TEAC DV-W28SS-BZ3
CD- RW/DVD-MULTI RECORDER/DVD+RW

HARDWARE SPECIFICATION

Rev. B

9212b

20 sheets in Total

TABLE OF CONTENTS

1. SCOPE

This is hardware specification of the TEAC DV-W28SS-BZ3 built-in type CD-RW/DVD-Multi recorder/ DVD+RW (hereinafter referred to as drive) . As for the software specification, refer to"DV-W28 SS-B Software Specification".

2. OUTLINE

The outline of this drive is given in Table 2-1 .

(Table 2-1) Outline of the specification

Model name		DV-W28SS-BZ3
TEAC P/N		1977290B-Z3
Applicable safety and EMC standards		UL, c-UL, TÜV, CE, RCM, BSMI, KC
Interface transfer rate		1.5Gbps
Average access time		140msec(CD-ROM)/150msec(DVD-ROM), average by TEAC standards
Disc speed (24x CAV speed mode)		5,160min-1 (Approx)
Host interface		Serial ATA
Power source		+5VDC
Starting time		CD-ROM:14 sec typ. (excluding the multi-session CD) DVD-ROM:15sec typ. (excluding dual layers and multi-border)
Readable discs	CD	CD-DA, CD-ROM, CD-R, CD-RW
	DVD	DVD-ROM, DVD-R, DVD-R DL, DVD-RW, DVD+R, DVD+R DL, DVD+RW, DVD-RAM
Recordable discs		CD-R, CD-RW, DVD-R, DVD-R DL, DVD-RW, DVD-RAM (4.7GB), DVD+R, DVD+R DL, DVD+RW, (Refer to item 4.6)
Applicable format	CD	CD-DA, CD-ROM(Mode1 , Mode2), CD-ROM XA Mode2 (Form1 , Form2) , Photo CD (Single/Multi-session), CD-i, Video-CD, CD-Extra(CD-Plus), CD-Text
	DVD	DVD-ROM, DVD-Video, DVD-R (Single/Multi-border), DVD-R DL (Single/Multi-border), DVD-RW (Single/Multi-border), DVD+R (Single/Multi-session), DVD+R DL (Single/Multi-session), DVD+RW (Single/Multi-session), DVD-RAM (4 .7 GB)
Front bezel color		Black
Eject button color		Black
Access indicator		Green
Laser class		Clas s 1 laser product
Write methods	CD	Disc at once, Session at once, Track at once, Packet write
	DVD	Disc at once, Incremental, Over write, Sequential
RoHS directive		Complies with

3. CONSTRUCTION

3.1 External Construction

(1) Dimensions

(a) Height :12.7mm (excluding the front bezel)

(b)Width :128mm (excluding the front bezel)

(c) Depth :129.4mm (excluding the eject button)

(2) Mass : 160g or less(without bezel)

(3) Disc clamp system : Ball clamp

(4) Loading : Power loading by pushing the disc

[Caution] : Disc shall be inserted straight with no pressure applied from other directions.

(5) Ejection

(a) Automatically eject using the command

(b) Manual ej ect using the ej ect button

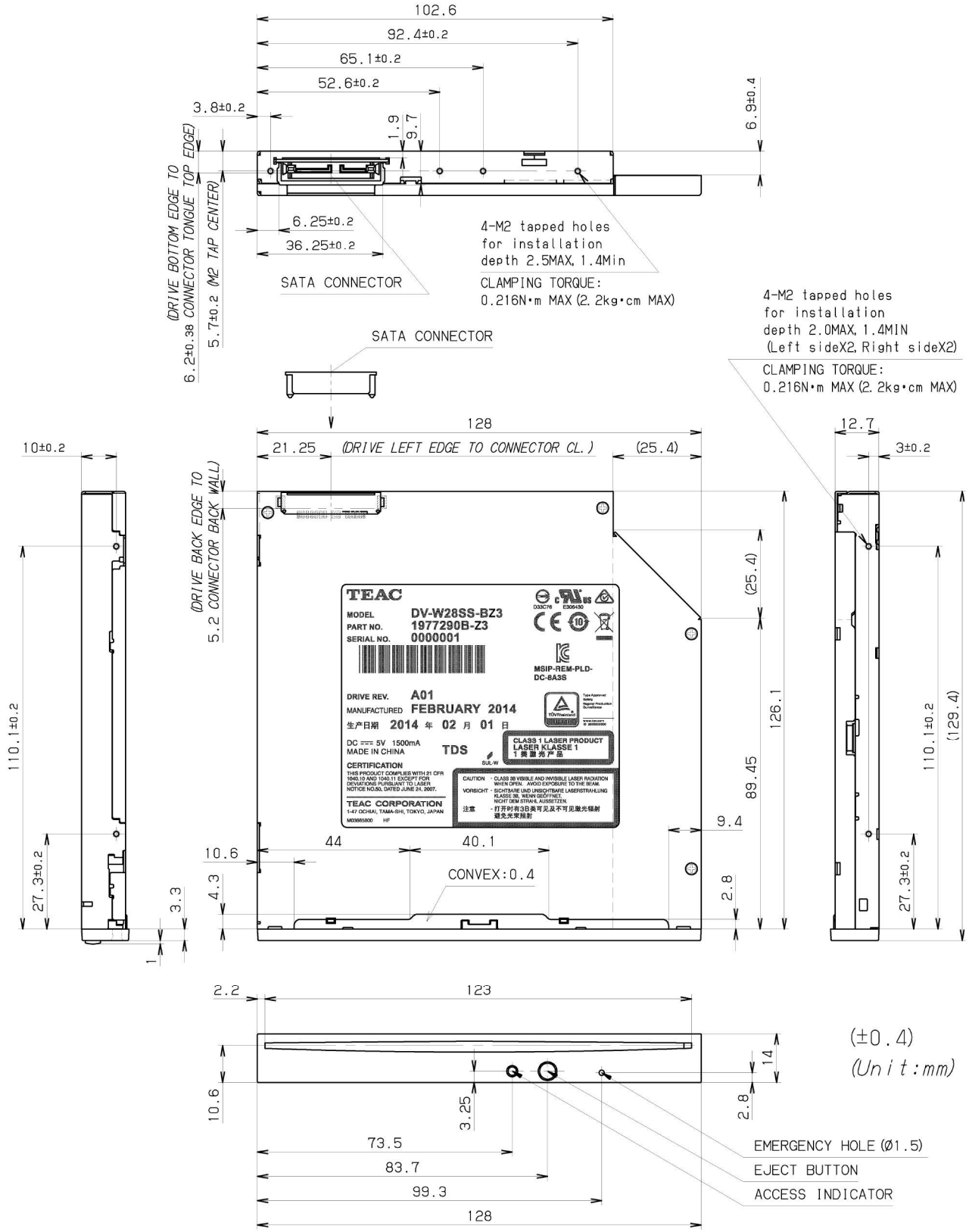
(c) Emergency ejection : Refer to Fig. 3.1 -3 .

When the disc cannot be ejected using the methods of the above (a) and (b), the disc can be mechanically ejected with the procedure described in Fig. 3 .1 -3 as long as a disc with the supported shape is inserted.

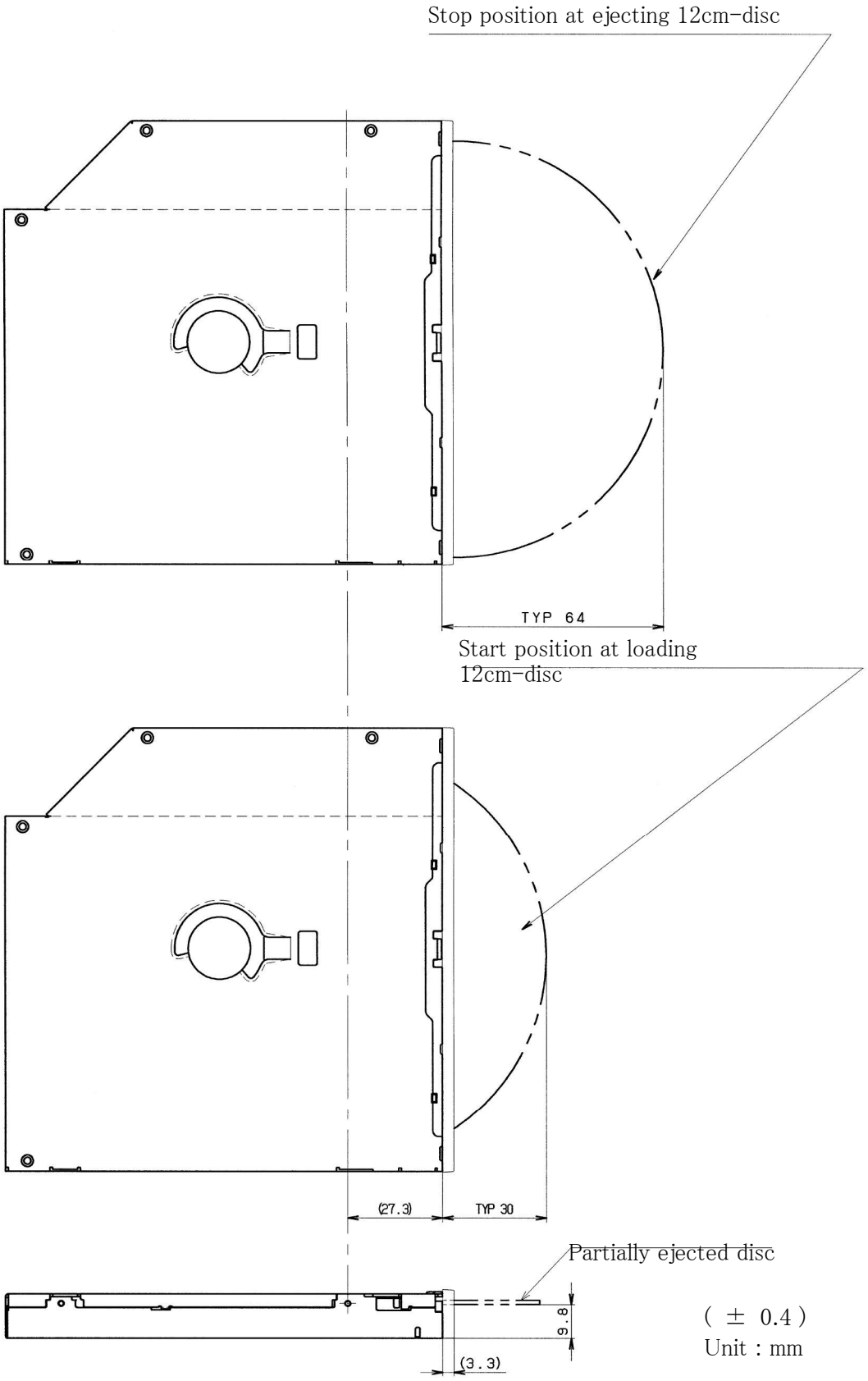
Note that it is not as sured that this function is always effective.

(6) Disc loading/ejecting position: Refer to Fig. 3.1 -2.

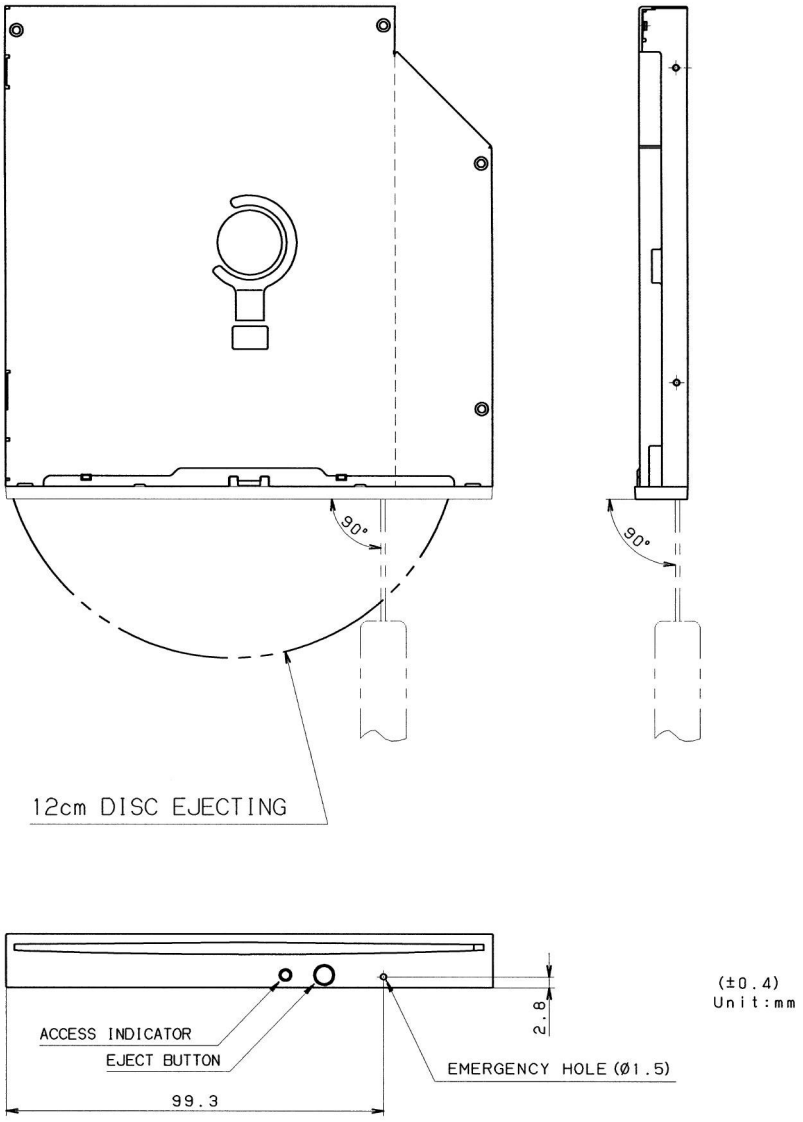
(7) External view : Refer to Fig. 3 .1 -1 .



(Fig. 3.1 -1) External view of the drive



(Fig. 3.1 -2) Disc position



Procedure:

1 . Prepare a metal rod that will not be easily bent with a diameter of 1 to 1 .2mm and a sufficient length.

(A length of 6 to 7cm excluding the holding area is most appropriate considering that the disc is to be ejected.)

2 . Confirm that the rotation of the disc completely stops. (It is desirable to wait for a while after powering off.) Operating the drive while the disc is rotating may cause the rotating disc to be ejected.

3 . Insert the metal rod into the emergency hole at right angles to the bezel face by approximately 11mm

(including the bezel). The rod will stop going after some operation sound is heard.

4 . Pull out the metal rod slowly.

5 . The disc will be ejected then, manually take the disc out.

6. If the disc is not ejected or is ejected but cannot be taken out, repeat Step3 .

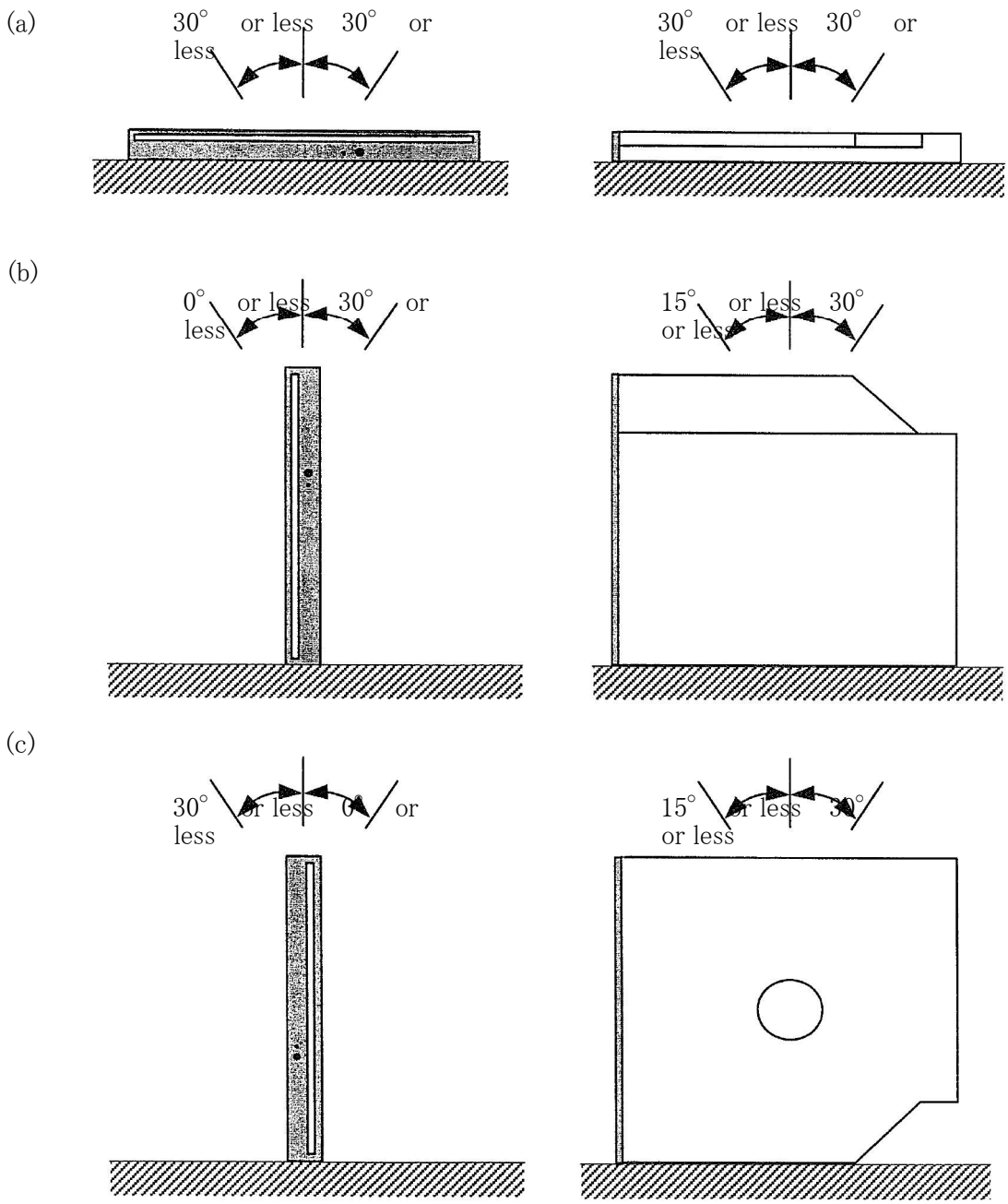
(Fig. 3 .1 -3) Emergency ejection

3.2 Installation

(1) Installation direction (2) Tilt : Refer to Fig. 3 .2-1 .

(3) Installation method : Refer to Fig. 3.2-1 below.

: The fixing holes in the side of the unit are used.
Separate discussions and arrangements are required when the installation holes are not used.



(Fig. 3.2-1) Tilt of the drive

4. DISC SPECIFICATION

4.1 Applicable Disc Format

Refer to Table 4.1 -1 .

(Table 4.1-1) Applicable disc format

CD	CD-DA CD-ROM(Mode1 , Mode2) CD-ROM XA Mode2 (Form1 , Form2) Photo CD (Single/Multi-session) CD-i Video-CD CD-Extra(CD-Plus) CD-Text
DVD	DVD-ROM DVD-Video DVD-R (Single/Multi-border), DVD-R DL (Single/Multi-border) DVD-RW (Single/Multi-border) DVD+R (Single/Multi-session), DVD+R DL (Single/Multi-session) DVD+RW (Single/Multi-session) DVD-RAM (4.7GB)

NOTE: The mechanism of this product is designed to work with 12cm-diameter discs only. It is prohibited to insert any other shaped discs such as 8cm-diameter discs, business card-shaped discs and so on.

4.2 Rotational Speed

Refer to Table 4 .2-1 for the rotational speed.

(Table 4.2-1) Rotational speed(Sheet 1 of2)

Operation/Disc format	Read speed
Idle mode(DVD)	2x CLV
Idle mode(DVD-RAM)	2x CLV
Idle mode(CD)	4x CLV
Read(DVD-ROM)	8x CAV
Read(DVD-ROM DL)	8x CAV
Read(DVD-Video)	4x CAV
Read(DVD-RAM)	3x - 5x ZCLV
Read(CD-ROM Model)	24x CAV
Read(CD-ROM Video CD)	10x CAV
Read(CD-DA)	24x CAV
Play Audio	10x CAV
Read(Mixed, CD-ROM Model and Mode2 Form2 or CD-DA)	24x CAV/10x CAV
Read(Mixed, DVD-ROM and DVD-Video)	8x CAV/4x CAV
Read(CD-R, CD-RW)	24x CAV
Read(DVD-R, DVD+R)	8x CAV
Read(DVD-R DL)	8x CAV

(Table 4.2-1) Rotational speed(Sheet 2 of2)

Operation/Disc format	Read speed
Read(DVD+R DL)	8x CAV
Read(DVD-RW, DVD+RW)	8x CAV

4.3 Data Capacity

- 650MB/700MB :CD-ROM Mode1
  CD-ROM XA Mode2 Form1
- 738MB/795MB : CD-ROM XA Mode2 Form2
- 74min/80min : CD-DA
- 4.7GB/side : DVD-ROM, DVD-Video, DVD-R, DVD-RW, DVD-RAM, DVD+R, DVD+RW
- 8 .5 GB/side : DVD-ROM, DVD-Video, DVD-R, DVD+R

4.4 Write Methods

CD	:Disc at once, Track at once, Session at once, and Packet
DVD-R	write : Disc at once, Incremental
DVD-RW	: Disc at once, Incremental, Over write
DVD+R	: Sequential(Multi-session)
DVD+RW	: Random write
DVD-RAM	: Random write

4.5 Readable Disc

CD-DA, CD-ROM, CD-R, CD-RW, DVD-ROM, DVD-R, DVD-R DL, DVD-RW, DVD+R, DVD+R DL, DVD+RW, DVD-RAM

4.6 Recordable Disc(Recording Speed)

With the recommended discs, the following speeds of recording are available:

(Table 4.6-1) Recording speed

CD-R	24x(CAV), 8 -24x(ZCLV), 8 -16x(ZCLV),8x(CLV)
CD-RW	8 - 10x(ZCLV),8x(CLV),4x(CLV)
DVD-R	8x(CAV), 2 -8x(ZCLV), 2 -6x(ZCLV), 2 -4x(ZCLV),2x(CLV)
DVD-R DL	2 -6x(ZCLV), 2 -4x(ZCLV),2x(CLV)
DVD-RW	2 -4x(ZCLV),2x(CLV),1x(CLV)
DVD-RAM	3x(ZCLV),2x(ZCLV)
DVD+R	8x(CAV), 2.4 -8x(ZCLV), 2.4 -6x(ZCLV), 2.4 -4x(ZCLV), 2.4x(CLV)
DVD+R DL	2.4 -6x(ZCLV), 2.4 -4x(ZCLV), 2.4x(CLV)
DVD+RW	2.4 -4x(ZCLV), 2.4x(CLV)

5. PERFORMANCE

5.1 Operating Performance

(1) Average random access time : 140msec average(CD-ROM,24x), 150msec average(DVD-ROM,8x)
(2) Disc speed : Refer to 4.2.
(3) Data transfer rate
(a) Read sustained : 1,545 to 3,600kB/sec(CD-ROM Mode1)
4,469 to10,816kB/sec(DVD-ROM)
(b) SATA Gen1 :1.5Gbps
(4) Starting time
(a) When power is switched on/when a disc is loaded
CD-ROM :12sec typ. (excluding the multi-session CD)
DVD-ROM : 13sec typ. (excluding dual layers and multi-border)
(b) Return time from the standby mode
CD-ROM :4secor less
DVD-ROM :4secor less
(5) Data buffer capacity :512KB

5.2 Acoustic Noise

(1) Operating : 45dBA or less (during seek/read/write/Active/Idle, ditance 0.5m)
(2) Ejecting : 65dBAor less (distance 0.5m)
(3) Others : 35dBA or less (distance 0.5m)

6. ENVIRONMENTAL CONDITIONS

The environmental conditions as specified here do not include the environmental conditions of the disc. The environmental conditions of the disc should follow the specifications of the applicable disc.

(1) Ambient temperature

(a) During operation : 5 to 45° C (Surface temperature on the top cover and the main frame; 5 to 55° C)
The recording speed may be limited or reduced even in the above temperature due to the temperature sensitive function in the pickup.

(b) During non-operation : –20 to 60° C

(c) During transportation (packaged)
: –40 to 65° C

(2) Temperature gradient

(a) During operation : 11° C/hour or less (non-condensing)

(b) During non-operation/transportation
: 20° C/houror less (non-condensing)

(3) Relative humidity

(a) During operation :8 to80% (non-condensing)
provided that the maximum wet-bulb temperature is 29 .4 ° C or less.

(b) During non-operation/transportation
:5 to 95% (non-condensing)
provided that the maximum wet-bulb temperature is 29 .4 ° C or less.

(c) During transportation (packaged)
:5 to 95% (non-condensing)
provided that the maximum wet-bulb temperature is 29 .4 ° C or less.

(4) Vibrations

(a) During operation : When installed horizontally:2.9m/s2 (0.3G) or less
When installed vertically :1.96m/s2 (0.2G) or less provided that the sweep frequency is 10 to 500Hz and sweep rate,
1 oct/min.
excepting recording mode.

(b) Transportation (packaged) : 19.6m/s2 (2G) or less provided that the sweep frequency is10 to 500Hz and sweep rate,1oct/min.

(5) Shock

(a) During operation (free from malfunction)
: When installed horizontally: 68.6m/s2 (7G) or less (half-sine shock pulse; 11 msec, intervals; 10sec)
When installed vertically :49m/s2 (5G)or less (half-sine shock pulse; 11msec, intervals; 10sec)
excepting recording mode and CD-DA play mode.

(b) During operation(while the CD-DA is playing)
: 19.6m/s2 (2G) or less (half-sine shock pulse; 11msec, intervals;10sec)

(c) During non-operation/transportation
: 588m/s2 (60G) or less (half-sine shock pulse; 11msec)
1 ,960m/s2 (200G) or less (half-sine shock pulse;2msec)

(6) Dust : Office environment

(7) Cooling : Natural air cooling

7. RELIABILITY

(1) Mean time between failures(MTBF)
: 60,000 POH or more (the frequency of use should be 10% at normal temperature and humidity)

(2) Mean time to repair(MTTR) :30 minutes

(3) Loading/ejecting life :10,000 times or more

(4) Power ON/OFF life :60,000 times or more

(5) Laser diode life

(a) CD : MTTF 85,000 hours (100ns Duty 50% pulse 380mW, 85° C)

(b) DVD : MTTF79,000 hours (40ns Duty 33%pulse 350mW, 85° C)

(6) Seeking life : 2 ×106 times or more (random access, 25° C, duty;20% or less)

(7) Error rate

(a) Read error rate

DVD : Once per 1012 bitsor less

CD : Mode1 and Mode2 (Form1) : Once per 1012 bitsor less
Mode2 (Form2) and CD-DA: Once per 109 bits or less

(b) Seek error rate : Once per 106 seeks or less

(8) Self-diagnosis

(a) When power is switched ON: Various controllers, ROM, RAM, buffer, ECC circuit, etc.

(b) When disc is inserted : Servo circuit, signal processors, etc.

8. SAFETY AN D EMC STAN DARDS

The drive complies with the following standards.

(1) Safety standards
UL, c-UL, TÜV, CE

(2) EMC standards
CE, RCM, BSMI, KC

9. FRONT INDICATOR

(1) Location : Refer to Fig. 3 .1 -1 .

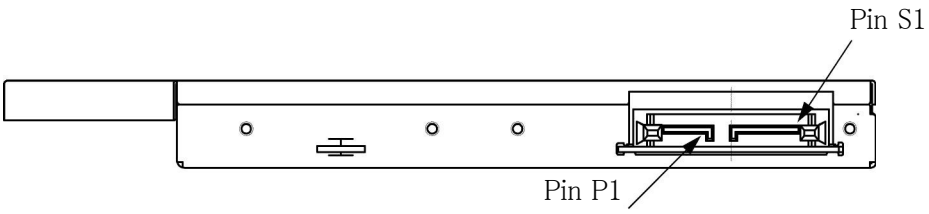
(2) Lighting conditions : Refer to Software Specification.

10. INTERFACE CONNECTOR

(1) Connector on the drive : MOLEX47300-1046 or equivalent
(2) Applicable connector on the host : MOLEX47650-0001 or equivalent
(3) Pin assignment : Refer to Table 10-1 , Fig.10-1 .

(Table 10-1) Interface connector pin assignment

NAME	TYPE	DESCRIPTION
S1	GND	
S2	A+	Differential Signal Pair A
S3	A−	
S4	GND	
S5	B−	Differential Signal Pair B
S6	B+	
S7	GND	
P1	DP	Device Present
P2	+5V	
P3		
P4	MD/DA	Manufacturing Diagnostic/Device Attention
P5	GND	
P6		



(F ig. 10-1) Interface connector assignment

11. POWER INTERFACE

The following specifications apply to the interface connector terminals of the drive. The power should be supplied from a power supply unit with reinforced insulation or double insulation.

(1) Allowable supply voltage range
: +5VDC ±5% (4.75 to 5.25V)

(2) Allowable ripple voltage : 100mVp-p or less,50 to 20MHz (including the spike noise)

(3) Current consumption : Refer to Table 11-1 .

(Table 11 -1) Current consumption

Mode	Average current max. (A)	Peak current max. (A)
Standby/Sleep	70/70(mA)	—
Write24x (CD-R)	1.15	—
Active	0.7	—
Random access(Duty 100%)	0.9	1.2
During starting/seek	—	1.5
During ej ect	—	0.9

Remarks:
1 . The supply voltage should be5V+5%.
2 . For each of the sleep, standby, and active modes, refer to "13 . POWER MANAGEMENT SPECIFICATION".
3 . Does not include pulse-like current below1msec.

12. SERIAL ATA INTERFACE

12.1 Outline

(1) Applicable standard

Serial ATA International Organization : Serial ATA Revision 3.1
ANSI standard : ATA-8
SFFC : SFF-8090iv8

12.2 Electrical Characteristics

Refer to Serial ATA Revision 3 .1 .

12.2.1 Serial ATA options

(1) Asynchrous Signal Recovery : yes
(2) Software Setting Preservation : yes
(3) Interface Power Management
device initiated : yes
host initiated : yes
(4) Spread Spectrum Clocking : no

12.3 Command Set

12.3.1 ATA command

Refer to Table12.3 .1 -1 .

(Table 12 .3.1 -1) ATA command

CODE	COMMAND
08	ATAPI SOFT RESET
E5	CHECK POWER MODE
90	EXECUTE DRIVE DIAGNOSTIC
E3	IDLE
E1	IDLE IMMEDIATE
00	NOP
A0	ATAPI PKT.
A1	ATAPI IDENTIFY DEVICE
EF	SET FEATURE
E6	SLEEP
E2	STANDBY
E0	STANDBY IMMEDIATE

12.3.2 ATAPI command

Refer to Table12.3 .2-1 .

(Table 12.3.2-1) List of the ATAPI commands(Sheet 1 of2)

CODE	COMMAND
A1	BLANK
5B	CLO SE TRACK/RZONE/SES SION/B ORDER
04	FORMAT UNIT
4A	GET EVENT STATUS NOTIFICATION
12	INQUIRY
BD	MECHANISM STATUS
55	MODE SELECT
5A	MODE SENSE
1E	PREVENT/ALLOW MEDIUM REMOVAL
28	READ (10)
A8	READ (12)
5C	READ BUFFER CAPACITY
25	READ CD/DVD CAPACITY
BE	READ CD
B9	READ CD MSF
51	READ DISC INFORMATION
44	READ HEADER
42	READ SUB-CHANNEL
43	READ TOC/PMA/ATIP
52	READ TRACK/RZONE INFORMATION
03	REQUEST SENSE
53	RESERVE TRACK/RZONE
01	REZERO UNIT
2B	SEEK
5D	SEND CUE SHEET
54	SEND OPC INFORMATION
BB	SET CD-ROM SPEED
1B	START/STOP UNIT
35	SYNCHRONIZE CACHE
00	TEST UNIT READY
2A	WRITE (10)
AA	WRITE (12)
AD	READ DVD STRUCTURE
23	READ FORMAT CAPACITIES
A4	REPORT KEY
A3	SEND KEY
A7	SET READ AHEAD

(Table 12.3.2-1) List of the ATAPI commands(Sheet 2 of2)

CODE	COMMAND
46	GET CONFIGURATION
AC	GET PERFORMANCE
BF	SEND DVD STRUCTURE
B6	SET STREAMING
2F	VERIFY (10)
2E	WRITE AND VERIFY (10)

13. POWER MANAGEMENT SPECIFICATION

This drive has a power management function to reduce power consumption.

13.1 Power Management Modes

The drive has the following four power management modes. The transition between these modes is performed by the timer within the drive or a command issued by the host.

- Active mode
- Idle mode
- Standby mode
- Sleep mode

14. OTHERS

14.1 RoHS Compliance

The drive complies with European directive "2011 /65/EU" .

EU Importer name and address

TEAC EUROPE GmbH

Bahnstrasse12, 65205 Wiesbaden - Erbenheim, Germany

14.2 Safety of Laser Prod ucts

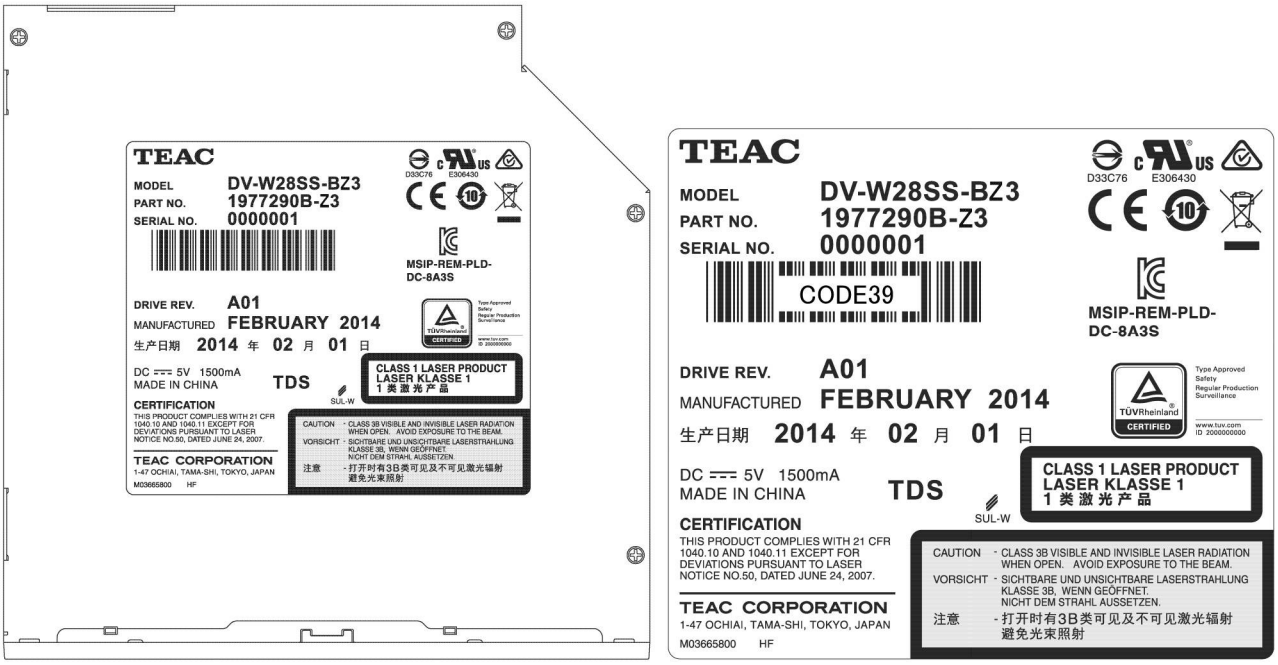
When selling this unit or a system with this unit to an end user, print the following text in the instruction manual or enclose the separate sheet on which the following text is printed with the instruction manual.

This product complies with Standard IEC60825-1 :2007.
This product has been designed and manufactured according to FDA regulations "title 21 . CFR. chapter1 , subchapter J. based on the radiation Control for Health and Safety Act of 1968 " , and is classified as a class 1 laser product. There is no hazardous invisible laser radiation during operation because invisible laser radiation emitted inside of this product is completely confined in the protective housings.
The label required in this regulation is shown bellow.

CAUTION
Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Optical pickup

Type	:LO-DWU01 T
Manufacturer	: Lite-Space Technology Co., Ltd.
Laser output	: Less than140mW(DVD) and 100mW(CD) on the objective lens
Wavelength	:785nm(CD) typ. 661 nm(DVD) typ.
Standard	: IEC60825-1 :2007



(Fig. 14.2-1)