2 B			MTZJ 13A	13 A	MTZJ 13B	13 B	MTZJ 13C	13 C		
MTZJ 2.4A	2.4 A	MTZJ 2.4B	2.4 B			MTZJ 15A	15 A	MTZJ 15B	15 B	MTZJ 15C	15 C		
MTZJ 2.7A	2.7 A	MTZJ 2.7B	2.7 B			MTZJ 16A	16 A	MTZJ 16B	16 B	MTZJ 16C	16 C		
MTZJ 3.0A	3.0 A	MTZJ 3.0B	3.0 B			MTZJ 18A	18 A	MTZJ 18B	18 B	MTZJ 18C	18 C		
MTZJ 3.3A	3.3 A	MTZJ 3.3B	3.3 B			MTZJ 20A	20 A	MTZJ 20B	20 B	MTZJ 20C	20 C	MTZJ 20D	20 D
MTZJ 3.6A	3.6 A	MTZJ 3.6B	3.6 B			MTZJ 22A	22 A	MTZJ 22B	22 B	MTZJ 22C	22 C	MTZJ 22D	22 D
MTZJ 3.9A	3.9 A	MTZJ 3.9B	3.9 B			MTZJ 24A	24 A	MTZJ 24B	24 B	MTZJ 24C	24 C	MTZJ 24D	24 D
MTZJ 4.3A	4.3 A	MTZJ 4.3B	4.3 B	MTZJ 4.3C	4.3 C	MTZJ 27A	27 A	MTZJ 27B	27 B	MTZJ 27C	27 C	MTZJ 27D	27 D
MTZJ 4.7A	4.7 A	MTZJ 4.7B	4.7 B	MTZJ 4.7C	4.7 C	MTZJ 30A	30 A	MTZJ 30B	30 B	MTZJ 30C	30 C	MTZJ 30D	30 D
MTZJ 5.1A	5.1 A	MTZJ 5.1B	5.1 B	MTZJ 5.1C	5.1 C	MTZJ 33A	33 A	MTZJ 33B	33 B	MTZJ 33C	33 C	MTZJ 33D	33 D
MTZJ 5.6A	5.6 A	MTZJ 5.6B	5.6 B	MTZJ 5.6C	5.6 C	MTZJ 36A	36 A	MTZJ 36B	36 B	MTZJ 36C	36 C	MTZJ 36D	36 D
MTZJ 6.2A	6.2 A	MTZJ 6.2B	6.2 B	MTZJ 6.2C	6.2 C	MTZJ 39A	39 A	MTZJ 39B	39 B	MTZJ 39C	39 C	MTZJ 39D	39 D
MTZJ 6.8A	6.8 A	MTZJ 6.8B	6.8 B	MTZJ 6.8C	6.8 C								
MTZJ 7.5A	7.5 A	MTZJ 7.5B	7.5 B	MTZJ 7.5C	7.5 C								
MTZJ 8.2A	8.2 A	MTZJ 8.2B	8.2 B	MTZJ 8.2C	8.2 C								
MTZJ 9.1A	9.1 A	MTZJ 9.1B	9.1 B	MTZJ 9.1C	9.1 C								
MTZJ 10A	10 A	MTZJ 10B	10 B	MTZJ 10C	10 C	MTZJ 10D	10 D						
MTZJ 11A	11 A	MTZJ 11B	11 B	MTZJ 11C	11 C								

MTZJSeries



Light Emitting Diodes

■Product Designation

ROHM LED product designation system consists of three parts, ①, ② and ③, as shown below in the examples.

●LED Lamps (bulk)

(Example 1) SLR-54VR 3 F
① ② ③

① Type name
② Pin forming code
③ Luminance classification code

●LED Lamps (on tape reels)

(Example 2) SLR-54VR A 49
① ② ③

① Type name
② Forming of lead frame terimal
③ Taping size (in control No.)

●Displays

(Example 3) LA-301VK
①

① Type name

Note : Products with special specifications may require special ordering designations other than the above.

■Standard products • Semi-standard products • Custom

To make it easier for the customer to select the type of product best suitable for the application, we offer types of Light Emitting Diodes :
(1) standard, (2) semi-standard and (3) custom

(1) Standard products

Standard products are available upon request.

(2) Semi-standard products

These products require a certain amount of time to fill an order. Please consult us for delivery date.

(3) Custom

Custom products are developed and manufactured to specifications prescribed by the customer. These are special specification products, require more time to deliver than do semi-standard products. Please ask us for delivery date.

●Please note the following when placing an order.

The amount of an order must be in multiples of the basic order unit.

●Introductory remarks

◎ : Standard products
○ : Semi-standard products
△ : Custom

High luminance chip LEDs with reflector

Can be used on automatic placemant machine.
The reflector assures flat viewing characteristics and high luminance.

Part No.	Emitting color	Emitting material	λp (nm)	Basic ordering unit	Quantity /package	Quantity /bag	Rank
SML-010LT	Red	GaAlAs	660	2,500	2,500	2,500	◎
SML-010VT		GaAsP on GaP	650				
SML-010DT	Orange		610				
SML-010YT	Yellow		585				
SML-010MT	Green	GaP	563				
SML-010PT	Pure Green		555				

◎ : Standard products

●Product Designation

S	M	L	0	1	0	V	T	T	8	7

Shape Type
Chip LED with reflector

Number of Chips

Emitting color

L	Brirhtness Red 660nm
V	Red 650nm (Typ.)
D	Orange 610nm (Typ.)
Y	Yellow 585nm (Typ.)
M	Green 563nm (Typ.)
P	Pure Green 555nm

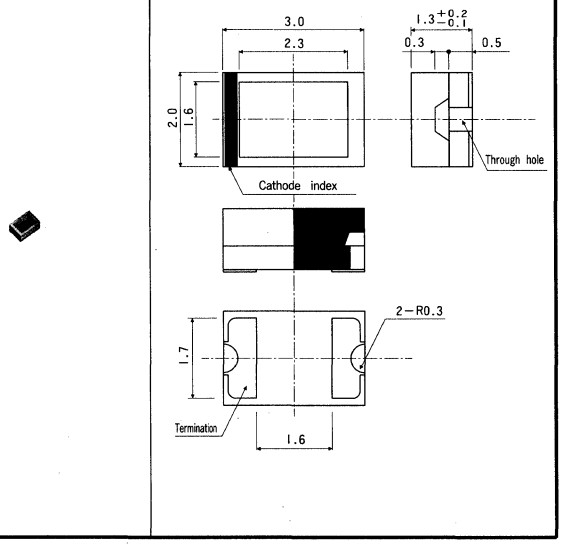
Resin color
Colored Clear

Taping

T86	Cathode right
T87	Cathode left

(Unit : mm)

SLM-010



Molded package chip LEDs

Mini molded packages can be mounted using an automatic placement machine. Best suitable for flat display backlight such as on a portable telephone.

●Product Designation

S L M — 1 3 V W

Shape Type

M	Mini-mold
N	New Mini-mold

Number of Chips

1	1-element lamp
2	2-element lamp

Lamp Shape

Emitting Color

R	Red 700nm
L	Brirhtness Red 660nm
V	Red 650nm (Typ.)
D	Orange 610nm (Typ.)
Y	Yellow 585nm (Typ.)
M	Green 563nm (Typ.)
P	Pure Green 555nm

Single color : 1 Letter, Two colors : 2 Letters

Lens Color

R	Red Colored Diffused
Y	Yellow Colored Diffused
G	Green Colored Diffused
W	Milky White
C	Colored Clear
T	Transparent Clear

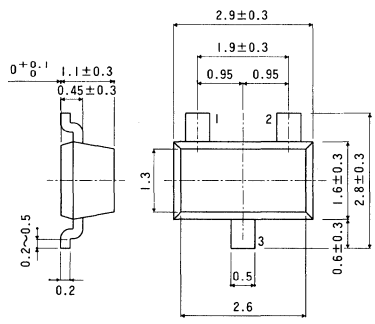
●Surface Mounted LEDs

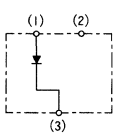
Emitter surface size (mm)	Lens	Part No.	Emitting color	Emitting material	λp (nm)	Basic ordering unit	Quantity /package	Quantity /bag	Rank
1.6×2.9	Diffused milky white	**SLM-13VW**	Red	GaAsP on GaP	650	3,000	3,000	100	○
		SLM-13DW	Orange		610				
		SLM-13YW	Yellow		585				
		SLM-13MW	Green	GaP	563				
		SLM-23VDW	Red／Orange	GaAsP on GaP ／ GaAsP on GaP	650／610	3,000	3,000	100	○
		SLM-23DYW	Orange／Yellow		610／585				
		SLM-23VMW	Red／Green	GaAsP on GaP ／ GaP	650／563				
		SLM-23DMW	Orange／Green		610／563				

○ : Semi-standard products

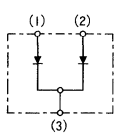
(Unit : mm)

SLM-13 SLM-23





SLM-13 series



SLM-23 series

Chip LEDs
LED
Packaging
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Packaging specifications
Page 219

Chip LEDs (SLM・SLN)

Molded package chip LEDs

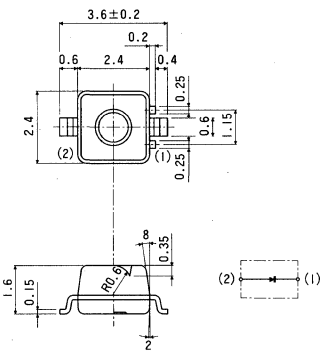
●High Luminance Type Surface Mounted LEDs With Lens

Emitter surface size (mm)	Lens	Part No.	Emitting color	Emitting material	λp (nm)	Basic ordering unit	Quantity /package	Quantity /bag	Rank
φ1.2	Diffused milky white	**SLM-1251VW**	Red	GaAsP on GaP	650	2,500	2,500	2,500	◎
		SLM-1251DW	Orange		610				
		SLM-1251YW	Yellow		585				
		SLM-1251MW	Green	GaP	563				
φ1.2	Diffused milky white	**SLM-245LMW**	Red／Green	GaAlAs／GaP	660／563	2,500	2,500	2,500	○

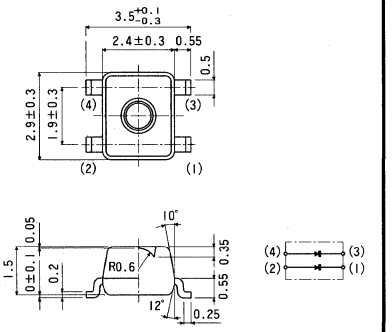
◎ : Standard products ○ : Semi-standard products

(Unit : mm)

SLM-1251



SLM-245



●Mini Molded LEDs

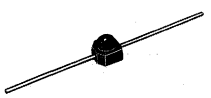
Emitter surface size (mm)	Lens	Part No.	Emitting color	Emitting material	λp (nm)	Basic ordering unit	Quantity /package	Quantity /bag	Rank
φ1.8	Transparent clear	**SLN-210LT**	Red	GaAlAs	660	1,000	1,000	200	○
		SLN-210VT		GaAsP on GaP	650				
	Colored clear	**SLN-210RC**		GaP	700				
		SLN-210VC		GaAsP on GaP	650				
	Transparent clear	**SLN-210DT**	Orange		610				
	Colored clear	**SLN-210DC**							
	Transparent clear	**SLN-210YT**	Yellow		585				
	Colored clear	**SLN-210YC**							
		SLN-210GYC		GaP	570				
	Transparent clear	**SLN-210MT**	Green	GaP	563				
	Colored clear	**SLN-210MC**							
		SLN-210PC	Pure Green		555				

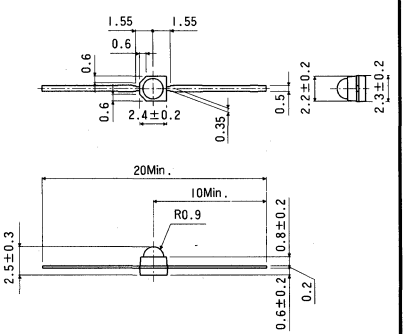
Note : Various taping and forming products are available.

○ : Semi-standard products

(Unit : mm)

SLN-210





Chip LEDs

●Packaging

	Applicable Types	Quantity/Package (pcs)
Reel taping	SML-010	2,500
	SLM-13/23	3,000
	SLM-1251/245	2,500
Axial taping	SLN-210	2,000

①Chip LED type name
②Taping code

Note : Taping code for SLM-1251 is T86.

Reel taping code

SML1251LTT86
SML1251LWT86

SML-010VT **T87**
① ②

SLM-1251VW **T87**
① ②

SLM-245LMW **T84L**
① ②

Axial taping code

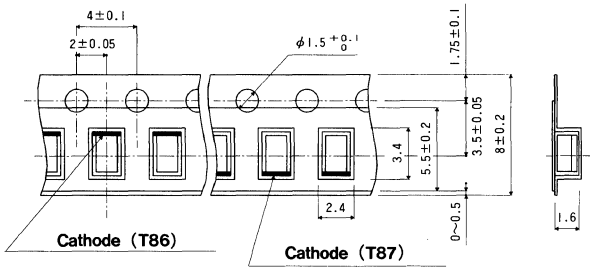
SLN-210VC **T12**
① ②

●Packaging specifications

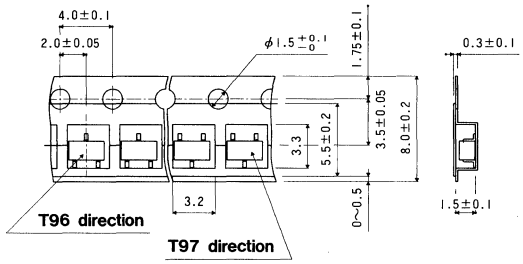
(Unit : mm)

Taping

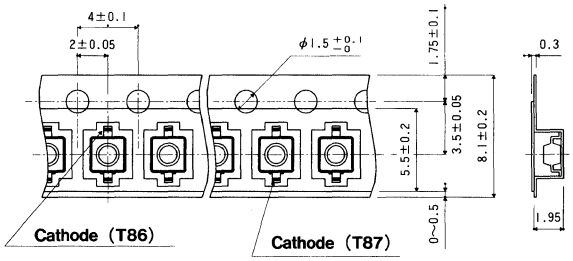
SML-010 (T86 • T87)



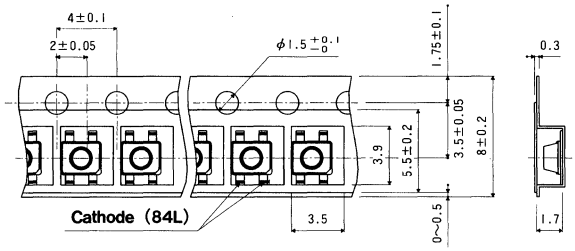
SLM-13/23 (T96 • T97)



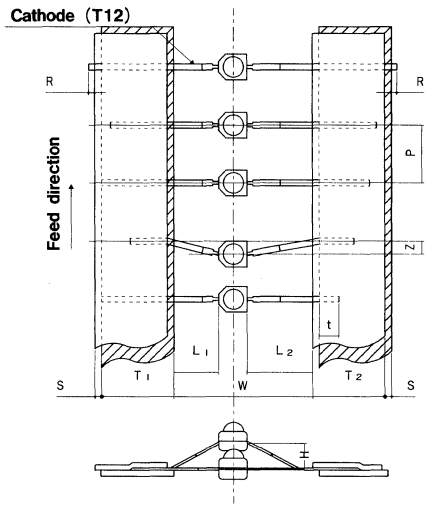
SLM-1251 (T86 • T87)



SLM-245 (T84L)



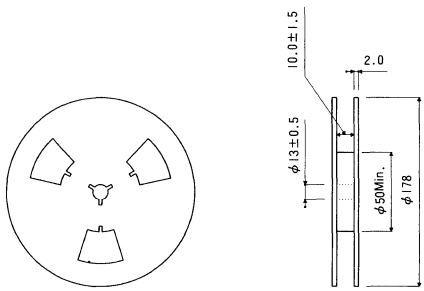
SLN-210 (T12)



W	P	L_2-L_1	T_1	T_2	Z	R	t	S	H
$26^{+1.5}_{-0}$	5±0.5	1Max.	6	5	1.2Max.	Note) 1	3.2Min.	1.2Max.	2.5Max.

Note : Lead terminals shall not exceed tape edges.

Reel



LED Indicator Lamps (SLA・SLR)

Direct mount LED lamps

Lead pitch of 2.5mm and 5mm allow direct mount on PCB by using an automatic placement machine.
Direct mount lamps won't fall down.

●Product Designation

2.5mm pitch

3 digits **Lamp Shape**

S L R - 3 4 2 V R F

Number of Chips

L	1-element lamp

Shape Type

A	Reflection
R	Reflection

Emitting Color

L	Brightness Red 660nm (Single hetero)
V	Red 650nm (Typ.)
U	Amber 635nm
D	Orange 610nm (Typ.)
Y	Yellow 585nm (Typ.)
M	Green 563nm (Typ.)
P	Pure Green 555nm (Typ.)

Lens Color

R	Red Colored Diffused
U	Orange Colored Diffused
Y	Yellow Colored Diffused
G	Green Colored Diffused
W	Milky White
C	Colored Clear
T	Transparent Clear

Terminal process shape and lead frame shape

3F	Straight
5F	Cathode index and stopper
F□□	Type 3 (straight) forming taping type
A□□	Type 3 (straight) straight type
E□□	Type 5 (with cathode index and stopper) straight type

5mm pitch

3 digits **Lamp Shape**

S L R - 3 2 5 V R A 4 7

Number of Chips

L	1-element lamp

Shape Type

R	Reflection
C	Cylinder

Emitting Color

L	Brightness Red 660nm (Single hetero)
V	Red 650nm (Typ.)
U	Amber 635nm
D	Orange 610nm (Typ.)
Y	Yellow 585nm (Typ.)
M	Green 563nm (Typ.)

Lens Color

R	Red Colored Diffused
U	Orange Colored Diffused
Y	Yellow Colored Diffused
G	Green Colored Diffused
W	Milky White
C	Colored Clear
T	Transparent Clear

Terminal process shape and lead frame shape

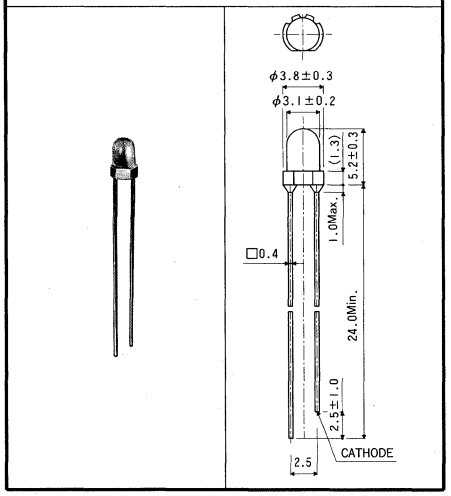
A□□	Type 3 (straight) straight type

●High luminance reflector types (SLA)

	Emitter surface size (mm)	Lens	Part No.	Emitting color	Emitting material	λp (nm)	Basic ordering unit	Quantity/package	Quantity/bag	Rank
	φ3	Transparent clear	**SLA-362LT**	Red	GaAlAs	660	2,000	2,000	100	○
			SLA-362MT	Green	GaP	563				

(Unit : mm)

SLA-362



●Reflector types (SLR)

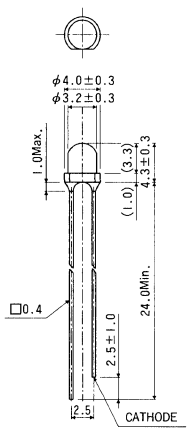
Type	Emitter surface size (mm)	Series name	Lens \ Emitting color / Emitting material / λp (nm)	Red GaAlAs 660	Red GaAsP on GaP 650	Amber GaAsP on GaP 635	Orange GaAsP on GaP 610	Yellow GaAsP on GaP 585	Green GaP 563	Pure Green GaP 555	Basic ordering unit	Quantity /package	Quantity /bag	Rank
Reflector types	φ3.2	SLR-332	Transparent clear		VT	UT	DT	YT	MT	PT	2,000	2,000	100	◎
			Colored clear		VC		DC	YC	MC	PC				
			Colored diffused		VR		DU	YY	MG					
			Milky white											
	φ3.1	SLR-342	Transparent clear	LT※3	VT	UT	DT	YT	MT	PT	2,000	2,000	100	◎
			Colored clear	LC※3	VC	UC	DC	YC	MC	PC				
			Colored diffused	LR※3	VR	UR	DU	YY	MG	PG				
			Milky white	LW※3	VW	UW	DW	YW	MW					
	φ3.2	SLR-325	Transparent clear								2,000 (Straight taping only)	2,000	–	◎
			Colored clear		VC		DC	YC	MC					
			Colored diffused	LR	VR			YY	MG					
			Milky white											
	φ5.0	SLR-505	Transparent clear								2,000 (Straight taping only)	2,000	–	◎
			Colored clear		VC		DC		MC					
			Colored diffused	LR	VR			YY	MG					
			Milky white											

Note : ※3 Need a certain lead time for delivery.

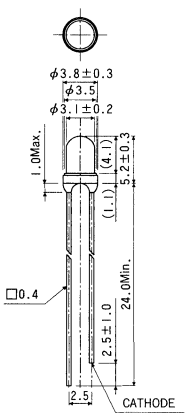
◎ : Standard products

(Unit : mm)

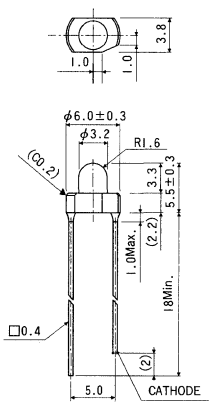
SLR-332



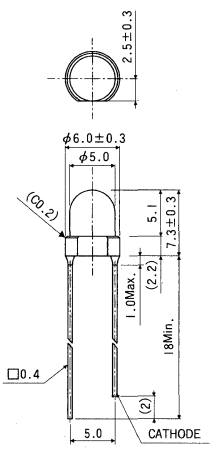
SLR-342



SLR-325



SLR-505



LED Indicator Lamps (SLC)

Direct mount LED lamp

●Cylindrical types (SLC)

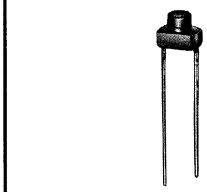
Type	Emitter surface size (mm)	Series name	Lens \ Emitting color	Red		Amber	Orange	Yellow	Green	Pure Green	Basic ordering unit	Quantity /package	Quantity /bag	Rank
			Emitting material	GaAlAs	GaAsP on GaP	GaAsP on GaP	GaAsP on GaP	GaAsP on GaP	GaP	GaP				
			λp (nm)	660	650	635	610	585	563	555				
Cylind-rical types	φ3.2	SLC-325	Transparent clear								2,000 (Straight taping only)	2,000	–	○
			Colored clear		VC		DC	YC	MC					
			Colored diffused											
			Milky white											
	φ5.0	SLC-505	Transparent clear								2,000 (Straight taping only)	2,000	–	○
			Colored clear		VC		DC	YC	MC					
			Colored diffused											
			Milky white											

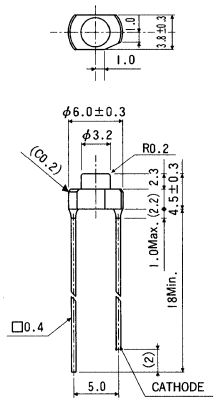
Note : ※3 Need a certain lead time for delivery.

○ : Semi-standard products

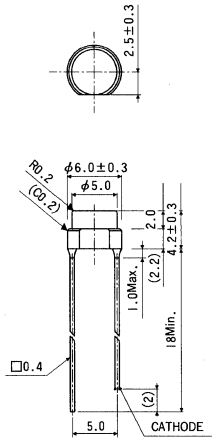
(Unit : mm)

SLC-325





SLC-505



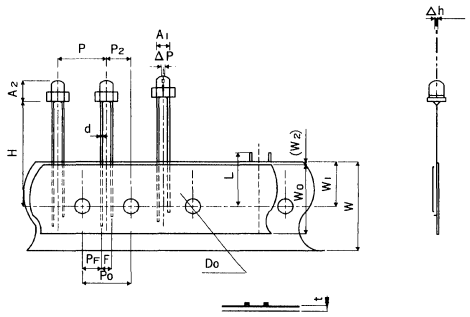
●Taping condition

Applicable types	Quantity／Package (pcs)
SLA-362	2000
SLC-325／505	
SLR-325／332／342／505	

●Taping specifications

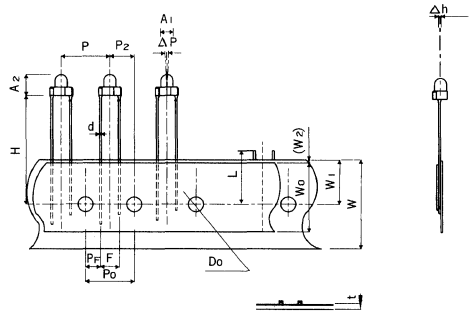
Straight type (Lead pitch : 2.5mm)

φ3 Type

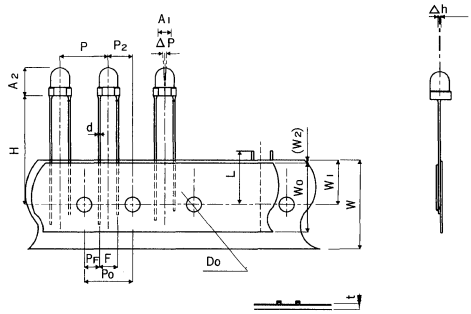


Straight type (Lead pitch : 5mm)

φ3 Type



φ5 Type



(Unit : mm)

Item	Symbol	Straight type (Lead pitch : 2.5mm)	Straight type (Lead pitch : 5.0mm)		Remarks
		φ3 Type	φ3 Type	φ5 Type	
Luminous emitting surface	A_1	※	φ3.2±0.2	φ5.0±0.2	Dimensions vary with type
Body length	A_2	※	※	※	
Inter-unit pitch	P	12.7±1.0	12.7±1.0		
Feed hole pitch	P_0	12.7±0.3	12.7±0.3		
Feed hole position (1)	P_2	6.35±0.4	6.35±0.4		
Accumulated feed hole pitch error	P20	1.0Max.	1.0Max.		As per 20 holes
Lead diameter	d	□0.4±0.1	□0.4±0.1		Not including burrs
Lead-to-lead distance	F	2.5±0.8	5.0±0.8		
Unit height	H	※	18.0±1.0		
Base tape width	W	18.0	18.0		
Top film width	W_0	13.0±0.3	13.0±0.3		
Feed hole position (2)	W_1	9.0±0.5	9.0±0.5		
Top film position	W_2	0～0.5	0～0.5		
Base tape thickness	t	0.7±0.2	0.7±0.2		
Unit tilt (1)	Δh	0±1.0	0±1.0		
Unit tilt (2)	ΔP	0±0.5	0±0.5		
Defective unit cutoff position	L	11.0Max.	11.0Max.		
Frame position	P_F	5.1±0.8	3.85±0.8		
Feed hole diameter	D_0	φ4.0±0.2	φ4.0±0.2		

Note : ※See dimension of each product

LED Indicator Lamps (SLA)

Ultra-high Luminance LEDs

ROHM ultra-high luminance LED lamps are divided into three types in terms of directivity and have a wide range of applications, e.g. on-vehicle devices (indicator, high mount stop lamp) and outdoor use (signs on road and station and advertisements).

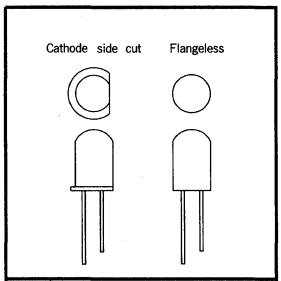
●High luminance reflector types (SLA)

	Emitter surface size (mm)	Lens	Part No.	Emitting color	Emitting material	λp (nm)	Basic ordering unit	Quantity/package	Quantity/bag	Rank
Ultra-high luminance	φ3	Transparent clear	**SLA-380LT/JT**※3	Red	GaAlAs	660	2,000	2,000	100	○
			SLA-380MT※3	Green	GaP	563				
	φ5	Transparent clear	**SLA-580LT/JT**※3	Red	GaAlAs	660	1,000	1,000	100	○
			SLA-580MT※3	Green	GaP	563				
			SLA-582LT/JT※3	Red	GaAlAs	660				
			SLA-582MT※3	Green	GaP	563				
High luminance (Medium directivity)	φ3	Transparent clear	**SLA-370LT/JT**※3	Red	GaAlAs	660	2,000	2,000	100	○
			SLA-370MT※3	Green	GaP	563				
	φ5	Transparent clear	**SLA-570LT/JT**※3	Red	GaAlAs	660	1,000	1,000	100	○
			SLA-570MT※3	Green	GaP	563				
			SLA-572LT/JT※3	Red	GaAlAs	660				
			SLA-572MT※3	Green	GaP	563				
High luminance (Wide directivity)	φ3	Transparent clear	**SLA-360LT/JT**※3	Red	GaAlAs	660	2,000	2,000	100	○
			SLA-360MT※3	Green	GaP	563				
	φ5	Transparent clear	**SLA-560LT/JT**※3	Red	GaAlAs	660	1,000	1,000	100	○
			SLA-560MT※3	Green	GaP	563				
			SLA-562LT/JT※3	Red	GaAlAs	660				
			SLA-562MT※3	Green	GaP	563				

Note : ※3 Need a certain lead time for delivery.

○ : Semi-standard products

●Product Designation



0	Cathode side cut (5φ lamp only)
2	Flangeless (φ5 lamp only)

Flange Shape

J	Ultra Brightness Red (Double hetero) 660nm
L	Brightness Red (Single hetero) 660nm
M	Green

Emitting Color

IV Rank

SLA — 3 8 0 L T 3 F

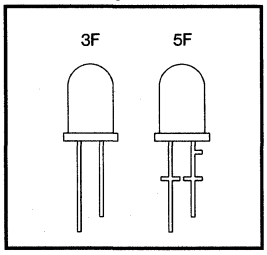
Lamp Shape (Viewing Angle)

58	φ5 Super Brightness Lamp, Lamp Viewing Angle, 2θ=12° (Typ.)
57	φ5 Lamp With Middle Viewing Angle, Lamp Viewing Angle, 2θ=25° (Typ.)
56	φ5 Lamp With Wide Viewing Angle, Lamp Viewing Angle, 2θ=40° (Typ.)
38	φ3 Super Brightness Lamp, Lamp Viewing Angle, 2θ=10° (Typ.)
37	φ3 Lamp With Middle Viewing Angle, Lamp Viewing Angle, 2θ=25° (Typ.)
36	φ3 Lamp With Wide Viewing Angle, Lamp Viewing Angle, 2θ=40° (Typ.)

Lens Color

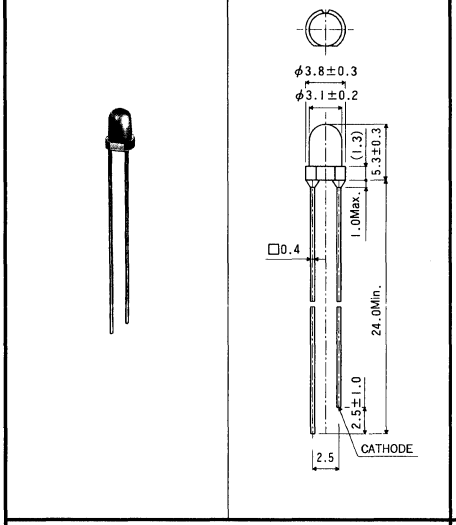
T	Transparent clear

Lead Shape

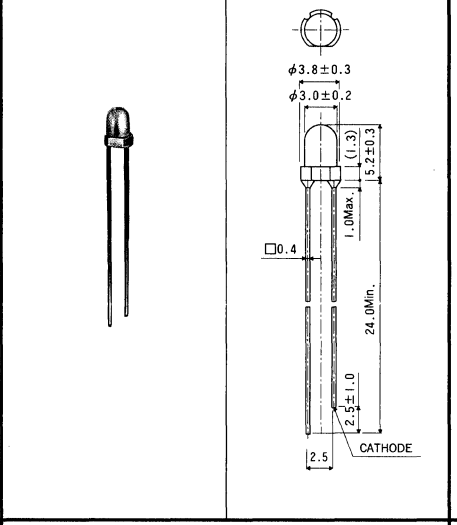


(Unit : mm)

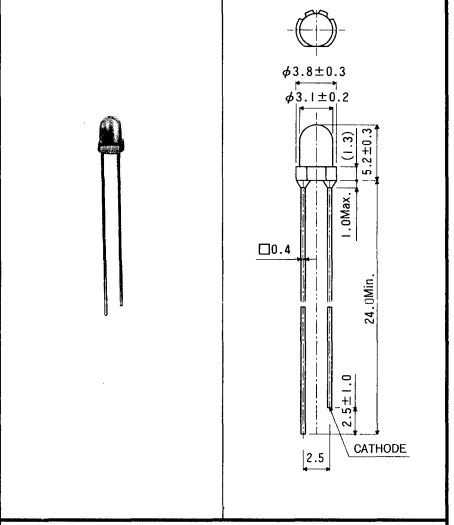
SLA-380



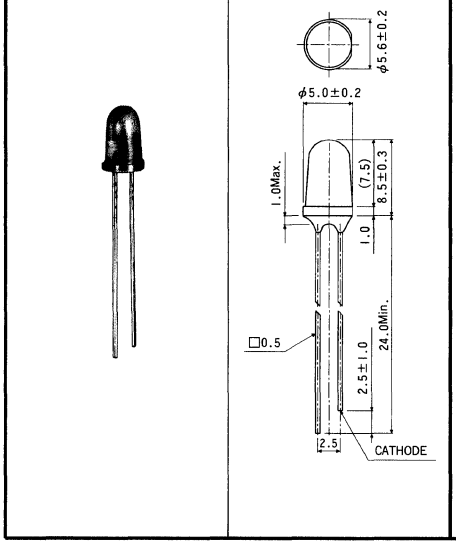
SLA-370



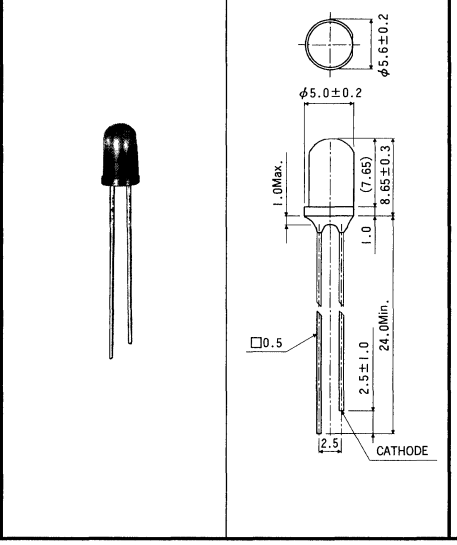
SLA-360



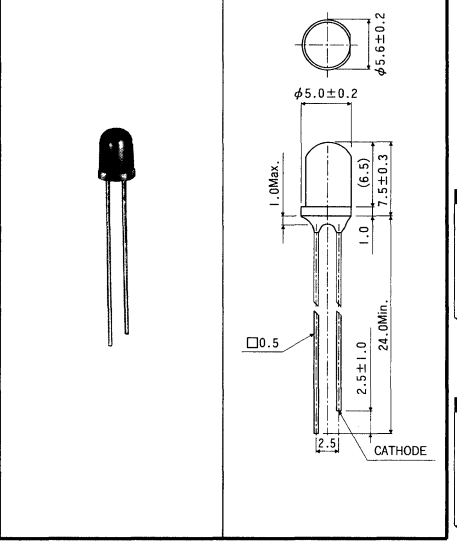
SLA-580



SLA-570

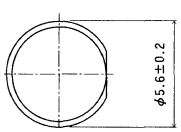


SLA-560



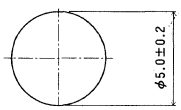
Shape of the flange

SLA-5□0



Flange cut off on the cathode side

SLA-5□2



Straight (no flange)

LED Indicator Lamps (SLR)

High luminance LED lamps

A wide range of product types are available including reflective lamps, block types and in various shapes.
The applications include pilot, bar display, flat illumination display, backlight, etc.

●Product Designation

2 or 3 Letters
Lamp Shape

S L R - 3 7 V R F

Number of Chips

L	1-element lamp
P	2-element lamp

Shape Type

R	Reflection
C	Cylinder
B	Block
J	Junction
T	Triangle
V	V-Shape

Emitting Color

R	Red 700nm
J	Super Brightness Red 660nm (Double hetero)
L	Brightness Red 660nm (Single hetero)
V	Red 650nm (Typ.)
U	Amber 635nm
D	Orange 610nm (Typ.)
Y	Yellow 585nm (Typ.)
M	Green 563nm (Typ.)
P	Pure Green 555nm (Typ.)

Single color : 1 Letter, Two colors : 2 Letters

Lens Color

R	Red Colored Diffused
U	Orange Colored Diffused
Y	Yellow Colored Diffused
G	Green Colored Diffused
W	Milky White
C	Colored Clear
T	Transparent Clear
S	Semi Colored Diffused
L	Semi Colored Clear

Terminal process shape and lead frame shape cf.P.220

3F	Straight
5F	Cathode index and stopper
F□□	Type 3 (straight) forming taping type
A□□	Type 3 (straight) straight type
E□□	Type 5 (with cathode index and stopper) straight type

●Reflector types (SLR)

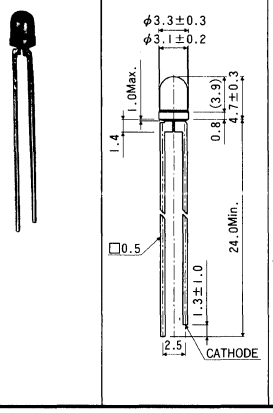
Type	Emitter surface size (mm)	Series name	Lens	Emitting color	Red		Amber	Orange	Yellow	Green	Pure Green	Basic ordering unit	Quantity /package	Quantity /bag	Rank
				Emitting material	GaAlAs	GaAsP on GaP	GaAsP on GaP	GaAsP on GaP	GaAsP on GaP	GaP	GaP				
				λp (nm)	660	650	635	610	585	563	555				
Reflector types	φ3.1	SLR-37	Transparent clear		LT※3	VT	UT	DT※3	YT	MT		2,000	2,000	100	○
			Colored clear			VC	UC	DC	YC	MC					
			Colored diffused			VR	UR	DU	YY	MG	PG				
			Milky white												
	φ3.1	SLR-38	Transparent clear							MT		2,000	2,000	100	○
			Colored clear			VC		DC		MC					
			Colored diffused			VR			YY	MG					
			Milky white												
	φ4.0	SLR-40	Transparent clear									1,000	1,000	100	○
			Colored clear			VC		DC	YC	MC					
			Colored diffused			VR	UR	DU	YY	MG					
			Milky white												
	φ4.8	SLR-47	Transparent clear									1,000	1,000	100	○
			Colored clear			VC				MC					
			Colored diffused			VR		DU	YY	MG					
			Milky white												
	φ4.8	SLR-48	Transparent clear									1,000	1,000	100	○
			Colored clear												
			Colored diffused			VR			YY	MG					
			Milky white												
	φ5.0	SLR-54	Transparent clear			VT	UT	DT	YT	MT	PT	1,000	1,000	100	◎
			Colored clear			VC		DC	YC	MC	PC				
			Colored diffused			VR	UR	DU	YY	MG					
			Milky white			VW	UW	DW	YW	MW					
	φ5.0	SLR-55	Transparent clear			VT		DT	YT	MT		1,000	1,000	100	○
			Colored clear			VC		DC	YC	MC	PC				
			Colored diffused			VR		DU	YY	MG					
			Milky white			VW		DW	YW	MW					
	φ5.0	SLR-56	Transparent clear		LT※3	VT	UT			MT		1,000	1,000	100	◎
			Colored clear			VC		DC	YC	MC	PC				
			Colored diffused			VR	UR	DU	YY	MG	PG				
			Milky white			VW	UW	DW	YW	MW					
	φ4.8	SLR-57	Transparent clear							MT		1,000	1,000	100	○
			Colored clear			VC		DC	YC	MC					
			Colored diffused			VR	UR	DU	YY	MG					
			Milky white			VW				MW					
	φ8.0	SLR-80	Transparent clear									500	500	50	○
			Colored clear												
			Colored diffused			VR※3		DU※3	YY※3	MG※3					
			Milky white												

Note : ※3 Need a certain lead time for delivery.

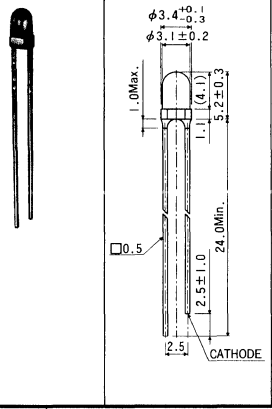
◎ : Standard products ○ : Semi-standard products

(Unit : mm)

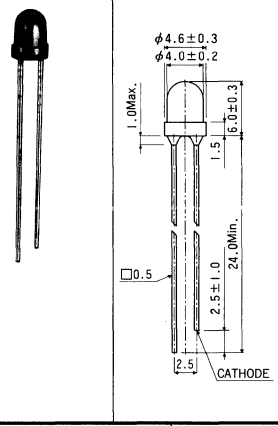
SLR-37



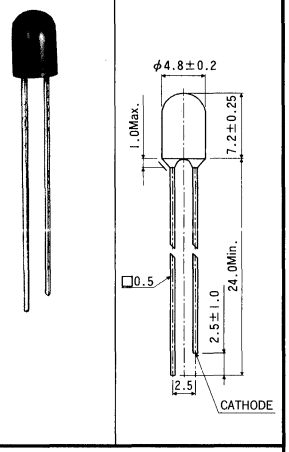
SLR-38



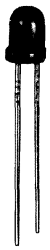
SLR-40

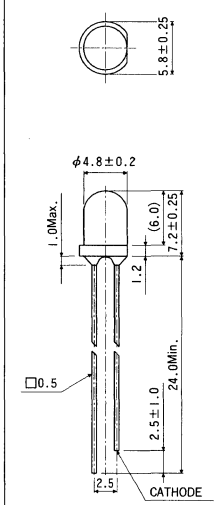


SLR-47

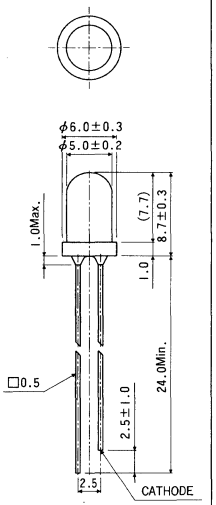


SLR-48

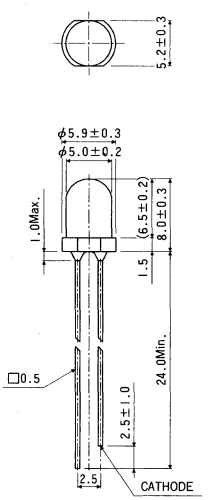




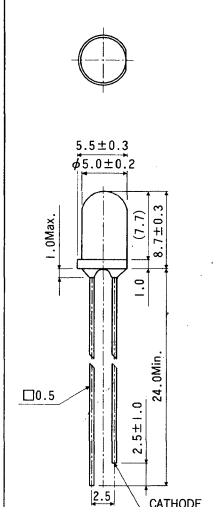
SLR-54



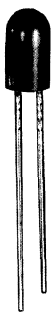
SLR-55

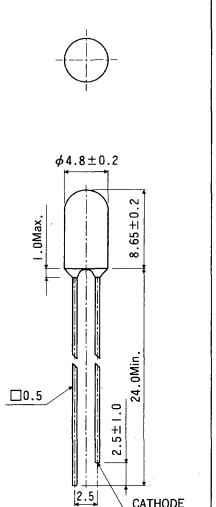


SLR-56

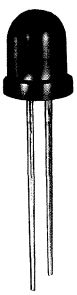


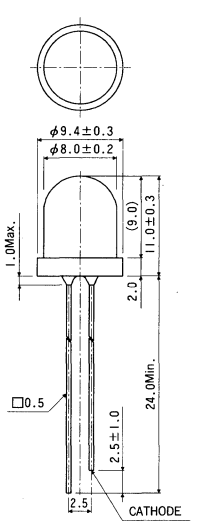
SLR-57





SLR-80





LED Indicator Lamps (SLR・SLV・SLC)

High luminance LED lamps

●Flat disc types (SLR)

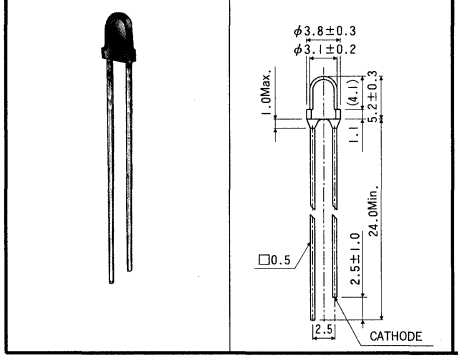
Type	Emitter surface size (mm)	Series name	Lens	Emitting color	Red		Amber	Orange	Yellow	Green	Pure Green	Basic ordering unit	Quantity /package	Quantity /bag	Rank
				Emitting material	GaAlAs	GaAsP on GaP	GaAsP on GaP	GaAsP on GaP	GaAsP on GaP	GaP	GaP				
				λp (nm)	660	650	635	610	585	563	555				
Flat disc types	φ3.1	SLR-320	Transparent clear		LT※3	VT		DT	YT	MT	PT	2,000	2,000	100	○
			Colored clear			VC		DC	YC	MC	PC				
			Colored diffused			VR	UR	DU	YY	MG	PG				
			Milky white												
	φ5.0	SLR-520	Transparent clear			VT※3		DT※3	YT※3	MT※3		1,000	1,000	100	○
			Colored clear			VC		DC	YC	MC					
			Colored diffused			VR				MG					
			Milky white												
	φ5.0	SLR-521	Transparent clear									1,000	1,000	100	○
			Colored clear												
			Colored diffused		LS※3					MS					
			Milky white												

Note : ※3 Need a certain lead time for delivery.

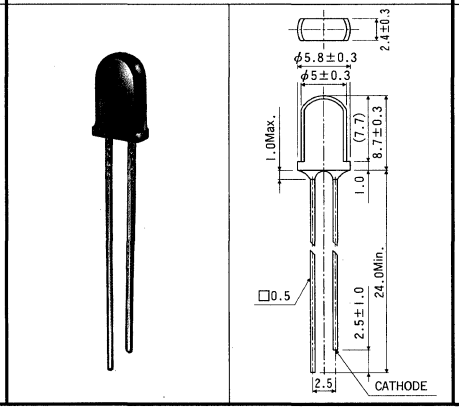
○ : Semi-standard products

(Unit : mm)

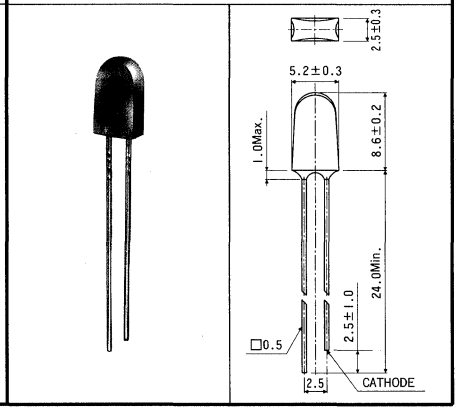
SLR-320



SLR-520



SLR-521



●Inverted cone types (SLV)

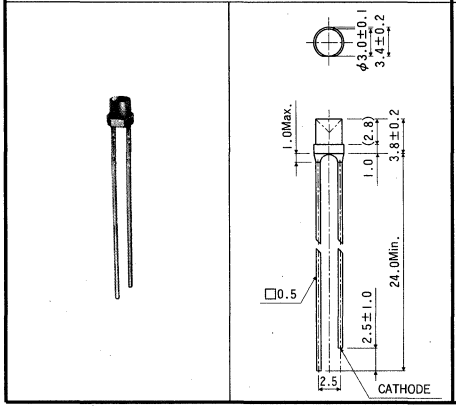
Type	Emitter surface size (mm)	Series name	Lens	Emitting color	Red		Amber	Orange	Yellow	Green	Pure Green	Basic ordering unit	Quantity /package	Quantity /bag	Rank
				Emitting material	GaAlAs	GaAsP on GaP	GaAsP on GaP	GaAsP on GaP	GaAsP on GaP	GaP	GaP				
				λp (nm)	660	650	635	610	585	563	555				
Inverted cone types	φ3.0	SLV-31	Transparent clear		LT※3	VT		DT	YT	MT		2,000	2,000	100	○
			Colored clear			VC		DC	YC	MC	PC				
			Colored diffused												
			Milky white												
	φ5.0	SLV-56	Transparent clear		LT※3	VT		DT	YT	MT		1,000	1,000	100	○
			Colored clear			VC		DC	YC	MC	PC				
			Colored diffused												
			Milky white												

Note : ※3 Need a certain lead time for delivery.

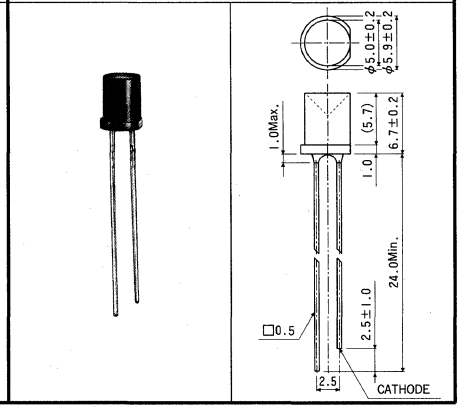
○ : Semi-standard products

(Unit : mm)

SLV-31



SLV-56



●Cylindrical types (SLC)

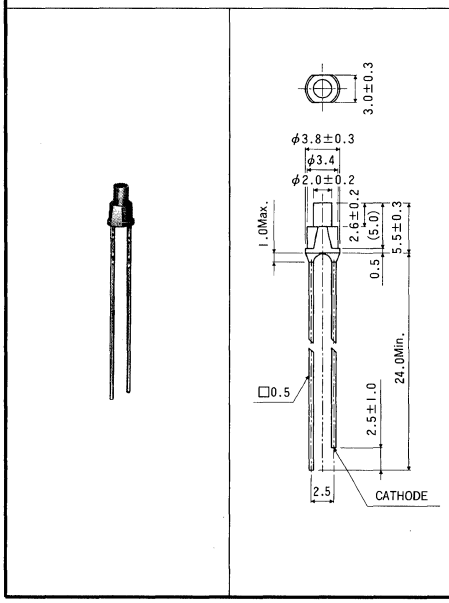
Type	Emitter surface size (mm)	Series name	Lens \ Emitting color / Emitting material / λp (nm)	Red GaAlAs 660	Red GaAsP on GaP 650	Amber GaAsP on GaP 635	Orange GaAsP on GaP 610	Yellow GaAsP on GaP 585	Green GaP 563	Pure Green GaP 555	Basic ordering unit	Quantity /package	Quantity /bag	Rank
Cylind-rical types	ϕ2.0	SLC-22	Transparent clear								2,000	2,000	100	○
			Colored clear											
			Colored diffused		VR	UR	DU	YY	MG					
			Milky white		VW		DW	YW	MW					
	ϕ2.5	SLC-26	Transparent clear								1,000	1,000	100	○
			Colored clear											
			Colored diffused		VR	UR	DU	YY	MG					
			Milky white		VW	UW	DW	YW	MW					
	ϕ4.7	SLC-50	Transparent clear	LT※3							1,000	1,000	100	○
			Colored clear											
			Colored diffused											
			Milky white	LW※3	VW		DW	YW	MW					

Note : ※3 Need a certain lead time for delivery.

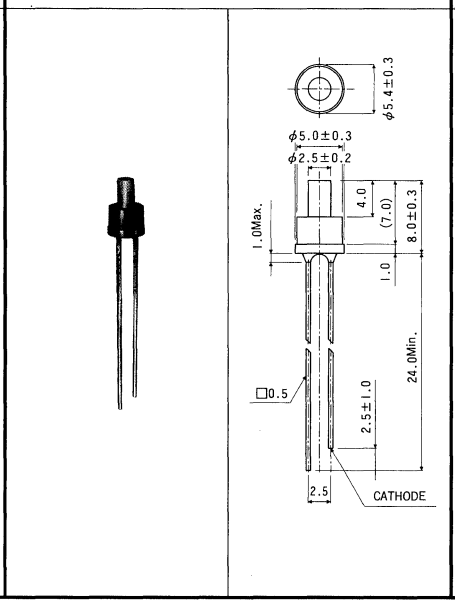
○ : Semi-standard products

(Unit : mm)

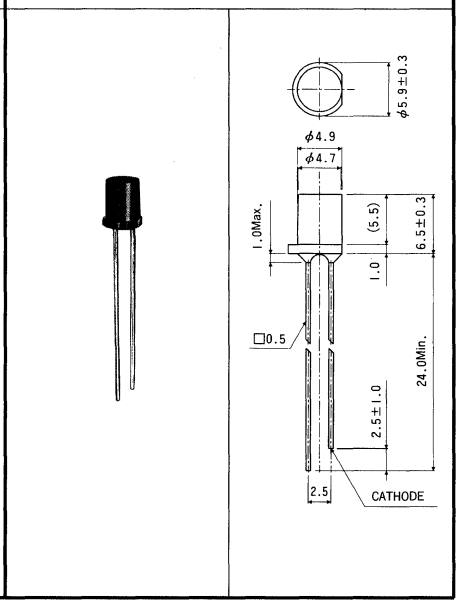
SLC-22



SLC-26



SLC-50



LED Indicator Lamps (SLB)

High luminance LED lamps

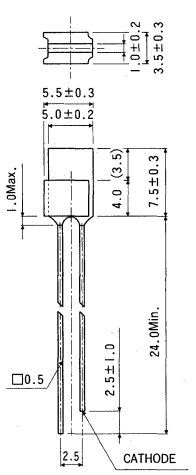
●Rectangular types (SLB)

Type	Emitter surface size (mm)	Series name	Lens	Emitting color / Emitting material / λp (nm)	Red GaAlAs 660	Red GaAsP on GaP 650	Amber GaAsP on GaP 635	Orange GaAsP on GaP 610	Yellow GaAsP on GaP 585	Green GaP 563	Pure Green GaP 555	Basic ordering unit	Quantity /package	Quantity /bag	Rank
Rectangular types	1×5	SLB-15	Transparent clear									1,000	1,000	100	○
			Colored clear												
			Colored diffused		VR	UR	DU	YY	MG	PG					
			Milky white		VW		DW	YW	MW						
	2×2	SLB-22	Transparent clear									2,000	2,000	100	○
			Colored clear												
			Colored diffused		VR	UR	DU	YY	MG						
			Milky white								PW				
	1.5×3	SLB-23	Transparent clear									2,000	2,000	100	○
			Colored clear												
			Colored diffused		VR	UR	DU	YY	MG						
			Milky white												
	1.9×4	SLB-24	Transparent clear									2,000	2,000	100	◎
			Colored clear												
			Colored diffused		VR		DU	YY	MG						
			Milky white												
	2×5	SLB-25	Transparent clear									1,000	1,000	100	◎
			Colored clear												
			Colored diffused		VR/VRD	UR	DU	YY/YYD	MG	PGD					
			Milky white												
	1.9×4.85	SLB-26	Transparent clear									1,000	1,000	100	○
			Colored clear												
			Colored diffused		VR	UR	DU	YY	MG						
			Milky white		VW	UW	DW	YW	MW						
	2×3.8	SLB-27	Transparent clear									1,000	1,000	100	○
			Colored clear												
			Colored diffused		VR		DU	YY	MG						
			Milky white												
	1.5×6.5	SLB-72	Transparent clear									1,000	1,000	100	○
			Colored clear												
			Colored diffused		VRD	URD	DUD	YYD	MGD						
			Milky white												
	4×7	SLB-74	Transparent clear									1,000	500	100	○
			Colored clear												
			Colored diffused		VRD	URD		YYD	MGD						
			Milky white												
	5×5	SLB-55	Transparent clear									1,000	1,000	100	◎
			Colored clear												
			Colored diffused		VR	UR	DU	YY	MG						
			Milky white												

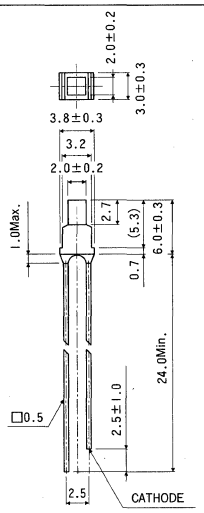
◎ : Standard products ○ : Semi-standard products

(Unit : mm)

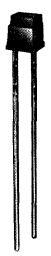
SLB-15

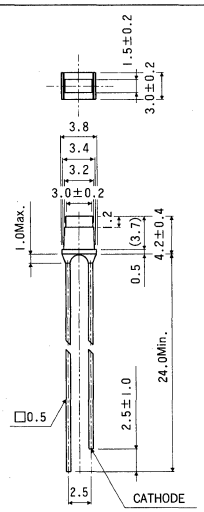


SLB-22



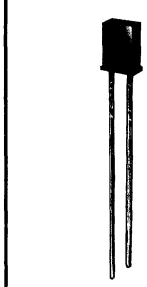
SLB-23

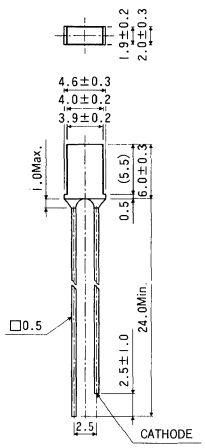




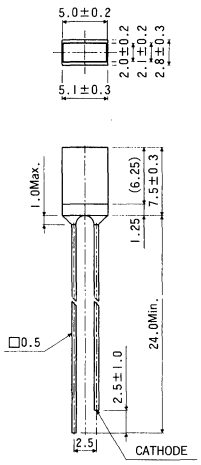
(Unit : mm)

SLB-24

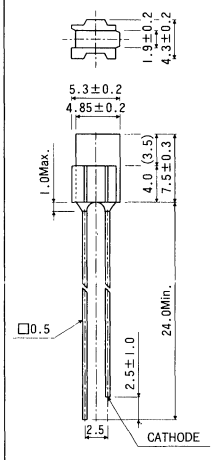




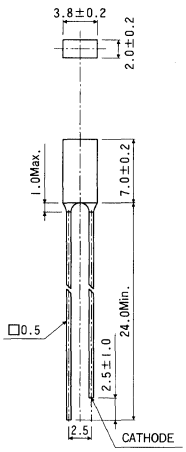
SLB-25



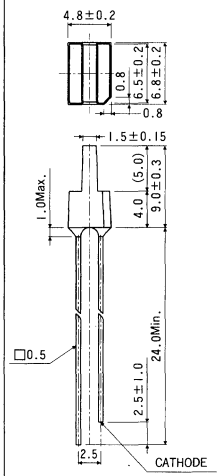
SLB-26



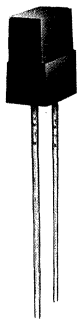
SLB-27

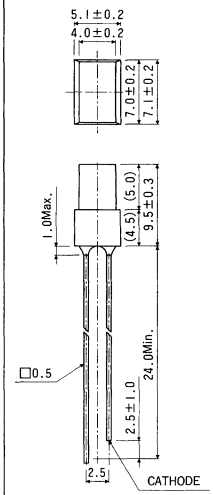


SLB-72

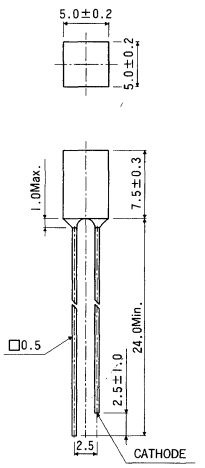


SLB-74





SLB-55



LED Indicator Lamps (SLT・SLJ・SPR・SPB)

High luminance LED lamps

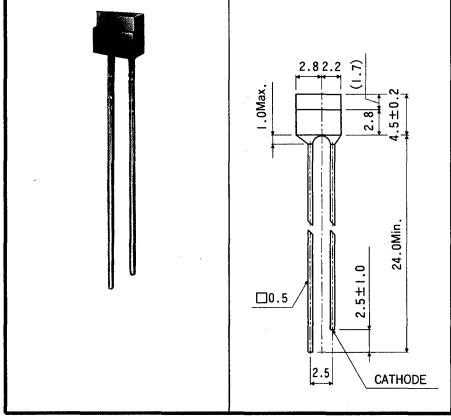
●Triangular types (SLT)

Type	Emitter surface size (mm)	Series name	Lens	Emitting color / Emitting material / λp (nm)	Red GaAlAs 660	Red GaAsP on GaP 650	Amber GaAsP on GaP 635	Orange GaAsP on GaP 610	Yellow GaAsP on GaP 585	Green GaP 563	Pure Green GaP 555	Basic ordering unit	Quantity /package	Quantity /bag	Rank
Trian-gular types	2×5	SLT-25	Transparent clear								1,000	1,000	100	○
			Colored clear											
			Colored diffused		VR		DU	YY	MG					
			Milky white											
	3×4.5	SLT-35	Transparent clear								1,000	1,000	100	○
			Colored clear											
			Colored diffused		VR	UR	DU	YY	MG					
			Milky white		VW		DW	YW	MW					

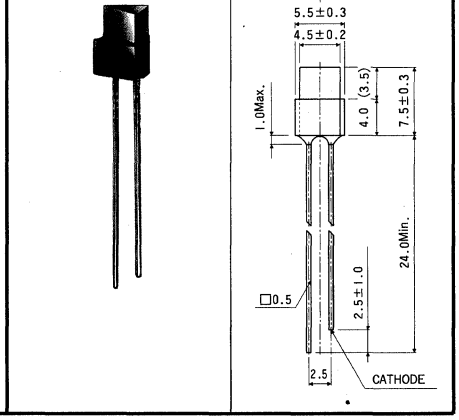
○ : Semi-standard products

(Unit : mm)

SLT-25



SLT-35



●Multiple type (SLJ)

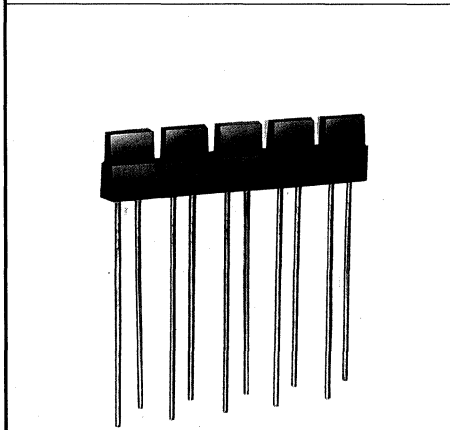
Type	Emitter surface size (mm)	Series name	Lens	Emitting color / Emitting material / λp (nm)	Red GaAlAs 660	Red GaAsP on GaP 650	Amber GaAsP on GaP 635	Orange GaAsP on GaP 610	Yellow GaAsP on GaP 585	Green GaP 563	Pure Green GaP 555	Basic ordering unit	Quantity /package	Quantity /bag	Rank
Mult-iple type	1.4×5.3×5	SLJ-165	Transparent clear								1,000	200	20	○
			Colored clear											
			Colored diffused		VRD※3	URD※3	DUD※3	YYD※3	MGD※3					
			Milky white											

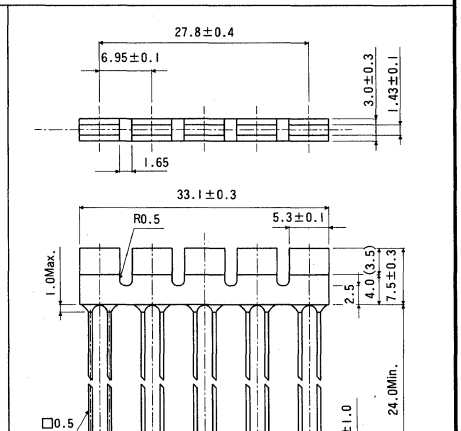
Note : ※3 Need a certain lead time for delivery.

○ : Semi-standard products

(Unit : mm)

SLJ-165





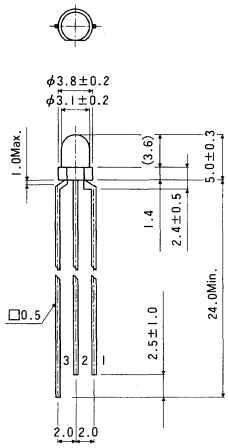
●Two-chip LEDs (SPR・SPB)

Type	Emitter surface size (mm)	Lens	Part No.	Emitting color	Emitting material	λp (nm)	Basic ordering unit	Quantity /package	Quantity /bag	Rank
Two-chip light emission	φ3.1	Milky white	**SPR-39MVW**	Red	GaAsP on GaP	650	1,000	1,000	100	○
				Green	GaP	563				
	φ5	Milky white	**SPR-54MVW**	Red	GaAsP on GaP	650	1,000	1,000	100	○
				Green	GaP	563				
	φ4.8	Milky white	**SPR-57MVW**	Red	GaAsP on GaP	650	1,000	1,000	100	○
				Green	GaP	563				
	1×5	Milky white	**SPB-15MVW**	Red	GaAsP on GaP	650	1,000	1,000	100	○
				Green	GaP	563				
	2×5	Milky white	**SPB-25MVW**	Red	GaAsP on GaP	650	1,000	1,000	100	○
				Green	GaP	563				
	1.9×4.9	Milky white	**SPB-26MVW**	Red	GaAsP on GaP	650	1,000	1,000	100	○
				Green	GaP	563				
	2×2	Milky white	**SPB-221MVW／PVW**	Red	GaAsP on GaP	650	1,000	1,000	100	○
				Green／Pure Green	GaP	563／555				

○ : Semi-standard products

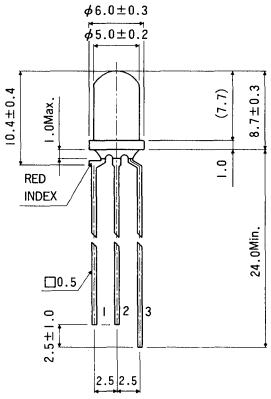
(Unit : mm)

SPR-39MVW



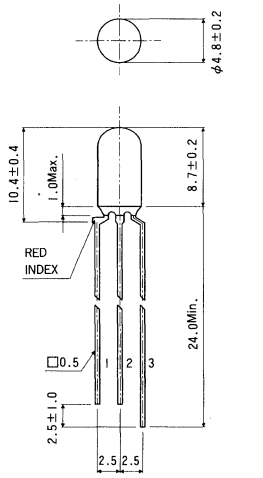
1 : ANODE RED
2 : CATHODE
3 : ANODE GREEN

SPR-54MVW



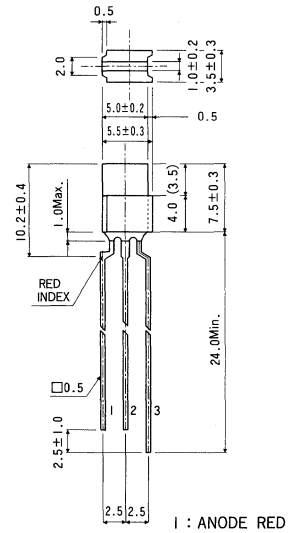
1 : ANODE RED
2 : CATHODE
3 : ANODE GREEN

SPR-57MVW



1 : ANODE RED
2 : CATHODE
3 : ANODE GREEN

SPB-15MVW



1 : ANODE RED
2 : CATHODE
3 : ANODE GREEN

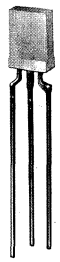
LED Indicator Lamps (SPB)

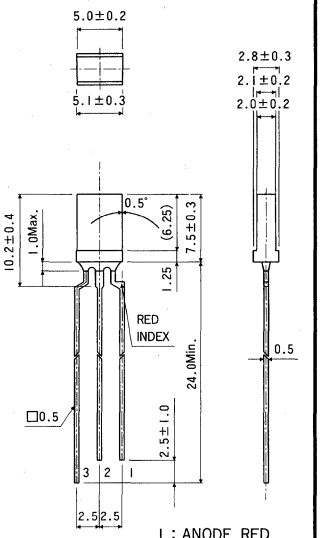
High luminance LED lamps

●Two-chip LEDs (SPB)

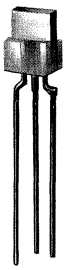
(Unit : mm)

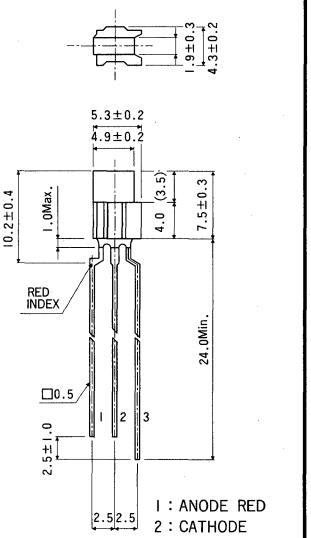
SPB-25MVW



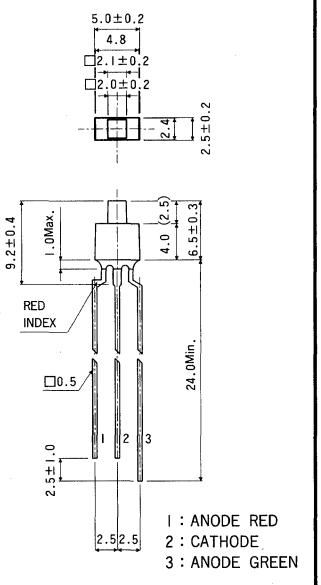


SPB-26MVW





SPB-221MVW SPB-221PVW



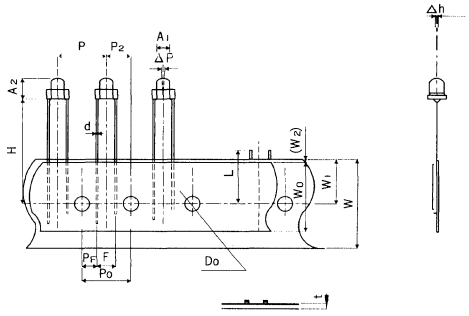
●Taping condition

Applicable types	Quantity／Package (pcs)
SLA-580	2,000
SLB-25／55	
SLR-320／37／40／54／55／56	

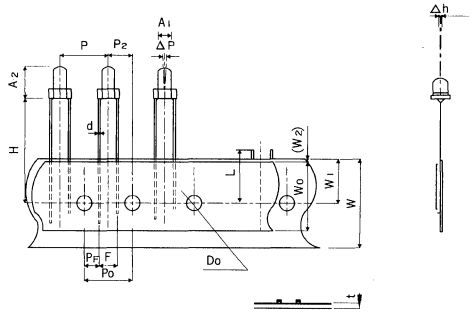
●Taping specifications

Straight Type

φ3 Type

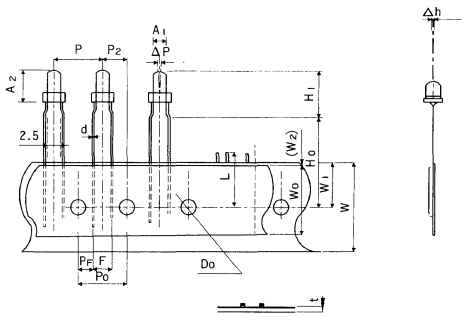


φ5 Type

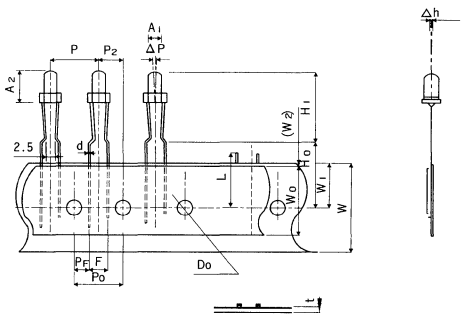


Forming Type

φ3 Type



φ5 Type



(Unit : mm)

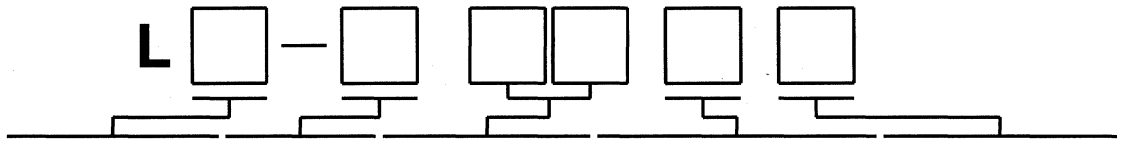
Item	Symbol	Straight Lead		Formed lead		Remarks
		φ3 Type	φ5 Type	φ3 Type	φ5 Type	
Luminous emitting surface	A_1	φ3.1±0.2	φ5.0±0.2	φ3.1±0.2	φ5.0±0.2	Dimensions vary with type
Body length	A_2	5.2±0.3	8.7±0.3	5.2±0.3	8.7±0.3	
Inter-unit pitch	P	12.7±1.0		12.7±1.0		
Feed hole pitch	P_0	12.7±0.3		12.7±0.3		
Feed hole position (1)	P_2	6.35±0.4		6.35±0.4		
Accumulated feed hole pitch error	P20	1.0Max.		1.0Max.		As per 20 holes
Lead diameter	d	□0.5±0.1		□0.5±0.1		Not including burrs
Lead-to-lead distance	F	2.5±0.8		5.0±0.8		
Lead clinch height	H_0	−		16.0±0.5		
Clinch angle	θ	−		0±15°		
Unit height	H／H_1	※	※	※	※	
Base tape width	W	18.0		18.0		
Top film width	W_0	13.0±0.3		13.0±0.3		
Feed hole position (2)	W_1	9.0±0.5		9.0±0.5		
Top film position	W_2	0～0.5		0～0.5		
Base tape thickness	t	0.7±0.2		0.7±0.2		
Unit tilt (1)	Δh	0±1.0		0±1.0		
Unit tilt (2)	ΔP	0±0.5		0±0.5		
Defective unit cutoff position	L	11.0Max.		11.0Max.		
Frame position	P_F	5.1±0.8		3.85±0.8		
Feed hole diameter	D_0	φ4.0±0.2		φ4.0±0.2		

Note : ※See dimension of each product

LED Numeric Displays (LA)

1 digit to 5 digit, for clock display, frequency display, etc.

●Product Designation



Type of Display

A	Single digit
B	2-3 digit
C	4-5 digit

Height of Segments (character height)

2	6, 6.4mm
3	8, 7.6, 7.62mm
4	10, 10.16, 11mm
5	12.5, 13mm
6	14.22, 14.3, 14.6, 15mm
8	20mm
1	25.4mm

Count

01, 21, 31	Single digit
02	Two digit
03	Three digit
04	Four digit
05	Five digit

Emitting Color (2-Color type : 2-digit display)

L	Brightness Red 660nm
V	Red 650nm
U	Amber 635nm
D	Orange 610nm
Y	Yellow 585nm
M	Green 563nm

Common

A–J	Anode Common
K–U	Cathode Common

*LA-6000, LA-221 and LB-6000 are not included.

●Single digit Numeric Displays (LA)

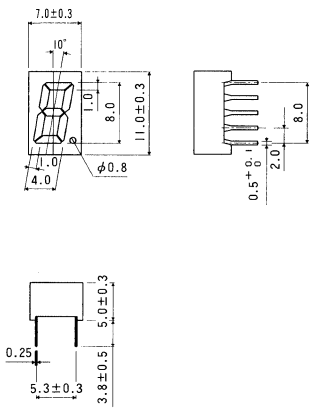
Digit count	Character height (outer dimensions) (mm)	Common \ Emitting color / Emitting material / λp (nm)	Red	Orange	Yellow	Green	Basic ordering unit	Quantity /package	Quantity /bag	Rank
			GaAsP on GaP			GaP				
			650/635	610	585	563				
Single Digit	8 (7×11)	Anode	LA-301VB	LA-301DB	LA-301YB	LA-301MB	200	200	200	◎
		Cathode	LA-301VL	LA-301DL	LA-301YL	LA-301ML				
	10.16 (9.6×13)	Anode	LA-401VD	LA-401DD※3	LA-401YD※3	LA-401MD	140	140	140	◎
		Cathode	LA-401VN	LA-401DN※3	LA-401YN※3	LA-401MN				
	10 (12.7×19)	Anode	LA-401VF	LA-401DF※3	LA-401YF※3	LA-401MF※3	120	120	120	◎
		Cathode	LA-401VP	LA-401DP※3	LA-401YP※3	LA-401MP※3				
	11 (12.5×17.5)	Anode	LA-421MLA (Green/Brightness Red※2 Two-color light emission) ※3				50	50	50	○
		Cathode	LA-421MLK (Green/Brightness Red※2 Two-color light emission) ※3							
	13 (12.5×17.5)	Anode	LA-501VD	LA-501DD※3	–	LA-501MD	60	60	60	◎
		Cathode	LA-501VN	LA-501DN※3	–	LA-501MN				
	12.5 (14.8×20.0)	Anode	LA-501VF	LA-501DF※3	LA-501YF※3	LA-501MF	80	80	80	○
		Cathode	LA-501VP	LA-501DP※3	LA-501YP※3	LA-501MP				
	14.6 (12.5×19)	Anode	LA-601LB※2/VB※3	LA-601DB※3	LA-601YB※3	LA-601MB※3	80	80	80	○
		Cathode	LA-601LL※2/VL※3	LA-601DL※3	LA-601YL※3	LA-601ML※3				
	15 (17.3×24)	Anode	LA-601VF	LA-601DF※3	LA-601YF※3	LA-601MF※3	60	60	60	○
		Cathode	LA-601VP	LA-601DP※3	LA-601YP※3	LA-601MP※3				
	14.22 (12.2×19)	Anode	LA-6760/6960※1※4	LA-6660※1※3	LA-6860※1※3	LA-6460※1	80	80	80	○
		Cathode	LA-6780/6980※1※4	LA-6680※1※3	LA-6880※1※3	LA-6480※1				
	15 (12.5×19)	Anode	LA-621LMA (Brightness Red※2/Green Two-color light emission) ※3				500	500	500	○
		Cathode	LA-621LMA (Brightness Red※2/Green Two-color light emission) ※3							
	20 (20×28)	Anode	LA-801VF	LA-801DF※3	LA-801YF※3	LA-801MF	40	40	40	◎
		Cathode	LA-801VP	LA-801DP※3	LA-801YP※3	LA-801MP				
	25.4 (24×34)	Anode	LA-101VF	LA-101DF※3	LA-101YF※3	LA-101MF	50	50	50	◎
		Cathode	LA-101VP	LA-101DP※3	LA-101YP※3	LA-101MP				
	57 (48×70)	Anode	LA-221LR※2※3	–	–	–	16	16	16	○
		Cathode	–	LA-2212DU※3	–	–				
New	25.4 (22.8×33)	Anode	LA-101LD※2※3	–	–	–	50	50	50	○
		Cathode	LA-101LN※2※3	–	–	–				
New	25.4 (22.8×33)	Anode	LA-131LA※2※3	–	–	–	50	50	50	○
		Cathode	LA-131LK※2※3	–	–	–				

Note : ※1 Surface finished gray ※2 Emitting material : GaAlAs λp : 660nm ※3 N eed a certain lead time for delivery ※4 λp : 635nm.

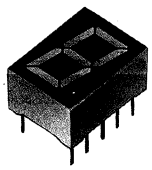
◎ : Standard products ○ : Semi-standard products

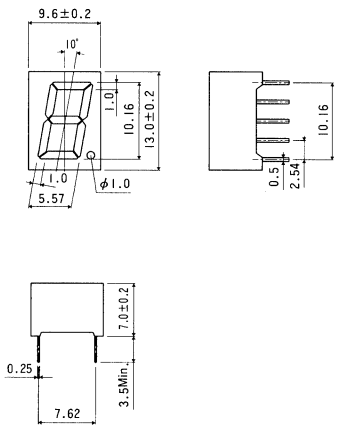
(Unit : mm)

LA-301VB/DB/YB/MB/VL/DL/YL/ML

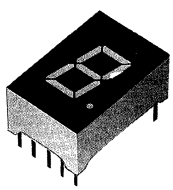


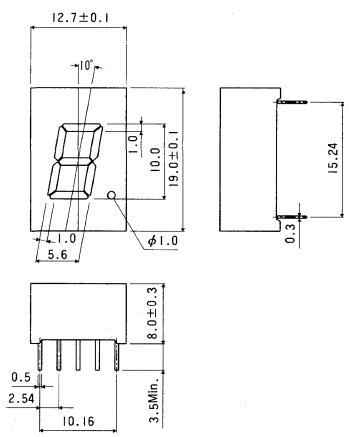
LA-401VD/DD/YD/MD/VN/DN/YN/MN



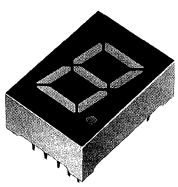


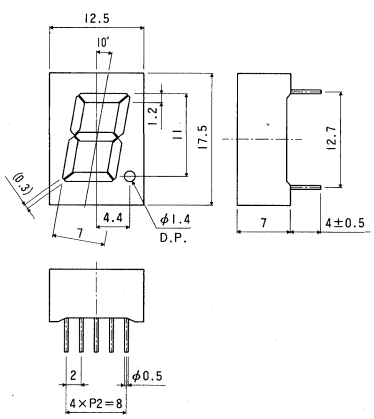
LA-401VF/DF/YF/MF/VP/DP/YP/MP





LA-421MLA/MLK



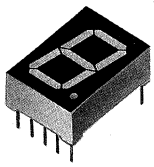


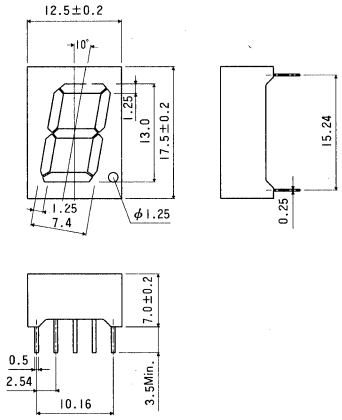
LED Numeric Displays (LA)

●Single Digit LED Numeric Displays (LA)

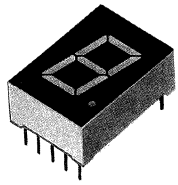
(Unit : mm)

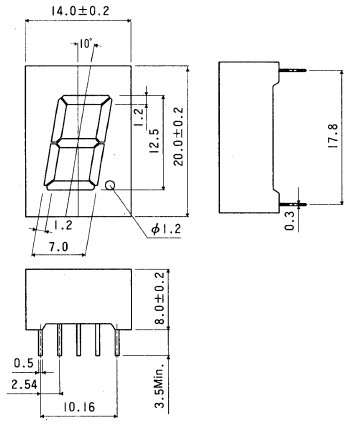
LA-501VD/DD/MD/VN/DN/MN



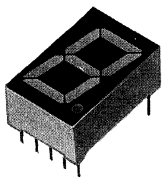


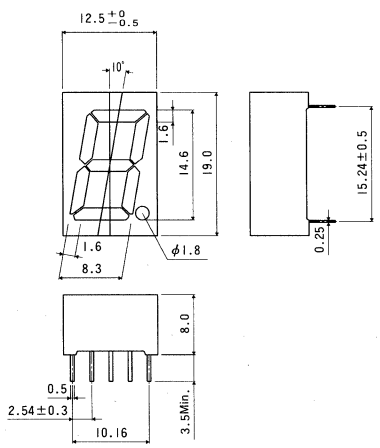
LA-501VF/DF/YF/MF/VP/DP/YP/MP



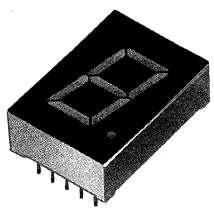


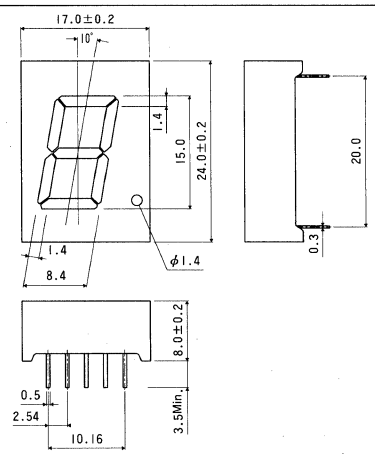
LA-601LB/VB/DB/YB/MB/LL/VL/DL/YL/ML





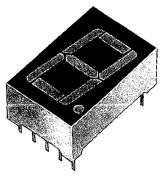
LA-601VF/DF/YF/MF/VP/DP/YP/MP

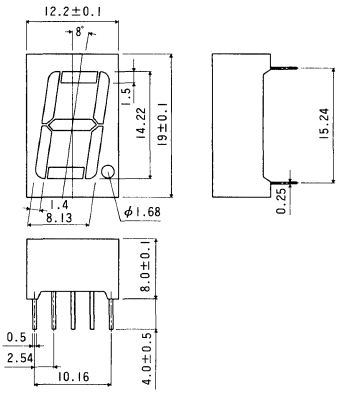




(Unit : mm)

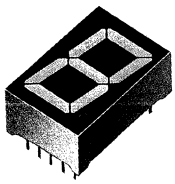
LA-6760/6960/6660/6860/6460/6780/6980/6680/6880/6480

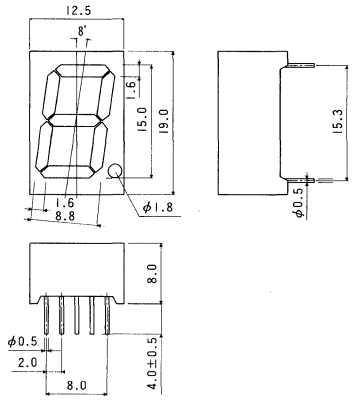




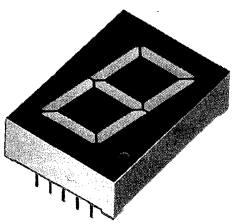
Note : Black coated surface colored segments LA-6760/6780 only.

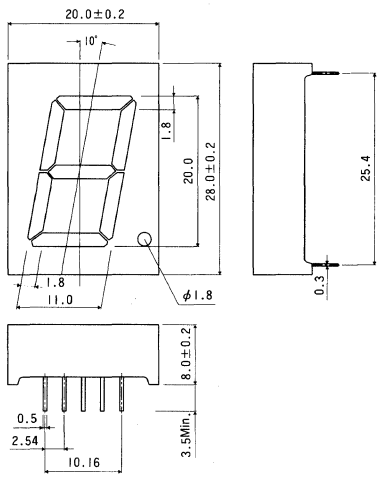
LA-621LMA/LMK



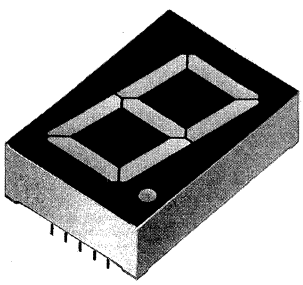


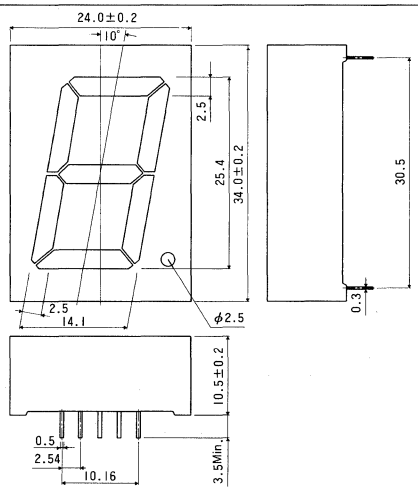
LA-801VF/DF/YF/MF/VP/DP/YP/MP





LA-101VF/DF/YF/MF/VP/DP/YP/MP



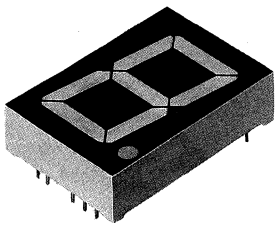


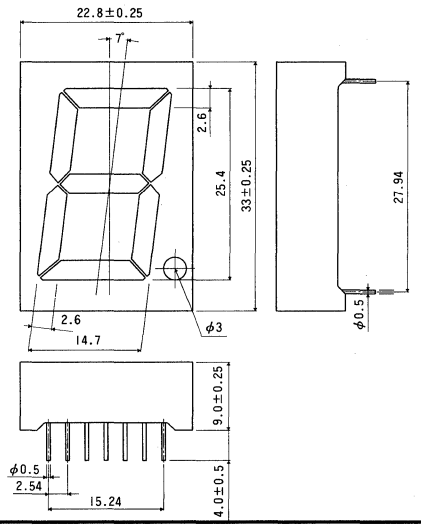
LED Numeric Displays (LA・LB)

●Single Digit LED Numeric Displays (LA)

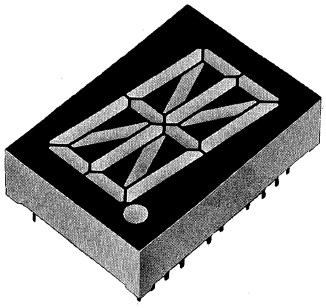
(Unit : mm)

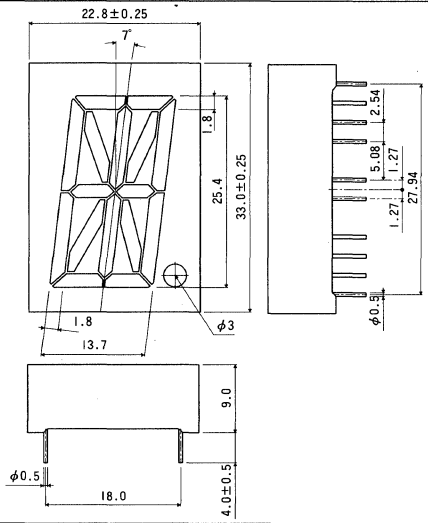
LA-101LD/LN



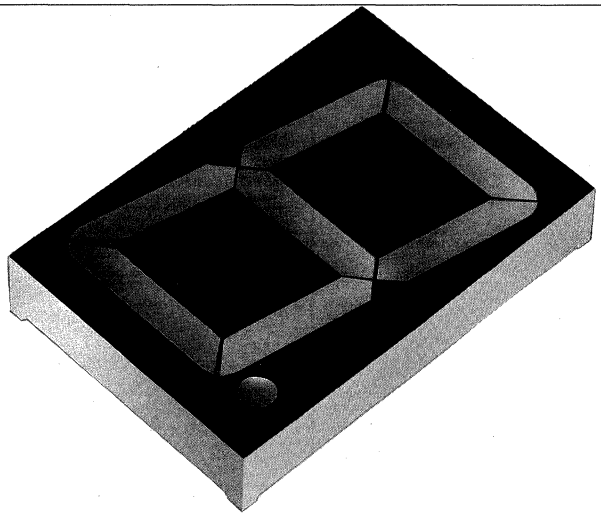


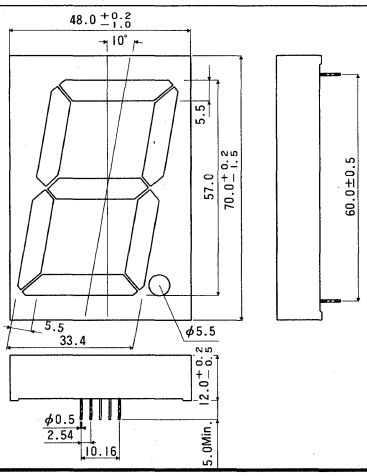
LA-131LA/LK





LA-221LR LA-2212DU





●Two or Three Digit LED Numeric Displays (LB)

Digit count	Character (outer dimensions) (mm)	Common	Emitting color	Red	Orange	Yellow	Green	Basic ordering unit	Quantity /package	Quantity /bag	Rank
			Emitting material	GaAsP on GaP			GaP				
			λp (nm)	650/635	610	585	563				
Two Digit	6.4 (12.8×15)	Anode		LB-202VB	LB-202DB	LB-202YB ※3	LB-202MB	100	100	100	◎
		Cathode		LB-202VL	LB-202DL	LB-202YL ※3	LB-202ML				
	7.62 (15.5×15)	Anode		LB-302VF ※3/VF1 ※3※5	LB-302DF ※3/DF1 ※3※5	LB-302YF ※3/YF1 ※3※5	LB-302MF ※3/MF1 ※3※5	500	500	500	○
		Cathode		LB-302VP ※3/VP1 ※3※5	LB-302DP ※3/DP1 ※3※5	LB-302YP ※3/YP1 ※3※5	LB-302MP ※3/MP1 ※3※5				
	10 (13×14)	Anode		LB-402LC ※2※3/VC ※3	—	—	LB-402MC ※3	200	200	200	○
		Cathode		LB-402LM ※2※3/VM ※3	—	—	LB-402MM ※3				
	10 (22×16)	Anode		LB-402VA	LB-402DA ※3	—	LB-402MA	70	70	70	○
		Cathode		LB-402VK	LB-402DK ※3	—	LB-402MK				
	10.16 (24×18)	Anode		LB-402VD	LB-402DD ※3	LB-402YD ※3	LB-402MD	40	40	40	◎
		Cathode		LB-402VN	LB-402DN ※3	LB-402YN ※3	LB-402MN				
	13 (25×17.5)	Anode		LB-502VD	LB-502DD ※3	—	LB-502MD	40	40	40	◎
		Cathode		LB-502VN	LB-502DN ※3	—	LB-502MN				
	14.3 (25×19)	Anode		LB-602VA2	LB-602DA2	LB-602YA2 ※3	LB-602MA2	300	300	300	◎
		Cathode		LB-602VK2	LB-602DK2	LB-602YK2 ※3	LB-602MK2				
	14.3 (25×18)	Anode		LB-602VF ※3	—	—	LB-602MF ※3	300	300	300	○
		Cathode		LB-602VP ※3	—	—	LB-602MP ※3				
	14.3 (25×18)	Anode		LB-602VF1 ※3	—	—	LB-602MF1 ※3	250	250	250	○
		Cathode		LB-602VP1 ※3	—	—	LB-602MP1 ※3				
	14.22 (25.0×19)	Anode		LB-6710/6910 ※1※4	LB-6610 ※1※3	LB-6810 ※1※3	LB-6410 ※1	300	300	300	○
		Cathode		LB-6740/6940 ※1※4	LB-6640 ※1※3	LB-6840 ※1※3	LB-6440 ※1				
Three Dight	6.4 (19.2×15)	Anode		LB-203VB	LB-203DB ※3	LB-203YB ※3	LB-203MB	80	80	80	◎
		Cathode		LB-203VL	LB-203DL ※3	LB-203YL ※3	LB-203ML				
	8 (22×13)	Anode		LB-303VA ※3	LB-303DA ※3	—	LB-303MA ※3	100	100	100	○
		Cathode		LB-303VK ※3	LB-303DK ※3	—	LB-303MK ※3				
	10.16 (33×16)	Anode		LB-403VD ※3	LB-403DD ※3	LB-403YD ※3	LB-403MD ※3	60	60	60	○
		Cathode		LB-403VN ※3	LB-403DN ※3	—	LB-403MN ※3				
	10 (26×16)	Anode		LB-403VF1 ※3	LB-403DF1 ※3	—	LB-403MF1 ※3	90	90	90	○
		Cathode		—	—	—	—				
	14.3 (37.5×18)	Anode		LB-603VF	—	—	LB-603MF	200	200	200	○
		Cathode		LB-603VP	—	—	LB-603MP				
	14.3 (37.5×18)	Anode		LB-603VF1 ※3	—	—	LB-603MF1 ※3	250	250	250	○
		Cathode		LB-603VP1 ※3	—	—	LB-603MP1 ※3				

Note : ※1 Surface finished gray ※2 Emitting material : GaAlAs λp : 660nm ※3 Need a certain lead time for delivery ※4 λp : 635nm ※5 DP unlit

◎ : Standard products ○ : Semi-standard products

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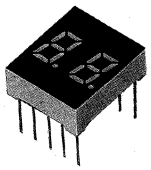
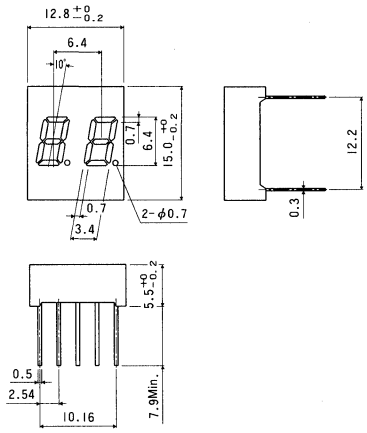
LED Numeric Displays (LB)

●Two or Three Digit LED Numeric Displays (LB)

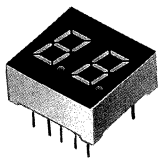
(Unit : mm)

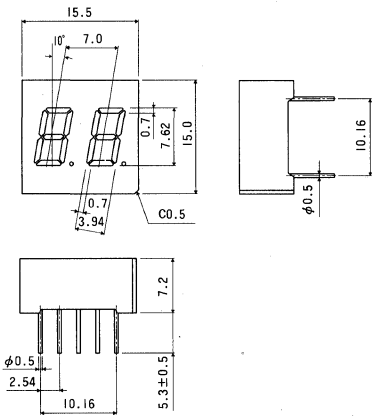
LB-202VB/DB/YB/MB/VL/DL/YL/ML



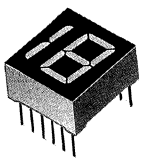


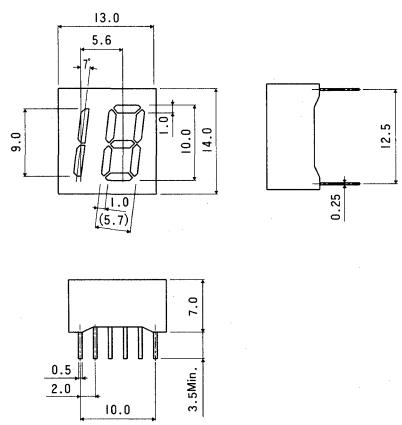
LB-302VF/VF1/DF/DF1/YF/YF1/MF/MF1/VP/VP1/DP/DP1/YP/YP1/MP/MP1



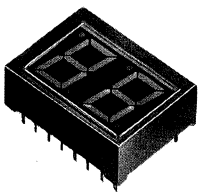


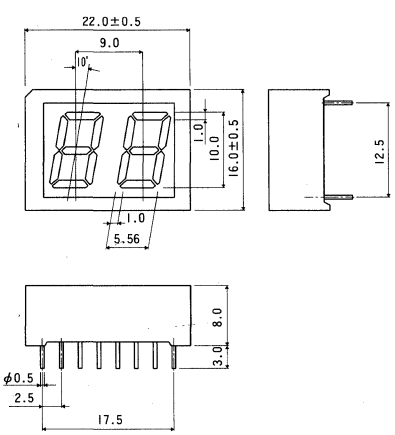
LB-402LC/VC/MC/LM/VM/MM





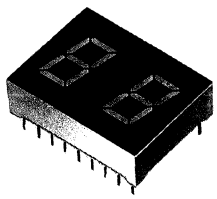
LB-402VA/DA/MA/VK/DK/MK

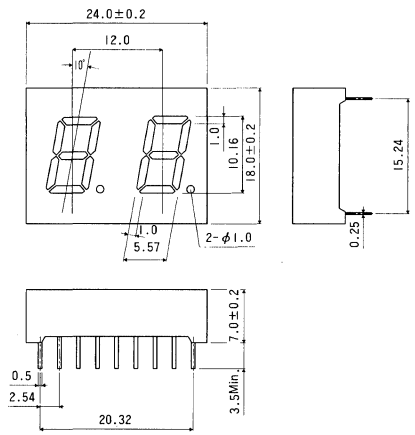




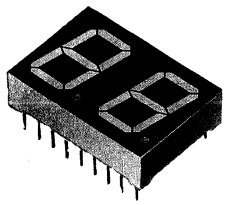
(Unit : mm)

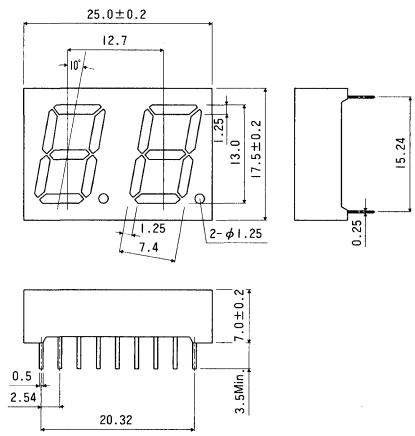
LB-402VD/DD/YD/MD/VN/DN/YN/MN



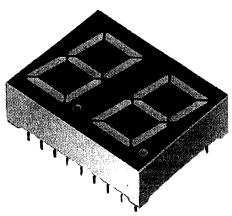


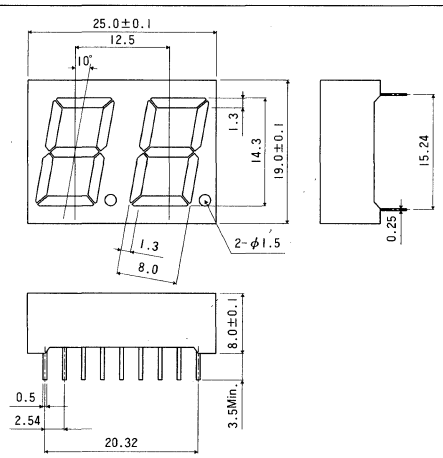
LB-502VD/DD/MD/VN/DN/MN



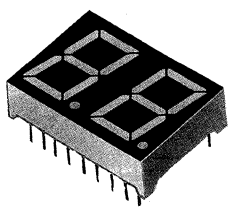


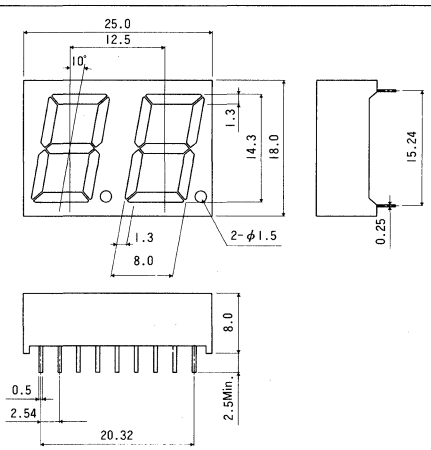
LB-602VA2/DA2/YA2/MA2/VK2/DK2/YK2/MK2





LB-602VF/MF/VP/MP



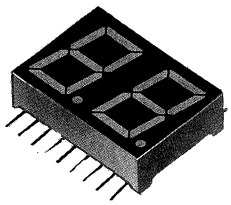


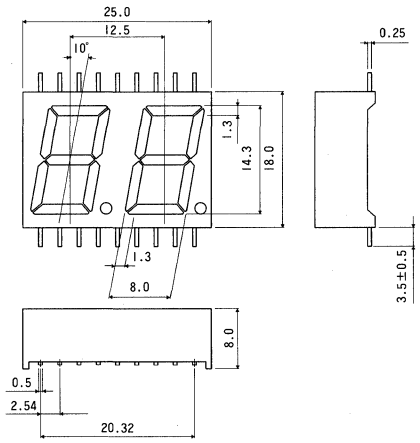
LED Numeric Displays (LB)

●Two or Three Digit LED Numeric Displays (LB)

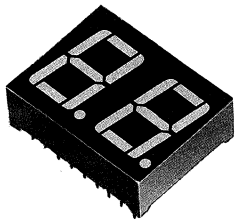
(Unit : mm)

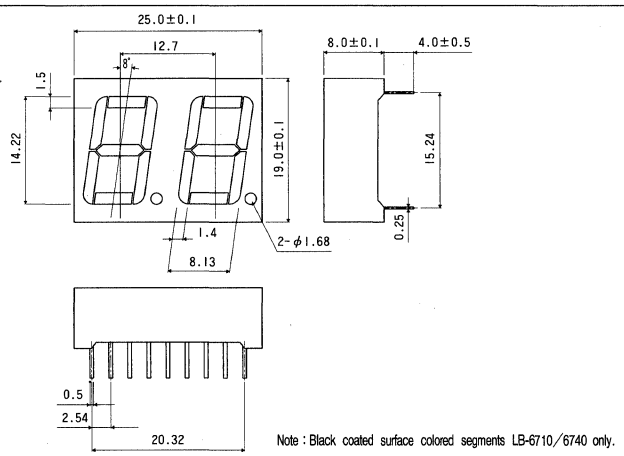
LB-602VF1/MF1/VP1/MP1





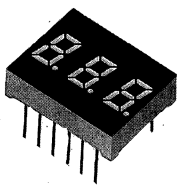
LB-6710/6910/6610/6810/6410/6740/6940/6640/6840/6440

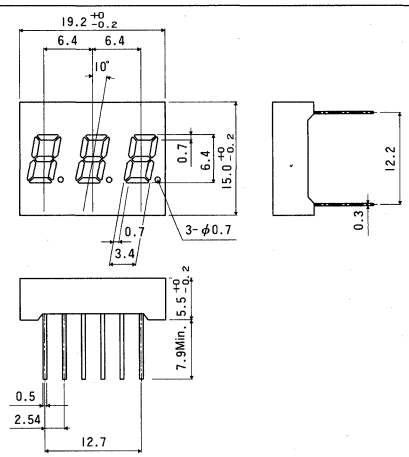




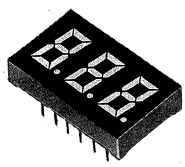
Note : Black coated surface colored segments LB-6710/6740 only.

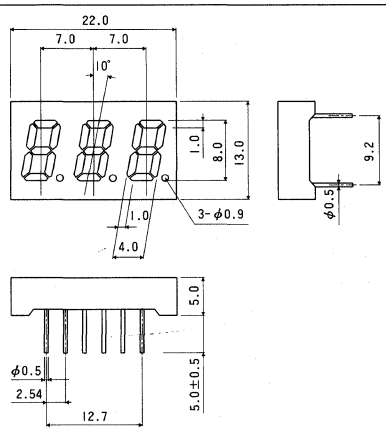
LB-203VB/DB/YB/MB/VL/DL/YL/ML





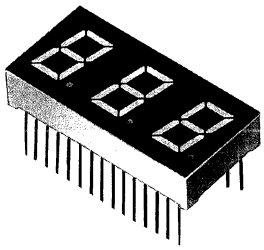
LB-303VA/DA/MA/VK/DK/MK

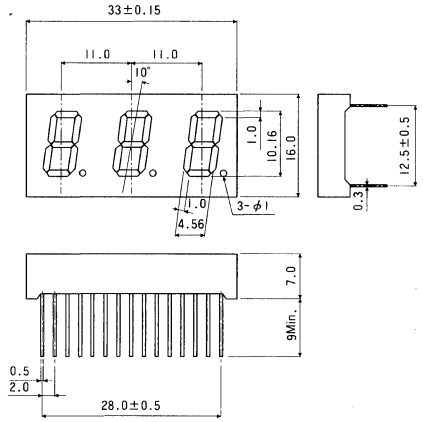




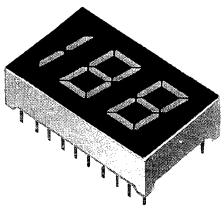
(Unit : mm)

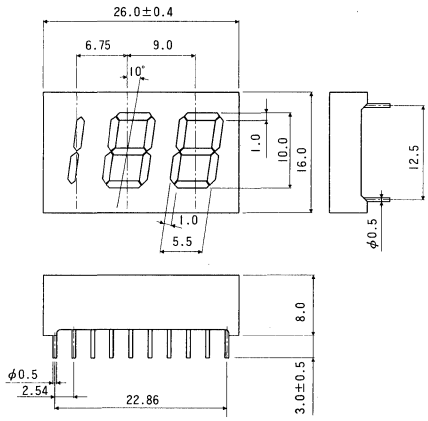
LB-403VD/DD/YD/MD/VN/DN/MN



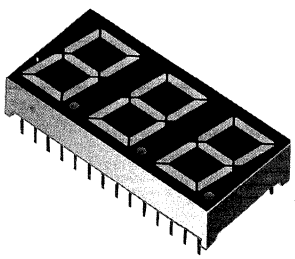


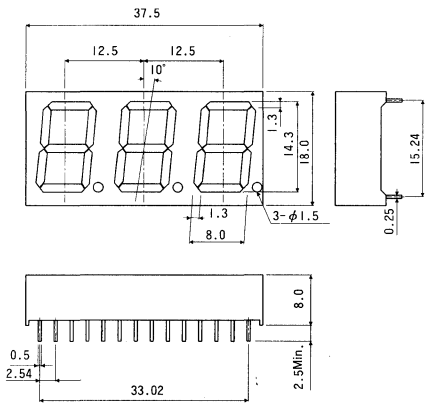
LB-403VF1/403DF1/403MF1



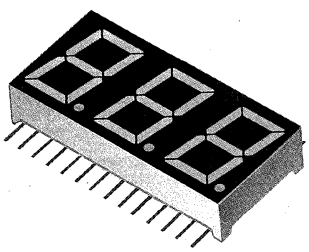


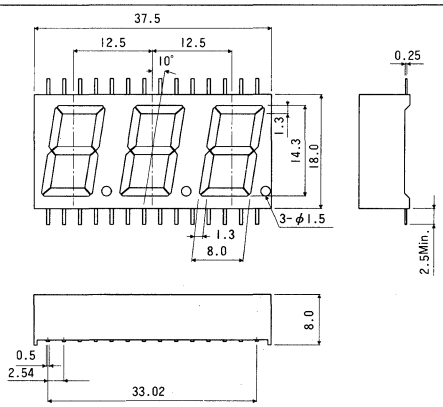
LB-603VF/MF/VP/MP





LB-603VF1/MF1/VP1/MP1





LED Numeric Displays (LC)

●Four or Five Digit Numeric displays (LC)

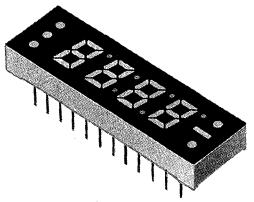
Digit count	Character height (outer dimensions) (mm)	Common: Emitting color / Emitting material / λp (nm)	Red	Orange	Yellow	Green	Basic ordering unit	Quantity /package	Quantity /bag	Rank
			GaAsP on GaP			GaP				
			650/635	610	585	563				
Four Digit	6 (36×11) Dynamic drive	Anode	LC-204VB	LC-204DB※3	–	LC-204MB	500	500	500	○
		Cathode	LC-204VL	LC-204DL※3	–	LC-204ML				
	6 (36×11) Static drive	Anode	LC-204VD※3	LC-204DD※3	–	LC-204MD※3	500	500	500	○
		Cathode	LC-204VN※3	LC-204DN※3	–	LC-204MN※3				
	8 (30×14)	Anode	LC-304VA/UA※3※4	LC-304DA※3	–	LC-304MA※3	60	60	60	○
		Cathode	LC-304VK/UK※3※4	LC-304DK※3	–	LC-304MK※3				
Five Digit	7.6 (38×14)	Anode	LC-305VA※3	LC-305DA※3	LC-305YA※3	LC-305MA※3	60	60	60	○
		Cathode	LC-305VK※3	LC-305DK※3	LC-305YK※3	LC-305MK※3				

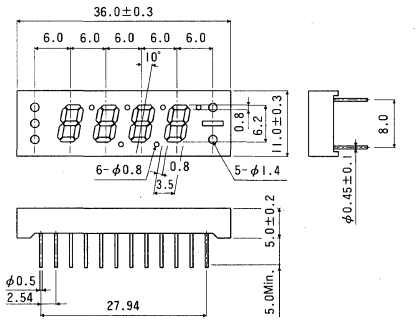
Note : ※3 Need a certain lead time for delivery ※4 λp : 635nm

○ : Semi-standard products

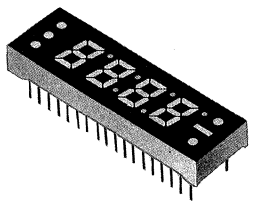
(Unit : mm)

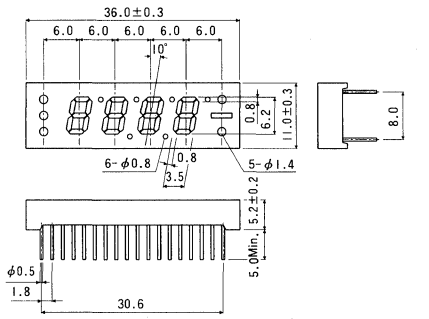
LC-204VB/DB/MB/VL/DL/ML



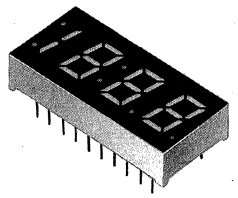


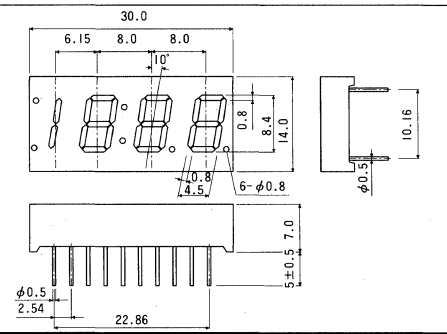
LC-204VD/DD/MD/VN/DN/MN



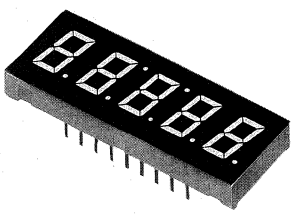


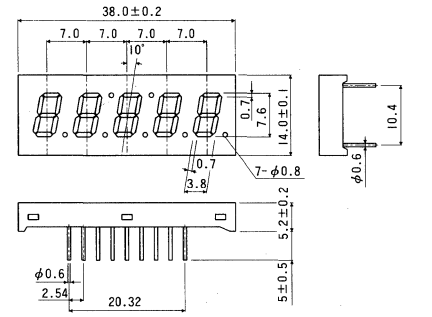
LC-304VA/UA/DA/MA/VK/UK/DK/MK





LC-305VA/DA/YA/MA/VK/DK/YK/MK





LED Flat Displays (LD)

From small to large sizes to meet all of your application needs.

Emitter surface size (mm)	Emitting color / Emitting material / λp (nm)	Red 650	Orange 610	Yellow 585	Green 563	Basic ordering unit	Quantity /package	Quantity /bag	Rank
			GaAsP on GaP		GaP				
5×2.5		LD-105VR	LD-105DU	LD-105YY	LD-105MG	100	1,000	100	◎
5.6×3.2		LD-201VR	LD-201DU	LD-201YY	LD-201MG	1,000	1,000	100	◎
5×5		LD-101VR	LD-101DU	LD-101YY	LD-101MG	2,000	2,000	100	◎
4.5×9.5		LD-001VR	LD-001DU	LD-001YY	LD-001MG	2,000	2,000	100	◎
6.8×13.8		LD-603VR	LD-603DU	LD-603YY	LD-603MG	200	200	200	◎
10×10		LD-404VR	LD-404DU	LD-404YY	LD-404MG	500	500	500	◎
4.5×20		LD-701VR	LD-701DU	LD-701YY	LD-701MG	200	200	200	◎
1.3×6.5×2Dots		LD-002VB	LD-002DB※3	LD-002YB※3	LD-002MB	300	300	300	○
1.3×6.5×3Dots		LD-003VB	LD-003DB※3	LD-003YB※3	LD-003MB	200	200	200	○
4×6.5×6Dots		LD-006AVRA※3	LD-006ADUA※3	LD-006AYYA※3	LD-006AMGA※3	100	100	100	○
		LD-006BVRB※3	LD-006BDUB※3	LD-006BYYB※3	LD-006BMGB※3				
1.52×5.08×10Dots		LD-010VW※3	LD-010DW※3	LD-010YW※3	LD-010MW※3	100	100	100	○
13×18		LD-706VR※3	LD-706DU※3	LD-706YY※3	LD-706MG※3	60	60	60	○
6.8×28.8		LD-1203LR※2※3 LD-1203VR※3	LD-1203DU※3	LD-1203YY※3	LD-1203MG※3	100	100	100	○
12×15		LD-605MVW (Green/Red Two-chip light emission) ※3				200	200	200	○

Note : ※2 Emitting material : GaAlAs λp : 660nm ※3 Need a certain lead time for delivery

◎ : Standard products ○ : Semi-standard products

●Product Designation

LD — 2 0 1 V R

Type
3 or 4 Letters

Emitting Color

V	Red 650nm
D	Orange 610nm
Y	Yellow 585nm
M	Green 563nm

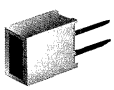
Single color : 1 Letter, Two colors : 2 Letters

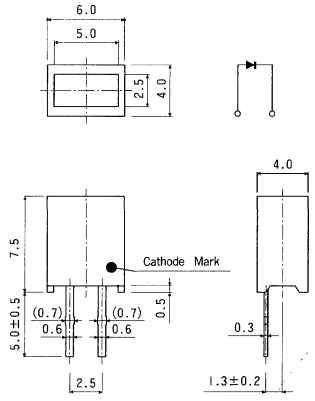
Display Color

R	Red Colored Diffused
U	Orange Colored Diffused
Y	Yellow Colored Diffused
G	Green Colored Diffused
W	Milky White

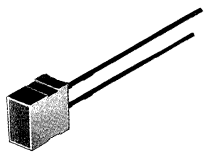
(Unit : mm)

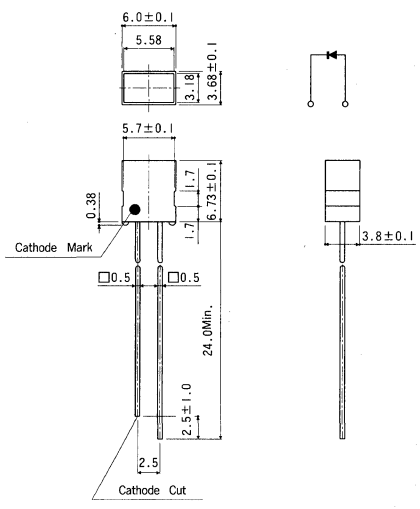
LD-105VR/DU/YY/MG



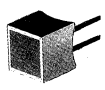


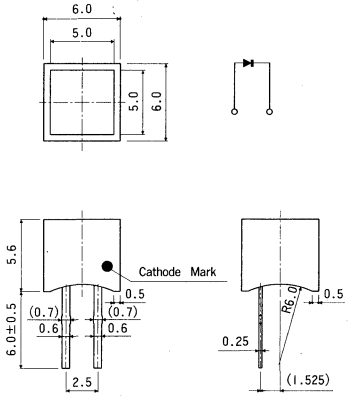
LD-201VR/DU/YY/MG





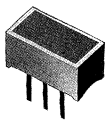
LD-101VR/DU/YY/MG

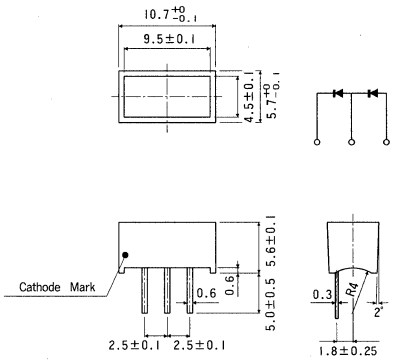




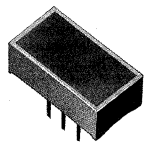
(Unit : mm)

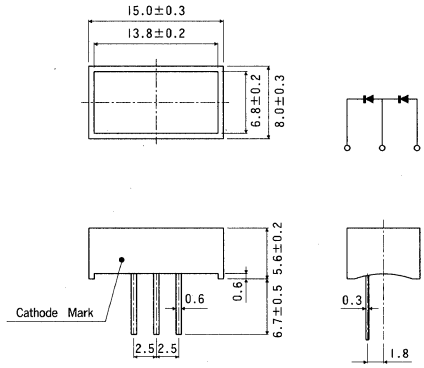
LD-001VR/DU/YY/MG



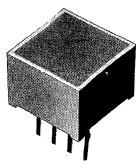


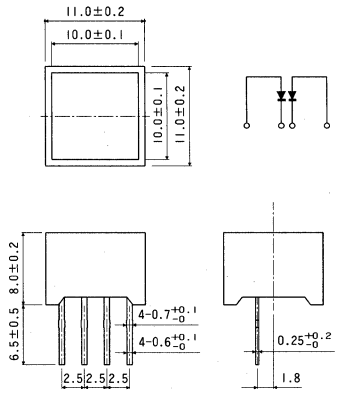
LD-603VR/DU/YY/MG



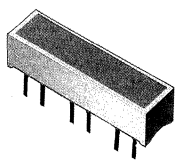


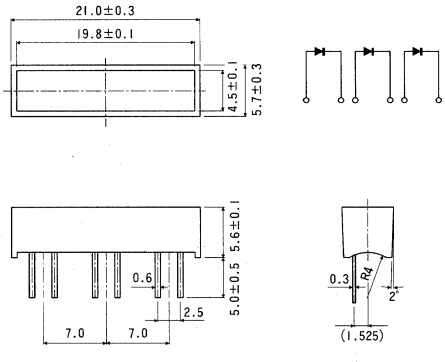
LD-404VR/DU/YY/MG





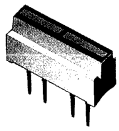
LD-701VR/DU/YY/MG

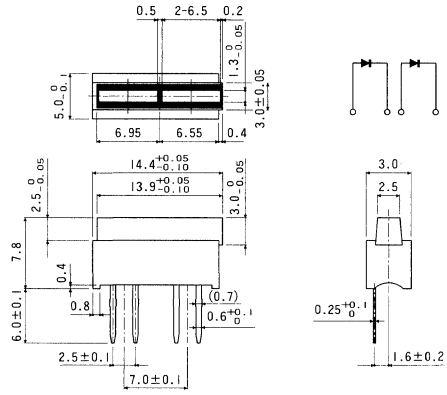




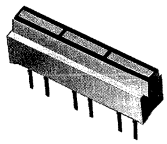
(Unit : mm)

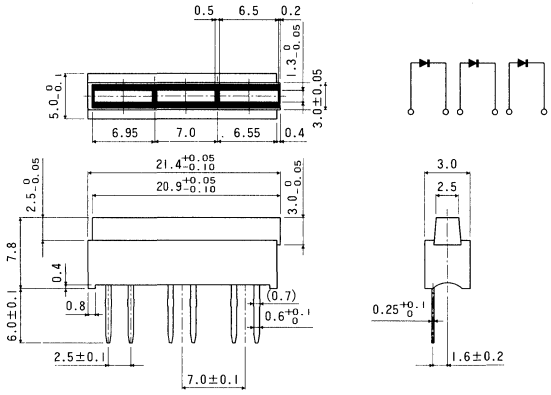
LD-002VB/DB/YB/MB



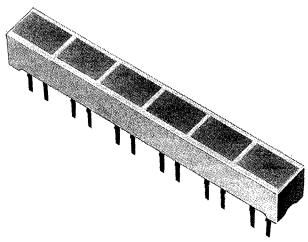


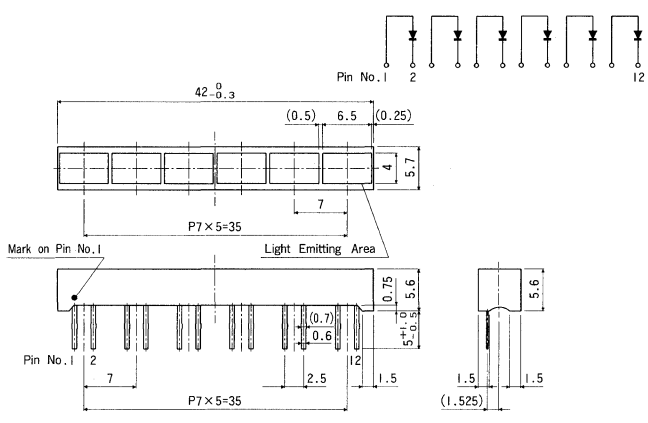
LD-003VB/DB/YB/MB



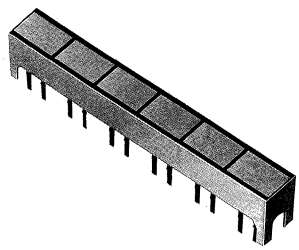


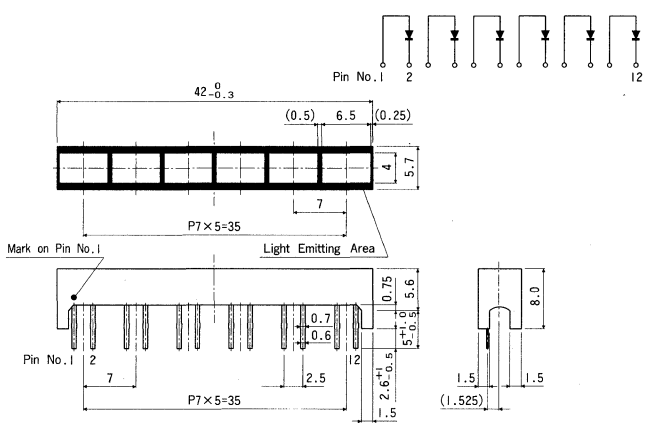
LD-006AVRA/ADUA/AYYA/AMGA





LD-006BVRB/BDUB/BYYB/BMGB

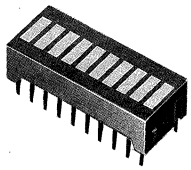


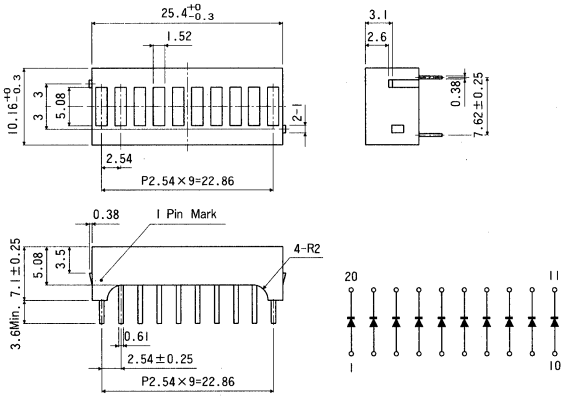


LED Flat Displays (LD)

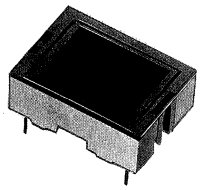
(Unit : mm)

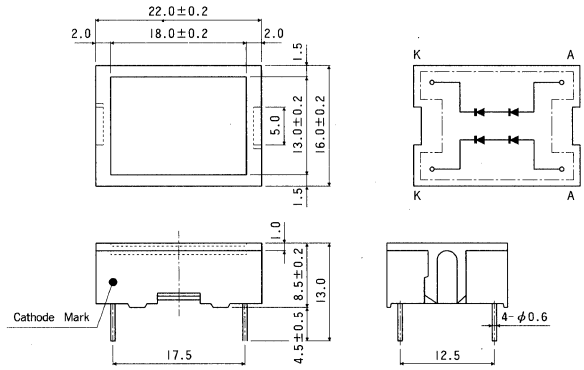
LD-010VW/DW/YW/MW



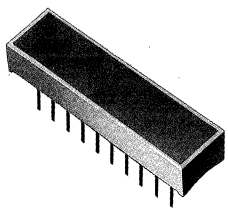


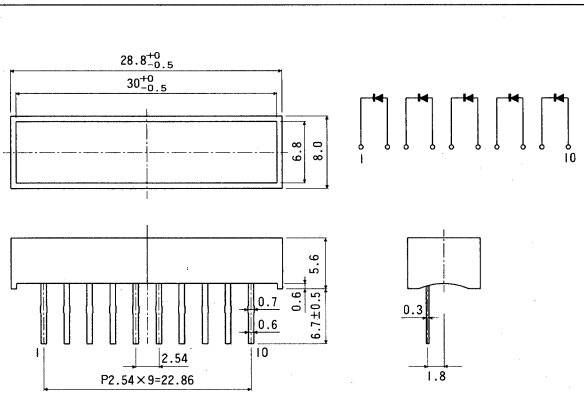
LD-706VR/DU/YY/MG



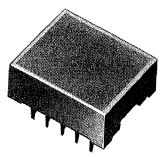


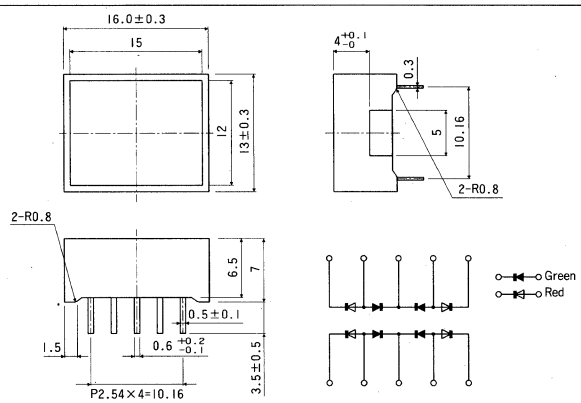
LD-1203LR/VR/DU/YY/MG





LD-605MVW

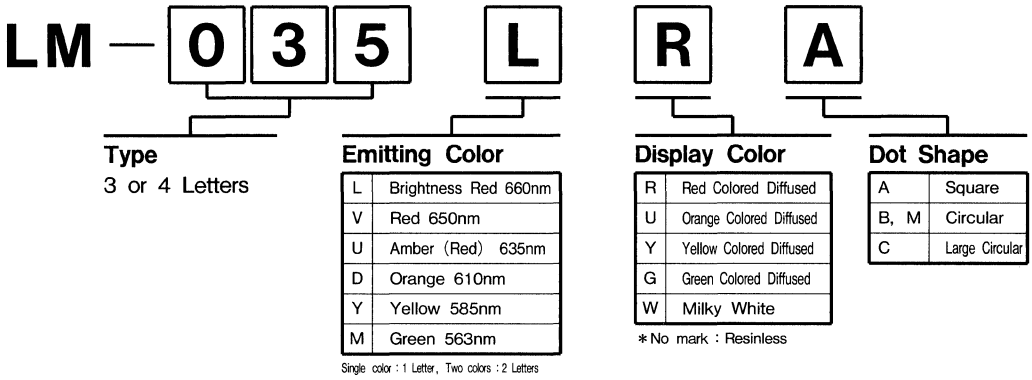




Dot Matrix Displays (LM・LUM)

A combination of vertical and horizontal matrixes expresses the desired character or image.
Available dot matrixes are 16×16, 16×32, 24×24 in red, green, yellow and orange, or high intensity red only, or two colors ; with or without driver.

●Product Designation



●5×7 Dot Matrix Displays

Emitter surface size (mm)	Common: Emitting color / Emitting material / λp (nm)	Red GaAlAs 660	Red GaAsP on GaP 650	Orange GaAsP on GaP 610	Yellow GaAsP on GaP 585	Green GaP 563	Basic ordering unit	Quantity /package	Quantity /bag	Rank
14×20 (□2.2×5×7)	Anode	LM-035LRA※3	LM-035VRA※3	LM-035DUA※3	LM-035YYA※3	LM-035MGA※3	80	80	80	○
	Cathode	–	LM-0352VRA※3	–	–	–	80	80	80	○
14×20 (φ2.2×5×7)	Anode	LM-035LRB※3	LM-035VRB※3	LM-035DUB※3	LM-035YYB※3	LM-035MGB※3	80	80	80	○
	Cathode	–	LM-0352VRB※3	–	–	LM-0352MGB※3	80	80	80	○
12.7×17.78 (φ2.0×5×7)	Anode	LM-2035LB※3	LM-2035VB※3	–	–	LM-2035MB※3	500	500	500	○
	Cathode	–	–	–	–	–	500	500	500	○
12.7×17.78 (φ2.0×5×7)	Anode	–					500	500	500	○
	Cathode	☆LM-2035MUM (Green／Red Two-color light emission) ※3					500	500	500	○
19.9×27.9 (φ2.8×5×7)	Anode	–	LM-0355VRB※3	LM-0355DUB※3	–	LM-0355MGB※3	80	80	80	○
	Cathode	–	LM-0354VRB※3	LM-0354DUB※3	–	LM-0354MGB※3	80	80	80	○
19.9×27.9 (φ3.5×5×7)	Anode	LM-0355LRC※3	LM-0355VRC※3	LM-0355DUC※3	–	LM-0355MGC※3	80	80	80	○
	Cathode	LM-0354LRC※3	LM-0354VRC※3	LM-0354DUC※3	–	LM-0354MGC※3	80	80	80	○
19.9×27.9 (φ2.8×5×7)	Anode	LM-0355MVWB※3 (Green／Red Two-color light emission)					80	80	80	○
	Cathode	–					80	80	80	○
19.9×27.9 (φ3.5×5×7)	Anode	☆LM-0355MLWC※3 (Green／Bright Red Two-color light emission)					20	20	20	○
	Cathode	☆LM-0354MLWC※3 (Green／Bright Red Two-color light emission)					20	20	20	○

Notes : 1. ※3 Need a certain lead time for delivery.
2. ☆Under development

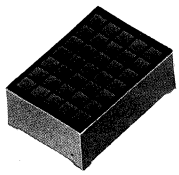
○ : Semi-standard products

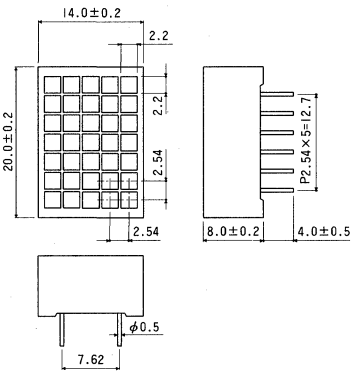
Dot Matrix Displays (LM・LUM)

●5×7 Dot Matrix Displays

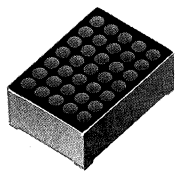
(Unit : mm)

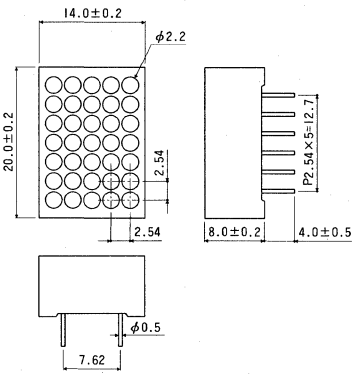
LM-035LRA/VRA/DUA/YYA/MGA/0352VRA



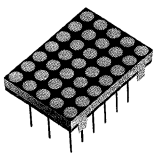


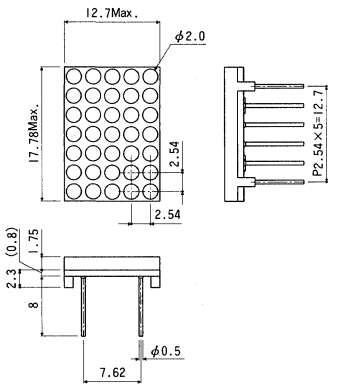
LM-035LRB/VRB/DUB/YYB/MGB/0352VRB



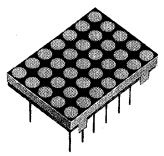


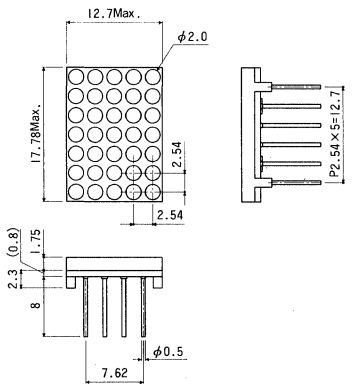
LM-2035LB/VB/MB



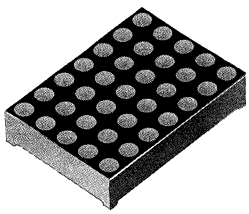


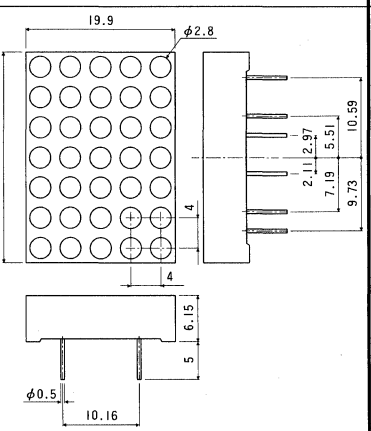
LM-2035MUM



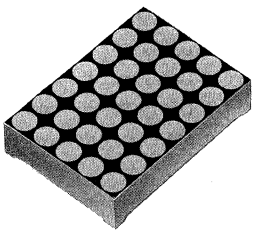


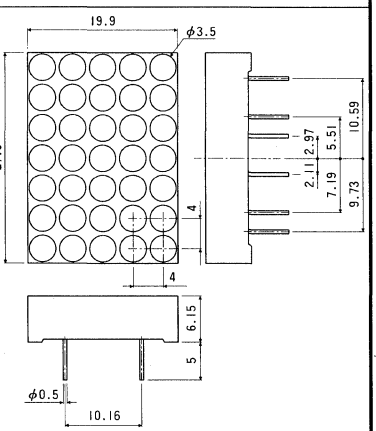
LM-0355VRB/DUB/MGB/0354VRB/DUB/MGB



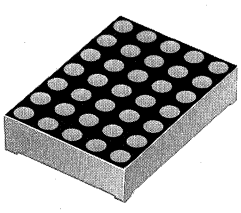


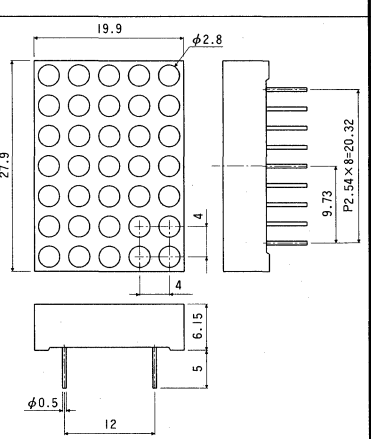
LM-0355LRC/VRC/DUC/MGC/0354LRC/VRC/DUC/MGC



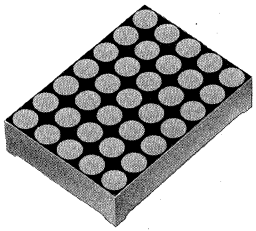


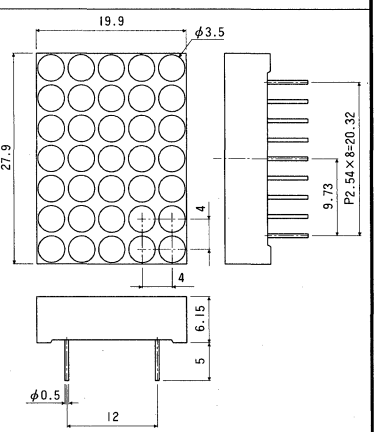
LM-0355MVWB





LM-0355MLWC/0354MLWC





●7×10 Dot Matrix Displays

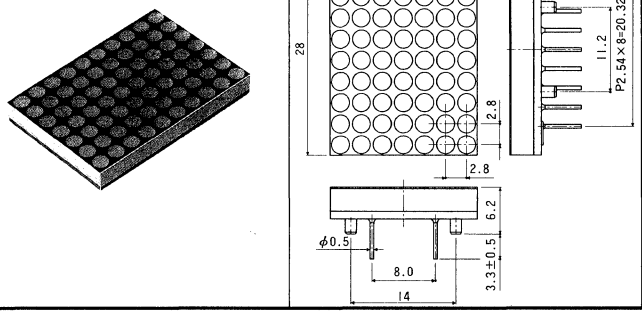
Emitter surface size . (mm)	Common / Emitting color	Red	Red	Orange	Yellow	Green	Basic ordering unit	Quantity /package	Quantity /bag	Rank
	Common / Emitting material	GaAlAs	GaAsP on GaP			GaP				
	Common / λp (nm)	660	650	610	585	563				
19.6×28 (φ2.4×7×10)	Anode	**LM-0701LB**※3	–	–	–	–	200	200	200	○
	Cathode	–	–	–	–	–	200	200	200	○
19.6×28 (φ2.4×7×10)	Anode	–					200	200	200	○
	Cathode	☆**LM-0701MUM**※3 **(Green／Red Two-color light emission)**					200	200	200	○

Notes : 1. ※3 Need a certain lead time for delivery.
2. ☆Under development

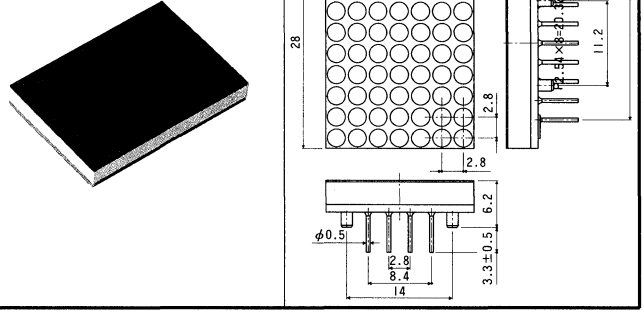
○ : Semi-standard products

(Unit : mm)

LM-0701LB



LM-0701MUM



●8×8 Dot Matrix Displays

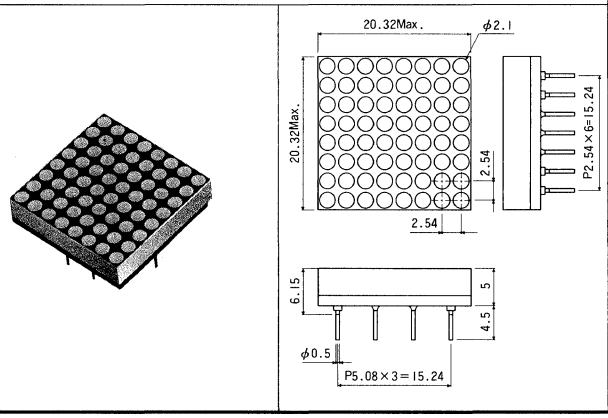
Emitter surface size	Dot size	Specifications	Emitting color		Part No.	Duty ratio	Basic ordering unit	Quantity /package	Quantity /bag	Rank
20.32×20.32mm	φ2.1mm	Display only	Single color	Brightness red	**LM-2064LB**※3	1／8	100	100	100	○
				Green	**LM-2064MB**※3		100	100	100	○
			Multi-color	Red／Green／Orange	☆**LM-2064MUM**※3		100	100	100	○

Notes : 1. ※3 Need a certain lead time for delivery.
2. ☆Under development

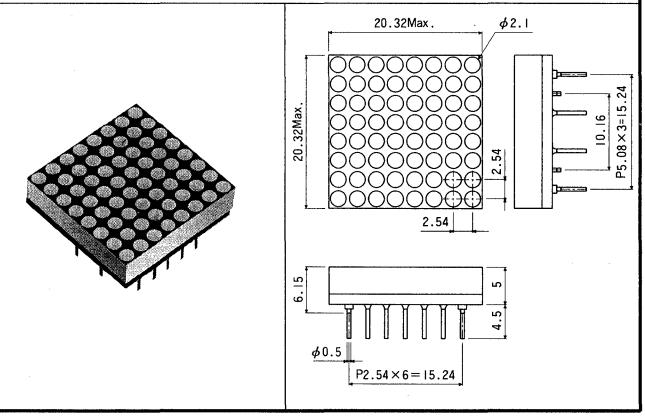
○ : Semi-standard products

(Unit : mm)

LM-2064LB/MB



LM-2064MUM



●16×16 Dot Matrix Displays

Emitter surface size	Dot size	Specifications	Emitting color		Part No.	Duty ratio	Basic ordering unit	Quantity /package	Quantity /bag	Rank
32×32mm	φ1.6mm	Display only	Single color	Brightness Red／Red	**LM-1256LB／VB**※3	1／16	50	50	50	○
			Multi-color	Red／Green／Orange	☆**LM-1256MUM**※3	1／16	50	50	50	○
40×40mm	φ2mm	Display only	Single color	Red／Green	**LM-2256UB／MB**※3	1／16	40	40	40	○
			Multi-color	Red／Green／Orange	**LM-2256MUB**※3	1／16	40	40	40	○
64×64mm	φ3mm	Display only	Single color	Orange	**LUM-2563D100**	1／16	9	9	9	○
			Multi-color	Red／Green／Orange	**LUM-2563MU100**	1／16	8	8	8	○
				Brightness Red/Green/Orange	**LUM-2563ML100**	1／16	9	9	9	○
96×96mm	φ5mm	Display only	Single-color	Red／Green	**LUM-2565M100／V100 (Rラインタイプ)**	1／8	40	40	40	○
			Multi-color	Red／Green／Orange	**LUM-2565MV100 (Rラインタイプ)**	1／16	40	40	40	○

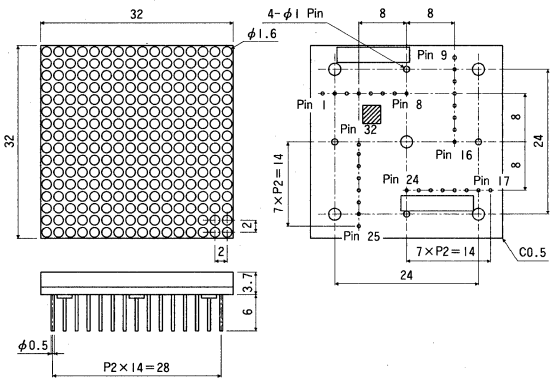
Notes : 1. ※3 Need a certain lead time for delivery.
2. ☆Under development

○ : Semi-standard products

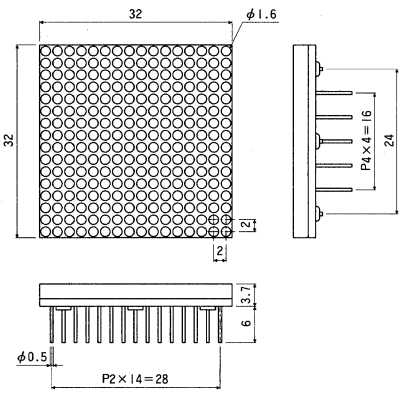
●16×16 Dot Matrix Displays

(Unit : mm)

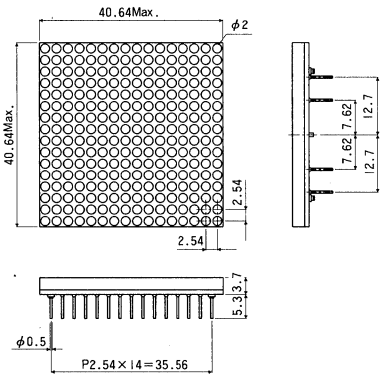
LM-1256LB/VB



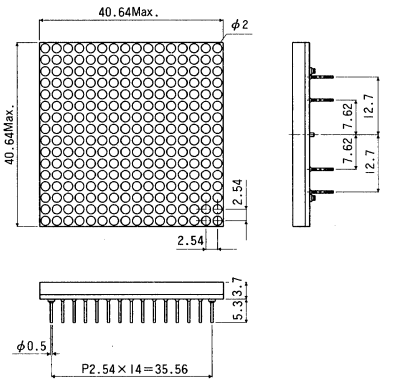
LM-1256MUM



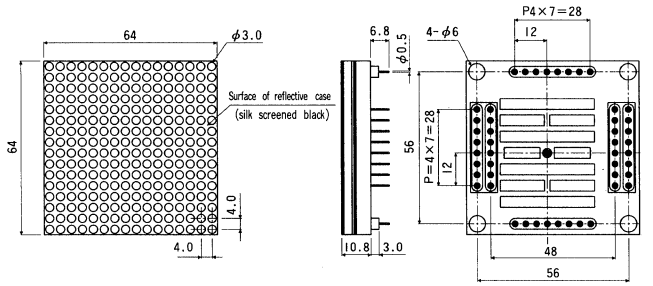
LM-2256UB/MB



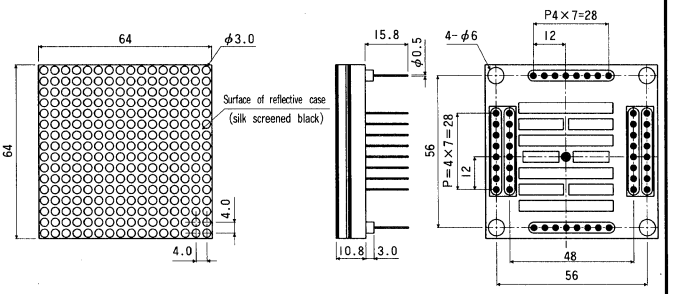
LM-2256MUB



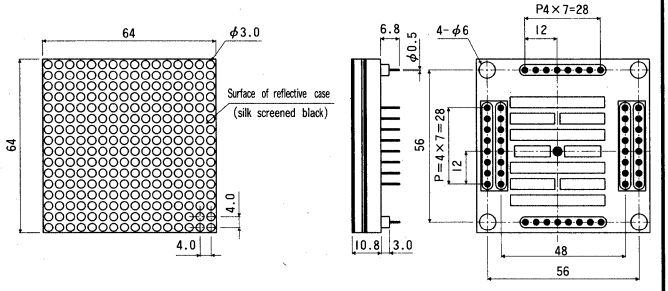
LUM-2563D100



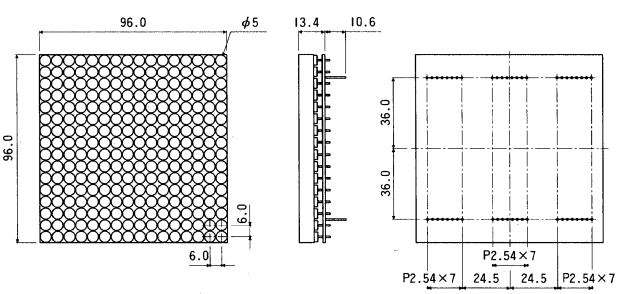
LUM-2563MU100



LUM-2563ML100

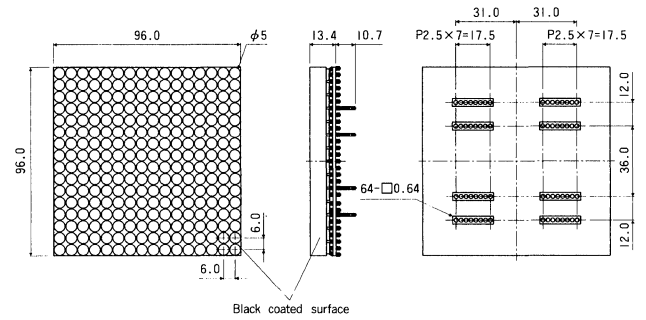


LUM-2565M100/V100



(Unit : mm)

LUM-2565MV100



Dot Matrix Units (LUM)

●16×16 Dot Matrix Units

Emitter surface size	Dot size	Specifications	Emitting color		Part No.	Duty ratio	Basic ordering unit	Quantity/package	Quantity/bag	Rank
64×64mm	φ3mm	Display with driving circuit	Multi-color	Red Green Orange	**LUM-2563MU300** (COBタイプ)	1/16	10	10	10	○
					LUM-2563MU301 (Cランプタイプ)		10	10	10	○
					LUM-2563MU302 (Rランプタイプ)		10	10	10	○
96×96mm	φ5mm	Display with driving circuit	Multi-color	Red Green Orange	**LUM-2565MU302** (Rランプタイプ)	1/16	20	20	20	○
					LUM-2565MU304 (Rランプタイプ)	1/16	20	20	20	◎
					LUM-2565MU305 (Cランプタイプ)	1/16	20	20	20	○
					LUM-2565MU306 (ルーバ付タイプ)	1/16	20	20	20	○
					☆**LUM-2565ML302** (ルーバ付タイプ)	1/8	20	20	20	○
144×144mm	φ8mm	Display with driving circuit	Single-color	Brightness Red	☆**LUM-2568L300** (Rランプタイプ)	1/16	10	10	10	○
			Multi-color	Red Green Orange	**LUM-2568MU302** (Rランプタイプ)	1/16	10	10	10	○
					LUM-2568ML302 (ルーバ付タイプ)	1/16	10	10	10	○
					LUM-2568ML303 (ルーバ付タイプ)	1/8	10	10	10	○
200mm×200mm	φ8mm	Display with driving circuit	Single-color	Brightness Red	☆**LUM-2568L350** (Rランプタイプ)	1/16	8	8	8	○
	φ10mm		Multi-color	Red Green Orange	**LUM-2568MU352** (Rランプタイプ)	1/16	8	8	8	○
	φ8mm				**LUM-2568ML352** (ルーバ付タイプ)	1/16	8	8	8	○

Note : 1. K☆Under development

◎ : Standard products ○ : Semi-standard products

Dot Matrix Unit

LUM — 2 5 6 | 3 | M U □ | 1 0 0

Number of Dots

256	16×16
512	16×32
576	24×24

Dot Diameter

2φ	2
3φ	3
5φ	5
8φ	8
10φ	A

Emitting Color

L	Brightness Red 660nm
V	Red 650nm
U	Amber (Red) 635nm
M	Green 563nm
B	Blue 470nm

Additional

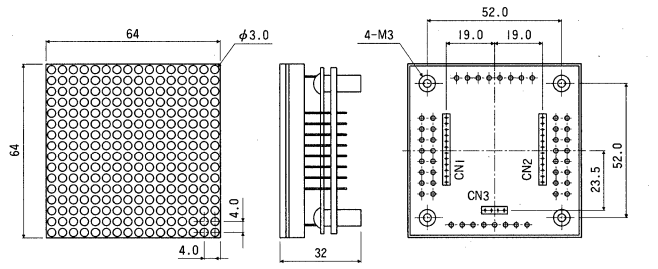
100～	Display only
200～	With Driver
300～	Controller

Dot Matrix Units (LUM)

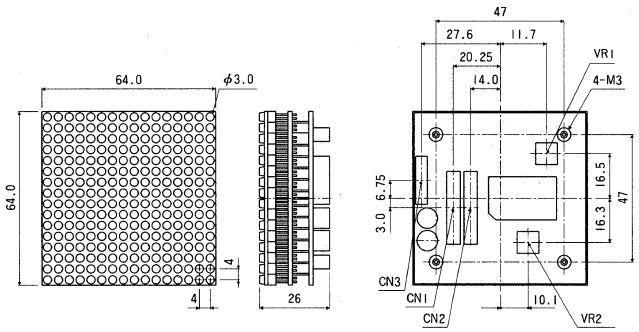
●16×16 Dot Matrix Units

(Unit : mm)

LUM-2563MU300



LUM-2563MU301



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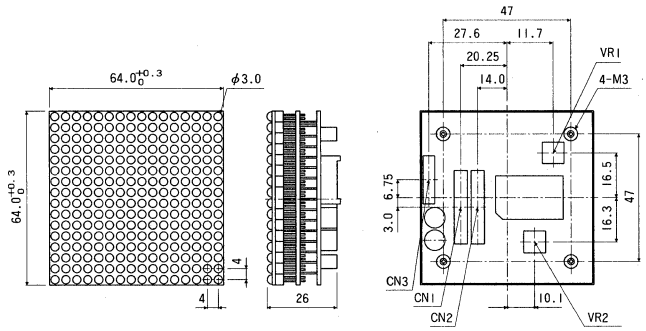
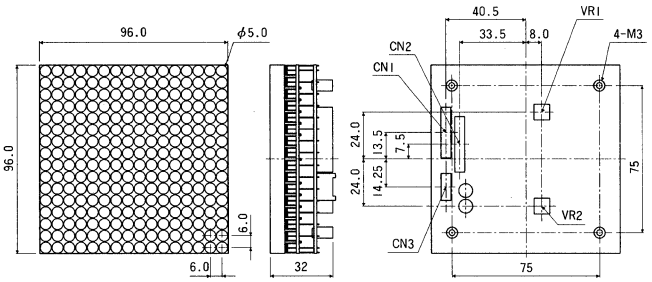
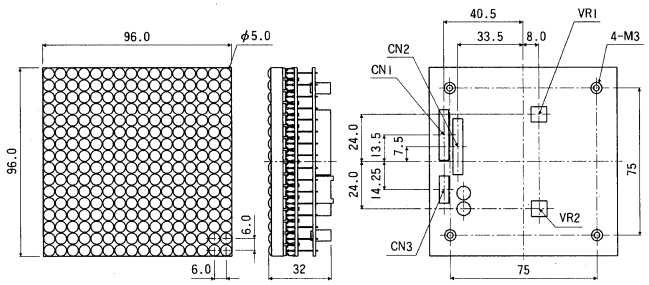


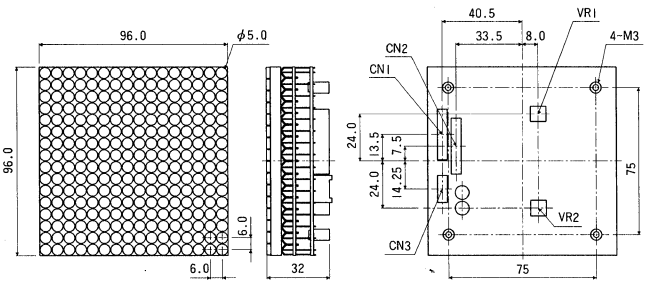
LUM-2565MU302



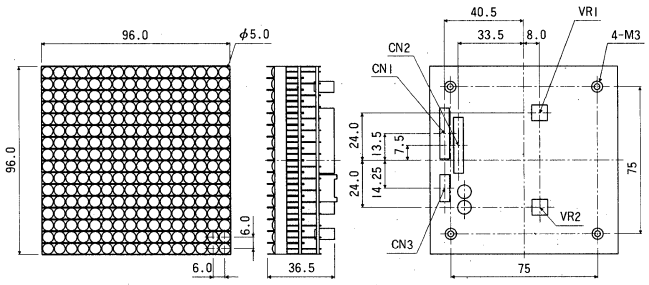
LUM-2565MU304



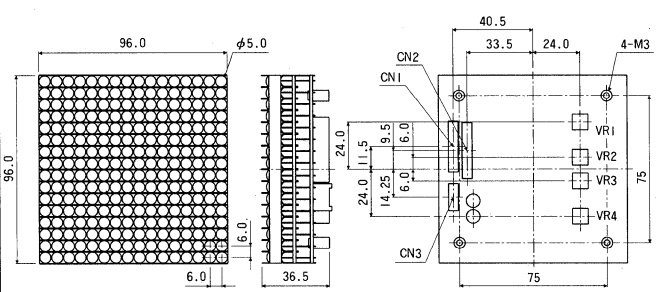
LUM-2565MU305



LUM-2565MU306

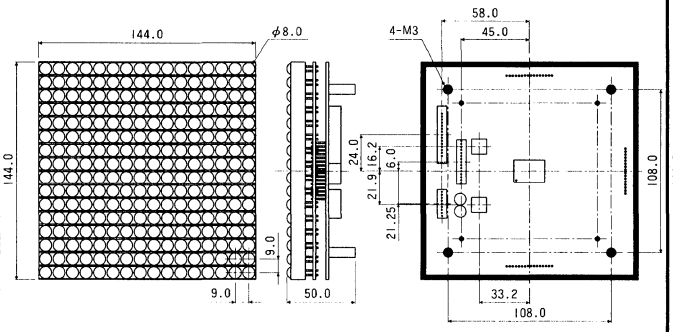


LUM-2565ML302



(Unit : mm)

LUM-2568L300



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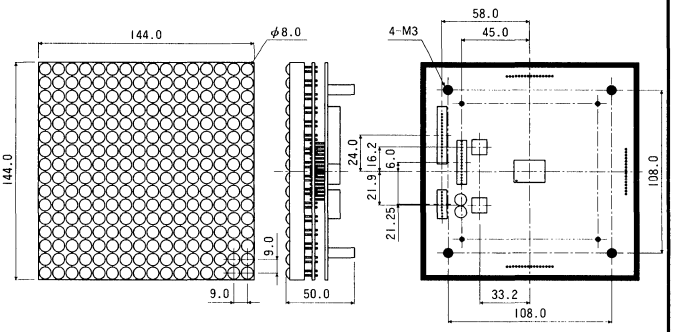

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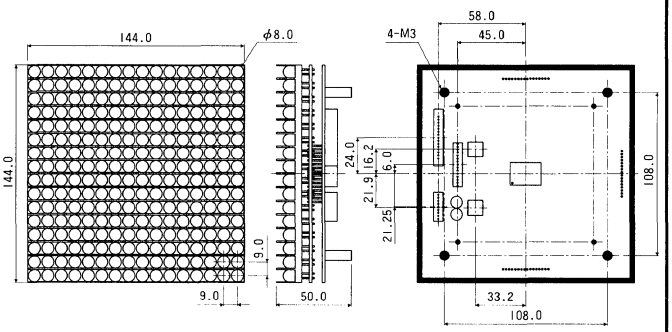
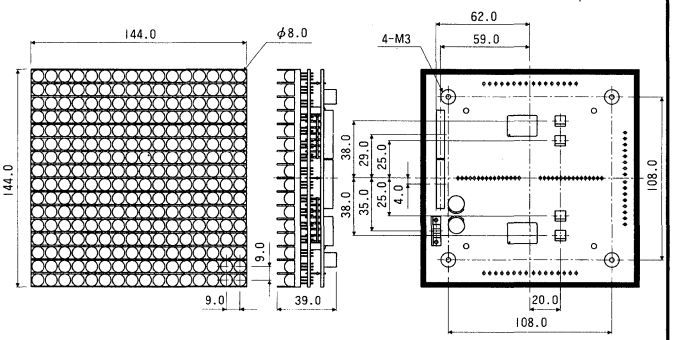
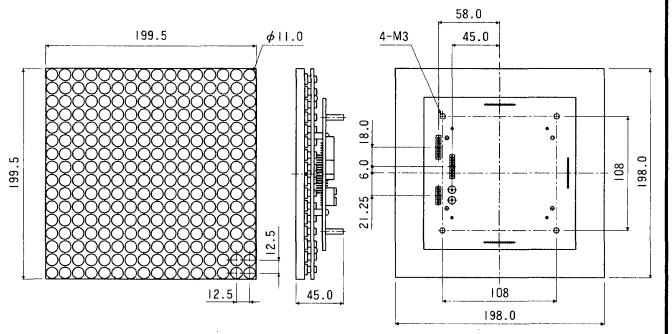


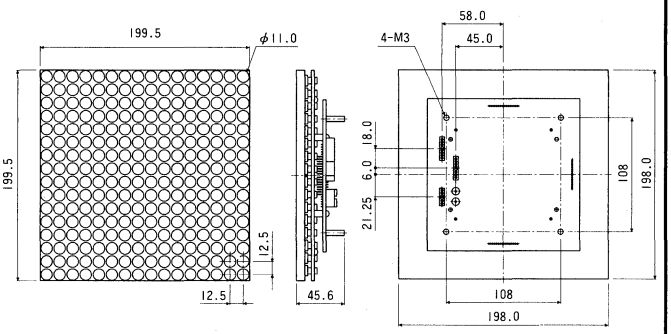
LUM-2568ML303



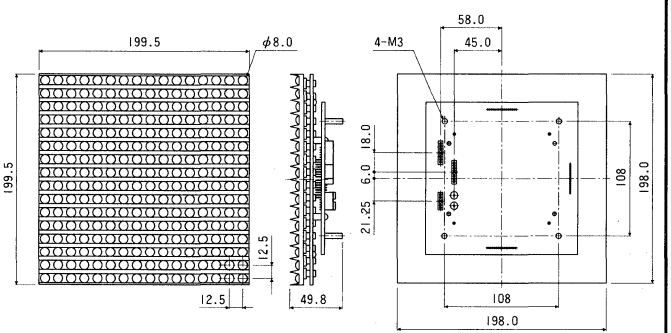
LUM-2568L350



LUM-2568MU352



LUM-2568ML352



Dot Matrix Units (LUM)

●24×24 Dot Matrix Units

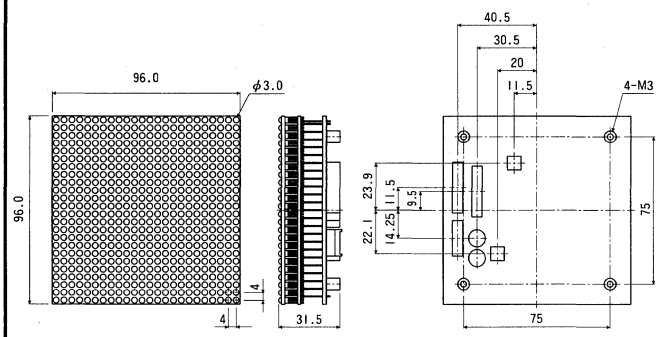
Emitter surface size	Dot size	Specifications	Emitting color		Part No.	Duty ratio	Basic ordering unit	Quantity/package	Quantity/bag	Rank
96×96mm	φ3mm	Display with driving circuit	Multi-color	Red Green Orange	**LUM-5763MU302 (R Lamp type)**	1/24	20	20	20	○
					☆**LUM-5763MU301 (C Lamp type)**		20	20	20	○

Note : ☆Under development

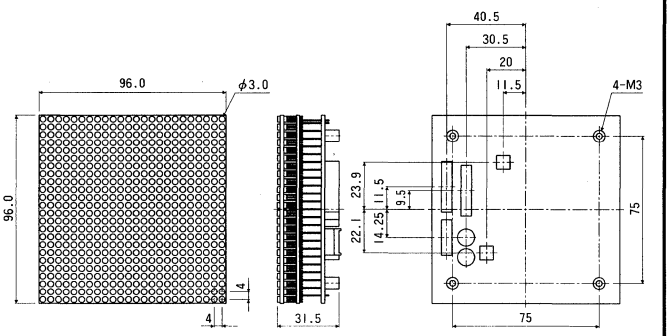
○ : Semi-standard products

(Unit : mm)

LUM-5763MU302



LUM-5763MU301



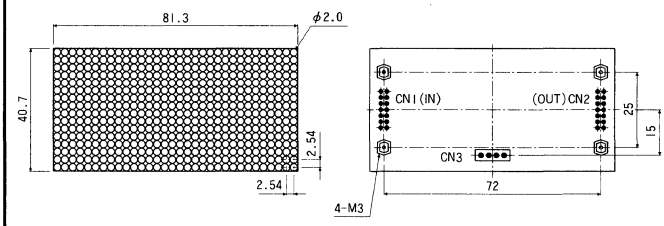
●16×32 Dot Matrix Units

Emitter surface size	Dot size	Specifications	Emitting color		Part No.	Duty ratio	Basic ordering unit	Quantity/package	Quantity/bag	Rank
40.7×81.3mm	φ2mm	Display with driving circuit	Multi-color	Red Green Orange	**LUM-5122MU300 (COB type)**	1/16	10	20	20	○
New 64 ×128mm	φ3mm	Display with driving circuit	Multi-color	Red Green Orange	**LUM-5123MU300 (C Lamp type)**	1/16	10	10	10	○
					LUM-5123MU301 (R Lamp type)		10	10	10	○
New 96 ×192mm	φ5mm	Display with driving circuit	Multi-color	Red Green Orange	**LUM-5125MU300 (R Lamp type)**	1/16	10	5	5	○

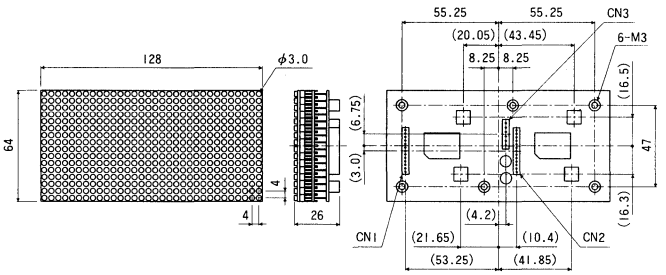
○ : Semi-standard products

(Unit : mm)

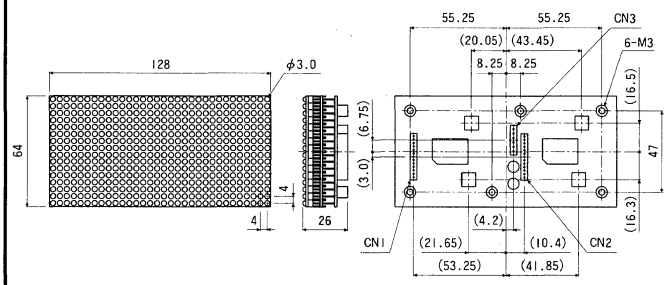
LUM-5122MU300



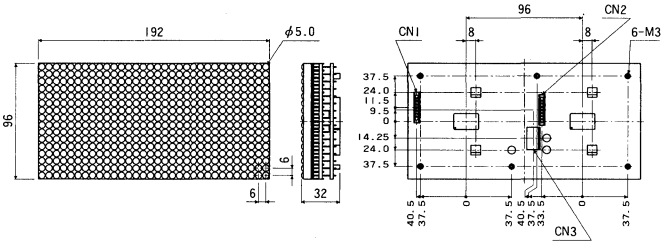
LUM-5123MU300



LUM-5123MU301



LUM-5125MU300



Lamp House (LR)

Can be used as backlight display function on audio and home appliances.
Various sizes and custom options are available.

Emitter surface size (mm)	Part No.	Emitting color	Applicable lamp	Emitting material	λp (nm)	Basic ordering unit	Quantity /package	Quantity /bag	Rank
5×13.5	**LR-1140DC**	Orange	SLV-31DC	GaAsP on GaP	610	400	400	400	○
	LR-1140MC	Green	SLV-31MC	GaP	563				
7×16	**LR-1150LT**	Red	SLV-31LT	GaAlAs	660	500	250	250	○
	LR-1150YC	Yellow	SLV-31YC	GaAsP on GaP	585				
	LR-1150NYC		SLV-31NYC	GaP	566				
	LR-1150MC	Green	SLV-31MC		563				

○ : Semi-standard products

●Product Designation

LR — 11 4 0 D C

Shape Type

Emitting Color

L	Brighthness Red 660nm
V	Red 650nm (Typ.)
U	Amber 635nm
D	Yellow 610nm (Typ.)
Y	Yellow 585nm (Typ.)
N	Natural Green 566nm
M	Green 563nm (Typ.)

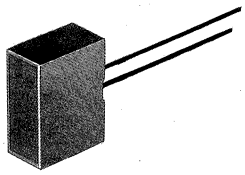
Single color : 1 Letter, Two colors : 2 Letters

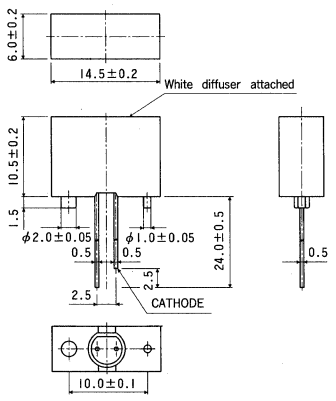
Lens Color

R	Red Colored Diffused
U	Amber Colored Diffused
Y	Yellow Colored Diffused
G	Green Colored Diffused
W	Milky White
C	Colored Clear
T	Transparent Clear
S	Semi Colored Diffused
L	Semi Colored Clear

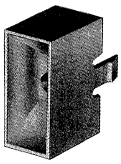
(Unit : mm)

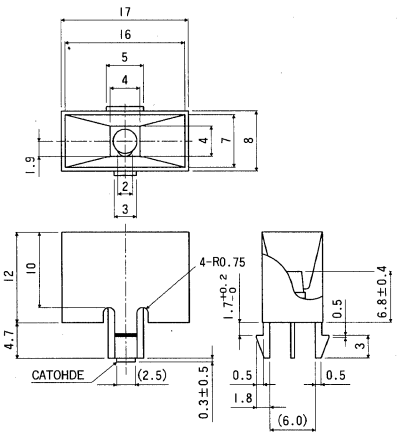
LR-1140





LR-1150





Pixel (LUL)

Assembled LED lamp incorporates several high intensity LEDs of different colors (red and green) . This arrangement provides wider viewing angle and clear visibility and eliminates parallax error. The LEDs are housed in a water tight case for outdoor use. To block the direct sunlight, the hood can extend up to 15 mm and rotate in steps of 30 dgrees.
Assembled LED units incorporating these assembled LED lamps are also available. In these units assembled LED lamps are located in a form of matrix.

Emitter surface size (mm)	Part No.	Emitting color	Emitting material	λp (nm)	Basic ordering unit	Quantity/package	Quantity/bag	Rank
φ30.5	LUL-3015MLC10	Red	GaAlAs	660	100	100	100	◎
		Green	GaP	563				
φ54.0	LUL-5050MLC10	Red	GaAlAs	660	60	60	60	◎
		Green	GaP	563				
New □80 (φ18×16 Dot)	LUL-C08018ML1	Red	GaAlAs	660	50	50	50	◎
		Green	GaP	563				

◎ : Standard products

●Product Designation

B	Lamp Viewing Angle2 θ (1/2) = ±10° (Typ.)
C	Lamp Viewing Angle2 θ (1/2) = ±25° (Typ.)

Viewing Angle

LUL — 30 15 ML C 10

- 30 — Dot Diameter
- 15 — Chip Counts
- ML — Emitting Color

M	Green
L	Bright Red

- 10 — Angle of Unit

LUL — C 080 18 ML 1

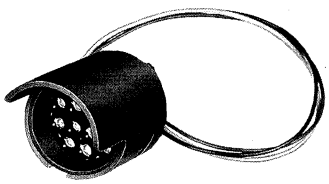
- 080 — External Dimensions
- 18 — Dot Diameter
- ML — Emitting Color

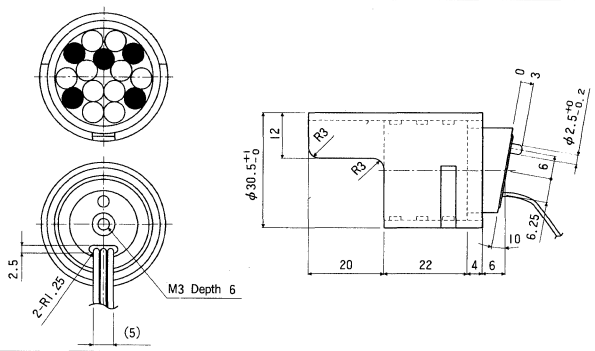
M	Green
L	Red

- 1 — Suffix

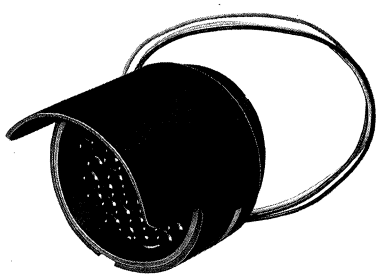
(Unit : mm)

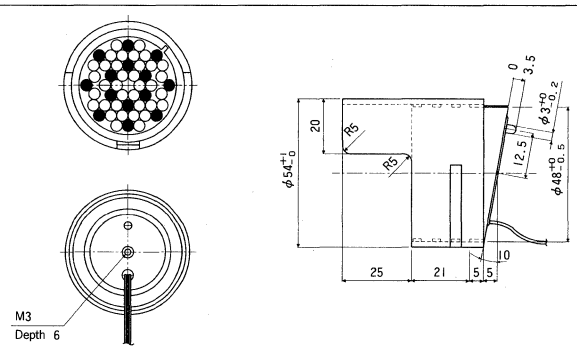
LUL-3015 MLC10





LUL-5050 MLC10

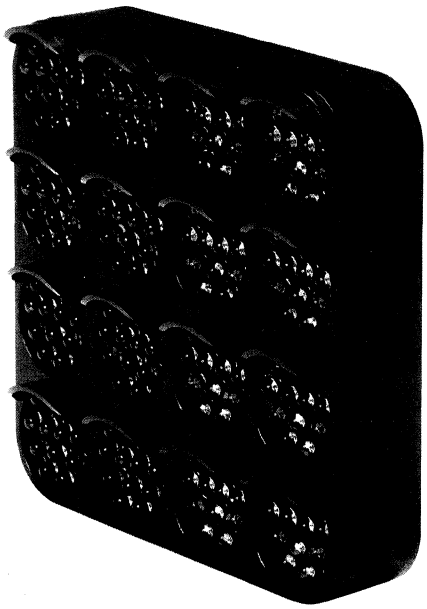


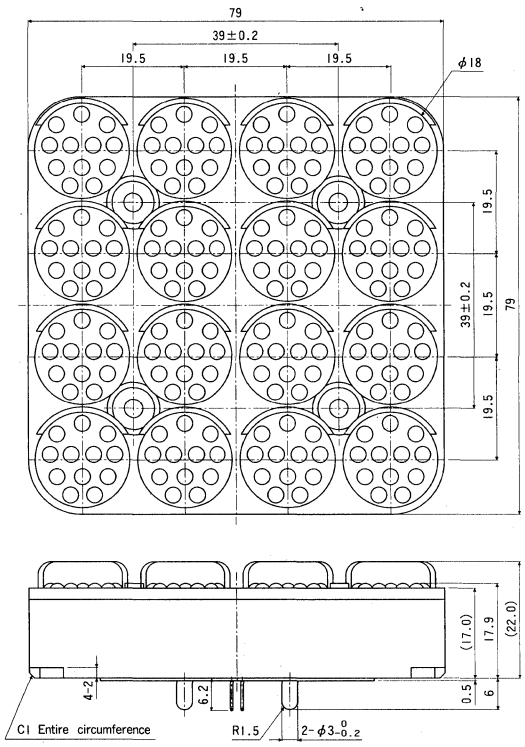


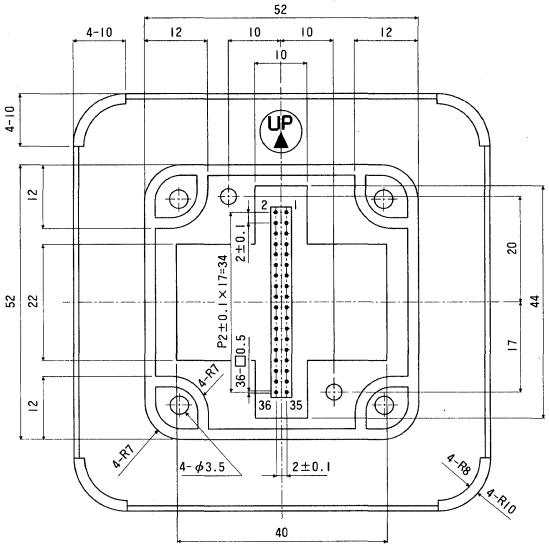
Pixel (LUL)

(Unit : mm)

LUL-C08018ML1







LED Arrays (LE)

The light from the source is focused into high intensity through the lens and emitted into the target, e.g. the sensor.

Size	Effective reading width Min. (mm)	Overall length (mm)	Emitting color		Basic ordering unit	Quantity /package	Quantity /bag	Rank
			Red	Green				
A3	307	326	**LE-128A3V** ※3	**LE-128A3M** ※3	25	25	25	○
B4	260	286	**LE-112B4V** ※3	**LE-112B4M** ※3	25	25	25	○
A4	216	236	**LE-1056V** ※3	**LE-1056M** ※3	30	30	30	○

Note : ※3 Need a lead time for delivery.

○ : Semi-standard products

●Product Designation

LE — □□□□ □

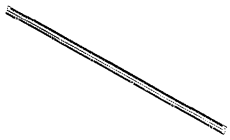
Shape Type
4 or 5 Letters Type

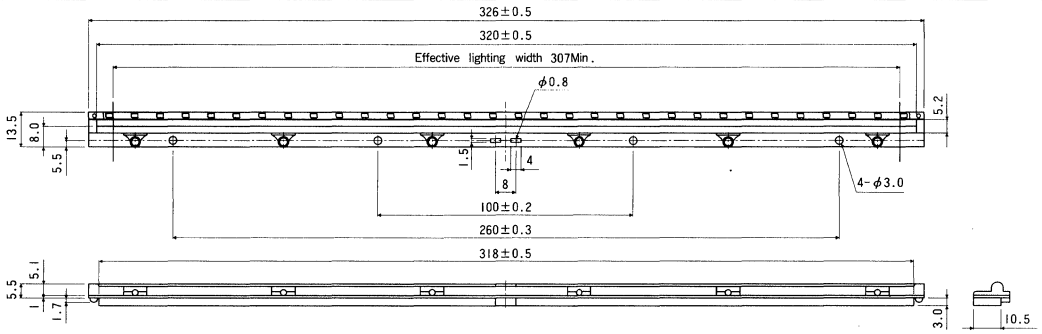
Emitting Color

M	Green
V	Red

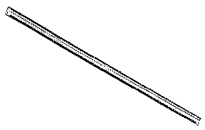
(Unit : mm)

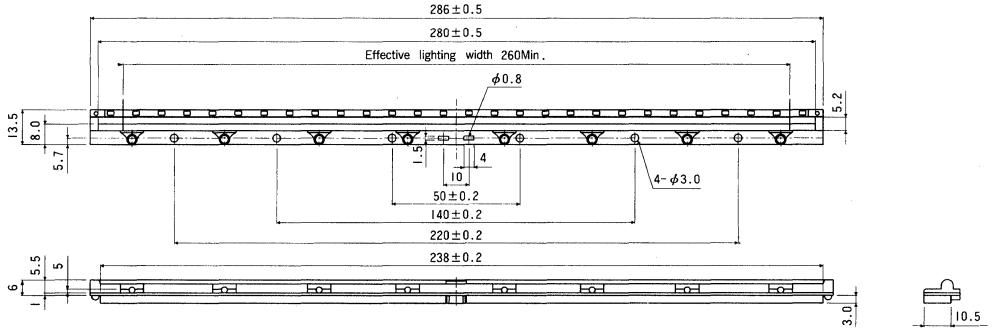
LE-128A3V/M



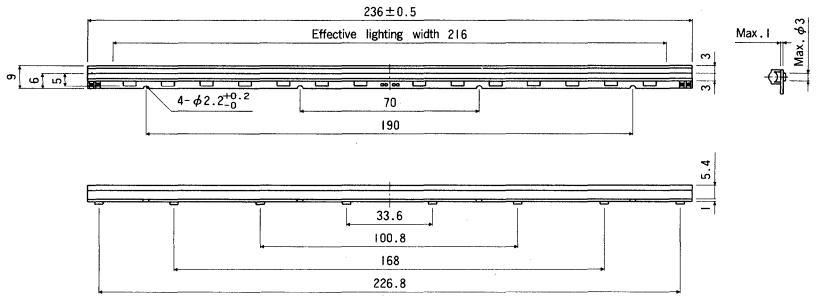


LE-112B4V/M





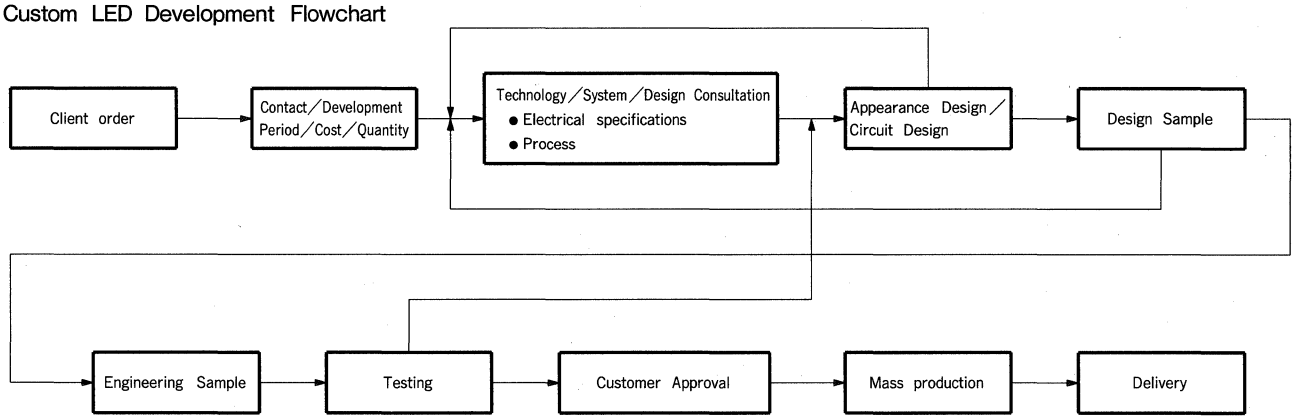
LE-1056V/M

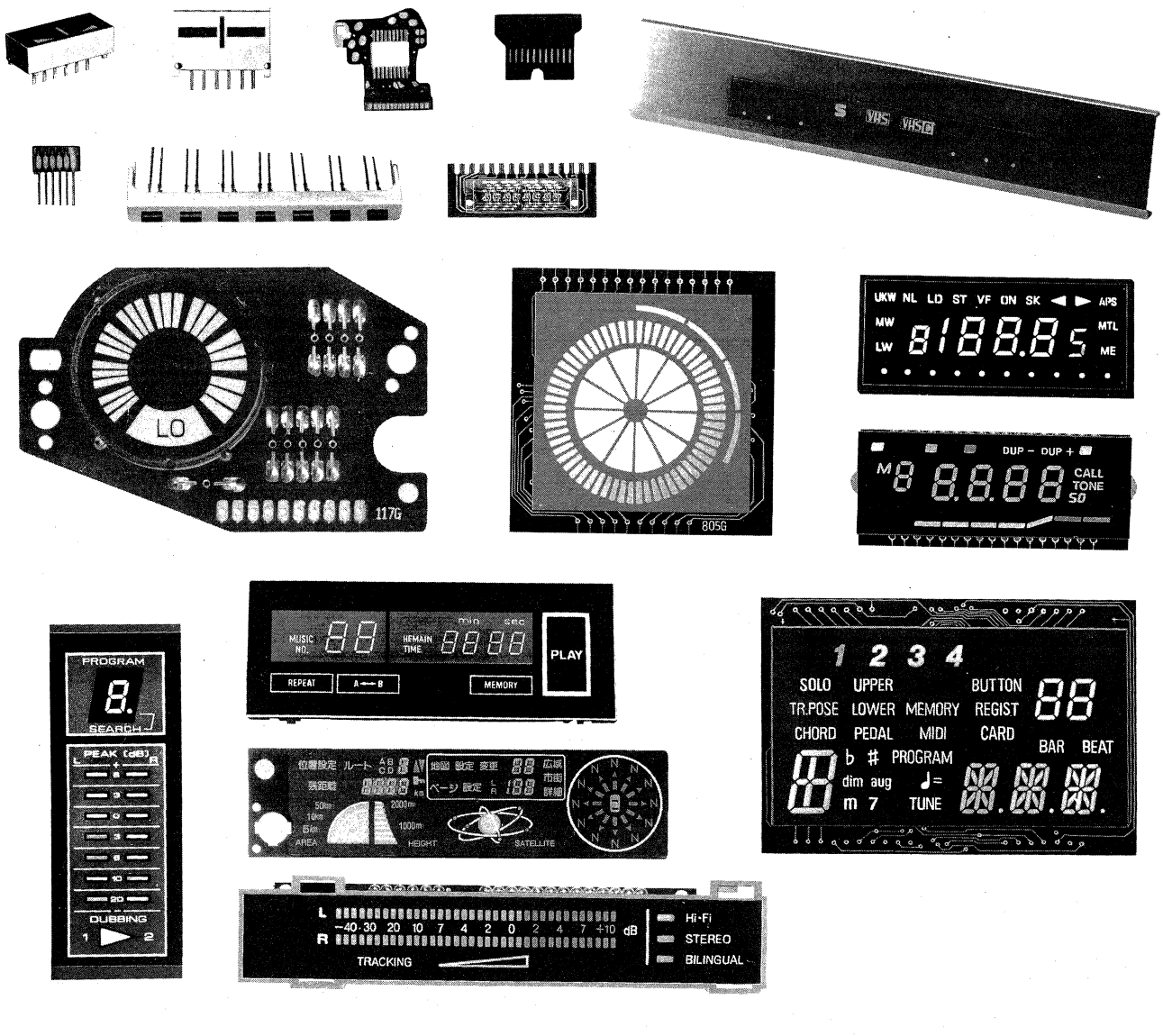


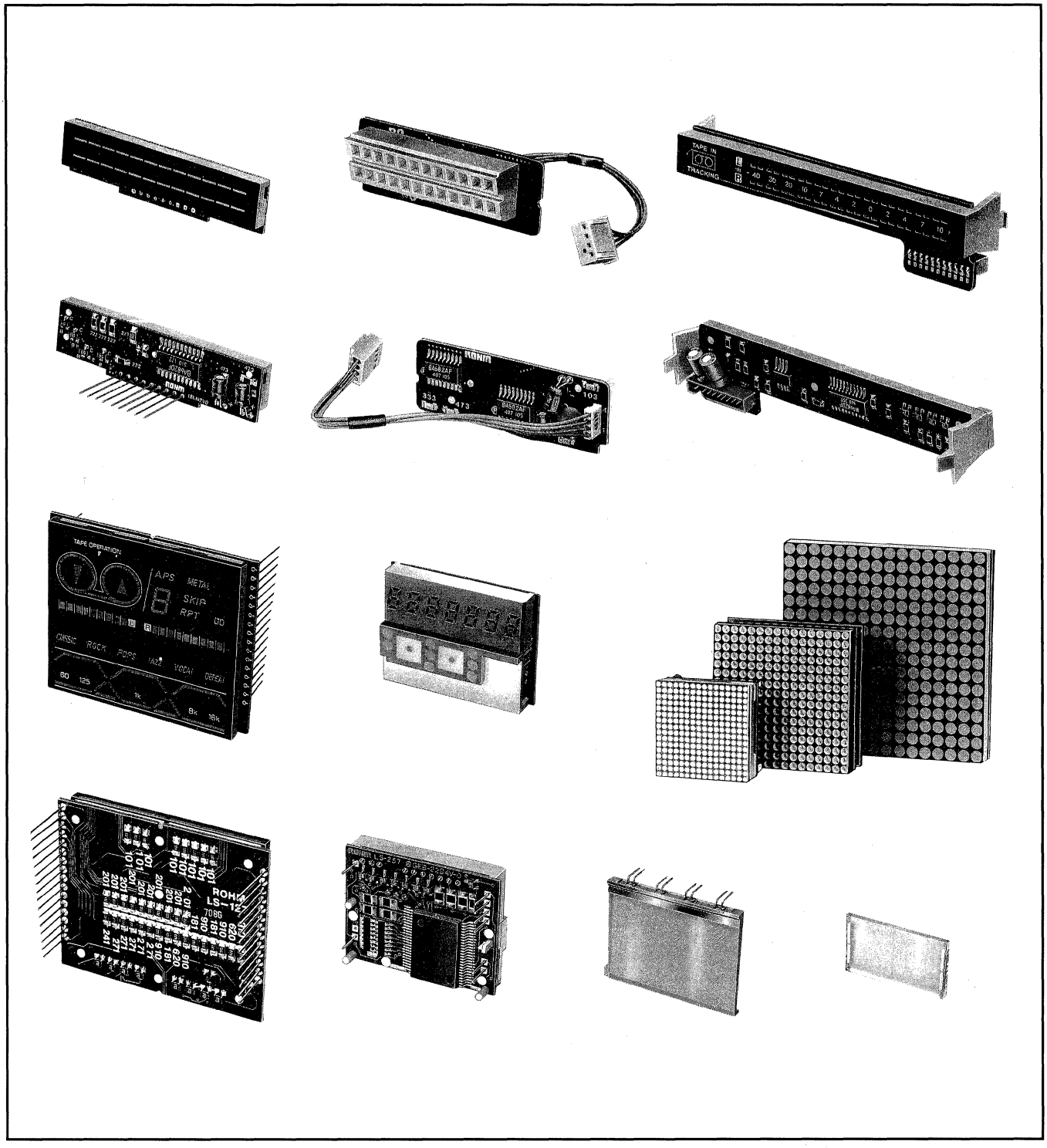
Custom LED

ROHM meets custom requirements using its full capabilities and technologies such as circuit design, PCB mounting and all in-house processing.
This total system enables us to deliver products on time.

Custom LED Development Flowchart






TAPE IN
TRACKING
TAPE OPERATION
APS
METAL
SKIP
RPT
CLASSIC
ROCK
POPS
JAZZ
VOCAL
DANCE
ROHM
LS-12

MEMO

Sensors

■Product Designation

ROHM Sensors are identified as follows :

(Example) SIR-56SB (①) 80F215 (②)

①Type code

②Forming and selection specifications code

■Standard products • Semi-standard products • Custom

To make it easier for the customer to select the type of product best suitable for applications, we offer Sensors in three types :

(1) standard, (2) semi-standard, and (3) custom

(1) Standard products

Standard products are available upon request.

(2) Semi-standard products

These products require a certain amount of time to fill an order. Please consult us for delivery date :

(3) Custom

Custom products are developed and manufactured to specifications prescribed by the customer.

These are special specification products, require more time to deliver than do semistandard products. Please ask us for delivery date.

●Please note the following when placing an order.

The amount of an order must be in multiples of the basic order unit.

●Introductory remarks

◎ : Standard products

○ : Semi-standard products

△ : Custom

Infrared Light Emitting Diodes (SIR • SIM • PLT • SIC)

Versions include card remote control (SIR-320ST3) for custom application.

Package	Part No.	Feature	Absolutem aximumra tings	Standard Characteristics							Basic ordering unit	Rank
			I_F (mA)	Po (mW)	I_F (mA)	V_F (V)	I_F (mA)	λp (nm)	tr, tf (μs)	θ1/2 (deg)		
3φ Resin	**SIR-320ST3**	Best suitable for card remote controller	75	9	50	1.2	50	940	1	18	2,000	◎
	SIR-33ST3	Small yet high output power	50	8	50	1.4	50	950	1	28	2,000	◎
	SIR-381SB3	Small yet high output power	100	8	50	1.4	50	950	1	20	2,000	◎
5φ Resin	**SIR-481ST3**	Best suitable for remote controller	100	9	50	1.4	100	940	1	25	1,000	◎
	SIR-482ST3	Best suitable for remote controller	100	10	50	1.3	100	940	1	25	1,000	◎
	SIR-56SB3	Best suitable for remote controller	100	8	50	1.38	100	950	1	23	1,000	◎
	SIR-563SB3	High power remote controller	100	11	50	1.34	50	940	1	23	1,000	◎
	SIR-567ST3	GaAlAs high output type	75	10	50	1.6	50	880	0.5	16	1,000	◎
Side view resin	**SIM-192ST**	Mold type general purpose	50	Io=1.2mA Min.	20	1.15	20	950	1	–	2,000	○
	SIM-20SB	Mold type general purpose	50	6.5	50	1.25	50	950	1	15	2,000	◎
	SIM-22ST	Mold type general purpose	50	0.48Min.	10	1.25	50	950	1	30	2,000	◎
Bidirectional lens resin	**PLT-462T3**	For tape end	50	I_L=1.0mA Min.	20	1.2	50	950	1	–	1,000	◎
	PLT-463SB	For tape end	50	I_L=1.0mA Min.	20	1.2	50	950	1	–	1,000	◎
TO-18 Stem	**SIC-58SL**	High reliability	100	7	100	1.3	100	950	1	11	1,000	○

◎ : Standard products ○ : Semi-standard products

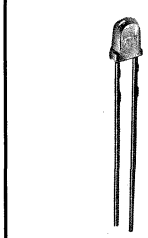
●Product Designation

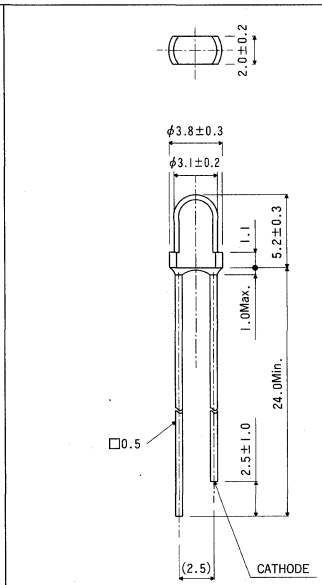
S I R — 3 3 S T 3

SIR	Lens type infrared LED
SIM	Molded infrared LED
SIC	High rel. infrared LED
PLT	Bidirectional infrared LED

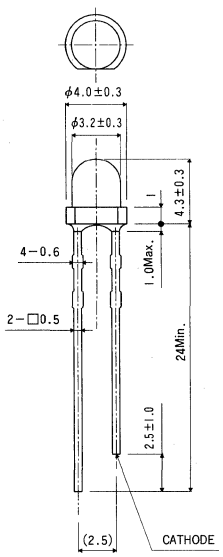
(Unit : mm)

SIR-320ST3



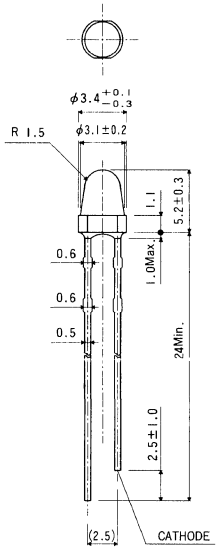


SIR-33ST3

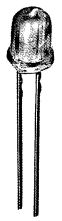


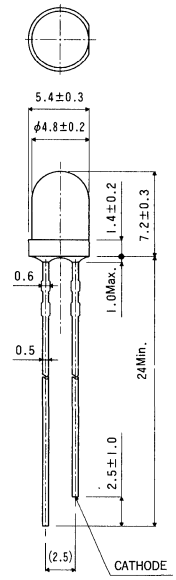
(Unit : mm)

SIR-381SB3

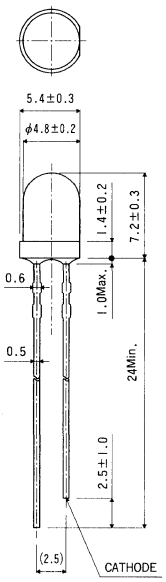


SIR-481ST3

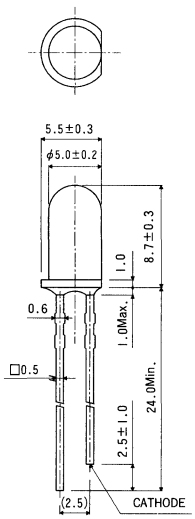




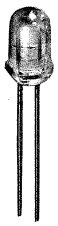
SIR-482ST3

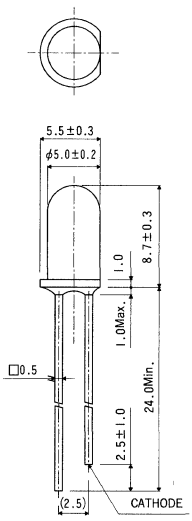


SIR-56SB3 • 563SB3

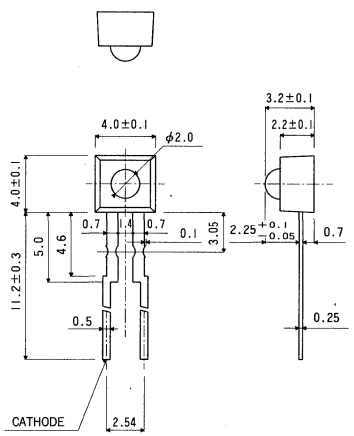


SIR-567ST3





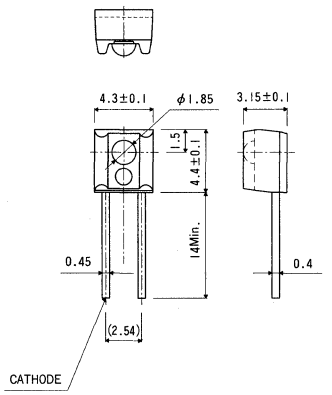
SIM-192ST



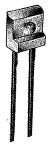
Infrared Light Emitting Diodes (SIR・SIM・PLT・SIC)

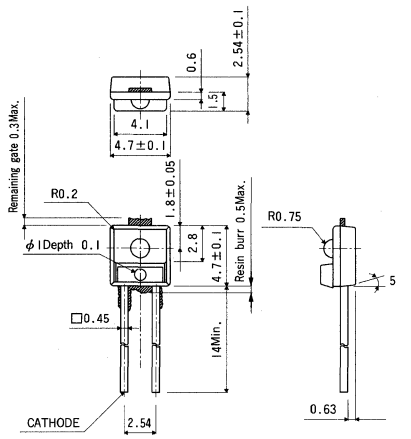
(Unit : mm)

SIM-20SB

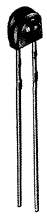


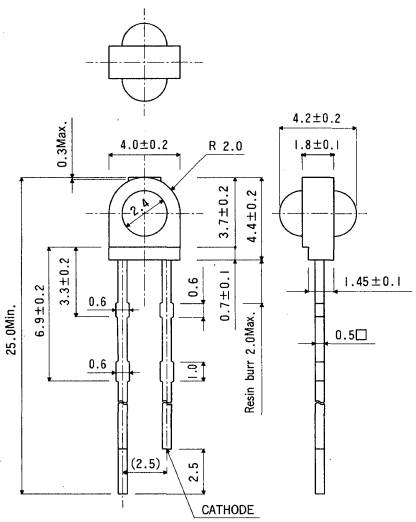
SIM-22ST



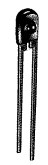


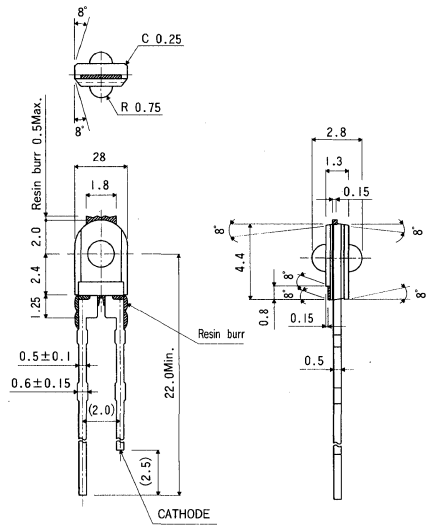
PLT-462T3



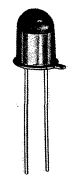


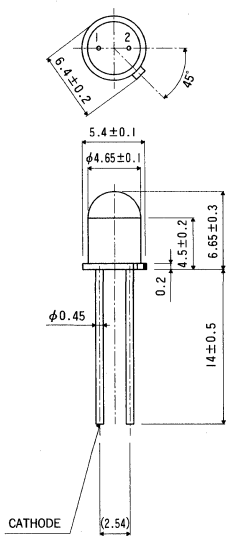
PLT-463SB





SIC-58SL





Phototransistors (RPM · RPT)

ROHM phototransistors are highly reliable, have high power and are used in precision equipment.
Available in side and top view packages.

Package	Part No.	Feature	Visible ray cut	Absolute maximum ratings		Standard Characteristics						Basic ordering unit	Rank
				V_{CEO} (V)	Pc Max. (mW)	I_{CEO} Max. (μA)	V_{CE} (V)	Ic (mA)	λ_P (nm)	tr, tf (μs)	$\theta 1/2$ (deg)		
Side view resin	**RPM-191PB**	Visible ray cut	○	32	100	0.5	11	2.0 Min.	800	10	–	2,000	○
	RPM-20PB	Visible ray cut	○	32	100	0.5	10	0.5 Min.	800	10	14	2,000	◎
	RPM-22PB	Visible ray cut	○	30	100	0.5	10	0.48Min.	800	10	32	2,000	◎
3ϕ Resin	**RPT-38PT3**	Clear type		32	150	0.5	10	2.0 Min.	800	10	36	2,000	◎
	RPT-38PB3	Visible ray cut	○	32	150	0.5	10	2.0 Min.	800	10	36	2,000	◎

◎ : Standard products ○ : Semi-standard products

●Product Designation

R P T — 3 8 P T 3

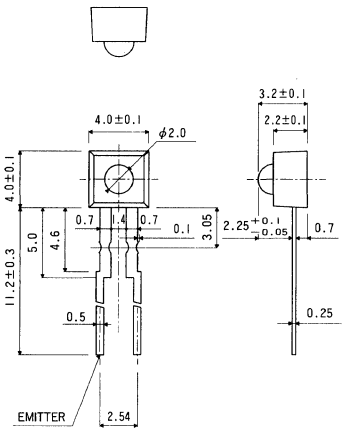
RPM	Molded package receiver
RPT	Lensed receiver

P	Phototransistors
D	Darlington Transistor

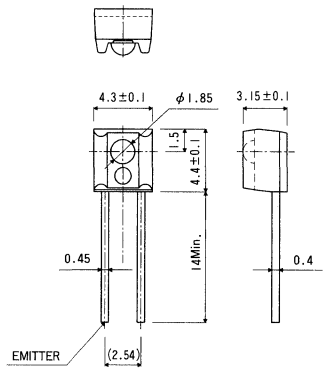
B	Colored
T	Clear

(Unit : mm)

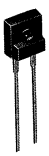
RPM-191PB

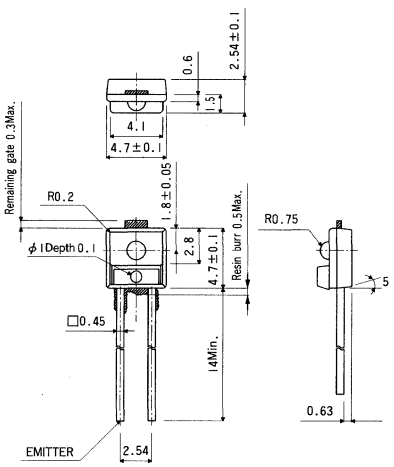


RPM-20PB



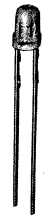
RPM-22PB



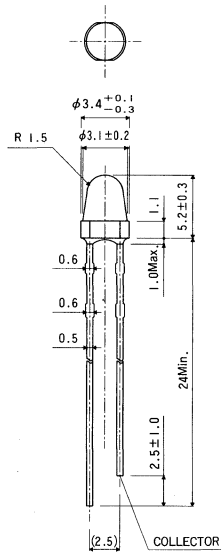


RPT-38PT3 · RPT-38PB3

RPT-38PT3



RPT-38PB3



PIN Photodiodes (RPM)

ROHM photodiodes are PIN diode chips, featuring fast and linear response.

Package	Part No.	Feature	Visible ray cut	Absolute maximum ratings		Standard Characteristics						Basic ordering unit	Rank
				V_R (V)	Pd (mW)	I_D Max. (nA)	V_R (V)	Isc (nA)	Ee (μW/cm²)	λp (nm)	θ1/2 (deg)		
Side view resin	**RPM-301B**	Visible ray cut	860nm>	32	150	10	10	520	20	1000	40	1,000	◎

◎ : Standard products

●Product Designation

R P M — 3 0 1 B

RPM	Molded package receiver

B	Colored

(Unit : mm)

RPM-301B

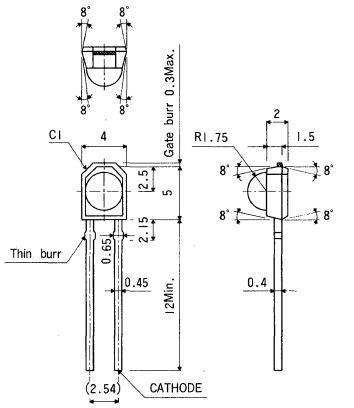


Photo ICs (RPM)

ROHM photo ICs can be driven at low voltage and thus best suitable for small, high resolution sets.

Package	Part No.	Feature	Absolute maximum ratings			Standard Characteristics					Output mode	Basic ordering unit	Rank
			V_{CC} (V)	Io (mA)	Pd (mW)	V_{OL} (V)	E_{eLH} (μW/cm²)	T_{PLH} (μs)	T_{PLH} (ns)	tr, tf (ns)			
Side view resin	**RPM-20CT**	Photo IC type	17	20	250	0.14	23	1.6	700	100	Dark ON	2,000	◎

◎ : Standard products

●Product Designation

R P M — 2 0 C T

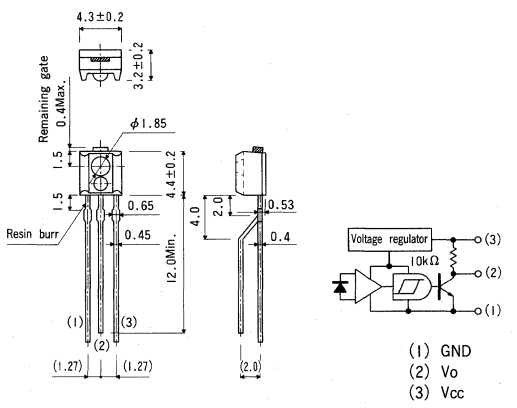
RPM	Molded package receiver

C	Photo IC

T	Clear

(Unit : mm)

RPM-20CT



Photosensitive ICs (RPM)

Small size single-chip IC with lightweight, molded package to detect light from a remote source.

Package	Part No.	Feature	Absolute maximum ratings	Standard Characteristics				Basic ordering unit	Rank
			V_{CC} (V)	V_{OL} (V)	ES (U_{PP}/m)	θ80% Horizontal	θ80% Vertical		
Side view resin	**RPM-600**	Photosensitive ICs	6.3	0.5Max.	400Min.	33	14	1,000	◎
	RPM-670	Photosensitive ICs	6.3	0.5Max.	400Min.	42	37	1,000	◎

◎ : Standard products

●Product Designation

600 type

R P M — 6 3 8 C B R — L

RPM	Molded package receiver

C	Photo IC
B	Colored

30	30.3KHz
33	32.8KHz
36	36KHz
37	36.7KHz
38	38KHz
40	40KHz
57	56.9KHz

S	Straight type
L	Forming type
H	With holder

670 type

R P M — 6 7 2 C B R — L

RPM	Molded package receiver

7	Wide directivity

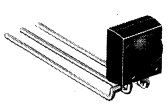
C	Photo IC
B	Colored

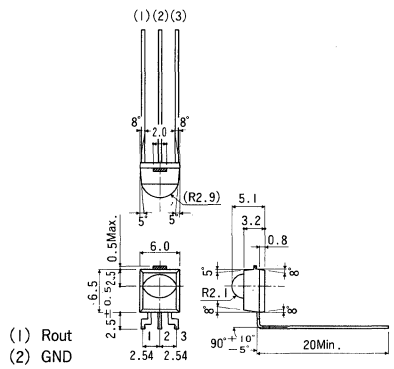
1	30.3KHz
2	32.8KHz
4	36KHz
5	36.7KHz
6	38KHz
8	40KHz
9	56.9KHz

S	Straight type
L	Forming type
H	With holder

(Unit : mm)

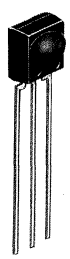
RPM-600CBR-L

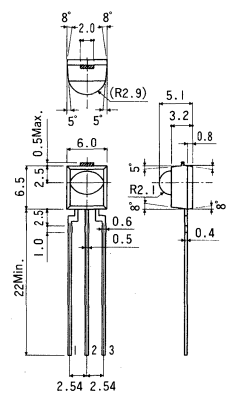




(1) Rout
(2) GND
(3) Vcc

RPM-600CBR-S

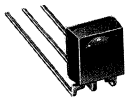


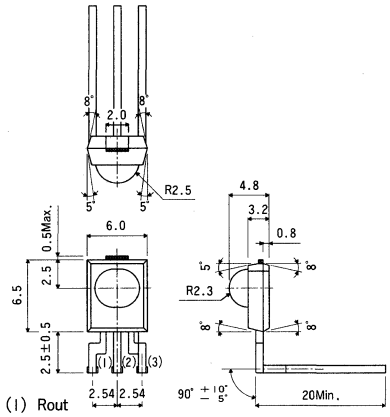


(1) Rout
(2) GND
(3) Vcc

(Unit : mm)

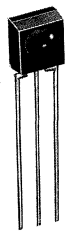
RPM-670CBR-L

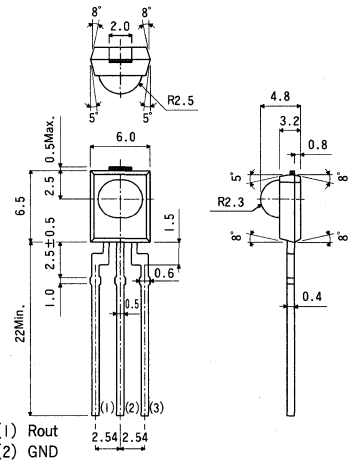




(1) Rout
(2) GND
(3) Vcc

RPM-670CBR-S



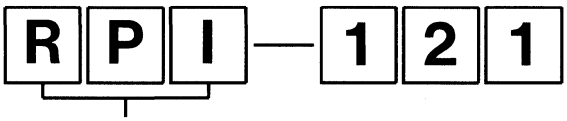


(1) Rout
(2) GND
(3) Vcc

Photointerrupters (RPI · SIU)

ROHM photointerrupter series is a high reliability, high resolution product packaged as standard molded product.

●Product Designation



RPI	Photointerrupters
SIU	Photointerrupters with actuater

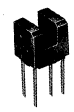
●Phototransistors Output (Molded type)

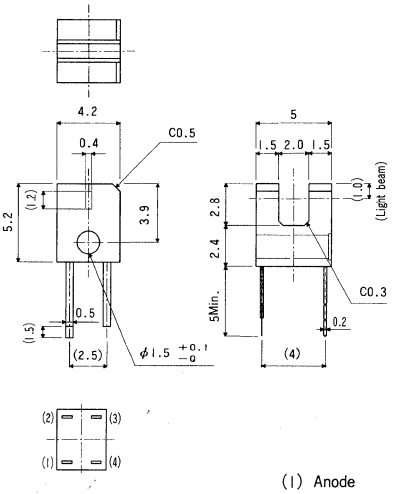
Package	Part No.	Feature	Absolute maximum ratings		Standard Characteristics							Basic ordering unit	Rank
			I_F (mA)	V_{CEO} (V)	Groove width (mm)	Slit width (mm)	Ic (mA)	V_{CE} (V)	I_F (mA)	I_{CEO} Max. (μA)	tr, tf (μs)		
Molded in one small package	**RPI-243**	2mm gap	50	30	2.0	0.4	2	5	20	0.5	10	2,000	◎
	RPI-244	Long lead	50	30	2.0	0.4	0.5Min.	5	20	0.5	10	2,000	◎
	RPI-352	3mm gap	50	30	3.0	0.4	1	5	20	0.5	10	2,000	◎
	RPI-441(RPI-442)	3mm gap	50	30	4.0	0.5	1	5	20	0.5	10	2,000	◎
	RPI-131	Easy-mount	50	30	1.2	0.4	0.7Min.	5	20	0.5	10	2,000	◎
	RPI-131A	Easy-mount	50	30	1.2	0.4	0.07Min.	0.6	1.3	0.5	10	2,000	○
	RPI-131B	Easy-mount	50	30	1.2	0.4	0.6Min.	5	9	0.5	10	2,000	○
	RPI-131C	Easy-mount	50	30	1.2	0.4	0.065Min.	5	1.5	0.5	10	2,000	○
	RPI-131D	Easy-mount	50	30	1.2	0.4	2Min.	4.5	20	0.5	10	2,000	○
	RPI-131E	Easy-mount	50	30	1.2	0.4	0.7Min.	5	20	0.5	10	2,000	○
	RPI-141	Easy-mount	50	30	1.2	0.4	0.03Min.	5	1.5	0.5	10	2,000	◎
	RPI-141C	Easy-mount	50	30	1.2	0.4	0.065Min.	5	1.5	0.5	10	2,000	○
	RPI-141G	Easy-mount	50	30	1.2	0.4	0.14Min.	5	1.5	0.5	10	2,000	○
	RPI-141F	Easy-mount	50	30	1.2	0.4	0.03Min.	5	1.5	0.5	10	2,000	○
Molded in one ultraminiature package	**RPI-121**	Ultraminiature	50	30	1.0	0.4	0.7Min.	5	20	0.5	10	2,000	○
	RPI-122	With mounting lib	50	30	0.8	0.25	0.18Min.	0.7	3	0.5	10	2,000	○
	RPI-123	High resolution (0.2mm slit)	50	30	1.0	0.2	0.2	5	20	0.5	10	2,000	○
	RPI-221	Wide gap (2mm)	50	30	2.0	0.4	0.2	5	20	0.5	10	2,000	○
With Actuater	**RPI-5100**	Molded in one small package	50	30	With Actuater		0.2Min.	5	20	0.5	10	1,000	○
	RPI-5200	Molded in one small package	50	30	With Actuater		0.2Min.	5	20	0.5	10	1,000	○

◎ : Standard products ○ : Semi-standard products

(Unit : mm)

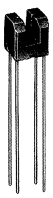
RPI-243

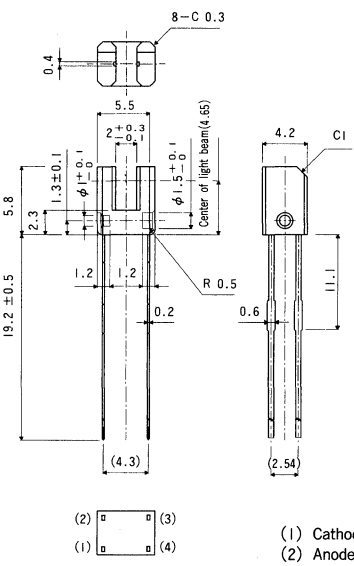




(1) Anode
(2) Collector
(3) Emitter
(4) Cathode

RPI-244





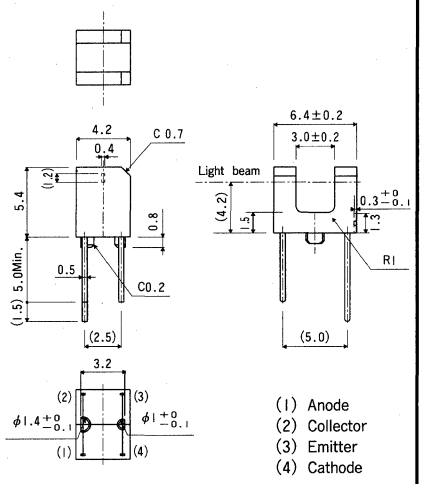
(1) Cathode
(2) Anode
(3) Collector
(4) Emitter

Photointerrupters (RPI · SIU)

●Phototransistors Output (Molded type)

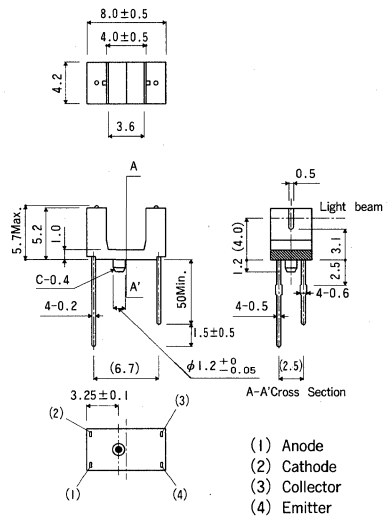
(Unit : mm)

RPI-352



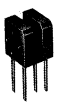
(1) Anode
(2) Collector
(3) Emitter
(4) Cathode

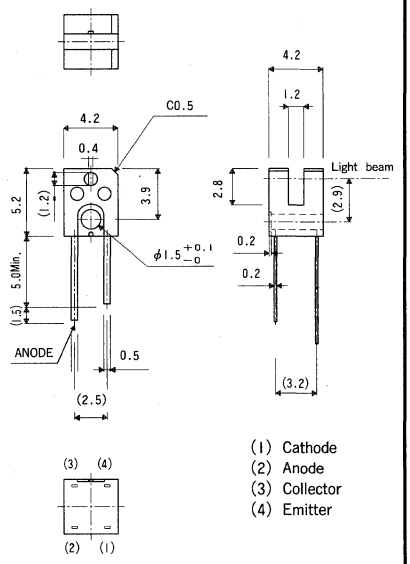
RPI-441(RPI-442)



(1) Anode
(2) Cathode
(3) Collector
(4) Emitter

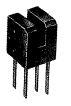
RPI-131/131A/131B/131C/131D/131E

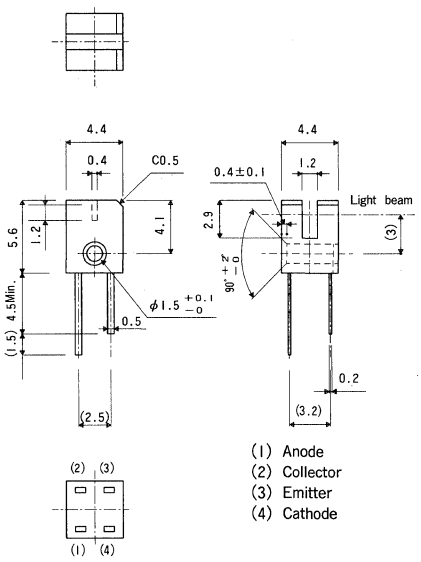




(1) Cathode
(2) Anode
(3) Collector
(4) Emitter

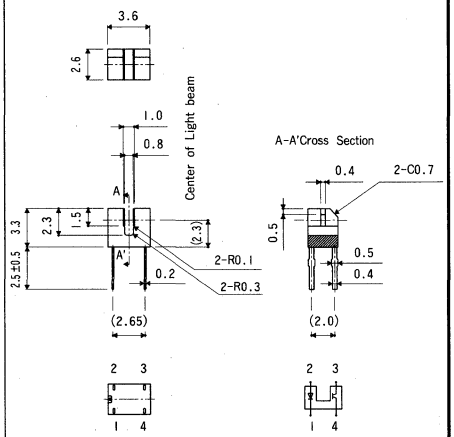
RPI-141/141C/141G/141E





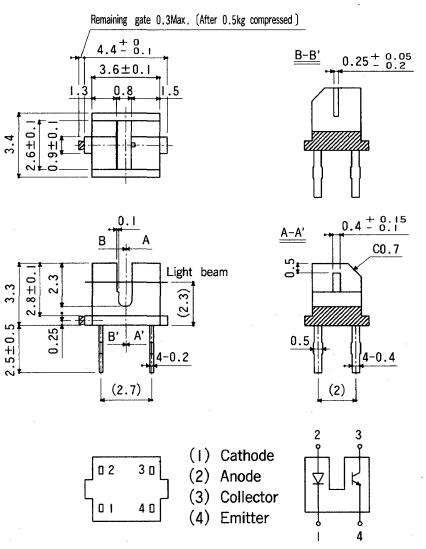
(1) Anode
(2) Collector
(3) Emitter
(4) Cathode

RPI-121



(1) Cathode
(2) Anode
(3) Collector
(4) Emitter

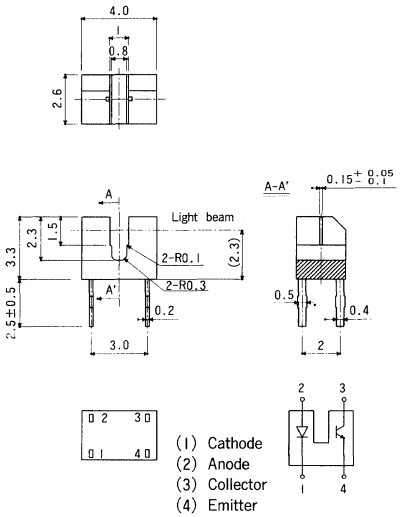
RPI-122



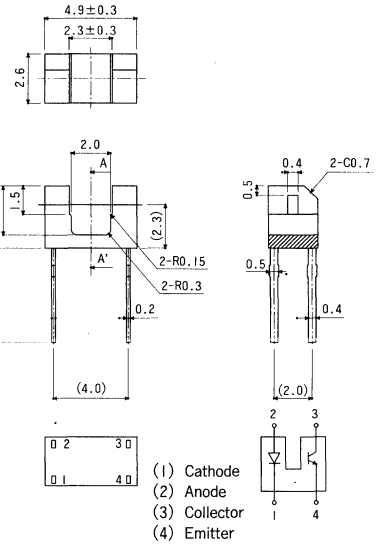
(1) Cathode
(2) Anode
(3) Collector
(4) Emitter

(Unit : mm)

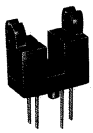
RPI-123

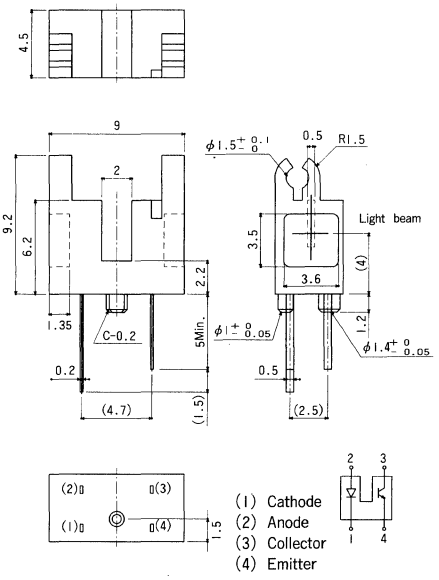


RPI-221

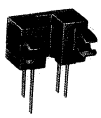


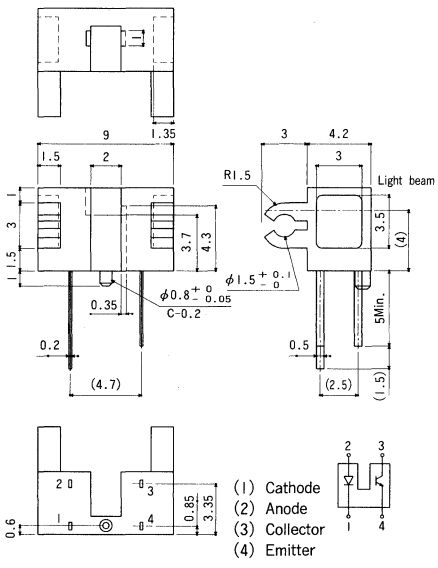
RPI-5100





RPI-5200





Photointerrupters (RPI · SIU)

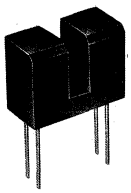
●Phototransistors Output (Type with case)

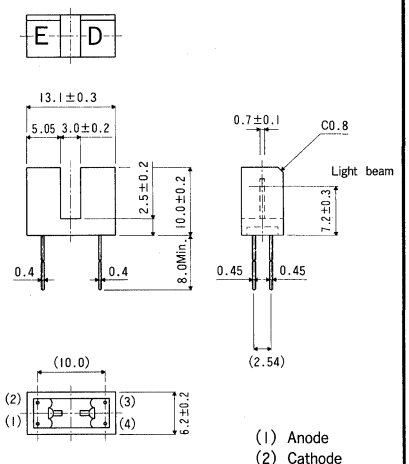
Package	Part No.	Feature	Absolute maximum ratings		Standard Characteristics							Basic ordering unit	Rank
			I_F (mA)	V_{CEO} (V)	Groove width (mm)	Slit width (mm)	Ic (mA)	V_{CE} (V)	I_F (mA)	I_{CEO} Max. (μA)	tr, tf (μs)		
PCB direct mount type	**RPI-38**	General purpose	50	30	3	0.7	7	5	20	0.5	10	200	◎
	RPI-261	With positioning set	50	30	2.5	0.5	1Min.	5	20	0.5	10	200	◎
	RPI-371	With rear lid	50	30	3.4	0.5	1Min.	10	20	0.5	10	200	○
	RPI-373R	With tapped hole in side	50	30	3.2	0.5	4	5	20	0.5	10	200	◎
	RPI-374	With tapped hole	50	30	3	0.5	1Min.	5	20	0.5	10	200	◎
	RPI-572	With positioning set	50	30	5	0.5	0.8Min.	5	20	0.5	10	200	◎
	RPI-581	With tapped hole	50	30	5	0.5	0.8Min.	5	20	0.5	10	200	◎
With actuator	**SIU-5000**	With actuator and leads	50	30	With Actuater		0.5Min.	5	20	0.5	10	200	◎

◎ : Standard products ○ : Semi-standard products

(Unit : mm)

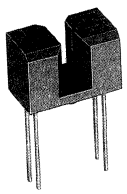
RPI-38

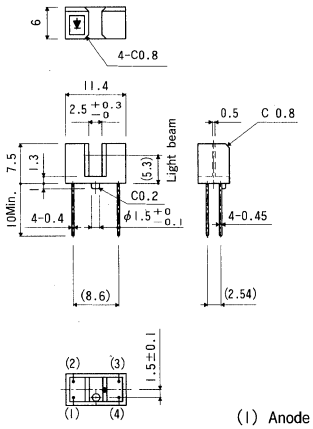




(1) Anode
(2) Cathode
(3) Collector
(4) Emitter

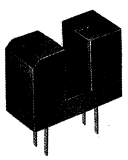
RPI-261

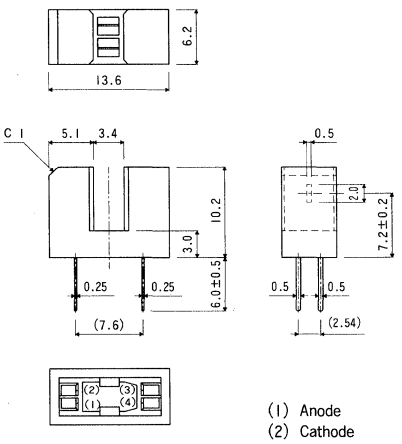




(1) Anode
(2) Cathode
(3) Collector
(4) Emitter

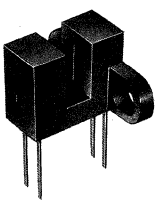
RPI-371

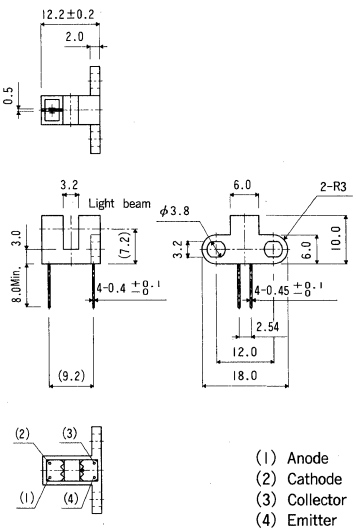




(1) Anode
(2) Cathode
(3) Collector
(4) Emitter

RPI-373R

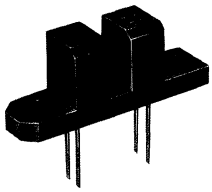


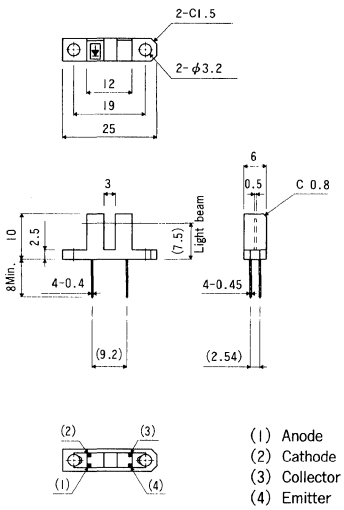


(1) Anode
(2) Cathode
(3) Collector
(4) Emitter

(Unit : mm)

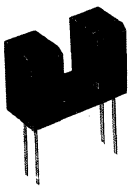
RPI-374

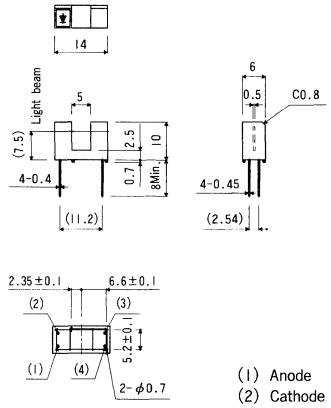




(1) Anode
(2) Cathode
(3) Collector
(4) Emitter

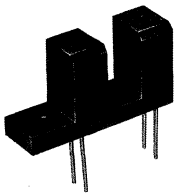
RPI-572

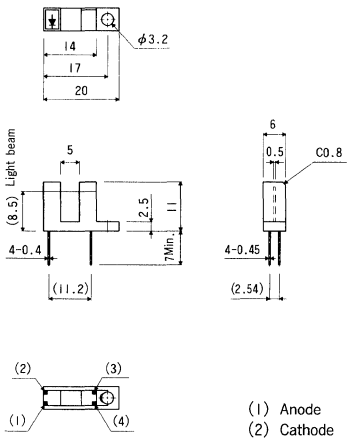




(1) Anode
(2) Cathode
(3) Collector
(4) Emitter

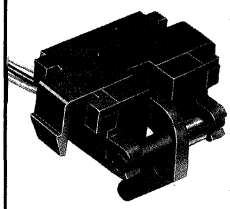
RPI-581

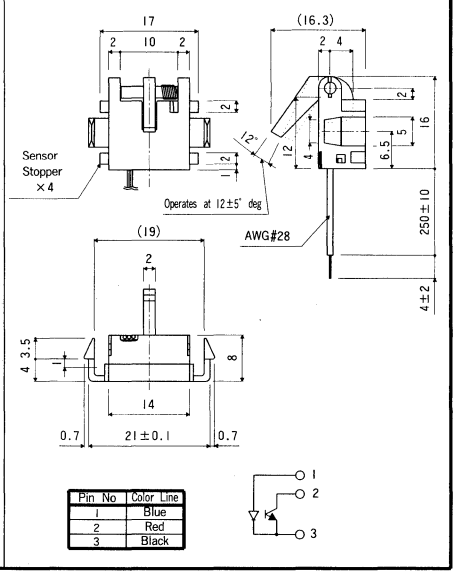




(1) Anode
(2) Cathode
(3) Collector
(4) Emitter

SIU-5000





Photointerrupters (RPI · SIU)

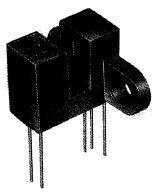
●Digital Output

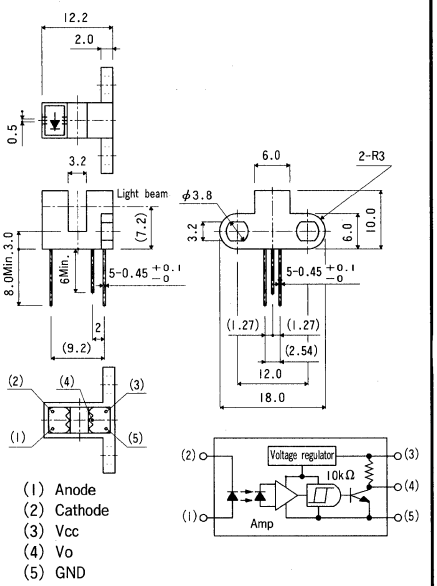
Package	Part No.	Feature	Absolute maximum ratings			Standard Characteristics					Output mode	Basic ordering unit	Rank
			I_F (mA)	V_{CC} (V)	I_O (mA)	Groove width (mm)	Slit width (mm)	V_F (V)	V_{OL} (V)	I_{FLH} (mA)			
PCB direct mounted type	**RPI-1373**	With tapped hole in side	50	17	20	3.2	0.5	1.1	0.14	1.0	Dark ON	200	○
	RPI-1374	With tapped hole	50	17	20	3	0.5	1.1	0.14	1.0	Dark ON	200	○
	RPI-1380	General purpose	50	17	20	3	0.7	1.1	0.14	1.0	Dark ON	200	○
	RPI-1572	With positioning set	50	17	20	5	0.5	1.1	0.14	2.0	Dark ON	200	○
	RPI-1581	With tapped hole	50	17	20	5	0.5	1.1	0.14	2.0	Dark ON	200	○
Molded in one ultraminiature package	**RPI-1133**	Mini molded	50	7	10	1.0	0.3	1.1	0.35Max.	1.5	Dark OFF	2,000	○
With connector	**RPI-811M2**	Easy mounting	–	9	20	8	0.8	–	0.4 Max.	–	Dark ON	150	○
	RPI-512	Easy mounting	–	7	20	5	0.5	1.1	0.4 Max.	–	Dark ON	200	○

○ : Semi-standard products

(Unit : mm)

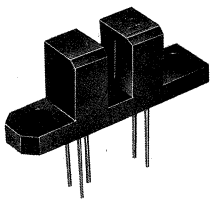
RPI-1373

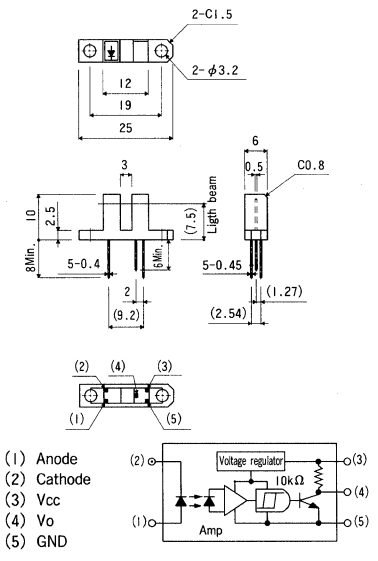




(1) Anode
(2) Cathode
(3) Vcc
(4) Vo
(5) GND

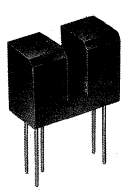
RPI-1374

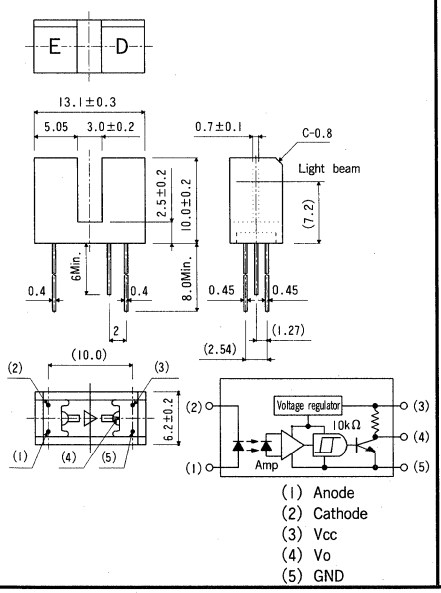




(1) Anode
(2) Cathode
(3) Vcc
(4) Vo
(5) GND

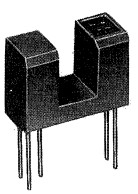
RPI-1380

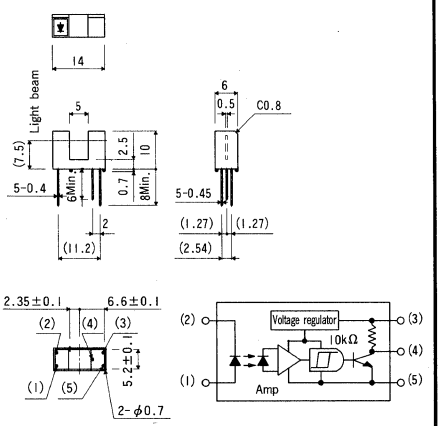




(1) Anode
(2) Cathode
(3) Vcc
(4) Vo
(5) GND

RPI-1572

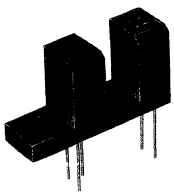


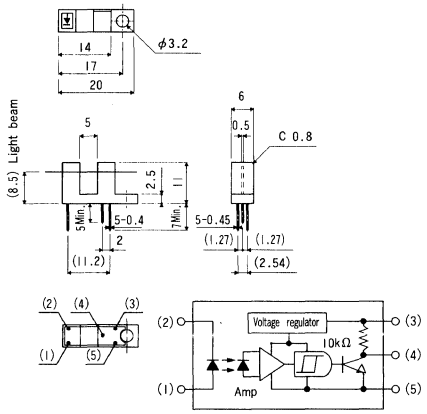


(1) Anode
(2) Cathode
(3) Vcc
(4) Vo
(5) GND

(Unit : mm)

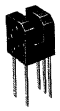
RPI-1581

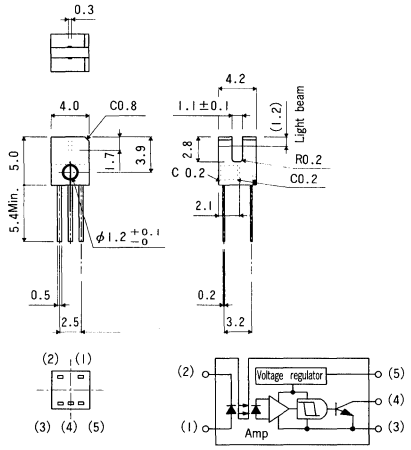




(1) Anode
(2) Cathode
(3) Vcc
(4) Vo
(5) GND

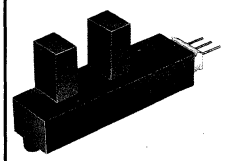
RPI-1133

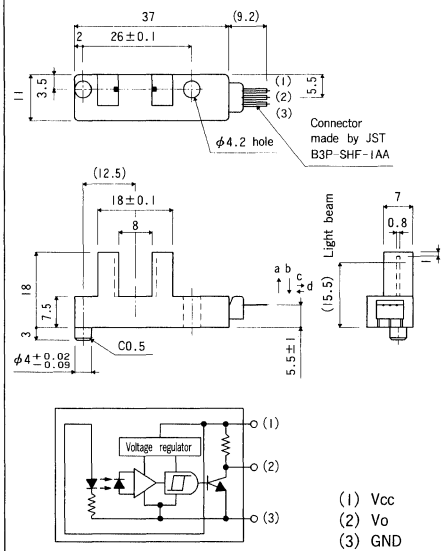




(1) Anode
(2) Cathode
(3) Vcc
(4) Vo
(5) GND

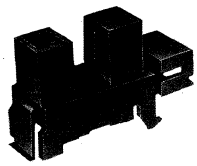
RPI-811M2

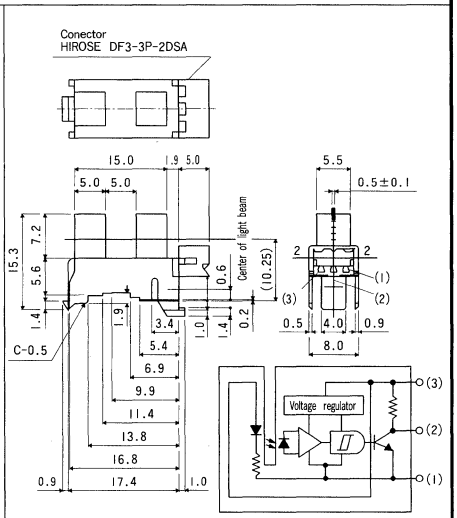




(1) Vcc
(2) Vo
(3) GND

RPI-512





(1) Vcc
(2) Vo
(3) GND

Reflective Photosensors<Photo Reflectors> (RPR)

ROHM photo reflector has sensing distance from 3.5-5mm, the longest among similar products. Connector type is also available.

●Phototransistors Output

Package	Part No.	Feature	Absolute maximum ratings		Standard Characteristics							Basic ordering unit	Rank
			I_F (mA)	V_{CEO} (V)	Detectiond istance (mm)	I_C (μA)	V_{CE} (V)	I_F (mA)	I_{CEO} Max. (μA)	tr, tf (μs)	V_{CE} (sat) (V)		
Type with case	**RPR-359F**	Detection distance 3.5mm	50	30	3.5	500	5	20	0.5	10	0.1	200	◎
	RPR-363A	Detection distance 5mm	50	30	5.0	100Min.	5	20	0.5	10	0.1	200	◎
With connector	**RPR-360FSC**	With tapped hole	50	30	3.5	500	5	20	0.5	10	0.1	200	○
	RPR-361FS	With tapped hole	50	30	3.5	550	5	20	0.5	10	0.1	200	○
	RPR-362FS	With tapped hole	50	30	3.5	550	5	20	0.5	10	0.1	200	○

◎ : Standard products ○ : Semi-standard products

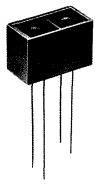
●Product Designation

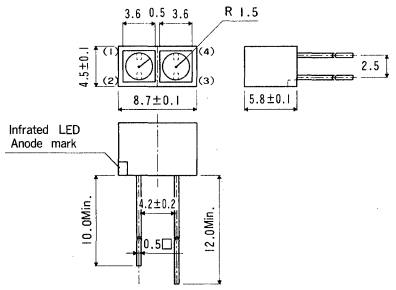
R P R — 3 6 1 F S

RPR	Photo Reflector

(Unit : mm)

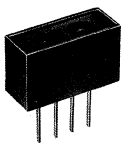
RPR-359F

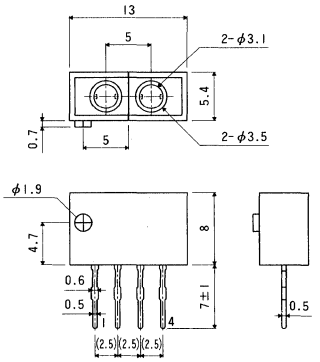




(1) Cathode
(2) Anode
(3) Emitter
(4) Collector

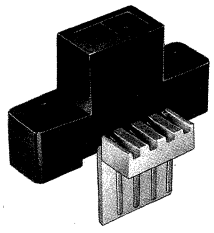
RPR-363A

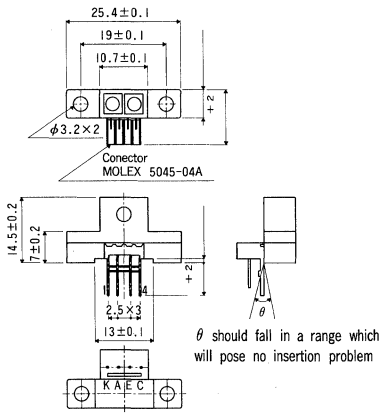




(1) Cathode
(2) Anode
(3) Collector
(4) Emitter

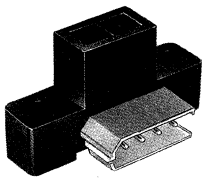
RPR-360FSC

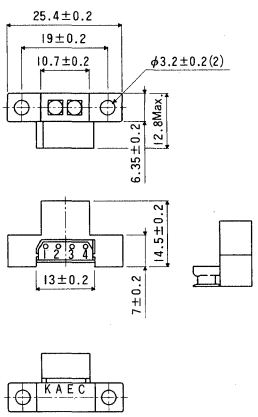




(1) Cathode
(2) Anode
(3) Emitter
(4) Collector

RPR-361FS

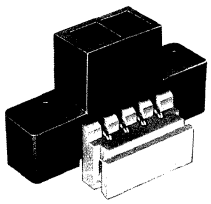


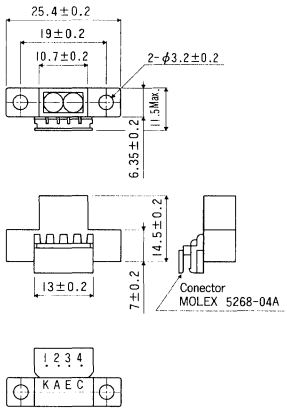


(1) Cathode
(2) Anode
(3) Emitter
(4) Collector

(Unit : mm)

RPR-362FS





(1) Cathode
(2) Anode
(3) Emitter
(4) Collector

MEMO

Laser Diodes

■Ordering Information

ROHM laser diodes are identified as follows:

(Example) ①~④ indicate the type name of standard products.

RLD-78	M	A	-	*
① ②	③	④		⑤

① Type name
② Wavelength
③ Supply voltage classification code
④ Application code (Alphanumeric)
⑤ Special specifications code

■Standard products • Semi-standard products • Custom

To make it easier for the customer to select the type of product best suitable for the application, we offer three types of laser diode:
(1) standard, (2) semi-standard, and (3) Custom.

(1) Standard products
Standard products are available upon request.

(2) Semi-standard products
These products require a certain amount of time to fill an order. Please consult us for delivery date:

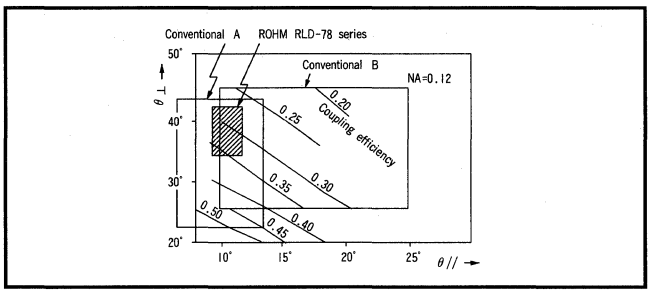
(3) Custom
Custom products are developed and manufactured for specifications prescribed by the customer. These special specification products require more time to deliver than semistandard products. Please inquire of us about the delivery.

●Please note the following when placing an order.
The amount of an order must be in multiplies of the basic order unit.

●Introductory remarks
◎ : Standard products
○ : Semi-standard products
△ : Custom

Laser Diodes

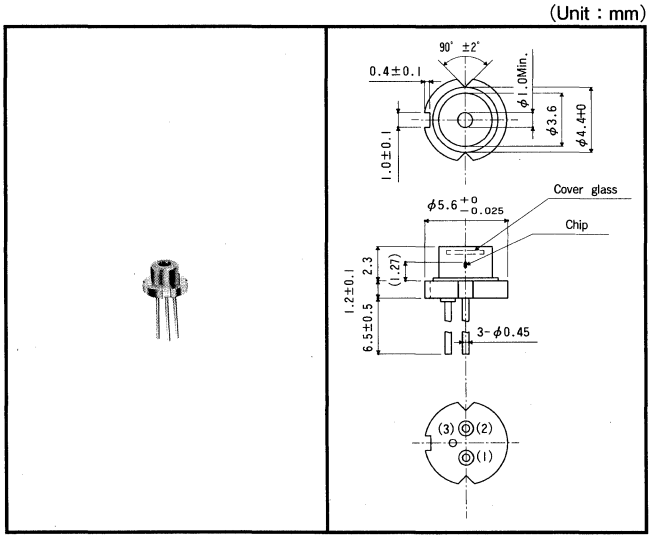
RLD-series laser diodes developed and manufactured by ROHM have a striking feature: a very small optical and electrical characteristic dispersion, which has been reduced to a third that of conventional equivalents, as illustrated on the right. This has made it possible for ROHM to constantly supply best lasers for various applications in large quantities. The RLD laser diodes are the products of ROHM's state-of-the-art laser technology, molecular beam epitaxial (MBE) method, which provides very precise controllability, and an ideally structured SAM laser developed by ROHM.



●Applications and Types of Lasers

Applications		RLD-78 Series	RLD-83 Series	RLD-85 Series
Compact Disc	General CD players	**RLD-78MA/PA**	–	–
	Battery-powered portable CD players	**RLD-78MA3/PA3**	–	–
	Battery-powered small portable CD players	**RLD-78MA4/PA4**	–	–
	Car CD players	**RLD-78MAT1/PAT1**	–	–
		RLD-78MAT2/PAT2	–	–
Video Disk	VD and LD players	**RLD-78MV/PV**	–	–
General Applications	Sensors and bar code readers,etc.	**RLD-78MC/PC**	–	–
LBP	LBPs	**RLD-78MP/PP/NP**	–	–
	High-speed LBPs	**RLD-78MP10/PP10/NP10**	–	–
Optical Disc	Opitacal Disc memory and high-speed LBPs	**RLD-78M20/P20/N20**	**RLD-83M30/P30/N30**	–
	Optical Disc, Sensors, etc.	**RLD-78M21/P21/N21**	**RLD-83M31/P31/N31**	–
		RLD-78M30/P30/N30	**RLD-83M40/P40/N40**	–
		RLD-78M35/P35/N35	–	–
Optical link	Optical link	**RLD-78MF/PF**	**RLD-83MF/PF**	**RLD-85MC/PC**
		RLD-78MIT/PIT	–	–

(Unit : mm)



All the ROHM lasers are available in the highly-precise small package depicted above.

Equivalent Integrated Circuits

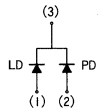


Fig.1 Type M

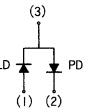


Fig.2 Type P

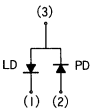
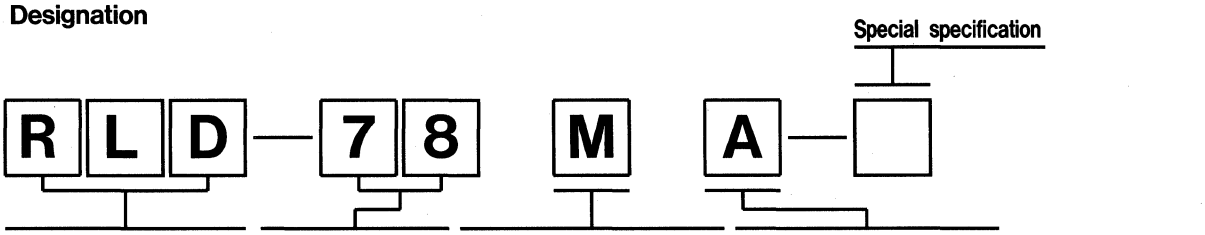


Fig.3 Type N

●Product Designation



Wavelength	
78	780nm
83	830nm
85	850nm

Drive source polarity	
M	Type M (Fig.1)
P	Type P (Fig.2)
N	Type N (Fig.3)

Applications (alphanumeric, high output type: max.optical output)	
A	For CD
V	For VD
C	For Sensors and General Measurement
P	For LBP
P10	High-speed LBPs

●For Compact Disc Players

Noise problem is eliminated by optimizing design characteristics. Noise from two of the three feedback beams is eliminated through our laser geometry. RLD 78MA4/PA4 series requires lower power compared to any other laser diodes on the market, and will support demanding system design. RLD78MAT1/PAT1/MAT2/PAT2 is suitable when high reliablilty is required.

Part No.	Application	Wavelength	Absolute maximum ratings (Tc=25°C)			Optical/electrical characteristics (Tc=25°C)							Package/ Equivalent Integrated Circuit	Basic order unit (pcs.)	Rank
		λp (nm)	Po (mW)	V_R (V)	$Topr_{MAX.}$ (°C)	V_F (V)	I_{TH} (mA)	Iop (mA)	Im (mA)	θ⊥ (deg)	θ// (deg)	S/N Min. (dB)			
RLD-78MA	GeneralCD players.	785	5	2	60	1.9	35	45	0.2	37	11	60	Fig.1	500	◎
RLD-78PA		785	5	2	60	1.9	35	45	0.2	37	11	60	Fig.2	500	◎
RLD-78MA3	Battery-powered portableCD players.	785	4	2	60	1.9	30	40	0.2	37	11	60	Fig.1	500	◎
RLD-78PA3		785	4	2	60	1.9	30	40	0.2	37	11	60	Fig.2	500	◎
RLD-78MA4	Battery-powered smallportableCD players.	785	4	2	60	1.9	25	35	0.2	37	11	60	Fig.1	500	◎
RLD-78PA4		785	4	2	60	1.9	25	35	0.2	37	11	60	Fig.2	500	◎
RLD-78MAT1	CarCD players.	785	5	2	80	1.9	35	45	0.2	37	11	60	Fig.1	500	◎
RLD-78PAT1		785	5	2	80	1.9	35	45	0.2	37	11	60	Fig.2	500	◎
RLD-78MAT2		785	5	2	80	1.9	35	45	0.2	37	11	60	Fig.1	500	◎
RLD-78PAT2		785	5	2	80	1.9	35	45	0.2	37	11	60	Fig.2	500	○

Note : 1.Unless otherwise specified ,the electrical and optical characteristics are typical values.

◎ : Standard products ○ : Semi-standard products

●For Video Disc Players

Consistency of low noise, low astigmatism and stable production can be realized by selfpulsations. S/N is typically 100 dB. Astigmatism is typically 5 μm which enables to solve crosstalk problem.

Part No.	Application	Wavelength	Absolute maximum ratings (Tc=25°C)			Optical/electrical characteristics (Tc=25°C,Po=3mW)							Package/ Equivalent Integrated Circuit	Basic order unit (pcs.)	Rank
		λp (nm)	Po (mW)	V_R (V)	$Topr_{MAX.}$ (°C)	V_F (V)	I_{TH} (mA)	Iop (mA)	Im (mA)	θ⊥ (deg)	θ// (deg)	S/N Min. (dB)			
RLD-78MV	VD and LD players.	785	5	2	60	1.9	45	55	0.2	37	11	85	Fig.1	500	◎
RLD-78PV		785	5	2	60	1.9	45	55	0.2	37	11	85	Fig.2	500	○

Note : 1.Unless otherwise specified ,the electrical and optical and characteristics are typical values.

◎ : Standard products ○ : Semi-standard products

●For Sensors and General Measurements

RLD-78MC/PC are the best choice when high coherency is required for sensing and measurement at 780 nm. ROHM's mass production technology established for CD is flexible enough to meet any volume.

Part No.	Application	Wavelength	Absolute maximum ratings (Tc=25°C)			Optical/electrical characteristics (Tc=25°C,Po=3mW)							Package/ Equivalent Integrated Circuit	Basic order unit (pcs.)	Rank
		λp (nm)	Po (mW)	V_R (V)	$Topr_{MAX.}$ (°C)	V_F (V)	I_{TH} (mA)	Iop (mA)	Im (mA)	θ⊥ (deg)	θ// (deg)	S/N Min. (dB)			
RLD-78MC	Sensors, barcode readers,etc.	785	5	2	60	1.9	35	45	0.2	37	11	–	Fig.1	500	◎
RLD-78PC		785	5	2	60	1.9	35	45	0.2	37	11	–	Fig.2	500	◎

Note : 1.Unless otherwise specified ,the electrical and optical characteristics are typical values.

◎ : Standard products

●For Laser Beam Printers

Low droop can be achieved with small-package laser, φ5.6, thanks to design technology unique to ROHM. The laser can be used for LBP applications. Low droop characteristic, typ 5%, will improve printing quality. RLD-78, MP10/PP10/NP10 are specially designed to have high power (Po, max. 10 mW) for high speed printing.

Part No.	Application	Wavelength	Absolute maximum ratings (Tc=25°C)			Optical/electrical characteristics (Tc=25°C,Po=3mW)							Condition Po (mW)	Package/ Equivalent Integrated Circuit	Basic order unit (pcs.)	Rank
		λp (nm)	Po (mW)	V_R (V)	$Topr_{MAX.}$ (°C)	V_F (V)	I_{TH} (mA)	Iop (mA)	Im (mA)	θ⊥ (deg)	θ// (deg)	Droop (%)				
RLD-78MP	LBP	785	5	2	60	1.9	25	45	0.55	30	11	5	3	Fig.1	500	◎
RLD-78PP		785	5	2	60	1.9	25	45	0.55	30	11	5	3	Fig.2	500	◎
RLD-78NP		785	5	2	60	1.9	25	45	0.55	30	11	5	3	Fig.3	500	○
RLD-78MP10	High-speed LBPs.	785	10	2	60	1.9	25	45	0.4	30	11	5	6	Fig.1	500	○
RLD-78PP10		785	10	2	60	1.9	25	45	0.4	30	11	5	6	Fig.2	500	○
RLD-78NP10		785	10	2	60	1.9	25	45	0.4	30	11	5	6	Fig.3	500	○

Note : 1.Unless otherwise specified, the electrical and optical characteristics are typical values.

◎ : Standard products ○ : Semi-standard products

Laser Diodes

●For Optical Link

RLD-85MC/PC oscillate at a wave length which matches the sensitivity of silicone photo diode: the most suitable laser for FDDI. RLD-83MF/PF in relaxation oscillation mode and RLD-78MF/PF in self-pulsation mode reduce modal noise in multi-mode optical fibers. Their characteristics are very suitable to digital/ analog optical link applications. RLD78MIT/PIT features high response, long life, and high reliability, which are favorable for data communications such as Fiber Channel standard.

Part No.	Application	Wavelength	Absolute maximum ratings (Tc=25°C)			Optical/electrical characteristics (Tc=25°C)						Condition	Package/ Integrated Circuit	Basic order unit (psc.)	Rank
		λp (nm)	Po (mW)	V_R (V)	Topr MAX. (°C)	V_F (V)	I_{TH} (mA)	Iop (mA)	Im (mA)	θ⊥ (deg)	θ// (deg)	Po (mW)			
RLD-78MF	Optical link	785	5	2	60	1.9	35	45	0.2	37	11	3	Fig.1	500	○
RLD-78PF		785	5	2	60	1.9	35	45	0.2	37	11	3	Fig.2	500	○
RLD-83MF		830	5	2	60	1.9	35	45	0.2	30	11	3	Fig.1	500	○
RLD-83PF		830	5	2	60	1.9	35	45	0.2	30	11	3	Fig.2	500	○
RLD-85MC		850	5	2	60	1.9	30	40	0.2	30	11	3	Fig.1	500	○
RLD-85PC		850	5	2	60	1.9	30	40	0.2	30	11	3	Fig.2	500	○
New RLD-78MIT		785	5	2	80	1.9	35	45	0.2	37	11	3	Fig.1	500	○
New RLD-78PIT		785	5	2	80	1.9	35	45	0.2	37	11	3	Fig.2	500	○

Note : 1.Unless otherwise specified, the electrical and optical characteristics are typical values.

○ : Semi-standard products

●For Optical Disc Drives

High-power lasers oscillate with stability up to high optical output and exhibit longitudinal multi-mode at low optical output (in the reading mode) featuring low noise characteristics compared with conventional high-power lasers. Lasers having these characteristics have been thought difficult to make, but ROHM overcame various problems and was first in the world to manufacture this type of laser. This series is most suitable for optical disc, optical cards and optical measurement equipment.

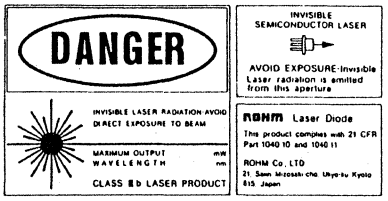
Part No.	Application	Wavelength	Absolute maximum ratings (Tc=25°C)			Optical/electrical characteristics (Tc=25°C)						Condition	Package/ Integrated Circuit	Basic order unit (pcs.)	Rank
		λp (nm)	Po (mW)	V_R (V)	Topr MAX. (°C)	V_F (V)	I_{TH} (mA)	Iop (mA)	Im (mA)	θ⊥ (deg)	θ// (deg)	Po (mW)			
RLD-78M20	Optical disc memory and high-speed LBPs	785	20	2	60	1.9	35	55	0.2	30	9	10	Fig.1	50	○
RLD-78P20		785	20	2	60	1.9	35	55	0.2	30	9	10	Fig.2	50	○
RLD-78N20		785	20	2	60	1.9	35	55	0.2	30	9	10	Fig.3	50	○
RLD-78M21	Optical disc, Optical card, sensors, etc.	785	30 ※	2	60	1.9	35	55	0.2	30	9	10	Fig.1	50	○
RLD-78P21		785	30 ※	2	60	1.9	35	55	0.2	30	9	10	Fig.2	50	○
RLD-78N21		785	30 ※	2	60	1.9	35	55	0.2	30	9	10	Fig.3	50	○
RLD-78M30		785	30	2	60	1.9	45	85	0.4	25	9	20	Fig.1	50	○
RLD-78P30		785	30	2	60	1.9	45	85	0.4	25	9	20	Fig.2	50	○
RLD-78N30		785	30	2	60	1.9	45	85	0.4	25	9	20	Fig.3	50	○
New RLD-78M35		785	35	2	60	1.9	50	110	0.6	25	9	30	Fig.1	50	○
New RLD-78P35		785	35	2	60	1.9	50	110	0.6	25	9	30	Fig.2	50	○
New RLD-78N35		785	35	2	60	1.9	50	110	0.6	25	9	30	Fig.3	50	○
RLD-83M30	Optical disc, Optical card, sensors, etc.	830	30	2	60	1.9	45	85	0.2	25	10	20	Fig.1	50	○
RLD-83P30		830	30	2	60	1.9	45	85	0.2	25	10	20	Fig.2	50	○
RLD-83N30		830	30	2	60	1.9	45	85	0.2	25	10	20	Fig.3	50	○
RLD-83M31		830	40 ※	2	60	1.9	45	85	0.2	25	10	20	Fig.1	50	○
RLD-83P31		830	40 ※	2	60	1.9	45	85	0.2	25	10	20	Fig.2	50	○
RLD-83N31		830	40 ※	2	60	1.9	45	85	0.2	25	10	20	Fig.3	50	○
RLD-83M40		830	40	2	60	1.9	45	100	0.3	25	9	30	Fig.1	50	○
RLD-83P40		830	40	2	60	1.9	45	100	0.3	25	9	30	Fig.2	50	○
RLD-83N40		830	40	2	60	1.9	45	100	0.3	25	9	30	Fig.3	50	○

Notes : 1.Unless otherwise specifies, the electrical, optical characteristics are typical values.
2.Ratings marked with an asterisk (※) are measured with pulses (1μsec, duty1/2).

○ : Semi-standard products

Safety Considerations

The light emitted from laser diodes, while almost invisible to the human eye, can cause retinal damage if viewed directly. Never look directly into the laser beam or through any lenses or fibers when the system is operating.
For optical axis alignment or other operations, we recommend use of an infrared-sensitive camera (ITV) or to wear protection goggles.

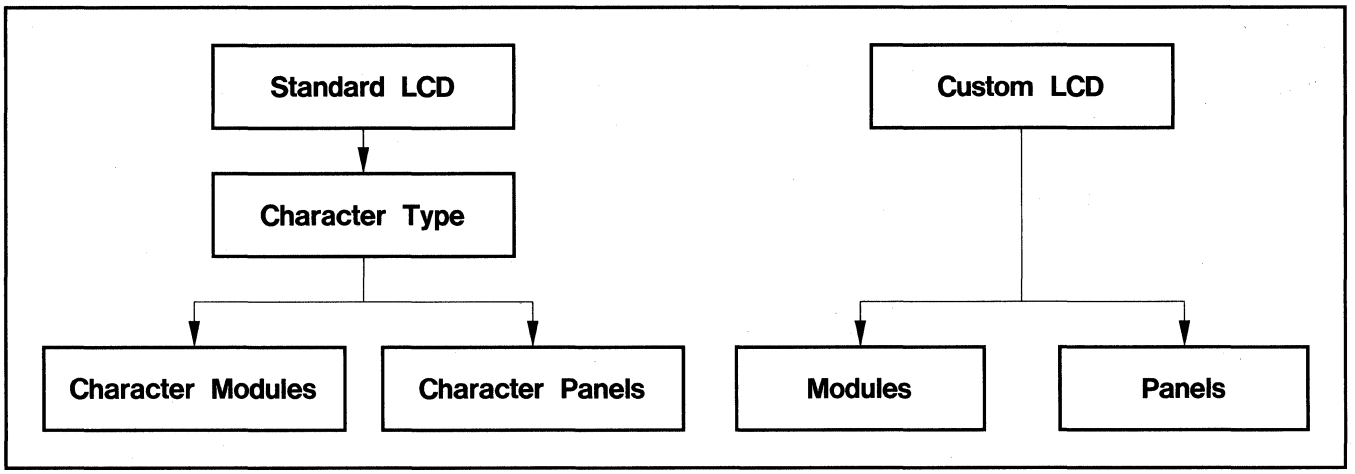


Liquid Crystal Displays

Liquid Crystal Displays

Modern society requires more sophisticated, interactive methods to interface with technology.
ROHM believes that the LCD is the interface that meets this requirement.
Through many years of R&D and production and our experience with LCD technology, we have improved the functions of LCDs and emphasized our capability and performance in meeting everchanging needs.

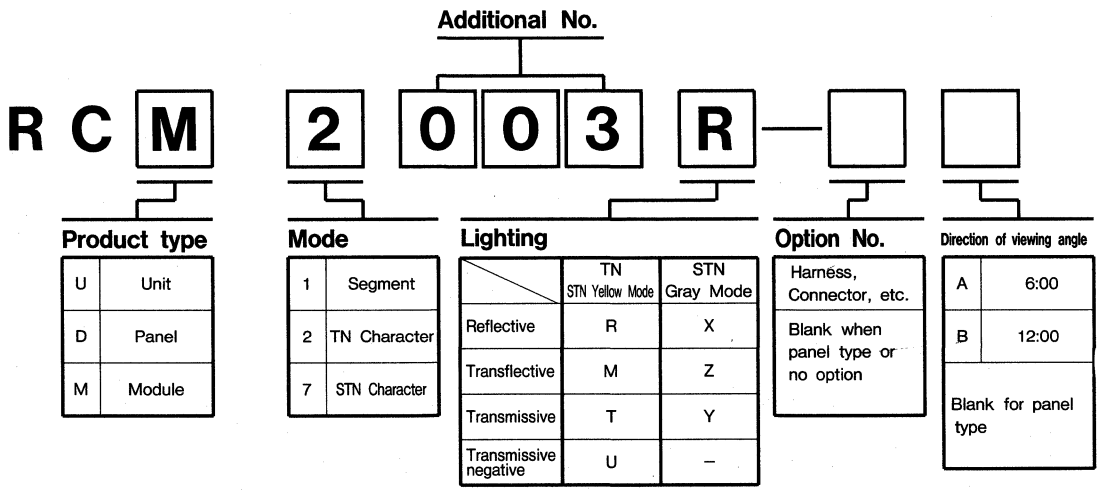
Liquid crystal product line



●Application

Household electric appliances AV equipment	• Air-conditioner indicators • Electric rice cookers • Home bakery • Microwaves • VTRs • Video cameras • Video disk systems • Stereos • Clock radios, etc.
Measuring instruments	• Multimeters • Digital meters • Digital clinical thermometers • Digital voltmeters • Testers, etc.
Traffic telecommunication equipment	• Cars • Motorbike dashboards • Telephone receivers (car telephones/stand alone telephones), etc.
OA information and educational equipment	• Word processors • Typewriters • Facsimiles • Photocopiers • Electronic cameras • Electronic games, etc.
Calculators, scale machines	• Computer terminals • Personal computers • Cash registers • Scale machines • Electronic calculators, etc.
Medical equipment	• ME terminals • Clinical thermometers • Pulsemeters, etc.
Timepieces	• Tabletop clocks • Digital watches, etc.
Indicator	• Destination sign, signpost, message board and other public signs at airport, station, railroad station, bus stop, etc., and on vehicles.

●Product Designation



Character Display LCD Modules

ROHM standard LCD modules are designed as a general purpose man-machine interface for various electronic assemblies.

The character module LCD is constructed with an LCD panel, driving circuit, display data RAM, character ROM and character generator RAM.

The character module can display the characters sent from a microprocessor.

First, incoming character code is stored in the module's internal display RAM. Then the code is converted into the 5×7 dot pattern in the character generator and sent to the correct display location on the LCD.

Display pattern can be 16 characters by 1 row, 2 rows or 4 rows, or up to 40 characters by 2 rows.

ROHM has a wide range of products that include LED backlight and STN type.

1) Wide viewing angle and high contrast.
2) Low power dissipation.
3) Quick response time.
4) 5×7 dots with cursor.
5) Compatible with 4-bit or 8-bit MPU.
6) 240 types of characters, symbols, and special characters can be used.
7) User patterns can be stored into the internal character RAM.
8) Powerful instructions including "clear display" "cursor ON/OFF", and character blinking.
9) Miniature, slim and lightweight-fits into a compact assembly.
10) Operates from a single 5V SUM battery. (Except backlight)
11) LED backlight type is available.

Character Display LCD Modules

TN Character Modules

●Quick Reference

(characters × lines) / Character size (mm)	16×1	16×2	16×4	20×2	24×2	40×2
3.2×5.2	**RCM2003R**					
3.1×5.76	**RCM2034R**					
2.95×3.8		**RCM2037R**				
2.95×4.85		**RCM2013R** **RCM2025R** **RCM2033M**				
2.95×4.15			**RCM2019R** **RCM2038R**			
3.2×4.85				**RCM2010R** **RCM2011M**		**RCM2035R**
2.7×4.85					**RCM2030R** **RCM2029M**	

Note : □ Boxed : With back light, Others reflective

Display contents (characters × lines)	Lighting	Part No.	Outside dimensions width × height × depth (mm)	Effective visible area width × height (mm)	Character size width × height (mm)	Drive method (Duty)	Power supply voltage (V)	Operating temperature (℃)	storage
16×1	Reflective	**RCM2003R**※	80×36 ×12Max.	64.5×13.8	3.2 ×5.2	1/16	+5	0～+50	−20～+70
	Reflective	**RCM2034R**	80×36 ×12Max.	64.5×13.8	3.1 ×5.76	1/16	+5	0～+50	−20～+70
16×2	Reflective	**RCM2037R**	80×36 ×11Max.	64.5×13.8	2.95×3.8	1/16	+5	0～+50	−20～+70
	Transflective with backlight	**RCM2033M**	80×36 ×12Max.	61.0×15.8	2.95×4.85	1/16	+5	0～+50	−20～+70
	Reflective	**RCM2013R**※	84×44 ×12Max.	63.0×20.5	2.95×4.85	1/16	+5	0～+50	−20～+70
	Reflective	**RCM2025R**※	85×32.6×10Max.	61.0×15.8	2.95×4.85	1/16	+5	0～+50	−20～+70
16×4	Reflective	**RCM2019R**※	87×60 ×12Max.	61.8×25.2	2.95×4.15	1/16	+5	0～+50	−20～+70
New	Reflective	**RCM2038R**※	77×51 ×10Max.	61.8×25.2	2.95×4.15	1/16	+5	0～+50	−20～+70
20×2	Reflective	**RCM2010R**	116×37 ×11Max.	83.0×18.6	3.2 ×4.85	1/16	+5	0～+50	−20～+70
	Transflective with backlight	**RCM2011M**	116×37 ×16Max.	83.0×18.6	3.2 ×4.85	1/16	+5	0～+50	−20～+70
24×2	Reflective	**RCM2030R**	116×37 ×11Max.	83.0×18.6	2.7 ×4.85	1/16	+5	0～+50	−20～+70
	Transflective with backlight	**RCM2029M**	116×37 ×16Max.	83.0×18.6	2.7 ×4.85	1/16	+5	0～+50	−20～+70
New	40×2 Reflective	**RCM2035R**※	182×33.5×13Max.	154.0×15.3	3.2 ×4.85	1/16	+5	0～+50	−20～+70

Note : ※ EL backlight is available as option

STN Character Modules

●Quick Reference

(characters × lines) / Character size (mm)	16×1	16×2	20×2	24×2
3.1×5.76	**RCM7034X**			
2.95×3.8		**RCM7037X**		
2.95×4.85		**RCM7033M**		
3.2×4.85			**RCM7010X** **RCM7011T**	
2.7×4.85				**RCM7030X** **RCM7029T**

Note : □ Boxed : With back light, Others reflective

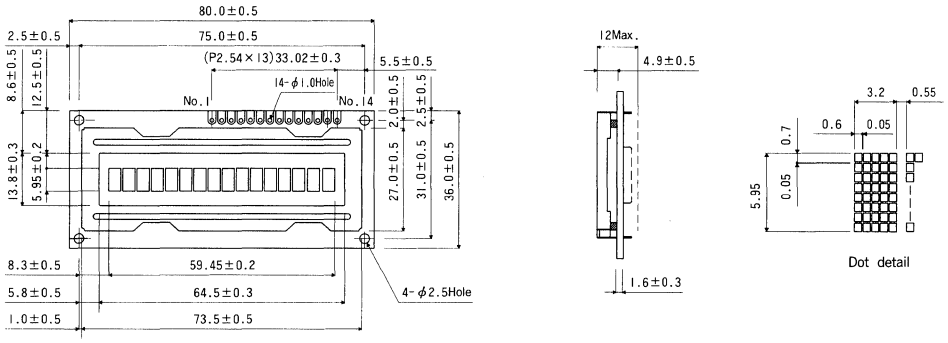
Display contents (characters × lines)	Lighting	Part No.	Outside dimensions width × height × depth (mm)	Effective visible area width × height (mm)	Character size width × height (mm)	Drive method (Duty)	Power supply voltage (V)	Operating temperature (℃)	storage
New 16×1	Reflective	**RCM7034X**	80×36×12Max.	64.5×13.8	3.1 ×5.76	1/16	+5	0～+50	−20～+70
New 16×2	Reflective	**RCM7037X**	80×36×11Max.	64.5×13.8	2.95×3.8	1/16	+5	0～+50	−20～+70
New	Transflective with backlight	**RCM7033M**	80×36×12Max.	61.0×15.8	2.95×4.85	1/16	+5	0～+50	−20～+70
New 20×2	Reflective	**RCM7010X**	116×37×11Max.	83.0×18.6	3.2 ×4.85	1/16	+5	0～+50	−20～+70
New	Transflective with backlight	**RCM7011T**	116×37×16Max.	83.0×18.6	3.2 ×4.85	1/16	+5	0～+50	−20～+70
New 24×2	Reflective	**RCM7030X**	116×37×11Max.	83.0×18.6	2.7 ×4.85	1/16	+5	0～+50	−20～+70
New	Transflective with backlight	**RCM7029T**	116×37×16Max.	83.0×18.6	2.7 ×4.85	1/16	+5	0～+50	−20～+70

Note : ※ EL backlight is available as option

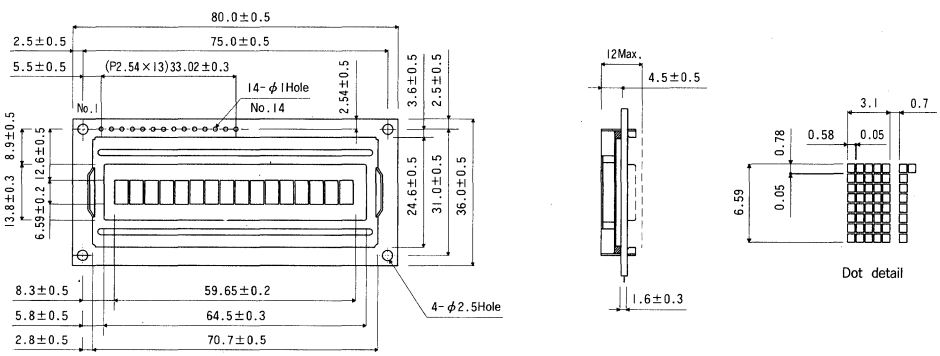
●16 Characters×1 Line (Reflective)

(Unit : mm)

TN Character Modules	STN Character Modules
RCM2003R	—



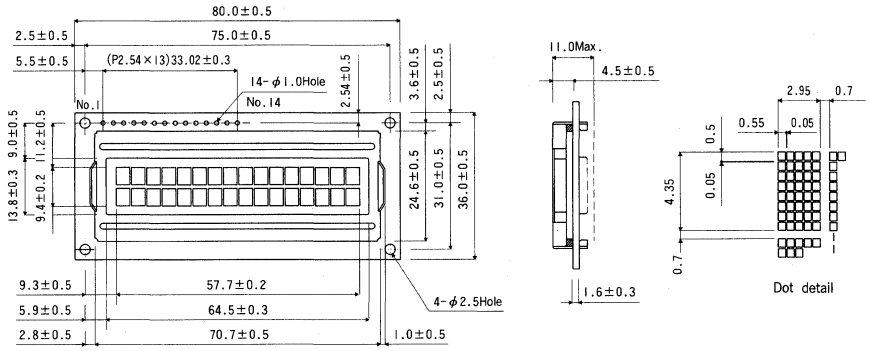
RCM2034R	RCM7034X



●16 Characters×2 Lines (Reflective)

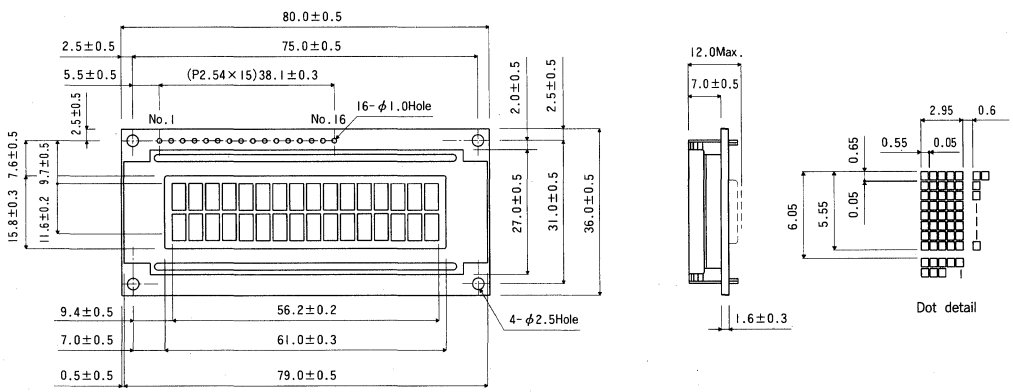
(Unit : mm)

TN Character Modules	STN Character Modules
RCM2037R	**RCM7037X**



●16 Characters×2 Lines (Transflective with backlight)

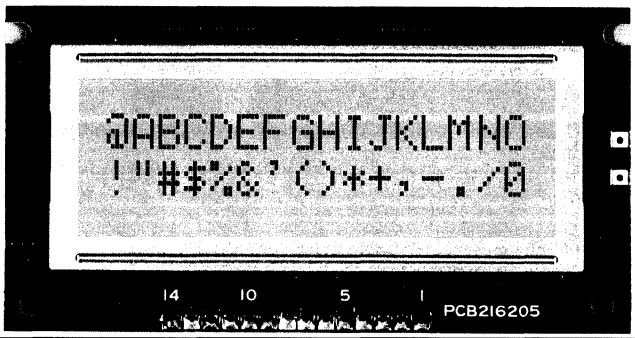
TN Character Modules	STN Character Modules
RCM2033M	**RCM7033M**

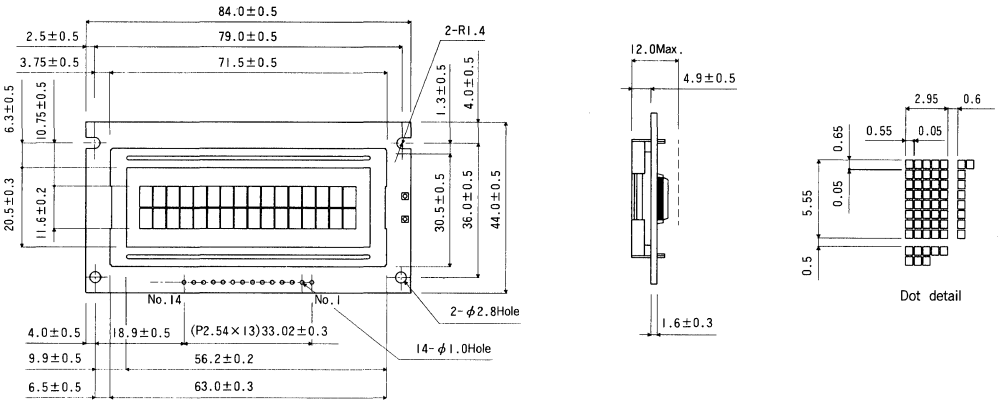


●16 Characters×2 Lines (Reflective)

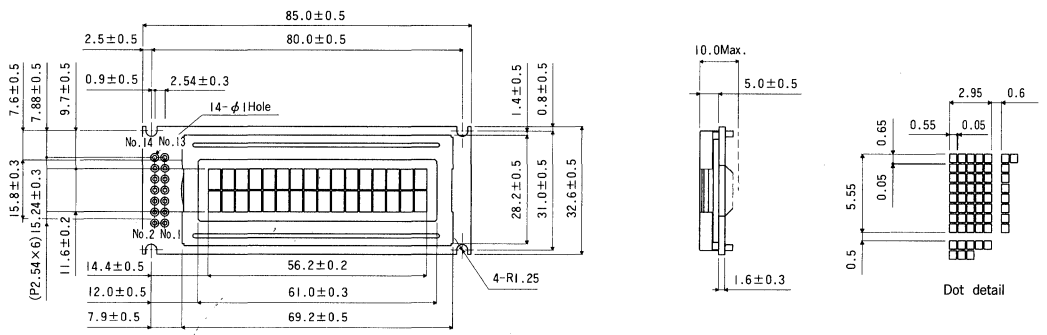
(Unit : mm)

TN Character Modules	STN Character Modules
RCM2013R	—





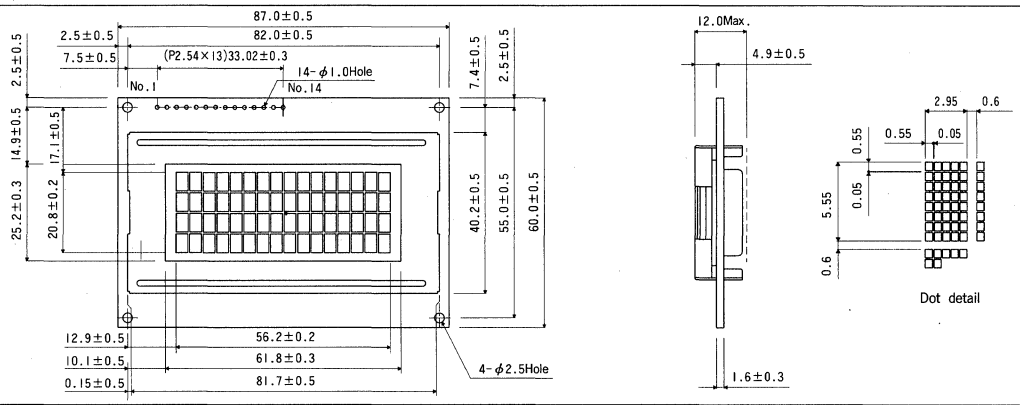
RCM2025R	—



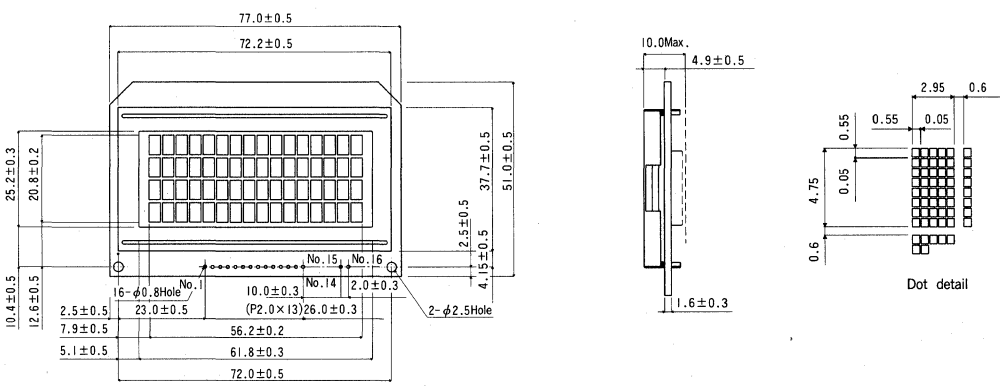
●16 Characters×4 Lines (Reflective)

(Unit : mm)

TN Character Modules	STN Character Modules
RCM2019R	—



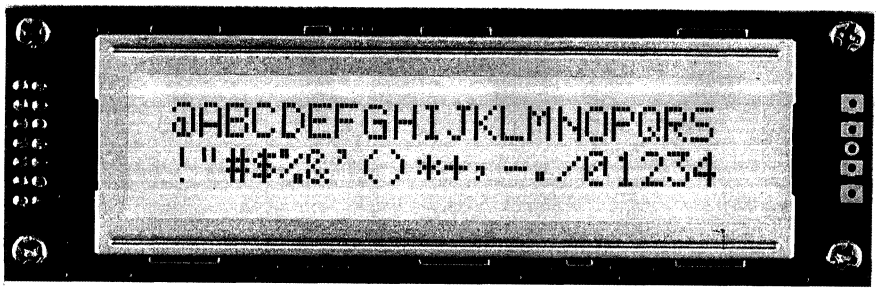
RCM2038R	—

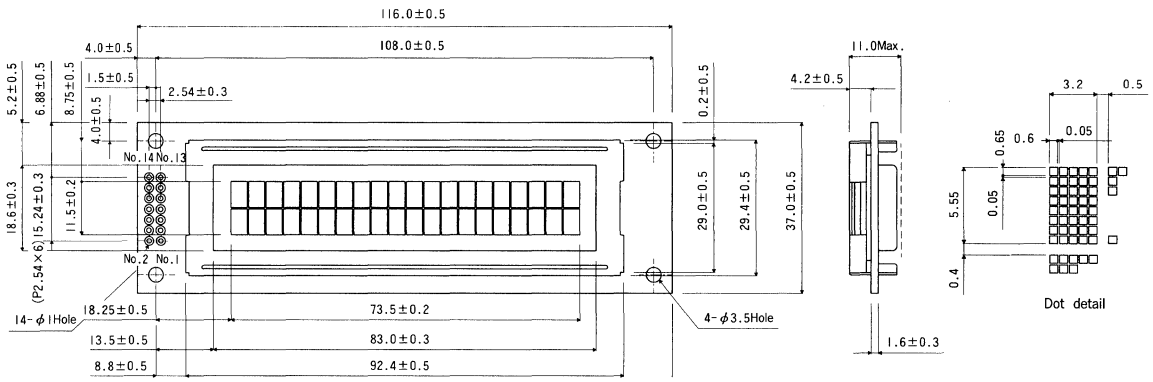


●20 Characters×2 Lines (Reflective)

(Unit : mm)

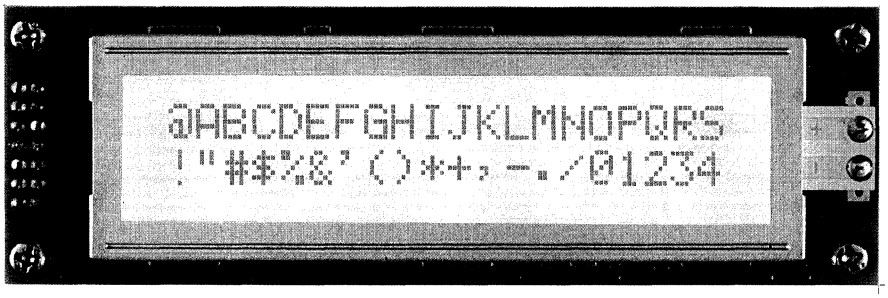
TN Character Modules	STN Character Modules
RCM2010R	**RCM7010X**

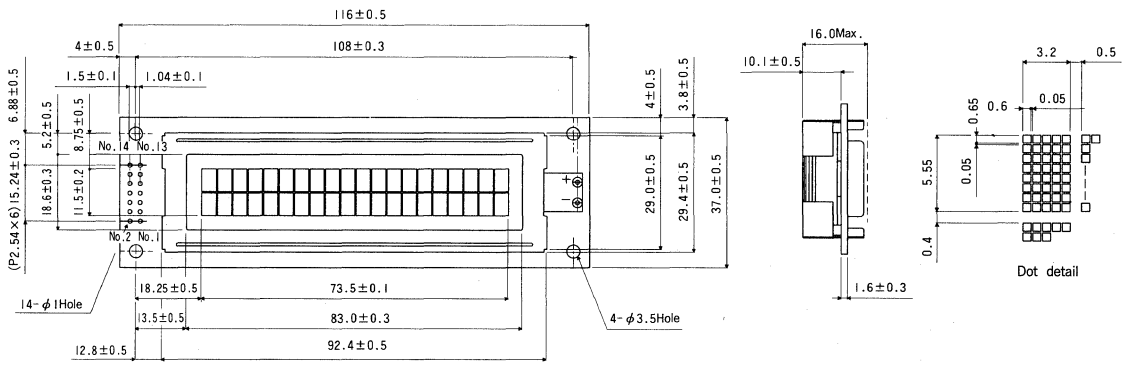




●20 Characters×2 Lines (Transflective with backlight)

TN Character Modules	STN Character Modules
RCM2011M	**RCM7011T**

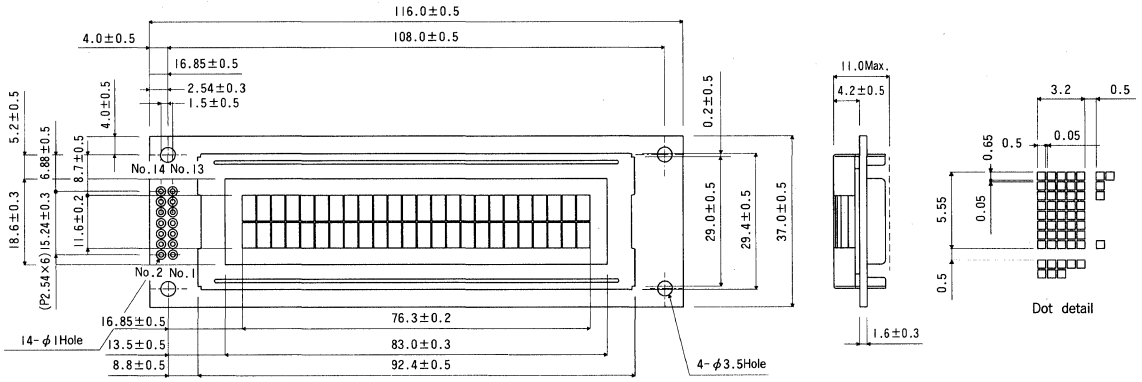




●24 Characters×2 Lines (Reflective)

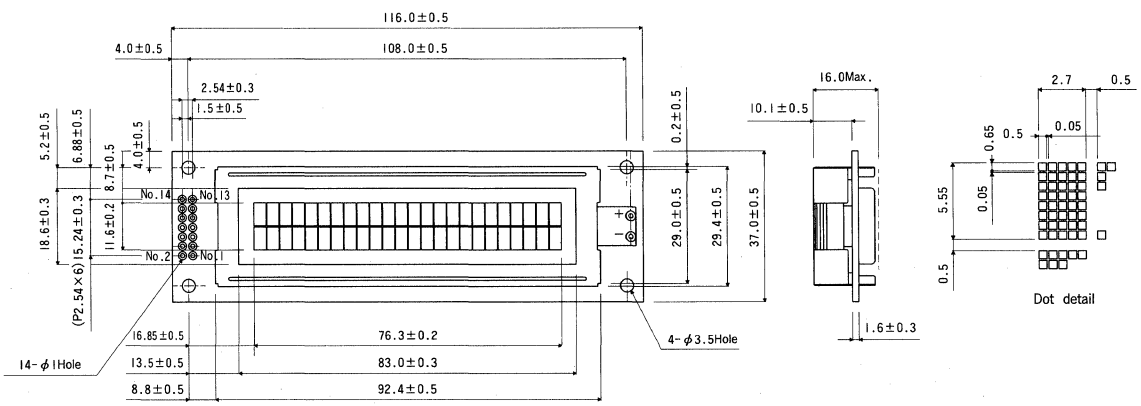
(Unit : mm)

TN Character Modules	STN Character Modules
RCM2030R	**RCM7030X**



●24 Characters×2 Lines (Transflective with backlight)

TN Character Modules	STN Character Modules
RCM2029M	**RCM7029T**

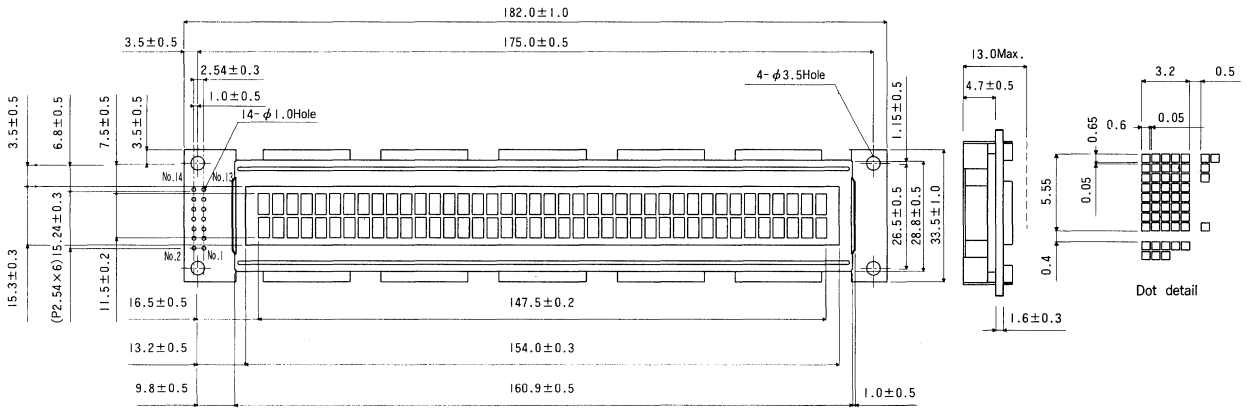


●40 Characters×2 Lines (Reflective)

(Unit : mm)

TN Character Modules	STN Character Modules
RCM2035R	—

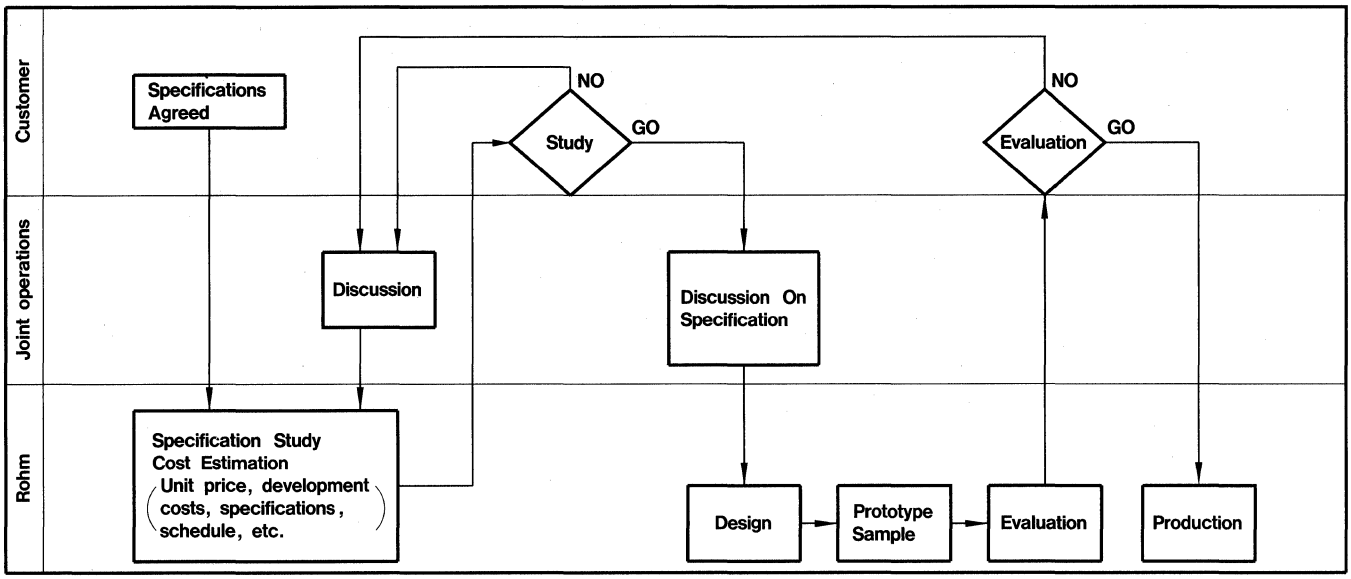
The photo is reduced 25% in size.



Custom LCD

ROHM provides custom panels and modules with a wide variety of display modes and connecting methods in order to meet customer needs in applications of both consumer and industrial products.

●Development Flow Chart



ROHM custom LCDs are designed, fabricated and delivered as follows :

1. Specification.
Send us your specification. ROHM may need art work film, pattern layout, circuit and interface spec.

2. Quotation and specification study.
ROHM will provide you information on price, development cost, specification and delivery schedule.

3. Specifications and feasibility study.
Customer and ROHM agree on final specification and to produce samples.

4. Design, development and evaluation.
Rohm designs, develops and evaluates the samples.

5. Customer evaluation.
Customer evaluates sample, approves and places production order.

6. Mass production.
Upon receiving the order, ROHM takes necessary steps for production.

●Product

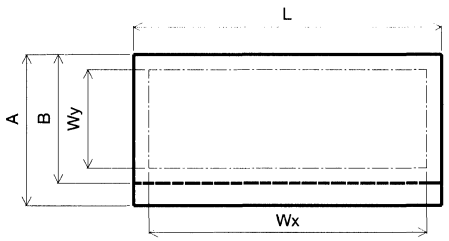
Product	Display Type	Optional
Panel (LCD Panel only)	Character Segment Graphic	Contact Pin Flexible Printed Circuit Board Glass Print Color Filter
Module (With Controller Driver)	Character Segment Graphic	BackLight (LED・EL・CFL) Wire Harness Connector

●Mode

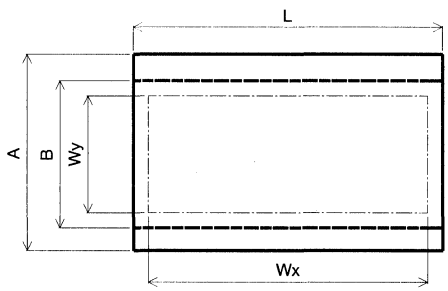
Liquid Crystal Mode	Display Mode	Lighting	Viewing Angle
TN	Negative	Transmissive Transflective	12:00 6:00 3:00 9:00 Other
	Positive	Transmissive Transflective Reflective	
STN	Yellow Gray	Transmissive Transflective Reflective	
	Blue	Transmissive	
	B/W	Transmissive Transflective Reflective	

●Recommended Glass Size for Custom LCD

ROHM suggests the follow glass sizes in order to provide custom LCDs with the most efficient cost performance. Additional LCD glass sizes may be ordered by special customer request.



<Pin Single in-line>



<Pin Dual in-line>

●Pin Single in-line

Specify Type I or Type II

Type I				
Width (mm)		Height (mm)		
L	Wx	A	B	Wy
76.2	72.2	57.8	55.3	51.3
61.0	57.0	48.5	46.0	42.0
50.8	46.8	41.6	39.1	35.1
43.5	39.5	36.7	34.2	30.2
38.1	34.1	32.6	30.1	26.1
33.8	29.8	29.6	27.1	23.1
		26.9	24.4	20.4
		24.9	22.4	18.4
		23.0	20.5	16.5
		21.5	19.0	15.0
		20.1	17.6	13.6
		19.0	16.5	12.5

Type II				
Width (mm)		Height (mm)		
L	Wx	A	B	Wy
94.6	90.6	52.0	49.5	45.5
71.0	67.0	44.6	42.1	38.1
56.8	52.8	39.3	36.8	32.8
47.3	43.3	35.0	32.5	28.5
40.5	36.5	31.7	29.2	25.2
35.5	31.5	28.8	26.3	22.3
31.5	27.5	26.6	24.1	20.1
		24.6	22.1	18.1
		23.0	20.5	16.5
		21.5	19.0	15.0
		20.3	17.8	13.8
		19.1	16.6	12.6

●Pin Dual in-line

Specify Type I or Type II

Type I				
Width (mm)		Height (mm)		
L	Wx	A	B	Wy
76.2	72.2	58.8	53.8	49.8
61.0	57.0	49.8	44.8	40.8
50.8	46.8	42.7	37.7	33.7
43.5	39.5	38.0	33.0	29.0
38.1	34.1	33.8	28.8	24.8
33.8	29.8	30.9	25.9	21.9
		28.1	23.1	19.1
		26.1	21.1	17.1
		24.1	19.1	15.1
		22.8	17.8	13.8
		21.2	16.2	12.2

Type II				
Width (mm)		Height (mm)		
L	Wx	A	B	Wy
94.6	90.6	53.3	48.3	44.3
71.0	67.0	45.7	40.7	36.7
56.8	52.8	40.6	35.6	31.6
47.3	43.3	36.1	31.1	27.1
40.5	36.5	33.0	28.0	24.0
35.5	31.5	30.0	25.0	21.0
31.5	27.5	27.9	22.9	18.9
		25.7	20.7	16.7
		24.3	19.3	15.3
		22.6	17.6	13.6
		21.5	16.5	12.5

Display For Public Information

<New Products>

Unique high contrast, wide visual field LCD displays designed and manufactured by Rohm to offer new public applications.

These LCD units are suitable for use as public signboard and information boards.

Public information boards and signboards must positively operate and have reliable performance under exact conditions in various environments.
This means that those display units must be easily visible at wide range of angles.
ROHM public LCD displays have been installed at various locations because they can offer satisfactory display functions and meet most stringent specifications.

●Applications

Destination sign, signpost, message board, and other public signs at airport, railroad station, bus stop, etc.

●Features

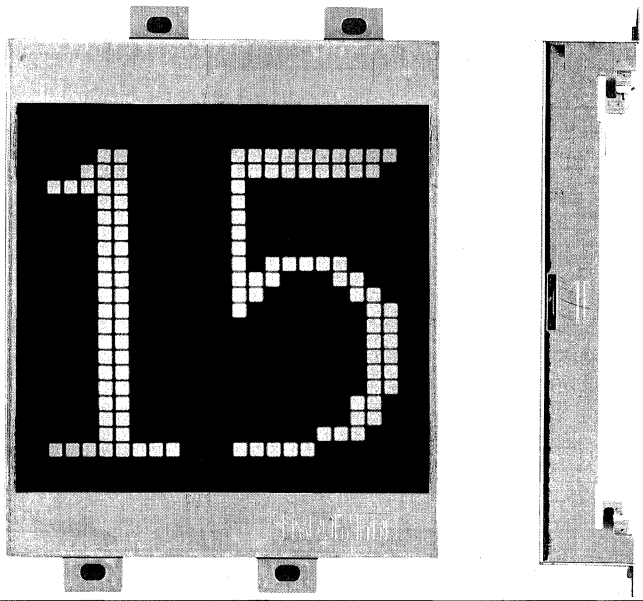
(1) Wide visual field, high contrast and quick response
(2) Compact and light weight to fit into verious display units
(3) Positive or negative video
(4) Low power consumption

Available in various sizes, dots and background colors to meet custom specifications for specific application.

	Part No.	No. of dots C×L (dots)	Character size width×height (mm)	Lighting	Outside dimensions width×height (mm)	Effective visible area width×height (mm)
New	RCU1209U	24×24	88.0×81.5	Transmissive negative	97.0×135.0	91.0×85.1

●24×24 dots (Transmissive negative)

RCU1209U



Printheads

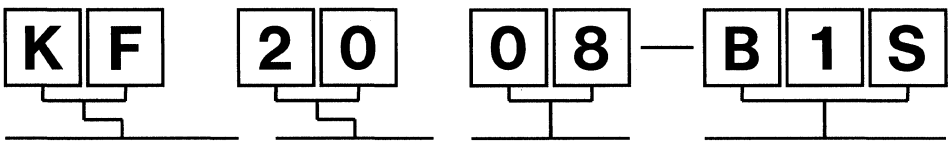
Thermal Printheads

Line type

●Quick Reference

Print width (inches)	Dot density (dots/mm)						
	3	4	6	7.52	7.87 8	11.81	15.75
1					KF2001-EA		
2	KE0802-A1S	KL1002-B4S	KF1502-C1S	KF1902-C1S KM1902-A1	KF2002-J1S KF2002-C1S KM2002-A1 NE2002-A1 NM2002-A3		
3	KE0803-A1S	KL1003-B4S	KF1503-C1S KM1503-A1	KF1903-C1S KM1903-A1	KF2003-C1S KM2003-22 NM2003-A3		
4	KE0804-A1S	KL1004-B4S	KF1504-C1S KM1504-A3	KF1904-C1S KM1904-A1	KF2004-C1S KM2004-A3 NE2004-B1 NM2004-A3	NM3004-A3	
5					KF2005-B1S		
6					KM2006-A3		
8 (A4)					KF2008-B1S KF2008-HEA KF2008-HE KF2008-HR KF2008-KA KF2008-RA KF2008-GA3 KF2008-GB3	KF3008-HR NB3008-C3	
10 (B4)					KF2010-HE KF2010-HR KF2010-RA KF2010-GA3 KF2010-GB3		
24 (A1)					KF2024-C1	KF3024-A1	KF4024-A1
36 (A0)					KF2036-B1	KF3036-A1	KF4036-A1

●Product Designation



Series name

KL KE KF	Thick film standard type
KM	Thick film, intelligent type
NB	Thin film standard type
NM	Thin film, intelligent type
NE	Thin film real edge type

Dot density

08	80 DPI
10	100 DPI
15	150 DPI
19	190 DPI
20	200 DPI
30	300 DPI
40	400 DPI

Approximate print width

01	1 inch
02	2 inches
03	3 inches
04	4 inches
05	5 inches
06	6 inches
07	7 inches
08	8 inches
10	10 inches
12	12 inches
24	24 inches
36	36 inches

Specification code

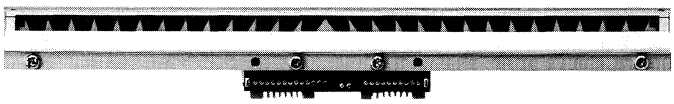
●For facsimiles

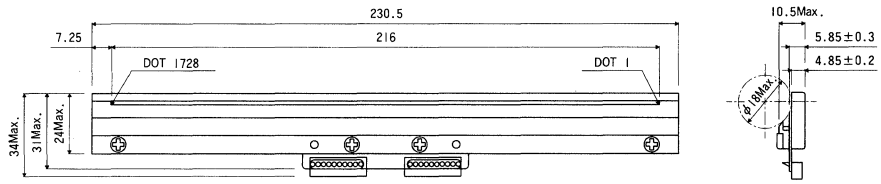
R series is a compact version (roller diameter 14Max.) of H series (roller diameter 18Max.).
G series is fabricated on a ceramic substrate directly equipped with special connectors.

Part No.	Dot density (dots/mm)	Effective print width (mm)	Number of dots	Average resistance (Ω)	Operation voltage Typ. (V)	Number of strobes	Weight (g)
KF2008-HEA	8	216.0	1728	3000	24.0	4	105
KF2008-HE	8	216.0	1728	3000	24.0	4	105
KF2008-KA	8	216.0	1728	3000	24.0	4	90
KF2008-RA	8	216.0	1728	3000	24.0	4	70
KF2008-GA3	8	216.0	1728	5000	24.0	2	45
KF2008-GB3	8	216.0	1728	5000	24.0	2	45
KF2010-HE	8	256.0	2048	3000	24.0	4	120
KF2010-RA	8	256.0	2048	3000	24.0	4	85
KF2010-GA3	8	252.0	2016	5000	24.0	2	55
KF2010-GB3	8	256.0	2048	5000	24.0	2	55

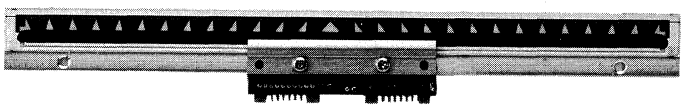
(Unit : mm)

KF2008-HEA

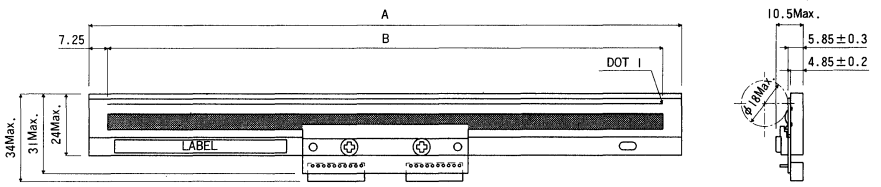




KF2008-HE KF2010-HE



KF2008-HE



Items \ Part No.	KF2008-HE	KF2010-HE
A	230.5	270.5
B	216	256

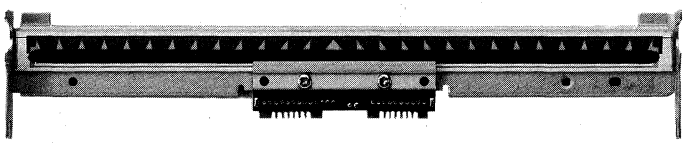
Thermal Printheads

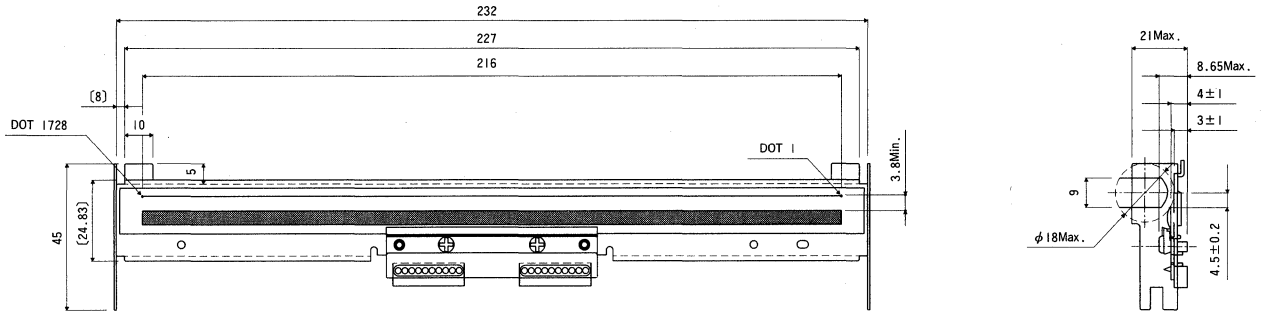
Line type

●For facsimiles

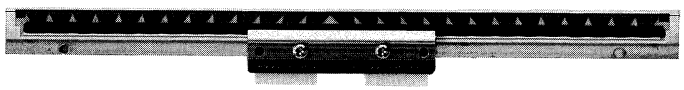
(Unit : mm)

KF2008-KA

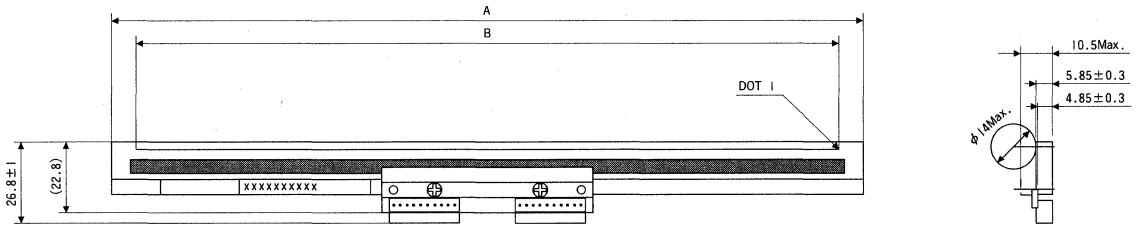




KF2008-RA KF2010-RA



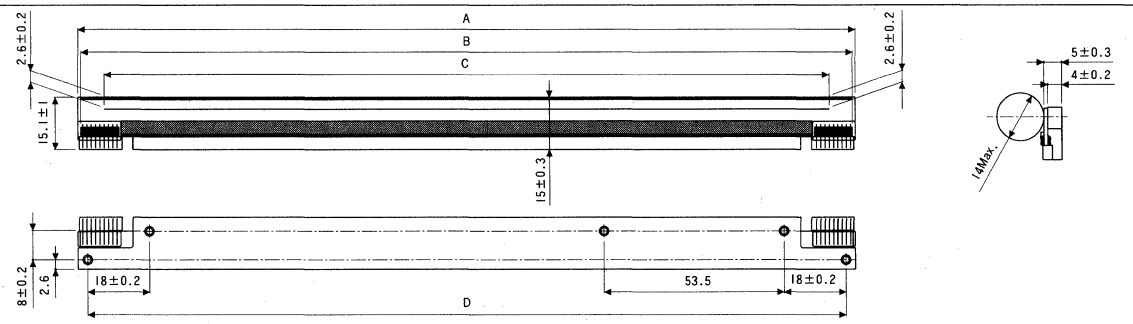
KF2008-RA



Items \ Part No.	KF2008-RA	KF2010-RA
A	230.5±0.3	270.5±0.3
B	216	256

KF2008-GA3 KF2008-GB3 KF2010-GA3 KF2010-GB3

KF2008-GA3



Items \ Part No.	KF2008-GA3	KF2008-GB3	KF2010-GA3	KF2010-GB3
A	232	232	272	272
B	230	230	270	270
C	216	216	252	256
D	226±0.2	226±0.2	266±0.2	266±0.2

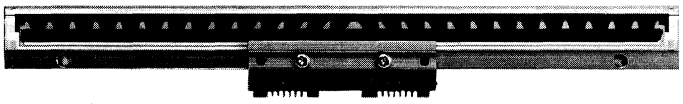
●For plain paper facsimiles

HR series is a version of HE series, employing partial glaze. It is effective for thermal transfer printing.

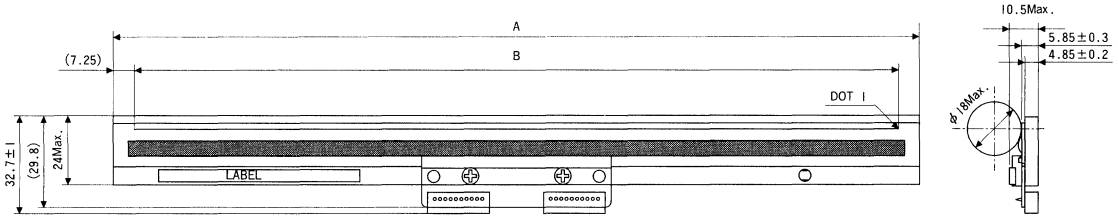
Part No.	Dot density (dots/mm)	Effective print width (mm)	Number of dots	Average resistance (Ω)	Operation voltage Typ. (V)	Number of strobes	Weight (g)
KF2008-HR	8	216.0	1728	3000	24.0	4	105
KF2010-HR	8	256.0	2048	3000	24.0	4	120

(Unit : mm)

KF2008-HR KF2010-HR



KF2008-HR



Items \ Part No.	KF2008-HR	KF2010-HR
A	230.5±0.5	270.5±0.5
B	216	256

Thermal Printheads

Line type

●For thermal transfer page printers

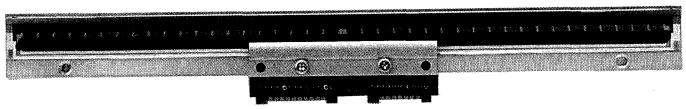
NB3008-C3 is fabricated using thin film process.

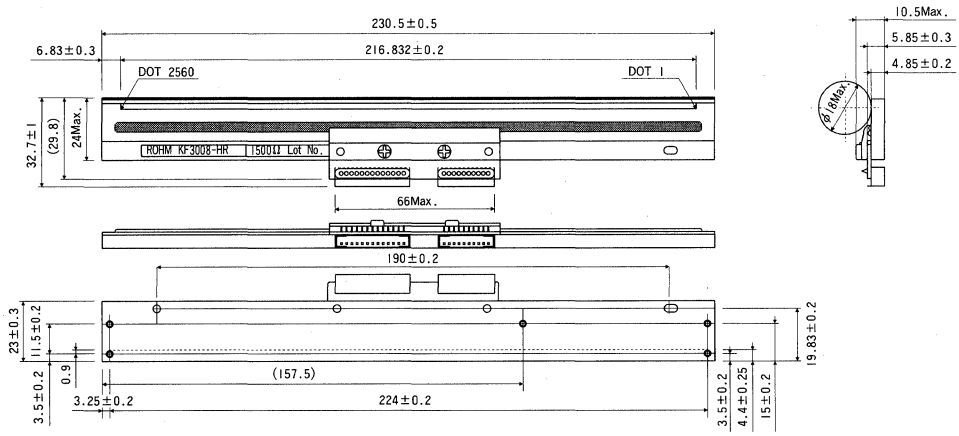
KF3008-HR is a compact design, almost the same printheads for facsimlies. Both serieses employ partial glaze.

Part No.	Dot density (dots/mm)	Effective print width (mm)	Number of dots	Average resistance (Ω)	Operation voltage Typ. (V)	Number of strobes	Weight (g)
KF3008-HR	11.8	216.8	2560	1500	24.0	4	90
NB3008-C3	11.81	216.8	2560	1400	24.0	8	220

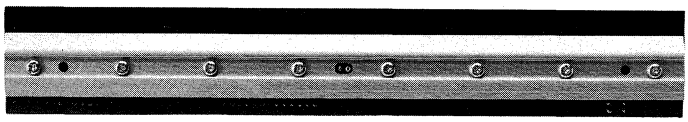
(Unit : mm)

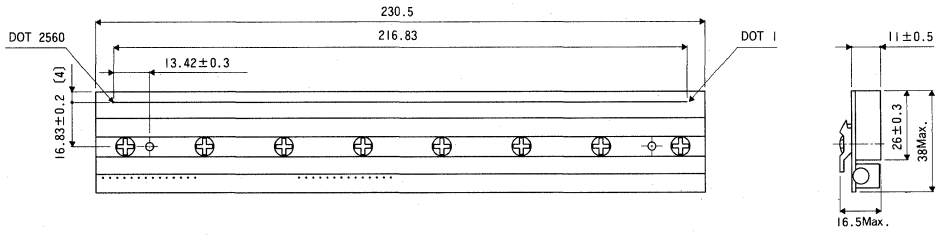
KF3008-HR





NB3008-C3





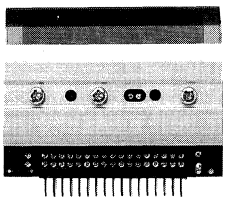
●For small printers

C1S Series allows selection of resolution (6 dots/mm, 7.5 dots/mm, and 8 dots/mm) among printheads of the same profile.

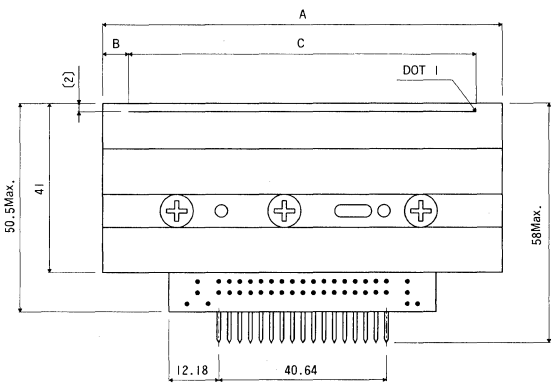
Part No.	Dot density (dots/mm)	Effective print width (mm)	Number of dots	Average resistance (Ω)	Operation voltage Typ. (V)	Number of strobes	Weight (g)
KE0802-A1S	3	52.8	160	160	20.3	5	50
KE0803-A1S	3	84.5	256	160	20.3	4	70
KE0804-A1S	3	105.6	320	160	20.3	5	90
KF2001-EA	8	32.0	256	1000	24.0	2	30
KF1502-C1S	6	52.8	320	700	24.0	5	50
KF1503-C1S	6	84.5	512	700	24.0	4	55
KF1504-C1S	6	105.6	640	700	24.0	5	75
KF1902-C1S	7.52	51.1	384	800	24.0	3	50
KF1903-C1S	7.52	76.6	576	800	24.0	5	55
KF1904-C1S	7.52	102.1	768	800	24.0	6	75
KF2002-C1S	8	56.0	448	800	24.0	3	50
KF2003-C1S	8	80.0	640	800	24.0	5	55
KF2004-C1S	8	104.0	832	800	24.0	6	75
KL1002-B4S	4	56.0	224	250	19.7	7	50
KL1003-B4S	4	80.0	320	250	19.7	5	70
KL1004-B4S	4	104.0	416	250	19.7	7	90

(Unit : mm)

KE0802-A1S KE0803-A1S KE0804-A1S



KE0802-A1S



Items / Part No.	KE0802-A1S	KE0803-A1S	KE0804-A1S
A	65	97	118
B	6.1	6.26	6.2
C	52.8	84.48	105.6

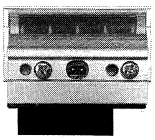
Thermal Printheads

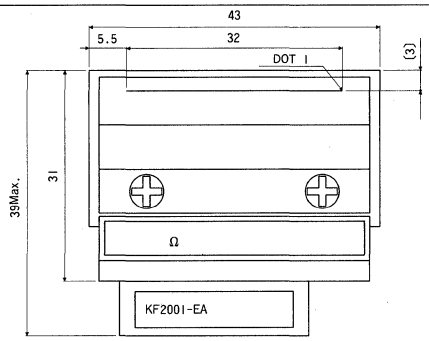
Line type

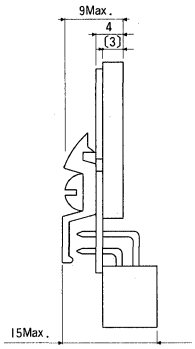
●For small printers

(Unit : mm)

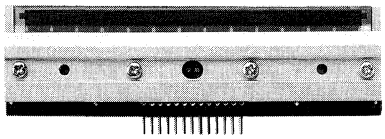
KF2001-EA



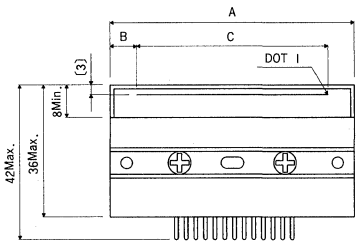


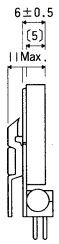


KF1502-C1S KF1503-C1S KF1504-C1S KF1902-C1S KF1903-C1S KF1904-C1S KF2002-C1S KF2003-C1S KF2004-C1S



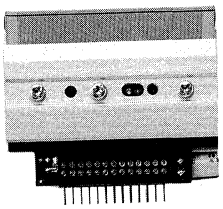
KF2004-C1S



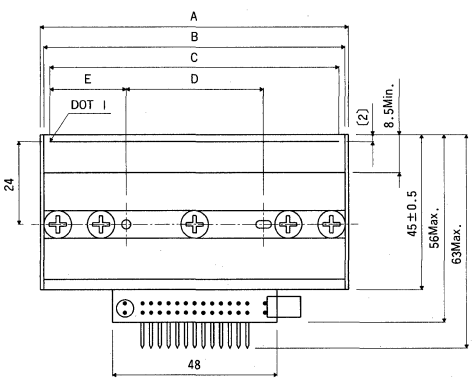


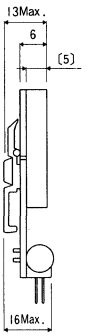
Items \ Part No.	KF1502-C1S	KF1503-C1S	KF1504-C1S	KF1902-C1S	KF1903-C1S	KF1904-C1S	KF2002-C1S	KF2003-C1S	KF2004-C1S
A	65	91	118	65	91	118	65	91	118
B	6.1	3.26	6.2	6.964	7.196	7.928	4.5	5.5	7
C	52.8	84.48	105.6	51.072	76.608	102.144	56	80	104

KL1002-B4S KL1003-B4S KL1004-B4S



KL1002-B4S





Items \ Prat No.	KL1002-B4S	KL1003-B4S	KL1004-B4S
A	66	90	114
B	64	88	112
C	56	80	104
D	25	40	40
E	15.5	20	32

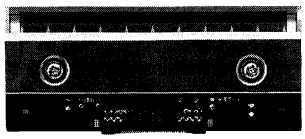
●For small high speed printers

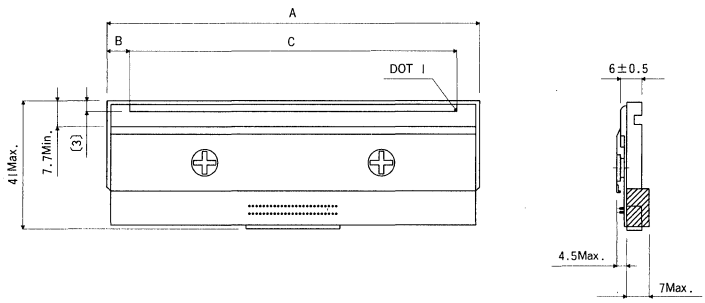
High speed recording printheads containing a history control IC developed by ROHM.

Part No.	Dot density (dots/mm)	Effective print width (mm)	Number of dots	Average resistance (Ω)	Operation voltage Typ. (V)	Number of strobes	Weight (g)
KM1503-A1	6	84.5	512	650	22.3	2	50
KM1504-A3	6.06	105.6	640	550	24.4	2	70
KM1902-A1	7.52	51.1	384	650	20.8	2	38
KM1903-A1	7.52	76.6	576	650	21.3	2	50
KM1904-A1	7.52	102.1	768	650	21.9	2	63
KM2002-A1	8	56.0	448	650	20.2	2	38
KM2003-22	8	80	640	650	22.0	2	60
KM2004-A3	8	104	823	650	21.7	2	70
KM2006-A3	8	160	1280	650	21.9	2	110
NM2002-A3	8	56.0	448	550	24.0	2	45
NM2003-A3	8	80.0	640	550	24.0	2	55
NM2004-A3	8	104.0	832	550	24.0	2	65
NM3004-A3	11.8	108.4	1280	1000	24.3	2	65

(Unit : mm)

KM1503-A1 KM1902-A1 KM1903-A1 KM1904-A1 KM2002-A1





Items \ Part No.	KM1503-A1	KM1902-A1	KM1903-A1	KM1904-A1	KM2002-A1
A	91	65	91	118	65
B	3.3	7	7.196	7.9	4.5
C	84.5	51.1	76.6	102.1	56.0

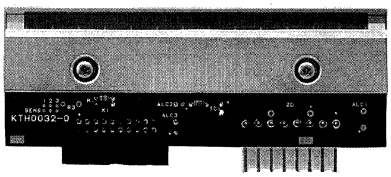
Thermal Printheads

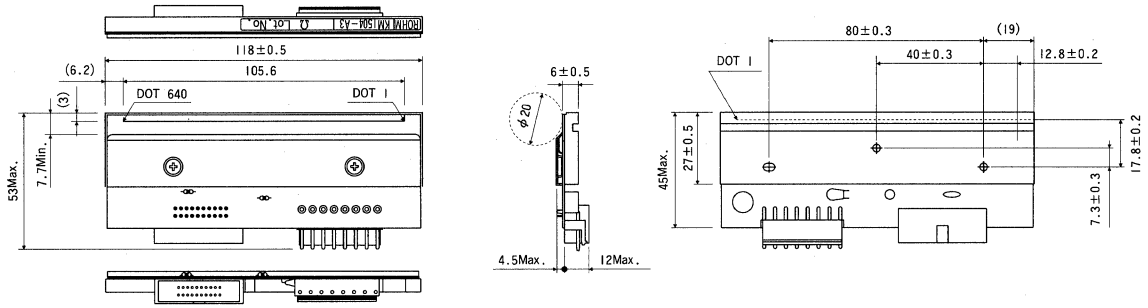
Line type

●For small high speed printers

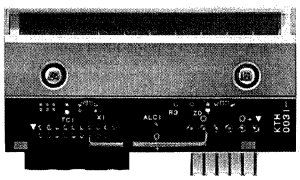
(Unit : mm)

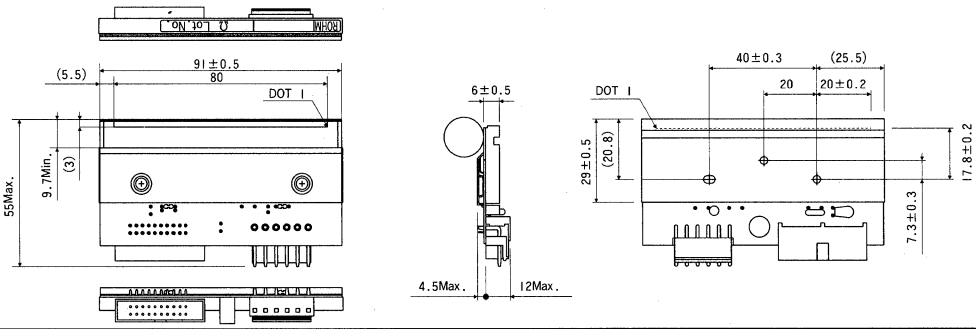
KM1504-A3



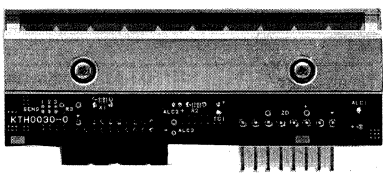


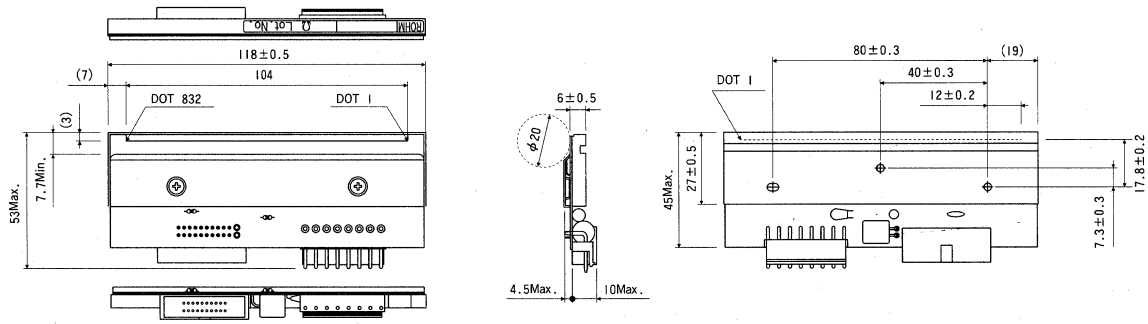
KM2003-22





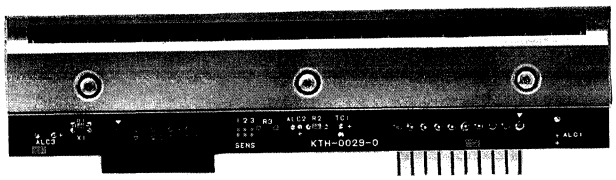
KM2004-A3

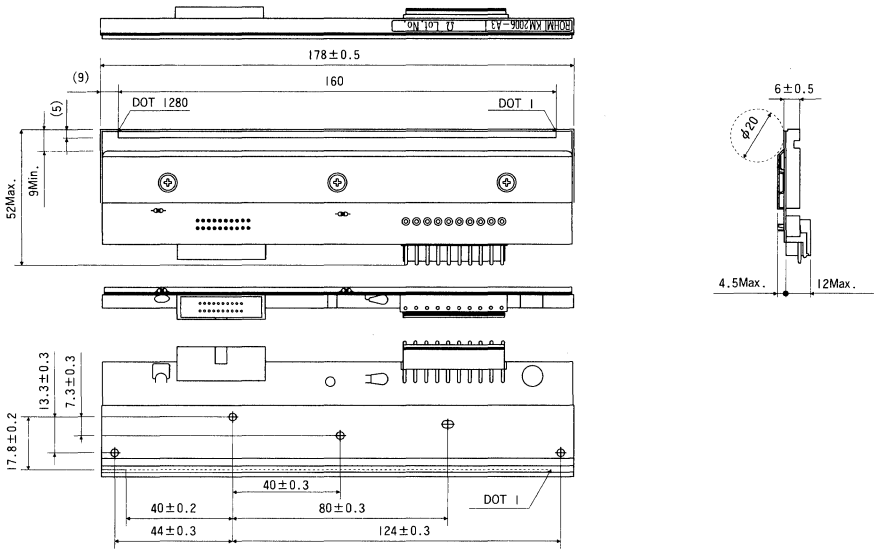




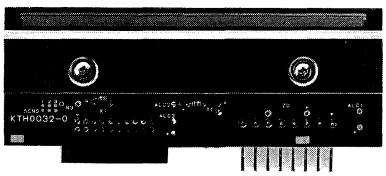
(Unit : mm)

KM2006-A3

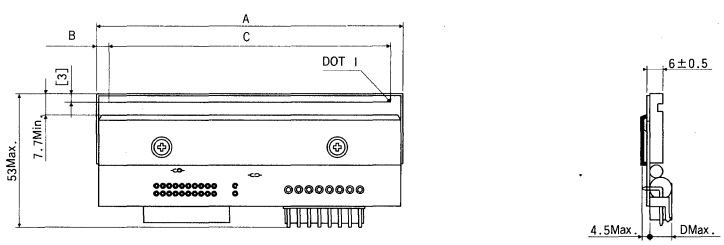




NM2002-A3 NM2003-A3 NM2004-A3 NM3004-A3



NM3004-A3



Items \ Part No.	NM2002-A3	NM2003-A3	NM2004-A3	NM3004-A3
A	65	91	118	118
B	4.5	5.5	7	4.792
C	56.0	80.0	104.0	108.416
D	12	12	10	10

Thermal Printheads

Line type

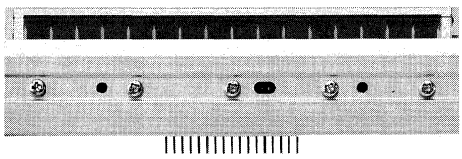
●For chart recorders

Designed to plot on recording charts (especially for medical applications).

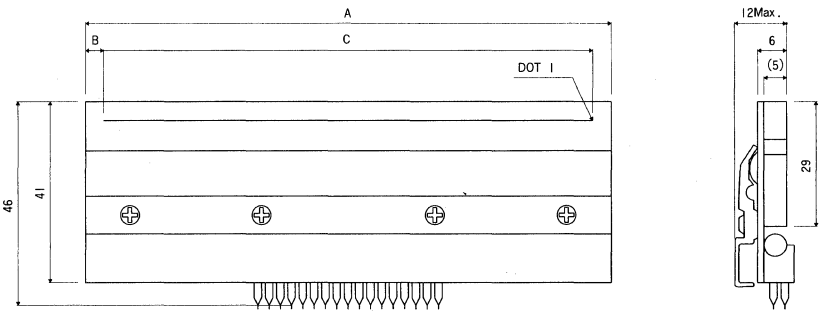
Part No.	Dot density (dots/mm)	Effective print width (mm)	Number of dots	Average resistance (Ω)	Operation voltage Typ. (V)	Number of strobes	Weight (g)
KF2002-J1S	8	48.0	384	800	24.0	6	50
KF2005-B1S	8	128.0	1024	650	24.0	4	120
KF2008-B1S	8	216.0	1728	650	24.0	6	110

(Unit : mm)

KF2002-J1S KF2005-B1S

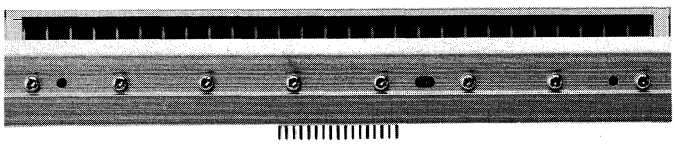


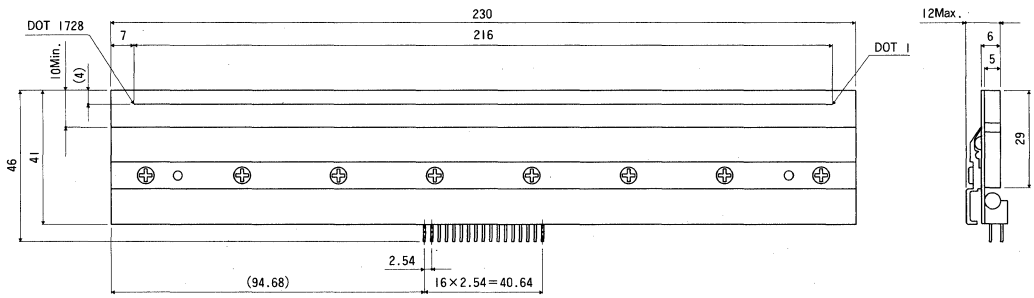
KF2005-B1S



Items \ Part No.	KF2002-J1S	KF2005-B1S
A	58	141
B	5	6.5
C	48	128

KF2008-B1S





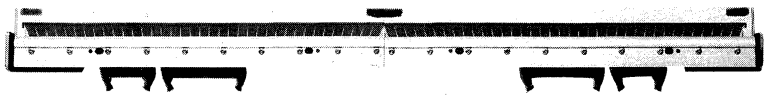
●For large format printers

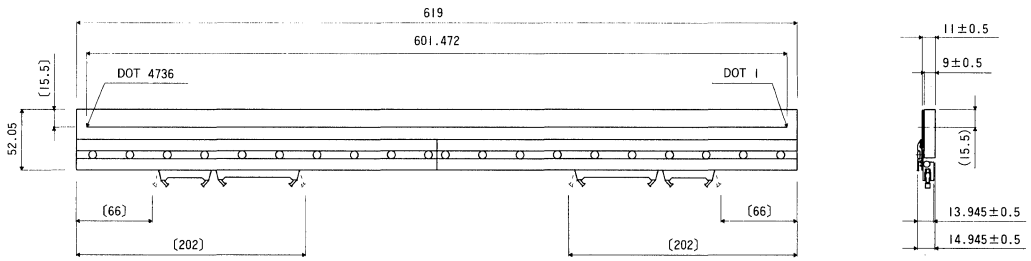
ROHM's proprietary PCB joint technology makes it possible to produce larger size printheads from 24 to 36 inches.

Part No.	Dot density (dots/mm)	Effective print width (mm)	Number of dots	Average resistance (Ω)	Operation voltage Typ. (V)	Number of strobes	Weight (g)
KF2024-C1	7.87	601.5	4736	1000	24.0	16	2500
KF2036-B1	7.87	902.2	7104	1000	24.0	24	3000
KF3024-A1	11.81	607.1	7168	1500	24.0	16	1800
KF3036-A1	11.81	910.7	10752	1500	24.0	24	2400
KF4024-A1	15.75	617.7	9728	2000	24.0	16	1800
KF4036-A1	15.75	926.6	14592	2000	24.0	24	2400

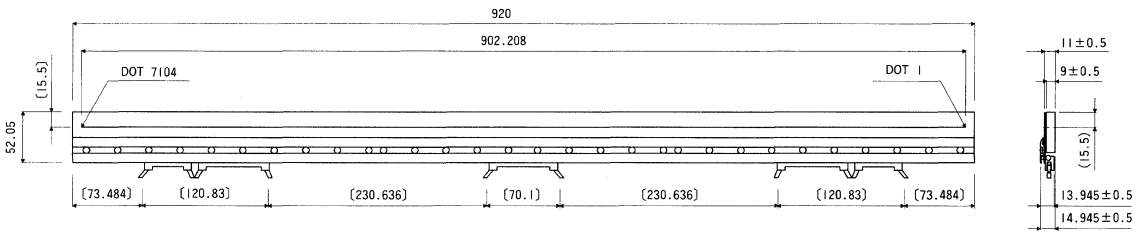
(Unit : mm)

KF2024-C1





KF2036-B1



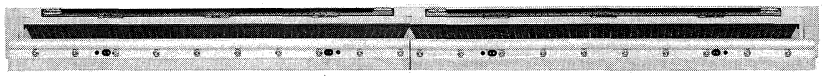
Thermal Printheads

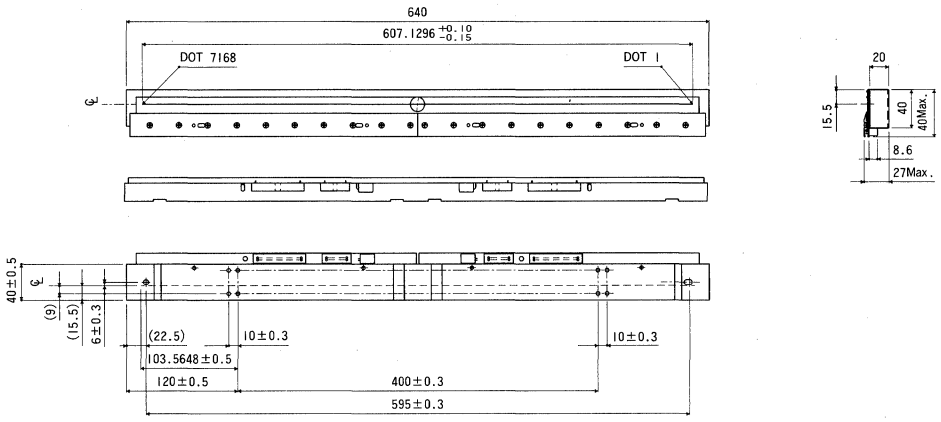
Line type

●For large format printers

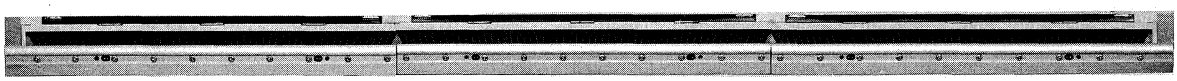
(Unit : mm)

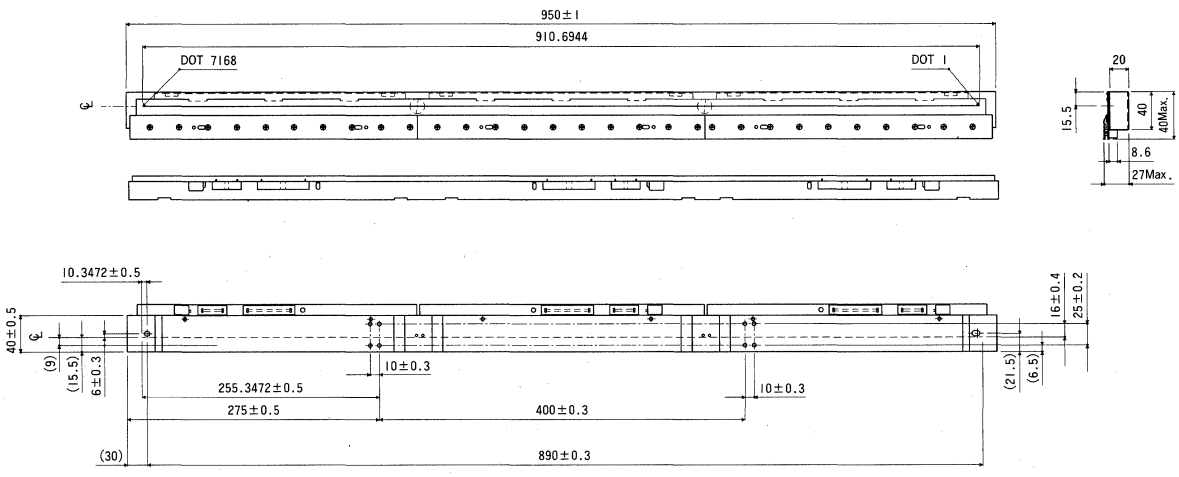
KF3024-A1





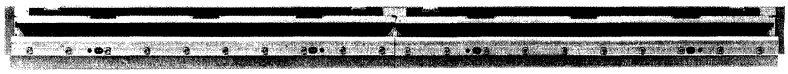
KF3036-A1

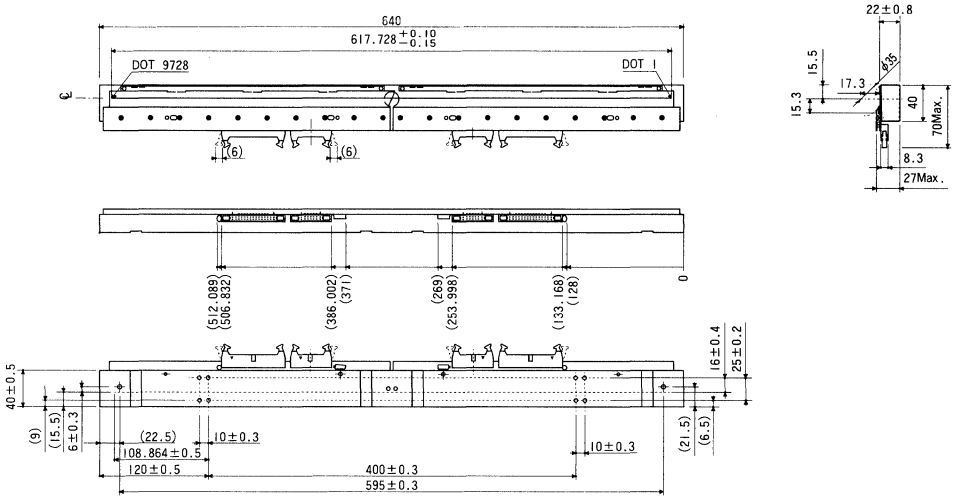




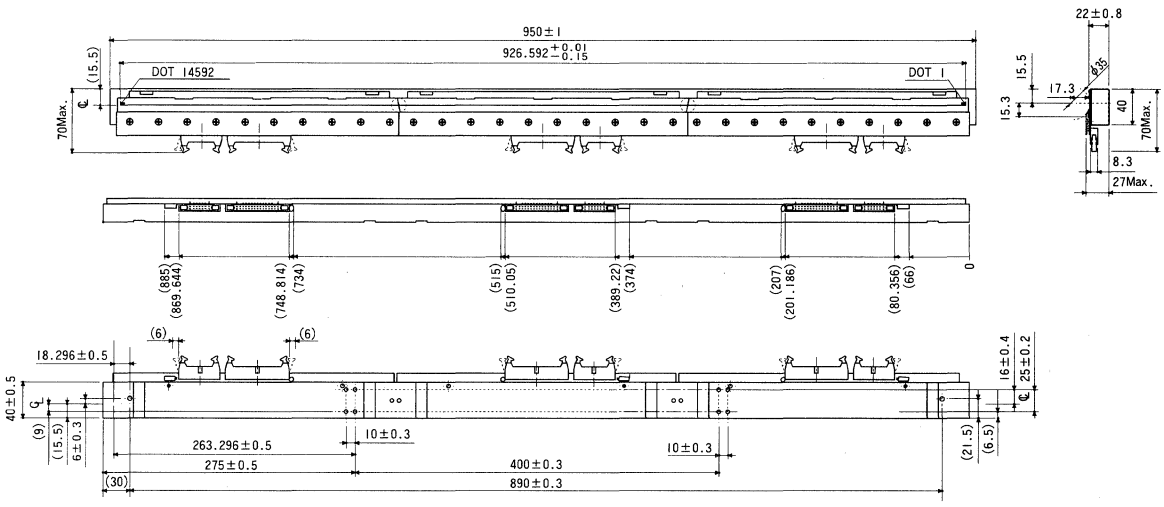
(Unit : mm)

KF4024-A1





KF4036-A1



Thermal Printheads

Line type

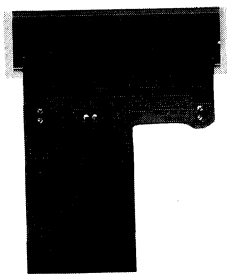
●For flat printing printers

Heating element located at edge of PCB (NE2002-A1, NE2004-B1) and real edge heating element enable printing on a flat plane.

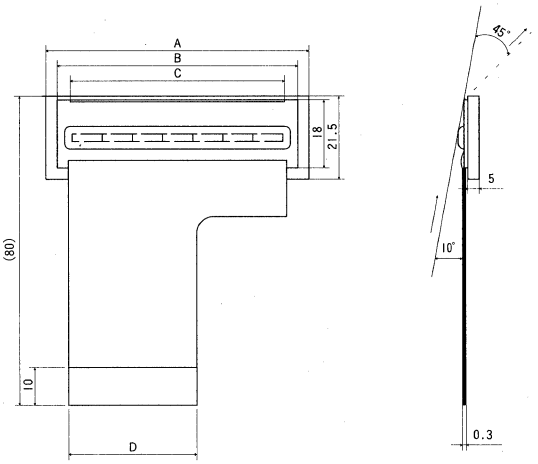
Part No.	Dot density (dots/mm)	Effective print width (mm)	Number of dots	Average resistance (Ω)	Operation voltage Typ. (V)	Number of strobes	Weight (g)
NE2002-A1	8	56.0	448	300	12.0	5	30
NE2004-B1	8	112.0	896	1000	24.0	3	50

(Unit : mm)

NE2002-A1 NE2004-B1



NE2002-A1



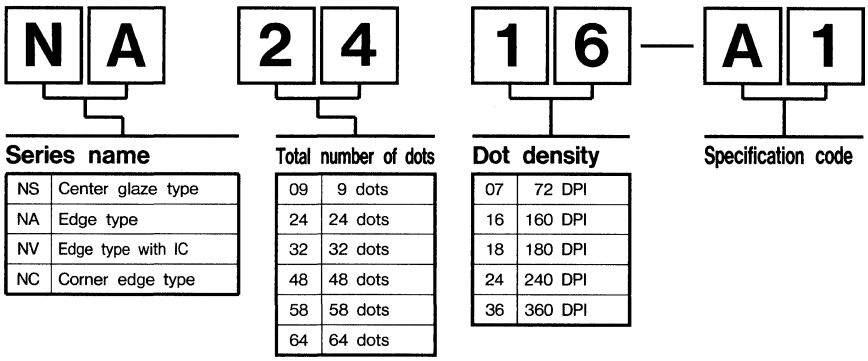
Items \ Part No.	NE2002-A1	NE2004-B1
A	69	130
B	63.75	125
C	56	112
D	33.75	41.25

Serial type

●Quick Reference

Number of dots	Dot density (dots/inch)				
	72	160	180	240	360
9	**NS0907-D1** **NS0907-T1**				
24		**NA2416-A1**	**NA2418-A1** **NA2418-J1**		
32				**NV3224-A1**	
48			**NA4818-Y1** **NV4818-YA**		**NA4836-A1**
58					**NV5836-A1**
64					**NC6436-A1**

●Product Designation



Series name	
NS	Center glaze type
NA	Edge type
NV	Edge type with IC
NC	Corner edge type

Total number of dots	
09	9 dots
24	24 dots
32	32 dots
48	48 dots
58	58 dots
64	64 dots

Dot density	
07	72 DPI
16	160 DPI
18	180 DPI
24	240 DPI
36	360 DPI

Thermal Printheads

Serial type

●For alphanumeric printers

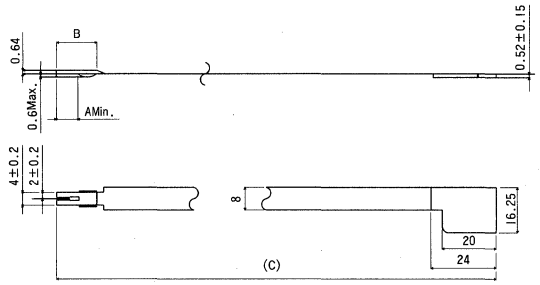
Low cost, low density thin film serial printhead, typically designed for low end alphanumeric printers.

Part No.	Dot density (dots/inch)	Effective print width (mm)	Number of dots	Average resistance (Ω)	Operation Voltage Typ. (V)	Weight (g)
NS0907-D1	72	3.152	9	51.6	10.4	2
NS0907-T1	72	3.152	9	46.1	9.3	2

(Unit : mm)

NS0907-D1 NS0907-T1

NS0907-D1



Items / Part No.	NS0907-D1	NS0907-T1
A	6.5	8
B	12	15
C	310	312.5

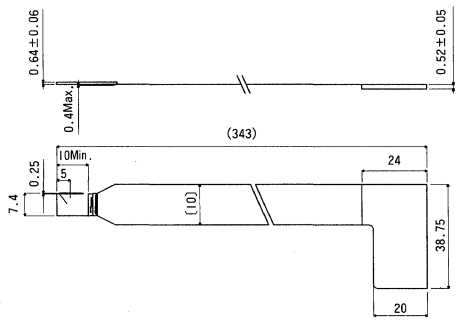
●For word processors

High quality printhead can print on paper having 10 sec and higher smoothness. Also prints on thermal paper.

Part No.	Dot density (dots/inch)	Effective print width (mm)	Number of dots	Average resistance (Ω)	Operation Voltage Typ. (V)	Weight (g)
NA2416-A1	160	3.801	24	210	12.0	2
NA2418-A1	180	3.369	24	260	12.0	2
NA2418-J1	180	3.369	24	260	12.0	2
NV3224-A1	240	3.377	32	550	15.5	2
NA4836-A1	360	3.374	48	250	8.8	3
NV5836-A1	360	4.080	58	600	14.4	3

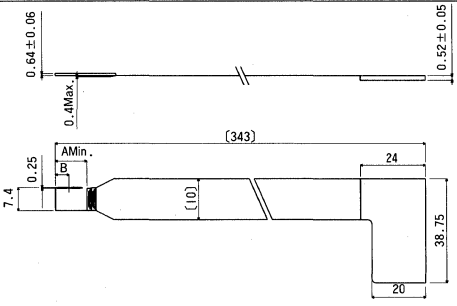
(Unit : mm)

NA2416-A1



NA2418-A1 NA2418-J1

NA2418-A1

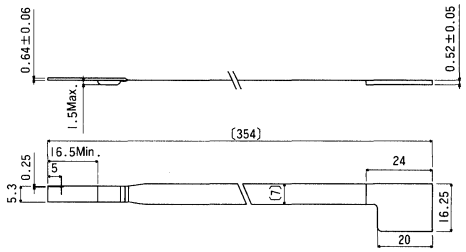


Items / Part No.	NA2418-A1	NA2418-J1
A	10	7
B	5	3.5

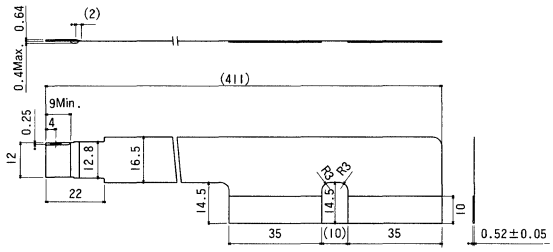
●For word processors

(Unit : mm)

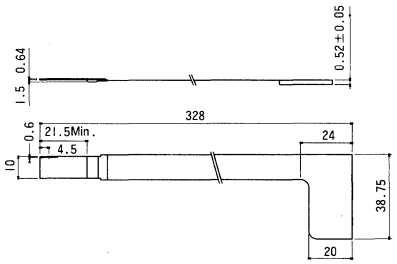
NV3224-A1



NA4836-A1



NA5836-A1



Thermal Printheads

Serial type

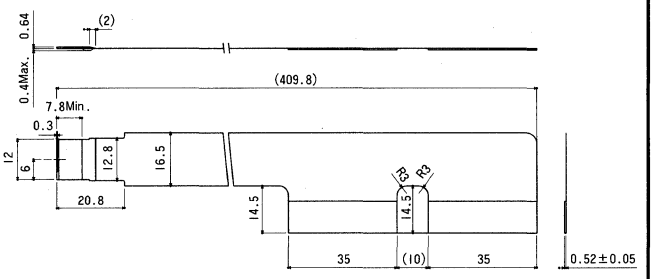
●For flat printing

Heat element is placed in parallel with lead take-out to enable the handy printer print on plane paper.

Part No.	Dot density (dots/inch)	Effective print width (mm)	Number of dots	Average resistance (Ω)	Operation voltage Typ. (V)	Weight (g)
NA4818-Y1	180	6.753	48	200	12.0	3

(Unit : mm)

NA4818-Y1



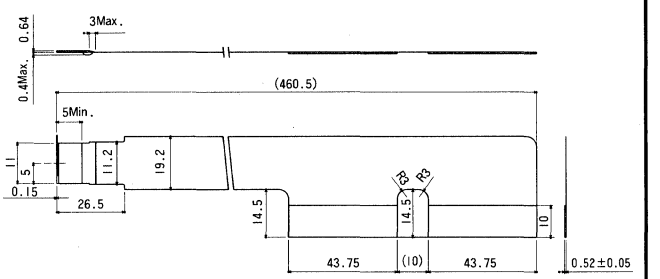
●For high speed printing on bond paper

The heat element on special glaze allows printing on 2-sec or 9-sec bond paper without any special process.
Concentrated pressure saves power.

Part No.	Dot density (dots/inch)	Effective print width (mm)	Number of dots	Average resistance (Ω)	Operation voltage Typ. (V)	Weight (g)
NC6436-A1	360	4.497	64	400	12.0	3

(Unit : mm)

NC6436-A1



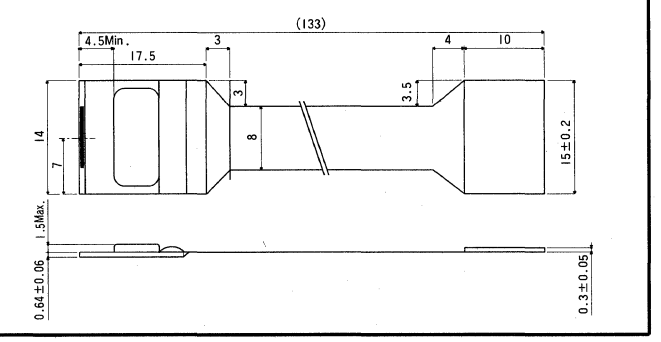
●For tapewriters

Plane printing printhead NA4818-YA with IC suitable for use on tapewriter.

Part No.	Dot density (dots/inch)	Effective print width (mm)	Number of dots	Average resistance (Ω)	Operation voltage Typ. (V)	Weight (g)
NV4818-YA	180	6.753	48	330	12.0	2

(Unit : mm)

NV4818-YA



LED Printheads

●Quick Reference

Print width (inches)	Dot density (dots/inch)		
	200	240	300
8 (A4)	**JE2008-SSBA** **JF2008-SSC**		**JE3008-SSBA** **JF3008-SSC**
10 (B4)		**JE2410-SSBA**	

●Product Designation

JE 20 08 — SSBA

Series name

JE	Miniature LED head
JF	Super Compact LED head

Dot density

20	200 DPI
24	240 DPI
30	300 DPI

Approximate print width

08	8 inches
10	10 inches

Specification code

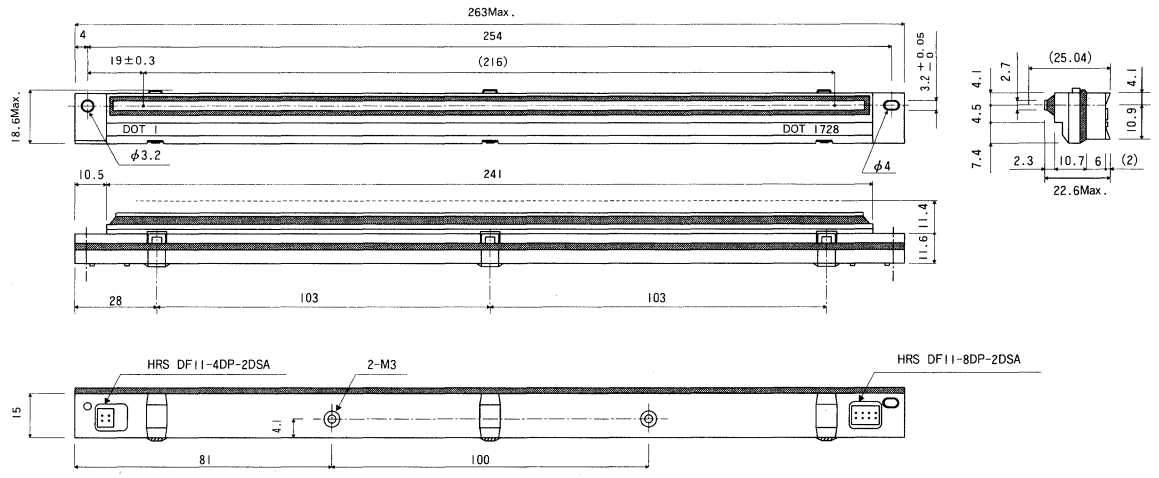
●For facsimiles

LED printhead designed to use on G III plain facsimile.
JF2008-SSC is a compact version of JE series.

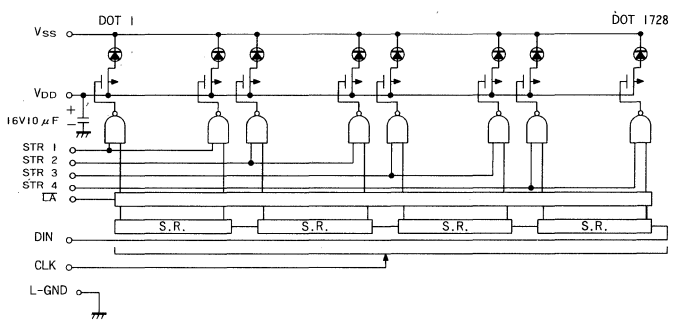
Part No.	Dot density	Paper size	Effective print width (mm)	Wave length (nm)	Light emitter dimensions (μm)	Light emitter pitch (μm)	Number of light emitters (dot)	Light output (μW/dot)	Light output dispersion (%)	Number of strobes
JE2008-SSBA	8	A4	216.0	720	80×90	125	1728	0.552	±30	4
JF2008-SSC	8	A4	216.0	720	80×10	125	1728	0.076	±30	1

(Unit : mm)

JE2008-SSBA



Equivalent Circuits

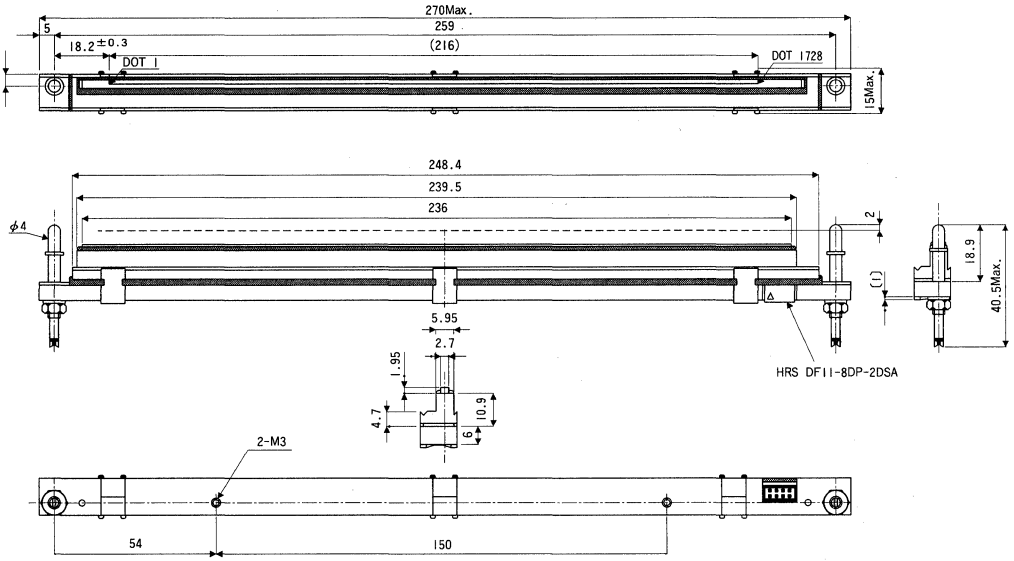


LED Printheads

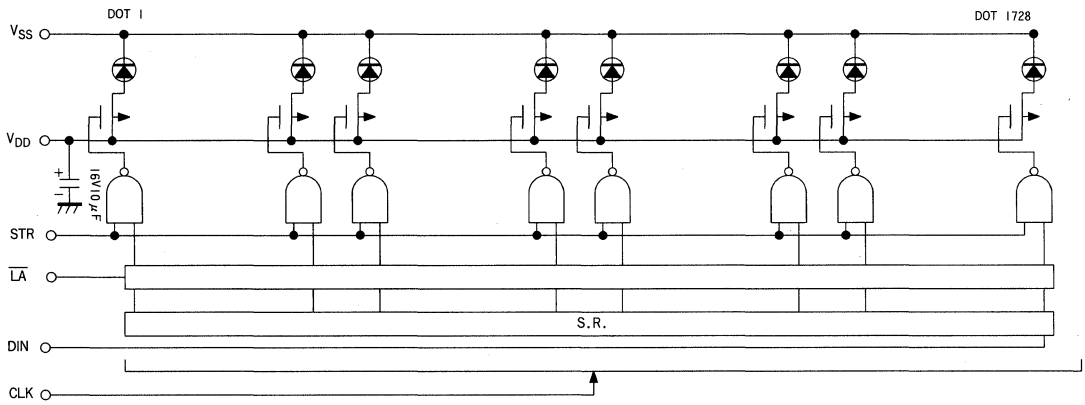
●For facsimiles

(Unit : mm)

JF2008-SSC



Equivalent Circuits



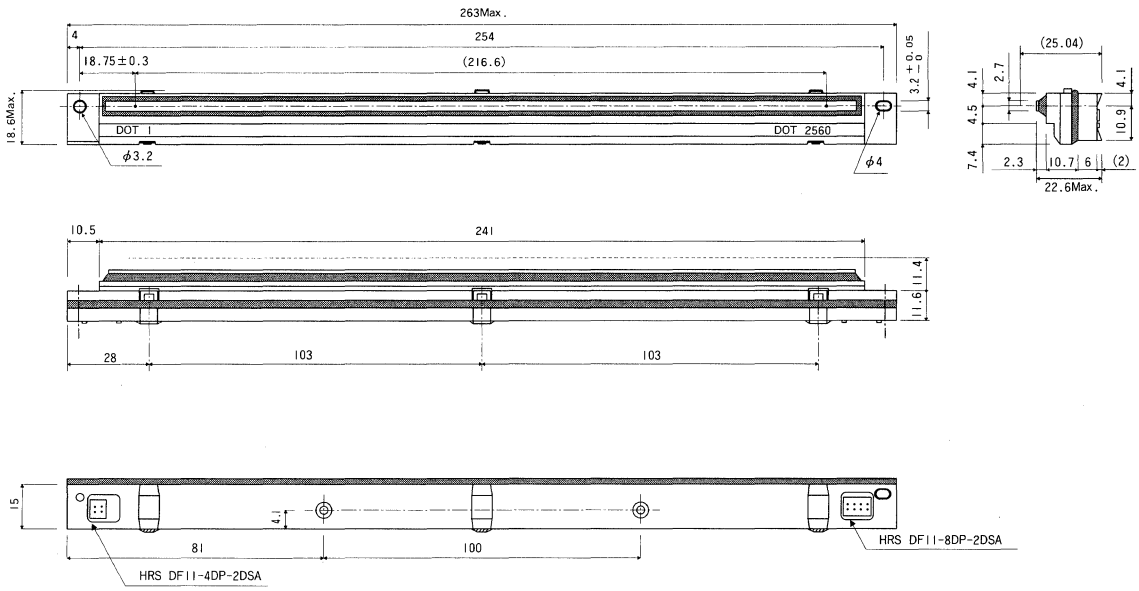
●For page printers

LED printheads that fit on low end, small page printer.

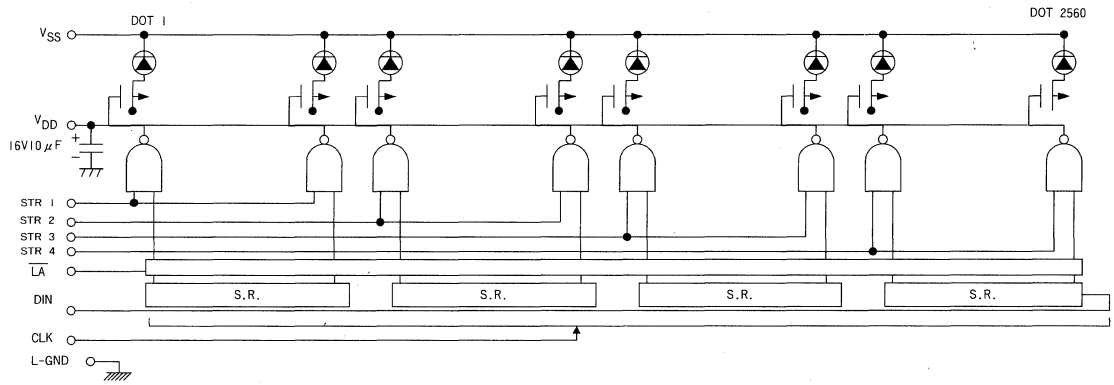
Part No.	Dot density (DPI)	Paper size	Effective print width (mm)	Wave length (nm)	Light emitter dimensions (μm)	Light emitter pitch (μm)	Number of light emitters (dot)	Light output (μW/dot)	Light output dispersion (%)	Number of strobes
JE3008-SSBA	300	A4	216.6	720	45×65	84.6	2560	0.552	±30	4
JE2410-SSBA	240	B4	257.3	720	70×85	105.8	2432	0.552	±30	4
JF3008-SSC	300	A4	211.2	720	45×10	84.6	2496	0.037	±30	1

(Unit : mm)

JE3008-SSBA



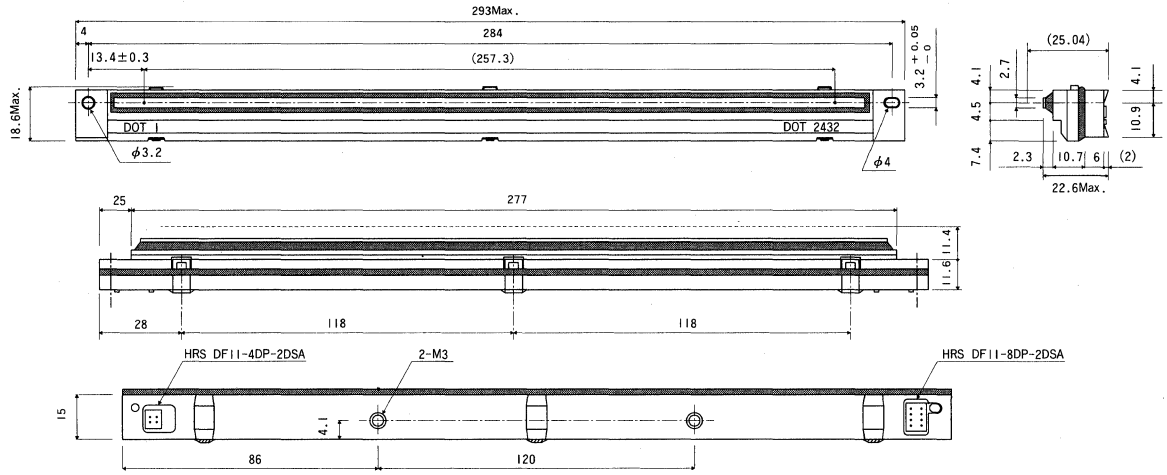
Equivalent Circuits



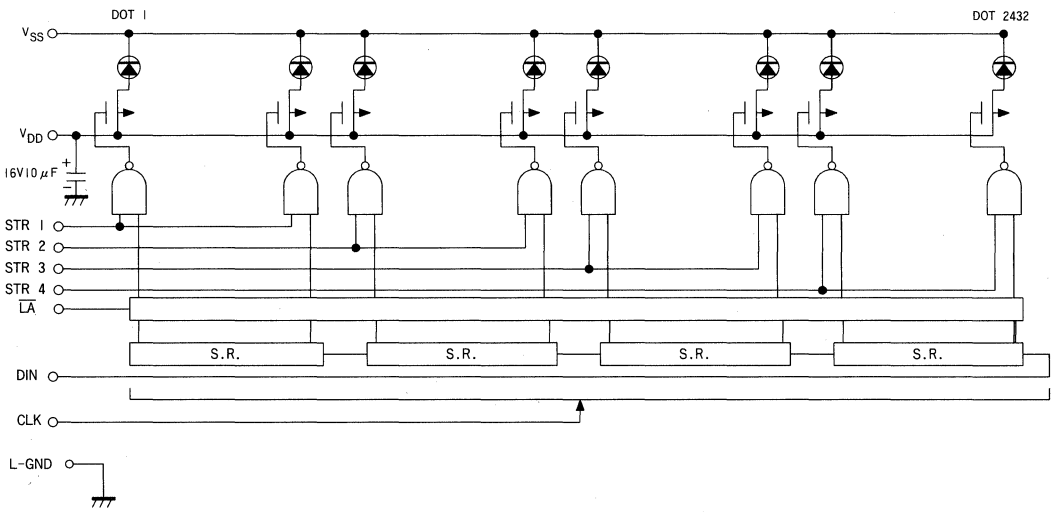
●For page printers

(Unit : mm)

JE2410-SSBA

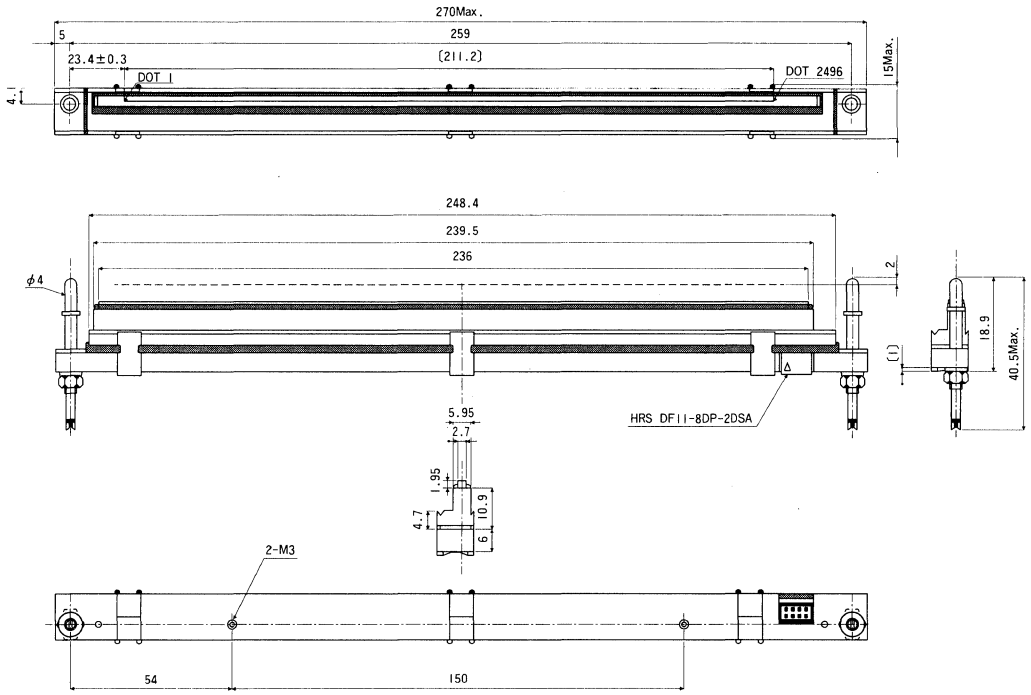


Equivalent Circuits

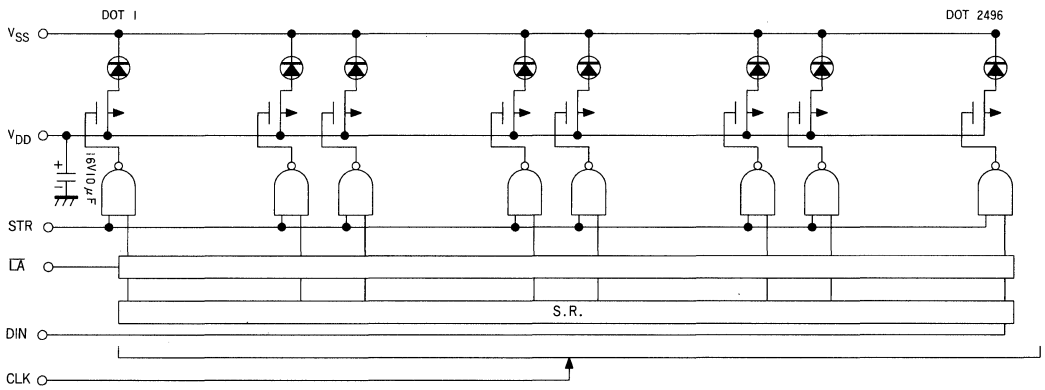


(Unit : mm)

JF3008-SSC



Equivalent Circuits

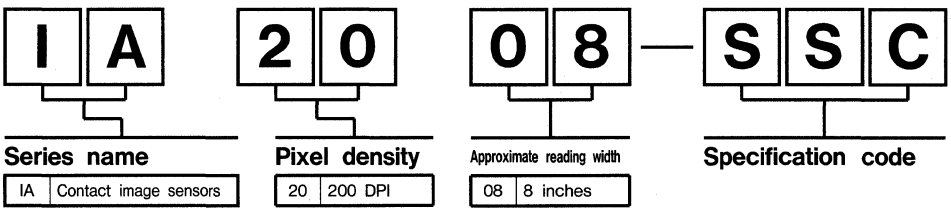


Contact Image Sensors

●Quick Reference

Effective reading width (inches)	Pixel density (pixels/mm) 8	Reading speed
8 (A4)	**IA2008-SSC** **IA2008-SSG**	5 ms/line
	IA2008-SSD **IA2008-SSH**	10 ms/line

●Product Designation



Series name	
IA	Contact image sensors

Pixel density	
20	200 DPI

Approximate reading width	
08	8 inches

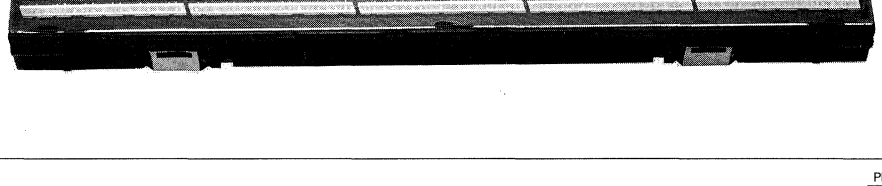
●For facsimiles

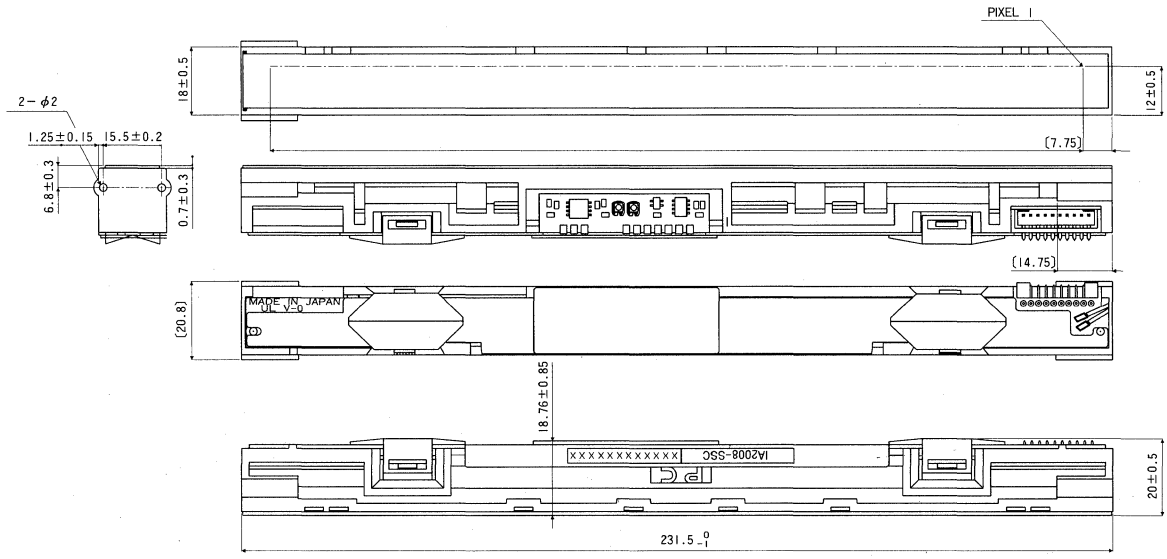
Contact image sensors to meet an increasing demand for plain paper capability G III facsimiles.

Part No.	Pixel density (pixels/mm)	Paper size	Reading width (mm)	LED Wave length (nm)	Reading speed (ms/line)	Number of pixels (pixel)	Output Typ. (V)
IA2008-SSC	8	A4	216.0	570	5	1728	2
IA2008-SSD	8	A4	216.0	570	10	1728	2
IA2008-SSG	8	A4	216.0	570	5	1728	2
IA2008-SSH	8	A4	216.0	570	10	1728	2

(Unit : mm)

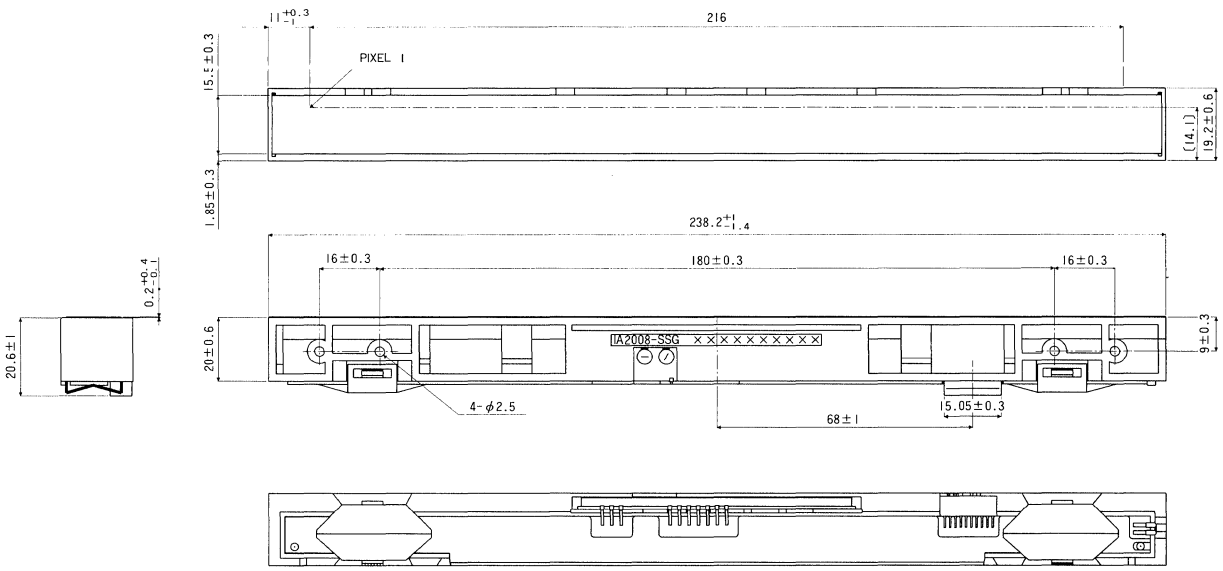
IA2008-SSC IA2008-SSD





(Unit : mm)

IA2008-SSG IA2008-SSH



MEMO

Resistors

■Standard products • Semi-standard products • Custom

To make it easier for the customer to select the type of product best suited to his needs, we offer Resistors in three types :
(1) standard, (2) semi-standard, and (3) custom.

(1) Standard products
An inventory of these products is maintained so we can respond to customer orders quickly.

(2) Semi-standard products
Theses differ from standard products in that an inventory is not maintained, and therefore,a certain amount of time is required to fill an order. Please consult with the company before ordering these products.

(3) Custom
Custom products are developed and manufactred based on specifications prescribed by the customer. Since these are special specification products, they require more time to deliver than do semi-standard products. Please consult with the company before ordering these products.

●Please note the following when submitting an order.
The amount of an order must be in multiplies of the basic order unit.

●Introductory remarks
◎ : Standard products
○ : Semi-standard products
△ : Custom

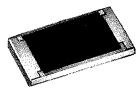
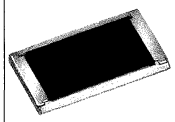
Thick Film Rectangular Chip Resistors(MCR)

(JIS Standard : JIS C 5223)

ROHM was the first in the world to develop rectangular chip resistors and is now offering 7 series of reliable chip resistors ranging from MCR01 (1.0mm×0.5mm) to MCR100 (6.3mm×3.2mm).

●Dimensions list

(Unit : mm)

Part No.	MCR01	MCR03	MCR10	MCR18	MCR25	MCR50	MCR100
Body Dimensions	1.0 × 0.5	1.55 × 0.8	2.0 × 1.25	3.1 × 1.55	3.2 × 2.6	5.0 × 2.5	6.3 × 3.15
	1005 (0402)	1608 (0603)	2012 (0805)	3216 (1206)	3225 (1210)	5025 (2010)	6432 (2512)
Actual size							
Enlarged (×3.0)							

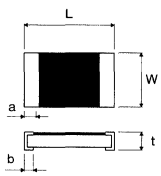
Note : 1. 4-digit numbers in the dimensions column are sizes in mm and parenthetically in inches.

Part No.	Power rating (70°C)	Maximum working voltage (V)	Resistance tolerance	Temperature coefficient	Resistance range	Operating ambient temperature (°C)
MCR01	1/16W (0.063W)	50	F (±1%) ※	–	100Ω～2.2MΩ	−55～125
			G (±2%)	–	100Ω～3.3MΩ	
			J (±5%)	–	2.2Ω～3.3MΩ	
MCR03	1/16W (0.063W)	50	F (±1%) ※	–	100Ω～2.2MΩ	
			G (±2%)	–	100Ω～2.2MΩ	
			J (±5%)	–	1.0Ω～10MΩ	
			J (±5%)	W (±200ppm/°C)	300Ω～2.0MΩ	
MCR10	1/10W (0.100W)	150	F (±1%)	X (±100ppm/°C)	75Ω～1.0MΩ	
			F (±1%)	–	10Ω～2.2MΩ	
			G (±2%)	–	10Ω～2.2MΩ	
			J (±5%)	–	0.68Ω～10MΩ	
			J (±5%)	W (±200ppm/°C)	24Ω～2.2MΩ	
			K (±10%)	–	0.47Ω～10MΩ	
MCR18	1/8W (0.125W)	200	F (±1%)	X (±100ppm/°C)	10Ω～1.24MΩ	
			F (±1%)	–	1.0Ω～2.2MΩ	
			G (±2%)	–	1.0Ω～2.2MΩ	
			J (±5%)	–	0.39Ω～ 10MΩ	
			J (±5%)	W (±200ppm/°C)	10Ω～10MΩ	
			K (±10%)	–	0.39Ω～10MΩ	
MCR25	1/4W (0.25W)	200	F (±1%)	X (±100ppm/°C)	39Ω～1.0MΩ	
			F (±1%)	–	10Ω～1.0MΩ	
			J (±5%)	–	0.47Ω～3.3MΩ	
			J (±5%)	W (±200ppm/°C)	5.6Ω～3.3MΩ	
			K (±10%)	–	0.25Ω～3.3MΩ	
MCR50	1/2W (0.50W)	200	F (±1%)	–	10Ω～ 180kΩ	
			G (±2%)	–	9.1Ω～180kΩ	
			J (±5%)	–	1.0Ω～560kΩ	
			J (±5%)	W (±200ppm/°C)	10Ω～330kΩ	
			K (±10%)	–	0.68Ω～560kΩ	
MCR100	1.00W	200	F (±1%)	–	10Ω～ 82kΩ	
			J (±5%)	–	0.68Ω～100kΩ	
			J (±5%)	W (±200ppm/°C)	24Ω～100kΩ	
			K (±10%)	–	0.68Ω～100kΩ	

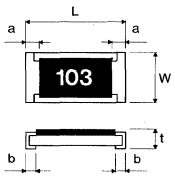
Notes : 1.Jumper chips of the same shape are available (50mΩ Max.)
2.Some resistors made to resistance tolerance of J (±5%) have temperature coefficient of W (±200ppm/°C)
3.Resistors around max. or min. resistance extreme or resistors of F grade MCR03 and MCR03 are made to the custom specification.

(Unit : mm)

MCR01



(Except for)MCR01



Part No.	L	W	t	a	b
MCR01	1.0±0.05	0.5±0.05	0.35±0.05	0.20±0.10	$0.25^{+0.05}_{-0.10}$
MCR03	1.55±0.10	$0.80^{+0.15}_{-0.10}$	0.45±0.05	0.30±0.20	0.30±0.20
MCR10	2.0±0.10	1.25±0.10	0.55±0.10	0.35±0.20	0.35±0.20
MCR18	3.10±0.10	$1.55^{+0.15}_{-0.10}$	0.55±0.10	0.45±0.20	0.45±0.20
MCR25	3.2±0.20	2.60±0.20	0.55±0.10	0.50±0.20	0.50±0.20
MCR50	5.00±0.20	2.50±0.20	0.55±0.10	0.60±0.20	0.60±0.20
MCR100	6.30±0.20	3.15±0.20	0.55±0.10	0.60±0.20	0.60±0.20

●Product Designation

3 or 4 digit IEC coding system

Part No. — Nominal resistance

MCR 0 1 □ – M Z S □ – G – □ – □ □ □ □

Packaging and forming specifications

PZH	MCR03/10/18/25/50/100	Bulk	Polyethylene bag
PZHI	MCR03/10/18		Bulk case
MZS	MCR01	Taping	Paper tape reel
EZHU	MCR03/10/18		
JZHU	MCR25/50/100		Embossed tape reel

Resistance Tolerance

F	±1%	J	±5%
G	±2%	K	±10%

Temperature coefficient

X	±100ppm/°C
W	±200ppm/°C
Blank	±250ppm/°C or General use

Applicable to precision type

●Packaging

Part No.	Packaging type	Packaging style	Code	Quantity/Package (pcs)	Quantity/Unit (pcs)	Standard product・Semi-standard product		
						J (±5%)	G (±2%)	F (±1%)
MCR01	Tape & Reel	Paper tape reel	MZS	10,000	–	◎	○	(2mm Pitch)
MCR03	Bulk	Polyethylene bag	PZH	20,000	2,000	◎	／	／
	Tape & Reel	Paper tape reel	EZHU	5,000	–	◎	／	／
	Bulk	Bulk Case	PZHI	25,000	–	◎	○	○
MCR10	Bulk	Polyethylene bag	PZH	20,000	2,000	◎	○	○
	Tape & Reel	Paper tape reel	EZHU	5,000	–	◎	○	○
	Bulk	Bulk Case	PZHI	10,000	–	◎	○	○
MCR18	Bulk	Polyethylene bag	PZH	20,000	2,000	◎	○	○
	Tape & Reel	Paper tape reel	EZHU	5,000	–	◎	○	○
	Bulk	Bulk Case	PZHI	5,000	–	◎	○	○
MCR25	Bulk	Polyethylene bag	PZH	10,000	1,000	○	／	○
	Tape & Reel	Embossed tape reel	JZHU	4,000	–	◎	／	○
MCR50	Bulk	Polyethylene bag	PZH	10,000	1,000	○	／	○
	Tape & Reel	Embossed tape reel	JZHU	4,000	–	◎	／	○
MCR100	Bulk	Polyethylane bag	PZH	8,000	1,000	○	／	○
	Tape & Reel	Embossed tape reel	JZHU	4,000	–	◎	／	○

◎:Standard product ○:Semi-standard product

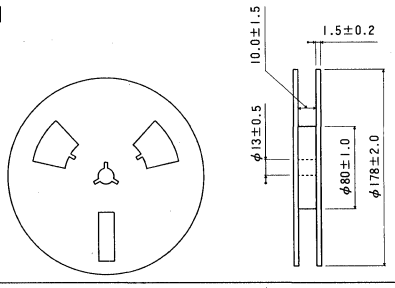
●Packaging Specifications

(Unit : mm)

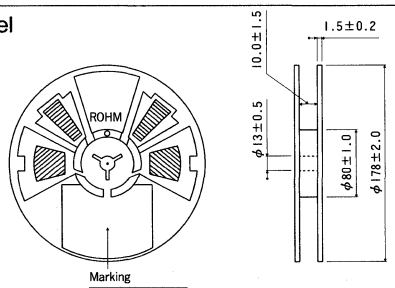
MCR01

Reel

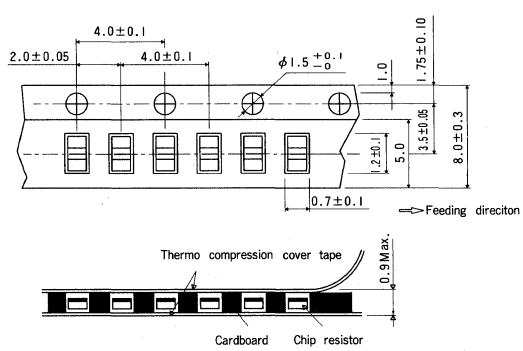
Paper reel



Plastic reel



Tape

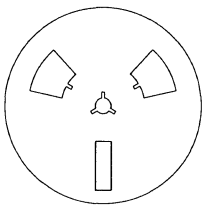


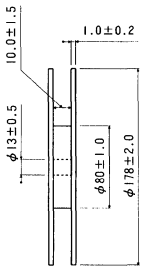
(Unit : mm)

MCR03 MCR10 MCR18

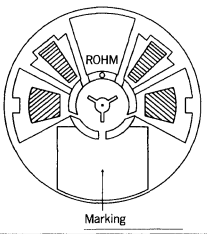
Reel

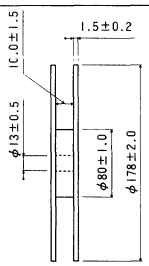
Paper reel



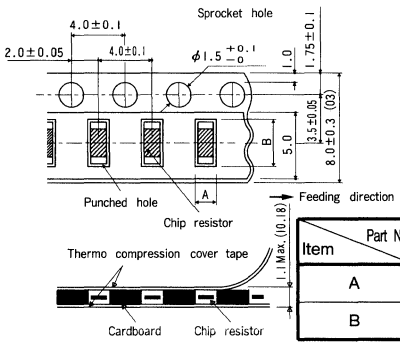


Plastic reel



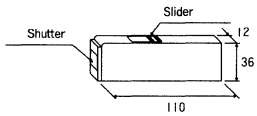


Tape



Item \ Part No.	MCR03	MCR10	MCR18
A	1.1±0.1	1.65 +0.20 −0.10	1.95 +0.10 −0.05
B	1.9±0.1	2.40 +0.20 −0.10	3.5 +0.15 0.05

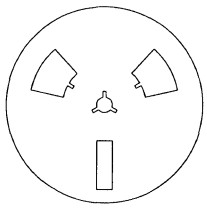
Bulk Case

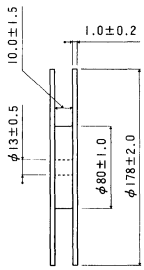


MCR03	MCR10	MCR18
25,000pcs/case	10,000pcs/case	5,000pcs/case

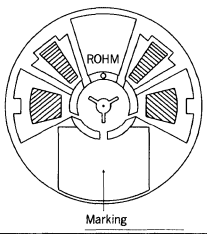
MCR25

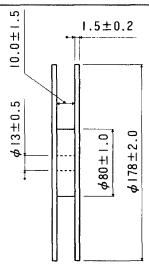
Paper reel

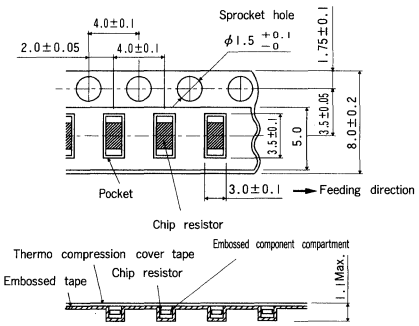




Plastic reel

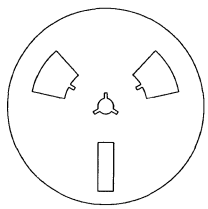


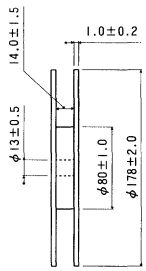


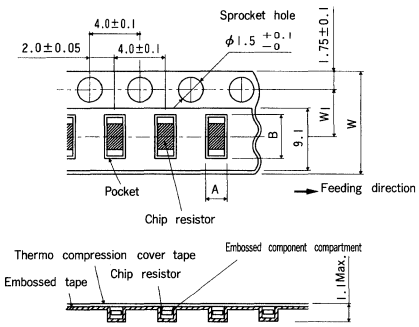


MCR50 MCR100

Paper reel







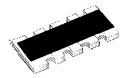
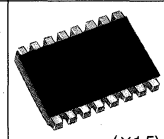
Item \ Part No.	MCR50	MCR100
A	3.4±0.2	3.5±0.2
B	5.6±0.2	6.7±0.2
W	12.0±0.1	12.0±0.1
W_1	5.5±0.05	5.5±0.05
T	1.1Max.	

Chip Resistor Networks(MNR)

The smallest new chip resistor networks are now available.MNR02 is the smallest resistor network in the world and the MNR35 fits into high density applications to facilitate building highly reliable,compact industrial equipment.

●Dimensions list

(Unit : mm)

Part No.	MNR02	MNR12	MNR14	MNR32	MNR34	MNR35	MNR38	MNR78
Body Dimensions	1.0 × 1.0 1010 (0404)	1.6 × 1.6 1616 (0606)	3.2 × 1.6 1632 (0612)	2.6 × 3.1 3225 (1012)	5.2 × 3.1 3251 (2012)	6.4 × 3.1 3264 (2512)	10.3 × 3.1 32102 (4012)	10.2 × 7.6 76102 (4030)
Actual size								
Enlarged (×2.0)							 (×1.5)	 (×1.5)

Note : 1. 4-digit numbers in the dimensions column are sizes in mm and parenthetically in inches.

Part No.	No.of elements	Power rating (70°C)	Maximum working voltage (V)	Resistance tolerance	Resistance range	Operating ambient temperature (°C)
MNR02	2	0.063W/Device	25	J (±5%)	10Ω～1MΩ (E12 Series)	−55～125
MNR12	2	0.063W/Device	50			−40～125
MNR14	4	0.063W/Device	50			
MNR32	2	0.063W/Device	50		22Ω～1MΩ (E12 Series)	
MNR34	4	0.063W/Device	50		22Ω～1MΩ (E12 Series)	
MNR35	8	0.063W/Device	50		100Ω～100kΩ (E12 Series)	
MNR38	8	0.063W/Device	50		22Ω～1MΩ (E12 Series)	
MNR78	8～16	0.063W/Device	50		100Ω～330kΩ (E12 Series)	

●Product Designation

Part No.

MNR [0][2] − [M][0][A][ ] − [J] − [ ][ ][ ]

Packaging and forming specifications

P2	MNR12/14/78	Bulk	Polyethylene bag
P3	MNR32/34/38		
M0	MNR02	Taping	Paper tape reel
E0	MNR12/14		
J0	MNR32		Embossed tape reel
J5	MNR34/35		
H0	MNR38		
W1	MNR78		Adhesive paper tape reel

Circuit

A	MNR02/12/14/32/34/38
S,R	MNR35
S,L	MNR78

Resistance Tolerance

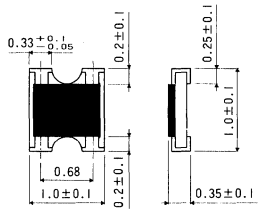
J	±5%

Nominal resistance

3-digit IEC coding system

(Unit : mm)

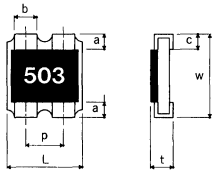
MNR02



Equivalent Circuit Diagram

$R_1=R_2$

MNR12 MNR32

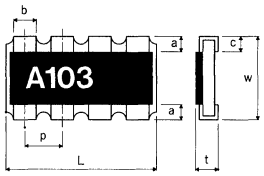


Part No.	L	W	t	a	b	c	p
MNR12	1.6±0.30	1.6±0.15	0.5±0.10	0.3±0.20	0.5±0.15	0.3Max.	0.80
MNR32	2.6±0.20	3.1±0.20	0.55±0.10	0.5±0.30	0.8±0.20	0.5Max.	1.27

Equivalent Circuit Diagram

$R_1=R_2$

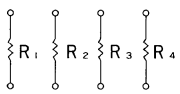
MNR14 MNR34



This marking is example for MNR34 series.

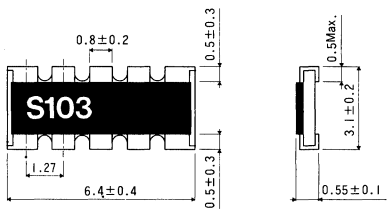
Part No.	L	W	t	a	b	c	p
MNR14	3.2±0.10	1.6±0.10	0.50±0.10	0.3±0.20	0.5±0.15	0.3Max.	0.80
MNR34	5.2±0.40	3.1±0.20	0.55±0.10	0.5±0.30	0.8±0.20	0.5Max.	1.27

Equivalent Circuit Diagram



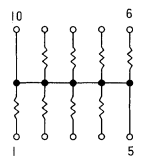
$R_1=R_2=R_3=R_4$

MNR35

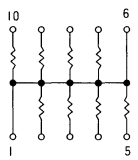


Equivalent Circuit Diagram

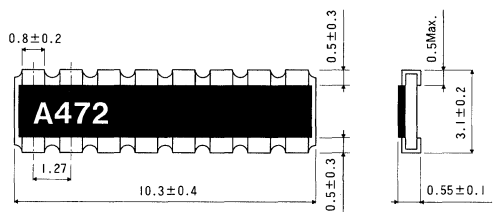
(R circuit)



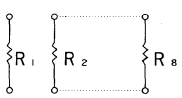
(S circuit)



MNR38

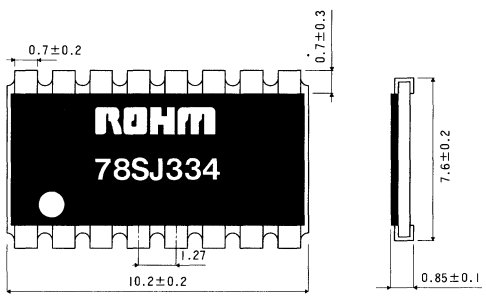


Equivalent Circuit Diagram



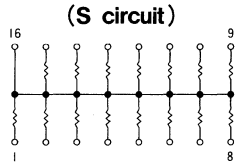
$R_1=R_2=\cdots=R_8$

MNR78

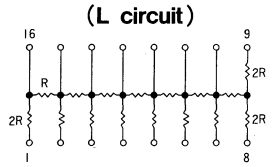


Equivalent Circuit Diagram

(S circuit)



(L circuit)



Circuit can be configured to customer specification.

Land pattern
Page 348
Chip Resistor Networks
Resistors

Chip Resistor Networks (MNR)

●Packaging

Part No.	Packaging type	Packaging style	Code	Quantity/Package (pcs)	Quantity/Unit (pcs)	Standard product · Semi-standard product
MNR02	Taping	Paper tape reel (2mm pitch)	MO	10,000	–	△
MNR12	Bulk	Polyethylene bag	P2	20,000	2,000	△
	Taping	Paper tape reel	E0	5,000	–	○
MNR14	Bulk	Polyethylene bag	P2	20,000	2,000	○
	Taping	Paper tape reel	E0	5,000	–	○
MNR32	Bulk	Polyethylene bag	P3	10,000	2,000	○
	Taping	Embossed tape reel	J0	4,000	–	○
MNR34	Bulk	Polyethylene bag	P3	10,000	2,000	○
	Taping	Embossed tape reel	J5	4,000	–	○
MNR35	Taping	Embossed tape reel	J5	4,000	–	○
MNR38	Bulk	Polyethylene bag	P3	5,000	1,000	○
	Taping	Embossed tape reel	H0	2,000	–	○
MNR78	Bulk	Polyethylene bag	P2	1,500	500	○
	Taping	Adhesive paper tape reel	W1	3,000	–	○

○ : Semi-standard product △ : Special specification

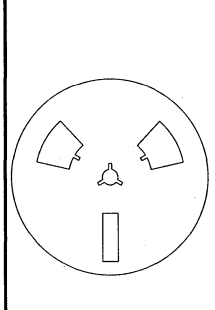
●Packaging Specifications

(Unit : mm)

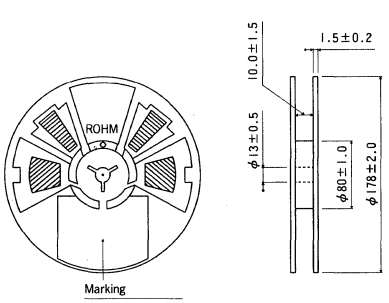
MNR02

Reel

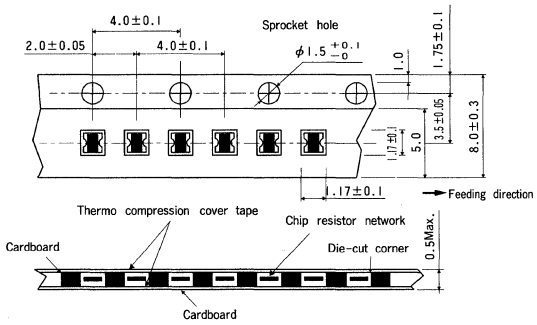
Paper reel



Plastic reel

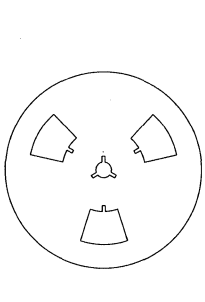


Tape

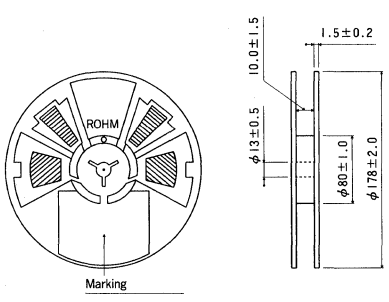


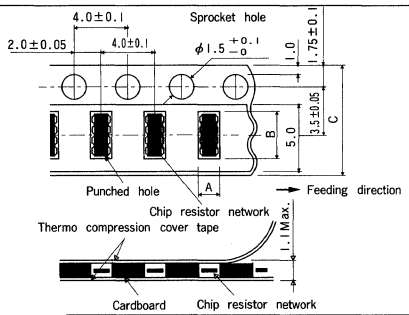
MNR12 MNR14

Paper reel



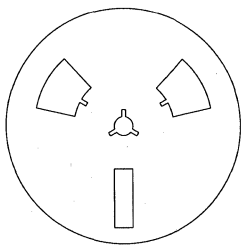
Plastic reel

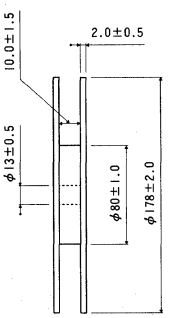


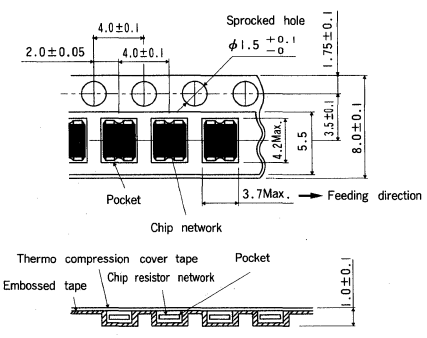


Item \ Type	MNR12	MNR14
A	1.8±0.1	1.8±0.10
B	1.8±0.1	3.4±0.10
C	8.0±0.3	8.0±0.2

MNR32



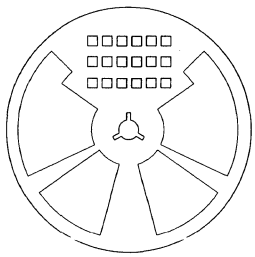


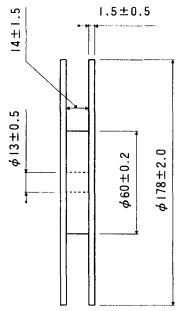


(Unit : mm)

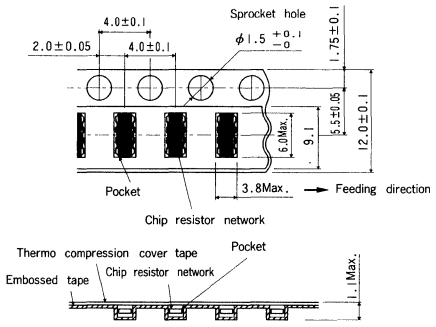
MNR34

Reel

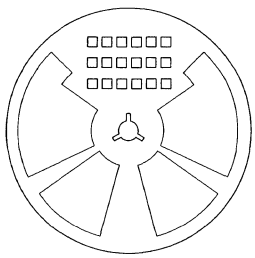


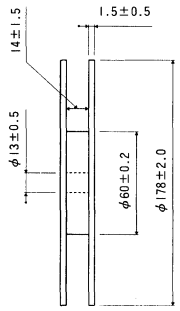


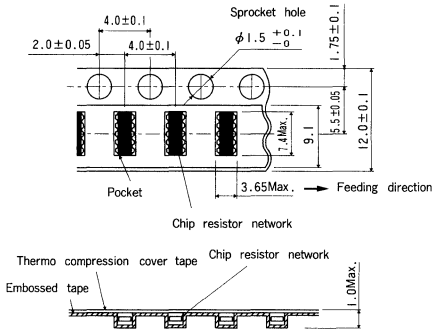
Tape



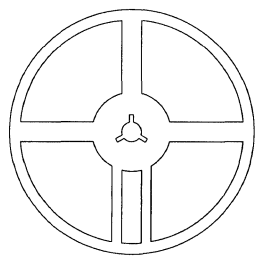
MNR35

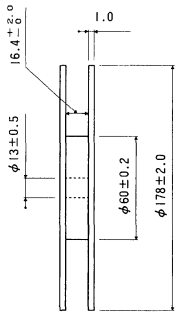


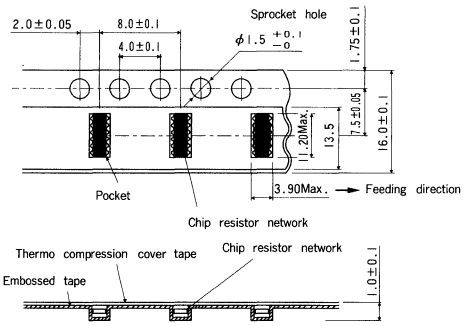




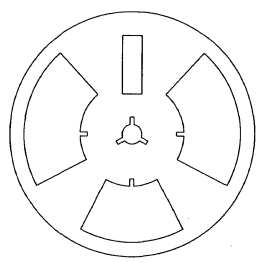
MNR38

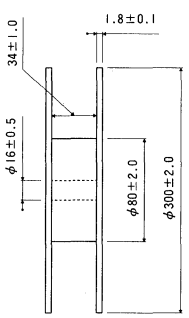


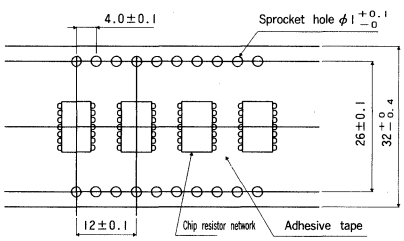




MNR78







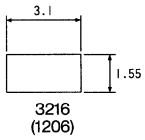
Note : 1.Both 268mm and 294mm dia. are available.

Temperature Sensitive Chip Resistors (MTSR)

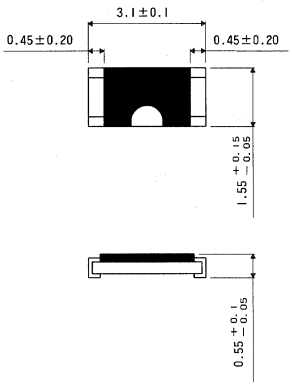
Having linear temperature coefficient, these resistors are best suited for temperature compensation. Made of reliable metal glaze thick film and special electrodes of good solderability, their performance has been proven on the MCR series. The shape and dimensions follow those of MCR18.

●Dimensions list

(Unit : mm)

Part No.	MTSR18
Body Dimensions	 3216 (1206)
Actual size	
Enlarged (×3.0)	

(Unit : mm)



Note : 1. 4-digit numbers in the dimensions column are sizes in mm and parenthetically in inches.

Part No.	Power rating (70°C)	Maximum working voltage (V)	Temperature coefficient (ppm/°C)	Resistance tolerance	Resistance range	Operating ambient temperature (°C)
MTSR18	1/20W (0.05W)	50	+1500±150	J (±5%)	10kΩ	−55~125

●Product Designation

Part No.

Temperature coefficient

15	+1500ppm/°C

MTSR 1 8 - E 1 5 - J - □ □ □

Packaging and forming specifications

P	Bulk	Polyethylene bag
E	Taping	Paper tape reel

Resistance Tolerance

J	±5%

Nominal resistance

3-digit IEC coding system

●Packaging

Part No.	Packaging type	Packaging style	Code	Quantity/Package (pcs)	Quantity/Unit (pcs)	Standard product・Semi-standard product
MTSR18	Bulk	Polyethylene bag	P15	20,000	2,000	△
	Taping	Paper tape reel	E15	5,000	–	△

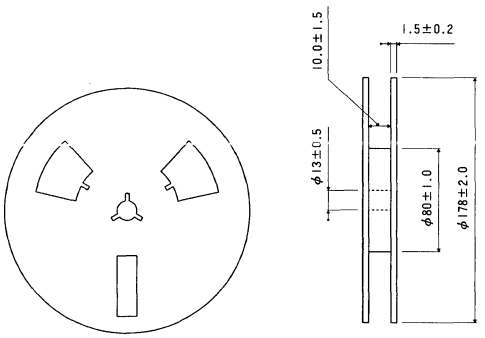
△ : Special specifications

●Packaging specifications

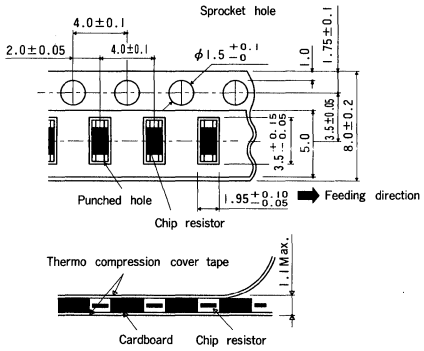
(Unit : mm)

MTSR18

Reel



Tape

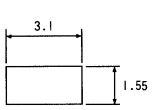
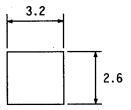
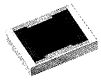


Trimmable Chip Resistors (MCL)

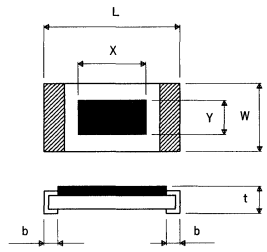
These resistors are tailored to the desired resistance value using the YAG laser and can replace trimmer potentionmeters used on the circuitry which must be stable for a long period once adjusted.
Since adjusting process can be automated, the operating cost of your assembly line will be drastically reduced.

●Dimensions list

(Unit : mm)

Part No.	MCL18	MCL25
Body Dimensions	 3216 (1206)	 3225 (1210)
Actual size		
Enlarged (×3.0)		

(Unit : mm)



XY : Trimming area

Part No.	L	W	X	Y	t	b
MCL18	3.10±0.10	1.55 $^{+0.15}_{-0.10}$	1.20±0.20	0.85±0.20	0.50 $^{+0.10}_{-0.05}$	0.45±0.20
MCL25	3.20±0.20	2.60±0.20	1.20±0.10	1.8±0.10	0.55±0.10	0.45±0.20

Note : 1. 4-digit numbers in the dimensions column are sizes in mm and parenthetically in inches.

Part No.	Power rating (70℃)	Maximum working voltage (V)	Temperature coefficient (ppm/℃)	Resistance tolerance	Resistance range	Operating ambient coefficient (℃)
MCL18	1/8W (0.125W)	100	±250	M (±22%)	100Ω~330kΩ	−55~125
MCL25	1/4W (0.25W)	100	±250	M (±22%)	100Ω~330kΩ	−55~125

●Product Designation

MCL | 1 | 8 | - | E | X | 0 | | - | M | - | | | |

Part No.

Packaging and forming specifications

PXO	Bulk	Polyethylene bag
EXO	Taping	Paper tape reel
JXO		Embossed tape reel

Tolerance of resistance

M	±22%

Nominal resistance

3-digit IEC coding system

●Packaging

Part No.	Packaging type	Packaging style	Code	Quantity/Package(pcs)	Quantity/Unit(pcs)	Standard product・Semi-standard product
MCL18	Bulk	Polyethylene bag	PXO	20,000	2,000	○
	Taping	Paper tape reel	EXO	5,000	–	○
MCL25	Bulk	Polyethylene bag	PXO	10,000	2,000	△
	Taping	Embossed tape reel	JXO	4,000	–	△

○ : Semi-standard product △ : Special specification

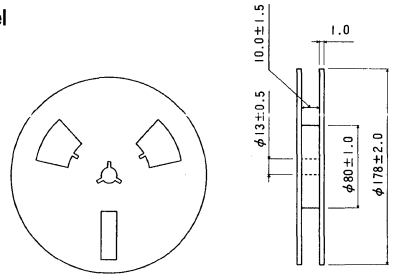
●Packaging Specifications

(Unit : mm)

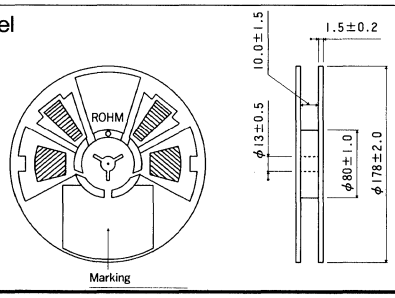
MCL18

Reel

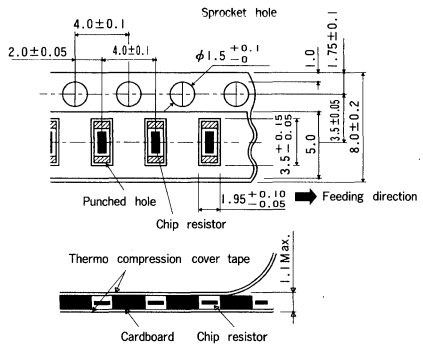
Paper reel



Plastic reel

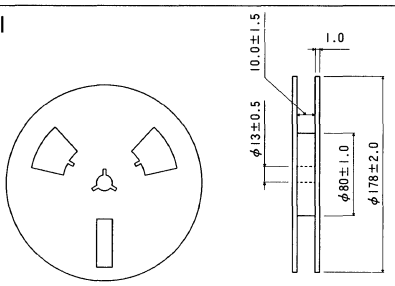


Tape

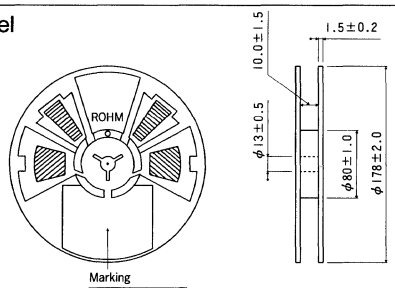


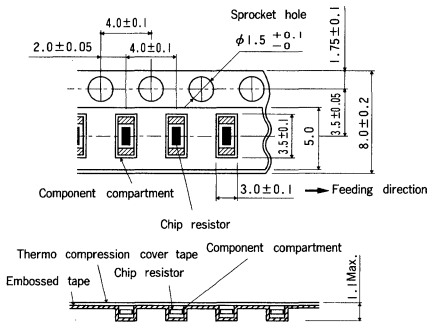
MCL25

Paper reel



Plastic reel





Chip Trimmer Potentiometers (MVR)

Compact
The MVR32 is ultra low profile, 1.3mm. The MVR22 is ultra miniature, 2×2.7mm.

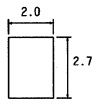
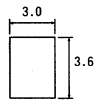
Easily adjustable
Special tool is not required for MVR22: can be adjusted using a (+) screwdriver. Small but as easily be adjusted as MVR32.

100% tested
All MVR series potentiometers undergo full turning test before shipping to assure error free operation after delivery to the customers.

Stainless steel parts
All parts are of stainless steel which highly resistant to chemical and damp. The slider is free from solder.

●Dimensions list

(unit : mm)

Part No.	MVR22	MVR32
Body Dimensions		
Actual size		
Enlarged (×3.0)		

Part No.	Size	Terminals	Adjustment	Power rating	Maximum working voltage (V)	Resistance range	Resistance tolerance	Taper	Operating ambient temperature (°C)
MVR22	2mm	3	Surface adjustment with (+) screwdriver	0.05W	30	100Ω～1MΩ※	N (±25%)	B (Linear)	−55～+125
MVR32	3mm	3	Surface adjustment with (−) screwdriver	0.1W	50	100Ω～1MΩ※	N (±25%)	B (Linear)	−55～+125

※ E6 series aer available together with following digit values,2.0,3.0,4.0,5.0 are available in any of all resistance range.

●Product Designation

Part No.

MVR 2 2 - H X B R - N - □ □ □

Packaging and forming specifications

HXBR	MVR22／32	Reflow soldering	Taping	Embossed tape reel	2000
KXBR					5000
HXBF	MVR32	Reflow soldering			2000
KXBF		Flow soldering			5000

Resistance Tolerance

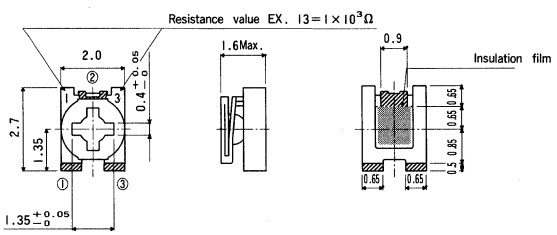
N	±25%

Nominal resistance

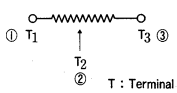
3-digit IEC coding system

(Unit : mm)

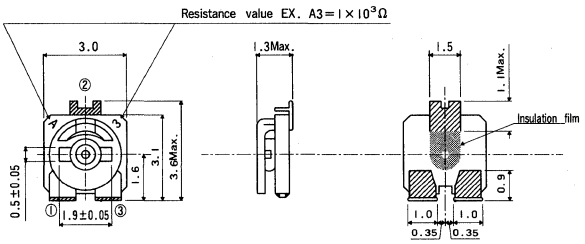
MVR22



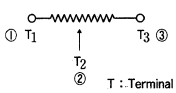
Equivalent Circuit Diagram



MVR32



Equivalent Circuit Diagram



●Packaging

Part No.	Packaging type	Packaging style	Code	Quantity/package(pcs)	Quantity/Unit(pcs)	Standard product・Semi-standard product
MVR22	Taping	Embossed tape reel	HXBR	2,000	–	○
			KXBR	5,000	–	○
MVR32	Taping	Embossed tape reel	HXBR	2,000	–	○
			HXBF	2,000	–	○
			KXBR	5,000	–	○
			KXBF	5,000	–	○

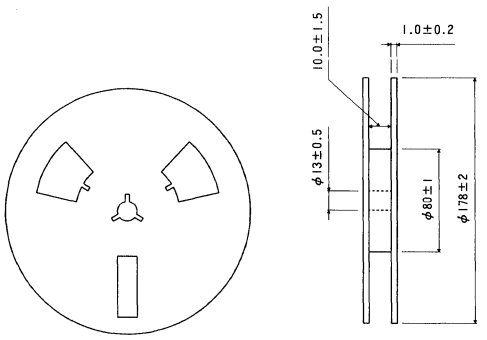
○ : Semi-standard products

●Packaging Specifications

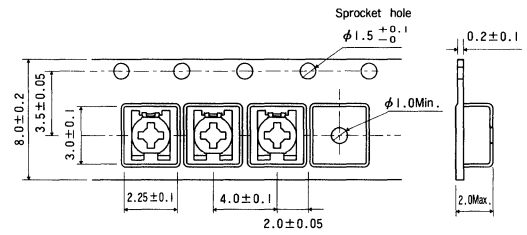
(Unit : mm)

MVR22

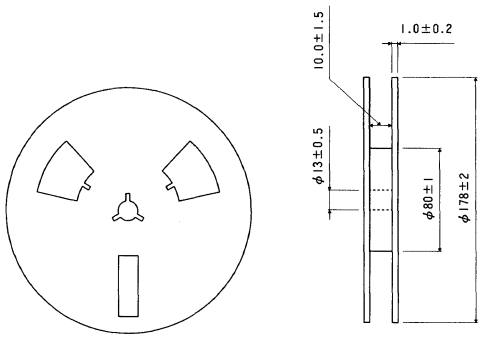
Reel

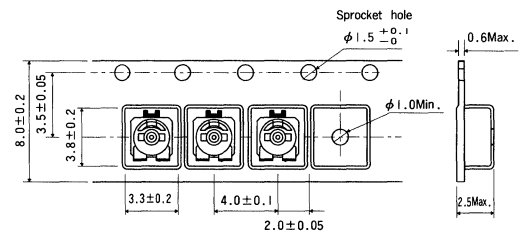


Tape



MVR32

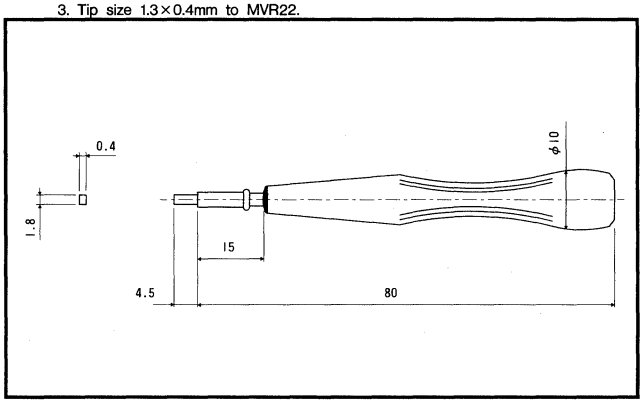




●MVR adjusting screwdriver specified by ROHM (for MVR32)

Part No.	Tip size	Tip material	Body material
AD1804	1.8×0.4	Zirconia	ABS resin

Notes : 1. Minimum QTY 20.
2. With protection cap.
3. Tip size 1.3×0.4mm to MVR22.



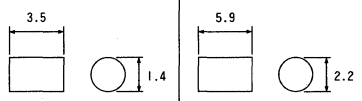
Land pattern
Page 348
Chip Trimmer Potentiometers
Resistors

Leadless, Carbon Film Resistors (LLR)

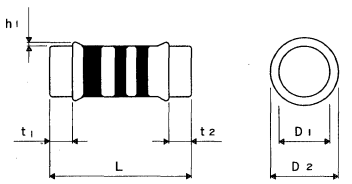
(JIS standard : JIS C 5212)

●Dimensions list

(Unit : mm)

Part No.	LLR10	LLR25
Body Dimensions		
Actual size		
Enlarged (×3.0)		

(Unit : mm)



Part No.	L	D_1	D_2	t_1,t_2	h_1
LLR10	3.5 ±0.1	1.4±0.1	1.55Max.	0.5~1.1	0.10Max.
LLR25	5.9 ±0.2	2.2±0.1	2.35Max.	0.6~1.5	0.15Max.

Part No.	Power rating (70℃)	Maximum working voltage (V)	Rasistance tolerance	Resistance range	Operating ambient temperature (℃)
LLR10	1/8W (0.125W)	200	J (±5%)	1Ω~1 MΩ	−55~155
LLR25	1/4W (0.25W)	300	J (±5%)	1Ω~3.3MΩ	
			G (±2%)	10Ω~1 MΩ	

Note : 1.0Ω (less than 50mΩ) resistors available.

●Product Designation

Part No.

LLR **1** **0** - **P** — **0** **1** - **J** - □ □ □

Packaging and forming specifications

P-01	LLR10	Bulk	Polyethylene bag
P-04	LLR25		
E-01	LLR10	Taping	Emmbosed tape reel
E-03	LLR25		

Resistance tolerance

G	±2%
J	±5%

Nominal resistance

3-digit IEC coding system

●Packaging

Part No.	Packaging type	Code	Packaging style	Quantity/Package(pcs)	Quantity/Unit(pcs)	Standard product・Semi-standard product
LLR10	Bulk	P-01	Polyehtylene bag	10,000	5,000	◎
	Taping	E-01	Embossed tape reel	2,500	–	◎
LLR25	Bulk	P-04	Polyethylene bag	5,000	1,000	◎
	Taping	E-03	Embossed tape reel	1,500	–	◎

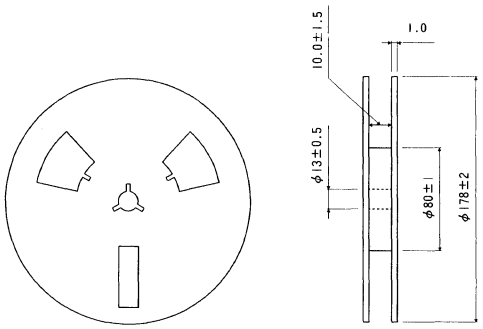
◎ : Standard product

●Packaging Specifications

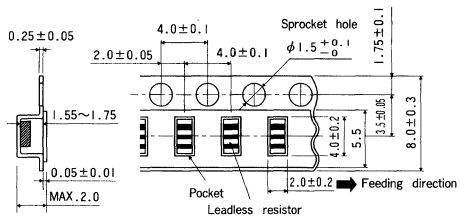
(Unit : mm)

LLR10

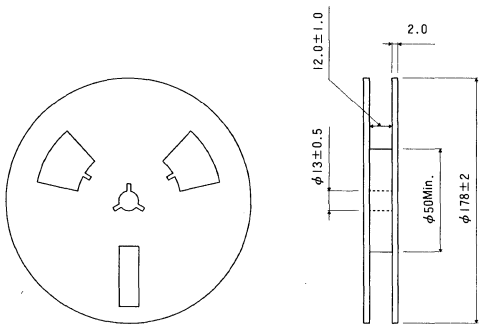
Reel

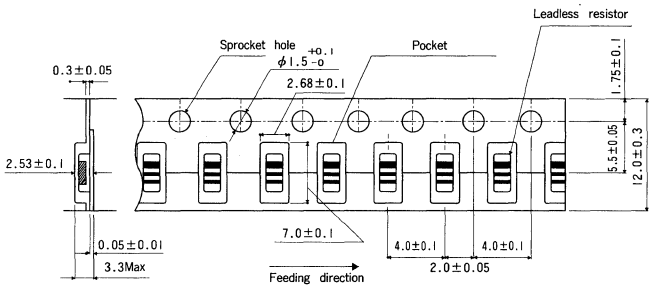


Tape



LLR25



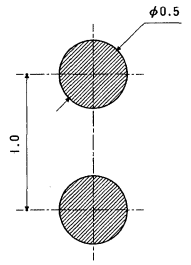


Recommended land pattern(For Reflow Soldering)

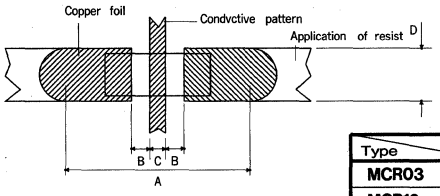
●Thick Film Rectangular Chip Resistors(MCR)

(Unit : mm)

MCR01



MCR03/MCR10/MCR18/MCR25/MCR50/MCR100

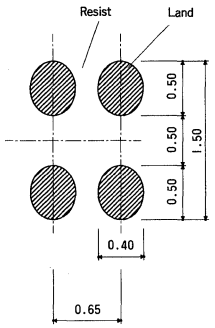


Type \ Dimensions	A	B	C	D reference value
MCR03	2.7	0.3	0.2	0.52~0.92
MCR10	3.5	0.3~0.4	0.3	1.1~1.3
MCR18	5.0	0.8	0.6	1.4~1.8
MCR25	5.0	0.8	0.6	2.1~3.0
MCR50	8.4	1.6	0.6	2.1~3.0
MCR100	10.5	1.6	0.6	2.56~4.8

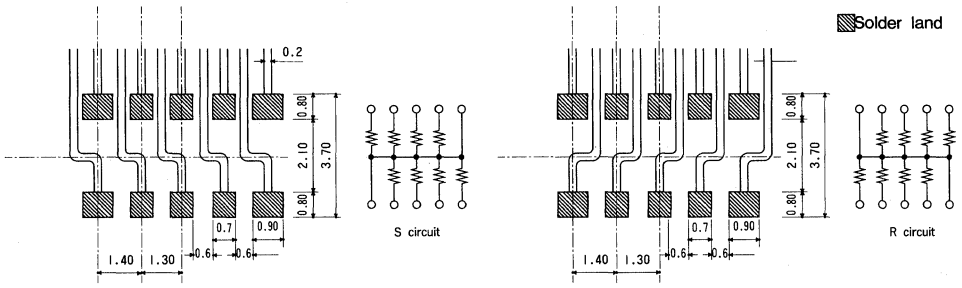
●Chip Resistor Networks

(Unit : mm)

MNR02

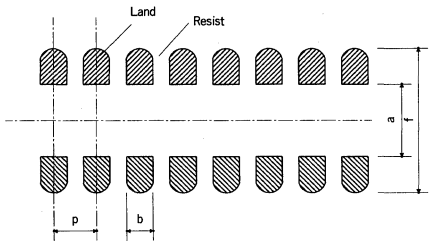


MNR35



※Please use solder resist to cover PC board expect solder pad area.

MNR12/MNR14/MNR32/MNR34/MNR38/MNR78

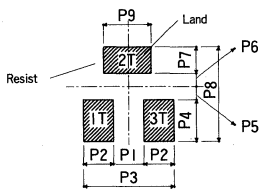


Type	a	b	p	f
MNR12/14	1.0	0.5	0.8	2.6
MNR32/34/38	2.1	0.8	1.27	4.1
MNR78	5.6	0.6	1.27	9.2

●Chip Trimmer Potentiometers(MVR)

(Unit : mm)

MVR22/MVR32



Type	P1	P2	P3	P4	P5	P6	P7	P8	P9
MVR22	0.7	0.65	2.0	0.8	0.8	0.7	0.9	3.2	1.1
MVR32(reflow)	0.8	1.2	3.2	1.2	1.0	0.9	1.5	4.6	1.6

※These lands are meant as a standard' layout and' do not assure circuit performance.
※ROHM is not liable for infrigement of industrial rights of third parties concerning land configurations.

MEMO

Carbon Film Resistors (R · F)

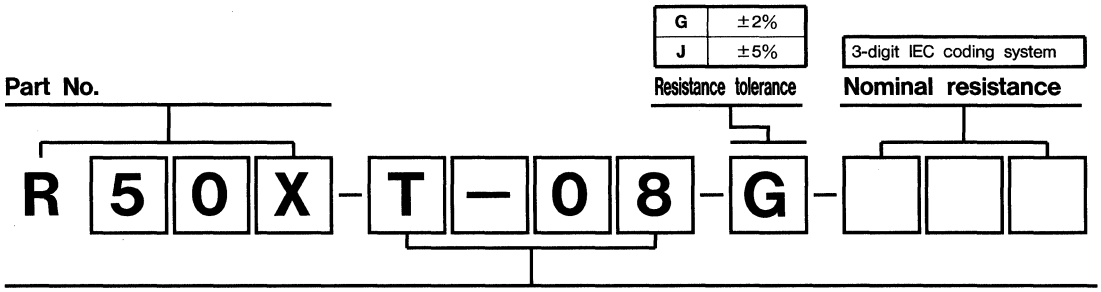
(JIS Standard : JIS C 6408)

From the preparation of component materials to final production, all stages are conducted in-house with highly advanced manufacturing technology to assure stable quality.

Part No.	Power rating (70℃)	Maximum working voltage (V)	Resistance tolerance	Resistnace range	Operating ambient temperature (℃)
R20	1/5W (0.20W) or 1/4W (0.25W)	250	J (±5%)	0.47 Ω～ 2.2MΩ	−55～+155
			G (±2%)	10 Ω～270 kΩ	
R25X	1/3W (0.33W)	300	J (±5%)	0.47 Ω～ 3.3MΩ	−55～+155
			G (±2%)	10 Ω～ 3.3MΩ	
R50X	1/2W (0.50W)	350	J (±5%)	0.47 Ω～ 5.1MΩ	−55～+155
			G (±2%)	10 Ω～ 5.1MΩ	
R75X	3/4W (0.75W)	350	J (±5%)	0.47 Ω～ 5.1MΩ	−55～+155
			G (±2%)	10 Ω～ 5.1MΩ	
F20 (Non-flammable)	1/4W (0.25W)	250	J (±5%)	0.47 Ω～100 kΩ	−55～+155
			G (±2%)	10 Ω～100 kΩ	
F25X (Non-flammable)	1/3W (0.33W)	300	J (±5%)	0.47 Ω～ 1.5MΩ	−55～+155
			G (±2%)	10 Ω～100 kΩ	
F50X (Non-flammable)	1/2W (0.50W)	350	J (±5%)	0.47 Ω～100 kΩ	−55～+155
			G (±2%)	10 Ω～100 kΩ	
F75X (Non-flammable)	3/4W (0.75W)	350	J (±5%)	0.47 Ω～ 56 kΩ	−55～+155
			G (±2%)	10 Ω～ 56 kΩ	

Notes : 1.Besides the resistors listed in the above table. 0Ω resistors (50mΩ or less) are available in the R20 and R25X series.
2.Resistors less than 10Ω are metal film.
3.General products are fire retardant. (Comform to UL94V-0).
4.High resistance resistors must be used under well designed operating conditions (load factor, voltage).
5.R75X : old R50A.

●Product Designation



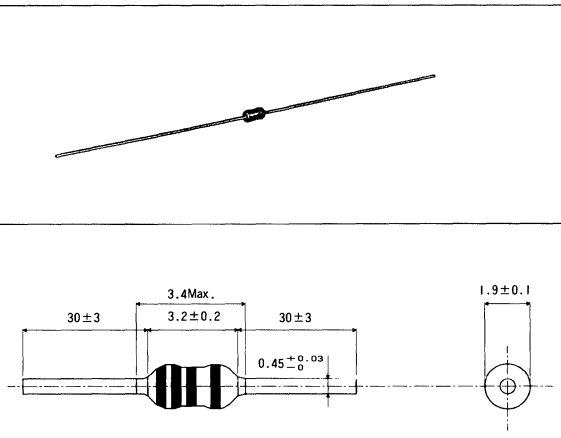
Packaging and forming specifications

T-08	R50X/75X,F50X/75X	Taping	Axial	52mm wide	Ammo Box	1,000
T-29	R20/25X,F20/25X					2,000
T04P	R20					5,000
T-24	R20/25X/50X,F20/25X/50X			26mm wide	Ammo Box	2,000
T-23	R20					5,000
T-22	R20					6,000
T42V	R20		Radial	5mm pitch parallel	Ammo Box	2,000
T41X	R20				Reel	2,500
T34V	R25X			5mm pitch lengthwise	Ammo Box	2,000
T31X	R25X				Reel	2,500
T36V	R20			2.5mm pitch lengthwise	Ammo Box	2,000
T35X	R20				Reel	2,500
R-02	R20/25X/50X/75X,F20/25X/50X/75X	Bulk	Straight		Polyethylene bag	1,000
FC02	R20,F20		Lead forming	FCR (pitch parallel) 5mm pitch	Polyethylene bag	1,000
FC06	R25X,F25X			10mm pitch	Polyethylene bag	1,000
FC16	R50X,F50X					1,000
FC10	R75X,F75X			12.5mm pitch	Polyethylene bag	1,000
ELR	R20/50X			ELR (pitch lengthwise)	Polyethylene bag	1,000
EL03	R25X					1,000

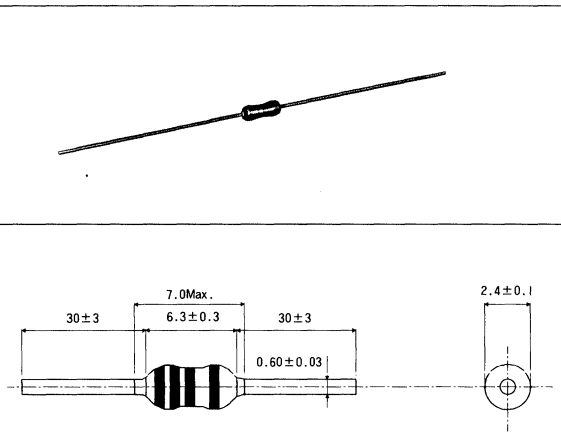
●Dimensions list

(Unit : mm)

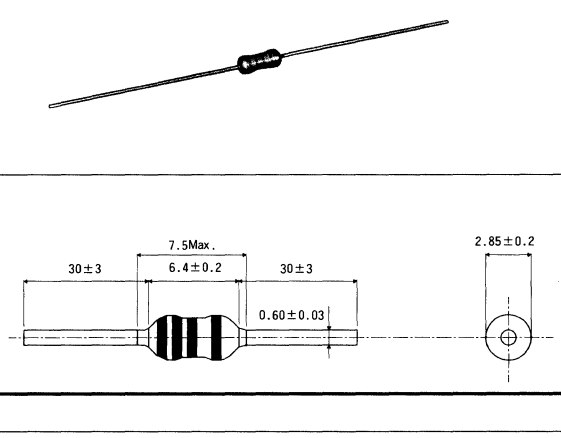
R20



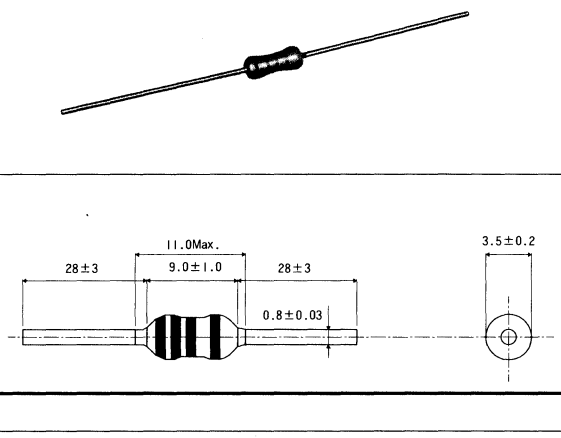
R25X



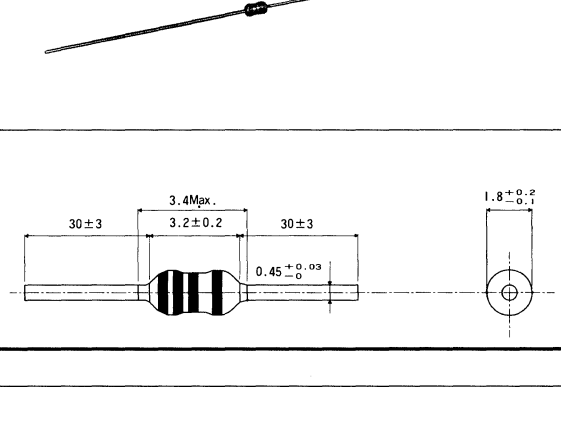
R50X



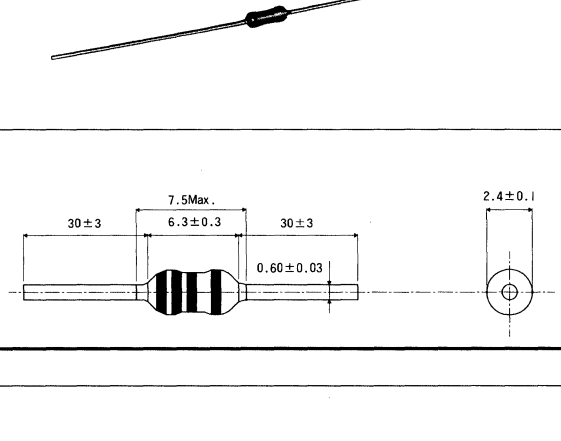
R75X



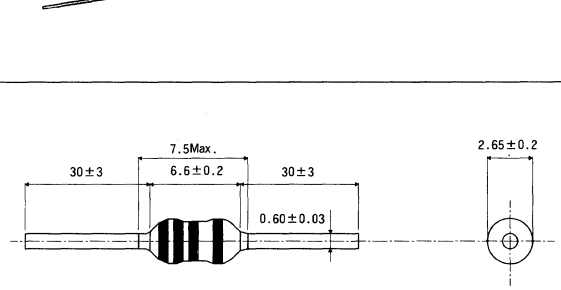
F20



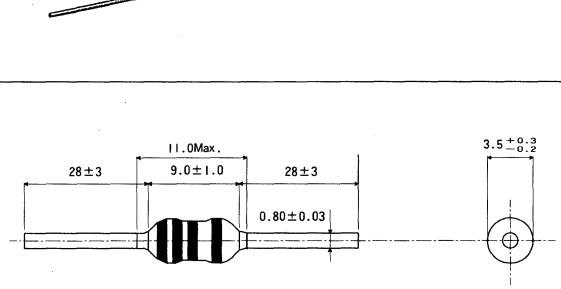
F25X



F50X



F75X



●Packaging

Part No.	Packaging type		Code	Packaging style	Quantity (pcs)	Standard product・Semi-standard product	
						J (±5%)	G (±2%)
R20	Bulk		R-02・FC02・ELR	Polyethylene bag	1,000	◎	○
	Axial	52mm wide	T-29	Ammo Box	2,000	◎	○
			T04P		5,000	◎	○
		26mm wide	T-24		2,000	◎	○
			T-23		5,000	○	○
			T-22		6,000	◎	○
	Radial	5mm pitch parallel	T42V	Ammo Box	2,000	◎	○
			T41X	Reel	2,500	○	○
		2.5mm pitch lengthwise	T36V	Ammo Box	2,000	○	○
			T35X	Reel	2,500	○	○
R25X	Bulk		R-02・FC06・EL03	Polyethylene bag	1,000	◎	○
	Axial	52mm wide	T-29	Ammo Box	2,000	◎	○
		26mm wide	T-24		2,000	◎	○
	Radial	5mm pitch lengthwise	T34V	Ammo Box	2,000	◎	○
			T31X	Reel	2,500	○	○
R50X	Bulk		R-02・FC16・ELR	Polyethylene bag	1,000	◎	○
	Axial	52mm wide	T-08	Ammo Box	1,000	◎	○
		26mm wide	T-24		2,000	◎	○
	Radial	5mm pitch lengthwise	T34V	Ammo Box	2,000	◎	○
			T31X	Reel	2,500	○	○
R75X	Bulk		R-02・FC10	Polyethylene bag	1,000	◎	○
	Axial	52mm wide	T-08	Ammo Box	1,000	○	○
F20	Bulk		R-02	Polyethylene bag	1,000	○	○
	Axial	52mm wide	T-29	Ammo Box	2,000	○	○
		26mm wide	T-24		2,000	○	○
F25X	Bulk		R-02	Polyethylene bag	1,000	○	○
	Axial	52mm wide	T-29	Ammo Box	2,000	○	○
		26mm wide	T-24		2,000	○	○
F50X	Bulk		R-02	Polyethylene bag	1,000	○	○
	Axial	52mm wide	T-08	Ammo Box	1,000	○	○
		26mm wide	T-24		2,000	△	△
F75X	Bulk		R-02	Polyethylene bag	1,000	○	○
	Axial	52mm wide	T-08	Ammo Box	1,000	○	○

◎ : Standard product ○ : Semi-standard product △ : Special specification

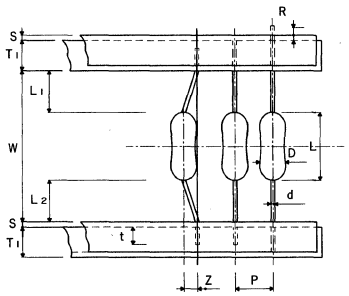
●Packaging Specifications

●Taping (Axial)

(Unit : mm)

R20 F20

R25X R50X R75X F25X F50X F75X



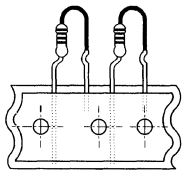
R20 F20

		26mm	52mm
L	Length	See page 351	
D	Outer diameter		
d	Lead wire diameter		
$\|L_2-L_1\|$	Off-center	0.2Max.	0.5Max.
P	Pitch	5.0±0.3	5.08±0.38
R	Lead wire projection	0	
S	Tape shift	0.1Min.	
T_1	Base tape width	6.0±0.5	
W	Inner tape width	$26.0^{+0.2}_{-0}$	52.0±1.0
t	Lead wire connection length	4.0Min.	
Z	Lead wire curvature	1.0Max.	

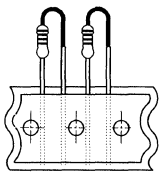
R25X R50X R75X F25X F50X F75X

		26mm	52mm
L	Length	See page 351	
D	Outer diameter		
d	Lead wire diameter		
$\|L_2-L_1\|$	Off-center	1.0Max.	
P	Pitch	5.0±0.3	5.08±0.38
R	Lead wire projection	0	
S	Tape shift	0.1Min.	
T_1	Tape width	6.0±0.5	
W	Inner tape width	$26.5^{+1.0}_{-0.5}$	$52.4^{+1.6}_{-1.4}$
t	Lead wire connection length	4.0Min.	
Z	Lead wire curvature	1.0Max.	

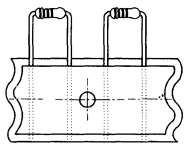
●Taping (Radial)



(5mm pitch lengthwise)
R25X/R50X



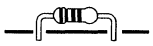
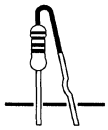
(2.5mm pitch lengthwise)
R20 only



(5mm pitch parallel)
R20 only

Taping \ Part No.		R20	R25X	R50X	R75X	F20	F25X	F50X	F75X
Axial	52mm wide	○	○	○	○	○	○	○	○
	26mm wide	○	○	○	–	○	○	○	–
Radial	For Avisert	○	○	○	–	–	–	–	–
	For Panasert	○	○	○	–	–	–	–	–

●Bulk (Forming)

FCR	ELR
	

Forming \ Part No.		R20	R25X	R50X	R75X	F20	F25X	F50X	F75X
FCR	5mm pitch	FC02	–	–	–	FC02	–	–	–
	10mm pitch	–	FC06	FC16	–	–	FC06	FC16	–
	12.5mm pitch	–	–	–	FC10	–	–	–	FC10
ELR		ELR	EL03	ELR	–	–	–	–	–

Metal Film Resistors (CRB)

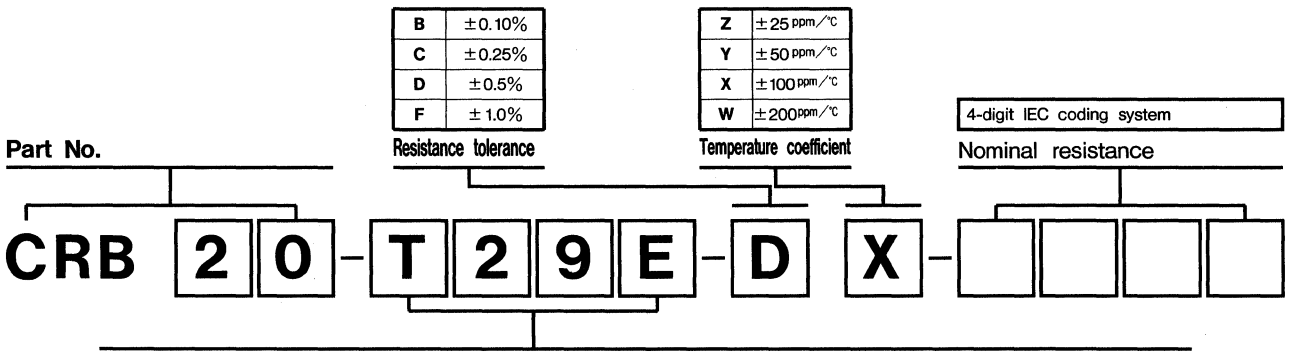
(JIS Standard : JIS C 5724)

The same size as small carbon film resistors, but made of nickel chromium film, these resistors are reliable because the resistive element is formed by ROHM's unique vacuum metal deposition process, and is highly stable.

Part No.	Power rating (70℃)	Maximum working voltage (V)	Resistance tolerance	Temperature coefficient (PPM/℃)	Resistance range	Operating ambient temperature (℃)
CRB20	0.20W	250	F (±1%)	X (±100)	1Ω～1MΩ	−55～+165
				Y (± 50)	10Ω～1MΩ	
			D (±0.5%)	X (±100)	10Ω～1MΩ	
				Y (± 50)	10Ω～1MΩ	
CRB25	0.25W	300	F (±1%)	W (±200)	1Ω～1MΩ	−55～+165
				X (±100)	10Ω～1MΩ	
				Y (± 50)	10Ω～1MΩ	
				Z (± 25)	49.9Ω～330kΩ	
			D (±0.5%)	X (±100)	10Ω～1MΩ	
				Y (± 50)	49.9Ω～1MΩ	
				Z (± 25)	49.9Ω～330kΩ	
			C (±0.25%) B (±0.10%)	X (±100)	49.9Ω～1MΩ	
				Y (± 50)	49.9Ω～1MΩ	
				Z (± 25)	49.9Ω～330kΩ	
CRB50	0.50W	350	F (±1%)	W (±200)	1Ω～2.2MΩ	−55～+165
				X (±100)	10Ω～2.2MΩ	
				Y (± 50)	10Ω～1MΩ	
				Z (± 25)	49.9Ω～330kΩ	
			D (±0.5%)	X (±100)	49.9Ω～1MΩ	
				Y (± 50)	49.9Ω～680kΩ	
				Z (± 25)	49.9Ω～680kΩ	
			C (±0.25%) B (±0.10%)	X (±100)	49.9Ω～100kΩ	
				Y (± 50)	49.9Ω～100kΩ	
				Z (± 25)	49.9Ω～100kΩ	

Notes : 1.Standard resistance series : E96,D(±0.5%),C(±0.25%),B(±0.1%) : E192
2.The 250 and 500 are the same as the standard series.

●Product Designation



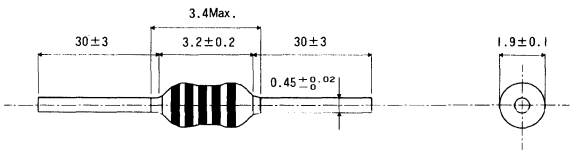
Packaging and forming specifications

T08E	CRB50	Taping	Axial	52mm wide	Ammo Box	1,000
T29E	CRB20／25					2,000
T24E	CRB20／25			26mm wide	Ammo Box	2,000
T42E	CRB20		Radial	5mm pitch parallel	Ammo Box	2,000
T41X	CRB20				Reel	2,500
T34E	CRB25			5mm pitch lengthwise	Ammo Box	2,000
T31X	CRB25				Reel	2,500
T35X	CRB20			2.5mm pitch parallel	Reel	2,500
R-65	CRB20／25／50	Bulk	Straight		Polyethylene bag	1,000
F02E	CRB20		Lead forming	FCR (lengthwise) 5mm pitch	Polyethylene bag	1,000
F06E	CRB25			FCR (lengthwise) 10mm pitch	Polyethylene bag	1,000
ELRE	CRB20			ELR (parallel)	Polyethylene bag	1,000
E03E	CRB25					1,000

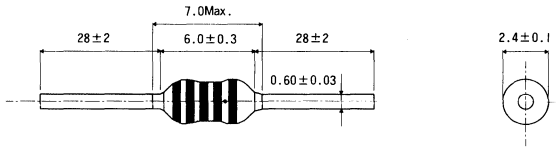
●Dimensions list

(Unit : mm)

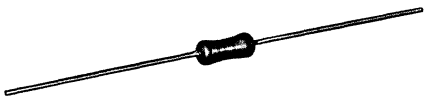
CRB20

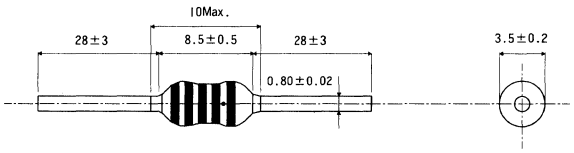


CRB25



CRB50





Metal Film Resistors (CRB)

●Packaging

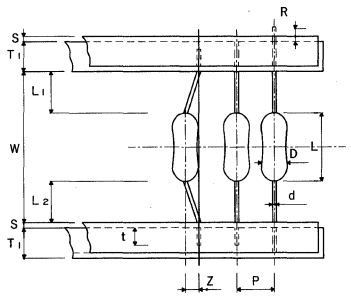
Part No.	packaging type		Code	Packaging style	Qunantity (pcs)
CRB20	Bulk		R-65・F02E・ELRE	Polyethylene bag	1000
	Axial	52mm wide	T29E	Ammo Box	2000
		26mm wide	T24E		2000
	Radial	5mm pitch parallel	T42E	Ammo Box	2000
			T41X	Reel	2500
CRB25	Bulk		R-65・F06E・E03E	Polyethylene bag	1000
	Axial	52mm wide	T29E	Ammo Box	2000
		26mm wide	T24E		2000
	Radial	5mm pitch lengthwise	T34E	Ammo Box	2000
			T31X	Reel	2500
CRB50	Bulk		R-65	Polyethylene bag	1000
	Axial	52mm wide	T08E	Ammo Box	1000

●Packaging Specifications

●Taping (Axial)

(Unit : mm)

CRB20 | **CRB25 CRB50**



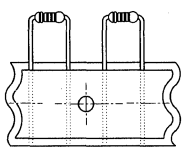
CRB20

		26mm	52mm
L	Length	See page355.	
D	Outer diameter		
d	Lead wire diameter		
$\|L_2-L_1\|$	Off-center	0.2Max.	0.5Max.
P	Pitch	5.0±0.3	5.08±0.38
R	Lead wire projection	0	
S	Tape shift	0.1Min.	
T_1	Base tape width	6.0±0.5	
W	Inner tape width	$26.0^{+0.2}_{-0}$	52.0±1.0
t	Lead wire connection length	4.0Min.	
Z	Lead wire curvature	1.0Max.	

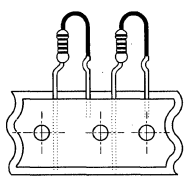
CRB25 CRB50

		26mm	52mm
L	Length	See page355.	
D	Outer diameter		
d	Lead wire diameter		
$\|L_2-L_1\|$	Off-center	1.0Max.	
P	Pitch	5.0±0.3	5.08±0.38
R	Lead wire projection	0	
S	Tape shift	0.1Min.	
T_1	Base tape width	6.0±0.5	
W	Inner tape width	$26.5^{+1.0}_{-0.5}$	$52.4^{+1.6}_{-1.4}$
t	Lead wire connection length	4.0Min.	
Z	Lead wire curvature	1.0Max.	

●Taping (Radial)



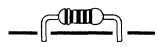
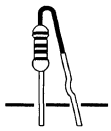
(5mm pitch, horizontal)
CRB20 only



(5mm pitch, vertical)
CRB25 only

Taping \ Part No.		CRB20	CRB25	CRB50
Axial	52mm wide	○	○	○
	26mm wide	○	○	–
Radial	For Avisert	○	○	–
	For Panasert	–	○	–

●Bulk (Forming)

FCR	ELR
	

Forming \ Part No.		CRB20	CRB25	CRB50
FCR	5mm	F02E	–	–
	10mm	–	F06E	–
ELR		ELRE	E03E	–

Metal Oxide Film Resistors (CRH)

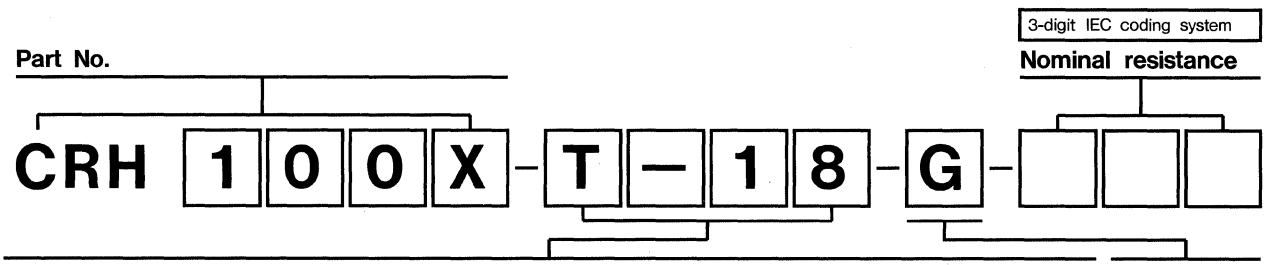
(JIS Standard : JIS C 6409)

CRH series fixed metal oxide film resistors are a modified version of conventional nickel chromuim metal film resistor, CRB series, which is very stable and reliable. CRH is manufactured using ROHM's unique sputtering process which reduces the body size but increases high-temperature properties. These characteristics help in designing cost-effective devices.

Part No.	Power rating (70°C)	Maximum working voltage (V)	Resistance tolerance	Resistance range	Operating ambient temperature (°C)
CRH50	0.50W	350	J (±5%)	0.22Ω～ 68kΩ	−25～+200
			G (±2%)	10Ω～ 68kΩ	
CRH100X	1.00W	350	J (±5%)	0.22Ω～100kΩ	
			G (±2%)	10Ω～100kΩ	
CRH100	1.00W	350	J (±5%)	0.22Ω～100kΩ	
			G (±2%)	10Ω～100kΩ	
CRH200	2.00W	350	J (±5%)	0.22Ω～120kΩ	
			G (±2%)	10Ω～120kΩ	
CRH300	3.00W	350	J (±5%)	0.33Ω～120kΩ	
			G (±2%)	10Ω～120kΩ	

Notes : 1.Applicable types;straight lead;independent,preformed;and 52mm−wide taped.
2.Resistors with tolerance grade F (±1%) and resistance temperature coefficient × (±100ppm/°C) are also available.

●Product Designation



Packaging and forming specifications

T-11	CRH200	Taping	Axial	52mm wide	Ammo Box	500
T-13	CRH200				Reel	1,000
T-08	CRH100				Ammo Box	1,000
T-29	CRH50					1,000
T-18	CRH100X					2,000
T-24	CRH50			26mm wide	Ammo Box	2,000
R-02	CRH300	Bulk	Straight		Polyethylene bag	250
R-02	CRH200					500
R-02	CRH50/100/100X					1,000
FC10	CRH100/100X		Lead forming	FCR (Parallel) 12.5mm pitch	Polyethylene bag	1,000
FC17	CRH50			FCR (Parallel) 15mm pitch	Polyethylene bag	1,000
FH01	CRH50			FH (Independent) 10mm pitch	Polyethylene bag	1,000
FH11	CRH100/100X			FH (Independent) 12.5mm pitch	Polyethylene bag	1,000
FH24	CRH200			FH (Independent) 15mm pitch	Polyethylene bag	500
FH34	CRH300			FH (Independent) 20mm pitch	Polyethylene bag	250

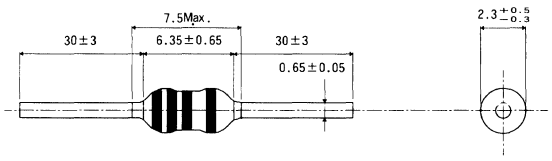
Resistance tolerance

G	±2%
J	±5%

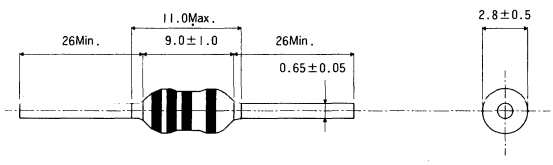
●Dimensions list

(Unit : mm)

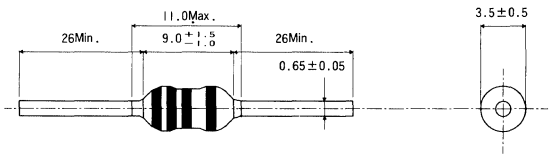
CRH50



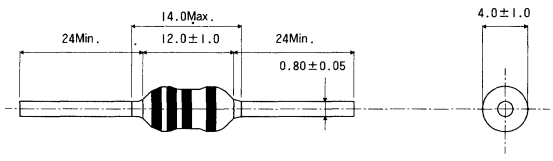
CRH100X



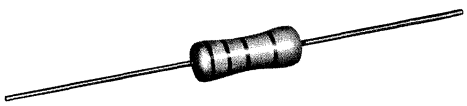
CRH100

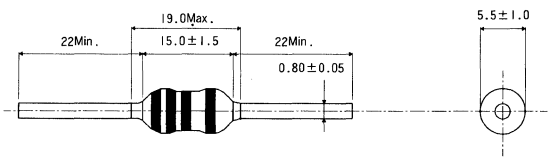


CRH200



CRH300





Metal Oxide Film Resistors (CRH)

●Packaging

Part No.	Packaging type		Code	Packaging style	Quantity (pcs)	Standard product・Semi-standard product
CRH50	Axial	52mm wide	T-29	Ammo box	2,000	○
		26mm wide	T-24		2,000	○
CRH100	Axial	52mm wide	T-08	Ammo box	1,000	○
CRH100X	Axial	52mm wide	T-18	Ammo box	2,000	○
CRH200	Axial	52mm wide	T-11	Ammo box	500	○
			T-13	Reel	1,000	○

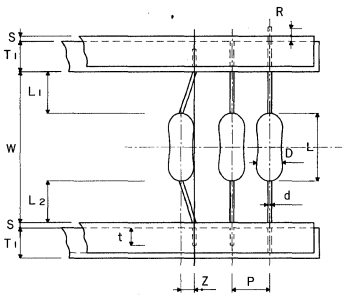
○ : Semi-standard product

●Packaging Specifications

●Taping (Axial)

(Unit : mm)

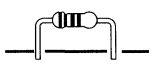
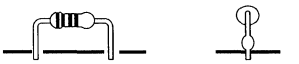
CRH50 CRH100 CRH100X CRH200



		26mm	52mm
L	Length	See page359	
D	Outer diameter		
d	Lead wire diameter		
$\|L_2-L_1\|$	Off-Center	1.0Max.	
P	Pitch	5.0±0.3	5.08±0.38
R	Lead wire projection	0	
S	Tape shift	0.1Min.	
T_1	Tape width	6.0±0.5	
W	Inner tape width	$26.5^{+1.0}_{-0.5}$	$52.4^{+1.6}_{-1.4}$
t	Lead wire connection length	4.0Min.	
Z	Lead wire curvature	1.0Max.	

Taping \ Part No.		CRH50	CRH100	CRH100X	CRH200	CRH300
Axial	52mm wide	○	○	○	○	–
	26mm wide	○	–	–	–	–

●Bulk (Forming)

FCR (Horizontal)	FH (Snap-in Type)
	

Forming \ Part No.		CRH50	CRH100	CRH100X	CRH200	CRH300
FCR	12.5	–	FC10	FC10	–	–
	15	FC17	–	–	–	–
FH (Snap-in Type)	10	FH01	–	–	–	–
	12.5	–	FH11	FH11	–	–
	15	–	–	–	FH24	–
	20	–	–	–	–	FH34

Resistor Networks (RM・RY)

A number of resistors are packed in a small package, for high density mounting.
The excellent characteristics of thick film resistor are fully made by our designers who have long experience in this field.
The result is a series of high performance, high reliable resistor network products.

●Resistor Networks

Type	Part No.	Type	Power rating (at 70°C／Element)	Temperature coefficient (ppm／°C)	Resistance tolerance	Resistance range	Package
Number of elements specified	**RM series**	RML	1／8W	X : ±100 General : ±200	F (±1%) G (±2%) J (±5%)	FX (GX) 510Ω～1MΩ J 22Ω～2.2MΩ	SIP 4～14pins
		RMN	1／6W				
		RMH	1／4W				
Number of elements specified	**RY series**	RYL	0.075W	±300	J (±5%)	33Ω～1MΩ	SIP 4～16pins

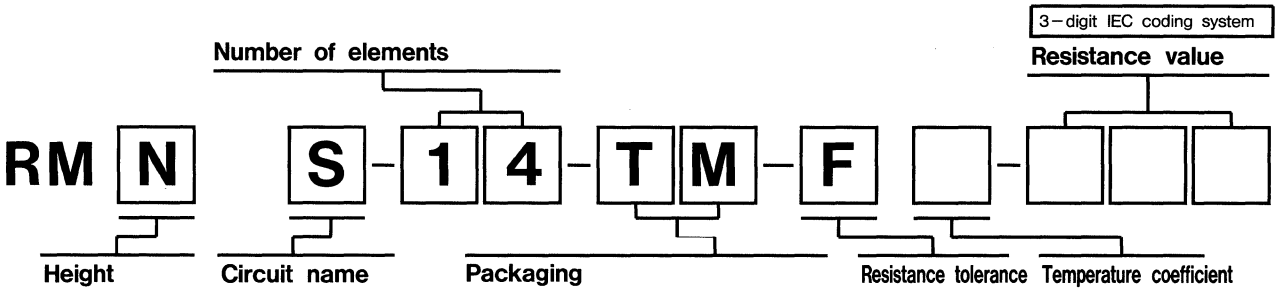
●Ladder Networks

Part No.	Bits	Circuit	Resistance	Linearity	Tolerance	Temp. coefficient
RKM5LW××××	4bit weighting	R/2R/4R/8R	1kΩ～15kΩ	±1/2LSB(±3.12%)	J (±5%) G (±2%) F (±1%)	Absolute ±200ppm/°C Tracking ±50ppm/°C
RKM6LW××××	5bit weighting	R/2R/4R/8R/16R		±1/2LSB(±1.56%)		
RKM7LW××××	6bit weighting	R/2R/4R/8R/16R/32R		±1/2LSB(±0.78%)		
RKM8LW××××	7bit weighting	R/2R/4R/8R/16R/32R/64R		±1/2LSB(±0.39%)		
RKM6L××××	R/2R 4bit	R/2R	750Ω～120kΩ	±1/2LSB(±3.12%)	J (±5%) G (±2%) F (±1%)	Absolute ±200ppm/°C Tracking ±50ppm/°C
RKM7L××××	R/2R 5bit	R/2R		±1/2LSB(±1.56%)		
RKM8L××××	R/2R 6bit	R/2R		±1/2LSB(±0.78%)		
RKM9L××××	R/2R 7bit	R/2R		±1/2LSB(±0.39%)		
RKM10L××××	R/2R 8bit	R/2R		±1/2LSB(±0.20%)		

Note : 1.No.of pins, instead of elements.

●Product Designation

● RM, RY series (Number of elements specified)



Height

L	5.08mm
N	6.35mm
H	8.90mm

Circuit name

See page 363 for applicable circuits.

Packaging

–	Bulk	
TM	Taping (4～9pins)	3-lead taping
TA		All-lead taping
GM	Container	For 5.08mm height component(RML・RYL)
GC		
GN		For 6.35mm height component (RMN)
GH		For 8.90mm height component (RMH)

Resistance tolerance

F	±1%
G	±2%
J	±5%

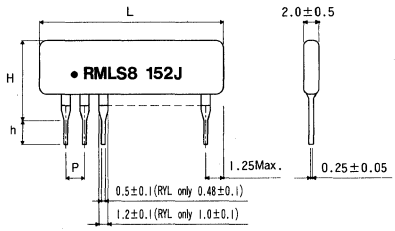
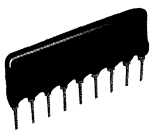
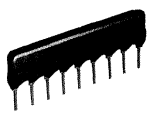
Temperature coefficient

X	±100ppm／°C
–	±200ppm／°C

Resistor Networks (RM · RY)

●Dimensions list

(Unit : mm)

Type	Outward (example)	Dimensions (mm)	H Max.	P	L Max.	h
RML			5.08	2.54±0.1	2.54×(number of pins−1)+2.5	$3.2^{+0.6}_{-0}$
RMN			6.35			
RMH			8.90			
RYL			5.08	1.778±0.1	1.778×(number of pins−1)+2.5	
RKM			6.35	2.54±0.1	2.54×(number of pins−1)+2.5	

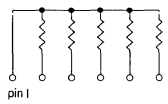
Notes : 1.Standard devices have 4 to 14 lead terminals.
2.Up to 18 terminals are available.
3.RML and RYL available in 3 pin configuration.

●Applicable Circuits

Part No. \ Circuit		Stnadard S Circuit	C Circuit (RM Series) W Circuit (RK Series)	Series H Circuit	Parallel A Circuit	Both end common D Circuit	Terminal T Circuit	Divider B Circuit	Divider E Circuit	Divider G Circuit	Custom
RM	RML	○	○	○	○	○					△
	RMN	○	○	○	○	○	△	○	○	△	△
	RMH	○	○	○	○	○	○	○	○	○	△
RY	RYL	○			○						

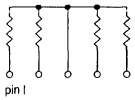
Side common(standard)

Circuit S



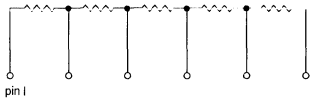
Center common

Circuit C (RM Series)
Circuit W (RK Series)



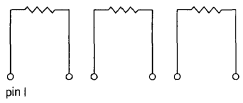
Series

Circuit H



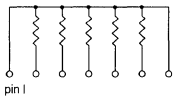
Parallel

Circuit A



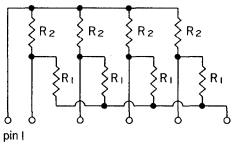
Both end common

Circuit D



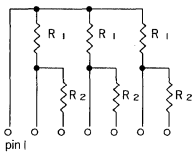
Terminator

Circuit T (RM Series)
Circuit B (RK Series)

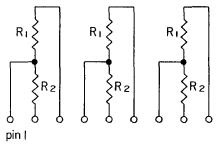


Divider

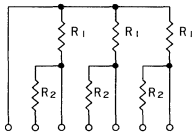
Circuit B (RM Series)
Circuit F (RK Series)



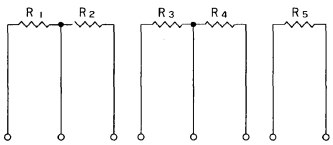
Circuit E

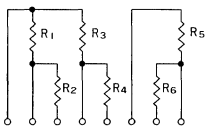


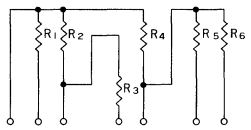
Circuit G

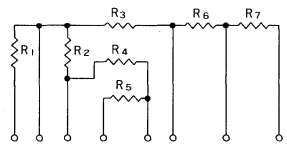


Custom(example)





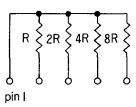




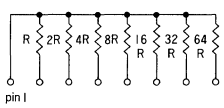
●Ladder Networks(RKM Type)

Applicable circuits

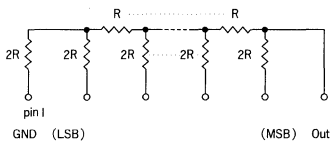
4-bit weighting(LW)



7-bit weighting(LW)



R/2R n-bit(L)



Resistor Networks (RM · RY)

●Packaging

Part No.		Packaging type	Code	Packaging style	Quantity/Package (Pcs)	Quantity/Unit (pcs)
RM Series		Bulk	–	Polyethylene bag	200,400 500,1000	100 (50)
RML	4~9Pins	3-lead taping	TM	Ammo Box	1,000	–
		All-lead taping	TA			
		Container	GM	Container tube	100 container tubes	13~60
			GC			
RMN/RKM	4~9Pins	3-lead taping	TM	Ammo Box	1,000	–
		All-lead taping	TA			
		Container	GN	Container tube	100 container tubes	13~60
RMH		Container	GH	Container tube	100 container tubes	13~60
RYL		Bulk	–	Polyethylene bag	500,1000	100
		Container	GM	Container tube	100 container tubes	13~60
			GC			

●The Class and Basic Ordering Units for Standard and Semi-standard Products

RM Type	Circuit Symbol / Basic order unit (pcs.)	S	C	H	A	D	B	G	E	T	Remarks
		200,400,500 or 1000									
RML		◎	◎	◎	◎	◎					◎,○and△are further classified by the resistance value used.
RMN		◎	○	○	◎	○	○	○	○	○	
RMH		◎	○	○	◎	○	○	○	○	○	

RY Type	Circuit Symbol / Basic ordering unit (pcs.)	S	A	Remarks
		500 or 1000		
RYL		◎	○	by the resistance value used.

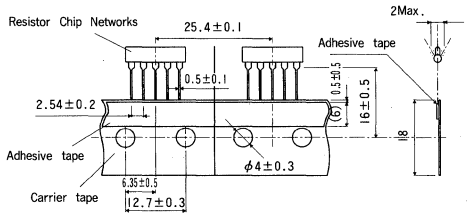
◎ : Standard product ○ : Semi-standard product

●Packaging Specifications

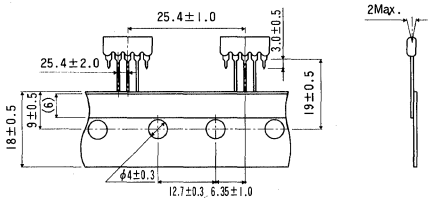
●Taping

(Unit : mm)

TA

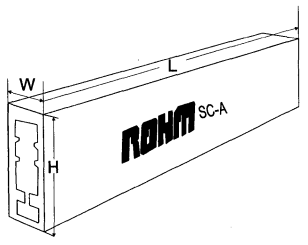


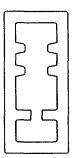
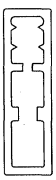
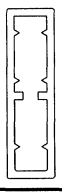
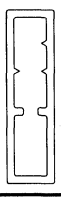
TM



●Container

(Unit : mm)



Item \ Specifications	GM	GC	GN	GH
H	11.0±0.2	13.2±0.2	13.4±0.2	14.5±0.2
W	5.0±0.15	3.8±0.15	3.8±0.15	3.8±0.15
L	$508^{+0}_{-1.5}$	$508^{+0}_{-1.5}$	$508^{+0}_{-1.5}$	580±0.5
Height	For 5.08mm height		For 6.35mm height	For 8.90mm height
Cross section				

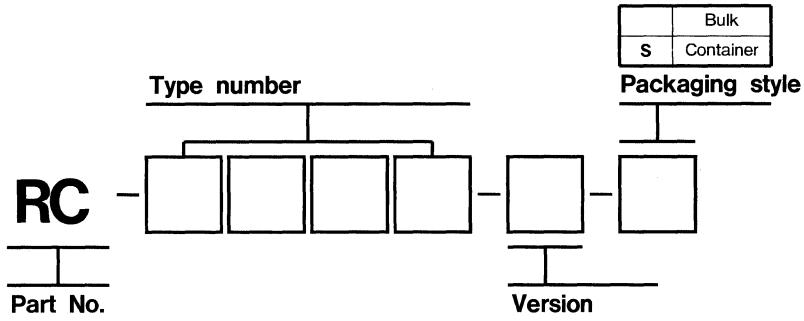
RC Networks (RC)

Several resistors and capacitors are packed into a single package, enabling high density mounting of resistors and capacitors. The number of reliable thick film resistors and chip capacitors in a package can be specified in the order sheet, to meet RC requirements of the specific circuit design and to eliminate unnecessary components and assemble processes. Can be used as an interface to TTL, C-MOS, etc., or as integrated components on industrial equipment and vehicle devices and other applications.

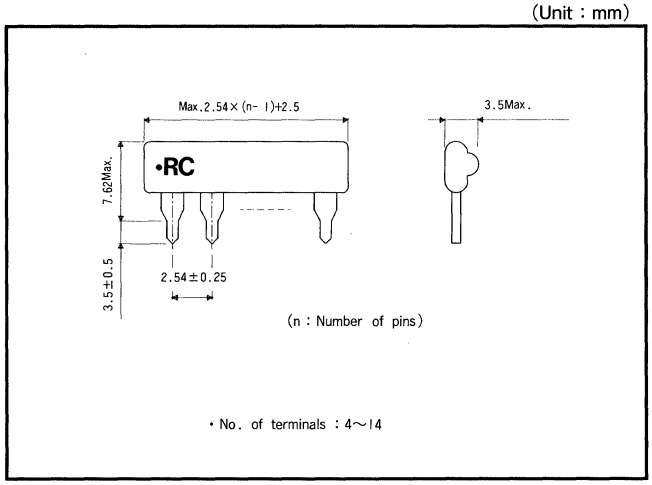
Part No.	Power rating	Temperature coefficient (ppm/℃)	Resistance tolerance	Resistnace range	Capacitance range	Package	Operating ambient temperature (℃)
RC	1/8W	±300	J (±5%) G (±2%)	47Ω~470kΩ	200pF~0.047μF (CK)	SIP4~14pin	−25~+85

Note : 1.This type is available in tube packing.

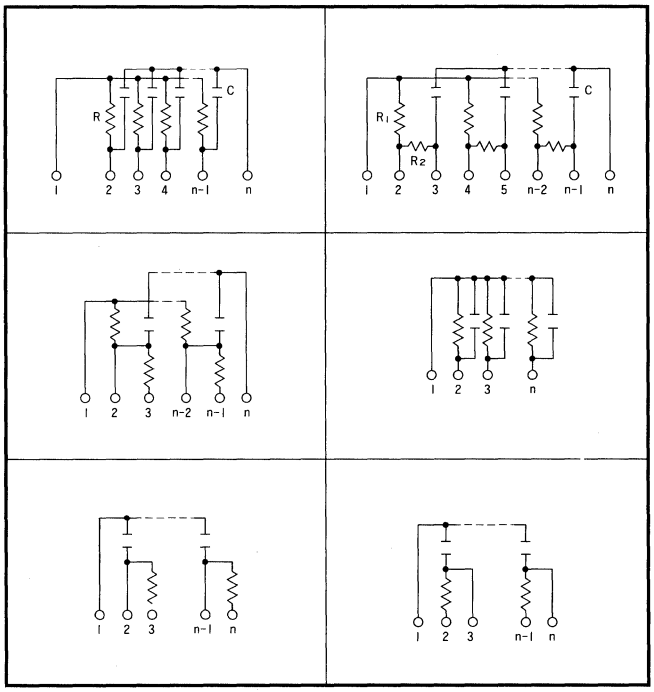
●Product Designation



(Unit : mm)



●Applicable Circuits



Note : 1. The following are typical circuits. Other circuits are available on request.

●Packaging

Part No.	Packaging type	Packaging style	Code	Quantity/Package (pcs)	Quantity/Unit (pcs)
RC Series	Bulk	Polyethylene bag	−	200,400 500,1000	100
	Container	Container	S	100 container tube	13~60

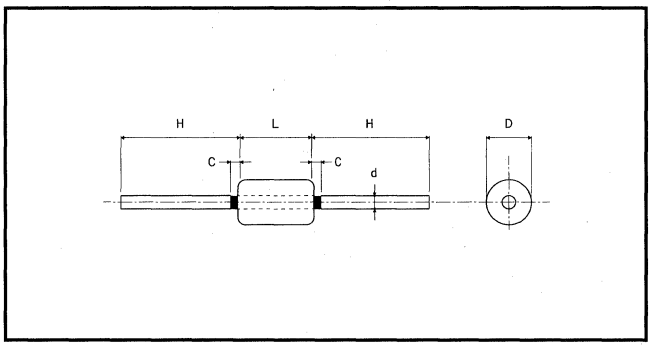
●The Class and Basic Ordering Units for Standard and Semi-Standard Products

RC Type	Basic Ordering Unit (pcs.)	5000	Remarks
RC		△	Only custom made products

△:Special specifications

Jumper Wires JPW01 and JPW02

Resistance : 10mΩ or less; max.current : 2A; Isolation voltage 1000V; useful for cross-pattern jumper and cross-part jumper.



(unit : mm)

Item		Part No.	JPW01	JPW02
	Outer diameter	D	1.80±0.10	2.30±0.15
	Length	L	3.2±0.2	5.7±0.2
	Lead diameter	d	$0.45^{+0.02}_{-0}$	0.55±0.02
	Lead length	H	28±3	28±3
	Adhesive flow length	C	0.3Max.	0.5Max.

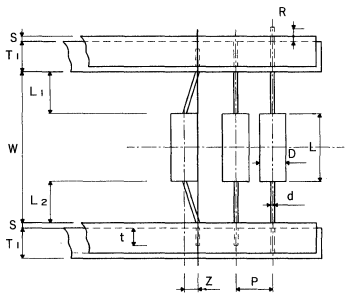
●Packaging

Part No.	Packaging type		Code	Packaging style	Qunantity (pcs)
JPW01	Bulk		R-01	Polyethylene bag	1000
	Axial	52mm wide	T-29	Ammo box	2000
		26mm wide	T-24		2000
JPW02	Bulk		R-01	Polyethylene bag	1000
	Axial	52mm wide	T-29	Ammo box	2000
		26mm wide	T24W		2000
	Radial taping	5mm pitch, vertical	T34V		2000

●Packaging Specifications

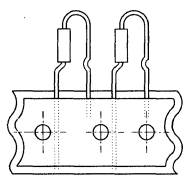
●Taping (Axial)

JPW01、JPW02



		26mm	52mm
L	Length	See figure left	
D	Outer diameter		
d	Lead wire diameter		
$\|L_2-L_1\|$	Off-Center	1.0Max.	
P	Pitch	5.0±0.3	5.08±0.38
R	Lead wire projection	0	
S	Tape shift	0.1Min.	
T_1	Tape width	6.0±0.5	
W	Inner tape width	$26.5^{+1.0}_{-0.5}$	$52.4^{+1.6}_{-1.4}$
t	Lead wire connection length	4.0Min.	
Z	Lead wire curvature	1.0Max.	

●Taping (Radial)



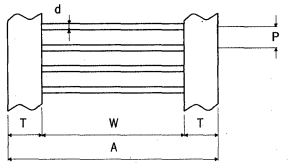
(5mmpitch, vertical)

JPW02

Taping	Part No.	JPW01	JPW02
Axial	52mm wide	○	○
	26mm wide	○	○
Radial	For Avisert	○	○
	For Panasert	–	○

Lead Wries for Taping : LW T-29 (Electical annealed copper wire)

Resistance 10mΩ or less;suitable for automatic placement.



(Unit : mm)

Item		Part No.	LW T-29
	Outer tape width	A	64.5±0.5
	Inner tape width	W	$52.4^{+1.6}_{-1.4}$
	Pitch	P	5.08±0.38
	Tape width	T	6.0±0.5
	Lead diameter	d	0.60±0.02

Capacitors

Surface Mounted

Radial

Axial

■Standard products • Semi-standard products • Custom

To make it easier for the customer to select the type of product best suitable for applications, we offer capacitors in three types :

(1) standard, (2) semi-standard, and (3) custom

(1) Standard products

Standard products are available upon request.

(2) Semi-standard products

Theses products require a certain amount of time to fill an order. Please consult us for delivery date :

(3) Custom

Custom products are developed and manufactred to specifications prescribed by tha customer.

These are special specification products, require more time to deliver than do semistandard products. Please ask us for delivery date.

●Please note the following when placing an order.

The amount of an order must be in multiplies of the basic order unit.

●Introductory remarks

◎ : Standard products

○ : Semi-standard products

△ : Custom

MCS • MCH • MC Series

●MCS Series 〔Dry plated termination type〕

Termination is dry plated employing a thin film process, featuring high deflection resistance, high thermal cycle resistance and high heat resistance. This process helps to obtain larger capacitance in a smaller size and to achieve higher density mounting.

●MCH Series 〔Solder plated termination type〕

Can be soldered either by wave or reflow soldering.

●MC Series 〔AgPd termination type〕

Reflow soldering type only. Available in wide capacitance range.

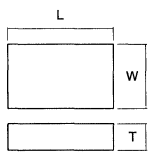
●Dimensions list

(Unit : mm)

Series name		–	MCS18	MCS21	MCS31	MCS32	MCS43	MCS53
		MCH15	MCH18	MCH21	MCH31	MCH32	–	–
		–	–	MC21	MC31	MC32	MC43	MC53
Body Dimensions		1.0 × 0.5	1.6 × 0.8	2.0 × 1.25	3.2 × 1.6	3.2 × 2.5	4.5 × 3.2	5.6 × 3.2
		1005 (0402)	1608 (0603)	2125 (0805)	3216 (1206)	3225 (1210)	4532 (1812)	5632 (2212)
Actual size								
Enlarged (×2.0)	MCS							
	MCH MC	MCH Only	MCH Only				MC Only	MC Only

Note : 4-digit number in the dimensions column are sizes in mm and parenthetically in inches.

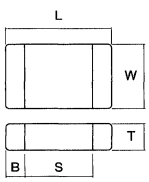
MCS Series



(Unit : mm)

Part No.	L	W	T
MCS18	1.6±0.05	0.8 ±0.05	0.9Max.
MCS21	2.0±0.1	1.25±0.1	1.25±0.2*
MCS31	3.2±0.1	1.6 ±0.1	$1.25^{+0}_{-0.2}$
MCS32	3.2±0.2	2.5 ±0.2	$1.0^{+0}_{-0.2}$
MCS43	4.5±0.2	3.2 ±0.2	$0.7^{+0}_{-0.2}$
MCS53	5.6±0.2	3.2 ±0.2	$1.25^{+0}_{-0.2}$

MCH/MC Series



(Unit : mm)

Part No.	L	W	T	B (Min.)	S (Min.)
MCH15	1.0±0.05	0.5±0.05	0.5±0.05	0.1	0.3
MCH18	1.6±0.1	0.8±0.1	0.9Max.	0.15	0.4
MCH/MC21	2.0±0.15	1.25±0.15	1.25±0.2*	0.2	0.6
MCH/MC31	3.2±0.15	1.6±0.15	$1.25^{+0}_{-0.2}$	0.2	1.0
MCH/MC32	3.2±0.2	2.5±0.2	$1.0^{+0}_{-0.2}$	0.3	1.0
MC43	4.5±0.5	3.2±0.4	$0.7^{+0}_{-0.2}$	0.4	2.0
MC53	5.6±0.5	3.2±0.4	$1.25^{+0}_{-0.2}$	0.4	2.0

Notes : 1.Only rated voltage 500V parts T=1.5±0.2

●Product Designation

Symbol	EIA code
15	0402
18	0603
21	0805
31	1206
32	1210
43	1812
53	2212

Shape, Dimensions

Symbol	Voltage
2	25V
3	16V
5	50V
7	500V

Rated voltage

In picofarads, given by a three-digit number, the first two digits are significant digits and the last digit gives the number of zeros. The position of a decimal point is identified by the letter R.
Example. 331 : 330pF, 472 : 4, 700pF, 1R5 : 1.5pF, 010 : 1pF, R75 : 0.75pF

Capacitance code

M	C	H	2	1	2	F	1	0	4	Z	K

Series name

Symbol	Series
MCS	Dry plated termination type
MCH	Solder plated termination type
MC	AgPd termination type

Capacitance-temperature characteristics

Code ROHM	Code EIA	Operating Temperature Range	Temp. Coefficient or Percent Change
A	C0G	−55～+125℃	0±30ppm／℃
UJ	U2J	−25～+85 ℃	−750±120ppm／℃
SL	−	−25～+85 ℃	+350～−1000ppm／℃
C	X7R	−55～+125℃	±15%
E	Z5U	+10～+85 ℃	+22, −56%
F	Y5V	−30～+85 ℃	+22, −82%
T	−	0～+85 ℃	+70, −30%

Capacitance tolerance

Symbol	Tolerance (Series)	Application
C	±0.25pF	10pF and below
D	±0.5pF	10pF and below
F	±1pF	10pF and below
J	±5% (E24)	−
K	±10% (E12)	−
M	±20% (E6)	−
Z	+80, −20% (E3)	−
P	More than nominal value (25℃)	Only for T characteristics
Q	More than nominal value (Operating temp. range)	Only for T characteristics

Packaging specifications

Symbol	Description
P	Plastic taping (φ178mm)
PB	Plastic taping (φ330mm)
K	Paper taping (φ178mm)
KB	Paper taping (φ330mm)
C	Bulk case
No symbol	Bulk

●Packaging

Type		Packaging type	Packaging condition		Code	Basic ordering unit	Rank
MCH15	1005 (0402)	Bulk	Bulk case		C	80,000	◎
			Polyethylen bag		−	2,000	○
		Taping	Paper taping	φ178	K	10,000	◎
				φ330	KB	50,000	◎
MCS18 MCH18	1608 (0603)	Bulk	Bulk case		C	15,000	◎
			Polyethylen bag		−	2,000	○
		Taping	Paper taping	φ178	K	4,000	◎
				φ330	KB	16,000	◎
MCS21 MCH21 MC21	2125 (0805)	Bulk	Bulk case		C	※10,000	◎
			Polyethylen bag		−	2,000	○
		Taping	Paper taping (T≦1.0mm)	φ178	K	4,000	◎
				φ330	KB	16,000	◎
			Plastic taping (T=1.25mm)	φ178	P	3,000	◎
				φ330	PB	12,000	◎
MCS31 MCH31 MC31	3216 (1206)	Bulk	Polyethylen bag		−	2,000	○
		Taping	Paper taping (T≦1.0mm)	φ178	K	4,000	◎
				φ330	KB	16,000	◎
			Plastic taping (T=1.25mm)	φ178	P	3,000	◎
				φ330	PB	12,000	◎
MCS32 MCH32 MC32	3225 (1210)	Bulk	Polyethylen bag		−	2,000	○
		Taping	Plastic taping	φ178	P	3,000	◎
				φ330	PB	12,000	◎
MCS43 MC43	4532 (1812)	Bulk	Polyethylen bag		−	2,000	◎
		Taping	Plastic taping	φ178	P	1,000	○
MCS53 MC53	5632 (2212)	Bulk	Polyethylen bag		−	2,000	◎
		Taping	Plastic taping	φ178	P	1,000	○

Note : ※T=0.7mm

◎ : Standard product ○ : Semi-standard product

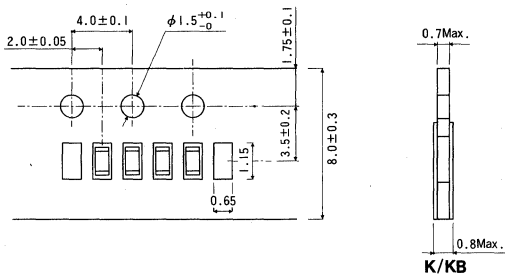
Multi-Layer Ceramic Chip Capacitors

●Packaging specifications

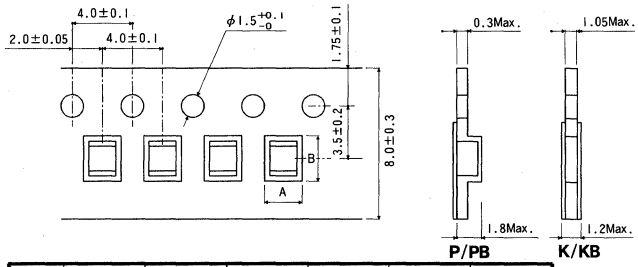
(Unit : mm)

Taping

MCH15

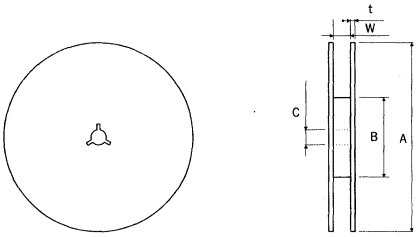


(All except) MCH15



Tape	MCS18	MCS21	MCS31	MCS32	MCS43	MCS53
	MCH18	MCH21	MCH31	MCH32	—	—
Symbol	—	MC21	MC31	MC32	MC43	MC53
A	1.0	1.65	2.0	3.0	4.0	4.0
B	1.8	2.4	3.6	3.6	4.9	6.0

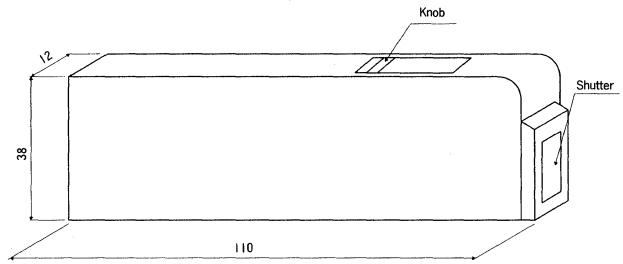
Reel



Specifications	A	B	C	t	W
φ178	φ178±2.0	φ50Min.	13.0±0.5	2.0	10.0±1.5
φ330	φ330±2.0	φ100Min.	13.0±0.5	2.5	10.0±1.5

(Unit : mm)

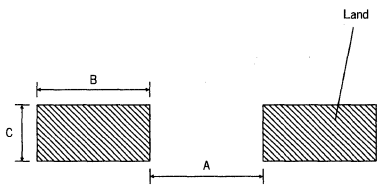
Bulk case



●Recommended land pattern

Excessive solder gives machanical and thermal stress on multi-layer ceramic capacitor, leading to chip damage. Land on PCB must be small enough to avoid accumulation of excessive solder.

(Unit : mm)



Part No.	A	B	C
MCS18	1.1	0.75	0.75
MCS21	1.5	0.75	1.1
MCS31	2.7	0.75	1.4
MCS32	2.7	0.80	2.3
MCS43	3.8	1.10	3.0
MCS53	4.9	1.10	3.0

Part No.	A	B	C
MCH18/MC18	0.8	0.7	0.9
MCH21/MC21	1.0	1.0	1.3
MCH31/MC31	2.0	1.0	1.7
MCH32/MC32	2.0	1.2	2.6

※Smaller C is preferable.

※These lands are of standard layout and do not assure circuit performance.

※ROHM is not liable to infringement industrial rights of third parties concerning the land configurations.

MCS Series

●Capacitance range

Class2 (High dielectric constant system) Rated voltage 25V・50V

Sizes		MCS18 (0603)						MCS21 (0805)					
Capacitance	Temperature characteristic	C (X7R)		E (Z5U)		F (Y5V)		C (X7R)		E (Z5U)		F (Y5V)	
	Rated voltage (V)	50	25	50	25	50	25	50	25	50	25	50	25
	Tolerance (%)	K (±10) M (±20)	K (±10) M (±20)	Z (+80, −20)	Z (+80, −20)	Z (+80, −20)	Z (+80, −20)	K (±10) M (±20)	K (±10) M (±20)	Z (+80, −20)	Z (+80, −20)	Z (+80, −20)	Z (+80, −20)
100 (pF)													
120													
150													
180													
220													
270													
330													
390													
470													
560													
680													
820													
1000													
1200													
1500													
1800													
2200													
2700													
3300													
3900													
4700													
5600													
6800													
8200													
10000													
12000													
15000													
18000													
22000													
27000													
33000													
39000													
47000			☆										
56000													
68000													
82000													
100000 (0.1 μF)													
120000													
150000													
180000									☆				
220000													
270000													
330000													
390000													
470000													
560000													
680000													
1000000 (1 μF)													☆
1500000													
2200000													

T Dimensions

	$0.7^{+0}_{-0.2}$	0.9Max.	$1.0^{+0}_{-0.2}$	1.25±0.2
Unit : mm (inch)	$\left(.028^{+0}_{-.008}\right)$	(.035Max.)	$\left(.039^{+0}_{-.008}\right)$	(.049±.008)

☆ 16V Version

MCS Series

●Capacitance range

Class2 (High dielectric constant system) Rated voltage 25V · 50V

Sizes		MCS31 (1206)						MCS32 (1210)			
Capacitance	Temperature characteristic	C (X7R)		E (Z5U)		F (Y5V)		C (X7R)		F (Y5V)	
	Rated voltage (V)	50	25	50	25	50	25	50	25	50	25
	Toletance (%)	K (±10) M (±20)	K (±10) M (±20)	Z (+80, −20)	Z (+80, −20)	Z (+80, −20)	Z (+80, −20)	K (±10) M (±20)	K (±10) M (±20)	Z (+80, −20)	Z (+80, −20)
100 (pF) 120 150 180 220											
270 330 390											
470 560 680											
820 1000 1200											
1500 1800 2200											
2700 3300 3900											
4700 5600 6800											
8200 10000 12000											
15000 18000 22000											
27000 33000 39000											
47000 56000 68000											
82000 100000 (0.1 μF) 120000											
150000 180000 220000											
270000 330000 390000											
470000 560000 680000			☆								
820000 1000000 (1 μF) 1200000											
1500000 1800000 2200000							☆				
3300000 4700000 6800000											

T Dimensions $0.7^{+0}_{-0.2}$ $1.0^{+0}_{-0.2}$ $1.25^{+0}_{-0.2}$

Unit : mm (inch) $\left(.028^{+0}_{-.008}\right)$ $\left(.039^{+0}_{-.008}\right)$ $\left(.049^{+0}_{-.008}\right)$

☆ 16V Version

Class2 (High dielectric constant system) Rated voltage 25V・50V

Sizes		MCS43 (1812)				MCS53 (2212)			
Capacitance	Temperature characteristic	C (X7R)		F (Y5V)		C (X7R)		F (Y5V)	
	Rated voltage (V)	50	25	50	25	50	25	50	25
	Tolerance (%)	K (±10) M (±20)	K (±10) M (±20)	Z (+80, −20)	Z (+80, −20)	K (±10) M (±20)	K (±10) M (±20)	Z (+80, −20)	Z (+80, −20)
100 (pF) 120 150 180 220									
270 330 390									
470 560 680									
820 1000 1200									
1500 1800 2200									
2700 3300 3900									
4700 5600 6800									
8200 10000 12000									
15000 18000 22000		■							
27000 33000 39000		■ ■ ■				■ ■			
47000 56000 68000		■ ■ ■				■ ■ ■			
82000 100000 (0.1 μF) 120000		■ ■ ■				■ ■ ■			
150000 180000 220000		■ ■ ■		 ■		■ ■ ■			
270000 330000 390000		■ ■ ■		 ■ 		■ ■ ■			
470000 560000 680000		■ ■ ■		■ ■		■ ■ ■			
820000 1000000 (1 μF) 1200000		■	 ■ ■	■		■ ■	 ■		
1500000 1800000 2200000				■ ■			■ ■	■ ■	
3300000 4700000 6800000				■	 ■ 			■ ■	 ■

■ T Dimensions $1.25^{+0}_{-0.2}$

Unit : mm (inch) $\left(.049^{+0}_{-.008}\right)$

MCH Series

●Capacitance range

Class1 (For temperature compensation) Rated voltage 50V

Sizes		MCH15 (0402)	MCH18 (0603)			MCH21 (0850)			MCH31 (1206)		
Temperature characteristic		A (C0G)	A (C0G)	UJ (U2J)	SL (−)	A (C0G)	UJ (U2J)	SL (−)	A (C0G)	UJ (U2J)	SL (−)
Capacitance	Tolerance										
0.5 (pF)	C (±0.25pF) D (±0.5pF)										
1											
1.2											
1.5											
1.8											
2.2											
2.7											
3.3											
3.9											
4.7											
5.6											
6.8	C (±0.25pF) D (±0.5pF) F (±1.0pF)										
8.2											
10											
11	J (±5%) K (±10%)										
12											
13											
15											
16											
18											
20											
22											
24											
27											
30											
33											
36											
39											
43											
47											
51											
56											
62											
68											
75											
82											
91											
100											
110											
120											
130											
150											
160											
180											
200											
220											
240											
270											
300											
330											
360											
390											
430											
470											
510											
560											
620											
680											
750											
820											

T Dimensions	0.5±0.05	$0.7^{+0}_{-0.2}$	0.9Max.	$1.0^{+0}_{-0.2}$	1.25±0.2
Unit : mm (inch)	(.020±.002)	$\left(.028^{+0}_{-.008}\right)$	(.035Max.)	$\left(.039^{+0}_{-.008}\right)$	(.049±.008)

Class1 (For temperature compensation) Rated voltage 50V

Sizes		MCH21 (0805)			MCH31 (1206)			MCH32 (1210)		
Temperature characteristic		A (C0G)	UJ (U2J)	SL (−)	A (C0G)	UJ (U2J)	SL (−)	A (C0G)	UJ (U2J)	SL (−)
Capacitance	Tolerance									
910 (pF) 1000 1100	J (±5%) K (±10%)									
1200 1300 1500										
1600 1800 2000										
2200 2400 2700										
3000 3300 3600										
3900 4300 4700										
5100 5600 6200										
6800 7500 8200										
9100 10000 11000										
12000 13000 15000										
16000 18000 20000										
22000 24000 27000										
30000 33000 39000										

T Dimensions	$0.7^{+0}_{-0.2}$	$1.0^{+0}_{-0.2}$	$1.25^{+0}_{-0.2}$	1.25 ± 0.2
Unit : mm (inch)	$\left(.028^{+0}_{-.008}\right)$	$\left(.039^{+0}_{-.008}\right)$	$\left(.049^{+0}_{-.008}\right)$	$(.049 \pm .008)$

MCH Series

●Capacitance range

Class2 (High dielectric constant system) Rated voltage 25V・50V

Sizes		MCH15 (0402)				MCH18 (0603)						MCH21 (0805)			
Capacitance	Temperature chatacteristic	C (X7R)		F (Y5V)		C (X7R)		E (Z5U)		F (Y5V)		C (X7R)		E (Z5U)	
	Rated voltage (V)	50	25	50	25	50	25	50	25	50	25	50	25	50	25
	Tolerance (%)	K (±10) M (±20)	K (±10) M (±20)	Z (+80, −20)	Z (+80, −20)	K (±10) M (±20)	K (±10) M (±20)	Z (+80, −20)	Z (+80, −20)	Z (+80, −20)	Z (+80, −20)	K (±10) M (±20)	K (±10) M (±20)	Z (+80, −20)	Z (+80, −20)
100 (pF)															
120															
150															
180															
220		□				▨						▨			
270		□				▨						▨			
330		□				▨						▨			
390		□				▨						▨			
470		□				▨						▨			
560		□				▨						▨			
680		□				▨						▨			
820		□				▨						▨			
1000		□		□		▨		▨	▨	▨		▨			
1200		□				▨		▨	▨			▨			
1500		□				▨		▨	▨			▨			
1800		□				▨		▨	▨			▨			
2200		□		□		▨		▨	▨	▨		▨			
2700		□				▨		▨	▨			▨		▨	▨
3300		□				▨		▨	▨			▨		▨	▨
3900		□				▨		▨	▨			▨		▨	▨
4700			□	□		▨		▨	▨	▨		▨		▨	▨
5600			□			▨		▨	▨			▨		▨	▨
6800			□			▨		▨	▨			▨		▨	▨
8200						▨	▨	▨	▨			▨		▨	▨
10000				□		▨	▨	▨	▨	▨	▨	■		▨	▨
12000							▨					■		■	■
15000				□			▨					■		■	■
18000					□		▨					■		■	■
22000					□		▨			▨	▨	■		■	■
27000							▨					▨		■	■
33000					□		▨			▨		▨		■	■
39000												▨		■	■
47000											▨	▨	▨	▨	▨
56000													▨	▨	▨
68000													▨	▨	▨
82000													▨		
100000 (0.1 μF)											▨		▨		
120000													▨		
150000													▨		
180000															
220000															
270000															
330000															
390000															
470000															
560000															
680000															
1000000 (1 μF)															
1500000															
2200000															

□ ▭ ▨ ■ ▨

T Dimensions	0.5±0.05	$0.7^{+0}_{-0.2}$	0.9Max.	$1.0^{+0}_{-0.2}$	1.25±0.2
Unit : mm (inch)	(.020±.002)	$\left(.028^{+0}_{-.008}\right)$	(.035Max.)	$\left(.039^{+0}_{-.008}\right)$	(.049±.008)

Class2 (High dielectric costant system) Rated voltage 25V・50V

Sizes		MCH21 (0805)		MCH31 (1206)						MCH32 (1210)			
Capacitance	Temperature chatacteristic	F (Y5V)		C (X7R)		E (Z5U)		F (Y5V)		C (X7R)		F (Y5V)	
	Rated voltage (V)	50	25	50	25	50	25	50	25	50	25	50	25
	Tolerance (%)	Z (+80, -20)	Z (+80, -20)	K (±10) M (±20)	K (±10) M (±20)	Z (+80, -20)	Z (+80, -20)	Z (+80, -20)	Z (+80, -20)	K (±10) M (±20)	K (±10) M (±20)	Z (+80, -20)	Z (+80, -20)
100 (pF)													
120													
150													
180													
220													
270													
330													
390													
470													
560													
680													
820													
1000													
1200													
1500													
1800													
2200													
2700													
3300													
3900													
4700													
5600													
6800													
8200													
10000													
12000													
15000													
18000													
22000													
27000													
33000													
39000													
47000													
56000													
68000													
82000													
100000 (0.1 μF)													
120000													
150000													
180000													
220000													
270000													
330000													
390000													
470000													
560000													
680000													
1000000 (1 μF)													
1500000													
2200000													

T Dimensions $0.7^{+0}_{-0.2}$ $1.0^{+0}_{-0.2}$ $1.25^{+0}_{-0.2}$ 1.25 ± 0.2

Unit : mm (inch) $\left(.028^{+0}_{-.008}\right)$ $\left(.039^{+0}_{-.008}\right)$ $\left(.049^{+0}_{-.008}\right)$ $(.049\pm.008)$

☆ 16V Version

※ Available special order Thickness : 0.6mm Max.

MC Series

●Capacitance range

Class1 (For temperature compensation) Rated voltage 50V

Sizes		MC21 (0805)			MC31 (1206)		
Temperature characteristic		A (C0G)	UJ (N750)	SL (P350)	A (C0G)	UJ (N750)	SL (P350)
Capacitance	Tolerance						
1 (pF)	C (±0.25pF) D (±0.5pF)	■		■	■		■
1.2		■		■	■		■
1.5		■		■	■		■
1.8		■		■	■		■
2.2		■		■	■		■
2.7		■		■	■		■
3.3		■		■	■		■
3.9		■		■	■		■
4.7		■		■	■		■
5.6		■		■	■		■
6.8	C (±0.25pF) D (±0.5pF) F (±1.0pF)	■		■	■		■
8.2		■		■	■		■
10		■	■	■	■		■
11	J (±5%) K (±10%)	■	■	■	■		■
12		■	■	■	■		■
13		■	■	■	■		■
15		■	■	■	■		■
16		■	■	■	■		■
18		■	■	■	■		■
20		■	■	■	■		■
22		■	■	■	■		■
24		■	■	■	■		■
27		■	■	■	■		■
30		■	■	■	■		■
33		■	■	■	■		■
36		■	■	■	■		■
39		■	■	■	■		■
43		■	■	■	■		■
47		■	■	■	■		■
51		■	■	■	■		■
56		■	■	■	■		■
62		■	■	■	■		■
68		■	■	■	■		■
75		■	■	■	■		■
82		■	■	■	■		■
91		■	■	■	■		■
100		■	■	■	■	■	■
110		■	■	■	■	■	■
120		■	■	■	■	■	■
130		■	■	■	■	■	■
150		■	■	■	■	■	■
160		■	■	■	■	■	■
180		■	■	■	■	■	■
200		■	■	■	■	■	■
220		■	■	■	■	■	■
240		■	■	■	■	■	■
270		■	■	■	■	■	■
300		■	■	■	■	■	■
330		■	■	■	■	■	■
360		■	■	■	■	■	■
390		■	■	■	■	■	■
430		■	■	■	■	■	■
470		■	■	■	■	■	■
510		■	■	■	■	■	■
560		■	■	■	■	■	■
620		■	■	■	■	■	■
680		■	■	■	■	■	■
750		■	■	■	■	■	■
820		■	■	■	■	■	■

■ ■ ■

T Dimensions $0.7^{+0}_{-0.2}$ $1.0^{+0}_{-0.2}$ $1.25^{+0}_{-0.2}$

Unit : mm (inch) $\left(.028^{+0}_{-.008}\right)$ $\left(.039^{+0}_{-.008}\right)$ $\left(.049^{+0}_{-.008}\right)$

Class1 (For temperature compensation) Rated voltage 50v

Sizes		MC21 (0805)			MC31 (1206)			MC32 (1210)			MC43 (1812)	MC53 (2212)
Temperature characteristic		A (C0G)	UJ (U2J)	SL (−)	A (C0G)	UJ (U2J)	SL (−)	A (C0G)	UJ (U2J)	SL (−)	A (C0G)	A (C0G)
Capacitance	Tolerance											
910 (pF) 1000 1100	J (±5%) K (±10%)											
1200 1300 1500												
1600 1800 2000												
2200 2400 2700												
3000 3300 3600												
3900 4300 4700												
5100 5600 6200												
6800 7500 8200												
9100 10000 11000												
12000 13000 15000												
16000 18000 20000												
22000 24000 27000												
30000 33000 39000												

T Dimensions

$0.7^{+0}_{-0.2}$	$1.0^{+0}_{-0.2}$	$1.25^{+0}_{-0.2}$	1.25 ± 0.2
$\left(.028^{+0}_{-.008}\right)$	$\left(.039^{+0}_{-.008}\right)$	$\left(.049^{+0}_{-.008}\right)$	$(.049\pm.008)$

Unit : mm (inch)

MC Series

●Capacitance range

Class2 (High dielectric constant system) Rated voltage 25V・50V

Sizes		MC21 (0805)					
Capacitance	Temperature characteristic	C (X7R)		E (Z5U)		F (Y5V)	
	Rated voltage (V)	50	25	50	25	50	25
	Tolerance (%)	K (±10) M (±20)	K (±10) M (±20)	Z (+80, −20)	Z (+80, −20)	Z (+80, −20)	Z (+80, −20)
100 (pF) 120 150 180 220							
270 330 390							
470 560 680							
820 1000 1200							
1500 1800 2200							
2700 3300 3900							
4700 5600 6800							
8200 10000 12000							
15000 18000 22000							
27000 33000 39000							
47000 56000 68000							
82000 100000 (0.1 μF) 120000							
150000 180000 220000							
270000 330000 390000							
470000 560000 680000							
1000000 (1 μF) 1500000 2200000							

T Dimensions

	$0.7^{+0}_{-0.2}$	$1.0^{+0}_{-0.2}$	1.25 ± 0.2
Unit : mm (inch)	$\left(.028^{+0}_{-.008}\right)$	$\left(.039^{+0}_{-.008}\right)$	$(.049 \pm .008)$

Class2 (High dielectric constant system) Rated voltage 25V・50V

Sizes		MC31 (1206)						MC32 (1210)				MC43 (2212)	
Capacitance	Temperature chatacteristic	C (X7R)		E (Z5U)		F (Y5V)		C (X7R)		F (Y5V)		C (X7R)	F (Y5V)
	Rated voltage (V)	50	25	50	25	50	25	50	25	50	25	50	50
	Tolerance (%)	K (±10) M (±20)	K (±10) M (±20)	Z (+80, -20)	Z (+80, -20)	Z (+80, -20)	Z (+80, -20)	K (±10) M (±20)	K (±10) M (±20)	Z (+80, -20)	Z (+80, -20)	K (±10) M (±20)	Z (+80, -20)
100 (pF) 120 150 180 220													
270 330 390													
470 560 680													
820 1000 1200													
1500 1800 2200													
2700 3300 3900													
4700 5600 6800													
8200 10000 12000													
15000 18000 22000													
27000 33000 39000													
47000 56000 68000													
82000 100000 (0.1μF) 120000													
150000 180000 220000							※ ※				※		
270000 330000 390000											※		
470000 560000 680000													
1000000 (1μF) 1500000 2200000													

T Dimensions: $0.7^{+0}_{-0.2}$ $1.0^{+0}_{-0.2}$ $1.25^{+0}_{-0.2}$

Unit : mm (inch) $\left(.028^{+0}_{-.008}\right)$ $\left(.039^{+0}_{-.008}\right)$ $\left(.049^{+0}_{-.008}\right)$

※Available special order Thickness : 0.6mm Max.

MC Series

●Capacitance range

Class2 (High dielectric constant system) Rated voltage 25V・50V

Sizes		MC53 (2212)		MC21 (0805)	MC31 (1206)	MC32 (1210)
Capacitance	Temperature characteristic	C (X7R)	F (Y5V)	T (−)		
	Rated voltage (V)	50	50	25	25	25
	Tolerance (%)	K (±10) M (±20)	Z (+80, −20)	P Q	P Q	P Q
100 (pF) 120 150 180 220						
270 330 390						
470 560 680						
820 1000 1200						
1500 1800 2200						
2700 3300 3900						
4700 5600 6800						
8200 10000 12000						
15000 18000 22000						
27000 33000 39000						
47000 56000 68000						
82000 100000 (0.1 μF) 120000						
150000 180000 200000 220000						
270000 330000 390000						
470000 560000 680000						
1000000 (1 μF) 1500000 2200000						

T Dimensions

	$0.7^{+0}_{-0.2}$	0.8Max.	$1.25^{+0}_{-0.2}$
Unit : mm (inch)	$\left(.028^{+0}_{-.008}\right)$	(.031Max.)	$\left(.049^{+0}_{-.008}\right)$

MC Series (500 volt capacitors)

●Capacitance range

Rated voltage 500V

Sizes		MC32 (1210)		MC43 (1812)	
Capacitance	Temperature characteristic	A (C0G)	C (X7R)	A (C0G)	C (X7R)
	Rated voltage (V)	500	500	500	500
	Tolerance (%)	J (±5) K (±10)	K (±10) M (±20)	J (±5) K (±10)	K (±10) M (±20)
10 (pF) 12 15					
18 22 27					
33 39 47					
56 62 68		□□□□□ □□□□□ □□□□□			
75 82 91		□□□□□ □□□□□ □□□□□			
100 110 120		□□□□□ □□□□□ □□□□□		□□□□□ □□□□□ □□□□□	
130 150 160		□□□□□ □□□□□		□□□□□ □□□□□ □□□□□	
180 200 220				□□□□□ □□□□□ □□□□□	
240 270 300				□□□□□ □□□□□ □□□□□	
330 360 390				□□□□□	
430 470 510			□□□□□		
560 620 680			□□□□□ □□□□□		
750 820 910			□□□□□		
1000 1100 1200			□□□□□		□□□□□ □□□□□
1300 1500 1600					□□□□□
1800 2000 2200					□□□□□ □□□□□

Note : Please consult for Custom specifications for chip size, characteristics and capacitance.

T Dimensions □□□□□ 1.5±0.2

Unit : mm (inch) (.059±.008)

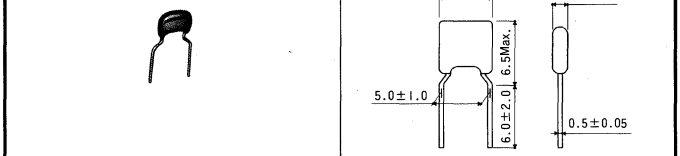
SR Series

Small size but high capacitance with various forming and lead pitches. Compatible with radial taping package.

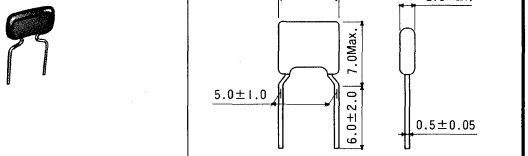
●Dimensions

(Unit : mm)

SR24



SR58



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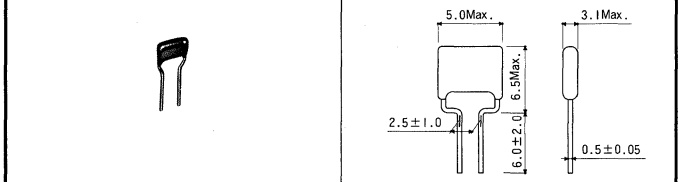

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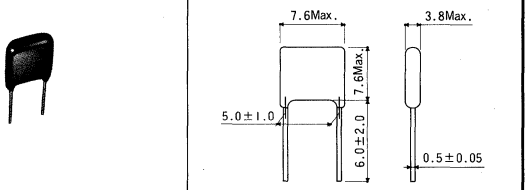
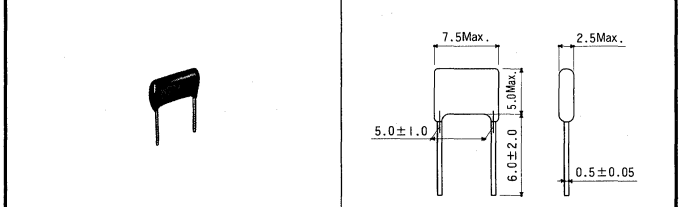
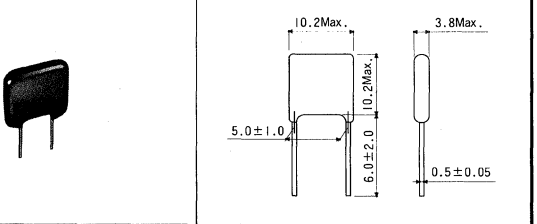


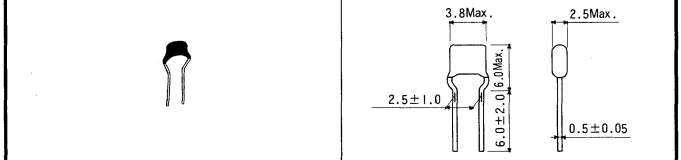
SR31



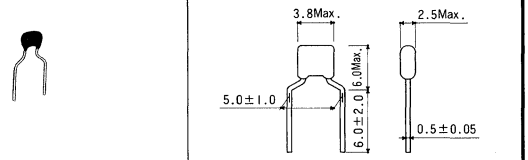
SR40



SRA2



SRA5



●Product Designation

In picofarads, given by a three-digit number, the first two digits are significant digits and the last digit gives the number of zeros. The position of a decimal point is identified by the letter R.

Example. 331 : 330pF, 472 : 4, 700pF, 1R5 : 1.5pF, 010 : 1pF, R75 : 0.75pF

Series name		Shape,Dimensions		Capacitance code					
S	R	2	4	5	F	1	0	4	Z	B	6

Rated voltage

Symbol	Voltage
5	50V
2	25V

Capacitance-temperature characteristics

Code ROHM	Code EIA	Operating Temperature Range	Temp. Coefficient or percent Change
A	C0G	−55～+125°C	0±30ppm/°C
C	X7R	−55～+125°C	±15%
E	Z5U	+10～+ 85°C	+22,−56%
F	Y5V	−30～+ 85°C	+22,−82%

Capacitance tolerance

Symbol	Tolerance	Application
J	±5%	Characteristic A
K	±10%	Characteristic A, C
M	±20%	Characteristic C
Z	+80, −20%	Characteristic F

Packaging specifications

Symbol	Description
B	Box packaging
No Symbol	Bulk

Ho dimensions (for tape-packed models only)

Symbol	Description
6	16±0.5mm

●Packaging

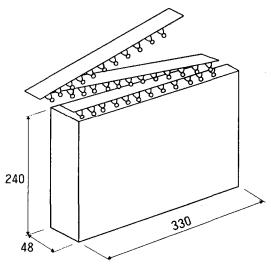
Sizes		Packaging type		Packaging condition	Code	Basic ordering unit	Rank
SR	24	Bulk		Polyethylene bag	–	5,000	◎
		Radial taping	5mm pitch	Ammo box	B6	2,000	◎
	29	Bulk		Polyethylene bag	–	5,000	◎
		Radial taping	2.5mm pitch	Ammo box	B6	2,000	◎
	31	Bulk		Polyethylene bag	–	5,000	◎
		Radial taping	5mm picth	Ammo box	B6	2,000	◎
	58	Bulk		Polyethylene bag	–	5,000	◎
		Radial taping	5mm picth	Ammo box	B6	2,000	◎
	30	Bulk		Polyethyene bag	–	2,000	◎
		Radial taping	5mm picth	Ammo box	B6	2,000	◎
	40	Bulk		Polyethylene bag	–	1,000	◎
		Radial taping	5mm pitch	Ammo box	B6	1,500	◎
	A2	Bulk		Polyethyene bag	–	5,000	◎
		Radial taping	2.5mm picth	Ammo box	B6	2,000	◎
	A5	Bulk		Polyethylene bag	–	5,000	◎
		Radial taping	5mm pitch	Ammo box	B6	2,000	◎

◎ : Standard Products

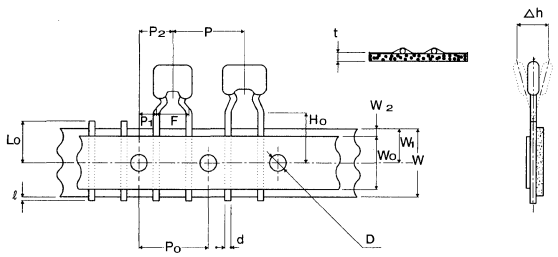
●Packaging specifications

(Unit : mm)

Box packaging

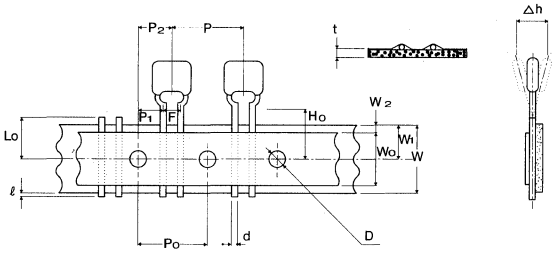


5mm Pitch Taping



Symbol	P	P_0	P_1	P_2	d	F	Δh	W	W_0	W_1	W_2	H_0	ℓ	D	t	L_0
Dimension	12.7	12.7	3.85	6.35	0.5	5.0	0	18	13	9	1.5	16	1.0	4.0	0.7	11
Tolerance	±1	±0.3	±0.7	±1.3	±0.05	±1	±2	$^{+1}_{-0.5}$	±1	±0.5	±1.5	±0.5	Max.	±0.2	±0.2	Max.

2.5mm Picth Taping



Symbol	P	P_0	P_1	P_2	d	F	Δh	W	W_0	W_1	W_2	H_0	ℓ	D	t	L_0
Dimension	12.7	12.7	5.1	6.35	0.5	2.5	0	18	13	9	1.5	16	1.0	4.0	0.7	11
Tolerance	±1	±0.3	±0.7	±1.3	±0.05	±1	±2	$^{+1}_{-0.5}$	±1	±0.5	±1.5	±0.5	Max.	±0.2	±0.2	Max.

SR Series

●Capacitance range A Characteristic (C0G/NPO)

Sizes	SR24	SR29	SR30	SR40
Capacitance (pF) \ Rated V (DC)	50	50	50	50
1 2 1.5 3				
4 6 8 5 7 9				
10 12 15 11 13 16				
18 22 27 20 24 30				
33 39 47 36 43 51				
56 68 82 62 75 91				
100 120 150 110 130 160				
180 220 270 200 240 300				
330 390 470 360 430 510				
560 680 820 620 750 910				
1,000 1,200 1,500 1,100 1,300 1,600				
1,800 2,200 2,700 2,000 2,400 3,000				
3,300 3,900 4,700 3,600 4,300 5,100				
5,600 6,800 8,200 6,200 7,500 9,100				
10,000 12,000 15,000 11,000 13,000 16,000				
18,000 22,000 27,000 20,000 24,000 30,000				
33,000 39,000 36,000				

●Capacitance range C Characteristic (X7R)

Sizes	SR24	SR29	SR30	SR40
Capacitance (pF) \ Rated V (DC)	50	50	50	50
100				
120				
150				
180				
220				
270				
330				
390				
470				
560				
680				
820				
1,000	■	■		
1,200	■	■		
1,500	■	■		
1,800	■	■		
2,200	■	■		
2,700	■	■		
3,300	■	■		
3,900	■	■		
4,700	■	■		
5,600	■	■		
6,800	■	■		
8,200	■	■		
10,000	■	■		
12,000	■	■		
15,000	■	■		
18,000	■	■		
22,000	■	■		
27,000	■	■		
33,000	■	■		
39,000	■	■		
47,000	■	■		
56,000	■	■		
68,000	■	■		
82,000	■	■		
100,000	■	■		
120,000	■	■		
150,000			■	
180,000			■	
220,000			■	
270,000			■	
330,000			■	
390,000			■	
470,000			■	
560,000				■
680,000				■
820,000				■
1,000,000				■

SR Series

●Capacitance range E Characteristics (Z5V)

Sizes	SR24	SR29	SR31		SR58		SR30	SR40
Capacitance (pF) \ Rated V (DC)	50	50	25	50	25	50	50	50
6,800								
10,000	■	■						
15,000	■	■						
22,000	■	■						
33,000	■	■						
47,000	■	■						
68,000	■	■						
100,000	■	■						
150,000	■	■						
220,000								
330,000			■	■	■	■	■	
470,000			■	■	■	■	■	
680,000								
1,000,000							■	■
1,500,000							■	■
2,200,000								■
3,300,000								■
4,700,000								

●Capacitance range F Characteristics (Y5V)

Sizes	SRA2	SRA5	SR24	SR29	SR31		SR58		SR30	SR40
Cap (pF) \ RatedV (DC)	50	50	50	50	25	50	25	50	50	50
6,800										
10,000			■	■						
15,000										
22,000			■	■						
33,000										
47,000			■	■						
68,000										
100,000	■	■	■	■						
150,000										
220,000			■	■						
330,000										
470,000			■	■						
680,000										
1,000,000						■		■	■	
1,500,000					■		■		■	
2,200,000										■
3,300,000										
4,700,000										■

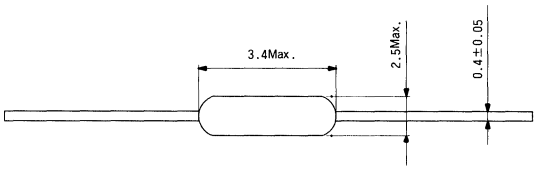
Multi-Layer Ceramic Capacitors

SA Series

Small size but high capacitance and compatible with axial taping package.

(Unit : mm)

SA05



●Product Designation

Symbol	Voltage
5	50V

Rated voltage

In picofarads, given by a three-digit number, the first two digits are significant digits and the last digit gives the number of zeros. The position of a decimal point is identified by the letter R.

Example. 331 : 330pF, 472 : 4, 700pF, 1R5 : 1.5pF, 010 : 1pF, R75 : 0.75pF

Capacitance code

Symbol	Description
B	Box packaging

Packaging specifications

S	A	0	5	5	F	1	0	4	Z	B	2

Series name

Shape,Dimensions

Capacitance−temperature characterisric

Symbol	Operating temperature (℃)	Temperature coefficient or percent change
C	−55～+125	±15%
F	−30～+85	+22%, −82%

Capacitance tolerance

Symbol	Tolerance (Series)
K	±10%(E12)
Z	+80, −20%(E3)

Inner tape width W.

Symbol	Description
2	26mm Wide
5	52mm Wide

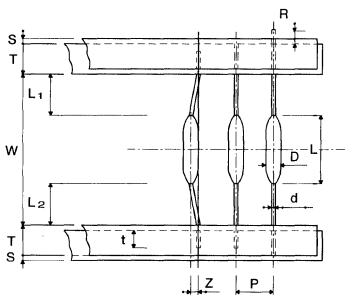
●Packaging

Cap.Type	Packaging type		Packaging condition	Code	Basic ordering unit	Rank
SA05	Axial taping	52mm Wide	Ammo box	B5	5,000	◎
		26mm Wide	Ammo box	B2	5,000	◎

◎ : Standard products

●Packaging specifications

(Unit : mm)



		26mm	52mm
L	Length	3.4Max.	
D	Outer diameter	2.5Max.	
d	Lead wire diameter	0.4±0.05	
L_2-L_1	Off−center	1.5Max.	
P	Pitch	5.0±0.5	
R	Lead wire projection	0Max.	
S	Tape shift	0.8Max.	
T	Tape width	6.0±1.0	
W	Inner tape width	$26^{+1.5}_{-0}$	$52^{+2.0}_{-1.0}$
t	Lead wire projection	3.2Min.	
z	Lead wire curvature	1.2Max.	

●Capacitance range SA05 (50V)

Cap (pF) \ Characteristics	C (X7R)	E (Z5U)	F (Y5V)
1,000 1,200 1,500 1,800 2,200 2,700	■ ■ ■ ■ ■ ■	■	
3,300 3,900 4,700 5,600 6,800 8,200	■ ■ ■ ■ ■ ■	■ ■ ■ ■ ■ ■	
10,000 12,000 15,000 18,000 22,000 27,000 33,000 39,000 47,000 56,000 68,000 100,000	■ ■ ■ ■	■ ■ ■ ■ ■ ■ ■ ■ ■ ■	■ ■ ■ ■

MEMO

Memory Cards • Circuit Protection Elements

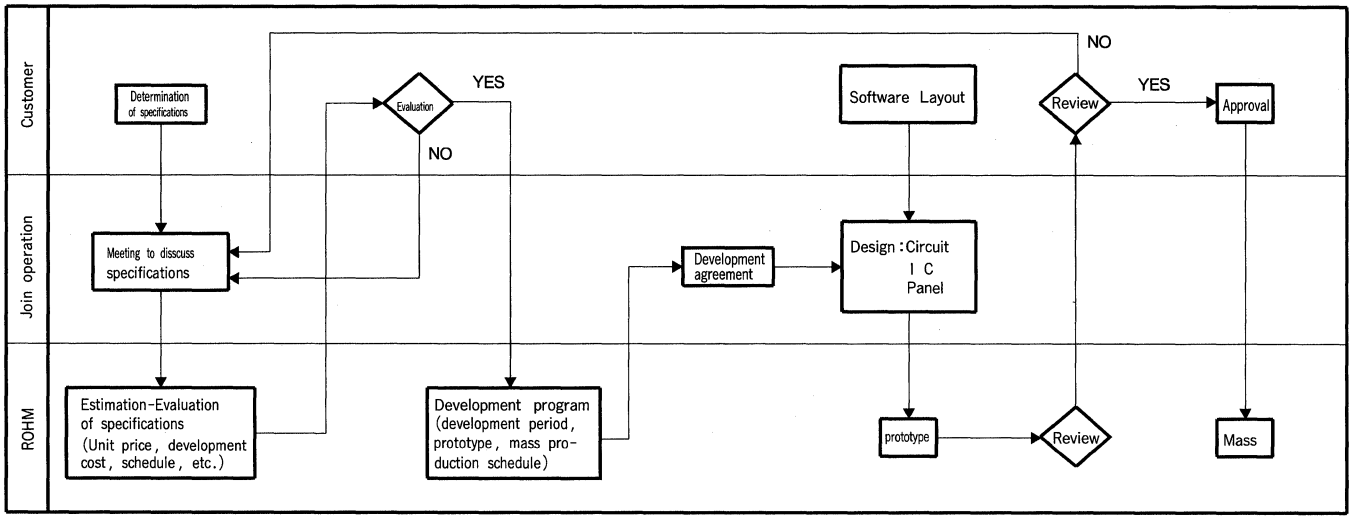
Memory Cards

Various high quality memory cards from ROHM products

ROHM offers many series of memory cards so that you can select specific memory card that best matches your system requirements, including size (full, 2/3 and half sizes) They have excellent environmental resistance, meaning that the cards can be used under severe temperature, humidity and dusty conditions. The cards can be plugged in/out many times and boast fast access time. The SRAM cards are equipped with source voltage detector which assures the data to be retained by the use of internal backup battery.

●ROHM's Custom Memory Cards

ROHM also offers custom memory cards. These function-intensive memory cards are developed in the sequence shown below. A variety of functions and configurations can be readily customized to cover the extensive needs of both consumer and industrial applications.



●Line Up

		Pin No.	Data width (bits)	Memory Capacity (Byte) 32K Byte	64K Byte	128K Byte	256K Byte	512K Byte	1M Byte	1.5M Byte	2M Byte	3M Byte	4M Byte	6M Byte	8M Byte	
MASK ROM	Full Size	68	16					RC-512J-MG RC-512J-MH RC-512J-MI	RC-M01J-MG RC-M01J-MH RC-M01J-MI	RC-F15J-MG RC-F15J-MH RC-F15J-MI	RC-M02J-MG RC-M02J-MH RC-M02J-MI	RC-M03J-MG RC-M03J-MH RC-M03J-MI	RC-M04J-MG ☆		RC-M08J-MG ☆	Note.1
	Full Size (PCMCIA)	68	16/8					RC-512J-MB	RC-M01J-MB	RC-F15J-MB	RC-M02J-MB		RC-M04J-MB	RC-M06J-MB		
	Half Size (Z)	40	8					RC-512Z-MB	RC-M01Z-MB		RC-M02Z-MB					
OTP ROM	Full Size (PCMCIA)	68	16/8					RC-512J-QD	RC-M01J-QD	RC-F15J-QD	RC-M02J-QD	RC-M03J-QD				
FLASH	Full Size (PCMCIA)	68	16/8				RC-256J-EF	RC-512J-EF	RC-M01J-EF		RC-M02J-EF	RC-M03J-EF	RC-M04J-EF		☆	
	Half Size (Z)	40	8			RC-128Z-EB	RC-256Z-EB	RC-512Z-EB	RC-M01Z-EB							
	2/3 Size	45	8			RC-128W-EB	RC-256W-EB									
DRAM	Full Size	68	16								RC-M02J-DB		RC-M04J-DB	RC-M06J-DB		
	Half Size (Y)	40	16								RC-M02Y-DA		RC-M04Y-DA			
	Full Size	40	16						RC-M01J-DA		RC-M02J-DA		RC-M04J-DA		RC-M08J-DA	
SRAM	Half Size (PCMCIA)	68	16/8		RC-064J-SF	RC-128J-SF	RC-256J-SF	RC-512J-SF	RC-M01J-SF	☆	☆RC-M02J-SF					Note.2
	Half Size (Z)	40	8	RC-032Z-SB	RC-064Z-SB	RC-128Z-SB	RC-256Z-SB									
MODEM	Full Size (PCMCIA Rel 2,type II)	68		☆												Note.4

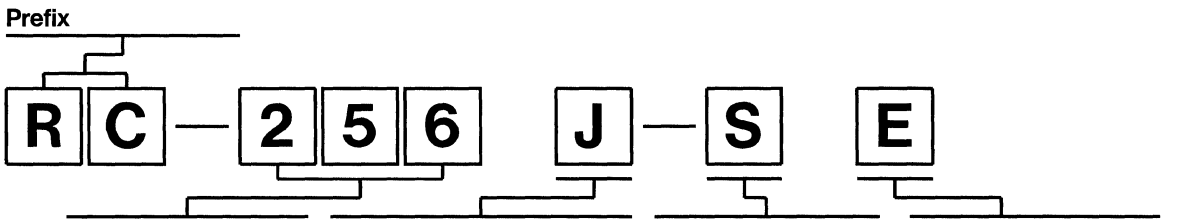
Note:1.* Under development

2.Model name subscript :MG=no attribute, MH=8K-byte attribute, MI=attribute "FF" returned.

3.Model name subscript :SE=attribute 5 bytes fixed, SF=attribute 5 bytes fixed, SH=attribute 2 Kbytes, SJ=attribute FF returned.

4.With FAX function (class 2)

●Product designation



Capacity of memory

032	32K
064	64K
128	128K
256	256K
512	512K
M01	1M
F15	1.5M
M02	2M
M03	3M
M04	4M
M06	6M
M08	8M

Use the letter "F" to represent 100K Byte in a range below 10M Byte

Physical size

J	68pin 3.3mm thickness Full size.
J	40pin 3.3mm thickness Full size.
Y	40pin 3.3mm thickness Half size.
Z	40pin 2.2mm thickness Half size.
W	45pin 2.1mm thickness 2/3 size.

Type of memory

M	MASK ROM
Q	OTPROM EPROM
E	EEPROM FLASH
D	DRAM
S	SRAM

Electrical specifications

A~Z	Standard specifications
0~9	Custom specifications

●MASK ROM

Application	Package	Pin count	Part No.	Capacity (K Byte)	Data width (bit)	Access Time (ns)
＊Video game programs ＊Program memory (spread sheet, word processor,etc.) for PCs and hand-held computers. and data. ＊Dictionaries ＊Educational software ＊Font card for typewriters and printers.	Full size	68 Pin PCMCIA downward compatible	**RC-512J-MG** **RC-512J-MH** **RC-512J-MI**	512	16	200
			RC-M01J-MG **RC-M01J-MH** **RC-M01J-MI**	1024		
			RC-F15J-MG **RC-F15J-MH** **RC-F15J-MI**	1536		
			RC-M02J-MG **RC-M02J-MH** **RC-M02J-MI**	2048		
			RC-M03J-MG **RC-M03J-MH** **RC-M03J-MI**	3072		
			RC-M04J-MG ☆**RC-M04J-MH** ☆**RC-M04J-MI**	4096		
			RC-M08J-MG ☆**RC-M08J-MH** ☆**RC-M08J-MI**	8192		
	Full size	68 Pin PCMCIA Release2	**RC-512J-MB**	512	8/16	250
			RC-M01J-MB	1024		
			RC-F15J-MB	1536		
			RC-M02J-MB	2048		
			RC-M04J-MB	4096		
			RC-M06J-MB	6144		
	Half size Z Series	40 Pin	**RC-512Z-MB**	512	8	200
			RC-M01Z-MB	1024		
			RC-M02Z-MB	2048		

Notes:1.☆Under development
2.Model name subscript :MG=no attribute, MH=8K-byte attribute, MI=attribute "FF" returned.

Memory Cards

●OTP ROM

Application	Package	Pin count	Part No.	Capacity (K Byte)	Data length (Bit)	Access time (ns)
*Program memory for parsonal computer, hand held computer,etc. *Electronic clinical charts	Full size	68 Pin PCMCIA: Release2	**RC-512J-QD**	512	8/16	250
			RC-M01J-QD	1024		
			RC-F15J-QD	1536		
			RC-M02J-QD	2048		
			RC-M03J-QD	3072		

●FLASH

Application	Package	Pin count	Part No.	Capacity (K Byte)	Data length (Bit)	Access time (ns)
*Image memory for electronic still cameras *Hard disc alternative for PCs. *Memory for electronic musical instruments. *Control program data storage for industrial equipment	Full size	68 Pin PCMCIA: Release2	**RC-256J-EF**	256	8/16	250
			RC-512J-EF	512		
			RC-M01J-EF	1024		
			RC-M02J-EF	2048		
			RC-M03J-EF	3072		
			RC-M04J-EF	4096		
			☆	8192		
	Half size Z Series	40 Pin	**RC-128Z-EB**	128	8	200
			RC-256Z-EB	256		
			RC-512Z-EB	512		
			RC-M01Z-EB	1024		
	2/3 Size	45 Pin	**RC-128W-EB**	128	8	200
			RC-256W-EB	256		

Note:1.☆Under development

●SRAM

Application	Package	Pin count	Part No.	Capacity (K Byte)	Data length (Bit)	Access time (ns)
*Floppy disk alternative for PCs. *Commodity information storage for POS terminals. *Wave form storage for oscilloscopes.	Full size	68 Pin PCMCIA: Release2	**RC-064J-SF**	64	8/16	250
			RC-128J-SF	128		
			RC-256J-SF	256		
			RC-512J-SF	512		
			RC-M01J-SF	1024		
			☆	1536		
			☆**RC-M02J-SF**	2048		
	Half size Z Series	40 Pin	**RC-032Z-SB**	32	8	200
			RC-064Z-SB	64		
			RC-128Z-SB	128		
			RC-256Z-SB	256		

Note:1.* Under development

2.Model name subscript:MG=no attribute, MH=8K-byte attribute, MI=attribute "FF" returned.

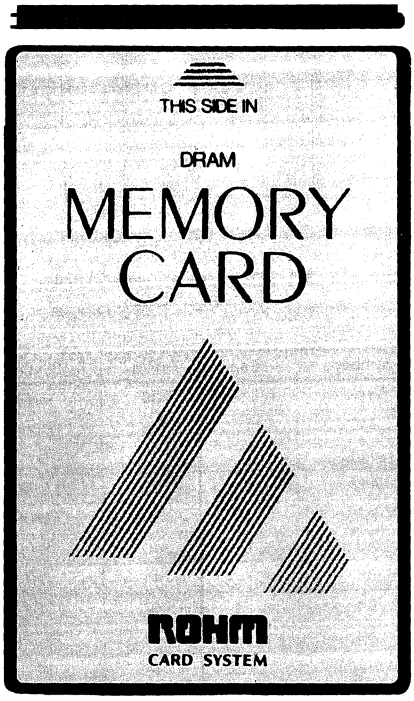
●DRAM

Application	Package	Pin count	Part No.	Capacity (K Byte)	Data length (Bit)	Access time (ns)
*Additional storage for PCs. *Temporary storage for facsimile. *Memory for Printer buffer.	Full Size	68 Pin	**RC-M02J-DB**	2048	16	100
			RC-M04J-DB	4096		
			RC-M06J-DB	6144		
	Half Size Y Series	40 Pin	**RC-M02Y-DA**	2048	16	100
			RC-M04Y-DA	4096		
	Full Size	40 Pin	**RC-M01J-DA**	1024	16	150
			RC-M02J-DA	2048		
			RC-M04J-DA	4096		
			RC-M08J-DA	8192		

Note:1.Verify attribute for model with subscript "DB".

●Dimensions


THIS SIDE IN
DRAM
MEMORY
CARD
ROHM
CARD SYSTEM


THIS SIDE IN
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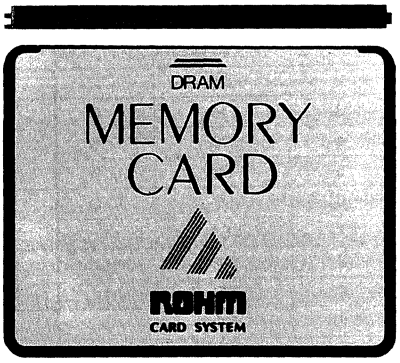
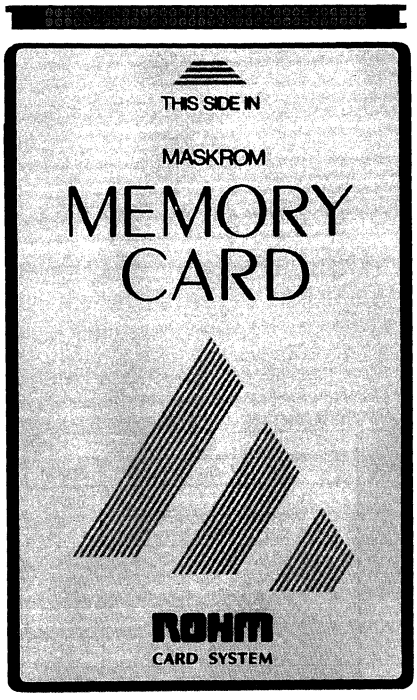
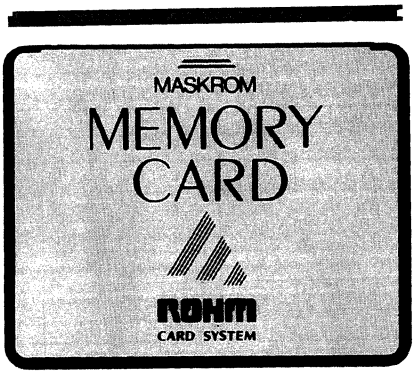
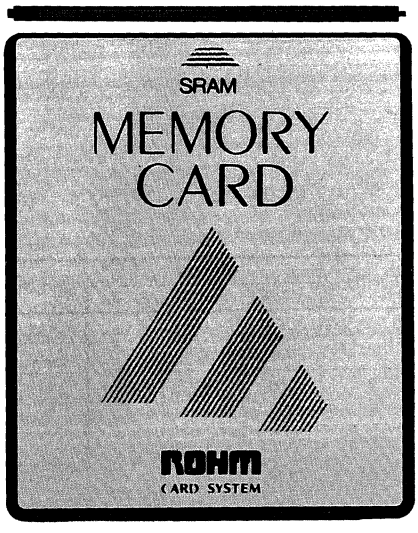
MEMORY
CARD
ROHM
CARD SYSTEM


DRAM
MEMORY
CARD
ROHM
CARD SYSTEM


THIS SIDE IN
MASKROM
MEMORY
CARD
ROHM
CARD SYSTEM

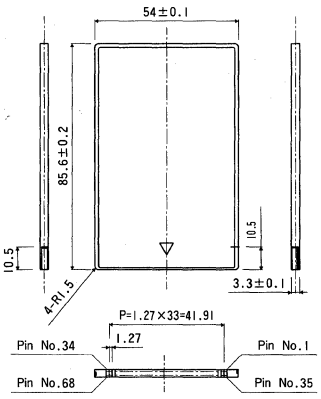

MASKROM
MEMORY
CARD
ROHM
CARD SYSTEM


SRAM
MEMORY
CARD
ROHM
CARD SYSTEM

●Dimensions and Pin Disposition

(Unit : mm)

Full Size 68Pin (PCMCIA Specification)

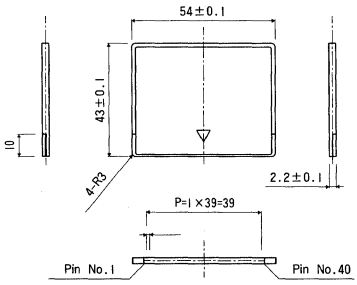


SF/SJ Attribute information

	Address	Output data	Description
SF	0h	01h	Device information at the next address
	2h	FFh	No other attribute information
	4h	61h	Memory:SRAM, Access time:250ns
	6h	XXh	Memory capacity
	8h	FFh	End of device information
SJ	0h	FFh	No attribute information

Pin No.	Symbol	Note	Pin No.	Symbol	Note	Pin No.	Symbol	Note	Pin No.	Symbol	Note
1	GND		18	Vpp1		35	GND		52	Vpp2	
2	D3	I/O	19	A16	I	36	CD1-	O	53	A22	I
3	D4	I/O	20	A15	I	37	D11	I/O	54	A23	I
4	D5	I/O	21	A12	I	38	D12	I/O	55	A23	I
5	D6	I/O	22	A7	I	39	D13	I/O	56	A25	I
6	D7	I/O	23	A6	I	40	D14	I/O	57	RFU	N.C
7	CE1-	I	24	A5	I	41	D15	I/O	58	RFU	N.C
8	A10	I	25	A4	I	42	CE2-	I	59	RFU	N.C
9	OE-	I	26	A3	I	43	RFSH-	I	60	RFU	N.C
10	A11	I	27	A2	I	44	RFU	N.C	61	REG-	I
11	A9	I	28	A1	I	45	RFU	N.C	62	BVD2	O
12	A8	I	29	A0	I	46	A17	I	63	BVD1	O
13	A13	I	30	D0	I/O	47	A18	I	64	D8	I/O
14	A14	I	31	D1	I/O	48	A19	I	65	D9	I/O
15	WE-/PGM-	I	32	D2	I/O	49	A20	I	66	D10	I/O
16	RDY/BSY-	O	33	WP	O	50	A21	I	67	CD2-	O
17	Vcc		34	GND		51	Vcc		68	GND	

Half Size 40 Pin (Z Series)

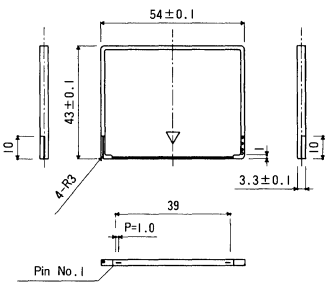


Pin No.	Symbol			Pin No.	Symbol			Pin No.	Symbol			Pin No.	Symbol		
	MASK	FLASH	SRAM		MASK	FLASH	SRAM		MASK	FLASH	SRAM		MASK	FLASH	SRAM
1	CA1	←	←	11	D6	←	←	21	A5	←	←	31	N.C	WE-	BWR-
2	Vss	←	←	12	A13	←	←	22	D5	←	←	32	OE-	←	←
3	Vdd	←	←	13	A12	←	←	23	D4	←	←	33	D1	←	←
4	A14	←	←	14	A11	←	←	24	N.C	←	DET-	34	D0	←	←
5	A15	←	←	15	A10	←	←	25	D3	←	←	35	CE-	←	←
6	A16	←	←	16	A9	←	←	26	D2	←	←	36	A19	←	N.C
7	A17	←	←	17	A18	←	N.C	27	A4	←	←	37	A20	N.C	N.C
8	N.C	←	LB-	18	A8	←	←	28	A3	←	←	38	Vdd	Vpp	Vdd
9	A0	←	←	19	A7	←	←	29	A2	←	←	39	Vss	←	←
10	D7	←	←	20	A6	←	←	30	A1	←	←	40	CA2	←	←

●Dimensions And Pin Dispositions

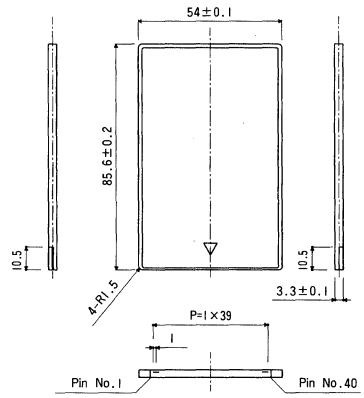
(Unit : mm)

Half Size 40Pin (Y Series)



Pin No.	Symbol DRAM	Pin No.	Symbol DRAM	Pin No.	Symbol DRAM	Pin No.	Symbol DRAM
1	CD1-	11	GND	21	Vcc	31	A8
2	D3	12	CAS10-	22	A1	32	D0
3	D4	13	CAS11-	23	A2	33	D1
4	D5	14	RAS1-	24	A3	34	D2
5	D6	15	WE0-	25	A4	35	D11
6	D7	16	CAS00-	26	A5	36	D12
7	D8	17	CAS01-	27	A6	37	D13
8	D9	18	RAS0-	28	A7	38	D14
9	D10	19	A9	29	Vcc	39	D15
10	A0	20	WE1-	30	GND	40	CD2-

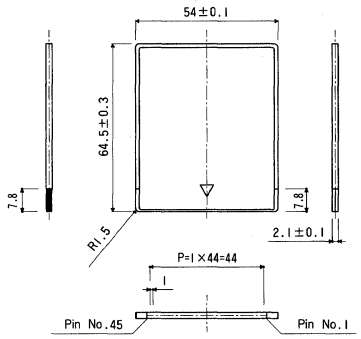
Full Size 40Pin



Pin No.	Symbol DRAM	Pin No.	Symbol DRAM	Pin No.	Symbol DRAM	Pin No.	Symbol DRAM
1	CD1-	11	GND	21	Vcc	31	A8
2	D3	12	CAS1-	22	A1	32	D0
3	D4	13	RAS3-	23	A2	33	D1
4	D5	14	RAS1-	24	A3	34	D2
5	D6	15	WE-	25	A4	35	D11
6	D7	16	CAS0-	26	A5	36	D12
7	D8	17	RAS2-	27	A6	37	D13
8	D9	18	RAS0-	28	A7	38	D14
9	D10	19	Vcc	29	GND	39	D15
10	A0	20	Vcc	30	GND	40	CD2-

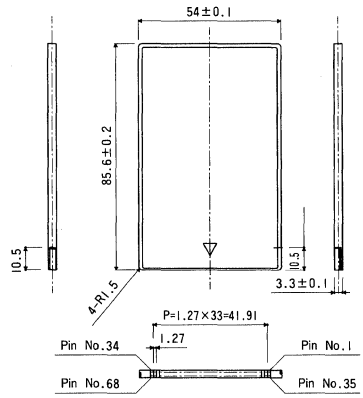
(Unit : mm)

2/3 Size 45Pin



Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol
	FLASH		FLASH		FLASH		FLASH
1	Vcc	13	A8	25	D3	37	N.C
2	N.C	14	A7	26	D4	38	N.C
3	N.C	15	A6	27	D5	39	A16
4	N.C	16	A5	28	D6	40	S1
5	Vpp	17	A4	29	D7	41	S2
6	A15	18	A3	30	CCE0-	42	N.C
7	A14	19	A2	31	N.C	43	N.C
8	A13	20	A1	32	CCE2-	44	N.C
9	A12	21	A0	33	N.C	45	GND
10	A11	22	D0	34	WE-		
11	A10	23	D1	35	OE-		
12	A9	24	D2	36	N.C		

Full Size 68Pin (DRAM)



Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol	Pin No.	Symbol
1	GND	18	N.C	35	GND	52	N.C
2	D3	19	CAS11-	36	CD1-	53	RAS2-
3	D4	20	CAS10-	37	D11	54	RAS3-
4	D5	21	N.C	38	D12	55	N.C
5	D6	22	A7	39	D13	56	N.C
6	D7	23	A6	40	D14	57	N.C
7	N.C	24	A5	41	D15	58	N.C
8	N.C	25	A4	42	N.C	59	N.C
9	N.C	26	A3	43	N.C	60	N.C
10	N.C	27	A2	44	N.C	61	N.C
11	A9	28	A1	45	N.C	62	N.C
12	A8	29	A0	46	CAS20-	63	N.C
13	N.C	30	D0	47	CAS21-	64	D8
14	N.C	31	D1	48	CAS30-	65	D9
15	WE-	32	D2	49	CAS31-	66	D10
16	N.C	33	N.C	50	RAS1-	67	CD2-
17	Vcc	34	GND	51	Vcc	68	GND

Circuit Protection Elements

●ROHM's Circuit Protection Elements

ROHM overcurrent protection elements are in lightweight, small package, offering low internal impedance against rated current, but high resistance against cut off current. They positively protect semiconductors such as ICs, LSIs, transistors when current is going to exceed the operating value due to overload or short circuit.

●Features

1) Sharp and stable cutoff response
2) Small voltage drop thanks to low internal resistance
3) Heat resistant
4) Small size
5) Can be continuously used at the rated current.
6) Better temperature characteristics
7) Surge resistant
8) UL approved (UL approval No. E107856)

●Application

Overcurrent protector

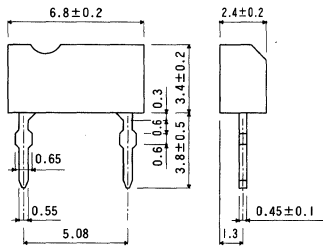
Part No.	Rated Current (A)	Cutoff	Internal Resistance Typ.(Ω)	Package	Rated Voltage (V)	Topr (°C)	Tstg (°C)
ICP-F10	0.4	Fig.4	0.220	Fig.1	50	−55～125	−55～125
ICP-F15	0.6	Fig.5	0.135				
ICP-F20	0.8	Fig.6	0.100				
ICP-F25	1.0	Fig.7	0.070				
ICP-F38	1.5	Fig.8	0.042				
ICP-F50	2.0	Fig.9	0.035				
ICP-F70	2.5	Fig.10	0.023				
ICP-N10	0.4	Fig.4	0.220	Fig.2			
ICP-N15	0.6	Fig.5	0.135				
ICP-N20	0.8	Fig.6	0.100				
ICP-N25	1.0	Fig.7	0.070				
ICP-N38	1.5	Fig.8	0.042				
ICP-N50	2.0	Fig.9	0.035				
ICP-N70	2.5	Fig.10	0.023				
ICP-S0.5	0.5	Fig.11	0.150	Fig.3			
ICP-S0.7	0.7	Fig.12	0.084				
ICP-S1.0	1.0	Fig.13	0.061				
ICP-S1.2	1.2	Fig.14	0.048				
ICP-S1.8	1.8	Fig.15	0.032				
ICP-S2.3	2.3	Fig.16	0.026				

●Dimensions

(Unit : mm)

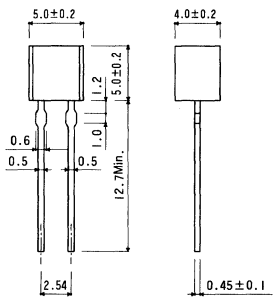
ICP-F10/F15/F20/F25/F38/F50/F70

Fig.1



ICP-N10/N15/N20/N25/N38/N50/N70

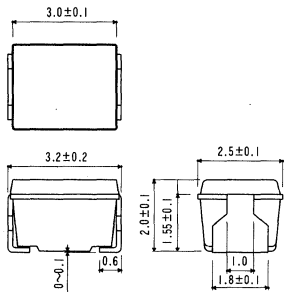
Fig.2



Taping version is available with pitch size 5.0mm

ICP-S0.5/S0.7/S1.0/S1.2/S1.8/S2.3

Fig.3



●Electrical Characteristic Curves

Flg.4 ICP F/N10

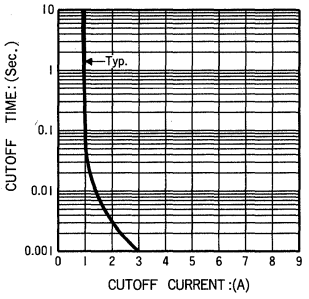


Fig.5 ICP F/N15

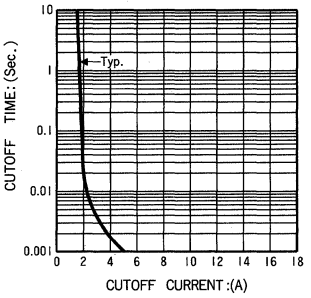
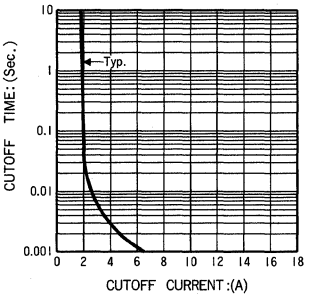


Fig.6 ICP F/N20



Flg.7 ICP F/N25

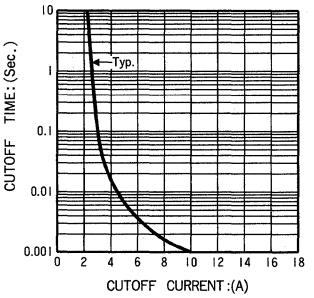


Fig.8 ICP F/N38

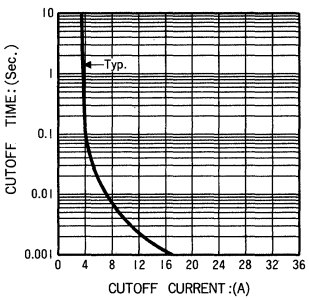
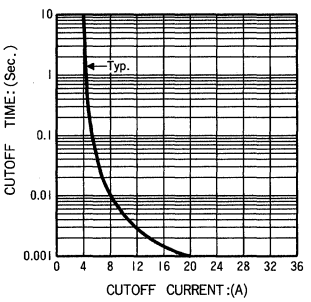
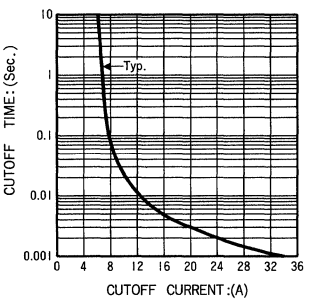


Fig.9 ICP F/N50



Flg.10 ICP F/N70



Flg.11 ICP S0.5

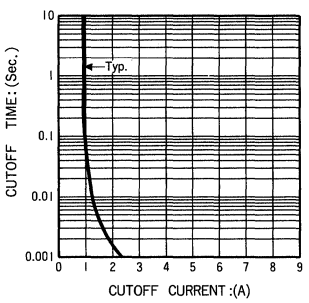


Fig.12 ICP S0.7

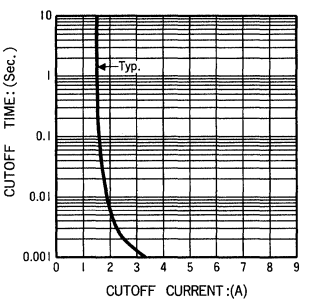
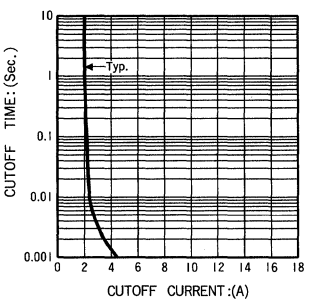


Fig.13 ICP S1.0



Flg.14 ICP S1.2

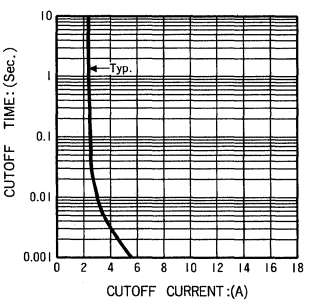


Fig.15 ICP S1.8

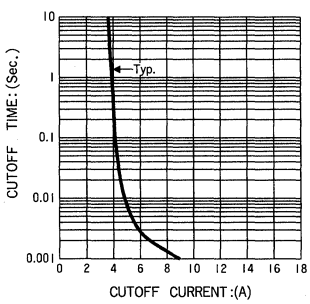
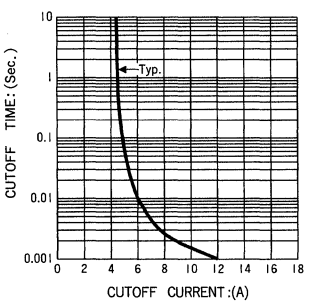


Fig.16 ICP S2.3

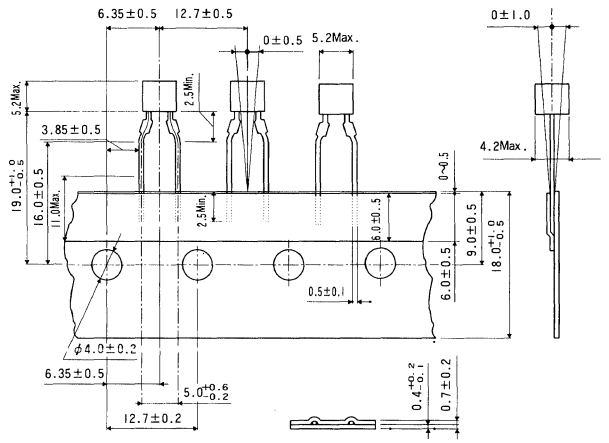


These figures show typical cutoff characteristics.
Technical bulletin showing detail data available on request.

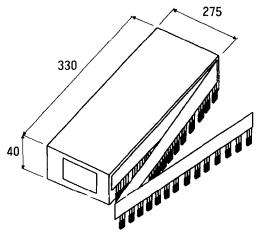
●Packaging Specifications

(Unit : mm)

ICP-N Taping (T104)



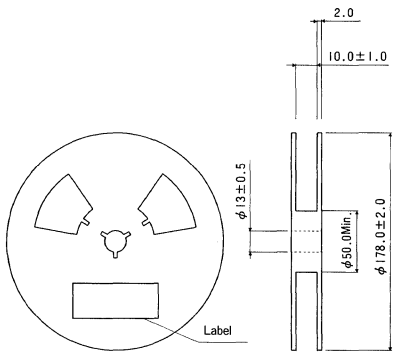
ICP-N Ammo Box



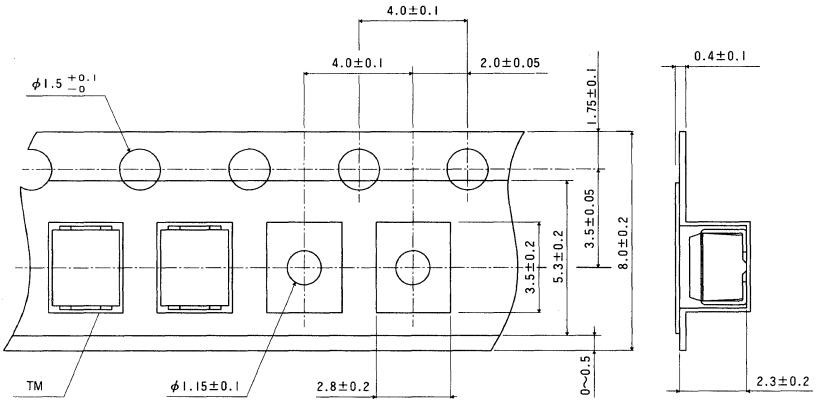
(Unit : mm)

ICP-S Taping (TM)

Reel



Tape



●standard/sub-standard product ordering unit

ICP-F	Package	Bulk
	code	
Part No.	Basic ordering unit (pcs)	1000
ICP-F10		◎
ICP-F15		○
ICP-F20		○
ICP-F25		○
ICP-F38		○
ICP-F50		○
ICP-F70		○

ICP-N	Package	Bulk	Taping
	code		T104
Part No.	Basic ordering unit (pcs)	1000	3000
ICP-N10		○	◎
ICP-N15		○	◎
ICP-N20		◎	◎
ICP-N25		○	◎
ICP-N38		○	◎
ICP-N50		○	◎
ICP-N70		○	◎

ICP-S	Package	Taping
	code	TM
Part No.	Basic ordering unit (pcs)	2000
ICP-S0.5		○
ICP-S0.7		○
ICP-S1.0		○
ICP-S1.2		○
ICP-S1.8		○
ICP-S2.3		○

◎ : Standard product ○ : Sub-standard product

MEMO

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Eltec Enterprises • Diamond Bar(714)861-4779
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- Specifications subject to change without notice for the purpose improvements.
- Current specifications in effect as of Oct. 1, 1993
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Excellence in Electronics

ROHM

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