

Hitachi-LG Data Storage, Inc.

Issued Date	Apr. 16. 2008	GH22NS30	R 1.0	1/22
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SPECIFICATIONS
OF
H/H DVD writable DRIVE
Model GH22NS30

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** This specifications can be changed for improvement without prior notice.*

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Revision History

Rev. No	Classification	Brief description	Revised Date	Applicant	Approval
R1.0		First Release for Standard			

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0. Attention *-To export this product-*

*The Shipment of this product is limited by the rules of export in each country.
The proper procedures should be taken when exporting this product.*

1. Features

1.1 General

- (1) Serial ATA interface
- (2) Internal Half-height Drive
- (3) CD-R/RW/ DVD-R/ -R DL/ -RW/+R /+R DL /+RW/RAM read and write compatible
CD Family and DVD-ROM read compatible
- (4) Buffer Under-run prevention function embedded
- (5) 2 MB buffer memory
- (6) Power loading and power eject of a disc. Bare media loading
- (7) MTBF: 100,000 POH
- (8) Vertical and Horizontal installable
- (9) Support SecurDisc™ Technology

1.2 Supported disc formats

- (1) Reads data in each DVD-ROM, DVD-R (Ver.1.0, Ver. 2.0 for Authoring), and DVD-RAM
(Ver. 2.0 & Higher)
- (2) Reads and writes in each DVD-R (Ver. 2.0 for General), -R DL, -RW,
DVD-RAM (Ver. 2.0 & Higher), DVD+R and +R DL (Double layer), +RW
- (3) Reads data in each CD-ROM, CD-ROM XA, CD-I, Video CD, CD-Extra and CD-Text
- (4) Reads data in Photo CD (Single and Multi session)
- (5) Reads standard CD-DA
- (6) Reads and writes CD-R discs conforming to "Orange Book Part 2"
- (7) Reads and writes CD-RW discs conforming to "Orange Book Part 3"
- (8) Reads and writes DVD-RAM, DVD-R, DVD-RW, DVD-R Dual with CPRM
- (9) Reads and Writes SecurDisc™ (DVD+R, DVD-R, DVD+R DL, DVD-R DL, DVD+RW, DVD-RW,
DVD-RAM, CD-R, CD-RW)

1.3 Supported write method

- (1) DVD-R : Disc at Once and Incremental Recording
- (2) DVD-R DL : Disc at Once and Sequential Recording
- (3) DVD-RW : Disc at Once, Incremental Recording and Restricted Overwrite
- (4) DVD+R : Sequential Recording
- (5) DVD+R DL : Sequential Recording
- (6) DVD+RW : Random Write
- (7) CD-R/RW : Disc at Once, Session at Once, Track at Once and Packet Write
- (8) DVD-RAM : Random Write (Ver. 2.0 & Higher)
- (9) SecurDisc™ : Disc at Once (for supported media)
- (10) CPRM : Disc at Once (for supported media)

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1.4 Performance

- (1) Average access time: DVD-ROM 140ms
(1/3) CD-ROM 120ms
- (2) Write speed:
- | | |
|----------|---|
| DVD+R | 2.4x, 4x (CLV), 8x (ZCLV), 12x (PCAV), 16x,20x,*22x (CAV) |
| DVD+RW | 2.4x, 4x ,6x(CLV), 8x (ZCLV) |
| DVD-R | 2x, 4x(CLV), 8x (ZCLV),12x (PCAV), 16x,20x,*22x (CAV) |
| DVD-RW | 1x, 2x, 4x , 6x (CLV) |
| DVD+R DL | 2.4x, 4x (CLV), 6x , 8x(ZCLV), 10x,12x (PCAV), 16x(CAV) |
| DVD-R DL | 4x (CLV), 6x, 8x (ZCLV), 10x, 12x (PCAV) |
| DVD-RAM | 2x, 3x (CLV) , 5x, 6x, 8x,12x PCAV (Ver. 2.0 & Higher) |
| CD-R | 16x (CLV), 24x (ZCLV), 40x, 48x (CAV) |
| CD-RW | 4x, 10x, 16x (CLV), 24x, 32x (ZCLV) |
- (High Speed: 10x , Ultra Speed ≥ 16x)
- (3) Read speed:
- | | |
|-------------------------------|-----------------------------|
| DVD-ROM (Single/Dual) | 16x/12x max |
| DVD-Video(CSS Compliant Disc) | 6x max. (Single/Dual layer) |
| DVD-R/-RW/-R DL | 16x/12x/12x max. |
| DVD+R/+RW/+R DL | 16x/ 12x/12x max. |
| DVD-RAM (Ver. 2.0 & Higher) | 5x, 12x PCAV |
| CD-R/RW/ROM | 48x/40x/48xmax. |
| CD-DA (DAE) | 40x max. |
- (4) Sustained Transfer rate: DVD-ROM 22.16 Mbytes/s (16x) max.
CD-ROM 7,200 kB/s (48x) max.
- (5) Burst Transfer rate: 1.5Gbps
- (6) Multimedia MPC-3 compliant

1.5 Audio

- (1) 16 bit digital data output through ATA interface
(2) Software Volume Control

1.6 SecurDisc™

Media : CD-R, CD-RW, DVD+R,DVD-R,DVD+RW,DVD-RW,DVD+R DL,DVD-R Dual,
DVD-RAM
Password Protection
Digital Signature
Data Integrity check
Data Reliability (Not 100% Proof)
Only use Bundle Tool Software (Ref. www.securdisc.net)

*Definition

DVD±R 22x Write Support Media : MKM , Taiyo Yuden
Transfer Rate: 1x (DVD) = 1.385 Mbytes/s, 1x (CD) = 150 kB/s
Capacity:MB = 2²⁰ bytes, kB = 2¹⁰ bytes (Kbytes/s = 10³ bytes/s, Mbytes/s = 10⁶ bytes/s)

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2. General description

2.1 Applicable disc formats

DVD	DVD-ROM	4.7GB (Single Layer) 8.5GB (Dual Layer)	
	DVD-R	3.95GB (Ver. 1.0: read only) 4.7GB (Ver. 2.0 for Authoring: read only) 4.7GB (Ver. 2.0 for General: read & write)	
	DVD-RW	4.7GB (Ver. 1.1)	
	DVD+R	4.7GB	
	DVD+R DL	8.5GB	
	DVD-R DL	8.5GB	
	DVD+RW	4.7GB	
	DVD-RAM	4.7GB (Ver. 2.0 & Higher)	
	CD	CD-ROM Mode-1 data disc	
		CD-ROM Mode-2 data disc	
		CD-ROM XA, CD-I, Photo-CD Multi-Session, Video CD	
		CD-Audio Disc	
		Mixed mode CD-ROM disc (data and audio)	
		CD-Extra	
CD-Text			
CD-R (Conforming to "Orange Book Part 2": read & write) CD-RW (Conforming to "Orange Book Part 3": read & write)			

2.2 Writing method

(1) DVD-R/RW	Disc at Once Incremental Recording Restricted Overwrite (DVD-RW only)
(2) DVD+R	Sequential Recording
(3) DVD+RW/RAM	Random Write
(4) DVD+R DL	Sequential Recording
(5) DVD-R DL	Disc at Once Sequential Recording
(6) CD-R/RW	Disc at Once (DAO) Session at Once (SAO) Track at Once (TAO) Packet Writing

2.3 Disc diameter

120 mm
80 mm (Horizontal only)

2.4 Data capacity

User data / Block	DVD-ROM/-R/-R DL/-RW/-RAM /+R/+RW/+R DL 2,048 bytes/block CD (Yellow Book) 2,048 bytes/block (Mode1 & Mode2 Form1) 2,336 bytes/block (Mode2) 2,328 bytes/block (Mode2 Form2) 2,352 bytes/block (CD-DA)
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3. Drive performance

3.1 Host interface X3T13 ATA/ATAPI5/1321D
INF-8090i Rev.5.3

3.2 Read / Write & Rotational speed

<Write>	DVD-R		2x,4x(CLV), 8x(ZCLV),12x(PCAV),16x,20x,22x(CAV)
	DVD-RW		1x, 2x, 4x, 6x (CLV)
	DVD+R		2.4x,4x(CLV),8x(ZCLV),12x(PCAV),16x,20x,22x(CAV)
	DVD+RW		2.4x, 4x , 6x (CLV), 8x (ZCLV)
	DVD+R DL		2.4x,4x(CLV), 6x,8x (ZCLV), 10x,12x (PCAV), 16x(CAV)
	DVD-R DL		4x (CLV), 6x,8x (ZCLV), 10x,12x (PCAV)
	DVD-RAM (Ver. 2.0 & Higher)		2x, 3x (CLV), 5x, 6x, 8x, 12x (PCAV)
	CD-R		16x (CLV), 24x (ZCLV), 40x, 48x(CAV)
	CD-RW		4x, 10x,16x(CLV), 24x, 32x (ZCLV) (High Speed: 10x, Ultra Speed ≥ 16x)
<Read>	DVD-ROM	Single layer	6.4x - 16x (CAV)
		Double layer	5x - 12x (CAV)
	DVD-Video (CSS)		2.5x - 6x (CAV)
	DVD-R	3.95GB	6.4x - 16x (CAV)
		4.7GB	6.4x - 16x (CAV)
	DVD-RW	4.7GB	5x - 12x (CAV)
	DVD+R	4.7GB	6.4x - 16x (CAV)
	DVD+RW	4.7GB	5x - 12x (CAV)
	DVD+R DL	8.5GB	5x - 12x (CAV)
	DVD-R DL	8.5GB	5x - 12x (CAV)
	DVD-RAM (Ver. 2.0 & Higher)		5x - 12x (PCAV)
	CD-R/ROM, data CD-I		20x - 48x (CAV)
	CD-RW		17x - 40x (CAV)
	CD-DA (DAE)		17x - 40x (CAV)
	Video CD		6x - 15x (CAV)

3.3 Data transfer rate

3.3.1 Sustained transfer rate

<Write>	DVD-R	12.81-30.47 Mbytes/s	(Max)	22x (CAV)
	DVD-RW	8.31 Mbytes/s	(Max)	6x (CLV)
	DVD+R	12.81-30.47 Mbytes/s	(Max)	22x (CAV)
	DVD+RW	11.08 Mbytes/s	(Max)	8x (ZCLV)
	DVD+R DL	22.16 Mbytes/s	(Max)	16x (CAV)
	DVD-R DL	16.62 Mbytes/s	(Max)	12x (PCAV)
	DVD-RAM	16.62 Mbytes/s	(Max)	12x (PCAV) (w/o Verify)
	(Ver. 2.0 & Higher)			
	CD-R	3,000-7,200 kB/s (Mode-1)	(Max)	48x (CAV)
	CD-RW	2,400-3,600 kB/s (Mode-1)	(Max)	32x (ZCLV)
<Read>	DVD-ROM	Single layer	9.00 - 22.16 Mbytes/s	16x max.
		Dual layer	6.93 - 16.62 Mbytes/s	12x max.
	DVD+/-R		9.00 - 22.16 Mbytes/s	16x max.
	DVD+/-RW/DL		6.93 - 16.62 Mbytes/s	12x max.
	DVD-RAM		6.93- 16.62 Mbytes/s	12x max.

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CD-R/ROM	3,000 - 7,200 kB/s	48x max.
CD-RW	2,550 - 6,000 kB/s	40x max.
CD-DA (DAE)	2,550 - 6,000 kB/s	40x max.

3.3.2 Burst transfer rate

SATA 1.0 , Ultra DMA Mode 5 , PIO Mode 4

3.4 Access time (Random)

DVD-ROM (SL/DL)	140/175 ms typ.* (Note 1)
DVD-RAM	230 ms typ.* (Note 1) (Ver. 2.0 & Higher)
CD-ROM	120 ms typ. (Note 1)

Note :

1) Average random access time is the typical value of more than 50 times including latency and error correction time.

Test Disc: DVD : ALMEDIO TDV-520 / TDR-820

CD : ALMEDIO TCDR-701 / HITACHI HCD-1

*) Typical value defines a measured value in normal temperature (20 degC) and horizontal position.

3.5 Data error rate (Measured with 5 retries maximum)

DVD-R/RW/ROM/RAM	$<10^{-12}$
DVD+R/+RW	$<10^{-12}$
CD-R/RW/ROM	$<10^{-12}$ (Mode-1)
	$<10^{-9}$ (Mode-2)

Condition: It is assumed that the worst case raw error rate of the disc is 10^{-3}

3.6 Spin up, Load time without Multi-session

Spin up time (Time to drive ready mode from standby mode) : 5s typ.

Load time (Time to drive ready mode from tray loading)

DVD-ROM	12 s typ.
DVD-R	22 s typ. (Disc At Once, Ver. 2.0 for general)
DVD-RW	22 s typ. (Disc At Once, Ver. 1.1)
DVD+R/RW	22 s typ.
DVD-RAM	24 s typ.
CD-ROM	10 s typ.

3.7 Data buffer capacity 2 M

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4. Environmental conditions

4.1 Ambient temperature

Operating 5 to 45 degC**
Storage / Transportation -30 to 60 degC

**** . Note1) Criteria is "No write failure and No read failure" under 50degC.**

Note2) Each test Media uses standard media of production line.

**Note3) If sensor of OPU is detected over 64 degC, Drive is writing under 16x CAV mode.
(DVD±R)**

4.2 Temperature gradient 10 degC/h

4.3 Relative humidity

Operating 10% to 80% (Non-Condensing)
Storage / Transportation 10% to 90% (Non-Condensing)

4.4 Dew point temperature restrictions Less than 29 degC

4.5 Vibration

(1) Operating :

Read : No unrecoverable error

Audio ; 3.43 m/s² (0.35G)

Data ; 3.43 m/s² (0.35G)

10-500Hz Sine sweep, 1Oct/min

at X(left and right),Y(back and front), Z(top and bottom) axis.

Write : No recording stop

CD-R/RW : 2.94 m/s² (0.3G)

DVD : 0.98 m/s² (0.1G)

10 - 500Hz sine sweep , 1oct/min

at X(left and right), Y(back and front), Z(top and bottom) axis.

(2) Non-Operating : No damage must result

19.6 m/s² (2G)

10 - 500Hz sine sweep , 1Oct/min

at X(left and right), Y(back and front), Z(top and bottom) axis. 40 min/axis.

4.6 Shock

(1) Operating

Read : No unrecoverable error

Audio : 19.6 m/s² (2G) Data : 58.8 m/s² (6G)

11ms , 1/2 sine wave (5 time shocks , 6sec between shocks)

at X(left and right),Y(back and front), Z(top and bottom) axis

Write : No recording stop

CD-R/RW : 9.8 m/s² (1G) DVD : 4.9m/s² (0.5G)

11ms , 1/2 sine wave (5 time shocks , 6sec between shocks)

at X(left and right), Y(back and front), Z(top and bottom) axis

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(2) Non-Operating : No damage after shock
140G
2ms, 1/2 sine wave
at X(left and right), Y(back and front), Z(top and bottom) axis

5. Quality and Reliability

5.1 MTBF

100,000 Power On Hours (POH)

- Assumption : Used in a normal office environment at room temperature.
- POH per year : 3,000
- ON / OFF cycles per year : 600
- Operating duty cycle : 20 % of power on time (Seek: 5 % of operating time)

5.2 Tray cycle test

: 30,000 times
No degeneration in the mechanical part after test
(1cycle ; one loading and one ejecting)

5.3 Actuator mechanism

: 1,000,000 full stroke seek

5.4 MTTR (Mean Time To Repair)

: 0.5 h

5.5 Component life

: 5 years or 2,000 h of Laser radiating time
Assumption: Used in a normal office environment

6. Electro Static Discharge susceptibility (ESD)

Up to 6 kV(contact)	No user detectable data error
Up to 8 kV(contact)	No catastrophic failure or damage
Up to 10kV (Air)	No user detectable data error
Up to 15kV (Air)	No catastrophic failure or damage

* Test Conditions : C = 150pF, R = 330 ohms, 20 times discharge
except Optical Pick-up block and Connector

7. Power requirements

7.1 Source voltage

- + 5 V +/- 5 % tolerance, less than 100 mVp-p Ripple voltage
- +12 V +/- 5 % tolerance, less than 100 mVp-p Ripple voltage

*Note

DVD±R 22x writing is supported regular +12V.

7.2 Current

Idle (Hold track state)	+ 5 V DC	0.6 A typ.	< 1.0 A max.
	+12 V DC	0.5 A typ.	< 1.0 A max.
Write (Active)	+ 5 V DC	1.2 A typ.	< 1.6 A max.
	+12 V DC	1.6 A typ.	< 2.0 A max.
Read (Active)	+ 5 V DC	1.1 A typ.	< 1.3 A max.
	+12 V DC	1.2 A typ.	< 1.5 A max.
Seek (Access)	+5 V DC	0.7 A typ.	< 1.2 A max.
	+12 V DC	0.7 A typ.	< 1.2 A max.
Label Printing	+5 V DC	0.7 A typ.	< 1.0 A max.
	+12 V DC	0.3 A typ.	< 1.0 A max.

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7.3 Standby

Standby mode	0.8 W typ.	<1.0 W max.
Sleep mode	0.8 W typ.	< 1.0 W max.

7.4 Rush Current

Maximum 2000mA / less than 1sec

8. Acoustic noise

Less than 50 dB, A scale, at 0.5 m away from the drive

Note :

1. Disc : Less than imbalance 0.3×10^{-4} Nm (0.3g-cm)
2. Installation : Horizontal
3. Ambient temperature : Normal temperature
4. Sequential read at max speed except loading, unloading and seek

9. Dimensions

External dimensions (W x H x D) 146 x 41.3 x 165 mm (See Appendix 1.)

Front bezel (W x H x D) 148 x 42 x 5 mm

10. Mass

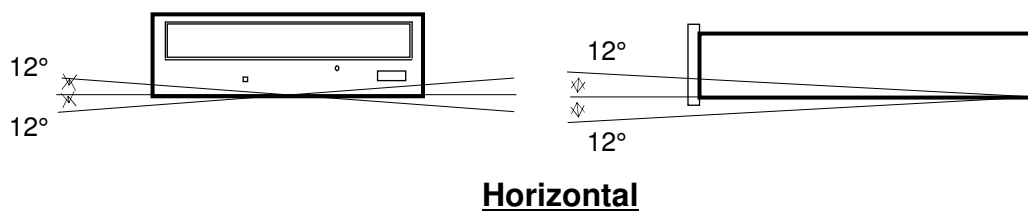
Max 800g (Net)

11. Mechanical

11.1 Disc loading

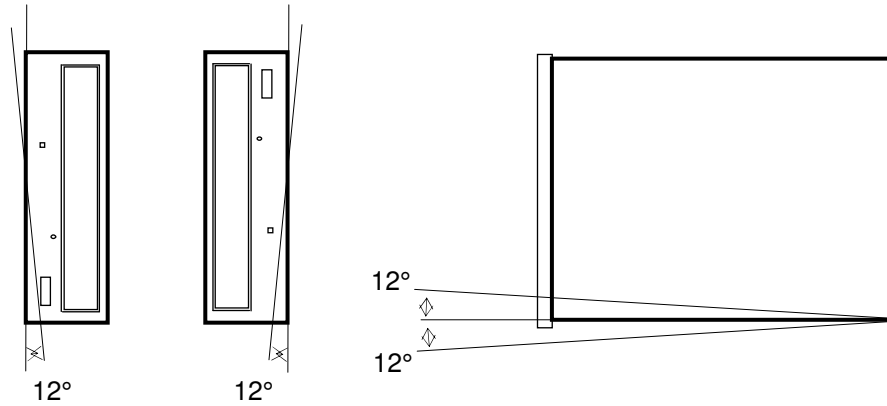
Tray type, Auto loading

11.2 Mounting requirements



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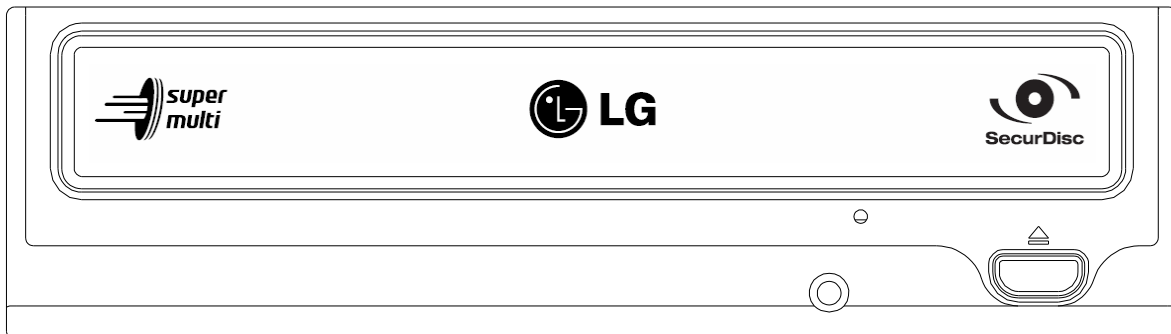
Vertical

-Note-

Operation with postures other than the above drawings is not guaranteed.

12. Controls and Functions

12.1 Front side (Front Design)

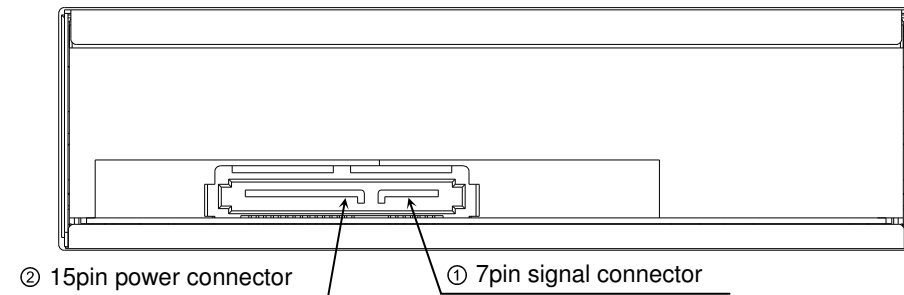


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	Part	Color	Material	Flammability
1	Tray	BLACK	PBT + ABS	UL94-V2
2	Door	BLACK	ABS	UL94-V0
3	Front bezel	BLACK		
4	Open/Close button	BLACK		
6	LED	Green		

12.2 Rear side



< Rear view >

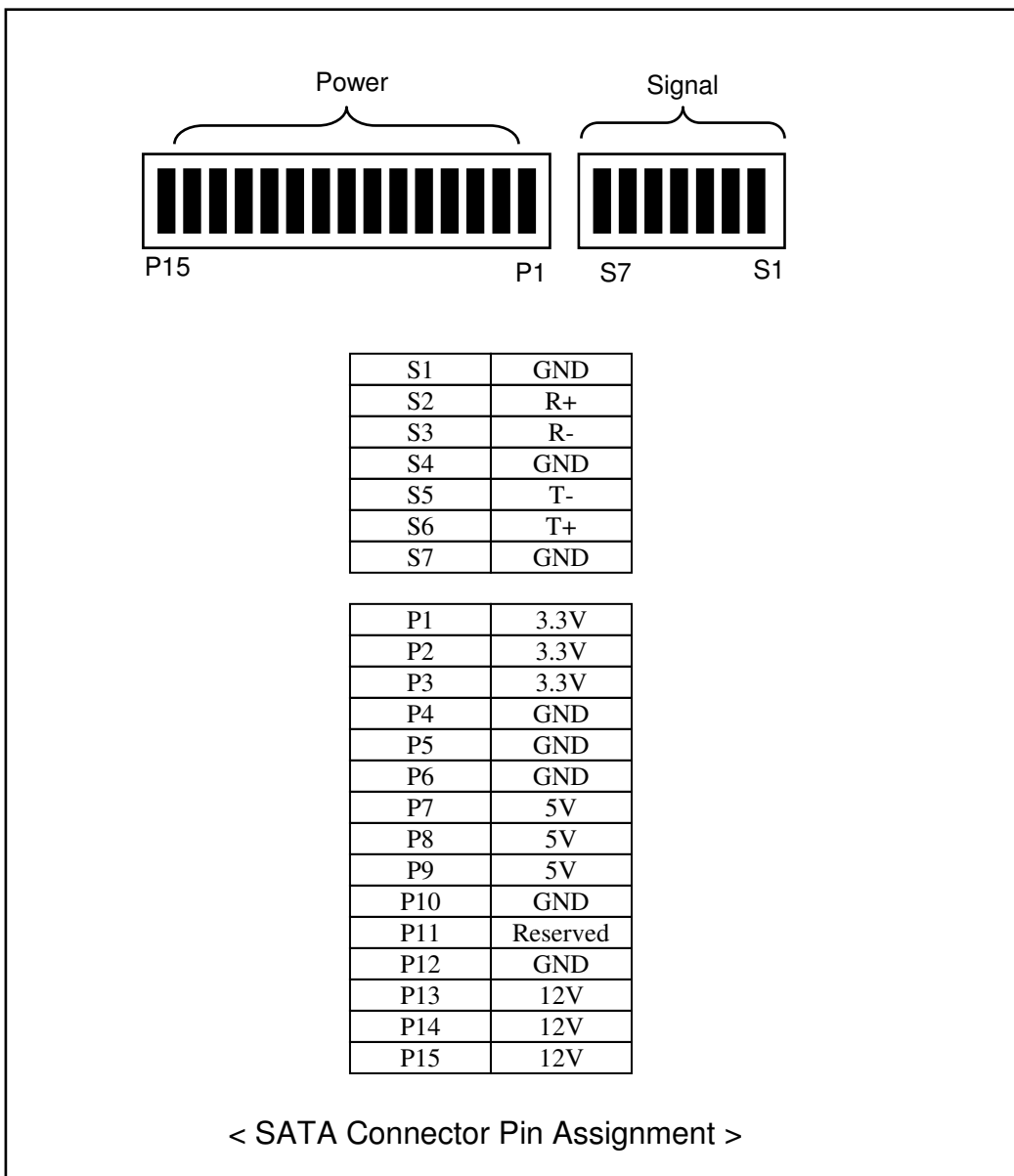
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13. Connector Pin define

SATA Drive consist of two connector .
 First , Power connector supply 5V and 12V Power .
 3.3V was not supplied .

Second , Signal Connector has 2 pairs .



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14. Supported Command List

14.1 ATA Commands

< Command >	< Code >
(1) ATAPI Packet Command	A0h
(2) ATAPI Soft Reset	08h
(3) Check Power Mode	E5h
(4) Execute Drive Diagnostics	90h
(5) Flush Cache	E7h
(6) Identify Packet Device	A1h
(7) Idle Immediate	E1h
(8) NOP	00h
(9) Set Features	EFh
(10) Sleep	E6h
(11) Standby Immediate	E0h

14.2 ATAPI Packet Commands

< Command >	< Code >
(1) BLANK	A1h
(2) CLOSE TRACK/RZONE/SESSION/BORDER	5Bh
(3) FORMAT UNIT	04h
(4) GET CONFIGURATION	46h
(5) GET EVENT STATUS NOTIFICATION	4Ah
(6) GET PERFORMANCE	ACh
(7) INQUIRY	12h
(8) MECHANISM STATUS	BDh
(9) MODE SELECT (10)	55h
(10) MODE SENSE (10)	5Ah
(11) PAUSE/RESUME	4Bh
(12) PLAY AUDIO (10)	45h
(13) PLAY AUDIO (12)	A5h
(14) PLAY AUDIO MSF	47h
(15) PREVENT ALLOW MEDIUM REMOVAL	1Eh
(16) READ (10)	28h
(17) READ (12)	A8h
(18) READ BUFFER	3Ch
(19) READ BUFFER CAPACITY	5Ch
(20) READ CAPACITY	25h
(21) READ CD	BEh
(22) READ CD MSF	B9h
(23) READ DISC INFORMATION	51h
(24) READ DVD STRUCTURE	ADh
(25) READ FORMAT CAPACITIES	23h
(26) READ SUB-CHANNEL	42h
(27) READ TOC/PMA/ATIP	43h
(28) READ TRACK/RZONE INFORMATION	52h
(29) REPAIR RZONE	58h
(30) REPORT KEY	A4h
(31) REQUEST SENSE	03h
(32) RESERVE TRACK/RZONE	53h

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< Command >	< Code >
(33) SCAN	BAh
(34) SEEK	2Bh
(35) SEND CUE SHEET	5Dh
(36) SEND DVD STRUCTURE	BFh
(37) SEND KEY	A3h
(38) SEND OPC INFORMATION	54h
(39) SET CD SPEED	BBh
(40) SET READ AHEAD	A7h
(41) SET STREAMING	B6h
(42) START/ STOP UNIT	1Bh
(43) STOP PLAY/SCAN	4Eh
(44) SYNCHRONIZE CACHE	35h
(45) TEST UNIT READY	00h
(46) VERIFY(10)	2Fh
(47) WRITE(10)	2Ah
(48) WRITE(12)	AAh
(49) WRITE AND VERIFY(10)	2Eh
(50) WRITE BUFFER	3Bh

15. Disc Eject Mechanism

The drive has 3-ways disc eject facility.

15-1. Touch Eject Button

The drive has a touch eject button on the front bezel to activate the eject signal to operate the drive. When the power is on, the tray can be ejected by pushing the eject button.

15-2. Software Eject

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

15-3. 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 1.7 mm in diameter into the emergency eject hole and push softly. The rod must be inserted into the drive at least 30 mm from the surface of bezel.

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16. Regulations and Standards

16.1 Safety

The product will satisfy the safety standards outlined below.

UL:	UL 1950 Third Edition
CSA:	CSA C22.2 NO 950
TÜV:	EN 60950
SEMKO:	EN 60950

16.2 EMC / EMI

The product complies with applicable technical requirements as specified below

FCC Part 15 Class B Digital Device	(U.S.A)
EMI EN5022, EMS EN50082-1	(European countries)
IC (Industry Canada) ICES-003 Digital Apparatus	(Canada)

16.3 Laser safety

The product will satisfy all the requirements for the laser specified below.

DHHS: 21CFR Subchapter J	(U.S.A)
EN60825-1/A2	(European countries)

17. Supporting Operating System & Recording tool

17.1 Operating System	Windows 2000 Professional Windows Server 2003 Windows XP Home Edition, Professional Windows Vista
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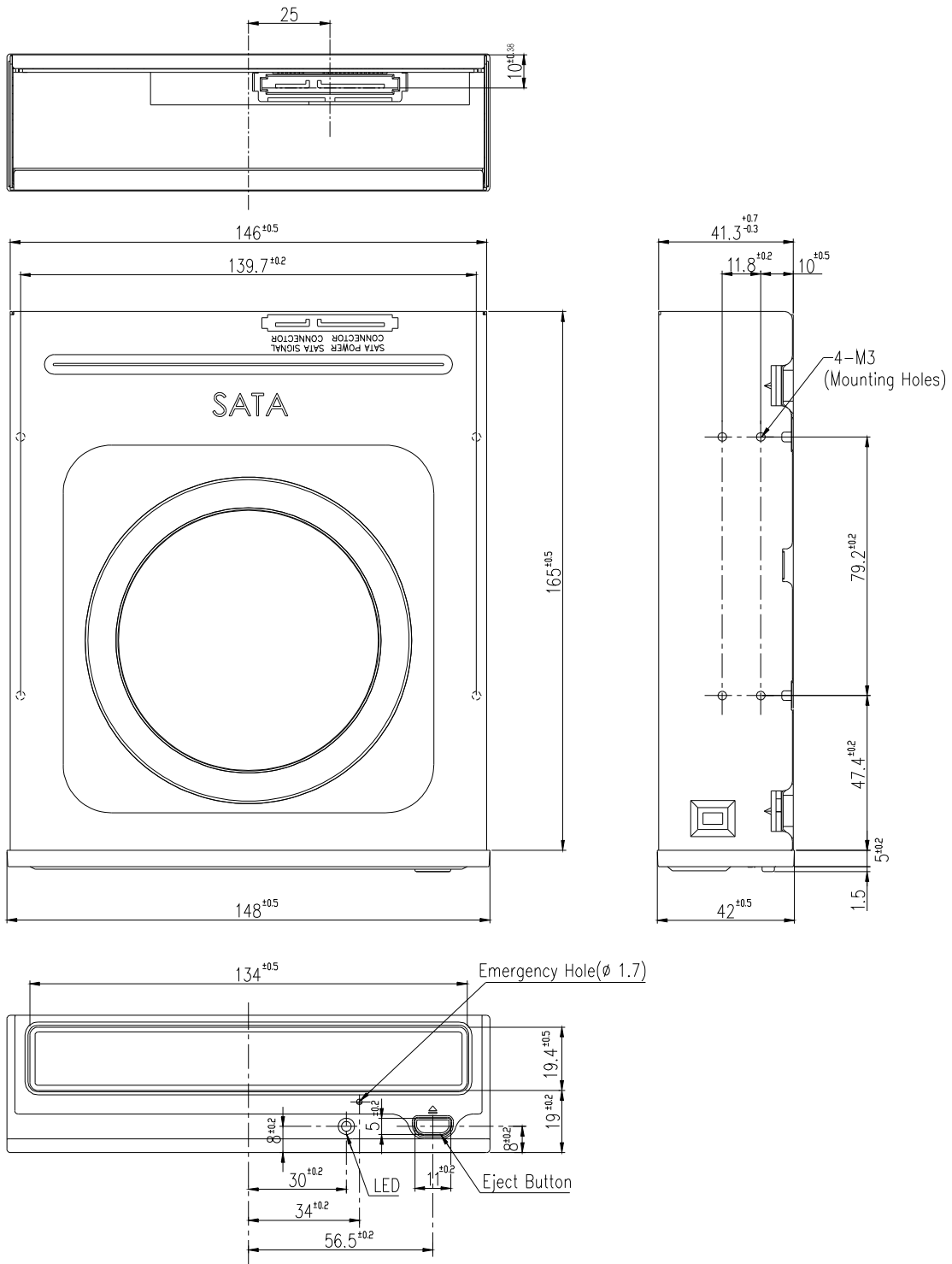
17.2 Writing Software (Plan)

Nero Express (SecurDisc™ support)

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Appendix 1: Mechanical dimensions



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Appendix 2. RPC and others

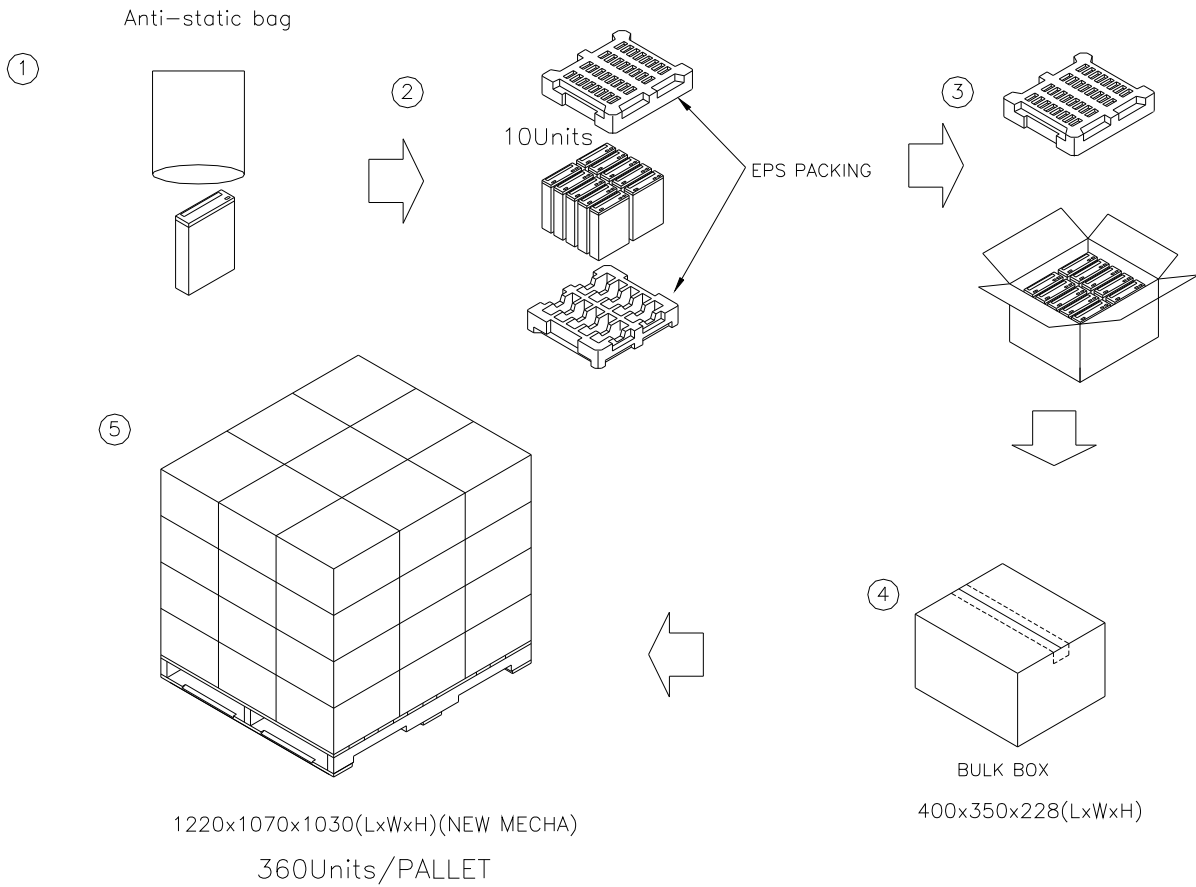
1. Chassis

Top cover	Steel
Bottom cover	Steel

2. RPC (Regional Playback Control) No Region (Default)

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Appendix 3. Packaging spec



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Appendix 4. Label spec

