

TEAC DV-W28SS-B94
CD-RW/DVD-MULTI RECORDER/DVD+RW

HARDWARE SPECIFICATION

Rev. PB

1708pb

TABLE OF CONTENTS

Title	Page
1. SCOPE	4
2. OUTLINE	4
3. CONSTRUCTION	6
3.1 External Construction	6
3.2 Installation	10
4. DISC SPECIFICATION	11
4.1 Applicable Disc Format	11
4.2 Read Speed	11
4.3 Data Capacity	12
4.4 Write Methods	12
4.5 Readable Disc	12
4.6 Recordable Disc (Recording Speed)	12
5. PERFORMANCE	13
5.1 Operating Performance	13
5.2 Acoustic Noise	13
6. ENVIRONMENTAL CONDITIONS	14
7. RELIABILITY	16
8. SAFETY AND EMC STANDARDS	16
9. FRONT INDICATOR	16
10. INTERFACE CONNECTOR	17
11. POWER INTERFACE	18
12. SERIAL ATA INTERFACE	19
12.1 Outline	19
12.2 Electrical Characteristics	19
12.2.1 Serial ATA options	19
12.3 Command Set	19
12.3.1 ATA command	19
12.3.2 ATAPI command	20
13. POWER MANAGEMENT SPECIFICATION	22
13.1 Power Management Modes	22

14. OTHERS22

 14.1 RoHS Compliance22

 14.2 Taiwan BSMI RoHS Compliance23

 14.3 Safety of Laser Products24

1. SCOPE

This is hardware specification of the DV-W28SS-B94 built-in type CD-RW/DVD-Multi recorder / DVD+RW (here in after referred to as drive).

As for the software specification, refer to "DV-W28SS-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-B94
TEAC P/N		1977290B-94
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:14sec 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(MS), CD-RW(HS), DVD-R, DVD-R DL, DVD-RW DVD-RAM (4.7GB), DVD+R, DVD+R DL, DVD+RW
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(4.7GB)
Front bezel color		Black
Eject button color		Black
Access indicator		Green

Laser class		Class 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]

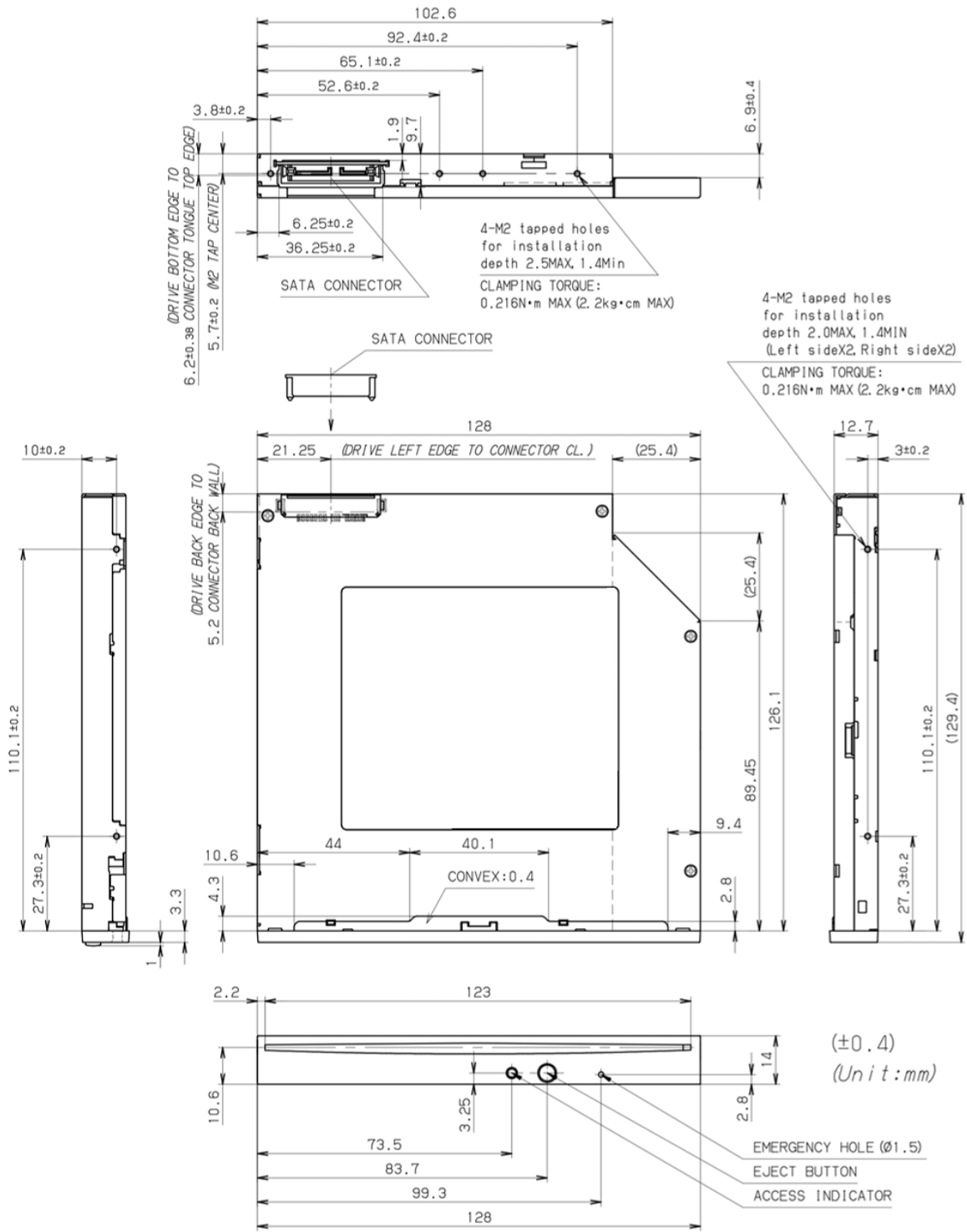
Disc shall be inserted straight with no pressure applied from other directions.

- (5) Ejection
 - (a) Automatically eject using the command.
 - (b) Manual eject using the eject button.
 - (c) Emergency ejection : Refer to Fig. 3.1-3

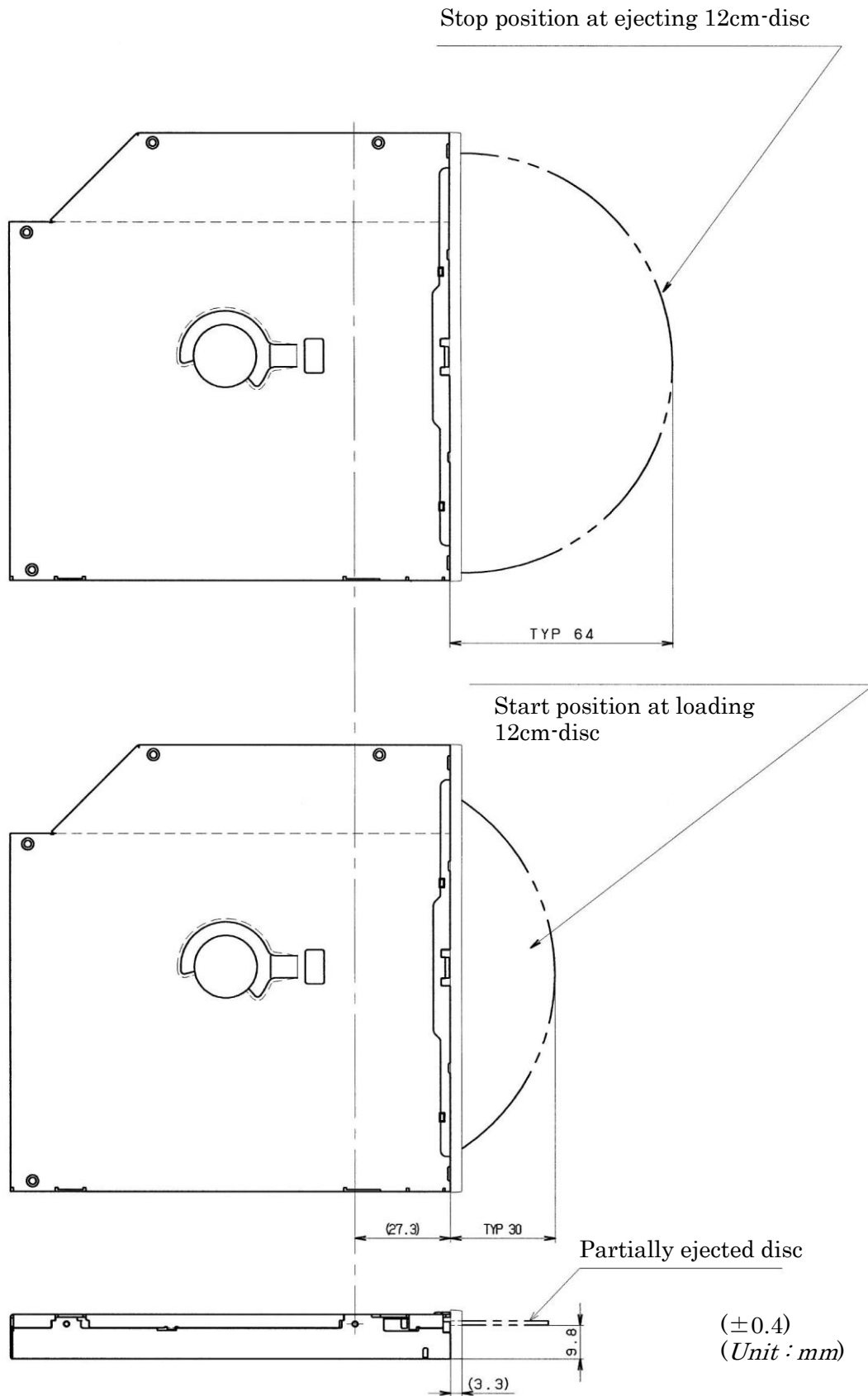
When the disc cannot be ejected using the methods of the above (a) and (b), the disc can be mechanically ejected with the procedure described in Fig. 3.1-3 as long as a disc with the supported shape is inserted.

Note that it is not assured that this function is always effective.

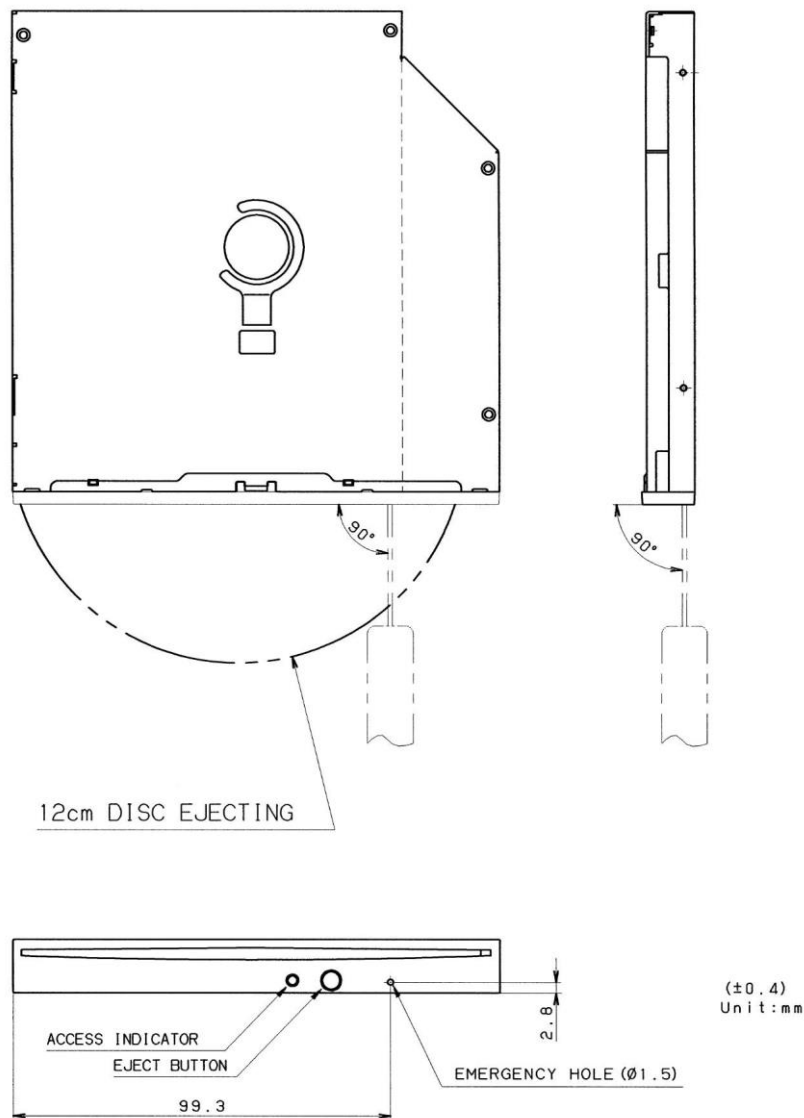
- (6) Disc loading/ejecting position : Refer to Fig. 3.1-2
- (7) External view : Refer to Fig. 3.1-1



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



(Fig. 3.1-2) Disc position



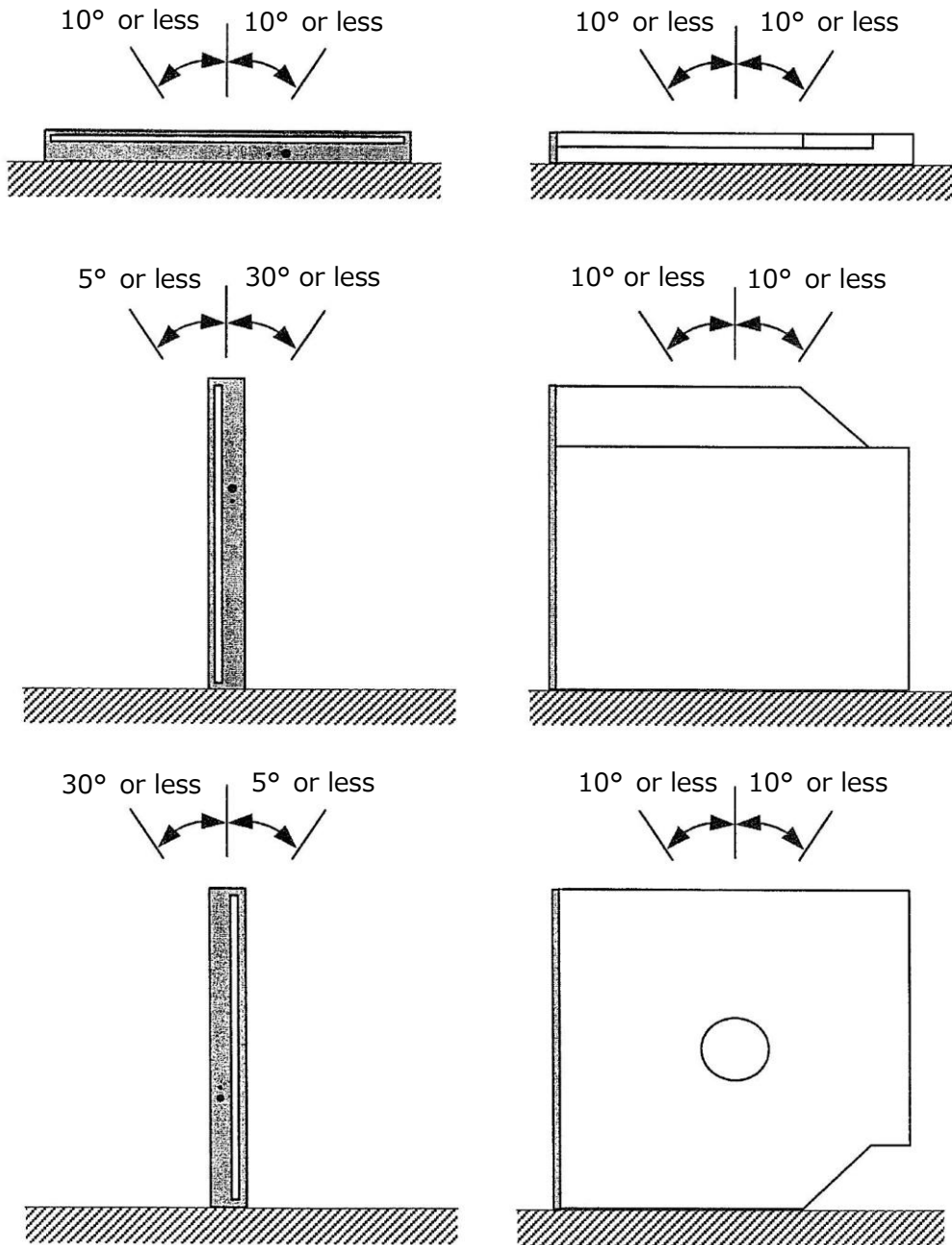
Procedure:

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 Refer to Fig. 3.2-1.
- (2) Tilt Refer to Fig. 3.2-1 below.
- (3) Installation method 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 .7 GB)

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

Operation / Disc format	Read Speed (Max.)
Idle Mode (DVD/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 Mode1)	24x CAV
Read (Video CD)	10x CAV
Read (CD-DA)	24x CAV
Play Audio	10x CAV
Read (Mixed, CD-ROM Mode1 and Mode2F2 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/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/79min : CD-DA
- 4.7GB : DVD-ROM, DVD-Video, DVD-R, DVD-RW, DVD-RAM, DVD+R, DVD+RW
- 8.5 GB : DVD-R DL, DVD+R DL, DVD-ROM, DVD-Video

4.4 Write Methods

- CD-R/CD-RW : Disc at once, Track at once, Session at once, Multi Session, Packet write
- DVD-R : Disc at once, Incremental, Multi Border
- DVD-RW : Disc at once, Incremental, Multi Border, Over Write
- DVD+R : Sequential, Multi Session
- DVD+RW : Sequential, Multi Session, Over 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(ZCAV), 2x(CLV)
DVD-R DL	2-6x(ZCLV), 2-4x (ZCLV), 2x(CLV)
DVD-RW	2-4x(ZCLV), 2x(CLV), 1x(CLV)
DVD+R	8x(CAV), 2.4-8x(ZCLV), 2.4-6x(ZCLV), 2.4-4x(ZCLV), 2.4(CLV)
DVD+R DL	2.4-6x(ZCLV), 2.4-4x(ZCLV), 2.4x(CLV)
DVD+RW	2.4-4x(ZCLV), 2.4x(CLV)
DVD-RAM	3x(ZCLV), 2x(ZCLV)

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 to 10,816kB/sec (DVD-ROM)
 - (b) SATA Gen1 : 1.5Gbps
- (4) Starting time
 - (a) When power is switched on/when 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 : 4 sec or less
 - DVD-ROM : 4 sec or less
- (5) Data buffer capacity : 512KB

5.2 Acoustic Noise

- (1) Operating : 45dBA or less
(during seek/read/write/active/idle, distance 0.5m)
- (2) Ejecting : 65dBA or 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/hour or less(non-condensing)

(3) Relative humidity

(a) During operation

8 to 80% (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

Sweep frequency is 10 to 500Hz and sweep rate
1 oct/min. (excepting recording mode)

(b) Transportation (packaged)

19.6m/s² (2G) or less

Sweep frequency is 10 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; 11msec, intervals : 10sec)

When installed vertically : 49m/s² (5G) or less (half-sine shock pulse : 11msec, intervals : 10sec)

Excepting recording mode and CD 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 : MTTF 79,000 hours (40ns Duty 33% pulse 350mW, 85°C)
- (6) Seeking life : 2×10^6 times or more
 - (random access, 25°C, duty : 20% or less)
- (7) Error rate
 - (a) Read error rate
 - DVD : Once per 10^{12} bits or less
 - CD Mode1 and Mode2 (Form1) : Once per 10^{12} bits or less
 - CD Mode2 (Form2) and CD-DA : Once per 10^9 bits or less
 - (b) Seek error rate : Once per 10^6 seeks or less

8. SAFETY AND EMC STANDARDS

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

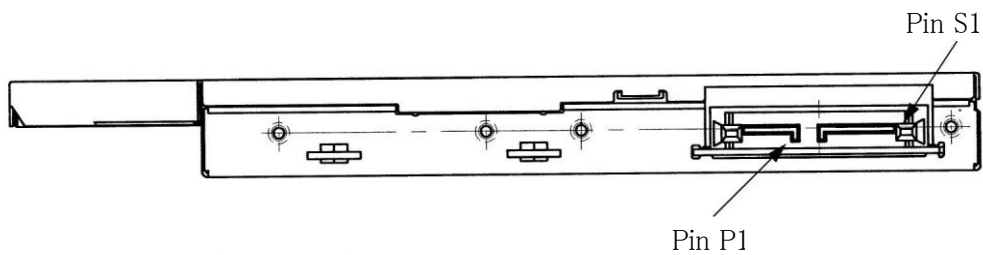
- (1) Location : Refer to Fig. 3.1-1.
- (2) Color : Green
- (3) Lighting conditions
 - (a) Continuous on : During seek, During read
 - (b) Flashing : During ejection, During disc initialization,
During write

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 (1 KΩ Pull Down)
P2	+5V	
P3		
P4	DA	Device Attention
P5	GND	
P6		



(Fig. 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 \pm 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.	Peak current max.
Standby/Sleep	70/70mA	–
Write24x (CD-R)	1.15A	–
Active	0.7A	–
Random access(Duty 100%)	0.9A	1.2A
During starting/seek	–	1.5A
During eject	–	0.9A

Remarks:

1. The supply voltage should be 5V+5%.
2. Does not include pulse-like current below 1msec.

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-8090i v8

12.2 Electrical Characteristics

Refer to Serial ATA Revision 3.1

12.2.1 Serial ATA options

- (1) Asynchronous Signal Recovery : Yes
- (2) Software Setting Preservation : Yes
- (3) Interface Power Management
 - device initiated : No
 - host initiated : No
- (4) Spread Spectrum Clocking : No

12.3 Command Set

12.3.1 ATA command

Refer to Table 12.3.1-1.

(Table 12.3.1-1) ATA commands

CODE	COMMAND
08	ATAPI SOFT RESET
E5	CHECK POWER MODE
90	EXECUTE DRIVE DIAGNOSTIC
E3	IDEL
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 Table 12.3.2-1.

(Table 12.3.2-1) List of the ATAPI commands

CODE	COMMAND
A1	BLANK
5B	CLOSE TRACK/RZONE/SESSION/BORDER
04	FORMAT UNIT
46	GET CONFIGURATION
4A	GET EVENT STATUS NOTIFICATION
AC	GET PERFORMANCE
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
BE	READ CD
25	READ CD/DVD CAPACITY
B9	READ CD MSF
51	READ DISC INFORMATION
AD	READ DVD STRUCTURE
23	READ FORMAT CAPACITIES
44	READ HEADER
42	READ SUB-CHANNEL
43	READ TOC/PMA/ATIP
52	READ TRACK/RZONE INFORMATION
A4	REPORT KEY
03	REQUEST SENSE
53	RESERVE TRACK/RZONE
01	REZERO UNIT
2B	SEEK
5D	SEND CUE SHEET
BF	SEND DISC STRUCTURE
A3	SEND KEY
54	SEND OPC INFORMATION
BB	SET CD SPEED
A7	SET READ AHEAD

B6	SET STREAMING
1B	START/STOP UNIT
35	SYNCHRONIZE CACHE
00	TEST UNIT READY
2F	VERIFY (10)
2A	WRITE (10)
AA	WRITE (12)
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 EU 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 Taiwan BSMI RoHS Compliance

The drive complies with Taiwan RoHS CNS 15663.

The restricted substances table is shown as the below.

設備名稱 : CD / DVD RECORDER		· 型號 (型式) : DV-W28SS-B				
Equipment name		Type designation (Type)				
單元	限用物質及其化學符號					
	Restricted substances and its chemical symbols					
	鉛 Lead (Pb)	汞 Mercury (Hg)	鎘 Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr ⁺⁶)	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
Optical Pick Up Unit 光学雷射頭	-	○	○	○	○	○
Spindle Motor Unit 驅動馬達	-	○	○	○	○	○
Stepping Motor Unit 步進馬達	○	○	○	○	○	○
Printed Circuit Board Ass'y 電路板主体	-	○	○	○	○	○
Mechanical Assembly 内部機構元件	-	○	○	○	○	○
Chassis / Case / Cover 機殼/上下蓋	○	○	○	○	○	○
<p>備考 1. “超出 0.1 wt %” 及 “超出 0.01 wt %” 係指限用物質之百分比含量超出百分比含量基準值。 Note 1 : “Exceeding 0.1 wt %” and “exceeding 0.01 wt %” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.</p> <p>備考 2. “○” 係指該項限用物質之百分比含量未超出百分比含量基準值。 Note 2 : “○” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.</p> <p>備考 3. “-” 係指該項限用物質為排除項目。 Note 3 : The “-” indicates that the restricted substance corresponds to the exemption.</p>						

14.3 Safety of Laser Products

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 : 2014.
 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 below.

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
 Manufacture : Lite-Space Technology Co., Ltd.
 Laser output : Less than 140mW(DVD) and 100mW(CD) on the objective lens.
 Wavelength : 785nm typ. (CD) 661nm typ. (DVD)
 Standard : IEC60825-1 : 2014

