BDR-203/BDC-203
Command Reference Manual

Version 1.01

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PIONEER CORPORATION

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1 Introduction

This document specifies a command set for BDR-203/BDC-203. (Hereinafter referred to as "drive") BDR-203 is a BD writer drive. BDC-203 is a BD combo drive. BDC-203 does not write to BD-R/RE disc.

The drive fundamentally complies with SFFC INF-8090i standard.

The drive complies with Information Technology Multimedia Commands-5 (MMC-5) Draft Revision 1b prior to SFFC INF-8090i standard, when a +R or a +RW disc is inserted in the drive.

The drive complies with Blu-ray Disc (BD) Multi-media Command Set Description Draft Version 1.0 prior to SFFC INF-8090i specification, when a BD is inserted in the drive.

In some cases, the drive executes unique operation that is not described in the standards.

This document describes details of such unique operation for each command or disc.

For More Information about SFFC INF-8090i, refer FTP site at:

ftp://ftp.avc-pioneer.com/Mtfuji_6/Spec/

For More Information about Information Technology Multimedia Commands-5 (MMC-5) Draft Revision 1b, refer a site at:

http://www.t10.org/drafts.htm

1.1 Change History

Version 1.00 created on Feb.12, 2009.

Version 1.01 created on Feb.13, 2009.

2.1 SATA version is changed.

2 Interface

The drive supports Serial ATA interface.

2.1 SATA version

The drive complies with the Serial ATA Revision 2.6. The data transfer mode is General1 1.5GBits/sec.

2.2 Drive Information

The data returned by INQUIRY command covers the following information.

Vendor name: “PIONEER ”

Product collation data: "BD-RW BDR-203" (writer)

“BD-ROM BDC-203” (combo)

3 DRIVE Descriptions

3.1 Compatible Media

The drive supports reading of BD-ROM, BD-R/RE Disc, CD-ROM/-R/-RW Disc, DVD-ROM/-R/-RW/RAM/-R DL Disc and +R/+RW/+R DL Disc and writing of BD-R/RE Disc (except BDC-203), CD-R/-RW Disc, DVD-R/-RW/RAM/-R DL Disc and +R/+RW/+R DL. (Except 8cm disc with an adaptor)

3.2 Power Condition

The drive is provided with 4 power conditions including active, idle, standby and sleep.

The power consumption in the active and idle conditions is identical while that in the standby and sleep conditions is also identical. The disc keeps rotating in the active and idle conditions while it is stopped in the standby and sleep conditions.

4 Packet Commands

The following commands are implemented in the drive.

In case of BDC-203, the following commands are not performed for BD-R/RE; CLOSE TRACK/SESSION, FORMAT UNIT, RESERVE TRACK, SEND DISC STRUCTURE, SEND OPC INFORMATION, SYNCRONIZE CACHE, WRITE(10), WRITE(12), and WRITE AND VERIFY commands.

Table 1– Packet Commands

Command Description	Operation code	Reference		
		SFF8090i	MMC-5	This document
BLANK Command	A1h	17.1	6.2	4.1
CLOSE TRACK/SESSION Command	5Bh	17.2	6.3	4.2
FORMAT UNIT Command	04h	17.3	6.5	4.3
GET CONFIGURATION Command	46h	17.4	6.6	4.4
GET EVENT/STATUS NOTIFICATION Command	4Ah	17.5	6.7	4.5
GET PERFORMANCE Command	ACh	17.6	6.8	4.6
INQUIRY Command	12h	17.7	6.9	4.7
LOG SELECT Command	4Ch			4.8
LOG SENSE Command	4Dh			4.9
MECHANISM STATUS Command	BDh	17.9	6.11	4.10
MODE SELECT (10) Command	55h	17.10	6.12	4.11
MODE SENSE (10) Command	5Ah	17.11	6.13	4.12
PAUSE/RESUME Command	4Bh	17.12		
PLAY AUDIO (10) Command	45h	17.13		
PLAY AUDIO (12) Command	A5h			
PLAY AUDIO MSF Command	47h	17.14		
PLAY CD Command	BCh			4.13
PREVENT / ALLOW MEDIUM REMOVAL Command	1Eh	17.15	6.14	
READ(10) Command	28h	17.16	6.15	4.14
READ(12) Command	A8h	17.17	6.16	4.14
READ BUFFER Command	3Ch	17.18	6.17	4.15
READ BUFFER CAPACITY Command	5Ch	17.19	6.18	4.16
READ CAPACITY Command	25h	17.20	6.19	4.17
READ CD Command	BEh	17.21	6.20	
READ CD MSF Command	B9h	17.22	6.21	
READ DISC INFORMATION Command	51h	17.23	6.22	4.18
READ DISC STRUCTURE Command	ADh	17.24	6.23	
READ FORMAT CAPACITIES Command	23h	17.25	6.24	
READ HEADER Command	44h			
READ SUBCHANNEL Command	42h	17.26		
READ TOC/PMA/ATIP Command	43h	17.27	6.26	
READ TRACK INFORMATION Command	52h	17.28	6.27	
REPAIR RZONE Command	58h	17.29	6.28	
REPORT KEY Command	A4h	17.30	6.29	
REQUEST SENSE Command	03h	17.31	6.30	4.19
RESERVE TRACK Command	53h	17.32	6.31	
SCAN Command	BAh	17.33		
SEEK (10) Command	2Bh	17.34	6.32	
SEND CUE SHEET	5Dh	17.35	6.33	
SEND DIAGNOSTIC Command	1Dh			
SEND DISC STRUCTURE Command	BFh	17.36	6.34	
SEND KEY Command	A3h	17.38	6.35	
SEND OPC INFORMATION Command	54h	17.39	6.36	
SET CD SPEED Command	BBh	17.40	6.37	4.20
SET READ AHEAD Command	A7h	17.41	6.38	
SET STREAMING Command	B6h	17.42	6.39	4.21
START/STOP UNIT Command	1Bh	17.43	6.40	
STOP PLAY/SCAN Command	4Eh	17.44		
SYNCHRONIZE CACHE Command	35h	17.45	6.41	
TEST UNIT READY Command	00h	17.46	6.42	
VERIFY(10) Command	2Fh	17.47	6.43	
WRITE (10) Command	2Ah	17.48	6.44	4.22
WRITE (12) Command	AAh	17.49	6.45	4.22

Command Description	Operation code	Reference		
		SFF8090i	MMC-5	This document
WRITE AND VERIFY Command	2Eh	17.50	6.46	
WRITE BUFFER Command	3Bh	17.51	6.47	4.23

4.1 BLANK Command

This command is valid for CD-RW and DVD-RW media.

The Immed bit is supported.

The READ DISC INFORMATION Command, the READ TRACK INFORMATION Command and the TEST UNIT READY Command are used to detect completion of the blank operation. While blank operation is performed by the BLANK Command that the Immed bit is set to one, the drive terminates these commands with the Check Condition status, LOGICAL UNIT NOT READY, OPERATION IN PROGRESS (2/04/07).

The drive supports following Blanking Type for CD-RW and DVD-RW media.

Table 2 - Blank Type

Code	Name	CD-RW media	DVD-RW media
000b	Blank the disc	Yes	Yes
001b	Minimally blank the disc	Yes	Yes
010b	Blank a Track	No	-
011b	Unreserved a Track/RZone	No	No
100b	Blank a Track/RZone Tail	Yes	No
101b	Unclose the last Session/Border	No	No
110b	Erase Session/Border	No	No

4.2 CLOSE TRACK/SESSION Command

The Immed bit is supported.

The READ DISC INFORMATION Command or READ TRACK INFORMATION Command is used to detect completion of the close operation. During a close operation performed by the CLOSE TRACK/SESSION Command whose Immed bit is set to one, the drive terminates these commands with the Check Condition status, LOGICAL UNIT NOT READY, OPERATION IN PROGRESS (2/04/07).

Note: The TEST UNIT READY Command may be used to identify the completion of close operation.

The valid Close Function field values are extended for handling the +R/+RW media in the MMC-5 rather than the SFFC INF-8090i.

This command is not valid for BD-RE.

Table 3 – Valid Close Function and Media

Close Function	Media
000b	+RW
001b	CD-R/RW
	DVD-R/RW/R DL
	+R, +R DL
	BD-R
010b	CD-R/RW
	DVD-R/RW/R DL
	Formatted DVD-RW
	+R/+RW/+R DL
	BD-R
011b	Formatted DVD-RW
	+RW
100b	+R DL
101b	+R/+R DL
110b	+R/+R DL
	BD-R

4.3 FORMAT UNIT Command

The CmpLst bit is supported only in DVD-RAM media, must be set to zero with other medias.

The Interleave Value field is not supported and must be set to zero.

The Format Code field allows the value of 001b and 111b. If Format Code field is set to 001b and a BD-RE/R media is mounted, the drive confirms for the definition of Blu-ray Disc(BD) Multi-Media Command Set Description. If Format Code field is set to 001b and a CD-RW/DVD-RW/DVD-RAM media is mounted, the drive conforms for the definition of SFFC INF-8090i. If Format Code is set to 001b and a +RW media is mounted, the drive conform for the definition of MMC-5. If Format Code is set to 111b and CD-RW media is mounted, the drive conforms for legacy specifications which are described in the definition of MMC-5.

The drive supports following Format Type for each media.

Table 4 - Format Type

Format Type	Name	Support for BD-RE media	Support for BD-R media	Support for CD-RW media	Support for DVD-RW media	Support for DVD-RAM media	Support for +RW media
00h	Full Format	Yes	Yes	Yes	Yes	Yes	-
01h	Spare Area Expansion	-	-	-		Yes	-
10h	C/DVD-RW Full Format	-	-	Yes	Yes	-	-
13h	DVD-RW Quick Grow the last Border	-	-	-	Yes	-	-
15h	DVD-RW Quick	-	-	-	Yes	-	-
26h	DVD+RW Basic Format	-	-	-	-	-	Yes
30h	Format with Spare Area	Yes	-	-	-	-	-
31h	Format without Spare Area	Yes	-	-	-	-	-
32h	Format BD-R with Spare Area	-	Yes	-	-		-

Table 5 - Format Code = 111b (CD-RW only)

Sess bit	Grow bit	Support for CD-RW media
0	0	Yes
0	1	No
1	0	No
1	1	No

The Format Unit parameter list shall be transferred from the Host to the drive. The data sent to the drive consists of a Format List Header, followed by one Format descriptor, so the parameter list length is always 12 bytes. When the Format Options Valid (FOV) bit in the Format List Header is set to one, the DPRY, DCRT, STPF, IP, Try-out, and VS shall be set to zero. In this case, the format operation is performed with an Immed function specified by the Immed bit. When the FOV bit is set to zero, the DPRY, DCRT, STPF, IP, Try-out, Immed, and VS shall be set to zero. In this case, the format operation is performed with the drive's internal default setting. The default setting of Immed function is one. Even if the format operation is requested with the FOV bit set to one, the drive's default setting itself will not be changed.

4.3.1 Format Code = 001b

4.3.1.1 Format Type = 00h (Full Forma for C/DVD-RW / Default Format for BD-RE/R)

4.3.1.1.1 On DVD-RAM media

The defect list handling is specified by the combination of the CmpLst bit and the DCRT bit. In the case that the CmpLst bit is set to zero and the DCRT bit is set to one, the Number of Blocks field shall be ignored and the number of addressable blocks shall be retained. In other cases, the Number of Blocks field specifies the number of addressable blocks for the whole disc and the Type Dependent Parameter field specifies the Block Length. Neither field is changeable from the values reported by READ FORMAT CAPACITIES command.

The defect list handling is decided by the following combinations.

Table 6 – DVD-RAM Defect List Handling

CmpLst	DCRT	Certification	PDL			SDL	Remarks
			P-list	G1-list	G2-list		
0	0	yes	preserved	new form Certification	disposed	disposed	slow initialization
1	1	no	preserved	preserved	disposed	disposed	Return to original slipping at the latest certification. quickly

4.3.1.1.2 On BD-R media

For BD-R, 4096 spare Clusters are allocated in ISA0 and 8192 Clusters in OSA. In addition, for BD-R Dual, 4096 spare Clusters are allocated in ISA1. TDMA1 size is 2048 Clusters and TDMA2 is 4096 Clusters. For BD-R Dual, TDMA2 is 2048 Clusters, TDMA3 is 4096 Clusters, TDMA4 is 4096 Clusters and TDMA5 is 2048 Clusters.

The drive supports the following Format Sub-type:

Table 7 - Format Sub-type

Sub-type Value	Description
00b	SRM with POW
01b	SRM without POW

The Drive ignores the Number of Blocks field and the Block Length field.

4.3.1.2 Format Type = 30h (Format with Spare Areas for BD-RE)

The drive supports the following Format Sub-type:

Table 8 - Format Sub-type

Sub-type Value	Description
00b	Quick Reformat
01b	No Certification

The drive formats the disc in order that the User Data Area contains at least Number of Blocks. If the number of spare Clusters to be allocated depend on Number of Blocks is less than 4096, the command will be terminated with CHECK CONDITION status and a SK/ASC/ASCQ values are set to ILLEGAL REQUEST/INVALID FIELD IN PARAMETER LIST(05/26/00).

The Spare Area size in Clusters field is ignored by the drive.

4.3.1.3 Format Type = 32h (Format BD-R with Spare Areas)

The drive supports the Format Sub-types as Table 9 - Format Sub-type.

Table 9 - Format Sub-type

Sub-type Value	Description
00b	SRM with POW
01b	SRM without POW

4.4 GET CONFIGURATION Command

4.4.1 Feature List and Profile List

Supported Feature is listed to Table 10 – Feature List.

Table 10 – Feature List

Feature Number	Feature Name
0000h	Profile List
0001h	Core
0002h	Morphing
0003h	Removable Medium
0004h	Write Protect
0010h	Random Readable
001Dh	Multi Read
001Eh	CD Read
001Fh	DVD Read
0020h	Random Writable
0021h	Incremental Streaming Writable
0023h	Formattable
0024h	Hardware Defect Management
0026h	Restricted Overwrite
002Ah	+RW
002Bh	+R
002Ch	DVD-RW Restricted Overwrite
002Dh	CD-Track at Once
002Eh	CD Mastering
002Fh	DVD-R/-RW Write
0033h	Layer Jump Recording
0038h	BD-R POW
003Bh	+R Double Layer
0040h	BD Read
0041h	BD Write
0100h	Power Management
0103h	CD Audio analog play
0104h	Microcode Upgrade
0105h	Time-out
0106h	DVD-CSS
0107h	Real-Time Streaming
0108h	Logical Unit serial number
010Ah	Disc Control Block
010Bh	DVD CPRM
010Dh	AACS

The +RW feature and the +R feature are defined in MMC-5.
The +R Double Layer feature is defined in Double Layer +R Multi-Media Command Set.
All other features are defined in SFFC INF-8090i.

In case of BDC-203, 0038h : BD-R POW and 0041h : BD Write do not exist.

Supported Profile is listed below.

Table 11 – Profile List

Profile Number	Profile Name
0002h	Removable Disc
0008h	CD-ROM
0009h	CD-R
000Ah	CD-RW
0010h	DVD-ROM
0011h	DVD-R Sequential Recording
0012h	DVD-RAM
0013h	DVD-RW Restricted Overwrite
0014h	DVD-RW Sequential Recording
0015h	DVD-R Dual Layer Sequential Recording
0016h	DVD-R Dual Layer Jump Recording
001Ah	+RW
001Bh	+R
002Bh	+R Double Layer
0040h	BD-ROM
0041h	BD-R SRM
0042h	BD-R RRM
0043h	BD-RE

The +RW profile and the +R profile are defined in MMC-5.
The +R Double Layer profile is defined in Double Layer +R Multi-Media Command Set.
All other profiles are defined in SFFC INF-8090i.

4.4.2 Media states

The Morphing is occurred when the media or media state is changed. The drive has Media states that is described in the Table 12 – Media states.

Table 12 – Media states

State No	Media	State	Descriptions
1	No Media	Not Ready	
2	CD-ROM	Complete	
3-1	CD-R	Empty	Empty Disc
3-2		No Complete Session	No Session closed Disc (Track at Once or Packet writing disc)
3-3		Existing Complete Session	Session closed Disc (Session at Once writing or Session closed disc : Appendable)
3-4		Complete	Not appendable Disc (Disc at Once writing or Finalized disc)
4-1	CD-RW	Empty	Empty or Blanked Disc
4-2		No Complete Session	No Session closed Disc (Track at Once or Packet writing disc)
4-3		Existing Complete Session	Session closed Disc
4-4		Complete	Not appendable Disc (Disc at Once writing or Finalized disc)
4-5		Full Formatted	Full formatted Disc
5	DVD-ROM	Complete	
6-1	DVD-R	Empty	Empty or Blanked Disc
6-2		No Complete Border	No Border closed Disc
6-3		Existing Complete Border	Border closed Disc (Appendable)
6-4		Complete	Not appendable Disc
7-1	DVD-RW	Empty	Empty or Blanked Disc
7-2		No Complete Border	No Border closed Disc
7-3		Existing Complete Border	Border closed Disc
7-4		Full Formatted	Full formatted Disc
7-5		Quick Formatted	1st Border is Quick formatted
8-1	+R	Empty	Empty Disc
8-2		No Complete Session	No Session closed Disc
8-3		Existing Complete Session	One or more Session closed Disc (Appendable)
8-4		Complete	Not appendable Disc
9-1	+RW	Empty	Empty Disc
9-2		Full Formatted	Full formatted Disc
9-3		Partially Formatted	Partially Formatted Disc
10	DVD-RAM	Complete	
11-1	+R Double Layer	Empty	Empty Disc
11-2		No Complete Session	No Session closed Disc
11-3		Existing Complete Session	One or more Session closed Disc (Appendable)
11-4		Complete	Not appendable Disc
12-1	DVD-R Dual Layer	Empty	Empty Disc
12-2		No Complete Border	No Border closed Disc
12-3		Complete	Not appendable Disc
12-4	DVD-R Dual Layer[Layer Jump Rec.]	No Complete Border	No Border closed Disc [Layer Jump Recording]
12-5		Existing Complete Border	Border closed Disc (Appendable) [Layer Jump Recording]
12-6		Complete	Complete [Layer Jump Recording]
16-1	BD-RE	Empty	Empty (Blank) Disc
16-2		Complete	Complete (Formatted) Disc
17	BD-ROM	Complete	
18-1	BD-R	Empty	Empty (Blank) Disc
18-2	BD-R SRM	No Complete Session	No Session closed Disc
18-3		Existing Complete Session	One or more closed Disc (Appendable)
18-4		Complete	Not Appendable
18-8	BD-R RRM	No Complete	Appendable
18-9		Complete	Not Appendable

4.4.3 Current Profile of the Feature Header and Current bit of the Profile List

The Current Profile of the Feature Header and the Current bit of the Profile List is set as following. The Current Profile and Current bit of Profile List is morphed by media state.

4.4.3.1 Current Profile and Current bit for No Media and CD Media

The following table indicates the Current Profile of the Feature Header and the Current bit of the Profile List that no media or CD media is mounted.

Table 13 – Current Profile and Current bit for No Media and CD Media

State No	Current Profile	Current bit of the Profile			descriptions
		CD-ROM 0008	CD-R 0009	CD-RW 000A	
1	0000h	0	0	0	No Profile whose current bit is set to one exists.
2	0008h	1	0	0	Only CD-ROM Profile is current to indicate the disc is read only.
3-1	0009h	0	1	0	Only CD-R Profile is current to indicate the disc is writable as a CD-R.
3-2	0009h	0	1	0	Only CD-R Profile is current to indicate the disc is writable as a CD-R.
3-3	0009h	1	1	0	CD-ROM Profile is current to indicate the disc can be mounted as a CD-ROM. CD-R Profile is current to indicate the disc is writable as a CD-R.
3-4	0008h	1	0	0	Only CD-ROM Profile is current to indicate the disc is read only.
4-1	000Ah	0	1	1	Both CD-R Profile and CD-RW Profile are current to indicate the disc is writable as a CD-R or a CD-RW.
4-2	000Ah	0	1	1	
4-3	000Ah	1	1	1	CD-ROM Profile is current to indicate the disc can be mounted as a CD-ROM. Both CD-R Profile and CD-RW Profile are current to indicate the disc is writable as a CD-R or a CD-RW.
4-4	000Ah	1	0	1	CD-ROM Profile is current to indicate the disc can be mounted as a CD-ROM. CD-RW Profile is current to indicate the disc can be erased or reformatted.
4-5	000Ah	1	0	1	CD-ROM Profile is current to indicate the disc can be mounted as a CD-ROM. CD-RW Profile is current to indicate the disc can be overwritten, erased or reformatted.

The other Current bits are all 0.

4.4.3.2 Current Profile and Current bit for DVD Media

The following table indicates the Current Profile of the Feature Header and the Current bit of the Profile List that DVD media is mounted.

Table 14 – Current Profile and Current bit for DVD Media

State No	Current Profile	Current bit of the Profile								descriptions
		Removable Disc 0002	DVD-ROM 0010	DVD-R S.W. 0011	DVD-RAM 0012	DVD-RW R.O. 0013	DVD-RW S.W. 0014	DVD-R DL S.W.0015	DVD-R DL L.J. 0016	
5	0010h	0	1	0	0	0	0	0	0	DVD-ROM Profile is current to indicate the read only.
6-1	0011h *a	0	0	1	0	0	0	0	0	DVD-R Sequential Recording Profile is current to indicate the sequential writable.
6-2	0011h *b	0	0	1	0	0	0	0	0	DVD-R Sequential Recording Profile is current to indicate the sequential writable.
6-3	0011h *b	0	1	1	0	0	0	0	0	DVD-ROM Profile is current to indicate the disc can be mounted as a DVD-ROM. DVD-R Sequential Recording Profile is current to indicate the disc is sequential writable.
6-4	0010h	0	1	0	0	0	0	0	0	Only DVD-ROM Profile is current to indicate the disc is read only.
7-1	0014h	0	0	1	0	1	1	0	0	DVD-R/-RW Sequential Recording Profile is current to indicate the disc is sequential writable. DVD-RW Restricted Overwrite Profile is current to indicate the disc is formattable.
7-2	0014h	0	0	1	0	1	1	0	0	
7-3	0014h	0	1	1	0	1	1	0	0	DVD-ROM Profile is current to indicate the disc can be mounted as a DVD-ROM. DVD-R/RW Sequential Recording Profile is current to indicate the disc is sequential writable. DVD-RW Restricted Overwrite Profile is current to indicate the disc is formattable..
7-4	0013h	0	1	0	0	1	1	0	0	DVD-ROM Profile is current to indicate the disc can be mounted as a DVD-ROM. DVD-RW Sequential Recording Profile is current to indicate the disc is erasable. DVD-RW Restricted Overwrite Profile is current to indicate the disc is overwritable.
7-5	0013h	0	0	0	0	1	1	0	0	DVD-RW Sequential Recording Profile is current to indicate the disc is erasable. DVD-RW Restricted Overwrite Profile is current to indicate the disc is overwritable.
10	0012h	1	0	0	1	0	0	0	0	Removable disc Profile is current to indicate the disc is Writable disk capable with removable media. DVD-RAM Profile is indicate the disc is Random writable.
12-1	0015h	0	0	0	0	0	0	1	0	DVD-R DL Sequential Recording Profile is current to indicate the sequential writable.
12-2	0015h	0	0	0	0	0	0	1	0	DVD-R DL Sequential Recording Profile is current to indicate the sequential writable.
12-3	0010h	0	1	0	0	0	0	0	0	Only DVD-ROM Profile is current to indicate the disc is read only.
12-4	0016h	0	0	0	0	0	0	0	1	DVD-R DL Layer Jump Recording Profile is current to indicate the sequential writable.
12-5	0016h	0	0	0	0	0	0	0	1	DVD-R DL Layer Jump Recording Profile is current to indicate the sequential writable.
12-6	0010h	0	1	0	0	0	0	0	0	Only DVD-ROM Profile is current to indicate the disc is read only.

*a : If the LPP information of the disc does not applicable for the drive to execute write operations, the disc is regarded as incompatible media and the Current Profile is set to 0000h.

*b : If the LPP information of the disc does not applicable for the drive to execute write operations, the Current Profile is set to 0010h.

The other Current bits are all 0.

4.4.3.3 Current Profile and Current bit for +R/+RW/+R DL Media

The following table indicates the Current Profile of the Feature Header and the Current bit of the Profile List that +R/+RW/+R DL media is mounted.

Table 15 – Current Profile and Current bit for +R/+RW/+R DL Media

State No	Current Profile	Current bit of the Profile			descriptions
		DVD+RW 001A	DVD+R 001B	DVD +R DL 002B	
8-1	001Bh	0	1	0	Only DVD+R Profile is current.
8-2		0	1	0	
8-3		0	1	0	
8-4		0	1	0	
9-1	001Ah	1	0	0	Only DVD+RW Profile is current.
9-2		1	0	0	
9-3		1	0	0	
11-1	002Bh	0	0	1	Only DVD+R Double Layer Profile is current.
11-2		0	0	1	
11-3		0	0	1	
11-4		0	0	1	

4.4.3.4 Current Profile and Current bit for BD-RE/R/ROM Media

The following table indicates the Current Profile of the Feature Header and the Current bit of the Profile List that BD-RE/ROM media is mounted.

Table 16 – Current Profile and Current bit for BD-RE/R/ROM Media

State No	Current Profile	Current bit of the Profile					descriptions
		Removable Disc 0002	BD-ROM 0040	BD-R SRM 0041	BD-R RRM 0042	BD-RE. 0043	
16-1	0043h	0	0	0	0	1	BD-RE Profile is current.
16-2		*a	0	0	0	1	
17	0040h	0	1	0	0	0	Only BD-ROM Profile is current.
18-1	0041h	0	0	1	0	0	Only BD-R SRM Profile is current.
18-2	0041h	0	0	1	0	0	
18-3	0041h	0	0	1	0	0	
18-4	0041h	0	0	1	0	0	
18-8	0042h	0	0	0	1	0	Only BD-R RRM Profile is current
18-9	0042h	0	0	0	1	0	

*a: When the BD-RE disc with Spare areas is inserted, the Current bit of Removable Disc profile is 1.

4.4.4 Current bit of the Feature List

4.4.4.1 Current bit of the Feature List for CD Media

The Current bit of the Feature List for CD media is set as Table 17 – Feature List for CD Media. The State No. is described in theTable 12 – Media states.

Table 17 – Feature List for CD Media

State No. / Feature Name	1	2	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	4-5	
0000h: Profile List	1	1	1	1	1	1	1	1	1	1	1	
0001h: Core	1	1	1	1	1	1	1	1	1	1	1	
0002h: Morphing	1	1	1	1	1	1	1	1	1	1	1	
0003h: Removable Medium	1	1	1	1	1	1	1	1	1	1	1	
0004h: Write Protect	0	0	0	0	0	0	0	0	0	0	0	
0010h: Random Readable	0	1	0	1	1	1	0	1	1	1	1	*a
001Dh: Multi Read	1	1	1	1	1	1	1	1	1	1	1	
001Eh: CD Read	0	1	0	0	1	1	0	0	1	1	1	*a
001Fh: DVD Read	0	0	0	0	0	0	0	0	0	0	0	
0020h: Random Writable	0	0	0	0	0	0	0	0	0	0	0	
0021h: Incremental Streaming Writable	0	0	1	1	1	0	1	1	1	0	0	*b
0023h: Formattable	0	0	0	0	0	0	1	1	1	1	1	
0024h: Hardware Defect Management	0	0	0	0	0	0	0	0	0	0	0	
0026h: Restricted Overwrite	0	0	0	0	0	0	1	*c	*c	*c	1	*b
002Ah: DVD+RW	0	0	0	0	0	0	0	0	0	0	0	
002Bh: DVD+R	0	0	0	0	0	0	0	0	0	0	0	
002Ch: Rigid Restricted Overwrite	0	0	0	0	0	0	0	0	0	0	0	
002Dh: CD-Track at Once	0	0	1	1	1	0	1	1	1	0	0	*b
002Eh: CD Mastering	0	0	1	0	0	0	1	0	0	0	0	*b
002Fh: DVD-R/-RW Write	0	0	0	0	0	0	0	0	0	0	0	
0033h: Layer Jump Recording	0	0	0	0	0	0	0	0	0	0	0	
0038h: BD-R POW	0	0	0	0	0	0	0	0	0	0	0	
003Bh: DVD+R Double Layer	0	0	0	0	0	0	0	0	0	0	0	
0040h: BD Read	0	0	0	0	0	0	0	0	0	0	0	
0041h: BD Write	0	0	0	0	0	0	0	0	0	0	0	
0100h: Power Management	1	1	1	1	1	1	1	1	1	1	1	
0103h: CD Audio analog play	0	*d	0	*d	*d	*d	0	*d	*d	*d	0	
0104h: Microcode Upgrade	1	0	0	0	0	0	0	0	0	0	0	
0105h: Time-out	1	1	1	1	1	1	1	1	1	1	1	
0106h: DVD-CSS	0	0	0	0	0	0	0	0	0	0	0	
0107h: Real-Time Streaming	0	1	1	1	1	1	1	1	1	1	1	
0108h: Logical Unit serial number	1	1	1	1	1	1	1	1	1	1	1	
010Ah: Disc Control Block	0	0	0	0	0	0	0	0	0	0	0	
010Bh: DVD CPRM	0	0	0	0	0	0	0	0	0	0	0	
010Dh: AACS	0	0	0	0	0	0	0	0	0	0	0	

*a: In write operation, if Read command or Play Audio command returns the Check Condition, the current bit is set to zero.

*b: In write operation, it keeps previous setting.

*c: This Feature indicates that Fixed Packet Writing is allowed. If only one Track is existing and the track is invisible or Fixed Packet writing, the current bit is set to one.

*d: If Audio Track is existing, the current bit is set to one.

4.4.4.2 Current bit of the Feature List for DVD Media

The Current bit of the Feature List for DVD media is set as Table 18 – Feature List for DVD-ROM/-R/-RW/RAM Media. The State No. is described in the Table 12 – Media states.

Table 18 – Feature List for DVD-ROM/-R/-RW/RAM Media

Feature Name \ State No.	1	5	6-1	6-2	6-3	6-4	7-1	7-2	7-3	7-4	7-5	10	12-1	12-2	12-3	12-4	12-5	12-6	
0000h: Profile List	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
0001h: Core	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
0002h: Morphing	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
0003h: Removable Medium	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
0004h: Write Protect	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	
0010h: Random Readable	0	1	0	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	*a
001Dh: Multi Read	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
001Eh: CD Read	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
001Fh: DVD Read	0	1	0	1	1	1	0	0	1	1	1	1	0	1	1	1	1	1	*a
0020h: Random Writable	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0021h: Incremental Streaming Writable	0	0	1	1	1	0	1	1	1	0	0	0	1	1	0	1	1	0	*b
0023h: Formattable	0	0	0	0	0	0	1	1	1	1	1	0	1	0	0	0	0	0	
0024h: Hardware Defect Management	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0026h: Restricted Overwrite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
002Ah: DVD+RW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
002Bh: DVD+R	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
002Ch: Rigid Restricted Overwrite	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	
002Dh: CD-Track at Once	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
002Eh: CD Mastering	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
002Fh: DVD-R/-RW Write	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	
0033h: Layer Jump Recording	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	
0038h: BD-R POW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
003Bh: DVD+R Double Layer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0040h: BD Read	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0041h: BD Write	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0100h: Power Management	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
0103h: CD Audio analog play	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0104h: Microcode Upgrade	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0105h: Time-out	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
0106h: DVD-CSS	0	*c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0107h: Real-Time Streaming	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
0108h: Logical Unit serial number	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
010Ah: Disc Control Block	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
010Bh: DVD CPRM	0	0	*d	*d	*d	*d	*d	*d	*d	*d	*d	*d	*d	*d	*d	*d	*d	*d	
010Dh: AACS	0	*e	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

*a: In write operation, if Read command returns the Check Condition, the current bit is set to zero.

*b: In write operation, it keeps previous setting.

*c: If CSS encrypted disc is existing, the current bit is set to one.

*d: If the CPRM exists on the disc the current bit is set to one, if the CPRM does not exist on the disc the current bit is set to zero.

*e: For BD9 media, the current bit is set to one.

4.4.4.3 Current bit of the Feature List for +R/+RW/+R DL Media

The Current bit of the Feature List for +R/+RW/+R DL media is set as Table 19 – Feature List for +R/+RW/+R DL Media. The State No. is described in the Table 12 – Media states.

Table 19 – Feature List for +R/+RW/+R DL Media

State No. / Feature Name	1	8-1	8-2	8-3	8-4	9-1	9-2	9-3	11-1	11-2	11-3	11-4	
0000h: Profile List	1	1	1	1	1	1	1	1	1	1	1	1	
0001h: Core	1	1	1	1	1	1	1	1	1	1	1	1	
0002h: Morphing	1	1	1	1	1	1	1	1	1	1	1	1	
0003h: Removable Medium	1	1	1	1	1	1	1	1	1	1	1	1	
0004h: Write Protect	0	0	0	0	0	0	0	0	0	0	0	0	
0010h: Random Readable	0	0	1	1	1	0	1	1	0	1	1	1	*a
001Dh: Multi Read	0	0	0	0	0	0	0	0	0	0	0	0	
001Eh: CD Read	0	0	0	0	0	0	0	0	0	0	0	0	
001Fh: DVD Read	0	0	1	1	1	0	1	1	0	1	1	1	*a
0020h: Random Writable	0	0	0	0	0	0	1	1	0	0	0	0	
0021h: Incremental Streaming Writable	0	0	0	0	0	0	0	0	0	0	0	0	
0023h: Formattable	0	0	0	0	0	1	1	1	0	0	0	0	
0024h: Hardware Defect Management	0	0	0	0	0	0	0	0	0	0	0	0	
0026h: Restricted Overwrite	0	0	0	0	0	0	0	0	0	0	0	0	
002Ah: DVD+RW	0	0	0	0	0	1	1	1	0	0	0	0	
002Bh: DVD+R	0	1	1	1	1	0	0	0	0	0	0	0	
002Ch: Rigid Restricted Overwrite	0	0	0	0	0	0	0	0	0	0	0	0	
002Dh: CD-Track at Once	0	0	0	0	0	0	0	0	0	0	0	0	
002Eh: CD Mastering	0	0	0	0	0	0	0	0	0	0	0	0	
002Fh: DVD-R/-RW Write	0	0	0	0	0	0	0	0	0	0	0	0	
0033h: Layer Jump Recording	0	0	0	0	0	0	0	0	0	0	0	0	
0038h: BD-R POW	0	0	0	0	0	0	0	0	0	0	0	0	
003Bh: DVD+R Double Layer	0	0	0	0	0	0	0	0	1	1	1	1	
0040h: BD Read	0	0	0	0	0	0	0	0	0	0	0	0	
0041h: BD Write	0	0	0	0	0	0	0	0	0	0	0	0	
0100h: Power Management	1	1	1	1	1	1	1	1	1	1	1	1	
0103h: CD Audio analog play	0	0	0	0	0	0	0	0	0	0	0	0	
0104h: Microcode Upgrade	1	0	0	0	0	0	0	0	0	0	0	0	
0105h: Time-out	1	1	1	1	1	1	1	1	1	1	1	1	
0106h: DVD-CSS	0	0	0	0	0	0	0	0	0	0	0	0	
0107h: Real-Time Streaming	0	0	1	1	1	0	1	1	0	1	1	1	
0108h: Logical Unit serial number	1	1	1	1	1	1	1	1	1	1	1	1	
010Ah: Disc Control Block	0	1	1	1	1	1	1	1	1	1	1	1	
010Bh: DVD CPRM	0	0	0	0	0	0	0	0	0	0	0	0	
010Dh: AACS	0	0	0	0	0	0	0	0	0	0	0	0	

*a: In write operation, if Read command returns the Check Condition, the current bit is set to zero.

4.4.4.4 Current bit of the Feature List for BD-RE/R/ROM Media

The Current bit of the Feature List for BD-RE/R/ROM media is set asTable 20 – Feature List for BD-RE/R/ROM Media.

The State No. is described in the Table 12 – Media states.

Table 20 – Feature List for BD-RE/R/ROM Media

Feature Name \ State No.	16 -1	16 -2	17	18 -1	18 -2	18 -3	18 -4	
0000h: Profile List	1	1	1	1	1	1	1	
0001h: Core	1	1	1	1	1	1	1	
0002h: Morphing	1	1	1	1	1	1	1	
0003h: Removable Medium	1	1	1	1	1	1	1	
0004h: Write Protect	1	1	0	1	1	1	0	
0010h: Random Readable	0	1	1	0	1	1	1	
001Dh: Multi Read	0	0	0	0	0	0	0	
001Eh: CD Read	0	0	0	0	0	0	0	
001Fh: DVD Read	0	0	0	0	0	0	0	
0020h: Random Writable	0	1	0	0	0	0	0	
0021h: Incremental Streaming Writable	0	0	0	1	1	1	0	
0023h: Formattable	1	1	0	1	0	0	0	
0024h: Hardware Defect Management	0	1	0	0	1	1	1	*a
0026h: Restricted Overwrite	0	0	0	0	0	0	0	
002Ah:+RW	0	0	0	0	0	0	0	
002Bh: +R	0	0	0	0	0	0	0	
002Ch: Rigid Restricted Overwrite	0	0	0	0	0	0	0	
002Dh: CD-Track at Once	0	0	0	0	0	0	0	
002Eh: CD Mastering	0	0	0	0	0	0	0	
002Fh: DVD-R/-RW Write	0	0	0	0	0	0	0	
0033h: Layer Jump Recording	0	0	0	0	0	0	0	
0038h: BD-R POW	0	0	0	0	1	1	0	*b
003Bh: DVD+R Double Layer	0	0	0	0	0	0	0	
0040h: BD Read	0	1	1	0	1	1	1	
0041h: BD Write	0	1	0	1	1	1	0	*c
0100h: Power Management	1	1	1	1	1	1	1	
0103h: CD Audio analog play	0	0	0	0	0	0	0	
0104h: Microcode Upgrade	0	0	0	0	0	0	0	
0105h: Time-out	1	1	1	1	1	1	1	
0106h: DVD-CSS	0	0	0	0	0	0	0	
0107h: Real-Time Streaming	0	1	1	1	1	1	1	
0108h: Logical Unit serial number	1	1	1	1	1	1	1	
010Ah: Disc Control Block	0	0	0	1	1	1	1	
010Bh: DVD CPRM	0	0	0	1	1	1	1	
010Dh : AACS	1	1	1	1	1	1	1	

*a: Defect Management Feature is not marked Current when no spares are allocated.

*b: BD-R POW Feature is not marked Current when the Recording mode is not SRM with LOW.

*c: BD Write Feature is not marked Current when Unknown PAC Rules are applicable or the Disc Write Protect PAC is valid.

4.5 GET EVENT/STATUS NOTIFICATION Command

The drive supports polling mode only. The Immed bit must be set to one.

Following Notification Classes are supported.

Table 21 - Notification Class Request

Bit	Definition	Support
0	Reserved	-
1	Operational Change Request/Notification	yes
2	Power Management	yes
3	External Request	no
4	Media	yes
5	Multi Host	no
6	Device Busy	no
7	Reserved	-

4.5.1 Media Events

Following Media Events are supported.

Table 22 – Media Event Format

Code	Event	Description
0	NoChg	Media status is unchanged.
1	Eject Request	The drive has received a request from the user to eject the media.
2	NewMedia	The drive has received new media, and is ready to access it.
3 - 4	Reserved	
5	BGformatCompleted	A +RW background format has completed.
6	BGformatRestarted	A +RW background format has been automatically restarted by the drive.
7 - F	Reserved	

4.6 GET PERFORMANCE Command

Following Types are supported.

Table 23 – Type field values description

Type field value	Definition
00h	Performance
01h	Unusable Area (DVD-RAM, BD-RE)
03h	Write Speed

4.6.1 Performance (Type field = 00h)

The drive has nominal only performance parameter. If Except field dose not set to 00b, the drive returns the Performance Header only.

Table 24 – Performance Data

Write bit	Disc	Start LBA	Start Performance	End LBA	End Performance
0	No Media	0	DVD 16x CAV 16*1385*(240/585) = 9091 (2383h)	0	DVD 16x CAV 16*1385 = 22160 (5690h)
	CD-ROM	0	CD 40x CAV 40*2352*75/1000*(240/585) = 2894 (B4Eh)	Lead-out Start LBA of Last Session -1	CD 40x CAV 40*2352*75/1000 = 7056 (1B90h)
	CD-R	0	CD 32x CAV 32*2352*75/1000*(240/585) = 2315 (90Bh)	Outermost Lead-out Start LBA from ATIP -1	CD 32x CAV 32*2352*75/1000 = 5644 (160Ch)
	CD-RW	0	CD 24x CAV 24*2352*75/1000*(240/585) = 1736 (6C8h)	Outermost Lead-out Start LBA from ATIP -1	CD 24x CAV 24*2352*75/1000 = 4233 (1089h)
	DVD-ROM	0	DVD 16x CAV 16*1385*(240/585) = 9091 (2383h)	Last LBA	DVD 16x CAV 16*1385 = 22160 (5690h)
	DVD-ROM Dual	0	DVD 12x CAV 12*1385*(240/585) = 6818 (1AA2h)	Last LBA	DVD 12x CAV 12*1385 = 16620 (40ECh)
	DVD-R	0	DVD 16x CAV 16*1385*(240/585) = 9091 (2383h)	Outermost Lead-out Start LBA in LPP -1	DVD 16x CAV 16*1385 = 22160 (5690h)
	DVD-RW	0	DVD 12x CAV 12*1385*(240/585) = 6818 (1AA2h)	Outermost Lead-out Start LBA in LPP -1	DVD 12x CAV 12*1385 = 16620 (40ECh)
	DVD-R DL	0	DVD 12x CAV 12*1385*(240/585) = 6818 (1AA2h)	Last Possible Lead-out Start LBA - 1	DVD 12x CAV 12*1385 = 16620 (40ECh)
	DVD-RAM	0	Established Read Speed	Last LBA, decided with FormatUnitCommand	Established Read Speed
	+R	0	DVD 16x CAV 16*1385*(240/585) = 9091 (2383h)	Outermost Lead-out Start LBA in ADIP -1	DVD 16x CAV 16*1385 = 22160 (5690h)
	+RW	0	DVD 12x CAV 12*1385*(240/585) = 6818 (1AA2h)	Outermost Lead-out Start LBA in ADIP -1	DVD 12x CAV 12*1385 = 16620 (40ECh)
	+R DL	0	DVD 12x CAV 12*1385*(240/585) = 6818 (1AA2h)	Last Possible Lead-out Start LBA - 1	DVD 12x CAV 12*1385 = 16620 (40ECh)
	BD-ROM	0	BD 8x CAV 8*4495*(240/585) = 14752 (39A0h)	Last LBA	BD 8x CAV 8*4495 = 35960 (8C78h)
	BD-ROM Dual	0	BD 8x CAV 8*4495*(240/585) = 14752 (39A0h)	Last LBA	BD 8x CAV 8*4495 = 35960 (8C78h)
	BD-R/RE	0	BD 8x CAV 8*4495*(240/585) = 14752 (39A0h)	Last Possible Lead-out Start LBA - 1	BD 8x CAV 8*4495 = 35960 (8C78h)
	BD-R/RE DL	0	BD 6x CAV 6*4495*(240/585) = 11064 (2B38h)	Last Possible Lead-out Start LBA - 1	BD 6x CAV 6*4495 = 26970 (695Ah)

1	No Media	0	DVD 16x CLV 16*1385 = 22160 (5690h)	0	DVD 16x CLV 16*1385 = 22160 (5690h)
	CD-ROM	Only the Performance Header is returned.			
	CD-R CD-RW	0	Established Write Speed	Outermost Lead-out Start LBA in ATIP -1	Established Write Speed
	DVD-ROM	Only the Performance Header is returned.			
	DVD-R DVD-RW	0	Established Write Speed	Outermost Lead-out Start LBA in LPP -1	Established Write Speed
	DVD- R DL	0	Established Write Speed	Last Possible Lead-out Start LBA – 1	Established Write Speed
	DVD-RAM	0	Established Write Speed	Last LBA, decided with FormatUnitCommand	Established Write Speed
	+R +RW	0	Established Write Speed	Outermost Lead-out Start LBA in ADIP -1	Established Write Speed
	+R DL	0	Established Write Speed	Last Possible Lead-out Start LBA – 1	Established Write Speed
	BD-ROM	Only the Performance Header is returned.			
	BD-R/RE	0	Established Write Speed	Outermost Lead-out Start LBA in ADIP -1	Established Write Speed
	BD-R/RE DL	0	Established Write Speed	Outermost Lead-out Start LBA in ADIP -1	Established Write Speed

Notes: About the Last Possible Lead-out Start LBA of +R DL media, refer the Notes of Table 26 – Write Speed Data for DVD Media.

4.6.2 Write Speed (Type field = 03h)

4.6.2.1 Write Speed Data for No Media and CD Media

Table 25 – Write Speed Data for No Media and CD Media

Disc	Write Speed Descriptor #	End LBA	Read Speed	Write Speed
No Media	#1	23127Fh	DVD 16x CLV 16*1385 = 22160 (5690h)	DVD 16x CLV 16*1385 = 22160 (5690h)
	#2		DVD 12x CLV 12*1385 = 16620 (40ECh)	DVD 12x CLV 12*1385 = 16620 (40ECh)
	#3		DVD 8x CLV 8*1385 = 11080 (2B48h)	DVD 8x CLV 8*1385 = 11080 (2B48h)
	#4		DVD 6x CLV 6*1385 = 8310 (2076h)	DVD 6x CLV 6*1385 = 8310 (2076h)
	#5		DVD 5x CLV 5*1385 = 6925 (1B0Dh)	DVD 5x CLV 5*1385 = 6925 (1B0Dh)
	#6		DVD 4x CLV 4*1385 = 5540 (15A4h)	DVD 4x CLV 4*1385 = 5540 (15A4h)
	#7		DVD 3.3x CLV 3.3*1385 = 4570 (11DAh)	DVD 3.3x CLV 3.3*1385 = 4570 (11DAh)
	#8		DVD 3x CLV 3*1385 = 4155 (103Bh)	DVD 3x CLV 3*1385 = 4155 (103Bh)
	#9		DVD 2.4x CLV 2.4*1385 = 3324 (CFCh)	DVD 2.4x CLV 2.4*1385 = 3324 (CFCh)
	#10		DVD 2x CLV 2*1385 = 2770 (AD2h)	DVD 2x CLV 2*1385 = 2770 (AD2h)
	#11		DVD 1x CLV 1*1385 = 1385 (569h)	DVD 1x CLV 1*1385 = 1385 (569h)
CD-ROM	#1	Lead-out Start LBA of Last Session -1	CD 32x CLV 32*2352*75/1000 = 5644 (160Ch)	CD 32x CLV 32*2352*75/1000 = 5644 (160Ch)
	#2		CD 24x CLV 24*2352*75/1000 = 4234 (108Ah)	CD 24x CLV 24*2352*75/1000 = 4234 (108Ah)
	#3		CD 16x CLV 16*2352*75/1000 = 2823 (B07h)	CD 16x CLV 16*2352*75/1000 = 2823 (B07h)
	#4		CD 10x CLV 10*2352*75/1000 = 1764 (6E4h)	CD 10x CLV 10*2352*75/1000 = 1764 (6E4h)
	#5		CD 4x CLV 4*2352*75/1000 = 706 (2C2h)	CD 4x CLV 4*2352*75/1000 = 706 (2C2h)
CD-R	#1	Outermost Lead-out Start LBA from ATIP -1	CD 32x CLV 32*2352*75/1000 = 5644 (160Ch)	CD 32x CLV 32*2352*75/1000 = 5644 (160Ch)
	#2		CD 24x CLV 24*2352*75/1000 = 4234 (108Ah)	CD 24x CLV 24*2352*75/1000 = 4234 (108Ah)
	#3		CD 16x CLV 16*2352*75/1000 = 2823 (B07h)	CD 16x CLV 16*2352*75/1000 = 2823 (B07h)
	#4		CD 10x CLV 10*2352*75/1000 = 1764 (6E4h)	CD 10x CLV 10*2352*75/1000 = 1764 (6E4h)
	#5		CD 4x CLV 4*2352*75/1000 = 706 (2C2h)	CD 4x CLV 4*2352*75/1000 = 706 (2C2h)
CD-RW (Ultra Speed+)	#1		CD 24x CLV 24*2352*75/1000 = 4234 (108Ah)	CD 24x CLV 24*2352*75/1000 = 4234 (108Ah)
	#2		CD 16x CLV 16*2352*75/1000 = 2823 (B07h)	CD 16x CLV 16*2352*75/1000 = 2823 (B07h)

	#3		CD 10x CLV 10*2352*75/1000 = 1764 (6E4h)	CD 10x CLV 10*2352*75/1000 = 1764 (6E4h)
CD-RW (Ultra Speed)	#1		CD 24x CLV 24*2352*75/1000 = 4234 (108Ah)	CD 24x CLV 24*2352*75/1000 = 4234 (108Ah)
	#2		CD 16x CLV 16*2352*75/1000 = 2823 (B07h)	CD 16x CLV 16*2352*75/1000 = 2823 (B07h)
	#3		CD 10x CLV 10*2352*75/1000 = 1764 (6E4h)	CD 10x CLV 10*2352*75/1000 = 1764 (6E4h)
CD-RW (High Speed)	#1		CD 10x CLV 10*2352*75/1000 = 1764 (6E4h)	CD 10x CLV 10*2352*75/1000 = 1764 (6E4h)
	#2		CD 4x CLV 4*2352*75/1000 = 706 (2C2h)	CD 4x CLV 4*2352*75/1000 = 706 (2C2h)
CD-RW (1x – 4x)	#1		CD 4x CLV 4*2352*75/1000 = 706 (2C2h)	CD 4x CLV 4*2352*75/1000 = 706 (2C2h)

4.6.2.2 Write Speed Data for DVD Media

Table 26 – Write Speed Data for DVD Media

Disc	Write Speed Descriptor #	End LBA	Read Speed	Write Speed
DVD-ROM	#1	Last LBA	DVD 16x CLV 16*1385 = 22160 (5690h)	DVD 16x CLV 16*1385 = 22160 (5690h)
	#2		DVD 12x CLV 12*1385 = 16620 (40ECh)	DVD 12x CLV 12*1385 = 16620 (40ECh)
	#3		DVD 8x CLV 8*1385 = 11080 (2B48h)	DVD 8x CLV 8*1385 = 11080 (2B48h)
	#4		DVD 6x CLV 6*1385 = 8310 (2076h)	DVD 6x CLV 6*1385 = 8310 (2076h)
	#5		DVD 5 CLV 5*1385 = 6925 (1B0Dh)	DVD 5x CLV 5*1385 = 6925 (1B0Dh)
	#6		DVD 4 CLV 4*1385 = 5540 (15A4h)	DVD 4x CLV 4*1385 = 5540 (15A4h)
	#7		DVD 3.3x CLV 3.3*1385 = 4570 (11DAh)	DVD 3.3x CLV 3.3*1385 = 4570 (11DAh)
	#8		DVD 3x CLV 3*1385 = 4155 (103Bh)	DVD 3x CLV 3*1385 = 4155 (103Bh)
	#9		DVD 2.4x CLV 2.4*1385 = 3324 (CFCh)	DVD 2.4x CLV 2.4*1385 = 3324 (CFCh)
	#10		DVD 2x CLV 2*1385 = 2770 (AD2h)	DVD 2x CLV 2*1385 = 2770 (AD2h)
	#11		DVD 1x CLV 1*1385 = 1385 (569h)	DVD 1x CLV 1*1385 = 1385 (569h)
DVD-R (16x) CAV Writing	#1	Outermost Lead-out Start LBA in LPP - 1	DVD 16x CAV 16*1385 = 22160 (5690h)	DVD 16x CAV 16*1385 = 22160 (5690h)
	#2		DVD 12x P-CAV 12*1385 = 16620 (40ECh)	DVD 12x P-CAV 12*1385 = 16620 (40ECh)
	#3		DVD 8x P-CAV 8*1385 = 11080 (2B48h)	DVD 8x P-CAV 8*1385 = 11080 (2B48h)
	#4		DVD 6x CLV 6*1385 = 8310 (2076h)	DVD 6x CLV 6*1385 = 8310 (2076h)
	#5		DVD 4x CLV 4*1385 = 5540 (15A4h)	DVD 4x CLV 4*1385 = 5540 (15A4h)
DVD-R (16x) Z-CLV Writing DVD-R (8x)	#1		DVD 12x CLV 12*1385 = 16620 (40ECh)	DVD 12x CLV 12*1385 = 16620 (40ECh)
	#2		DVD 8x CLV 8*1385 = 11080 (2B48h)	DVD 8x CLV 8*1385 = 11080 (2B48h)
	#3		DVD 6x CLV 6*1385 = 8310 (2076h)	DVD 6x CLV 6*1385 = 8310 (2076h)
	#4		DVD 4x CLV 4*1385 = 5540 (15A4h)	DVD 4x CLV 4*1385 = 5540 (15A4h)
DVD-R (4x)	#1		DVD 4x CLV 4*1385 = 5540 (15A4h)	DVD 4x CLV 4*1385 = 5540 (15A4h)
	#2		DVD 2x CLV 2*1385 = 2770 (AD2h)	DVD 2x CLV 2*1385 = 2770 (AD2h)
	#3		DVD 1x CLV 1*1385 = 1385 (569h)	DVD 1x CLV 1*1385 = 1385 (569h)
DVD-R (1x)	#1		DVD 1x CLV 1*1385 = 1385 (569h)	DVD 1x CLV 1*1385 = 1385 (569h)
DVD-R DL(8x)	#1	Last Possible Lead-out Start LBA -1	DVD 8x CLV 8*1385 = 11080 (2B48h)	DVD 8x CLV 8*1385 = 11080 (2B48h)
	#2		DVD 6x CLV 6*1385 = 8310 (2076h)	DVD 6x CLV 6*1385 = 8310 (2076h)
	#3		DVD 4x CLV 4*1385 = 5540 (15A4h)	DVD 4x CLV 4*1385 = 5540 (15A4h)
	#4		DVD 2x CLV 2*1385 = 2770 (AD2h)	DVD 2x CLV 2*1385 = 2770 (AD2h)

DVD-RW (6x)	#1	Outermost Lead-out Start LBA in LPP - 1	DVD 6x CLV 6*1385 = 8310 (2076h)	DVD 6x CLV 6*1385 = 8310 (2076h)
	#2		DVD 4x CLV 4*1385 = 5540 (15A4h)	DVD 4x CLV 4*1385 = 5540 (15A4h)
	#3		DVD 2x CLV 2*1385 = 2770 (AD2h)	DVD 2x CLV 2*1385 = 2770 (AD2h)
DVD-RW (4x)	#1		DVD 4x CLV 4*1385 = 5540 (15A4h)	DVD 4x CLV 4*1385 = 5540 (15A4h)
	#2		DVD 2x CLV 2*1385 = 2770 (AD2h)	DVD 2x CLV 2*1385 = 2770 (AD2h)
DVD-RW (2x)	#1		DVD 2x CLV 2*1385 = 2770 (AD2h)	DVD 2x CLV 2*1385 = 2770 (AD2h)
	#2		DVD 1x CLV 1*1385 = 1385 (569h)	DVD 1x CLV 1*1385 = 1385 (569h)
DVD-RW (1x)	#1		DVD 1x CLV 1*1385 = 1385 (569h)	DVD 1x CLV 1*1385 = 1385 (569h)
DVD-RAM (5x)	#1	Last LBA, decided with FormatUnitComand	DVD 5x CLV 5*1385 = 6925 (1B0Dh)	DVD 5x CLV 5*1385 = 6925 (1B0Dh)
	#2		DVD 3x CLV 3*1385 = 4155 (103Bh)	DVD 3x CLV 3*1385 = 4155 (103Bh)
	#3		DVD 2x CLV 2*1385 = 2770 (AD2h)	DVD 2x CLV 2*1385 = 2770 (AD2h)
DVD-RAM (3x)	#1		DVD 3x CLV 3*1385 = 4155 (103Bh)	DVD 3x CLV 3*1385 = 4155 (103Bh)
	#2		DVD 2x CLV 2*1385 = 2770 (AD2h)	DVD 2x CLV 2*1385 = 2770 (AD2h)
DVD-RAM (2x)	#1		DVD 2x CLV 2*1385 = 2770 (AD2h)	DVD 2x CLV 2*1385 = 2770 (AD2h)
+R (16x) CAV Writing (Z-CLV Writing)	#1	Outermost Lead-out Start LBA in ADIP - 1	DVD 16x CAV 16*1385 = 22160 (5690h)	DVD 16x CAV 16*1385 = 22160 (5690h)
	#2		DVD 12x P-CAV 12*1385 = 16620 (40ECh)	DVD 12x P-CAV 12*1385 = 16620 (40ECh)
	#3		DVD 8x P-CAV 8*1385 = 11080 (2B48h)	DVD 8x P-CAV 8*1385 = 11080 (2B48h)
	#4		DVD 6x CLV 6*1385 = 8310 (2076h)	DVD 6x CLV 6*1385 = 8310 (2076h)
	#5		DVD 4x CLV 4*1385 = 5540 (15A4h)	DVD 4x CLV 4*1385 = 5540 (15A4h)
+R (16x) Z-CLV Writing +R (8x)	#1		DVD 12x CLV 12*1385 = 16620 (40ECh)	DVD 12x CLV 12*1385 = 16620 (40ECh)
	#2		DVD 8x CLV 8*1385 = 11080 (2B48h)	DVD 8x CLV 8*1385 = 11080 (2B48h)
	#3		DVD 6x CLV 6*1385 = 8310 (2076h)	DVD 6x CLV 6*1385 = 8310 (2076h)
	#4		DVD 4x CLV 4*1385 = 5540 (15A4h)	DVD 4x CLV 4*1385 = 5540 (15A4h)
+R (4x)	#1		DVD 4x CLV 4*1385 = 5540 (15A4h)	DVD 4x CLV 4*1385 = 5540 (15A4h)
	#2		DVD 2.4x CLV 2.4*1385 = 3324 (CFCh)	DVD 2.4x CLV 2.4*1385 = 3324 (CFCh)
+R (2.4x)	#1		DVD 2.4x CLV 2.4*1385 = 3324 (CFCh)	DVD 2.4x CLV 2.4*1385 = 3324 (CFCh)
+R DL(8x)	#1	Last Possible Lead-out Start LBA -1	DVD 8x CLV 8*1385 = 11080 (2B48h)	DVD 8x CLV 8*1385 = 11080 (2B48h)
	#2		DVD 6x CLV 6*1385 = 8310 (2076h)	DVD 6x CLV 6*1385 = 8310 (2076h)
	#3		DVD 4x CLV 4*1385 = 5540 (15A4h)	DVD 4x CLV 4*1385 = 5540 (15A4h)
	#4		DVD 2.4x CLV 2.4*1385 = 3324 (CFCh)	DVD 2.4x CLV 2.4*1385 = 3324 (CFCh)
+RW (8x)	#1	Outermost Lead-out Start LBA in ADIP - 1	DVD 8x CLV 8*1385 = 11080 (2B48h)	DVD 8x CLV 8*1385 = 11080 (2B48h)
	#2		DVD 6x CLV 6*1385 = 8310 (2076h)	DVD 6x CLV 6*1385 = 8310 (2076h)

	#3		DVD 3.3x CLV 3.3*1385 = 4570 (11DAh)	DVD 3.3x CLV 3.3*1385 = 4570 (11DAh)
+RW (4x)	#1		DVD 4x CLV 4*1385 = 5540 (15A4h)	DVD 4x CLV 4*1385 = 5540 (15A4h)
	#2		DVD 2.4x CLV 2.4*1385 = 3324 (CFCh)	DVD 2.4x CLV 2.4*1385 = 3324 (CFCh)
+RW (2.4x)	#1		DVD 2.4x CLV 2.4*1385 = 3324 (CFCh)	DVD 2.4x CLV 2.4*1385 = 3324 (CFCh)

Notes : For +R DL media, the Last Possible Lead-out Start LBA is set as follows.

1) In case of the disc which has no complete status, it is set to the following value.

The value = (L0 Data Zone Capacity + 1 – 30000h) x 2 – Extended Partial Lead-out Size

As for the L0 Data Zone Capacity,
if it has not been changed from the default value, it is set to the Last Possible Physical Sector of the Data Zone on Layer 0 in ADIP,
and if it has been changed from the default value, it is set to the Actual last PSN of Data Zone on Layer 0 in TOC.

As for the Extended Partial Lead-out Size,
if the disc has an Extended Partial Lead-out, it is 30000h,
and if the disc has no Extended Partial Lead-out, it is 0.

2) In case of the disc which has a complete status, it is set to the Actual Lead-out Start LBA.

4.6.2.3 Write Speed Data for BD Media

Table 27 – Write Speed Data for BD Media

Disc	Write Speed Descriptor #	End LBA	Read Speed	Write Speed
BD-R SL/DL Z-CLV Writing	#1	Outermost Lead-out Start LBA in ADIP - 1	BD 8x CLV 8*4495 = 35960 (8C78h)	BD 8x CLV 8*4495 = 35960 (8C78h)
	#2		BD 6x CLV 6*4495 = 26970 (695Ah)	BD 6x CLV 6*4495 = 26970 (695Ah)
	#3		BD 4x CLV 4*4495 = 17980 (463Ch)	BD 4x CLV 4*4495 = 17980 (463Ch)
	#4		BD 2x CLV 2*4495 = 8990 (231Eh)	BD 2x CLV 2*4495 = 8990 (231Eh)
BD-RE SL/DL	#1		BD 2x CLV 2*4495 = 8990 (231Eh)	BD 2x CLV 2*4495 = 8990 (231Eh)

4.7 INQUIRY Command

CmdDt bit, EVPD bit and Page Code or Operation Code field does not supported. These bit or field must be set to 0.

The drive returns following 96bytes Inquiry data.

Table 28 - INQUIRY Data Format

Byte \ Bit	7	6	5	4	3	2	1	0
0	Reserved			Peripheral Device Type (05h)				
1	RMB (1)	Reserved						
2	ISO Version (0h)		ECMA Version (0h)		ANSI Version (0h)			
3	ATAPI Transport Version(3h)				Response Data Format(2h)			
4	Additional Length (5Bh)							
5	Reserved							
6	Reserved							
7	Reserved							
8	Vendor Identification = “PIONEER “							
15								
16	Product Identification = ” BD-RW BDR-203“							
31								
32	Product Revision Level = “X.XX”							
35								
36	Reserved							
37	Release Date = “YY/MM/DD”							
46								
47	Manufacture’s Information							
55								
56	Reserved							
95								

4.8 LOG SELECT Command

This command is used for checking the drive.

The specifications of this command are vendor unique.

4.9 LOG SENSE Command

This command is used for checking the drive.

The specifications of this command are vendor unique.

4.10 MECHANISM STATUS Command

Mechanism Status Parameter List:

Fault bit, Current Slot field, C/DVD Mechanism State field, Number of Slots Available field and Length of Slot Table(s) field are set to zero.

4.11 MODE SELECT (10) Command

The Save Page function is not supported. The SP bit must be set to zero.

Refer the MODE SENSE Command for the descriptions of each page.

4.12 MODE SENSE (10) Command

4.12.1 Mode Parameter Header

The Mode Parameter Header format is defined as shown in Table 29 - Mode Parameter Header.

Table 29 - Mode Parameter Header

Byte \ Bit	7	6	5	4	3	2	1	0
0	(MSB)			Mode Data Length				
1								(LSB)
2	Medium Type							
3	Reserved							
4								
5								
6	(MSB)			Block Descriptor Length (always 0000h)				
7								(LSB)

The Medium Type was defined in a legacy specification, and remains in this drive.

The Medium Type Codes are defined as shown in Table 30 – Medium Type Codes.

Table 30 – Medium Type Codes

Page code	Description
00h	Door closed, medium type unknown or BD
01h	120 mm CD-ROM data only, door closed
02h	120 mm CD-ROM audio only (CD-DA), door closed
03h	120 mm CD-ROM data and audio combined, door closed
04h	120 mm multi-session CD-ROM or CD-I, door closed
05h	80 mm CD-ROM data only, door closed
06h	80 mm CD-ROM audio only (CD-DA), door closed
07h	80 mm CD-ROM data and audio combined, door closed
08h	80 mm multi-session CD-ROM or CD-I, door closed
09h – 10h	Reserved
11h	120 mm CD-R data only, door closed
12h	120 mm CD-R audio only, door closed
13h	120 mm CD-R data and audio combined, door closed
14h	120 mm multi-session CD-R, door closed
15h	80 mm CD-R data only, door closed
16h	80 mm CD-R audio only, door closed
17h	80 mm CD-R data and audio combined, door closed
18h	80 mm multi-session CD-R, door closed
19h – 20h	Reserved
21h	120 mm CD-RW data only, door closed
22h	120 mm CD-RW audio only, door closed
23h	120 mm CD-RW data and audio combined, door closed
24h	120 mm multi-session CD-RW, door closed
25h	80 mm CD-RW data only, door closed
26h	80 mm CD-RW audio only, door closed
27h	80 mm CD-RW data and audio combined, door closed
28h	80 mm multi-session CD-RW, door closed
29h – 40h	Reserved
41h	120 mm single border/session DVD-ROM/-R/-RW/RAM/+R/+RW, door closed
42h	Reserved
43h	Reserved
44h	120 mm multi border/session DVD-R/-RW/+R, door closed
45h	80 mm single border/session DVD-ROM/-R/-RW/RAM/+R/+RW, door closed
46h	Reserved
47h	Reserved
48h	80 mm multi border/session DVD-R/-RW/+R, door closed
47h	Reserved
48h	80 mm multi border/session DVD-R/-RW/+R, door closed
49h – 6Fh	Reserved
70h	Door closed, no disc present
71h	Door open
72h	Door closed, incompatible medium exists
73h – FFh	Reserved

4.12.2 Mode Pages

The drive is not supported the Parameters Savable (PS) bit and must be set to zero.

The Page Code field identifies the format and parameters defined for that mode page.

The drive supports following Mode pages.

Table 31 - Mode Page Codes

Page code	Description	Section
01h	Error Recovery Page	4.12.2.2 on page 31
05h	Write Parameters Page	4.12.2.5 on page 32
08h	Caching Page	4.12.2.1 on page 31
0Eh	CD Audio Control Page	See SFFC INF-8090i document
1Ah	Power Condition Page	4.12.2.3 on page 31
1Dh	Time-out & Protect Page	4.12.2.4 on page 31
2Ah	Capabilities & Mechanical Status Page	4.12.2.6 on page 33
3Fh	Return all pages (valid only for the MODE SENSE command)	

4.12.2.1 Caching Page

The Caching Page is supported for compatibility of other CD-R/RW drive. This page has no effect on write/read operation. The returned Caching parameters by the MODE SENSE (10) Command are modified to the new parameters after receiving new parameters by MODE SENSE (10) Command.

Table 32 - Caching Parameter

Byte \ Bit	7	6	5	4	3	2	1	0
0	PS	Reserved	Page Code = 08h					
1	Page Length = 0Ah							
2	IC	ABPF	CAP	DISC	SIZE	WCE	MF	RCD
3	Demand Read Priority				Write Retention Priority			
4	(MSB)	Disable Pre-fetch Transfer Length						
5								(LSB)
6	(MSB)	Minimum Pre-fetch						
7								(LSB)
8	(MSB)	Maximum Pre-fetch						
9								(LSB)
10	(MSB)	Maximum Pre-fetch Ceiling						
11								(LSB)

Default value of the WCE bit is one. Default value of any other bits and field is zero.

4.12.2.2 Error Recovery Parameters Page

The AWRE and ARRE bits are not supported and are ignored.

The TB, RC, DTE and DCR bits are ignored.

The PER bit and EMCDR field are used to control the defect reporting.

Setting value of the Read Retry Count and the Write Retry Count field are ignored.

4.12.2.3 Power Condition Page

The default value of an Idle bit is one. The default value of the Idle Timer field is 000000c8h (20 second).

The default value of the Standby bit is one. The default value of Standby Timer field is 000012C0h (8 minutes).

4.12.2.4 Time-out & Protect Page

The DISP, SWPP bits are not supported and must be set to 0.

4.12.2.5 Write Parameters Mode Page

The parameters specified in the Write Parameters Mode Page are not applicable to DVD-RAM media.

The parameters specified in the Write Parameters Mode Page are not applicable to +R/+RW/+R DL media.

The parameters specified in the Write Parameters Mode Page are not applicable to formatted DVD-RW media.

The parameters specified in the Write Parameters Mode Page are not applicable to BD-RE/R media.

The default value of the BUFE bit is 1. The drive ignores this bit and assumes this bit is set to 1.

If LS_V bit is set to one, the Link Size field must be set to 7h for CD-R/RW or 10h for DVD-R/-RW. If LS_V bit is set to zero, the drive assumes the Link Size of 7h for CD-R/RW or 10h for DVD-R/-RW. The default value of the LS_V bit is 1, and the default value of the Link Size field is 10h.

The drive supports following Write Type.

Table 33 - Write Type Field

Value	Definition	for CD-R/RW		for DVD-R/-RW		for DVD-R DL	
		Support	Test Write	Support	Test Write	Support	Test Write
00h	Packet/Incremental	yes	yes	yes	yes	yes	yes
01h	Track-at-once	yes	yes	-	-	-	-
02h	Session-at-once/Disc-at-once	yes	yes	yes	yes	yes	yes
03h	Raw	yes	-	-	-	-	-
04h	Layer Jump Recording	-	-	-	-	yes	yes

If the Layer Jump Recording has not been supported, Layer Jump Recording (04h) is not supported.

The default value of the Test Write bit is 0, and the default value of the Write Type field is 0h.

When FP bit is set to one for CD-R/RW media, the Packet Size field must be set to 32. Because the drive supports 64K Fixed Packet Writing only. The default value of the FP bit is 0.

The Copy bit is not supported, and setting of this bit is ignored.

The drive supports following Data Block Type for CD-R/RW media.

Table 34 – Data Block Type Field

Value	Block Size	Definition	Support for CD-R/RW
0	2352	Raw data	yes
1	2368	Raw data with P and Q sub-channel	yes
2	2448	Raw data with P-W sub-channel appended	yes
3	2448	Raw data with raw P-W sub-channel appended	yes
8	2048	Mode 1 (ISO/IEC 10149)	yes
9	2336	Mode 2 (ISO/IEC 10149)	yes
10	2048	Mode 2 (CD-ROM XA, form 1)	yes
11	2056	Mode 2 (CD-ROM XA, form 1)	yes
12	2324	Mode 2 (CD-ROM XA, form 2)	yes
13	2332	Mode 2 (CD-ROM XA, form 1, form 2, or mixed form)	yes

The drive supports writing of DVD and CD. Each media needs different value of Link Size field in Write Parameters page. Current value of parameter can not change by mounted media automatically. But Default value of Link Size field is changed by mounted media. If DVD media is mounted, Link Size field of default value in Write Parameter page is set to 10h. If CD media is mounted, it is set to 07h. It recommends following step to setting the Write Parameters page.

1. Get default value of Write Parameters by using MODE SELECT command. (Page Control (PC) field = 10b)
2. Modify the necessary field on above parameter.
3. Send the modified parameter by using MODE SELECT command.

4.12.2.6 C/DVD Capabilities and Mechanical Status Page

The C/DVD Capabilities and Mechanical Status Page format is defined as shown in Table 35 - C/DVD Capabilities and Mechanical Status Page Format.

Table 35 - C/DVD Capabilities and Mechanical Status Page Format

Byte \ Bit	7	6	5	4	3	2	1	0
0	PS	Reserved	Page Code = 2Ah					
1	Page Length = 42h							
2	Reserved		DVD-RAM Read	DVD-R/-Read	DVD-ROM Read	Method 2	CD-RW Read	CD-R Read
	00b		1	1	1	1	1	1
3	Reserved		DVD-RAM Write	DVD-R Write	Reserved	Test Write	CD-RW Write	CD-R Write
	00b		1	1	0	1	1	1
4	BUF	Multi-session	Mode2 Form2	Mode2 Form1	Digital Port(2)	Digital Port(1)	Composite	Audio Play
	1	1	1	1	0	0	0	1
5	Read Bar Code Capable	UPC	ISRC	C2 Pointers Supported	R-W D&C	R-W Supported	CDDA Stream Accurate	CD-DA
	0	1	1	0	0	0	1	1
6	LMT			Reserved	Eject	Prevent Jumper	Lock State	Lock
	001b			0	1	0	current state	1
7	Reserved		R-W in Lead-in Readable	Side Change Capable	S/W Slot Selection (SSS)	Supports Disc Present (SDP)	Separate Channel Mute	Sep. vol.
	00b		1	0	0	0	1	1
8	(MSB) Maximum Read Speed Supported							
9								(LSB)
10	(MSB) Number of Volume Levels Supported = 0100h							
11								(LSB)
12	(MSB) Buffer Size supported by Logical Unit = 0FA0h							
13								(LSB)
14	(MSB) Current Read Speed							
15								(LSB)
16	Reserved = 00h							
17	Reserved		Length		LSBF	RCK	BCKF	Reserved
	00b		00b		0	0	0	0
18	(MSB) Maximum Write Speed Supported							
19								(LSB)
20	(MSB) Current Write Speed							
21								(LSB)
22	(MSB) Copy Management Revision Supported = 0001h							
23								(LSB)
24	Reserved = 00h							
25	Reserved = 00h							
26	Reserved = 00h							
27	Reserved							Rotation Control Selected
	000000b							00b
28	(MSB) Current Write Speed Selected							
29								(LSB)
30	(MSB) Number of Logical Unit Write Speed Performance Descriptor Tables							
31								(LSB)
32	Reserved = 00h							
33	Reserved							Rotation Control #1
	000000b							00b
34	(MSB) Write Speed Supported #1							
35								(LSB)
36 – 63	Logical Unit Write Speed Performance Descriptors #2 - #8							

Byte \ Bit	7	6	5	4	3	2	1	0
64	Reserved = 00h							
65	Reserved						Rotation Control #8	
	000000b						00b	
66	(MSB) Write Speed Supported #9							
67								(LSB)

The Maximum Read Speed Supported field does not reflect the maximum read speed for each medium type and format. If no disc is mounted in the drive, the field is set to the same value as DVD.

The Current Read Speed filed does not reflect the actual read speed. If no disc is mounted in the drive, the field is set to the same value as DVD.

The Maximum Write Speed Supported field is set to the same value of the Write Speed Descriptor #1 data which is returned for the GET PERFORMANCE command.

The Current Write Speed filed is set to the same value of the Write Performance data which is returned for the GET PERFORMANCE command.

The Number of Logical Unit Write Speed Performance Descriptor Tables and The Logical Unit Write Speed Performance Descriptors #1 - #8 are set to the suitable values by using the same algorism as the GET PERFORMANCE command.

4.13 PLAY CD Command

This command is defined in a legacy specification (MMC-2 Revision 10a).

4.14 READ (10), READ (12) Command

The RelAdr bit is not supported and must set to 0.

If the Streaming bit in the CDB of the READ (12) command is set to one, the FUA bit shall be set to zero. The setting of the Streaming bit is no effect on the operation.

4.15 READ BUFFER Command

This command is used for checking the drive.

The specifications of this command are vendor unique.

4.16 READ BUFFER CAPACITY Command

The Block bit is supported.

The Length of Buffer field in the READ BUFFER CAPACITY data is set to following.

BD or no medium : 180000h

DVD : 118000h

CD : 126800h

4.17 READ CAPACITY Command

The RelAdr bit is not supported and must set to 0.

If empty disc is mounted, the Logical Block Address field in the Read Capacity Data is set to zero.

If a non-blank +RW disc is mounted, the Logical Block Address field in the Read Capacity Data is set to 23053Fh.

If a disc that is not a +RW and has no Complete Session is mounted, Logical Block Address field in the Read Capacity Data is set to zero.

When a CD-R/RW disc is mounted, if it is recorded by Track-at-once, the Logical Block Address field in the Read Capacity Data is set to the LBA immediately behind of the outermost Lead-out, so 2 Run-out blocks will be encountered.

4.18 READ DISC INFORMATION Command

For +R/+R DL media, the Last Session Lead-in Start Address is the LBA of where the next Intro shall be recoded. If no session exists on the disc, then the value returned is 00000000h. If the disc has complete status, then the value returned is FFFFFFFFh.

For +R media, the Last Possible Lead-out Start Address is the LBA found in the ADIP of the disc's lead-in. If the disc has complete status, then the value returned is FFFFFFFFh.

For +R DL media, the Last Possible Lead-out Start Address is set as follows.

1) In case of a disc that has no complete status, it is set to the following value.

The value = (L0 Data Zone Capacity + 1 – 30000h) x 2 – Extended Partial Lead-out Size

As for the L0 Data Zone Capacity,
if it has not been changed from the default value, it is set to the Last Possible Physical Sector of the Data Zone on Layer 0 in ADIP,
and if it has been changed from the default value, it is set to the Actual last PSN of Data Zone on Layer 0 in TOC.

As for the Extended Partial Lead-out Size,
if the disc has an Extended Partial Lead-out, it is 30000h,
and if the disc has no Extended Partial Lead-out, it is 0.

2) In case of a disc that has a complete status, it is set to FFFFFFFFh.

The OPC table is not supported for +R/+RW/+R DL media.

4.19 REQUEST SENSE Command

The drive returns the 22 bytes of Sense Data.

When Sense Key, Additional Sense Code and Additional Sense Code Qualifier field is set to 2/3A/00 MEDIUM NOT PRESENT or 2/04/01 LOGICAL UNIT IS IN PROCESS OF BECOMING READY, the Loading information is set to Byte 21 in the Sense Data as following.

Table 36 – Loading Status

Byte 21	Loading Status
00h	Tray Open
01h	Loading
02h	Unloading
03h	Tray Close and no media
04h	Reserved
05h	Tray Close and Setup

4.20 SET CD SPEED Command

The drive can not specify the reading speed by any Packet command. The setting of Logical Unit Read Speed field is ignored. The reading speed is determined by the drive.

This command changes the writing speed for CD-R/RW media. It does not effect to the writing speed for DVD-R/-RW/RAM , +R/+RW/+R DL and BD-R/RE media.

The available writing speed may be restricted by the drive when the characteristic of media is not suitable for the speed.

Table 37 – Parameters to set Writing speed for CD-R/RW

Logical Unit Writing Speed	CD-R Writing Speed	CD-RW Writing Speed	DVD-R/-RW and +R/+RW Writing Speed	BD-R/RE Writing Speed
0000h – 06E2h	4x CLV	4x CLV	Remains previous setting	Remains previous setting
06E3h – 0B05h	10x CLV	10x CLV		
0B06h – 1088h	16x ZCLV	16x CLV		
1089h – 160Bh	24x ZCLV	24x ZCLV		
160Ch – FFFFh	32x ZCLV	32x ZCLV		

4.21 SET STREAMING Command

4.21.1 Reading Speed

The Drive can not specify the reading speed by any Packet command.

The reading speed may be automatically reduced by the drive in order to retry to read a block which has not been corrected errors.

Table 38 – Available Reading speed for each media

Media	Reading Speed
CD-DA/R/RW (play audio)	9.3x CAV - 4x CLV
CD-ROM/R/RW (read mode2form2)	9.3x CAV - 4x CLV
CD-DA/ROM (other operations)	40x CAV – 4x CLV
CD-R (other operations)	32x CAV – 4x CLV
CD-RW (other operation)	24x CAV – 4x CLV
DVD-ROM Single Layer	16x CAV – 1x CLV
DVD-ROM Dual Layer	12x CAV - 1x CLV
DVD-R	16x CAV – 1x CLV
DVD-R DL	12x CAV – 1x CLV
DVD-RW	12x CAV – 1x CLV
DVD-RAM	5x ZCLV – 2x CLV
+R	16x CAV – 2.4x CLV
+R DL	12x CAV – 2.4x CLV
+RW	12x CAV – 2.4x CLV
BD-ROM SL/DL、BD-R/RE SL	8x CAV – 2x CLV
BD-R/RE DL	6x CAV - 2x CLV

After writing, the reading speed is change to same speed of writing speed.

4.21.2 Writing Speed

The drive can specify the following writing speed. Default value of writing speed is maximum speed for each media type.

In this drive, the established values are always reset to the default values after loading media.

The available writing speed may be restricted by the drive when the characteristic of media is not suitable for the speed.

Table 39 – Available Writing speed for each media

Media	Available Writing Speed
CD-R	32x ZCLV, 24x ZCLV, 16x ZCLV, 10x CLV, 4x CLV
CD-RW (1 - 4x)	4x CLV
CD-RW High Speed	10x CLV, 4x CLV
CD-RW Ultra Speed	24x ZCLV, 16x ZCLV, 10x CLV, 4x CLV
CD-RW Ultra Speed+	24x ZCLV, 16x ZCLV, 10x CLV, 4x CLV
DVD-R (1x)	1x CLV
DVD-R (1 - 4x)	4x ZCLV, 2x CLV, 1x CLV
DVD-R (1 - 16x)	16x CAV, 12x ZCLV, 8x ZCLV, 6x ZCLV, 4x ZCLV
DVD-R DL (2 -8x)	8xZCLV, 6xZCLV, 4x ZCLV, 2x CLV
DVD-RW (1x)	1x CLV
DVD-RW (1 - 2x)	2x CLV, 1x CLV
DVD-RW (2 - 4x)	4x ZCLV, 2x CLV
DVD-RW (2 - 6x)	6x ZCLV,4x ZCLV, 2x CLV
DVD-RAM (2x)	2x CLV
DVD-RAM (2 – 3x)	3x CLV, 2x LCV
DVD-RAM (2 – 5x)	5x ZCLV, 3x CLV, 2x CLV
+R (1 - 2.4x)	2.4x CLV
+R (1 - 4x)	4x ZCLV, 2.4x CLV
+R (1 – 16x)	16x CAV, 12x ZCLV, 8x ZCLV, 6x ZCLV, 4x ZCLV
+R DL (2 -8x)	8x ZCLV,6x ZCLV, 4x ZCLV, 2.4x CLV
+RW (1 - 2.4x)	2.4x CLV
+RW (1 – 4x)	4x ZCLV, 2.4x CLV
+RW (3.3x – 8x)	8x ZCLV ,6x ZCLV , 3.3x CLV
BD-R SL/DL	8x ZCLV, 6x ZCLV, 4x ZCLV, 2x CLV
BD-RE SL/DL	2x CLV

The setting of the RDD, Exact and MRW bits and the Start LBA, End LBA, Read Size and Read Time fields are ignored. The specified writing speed will apply to whole disc area.

It is recommended to use the following values in order to set the write speed;

Table 40 – Parameters to set Writing speed for CD-R/RW media

Write time	Write Size	CD-R Writing Speed	CD-RW Writing Speed
0000h	0001h – FFFFh	32x ZCLV	24x ZCLV
03E8h	0000h – 06E3h	4x CLV	4x CLV
	06E4h – 0B06h	10x CLV	10x CLV
	0B07h – 1089h	16x ZCLV	16x ZCLV
	108Ah – 160Ch	24x ZCLV	24x ZCLV
	160Dh – FFFFh	32x ZCLV	

Table 41 – Parameters to set Writing speed for DVD-R/RW/R DL media

Write time	Write Size	DVD-R Writing Speed	DVD-R DL Writing Speed	DVD-RW Writing Speed
0000h	0001h – FFFFh	16x CAV	8x ZCLV	6x ZCLV
03E8h	0000h – 0AD1h	1x CLV	1x CLV	1x CLV
	0AD2h – 15A3h	2x CLV	2x CLV	2x CLV
	15A4h – 2075h	4x CLV	4x CLV	4x CLV
	2076h – 2B47h	6x CLV	6x CLV	6x CLV
	2B48h – 40EBh	8x ZCLV	8x ZCLV	
	40ECh – 568Fh	12x ZCLV		
	5690h – FFFFh	16x CAV		

Table 42 – Parameters to set Writing speed for +R/+RW/+R DL media

Write time	Write Size	+R Writing Speed	+R DL Writing Speed	+RW Writing Speed
0000h	0001h – FFFFh	16x CAV	8x ZCLV	8x ZCLV
03E8h	0000h – 15A3h	2.4x CLV	2.4x CLV	2.4x CLV
	15A4h – 2075h	4x CLV	4x CLV	4x CLV
	2076h – 2B47h	6x CLV	6x CLV	6x CLV
	2B48h – 40EBh	8x ZCLV	8x ZCLV	8x ZCLV
	40ECh – 568Fh	12x ZCLV		
	5690h – FFFFh	16x CAV		

Table 43 – Parameters to set Writing speed for BD-R/RE media

Write time	Write Size	BD-R Writing Speed	BD-RE Writing Speed
0000h	0001h – FFFFh	8x ZCLV	2x CLV
03E8h	0000h – 463Bh	2x CLV	
	463Ch – 6959h	4x CLV	
	695Ah – 8C77h	6x ZCLV	
	8C78h – FFFFh	8x ZCLV	

4.22 WRITE (10), WRITE (12) Command

The RelAdr bit is not supported and must be set to zero.

If the drive received a WRITE (10) or a WRITE (12) Command which causes an over run condition of the writing buffer, the execution of the command is deferred until the blank area of the buffer grows to be able to receive whole the data specified in the command. In this period, the interface bus is held by the drive.

A recording start is carried out when one of the following conditions is realized.
1)Write Buffer fills.
2) SYNC CACHE command is received.

In the recording state ,if eject or read request occurs, the data in a buffer is recorded and it ends. Eject or read request is performed continuously.

In the recording state ,if a buffer-under-run occurs, the drive leaves data for 1ECC and interrupts record operation temporarily until It receive the following Write command.

The Streaming bit of the WRITE (12) Command is reflected to the time-out value of write starting. If Streaming bit is set to one, the time-out value is set to 2 sec. If Streaming bit is set to zero time-out value is set to 5 sec. The drive maintains the Streaming bit of the latest Write (12) Command and determines the time-out value by maintained Streaming bit when writing operation is started. If sequential data are transferred, the Streaming bit of all WRITE (12) Command needs to keep same value.

The time-out value is valid in normal operating condition. If the drive is in abnormal condition, for example play backing the damaged area on the media, the time-out value will be grower by the drive to return from emergency condition of servo mechanism.

The FUA bit and the TSR bit are not supported and these are ignored.

For BD-RE/R, if the Streamig bit is set to one, Stream recording operation is used.

The VNR bit of WRITE(12) is applicable to BD-RE/R.

4.23 WRITE BUFFER Command

This command is used for checking the drive or firmware update.

The specifications of this command are vendor unique.