

Issued Date	04. 15. 2015	GH24NSD0		1/21
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SPECIFICATIONS
OF
SUPER MULTI DVD WRITER
Model GH24NSD0
For LG-Brand

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

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Revision History

No.	Date	Brief description	Note
1	2015 04.15	1 st Release	T1.0

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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) Half-height Internal Super Multi Drive
- (2) CD-R/RW, DVD-R/RW/RAM/ +R/RW +/-R DL M-DISC/+M SL read and write compatible, CD Family and DVD-ROM read compatible
- (3) Enhanced IDE (ATAPI) interface : SATA interface
- (4) Large buffer memory 0.5MB
- (5) Buffer Under-run prevention function embedded
- (6) Power loading and power eject of a disc. Bare media loading
- (7) MTBF: 100,000 POH
- (8) Vertical and Horizontal installable
- (9) Compliance with RoHS/ Pb Free production

1.2 Supported disc formats

- (1) Reads data in each DVD-ROM, DVD-R(Ver. 2.0 for Authoring) and DVD-RAM(Ver.1.0)
- (2) Reads and writes in each DVD-R(Ver. 2.1 for General), DVD-R DL(Dual Layer),DVD-RW, DVD-RAM(Ver.2.x), DVD+R, DVD+R DL(Double Layer) and +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) Support to read Super Audio CD (Compatible layer in Hybrid type)
- (7) Reads and writes CD-R discs conforming to "Orange Book Part 2"
- (8) Reads and writes CD-RW discs conforming to "Orange Book Part 3"
- (9) Reads DVD-R / RW / RAM with CPRM
- (10) Reads and writes in M-DISC/+M (Archival)

1.3 Supported write method

- (1) DVD-R: Disc at Once and Incremental Recording
- (2) DVD-R DL: Disc at Once, Format 4 (Layer Jump Recording)
- (3) DVD-RW: Disc at Once, Incremental Recording and Restricted Overwrite
- (4) DVD-RAM: Random Write
- (5) DVD+R: Sequential Recording
- (6) DVD+R DL: Sequential Recording
- (7) DVD+RW: Random Write
- (8) CD-R/RW: Disc at Once, Session at Once, Track at Once and Packet Write

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1.4 Performance

(1) Average access time: DVD-ROM 145 ms
(Random) CD-ROM 125 ms

(2) Write speed:

DVD-R 2x, 4x CLV, 8x PCAV, 16x, 24x CAV
DVD-R DL 4x CLV, 8x ZCLV
DVD-RW 2x, 4x, 6x CLV
DVD-RAM 2x, 3x 5x ZCLV
DVD+R 2.4x CLV 4x CLV, 8x PCAV, 16x, 24x CAV
DVD+R DL 2.4x, 4x CLV, 8x ZCLV
DVD+RW 2.4x, 4x, 6x CLV, 8x ZCLV
CD-R 16x CLV, 32x, 40x PCAV, 48x CAV
CD-RW 4x, 10x, 16x CLV, 24x ZCLV
M-DISC/+M 4x CLV

(3) Read speed:

DVD-R/RW/ROM(SL/DL) 16x/13x/16x/12x max.
DVD-R DL 12x max.
DVD-RAM (Ver.1.0/2.x) 2x ZCLV / 5x PCAV
DVD- Video (CSS Compliant Disc) 16x max.
DVD+R/+RW 16x / 13x max.
DVD+R DL 12x max.
CD-R/RW/ROM 48x/40x/48x max.
CD-DA (DAE) 40x max.
80 mm CD 22x max.
M-DISC/+M 12x CAV

(4) Sustained Transfer rate: DVD-ROM 22.16 Mbytes/s (16x) max.
CD-ROM 7,200 kB/s (48x) max.

(5) Burst Transfer rate: SATA, Ultra DMA Mode 6
Multi word DMA Mode2, PIO Mode 4

(6) Multimedia MPC-3 compliant

1.5 Audio

(1) 16 bit digital data output through ATA interface

*Definition Transfer Rate: 1x (DVD) = 1.385 Mbytes/s, Mbytes/s = 10^6 bytes/s
1x (CD) = 150 kB/s, kB/s = 2^{10} bytes/s
Capacity: MB = 2^{20} bytes, kB = 2^{10} bytes

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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:	4.7GB (Ver. 2.0 for Authoring: read only) 4.7GB (Ver. 2.1 for General: read & write) (DL) 8.5GB (Ver. 3.0)
	DVD-RW:	4.7GB (Ver. 1.2/ Rev 1.0, 2.0, 3.0)
	DVD-RAM:	2.6GB/side (Ver. 1.0: read only) 1.46GB/side, 4.7GB/side (Ver. 2.x)
	DVD+R:	4.7GB (Ver. 1.3) (DL) 8.5GB (Ver. 1.1)
	DVD+RW:	4.7GB (Vol. 1/Ver.1.3, Vol. 2/Ver.1.0)
Archival	M-DISC/+M	4.7GB
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 DL	Disc at Once (DAO), Format4(Layer Jump Recording)
(3) DVD-RAM/+RW	Random Write
(4) DVD+R	Sequential Recording
(5) DVD+R DL	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

2.4 Data capacity

User data / Block

DVD-ROM/R/RW/RAM /+R/+RW
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 T13 ATA/ATAPI-8, MMC-6, INF-8090i v8

3.2 Write Speed

<Write>	Media (Media Speed)	Writing Speed	Transfer rate (DVD: Mbytes/s, CD: kB/s)
	DVD-R (1-2x)	2x CLV	2.77 Mbytes/s
	-R (1-4x)	4x CLV	5.54
	-R (1-8x)	4x CLV, 6-8x PCAV	5.54, 8.31-11.08
	-R(1-16x)	7-8x PCAV, 7-16x CAV	9.9-11.08, 9.9-22.16
		10-24x CAV	13.85-33.24
	-R (8cm)	4x CLV	5.5
	DVD-R DL (2-4x)	4x CLV	5.54
	-R DL (2-8x)	4x CLV, 4+6+8x ZCLV	5.54, 5.54+ 8.31+11.08
	-R DL (8cm)	4x CLV	5.54
	DVD-RW (2x)	2x CLV	2.77
	-RW (2-4x)	4x CLV	5.54
	-RW (2-6x)	4x, 6x CLV	5.54, 8.31
	-RW (8cm)	2x CLV	2.77 (w/o Verify)
	DVD-RAM (Ver.2.x) (2x)	2x CLV	2.77 (w/o Verify)
	-RAM (3x)	3x CLV	4.16 (w/o Verify)
	-RAM (5x)	5x ZCLV	6.93 (w/o Verify)
	-RAM (8cm)	2x CLV	2.77 (w/o Verify)
	DVD+R (2.4x)	2.4x CLV	3.32
	+R (2.4-4x)	4x CLV	5.54
	+R (2.4-8x)	4x CLV, 6-8x PCAV	5.54, 8.31~11.08
	+R (2.4-16x)	7.1-8xPCAV, 7.1-16x CAV	9.9-11.08, 9.9-22.16
		10-24x CAV	13.85-33.24
	DVD+R DL (2.4x)	2.4x CLV	3.32
	+R DL (2.4-8x)	4x CLV,4+6+8xZCLV,	5.54, 5.54+8.31+11.08,
	DVD+R DL (8cm)	2.4x CLV	3.32
	DVD+RW (2.4x)	2.4x CLV	3.32
	+RW (2.4-4x)	4x CLV	5.54
	+RW (2.4-8x)	6x CLV, 6+8x ZCLV	8.31, 8.31+11.08
	DVD+RW (8cm)	4x CLV	5.54
		CD-R 16x CLV,	2,400 kB/s
		21-32x PCAV	3,150-4,800
		21-40x PCAV	3,150-6,000
		48x CAV	7,200
	CD-R (8cm)	16x CLV,	2,400 kB/s
		CD-RW (MS:1,2,4x)	600
	-RW(HS:4-10x)	10x CLV	1,500
	-RW (US:8-24x)	16x CLV, 16+24x ZCLV	2,400, 2,400+3,600
	-RW(US+:8-32x)	16x CLV,	2,400
		16+24x ZCLV	2,400+3,600
	CD-RW (8cm)	10x CLV,	1,500 kB/s

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3.3 Read Speed

<Read> **Media (Media Speed)** **Read Speed** **Transfer rate** **Rotational speed**
(DVD: Mbytes/s, CD: kB/s) (Approx. r/min)

3.3.1 Data

DVD-ROM (SL)	6.6 - 16x CAV	9.14- 22.16 Mbytes/s	9,360 r/min
(DL)	5.0 - 12x CAV	6.92- 16.62	7,750
DVD-R	6.6 - 16x CAV	9.14- 22.16	9,360
DVD+R	6.6 - 16x CAV	9.14- 22.16	9,360
DVD-R DL	5.0 - 12x CAV	6.92- 16.62	7,750
DVD+R DL	5.0 - 12x CAV	6.92- 16.62	7,750
DVD-RW	5.4 - 13x CAV	7.48- 18.00	7,670
DVD+RW	5.4 - 13x CAV	7.48- 18.00	7,670
DVD-RAM *3(Ver. 1.0)	2x CLV	2.77	4,780-2,020
-RAM (Ver. 2.x)	3 - 5x PCAV	4.16- 6.93	4,880-3,450
RAM (8cm)	3 - 5x PCAV	4.16- 6.93	4,880-3,450
CD-R/ROM*1	20 - 48x CAV	3,000- 7,200 kB/s	9,660
CD-RW	17 - 40x CAV	2,590- 6,000 kB/s	8,050
(8cm)	13.3 - 22x CAV	1,995 - 3,300 kB/s	6,480
M-DISC/+M	5.0 - 12x CAV	6.92- 16.62 Mbytes/s	7,050

3.3.2 DVD-Video, Video Format and CD-DA Playback

DVD-Video*2 (SL/DL)	2.5 - 6x CAV	3.46- 8.31	3,600/4,000
DVD-R	2.5 - 6x CAV	3.46- 8.31	3,600
DVD+R	2.5 - 6x CAV	3.46- 8.31	3,600
DVD-R DL	2.5 - 6x CAV	3.46- 8.31	4,000
DVD+R DL	2.5 - 6x CAV	3.46- 8.31	4,000
DVD-RW	2.5 - 6x CAV	3.46- 8.31	3,600
DVD+RW	2.5 - 6x CAV	3.46- 8.31	3,600
DVD-RAM *3	ditto	Same as the speed of Data above	
CD-DA(DAE)*4	17 - 40x CAV	2,590- 6,000 kB/s	8,050 r/min
CD-DA (Audio Play)*4	4.2 - 10x CAV	630- 1,500	1,900

*1) Fully recorded CD-R should be used.

*2) DVD-Video: CSS compliant discs

*3) DVD-RAM: Read speed of Data and Video Format are same as above.

*4) Read speed of CD-R/RW/ROM are same as above.

* Rotational speed (CLV, ZCLV)

DVD-R/RW/ROM, +R/RW 1x: Approx. 1,390 (Inside) - 580 r/min (Outside)

DVD-RAM Ver. 1.0 1x: Approx. 2,390 (Inside) - 1,010 r/min (Outside)

Ver. 2.x 2x: Approx. 3,250 (Inside) - 1,380 r/min (Outside)

CD-R/RW/ROM 1x: Approx. 500 (Inside) - 210 r/min (Outside)

*1) "+": change by step for ZCLV *2) "-": continuous change, for CAV, PCAV

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3.4 Burst transfer rate

SATA Gen.1 1.5 G bps

3.5 Access time (Random)

DVD-ROM	145 ms typ. (190ms Limit) * (Note 1)
DVD-ROM DL	220 ms typ. (300ms Limit) * (Note 1)
CD-ROM	125 ms typ. (180ms Limit) * (Note 1)
DVD-RAM (Ver.2.x)	270 ms typ. (400ms Limit)

Note :

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

Test Disc: DVD-ROM: ALMEDIO TDV-520 / TDR-820
DVD-ROM DL: ALMEDIO TDV-540 / TDR-840
CD: ALMEDIO TCDR-701 / HITACHI HCD-1

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

3.6 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

3.7 Spin up, Load time without Multi-session

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

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

DVD-ROM	8 s typ.
DVD-R	22 s typ. (Disc At Once, Ver. 2.0 for General)
DVD-RW	22 s typ. (Disc At Once, Ver. 1.2)
DVD-RAM	40 s typ. (60 s Limit)
DVD+R/RW	22 s typ.
CD-ROM	9 s typ.
DVD±R DL	30 s typ.

3.8 Data buffer capacity 0.5MB

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4. Environmental conditions

4.1 Ambient temperature

Operating 5 to 40 °C

Storage / Transportation -30 to 60 °C

4.2 Temperature gradient 10 °C/h

4.3 Relative humidity

Operating 15% to 85% (Non-Condensing)

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

4.4 Dew point temperature restrictions Less than 29 °C

4.5 Altitude

Operating 0 to 3,000 m

Non-operating 0 to 12,000 m

4.6 Vibration

(1) Operating

Read: Audio: 3.43 m/s² (0.35G) No unrecoverable error
Data: 3.43 m/s² (0.35G) No unrecoverable error
10 - 500Hz sine wave sweep, 1 oct./min at each of 3 directions¹⁾

Write: DVD: 0.98 m/s² (0.1G) No recording stop
CD-R/RW: 2.94 m/s² (0.3G) No recording stop
10 - 500Hz sine wave sweep, 1 oct./min at each of 3 directions¹⁾

(2) Non-Operating: 19.6 m/s² (2G) No damage must result
10 - 500Hz sine wave sweep, 1 oct./min at each of 3 directions¹⁾
for 40 minutes.

* ¹⁾ 3 direction : X (left and right), Y (back and front), Z (top and bottom) axis

4.7 Shock

(1) Operating

Read: Audio: 19.6 m/s² (2G) No unrecoverable error
Data: 58.8 m/s² (6G) No unrecoverable error
11ms, Half sine wave (5 time shocks, 6 s between shocks.)
at each of 3 directions¹⁾

Write: DVD: 4.9 m/s² (0.5G) No recording stop
CD-R/RW: 9.8 m/s² (1G) No recording stop
11 ms, Half sine wave (5 time shocks, 6 s between shocks.)
at each of 3 directions¹⁾

(2) Non-Operating 1,372 m/s² (140G) No damage after shock
2 ms Half sine wave at each of 3 directions¹⁾

* ¹⁾ 3 direction : X (left and right), Y (back and front), Z (top and bottom) axis

4.8 Drop impact

Less than 60 cm, No performance and physical damage

Note: Bulk package, 1 corner, 3 edges, 6 faces.

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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

: 20,000 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)

- 0 to 4 kV : With no user detectable data read errors
- From 5 kV to 8 kV : No catastrophic failure or damage
- * Test conditions : C = 150 pF, R = 330 ohms, 50 times discharge except connector

7. Power requirements

7.1 Source voltage

- + 5 V +/- 5 % tolerance, less than 100 mVp-p Ripple voltage
- +12 V +/- 10 % tolerance, less than 100 mVp-p Ripple voltage
 (when DVD+/-R 24x write, +12V 0% tolerance less than 100 mVp-p Ripple voltage)

7.2 Current

Idle (Hold track state)	+ 5 V DC	0.9 A typ.	< 1.0 A max.
	+12 V DC	0.5 A typ.	< 1.0 A max.
Write (Active)	+ 5 V DC	1.3 A typ.	< 2.0 A max.
	+12 V DC	1.5 A typ.	< 2.5 A max.
Read (Active)	+ 5 V DC	1.2 A typ.	< 1.5 A max.
	+12 V DC	0.9 A typ.	< 1.5 A max.
Seek (Access)	+5 V DC	1.0 A typ.	< 1.5 A max.
	+12 V DC	1.2 A typ.	< 2.0 A max.

7.3 Standby

Sleep mode (No disc) : 1.0 W typ.

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8. Acoustic noise

Less than 50 dB, A scale, at 0.5 m away from bezel and 0.45m height away

- Note :
1. Disc : Less than imbalance 0.3×10^{-4} Nm
 2. Installation : Horizontal (In system)
 3. Ambient temperature : Normal temperature
 4. Except loading, unloading and seek
 5. ISO7779 Seated operator position

9. Dimensions

External dimensions (W x H x D)	146 x 41.3 x 165 mm (W/O Bezel, Refer to Section 15.)
Front bezel (W x H x D)	148 x 42 x 5 mm

10. Mass

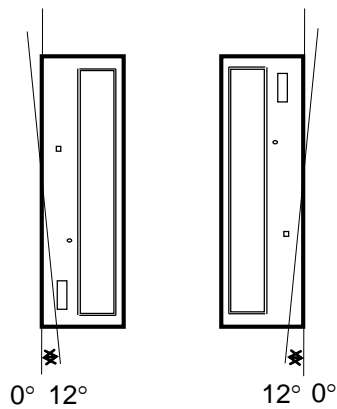
610±30g

11. Mechanical

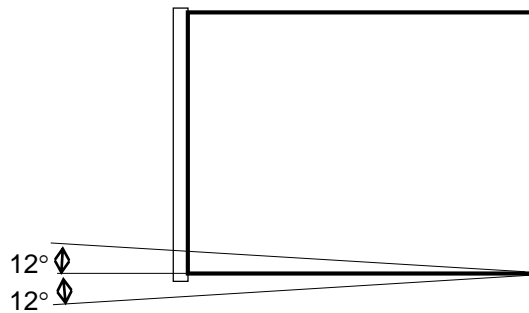
11.1 Disc loading

Tray type, Auto loading

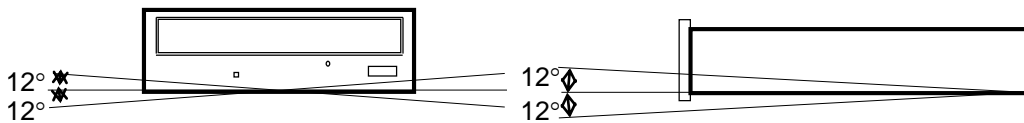
11.2 Mounting requirements



Vertical



Horizontal



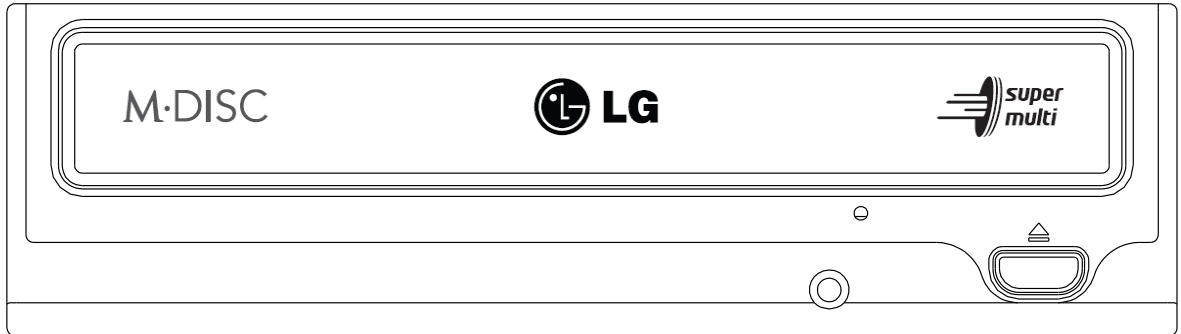
-Note-

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

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12. Front Design of Front side

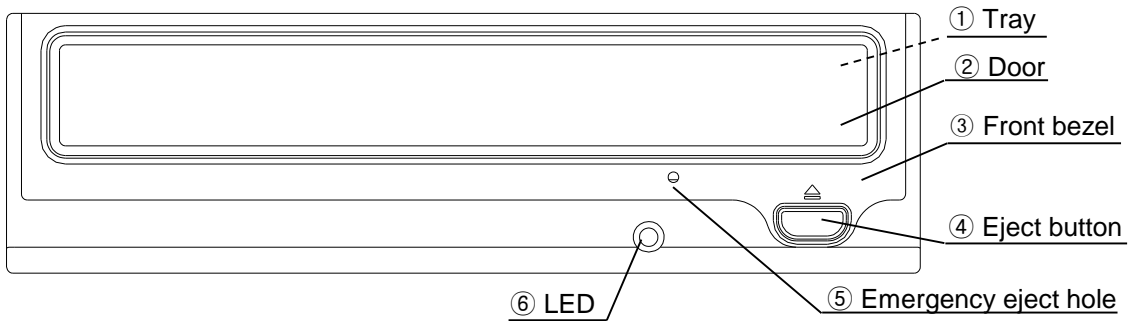
12.1 Front side (Front Design)



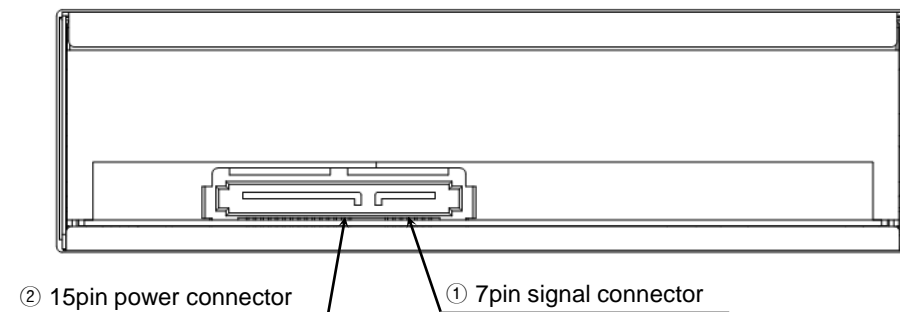
13. Controls and Functions

13.1 Front side

Refer to Appendix 1. for Front design (Logo, color, material, etc.)



13.2 Rear side



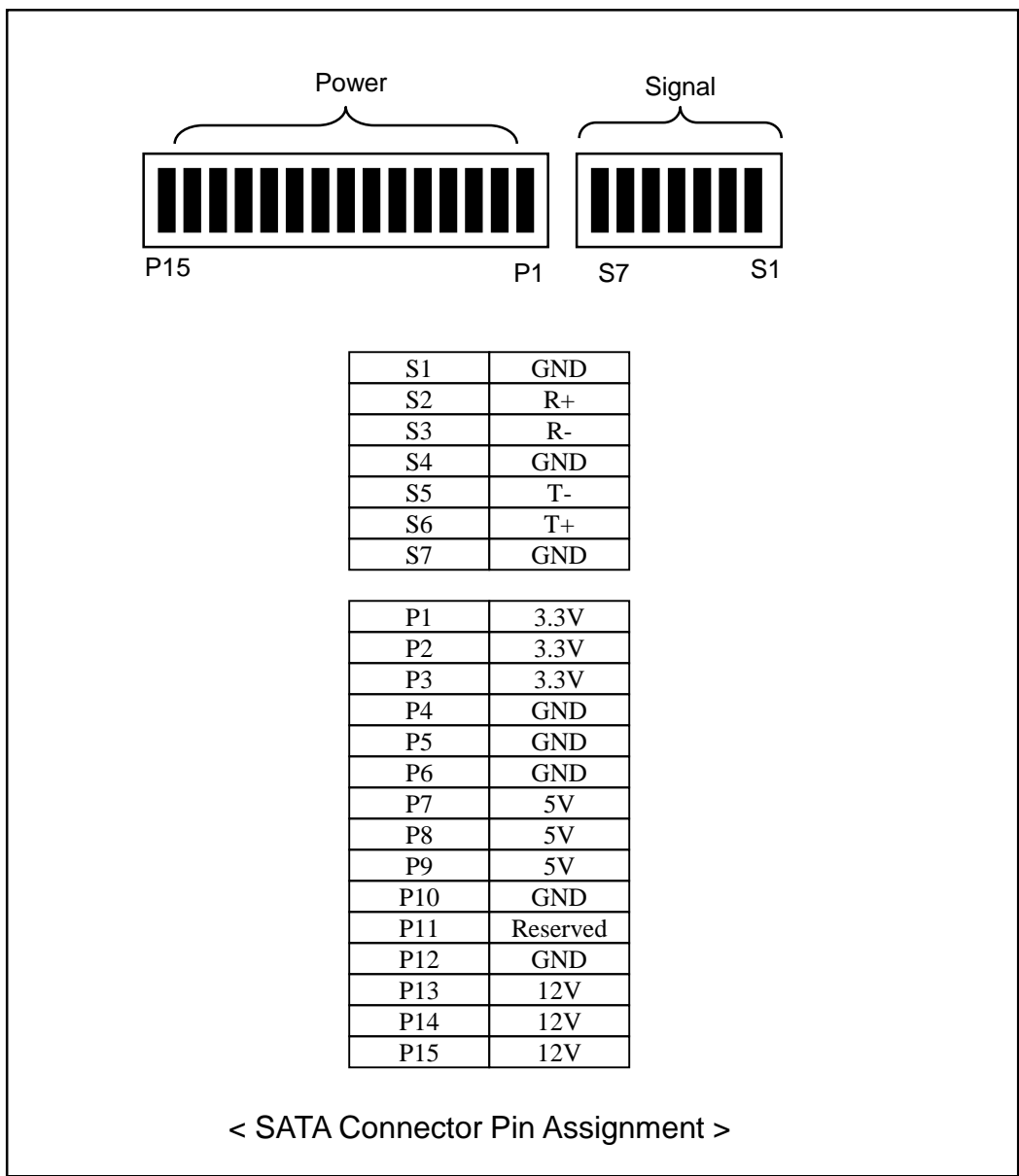
< Rear view >

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14. 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 .



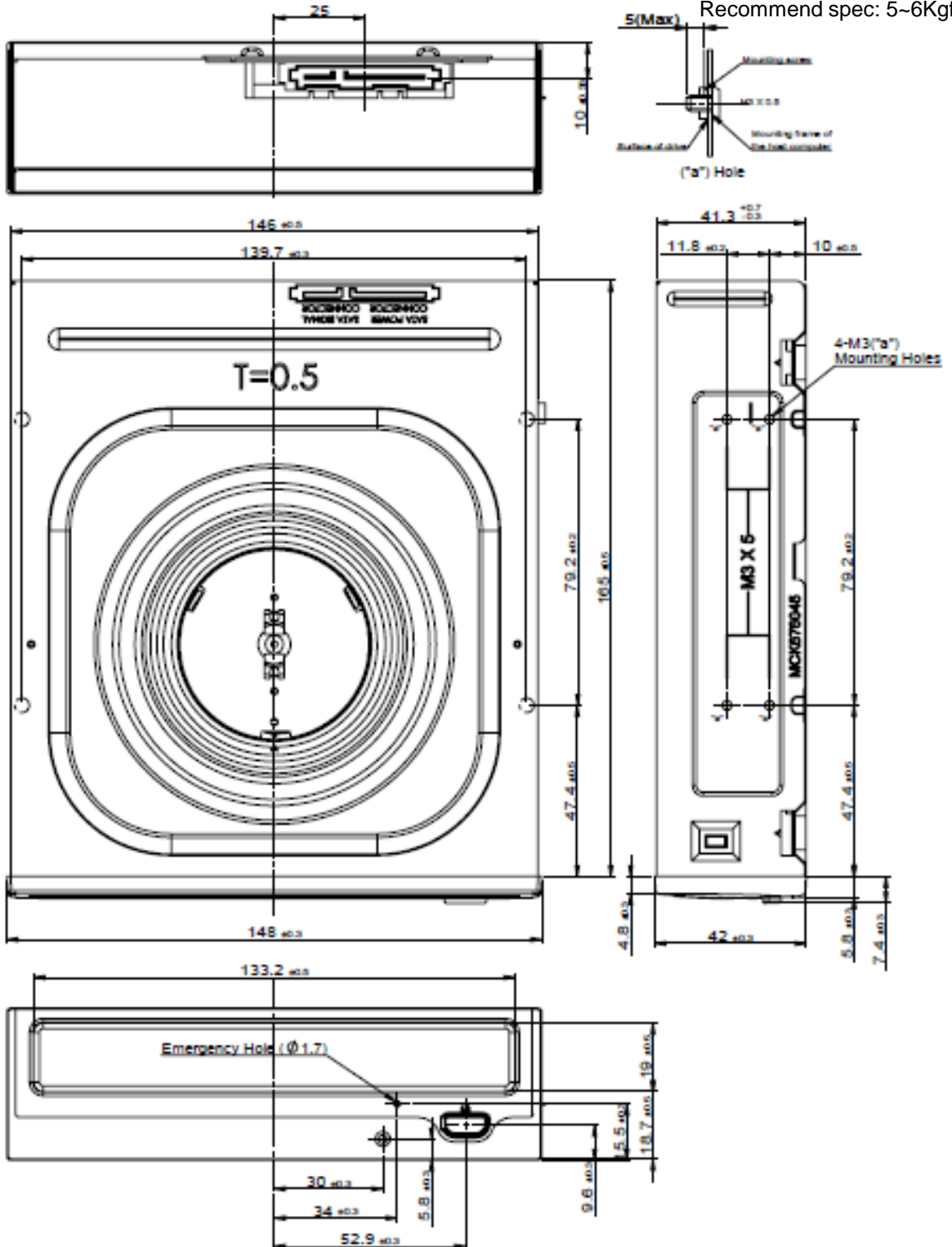
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15. Mechanical dimensions

Mechanical Drawing (Front & Back of Drive)

Unit: mm Allowance: +/- 0.5 unless otherwise stated

Host bracket recommend holes size: 3.2~3.5mm
 Torque spec.
 MIN. 4Kgf, Max. : 7Kgf
 Recommend spec: 5~6Kgf.cm



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16. Supported Command List

16.1 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) Set Features	EFh
(9) Sleep	E6h
(10) Standby Immediate	E0h

16.2 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) PREVENT ALLOW MEDIUM REMOVAL	1Eh
(12) READ (10)	28h
(13) READ (12)	A8h
(14) READ BUFFER	3Ch
(15) READ BUFFER CAPACITY	5Ch
(16) READ CAPACITY	25h
(17) READ CD	BEh
(18) READ CD MSF	B9h
(19) READ DISC INFORMATION	51h
(20) READ DVD STRUCTURE	ADh
(21) READ FORMAT CAPACITIES	23h
(22) READ HEADER	44h
(23) READ SUB-CHANNEL	42h
(24) READ TOC/PMA/ATIP	43h
(25) READ TRACK/RZONE INFORMATION	52h
(26) REPORT KEY	A4h
(27) REQUEST SENSE	03h
(28) RESERVE TRACK/RZONE	53h
(29) REZERO UNIT	01h
(30) SEEK	2Bh
(31) SEND CUE SHEET	5Dh
(32) SEND DVD STRUCTURE	BFh
(33) SEND KEY	A3h
(34) SEND OPC INFORMATION	54h

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< Command >	< Code >
(35) SET CD SPEED	BBh
(36) SET READ AHEAD	A7h
(37) SET STREAMING	B6h
(38) START/ STOP UNIT	1Bh
(39) SYNCHRONIZE CACHE	35h
(40) TEST UNIT READY	00h
(41) VERIFY(10)	2Fh
(42) WRITE(10)	2Ah
(43) WRITE(12)	AAh
(44) WRITE AND VERIFY(10)	2Eh
(45) WRITE BUFFER	3Bh

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17. Regulations and Standards

17.1 Safety

The product will satisfy the safety standards outlined below.

UL:	UL 60950-1 Second Edition
CSA:	CSA C22.2 No. 60950-1-07
TÜV:	EN 60950-1 / EN60825-1
SEMKO:	EN 60950-1 / EN60825-1

17.2 EMC / EMI

The product complies with applicable technical requirements as specified below

FCC Part15 Class B
CE Marking,
C-Tick Mark
Taiwan EMC (BSMI)
VCCI

17.3 Laser safety

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

Class 1 laser product comply with DHHS rules 21 CFR Subchapter J
Class 1 laser product to EN60825-1 / IEC 60825-1

18. Supporting Operating System & Application Software

18.1 Operating System

Windows XP (Home/Professional/Media Center Edition) with SP2 or higher,
Windows Vista™(X86,X64)

Windows 7 x86/x64

Windows 8 x86/x64

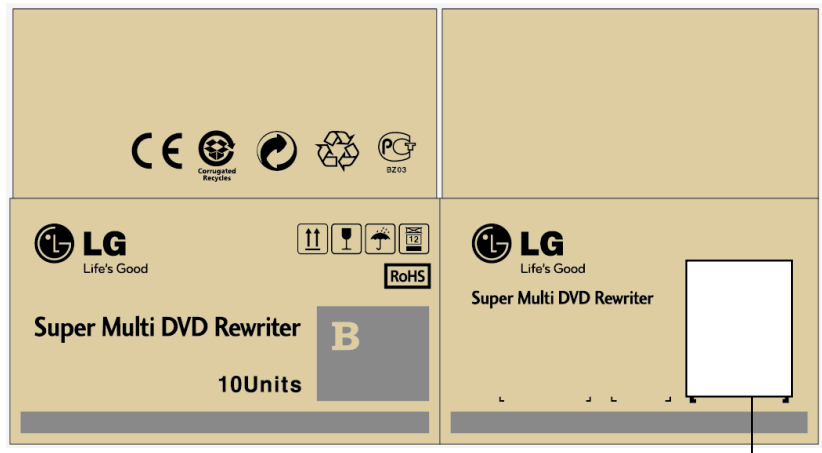
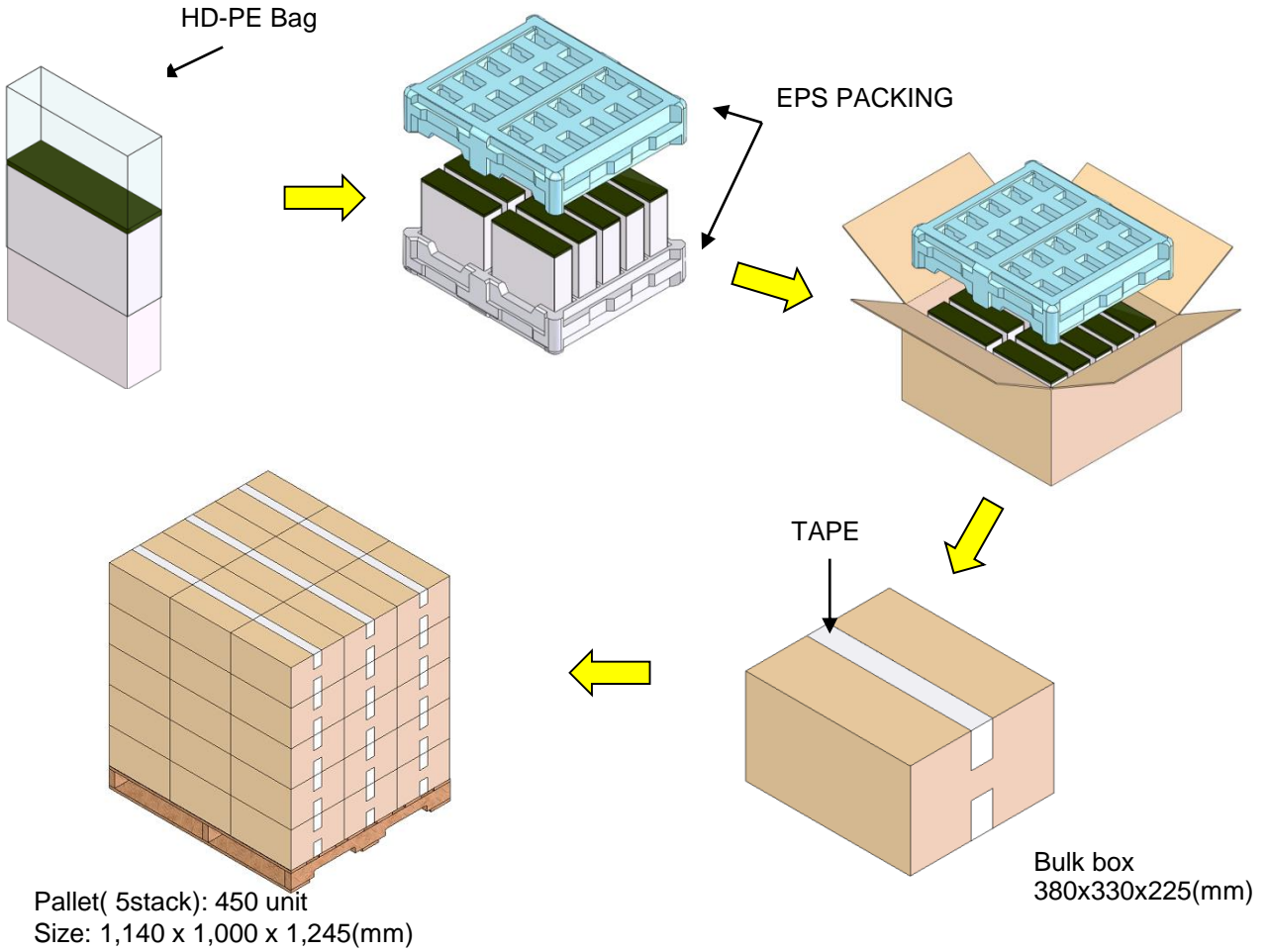
Windows 8.1 x86/x64

18.2 Application Software

(1) Cyberlink

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Appendix 1. Packaging Spec



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LGE LABEL INFORMATION