

PLDS

**HH BD Write Drive
Engineering Specifications**

BD Write DH-4B1S

Version 0.5

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Specifications in this document are subject to change without notice.

TABLE OF CONTENTS

1. INTRODUCTION	1
2. FEATURES.....	2
3. SPECIFICATIONS.....	3
3.1 DISC	3
3.2 OPERATION ENVIRONMENT FOR “WRITE/ REWRITE” APPLICATION	3
3.3 MECHANISM.....	4
3.4 SUPPORTED READ/WRITE/LABELING SPEED.....	5
3.5 SUPPORTED WRITE METHOD.....	6
3.6 PERFORMANCE	7
3.7 ERROR RATE	8
3.8 DVD-ROM PLAYABILITY.....	8
3.9 BD PLAYABILITY	8
3.10 CD PLAYABILITY	9
3.11 ENVIRONMENTAL CONDITIONS	9
3.12 RELIABILITY.....	10
3.13 ACOUSTIC NOISE.....	10
3.14 REGULATIONS AND STANDARDS	10
3.15 HOST OPERATING SYSTEM COMPATIBILITY	10
4. FRONT PANEL	11
4.1 MATERIAL.....	11
4.2 PHYSICAL DIMENSIONS	11
4.3 DRIVE MOUNTING SPEC	11
4.4 FRONT PANEL.....	11
4.5 REAR PANEL	11
4.6 DISC EJECT MECHANISM.....	12
5. ELECTRICAL	14
5.1 VOLTAGE REQUIREMENTS.....	14
5.2 CURRENT REQUIREMENTS.....	14
5.3 HOST INTERFACE.....	14
5.4 ATA COMMANDS LIST.....	14
5.5 ATAPI COMMANDS LIST	15
6. 6. BLOCK DIAGRAM.....	17
7.MECHANICAL DRAWING	18

1. INTRODUCTION

This document presents the engineering specifications of “BD Writer DH-4B1S”, a Half High SATA BD drive. These specifications guarantee the features provided by our drives are delicately implemented.

DH-4B1S is a versatile optical disk drive. For CD write function, it is capable to write data, which conforms to Orange Book: Part 2 CD-R Volume 1 / Part 2 CD-R Volume 2 Multi Speed / Part 3 CD-RW Volume 1 (known as Low Speed) / Part 3 CD-RW Volume2: High Speed / Part3 CD-RW Volume 3: Ultra Speed, into CD-R/RW disk in combination with write application software. For DVD write function, this drive confirms to DVD+R Version 1.3 / DVD+R9 Version 1.0 / DVD-R9 Version 3.0 / DVD+RW Version 1.3 / DVD-R Version 2.1 / DVD-RW Version 1.2 . For read function, it is capable to read all of the following media: DVD single/dual layer (PTP, OTP), DVD-R, DVD+R, DVD+R9, DVD-R9, DVD-RW, DVD+RW. For BD write function , this device confirm to Blue-ray disc recordable format Version 1.1, Blue-ray disc rewriteable format Version 2.1. Besides, it reads all of CD formats and media: CD-DA, CD-ROM, CD-ROM/XA, Photo-CD, Multi-session, Video CD, CD-I FMV, CD Extra, CD Plus, CD-R, and CD-RW.

The drive supports a DVD-ROM data read transfer rate of 12X in the outer track, 5.1X in the inner track, and achieves 8X speed in average for a 12cm (4.7Gbyte, single layer or layer 0 of dual layer) disc. For CD-ROM data transfer rate, it supports 40X in the outer track, 18X in the inner track, and achieves 31X speed in average for a 74 min disc. For BD-ROM data transfer rate, it support 4x in outer track, 1.66x in the inner track, and achieves 2.97X speed in average for a 22.5 Giga bytes disc. Besides, SMART-Speed function smartly adjusts CD-DA / VCD / DVD/BD data extraction to a fastest allowable speed according to both data request rate from host and disk quality. Regarding to CD write speed, it supports 40X (Max.) writing and 24X re-writing. For writing/ rewriting, Seamless-Link[®] function can avoid buffer under run as well as get the best writing quality by smartly adjusting writing strategy for Solid-Burn for DVD +/- R and BD-R SL .

Further more, heat dissipation is well considered that no cooling fan is needed.

2. FEATURES

1. 5 ¼", half height, SATA interface internal BD-ROM SL/DL, BD-R SL/DL, BD-RE SL/DL, DVD-R SL/DL, DVD-RW SL, DVD+R SL/ DL, DVD+RW, DVD-ROM SL/DL, CD-R, CD-RW, CD-ROM combination drive.
2. Fast access time and high data transfer rate, could be vertical mounted
3. Max. 12X DVD-ROM/DVD+R/DVD-R/DVD+RW/DVD-RW SL CAV (Constant Angular Velocity) reading
4. Max. 11.2X DVD-ROM/DVD+R/DVD-R DL CAV (Constant Angular Velocity) reading
5. Max. 40X CD-ROM/CD-R/CD-RW CAV reading
6. Max 4x CLV BD-ROM DL reading, 4x CAV BD-ROM/BD-R SL reading.
7. Max 2x CLV BD-R/BD-RE DL reading
8. Max. 12X DVD+R Zone CAV writing and Max. 8X DVD+RW Zone CLV rewriting
9. Max. 8X DVD+R9 Zone PCAV writing and Max. 8X DVD-R9 Zone PCAV writing.
10. Max. 12X DVD-R Zone CAV writing and Max. 6X DVD-RW CLV rewriting
11. Max. 4X BD-R SL ZCLV writing
12. Max. 2x BD-RE SL CLV writing
13. Max 2x BD-R DL CLV writing
14. Max. 2x BD-RE DL CLV writing
15. Max. 40X CD-R CAV writing
16. Max. 24X CD-RW Zone-CLV rewriting
17. SMART-Speed Smart Monitoring & Adjusting Read-speed Technology for host data requirement
18. Seamless-Link[®] for Buffer under run free
19. Solid-Burn for optimal writing strategy tuning
20. Conform to Orange Book: Part 2 CD-R Volume 1, Part 2 CD-R Volume 2 Multi Speed, Part 3 CD-RW Volume 1 (1x, 2x, and 4x), Part 3 CD-RW Volume2: High Speed, Part 3 CD-RW Volume 3: Ultra Speed. Support Fixed packet, Variable packet, Disc-at-once, Session-at-once and Track-at -once
21. Support Raw mode, and Over-Burn copy
22. DVD read compliant: DVD single/dual layer (PTP, OTP), DVD-R(3.9G/4.7G), DVD-R multi-borders ,DVD-R DL, DVD+R/DVD+R DL single/multi sessions, DVD-RW, DVD+RW and DVD-RAM discs with diameter of 8 or 12 cm .
23. CD read compliant: CD-DA, CD-ROM, CD-ROM/XA, Photo-CD, Multi-session, Video-CD, CD-I FMV, CD Extra, CD Plus, CD-R , and CD-RW discs of 8 or 12 cm diameter
24. BD read compliant: BD data, BD video
25. Support Windows DRMK DOS / XP/ 2003/ Vista and Linux operating system
26. Serial ATA Revision 2.5, ATA-7, MMC-5, SFF-8090 V6, and IMAPI compliant
27. MPC level 3, PC2001 System Design Guide, MultiRead/UDF compliant
28. Motor driven tray open/close without caddy system
29. 3 tray-eject methods - eject button, software, and emergency eject

- 30. Supported transfer mode: PIO mode 4, Ultra DMA mode 5.
- 31. ACPI compliant for power saving
- 32. MTBF 70,000 POH
- 33. Flash ROM support on line programming capability
- 34. Support RPC II (Region Playback Control)

3. SPECIFICATIONS

3.1 Disc

Applicable Formats	CD-DA, CD-TEXT, CD ROM Mode-1, CD-ROM/XA Mode-2 Form-1 and Form-2, CD-I Ready, Video-CD, Photo-CD, Enhance CD, CD extra, UDF (fixed/variable Packet mode), DVD-ROM, DVD-Video, DVD-Audio, DVD-R/DVD-R DL single/multi border(s), DVD+R/DVD+R DL single/multi session(s) DVD-RW DVD+RW BD-R SL/BD-R DL BD-RE SL/BD-RE DL BD-ROM SL/DL
Applicable Media Type	CD-ROM, CD-R and CD-RW DVD-ROM (4.7G) DVD-ROM dual layer (PTP/OTP) (8.54G) DVD-R (3.9G, 4.7G for General and Authoring), DVD-R DL DVD-RW, DVD+RW (4.7G), DVD+R, DVD+R DL BD-ROM SL/DL BD-R SL/BD-R DL BD-RE SL/BD-RE DL
Disc Diameter	12cm and 8cm
Capacity	2,048 bytes/sector (DVD-ROM,DVD-R/RW, DVD+R/RW) 2,048 bytes/sector (BD-R/BD-RE) 2,048 bytes/block (Mode-1 and Mode-2 Form-1), 2,336 bytes/block (Mode-2) 2,328 bytes/block (Mode-2 Form-2)

3.2 Operation environment for “write/ rewrite” application

Host Machine	IBM compatible PC (Pentium 4 3000MHz or above)
OS	MS-Windows XP/ 2003/ Vista/ Linux
Memory	Min. 512MB required
Hard disk	Empty Storage Capacity: 100 MB or more Average access time: 20 ms or less

Disc Diameter (Capacity)	8cm and 12cm
Recommended Media	<p>CD-R: CMC, Daxon, Infodisc, Leaddata, Maxell, MBI, MCC, Prodisc, Ritek, SAST, SONY, TDK, TY, Ricoh</p> <p>Low Speed CD-RW: CMC, Infodisc, MCC, Prodisc, Ricoh, Ritek, Lead Data,</p> <p>High Speed CD-RW: CMC, Infodisc, MCC, Prodisc, Ricoh, Ritek, Lead Data,</p> <p>Ultra Speed CD-RW: CMC, INFODISC, Mitsubishi, Ritek</p> <p>Ultra plus Speed CD-RW: Mitsubishi</p> <p>DVD+R 16X : SONY, MCC, CMC, Ritek, Maxell, TY, TDK, Ricoh, Prodisc, NEW START, INFORMEDIA, OPTODISC, PHILIPS, MBI, DAXON</p> <p>DVD+R9 2.4X : MKM, Ritek, Ricoh, CMC, PHILIPS, PRODISC</p> <p>DVD+R9 8X : MKM, Ritek, Ricoh, CMC, MBI, FUJI FILM</p> <p>DVD-R9 4X : MKM, CMC, Ritek</p> <p>DVD-R9 8X : MKM, CMC, Ritek</p> <p>DVD+RW 4X: MCC, SONY, RICOH, PHILIPS, INFODISC, PRODISC, RITEK, MBI</p> <p>DVD+RW 8X: MKM, PHILIPS, Ricoh, Ritek, SONY.</p> <p>DVD-R 16X: SONY, MCC, CMC, TY, Ritek, Prodisc, MBI, OPTODISC, TDK, Maxell, BEALL, MBI, NANYA, FUJI FILM, MUST, FTI, MJC, KDT</p> <p>DVD-RW4: JVC, TDK, RITEK, CMC, Prodisc</p> <p>DVD-RW 6X: MKM, JVC, TDK, CMC, Ritek.</p> <p>BD-R SL: Panasonic,Ritek,TDK,OM&T,Maxell,FujiFilm, Ricoh,Sony</p> <p>BD-RE SL: Panasonic,OM&T,Sony,TDK</p> <p>BD-R DL :Panasonic,TDK</p> <p>BD-RE DL: Panasonic</p>

3.3 Mechanism

Item	Specification
Pick-up	<p>NA: CD: 0.53 DVD: 0.67 BD : 0.85</p> <p>Focusing: CD: Astigmatic Method DVD Differential Astigmatic Method</p> <p>Tracking: CD: DPP DVD: DPD DVDR: DPP</p>

	BD: DPD BD-R/BD-RE: DPP Wave length: CD: 786 nm (typical) DVD: 660 nm (typical) BD: 405 nm(typical) Output power: Read CD: 2.25mW @ objective lens DVD: 1.6mW BD: 0.56mW Write CD: 158mW @ objective lens DVD: 100mW BD : 26 mW
Traverse mechanism	Stepping motor driven
Spindle motor	DC brushless motor
Loading mechanism	Motor driven tray open/close without caddy system

3.4 Supported Read/Write/Labeling speed

Media type for write	Write speed selected	Disc spin method for write
CD-R	40x	16X ~ 40X CAV
CD-R	32x	16X ~ 32X PCAV
CD-R	24x	16X ~ 24X PCAV
CD-R	12x/16x	12X/16X CLV
Low speed CD-RW	4x	4X CLV
High speed CD-RW	4x/10x	4x/10x CLV
Ultra speed CD-RW	16x/24x	10x ~16x~ 24x Zone-CLV
Ultra speed CD-RW plus	16x/24x	10x~16x~ 24x Zone CLV
DVD+R	4x/8x/12x	4x ZCAV, 8x/12x PCAV
DVD+R DL	2.4x/4x/8x	2.4x/4x ZCAV, 8x PCAV
DVD+RW	2.4x/4x/8x	2.4x/4x ZCAV,8x ZZCAV
DVD-R	4x/8x/12x	4x ZCAV, 8x/12x PCAV
DVD-R DL	2.4x/4x/8x	2.4x/4x ZCAV, 8x PCAV
DVD-RW	2.4x/4x/6x	2.4x/4x ZCAV,6x ZZCAV
BD-R SL	1x/2x/4x	1X/2X CLV 3.5x/4x ZCLV
BD-RE SL	1x/2X	1X CLV, 2X CLV
BD-R DL	1x/2x	1x/2x CLV
BD-RE DL	1x/2x	1x/2x CLV

Read (or data extraction for copy)	CLV	CAV
DVD-ROM (single layer)	NA	2~4X / 2.5X~6X / 3.5X~8X / 5.2X~12X
DVD-ROM (dual layer)	NA	2~3.8X / 2.5X~5.8X / 3.5X~8X
DVD+R	NA	2~4X / 2.5X~6X / 3.5X~8X / 5.2X~12X
DVD-R	NA	2~4X / 2.5X~6X / 3.5X~8X / 5.2X~12X
DVD+R DL	NA	2~3.8X / 2.5X~5.8X / 3.5X~7.8X / 5.2X~11.2X
DVD-R DL	NA	2~3.8X / 2.5X~5.8X / 3.5X~7.8X / 5.2X~11.2X
DVD+RW	NA	2~4X / 2.5X~6X / 3.5X~8X / 5.2X~12X
DVD-RW	NA	2~4X / 2.5X~6X / 3.5X~8X / 5.2X~12X
CD-ROM / Finalized CD-R	NA	4.5X~12X ,6.5X~16X,10X~24X 13X~32X ,16X~40X
Data /CD-DAE / Video CD	NA	4.5X~12X ,6.5X~16X,10X~24X 13X~32X ,16X~40X
Finalized CD-RW	NA	4.5X~12X,6.5X~16X,10X~24X 13X~32X ,16X~40X
Unfinalized CD-R/RW	NA	4.5X~12X,6.5X~16X,10X~24X 13X~32X
BD-ROM SL	1X/2X	1.7x~4X
BD-ROM DL	1X/2X	3.5X~4X CAV
BD-R SL	1X/2X	1.7x~4X CAV
BD-RE SL	1X/2X	NA
BD-R DL	1X/2X	NA
BD-RE DL	1X/2X	NA
Play	CLV	CAV
Video CD	NA	6.5X~16X
CD-DA	NA	6.5X~16X
DVD single/ dual layer	NA	2X~4X
DVD+R/RW,	NA	2X~4X
DVD-R/RW	NA	2X~4X

3.5 Supported Write Method

Following write methods are supported by this drive

For CD-R/RW disc

1. Disc At Once (DAO)
2. Session At Once (SAO)

- 3. Track At Once (TAO)
- 4. Variable Packet Write
- 5. Fixed Packet Write

For DVD+R / DVD+R9

- 1. Incremental.

For DVD+RW

- 1. Random Access Write.

For DVD-R

- 1. Disc-At-Once (un-interrupted)
- 2. Incremental.

For DVD-RW

- 1. Sequential recording : Disc-At-Once (un-interrupted) and Incremental.
- 2. Restricted overwrite

For DVD-R9

- 1. Disc-At-Once (un-interrupted)
- 2. Incremental
- 3. Layer Jump recording

For BD-R

- 1. sequential write+/- logical overwrite

For BD-RE

- 1. sequential write
- 2. random write

3.6 Performance

Item	Min	Typical	Max
Data Buffer (MB)			16
Burst Data Transfer Rate (MB/s)			
Ultra DMA 5			100
PIO mode 4			16.7
Spin Speed (rpm)			
CD-ROM read		8700	
DVD-ROM read		7200	
BD-ROM read		3300	
Sustained Data Transfer Rate(KB/s)			
DVD-ROM outside (LBA: 0x230000)	16620		
DVD-ROM inside (LBA: 0)	6925		
BD-ROM outside (LBA: 0xB67400)	17982		
BD-ROM inside (LBA: 0)	7642		
CD-ROM outside (LBA: 0x51432)	6000		
CD-ROM inside (LBA: 0)	2400		
Access Time(Average ms) test by CDSPEED			
DVD 1/3 Stroke			160
Full Stroke			250
Random Access			150

CD	1/3 Stroke			160
	Full Stroke			250
	Random Access			150
BD	1/3 Stroke			350
	Full Stroke			800
	Random Access			350
Start Up Time ¹		(s)		
	DVD			18.0
	CD-ROM			18.0
	BD-ROM			30.0
Stop Time ²		(s)		
	DVD			9.0
	CD-ROM			9.0
	BD-ROM			9.0
Spindle				
	Spin Up Time	(s)		6.0
	Spin Down Time	(s)		8.0

3.7 Error Rate

For CD-ROM

Mode-1 (ECC on)

10^{-12} Block/Bit

Mode-2 (ECC off)

10^{-9} Block/Bit

For DVD-ROM

10^{-15} Block/Bit

For BD-ROM

SER(symbol error rate) $<2 \times 10^{-4}$ for 10000 consecutive LDC blocks

3.8 DVD-ROM Playability

Item		Min.
Scratch	(mm)	3.0
Black Dot	(mm)	1.0
Fingerprint	(μ m)	75
Eccentric	(μ m)	150
Vertical Deviation	(mm)	1.0
Unbalance	(g-mm)	3 (at Max. speed, w/o down speed) 10 (No read error)

Note: No read error in the above tests

3.9 BD Playability

Item		Min.
Run-out	(μ m)	75
Unbalance	(g-mm)	4
Black Dot	(mm)	1.0
Vertical Deviation	(mm)	0.2

¹ It includes spin up and read TOC

² It includes spin down and tray eject

Note: No track jump in the above tests

3.10 CD Playability

Item	Min.
Scratch (mm)	1.6
Black Dot (mm)	1.0
Fingerprint (µm)	75
Eccentric (µm)	210
Vertical Deviation (mm)	1.0
Unbalance (g-mm)	3 (at Max. speed, w/o speed down) 10 (No read error)

Note: No read error in the above tests.

3.11 Environmental Conditions

Temperature (Non-Condensation)

Operating 0°C to 50°C
 Non-Operating -40°C to 65°C

Humidity (Non-Condensation)

Operating 10% to 90% RH
 Non-Operating 5% to 95% RH

Shock (11ms half-sine, 6 times per axis, in the directions of X, Y and Z axis)

Operating 2 G (CD-DA, no track jump)
 5 G (CD/DVD-ROM, no read error)
 1 G (CD-R/RW, no write/rewrite error)
 1 G (DVD+R/RW, no write/rewrite error)
 1 G (DVD-R/RW, no write/rewrite error)
 1 G (DVD-RAM, no write/rewrite error)
 1 G (BD-R/BD-RE, no write/rewrite error)

Shock (2ms half-sine, 6 times per axis, in the directions of X, Y and Z axis)

Operating 60 G (No tray opening)

Shock (2ms half-sine, 1 times per face, total 6 faces)

Non-Operating (with disk) 200 G (No damage)

Vibration (Random vibration from 7 to 800 Hz, in the direction of X, Y and Z)

Operating 0.5G RMS (CD-DA, no track jump)
 0.5G RMS (CD/DVD-ROM, no read error)
 0.5G RMS (CD-R/RW, no write/rewrite error)
 0.5G RMS (DVD+R/RW, no write/rewrite error)
 0.5G RMS (DVD-R/RW, no write/rewrite error)
 0.5G RMS (DVD-RAM, no write/rewrite error)
 0.5G RMS (BD-R/BD-RE, no write/rewrite error)

Vibration (Random vibration from 7 to 800 Hz, in the direction of X, Y and Z)

Non-Operating (with disc) 0.712G RMS, (No damage)

Altitude	
Operating	0 ~ 3,500 m
Non-Operating	0 ~ 12,500 m

3.12 Reliability

MTBF	70,000 POH at 25% duty cycle in room temp.
MTTR	30 minutes
Loading Operation	30,000 cycles
Actuator Mechanism	1,000,000 full stroke seeks

ElectroStatic Discharge Susceptibility (330Ω, 150pF)	4 KV (Contact Discharge)	No read/write/rewrite error
	8 KV (Air Discharge)	No read/write/rewrite error
	8 KV (Contact Discharge)	No damage
	15 KV (Air Discharge)	No damage

3.13 Acoustic Noise

Sound pressure (sequential read)	55 dB (follow ISO-7779)
	(random read) 55 dB (follow ISO-7779)
	Playing A-BEX SCD-3228 2.5g-mm unbalance

3.14 Regulations and Standards

Safety	
cUL	UL60950
TUV	EN60950, EN60825-1
CB	IEC60950, IEC60825-1
EMC	
FCC(USA)	FCC CFR 47 Part 15 Class B, CISPR22, ANSI C63.4
CE (European Countries)	EN55022, EN50024, EN61000,IEC61000
C-TICK (Australia)	AS/NZS CISPR22
BSMI (Taiwan)	CNS13438(C6537)
MIC(Optional)	KN61000
Laser Safety	
DHHS (USA)	21CFR Subchapter J

3.15 Host Operating System Compatibility

DRMK DOS / MS Windows XP/ 2003/ Vista and Linux

4. FRONT PANEL

4.1 Material

The front bezel, push button and tray lid are modeled. Additional specifications of these components are described in the following table.

ITEMS	Front Bezel/Button/Door	Tray
Material	ABS PA-765A	PC+ABS/ABS
Flammability	UL94V0	UL94V2

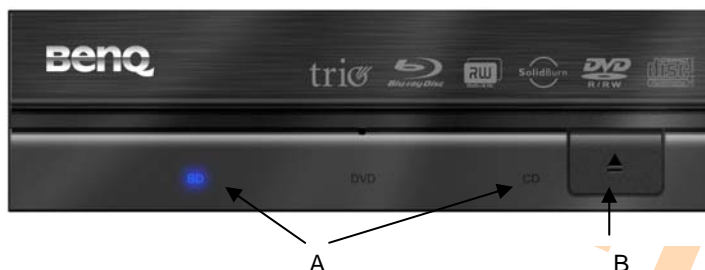
4.2 Physical Dimensions

Height	41.4 ± 0.5 mm(without panel)
Width	146.0 ± 0.5 mm
Depth	177.5 ± 0.5 mm
Weight	850 g

4.3 Drive mounting spec

Mount the drive horizontally within ±10° tilt.

4.4 Front Panel



- (A) LED
- (B) Eject button

Door

Door of the tray to hold the disc.

On/Busy LED

Indication of drive's operation status

Pin Hole Eject

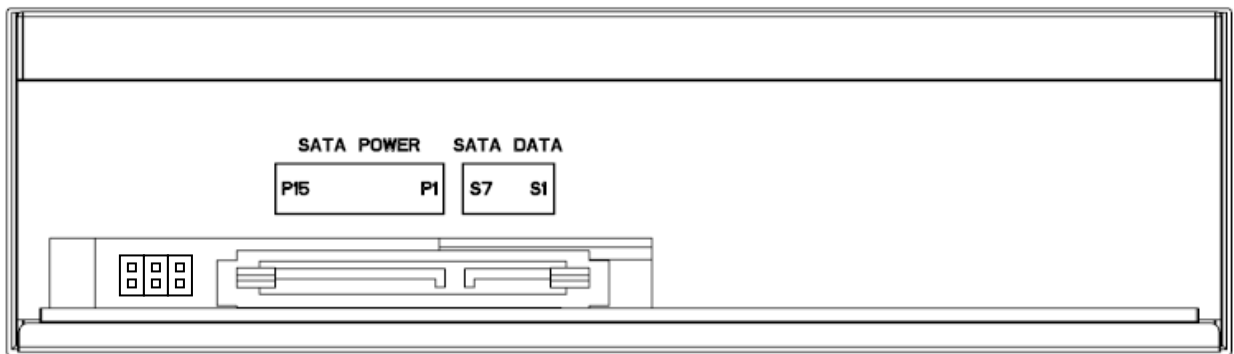
To eject the locked tray caused by loss of power.

Eject

Push button would eject the tray.

4.5 Rear Panel

The rear panel of the drive is a SATA connector which consists of DC power and signal connector. The following layout illustrates the rear panel.



Power Connector Pin segment

15 pin connector for DC power input.

Power segment	P1	V ₃₃	3.3 V power
	P2	V ₃₃	3.3 V power
	P3	V ₃₃	3.3 V power, pre-charge, 2 nd mate
	P4	Gnd	1 st mate
	P5	Gnd	2 nd mate
	P6	Gnd	2 nd mate
	P7	V ₅	5 V power, pre-charge, 2 nd mate
	P8	V ₅	5 V power
	P9	V ₅	5 V power
	P10	Gnd	2 nd mate
	P11	Reserved	1. The pin corresponding to P11 in the backplane receptacle connector is also reserved 2. The corresponding pin to be mated with P11 in the power cable receptacle connector shall always be grounded
	P12	Gnd	1 st mate
	P13	V ₁₂	12 V power, pre-charge, 2 nd mate
	P14	V ₁₂	12 V power
	P15	V ₁₂	12 V power

SATA Interface Connector Pin Segment

7-pin connector for SATA interface.

Signal Segment Key			
Signal segment	S1	Gnd	2 nd mate
	S2	A+	Differential signal pair A from Phy
	S3	A-	
	S4	Gnd	2 nd mate
	S5	B-	Differential signal pair B from Phy
	S6	B+	
	S7	Gnd	2 nd mate

4.6 Disc Eject Mechanism

The drive can eject the disc by any one of the following three methods.

Eject Button

When the power is on, the user can push this key to eject the tray.

Software Eject

The tray can be ejected by commands from the host computer.

Pin Hole Eject

A pin hole eject mechanism is available on the front bezel to eject the disc in an emergency situation. To eject a disc manually, insert a steel rod with 1.2 mm in diameter into this emergency eject hole and push softly. The rod must be inserted into the drive at least 50mm from the surface of bezel.

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5. ELECTRICAL

5.1 Voltage Requirements

- +5V: ±5% and less than 100 mVp-p ripple voltage
- +12V: ±10% and less than 200 mVp-p ripple voltage

5.2 Current Requirements

Operation Mode	+5V (Amp)	+12V (Amp)
Spinning Up (Peak)	1.1	1.3
Seeking (Peak)	1.2	0.9
Reading (Average)	1.1	0.9
Writing (Average)	1.2	0.9
Sleep (Average)	0.4	0.05

5.3 Host Interface

The interface is based on Serial ATA 2.5 (High Speed Serialized AT Attachment Revision 2.5), and SFF-8090i Rev. 6 (Mt. Fuji Commands for Multimedia Devices)

Signal Segment Key			
Signal segment	S1	Gnd	2 nd mate
	S2	A+	Differential signal pair A from Phy
	S3	A-	
	S4	Gnd	
	S5	B-	Differential signal pair B from Phy
	S6	B+	
	S7	Gnd	2 nd mate
Signal Segment "L"			
Central Connector Polarizer			
Power Segment "L"			
Power segment	P1	V ₃₃	3.3 V power
	P2	V ₃₃	3.3 V power
	P3	V ₃₃	3.3 V power, pre-charge, 2 nd mate
	P4	Gnd	1 st mate
	P5	Gnd	2 nd mate
	P6	Gnd	2 nd mate
	P7	V ₅	5 V power, pre-charge, 2 nd mate
	P8	V ₅	5 V power
	P9	V ₅	5 V power
	P10	Gnd	2 nd mate
	P11	Reserved	1. The pin corresponding to P11 in the backplane receptacle connector is also reserved 2. The corresponding pin to be mated with P11 in the power cable receptacle connector shall always be grounded
	P12	Gnd	1 st mate
	P13	V ₁₂	12 V power, pre-charge, 2 nd mate
	P14	V ₁₂	12 V power
	P15	V ₁₂	12 V power
Power Segment Key			

5.4 ATA Commands List

Code	Command	Type
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00h	NOP	Mandatory
08h	DEVICE RESET	Mandatory
90h	EXECUTE DEVICE DIAGNOSTIC	Mandatory
A0h	PACKET	Mandatory
A1h	IDENTIFY PACKET DEVICE	Mandatory
E0h	STANDBY IMMEDIATE	Mandatory
E1h	IDLE IMMEDIATE	Mandatory
E2h	STANDBY	Mandatory
E3h	IDLE	Mandatory
E5h	CHECK POWER MODE	Mandatory
E6h	SLEEP	Mandatory
E7h	FLUSH CACHE	Mandatory
EFh	SET FEATURES	Mandatory

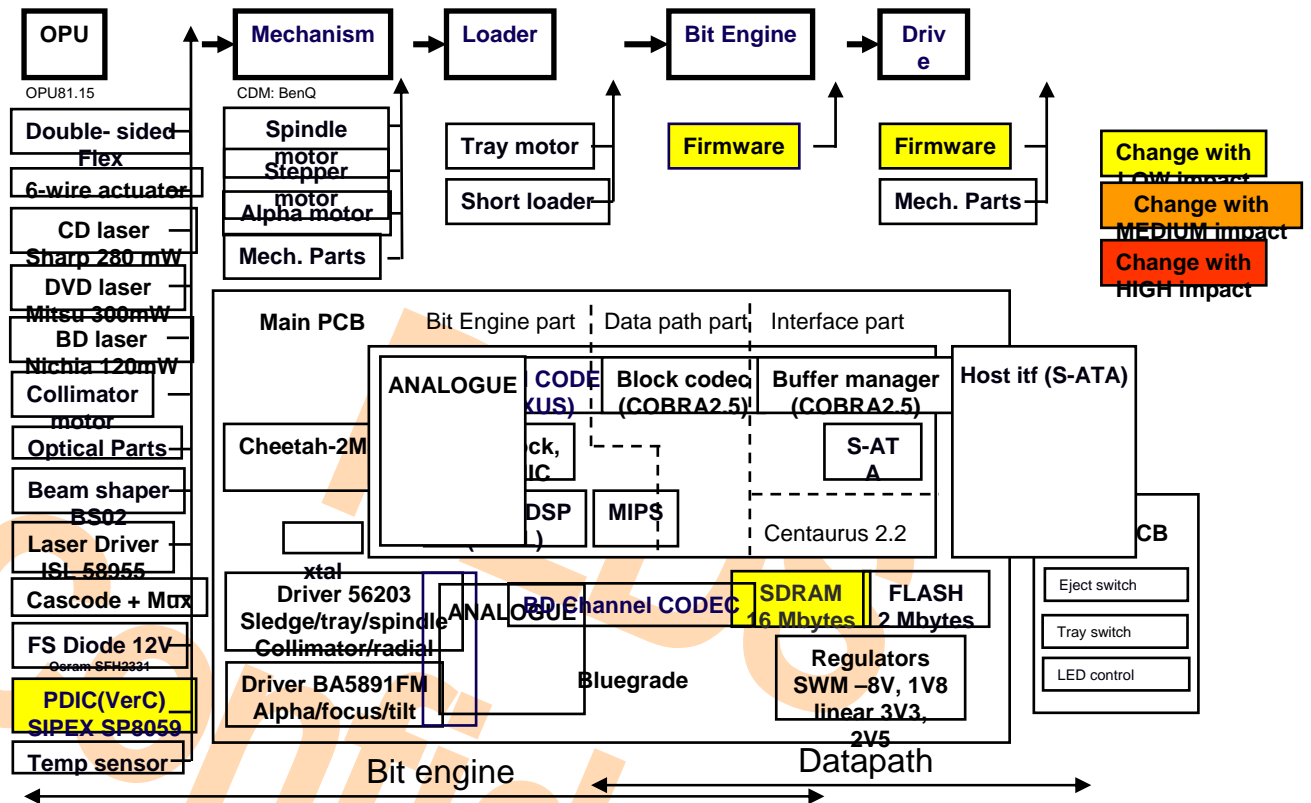
5.5 ATAPI Commands List

Code	Command	Type
00h	TEST UNIT READY	Mandatory
03h	REQUEST SENSE	Mandatory
04h	FORMAT UNIT	Mandatory
12h	INQUIRY	Mandatory
1Bh	START STOP UNIT	Mandatory
1Eh	PREVENT/ALLOW MEDIUM REMOVAL	Mandatory
23h	READ FORMAT CAPACITY	Mandatory
25h	READ CAPACITY	Mandatory
28h	READ (10)	Mandatory
2Ah	WRITE	Mandatory
2Bh	SEEK	Mandatory
2Eh	WRITE AND VERIFY (10)	Mandatory
2Fh	VERIFY(10)	Mandatory
35h	SYNCHRONIZE CACHE	Mandatory
3Bh	WRITE BUFFER	Mandatory
3Ch	READ BUFFER	Mandatory
42h	READ SUB-CHANNEL	Mandatory
43h	READ TOC/PMA/ATIP	Mandatory
44h	READ HEADER	Mandatory
45h	PLAY AUDIO (10)	Mandatory
46h	GET CONFIGURATION	Mandatory
47h	PLAY AUDIO MSF	Mandatory
4Ah	GET EVENT STATUS NOTIFICATION	Mandatory
4Bh	PAUSE/RESUME	Mandatory
4Eh	STOP PLAY / SCAN	Mandatory
51h	READ DISK INFORMATION	Mandatory
52h	READ TRACK INFORMATION	Mandatory
53h	RESERVE TRACK	Mandatory
54h	SEND OPC INFORMATION	Mandatory
55h	MODE SELECT (10)	Mandatory
5Ah	MODE SENSE (10)	Mandatory
5Bh	CLOSE TRACK SESSION	Mandatory
5Ch	READ BUFFER CAPACITY	Mandatory

5Dh	SEND CUE SHEET	Mandatory
A1h	BLANK	Mandatory
A3h	SEND KEY	Mandatory
A4h	REPORT KEY	Mandatory
A5h	PLAY AUDIO (12)	Mandatory
A7h	SET READ AHEAD	Mandatory
A8h	READ (12)	Mandatory
AAh	WRITE(12)	Mandatory
ACh	GET PERFORMANCE	Mandatory
ADh	READ DVD STRUCTURE	Mandatory
B6h	SET STREAMING	Mandatory
B9h	READ CD MSF	Mandatory
BBh	SET CD SPEED	Mandatory
BDh	MECHANISM STATUS	Mandatory
BEh	READ CD	Mandatory
BFh	SEND DVD STRUCTURE	Mandatory

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6. 6. BLOCK DIAGRAM



DH-4B1S block digram

