TEAC DV-W28S-BZ3
CD-RW/DVD-MULTI RECORDER/DVD+RW

HARDWARE SPECIFICATION

Rev. A

20 sheets in Total

9210a

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1. SCOPE

This is hardware specification of the TEAC DV-W28S-BZ3 built-in type CD-RW/DVD-Multi recorder /DVD +RW (hereinafter referred to as drive).

2. OUTLINE

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

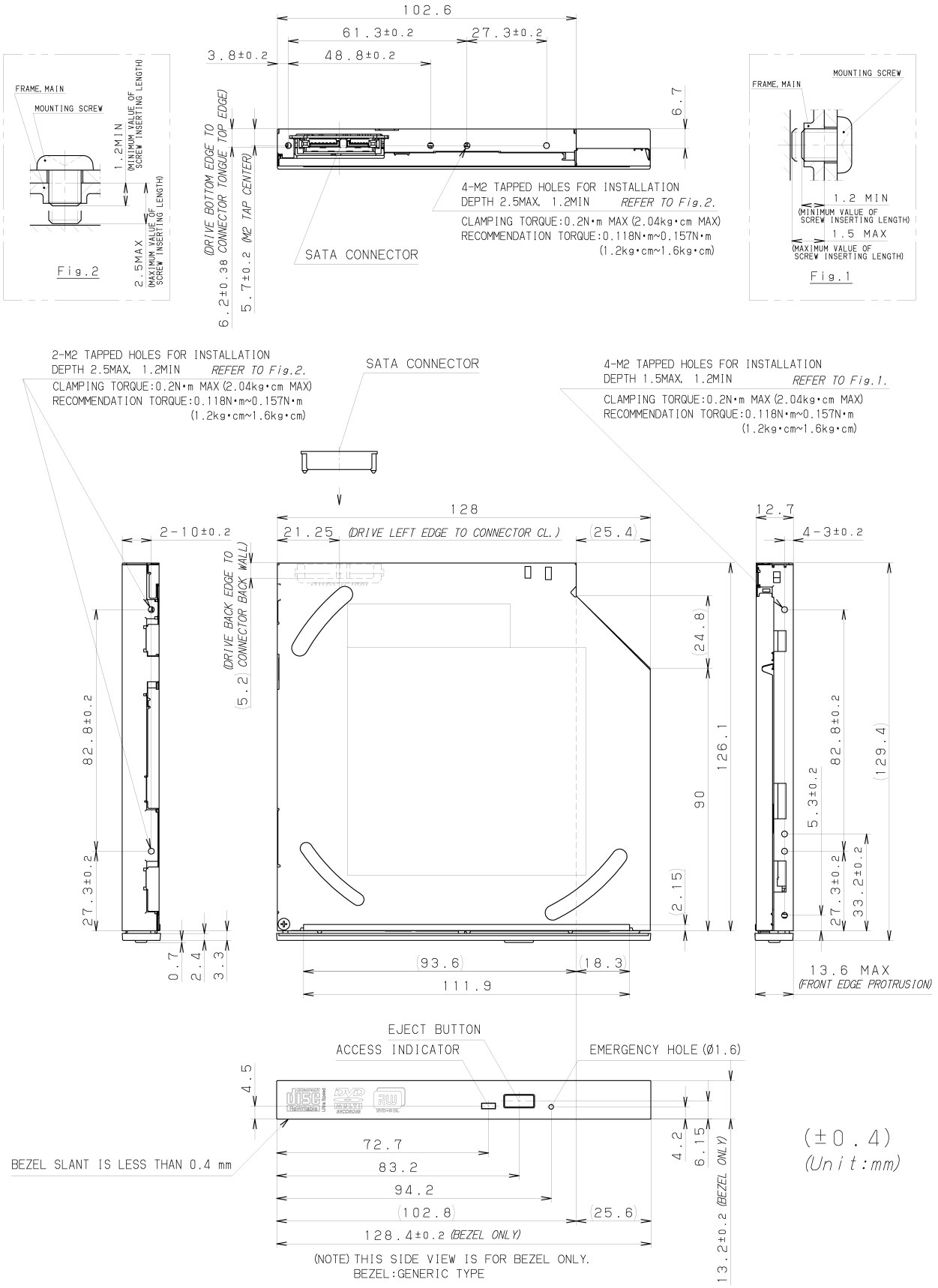
(Table 2-1) Outline of the specification

Model name		DV-W28S-BZ3
TEAC P/N		1977288B-Z3
Applicable safety and EMC standards		UL, c-UL, TÜV, CE, C-tick, 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)		4,900min^{-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, 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 (4.7GB)
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

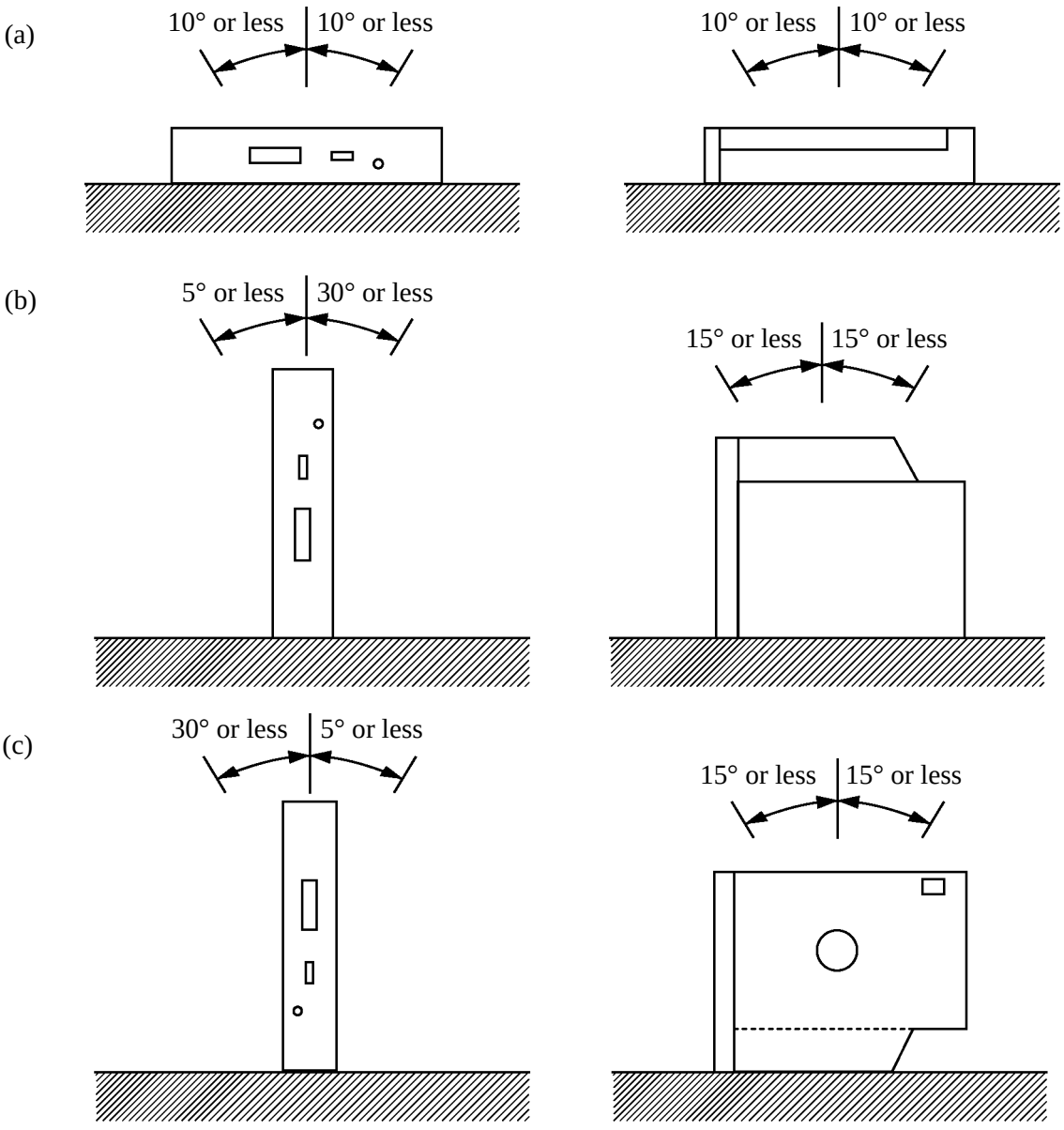
(1) Dimensions
  (a) Height : 12.7mm (excluding the front bezel)
  (b) Width : 128mm (excluding the front bezel)
  (c) Depth : 129.4mm (excluding the eject button)
(2) Mass : 140g Max. (without bezel)
(3) Disc clamp system : Ball clamp
(4) Loading : Manual loading using the tray
(5) Ejection
  (a) Manual eject using the eject button
  (b) Automatically eject using the command
  (c) Eject distance : 10mm or more
(6) External view : Refer to Fig. 3.1-1.



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

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 (4.7GB)

4.2 Read Speed

Refer to Table 4.2-1 for the read speed.

(Table 4.2-1) Read speed

Disc/Operation	Speed
Read or data extraction for copy	
DVD-ROM	3x (CAV), 4x (CAV), 6x (CAV), 8x (CAV)
DVD-ROM (DL)	3x (CAV), 4x (CAV), 6x (CAV), 8x (CAV)
DVD-R	3x (CAV), 4x (CAV), 6x (CAV), 8x (CAV)
DVD-R DL	3x (CAV), 4x (CAV), 6x (CAV), 8x (CAV)
DVD-RW	3x (CAV), 4x (CAV), 6x (CAV), 8x (CAV)
DVD+R	3x (CAV), 4x (CAV), 6x (CAV), 8x (CAV)
DVD+R DL	3x (CAV), 4x (CAV), 6x (CAV), 8x (CAV)
DVD+RW	3x (CAV), 4x (CAV), 6x (CAV), 8x (CAV)
DVD-RAM	2x (CLV), 3x (CLV)
CD-ROM	10x (CAV), 16x (CAV), 20x (CAV), 24x (CAV)
CD-R	10x (CAV), 16x (CAV), 20x (CAV), 24x (CAV)
CD-RW	10x (CAV), 16x (CAV), 20x (CAV), 24x (CAV)
Play	
Video CD	16x (CAV)
CD-DA	10x (CAV)
DVD Video	4x (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/side : DVD-ROM, DVD-Video, DVD-R, DVD-RW, DVD-RAM, DVD+R, DVD+RW
- 8.5GB/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 write
DVD-R : 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 (PCAV), 20x (PCAV), 16x (PCAV), 10x (CLV)
CD-RW	24x (ZCLV), 20x (ZCLV), 16x (ZCLV), 10x (CLV), 4x (CLV)
DVD-R	8x (PCAV), 6x (PCAV), 4x (PCAV), 3x (CLV), 2x (CLV)
DVD-R DL	6x (PCAV), 4x (PCAV), 3x (CLV)
DVD-RW	6x (ZCLV), 4x (ZCLV), 3x (CLV), 2x (CLV)
DVD+R	8x (PCAV), 6x (PCAV), 4x (PCAV), 3x (CLV), 2.4x (CLV)
DVD+R DL	6x (PCAV), 4x (PCAV), 3x (CLV), 2.4x (CLV)
DVD+RW	8x (ZCLV), 7x (ZCLV), 4x (ZCLV), 3x (CLV), 2.4x (CLV)
DVD-RAM	2x (CLV), 3x (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 Table 4.2-1.
(3) Data transfer rate
  (a) Read sustained : 1,545 to 3,600kB/sec (CD-ROM Model)
    4,469 to 10,816kB/sec (DVD-ROM)
(4) Starting time
  (a) When power is switched on/when disc is loaded
    CD-ROM : 14sec typ. (excluding the multi-session CD)
    DVD-ROM : 15sec typ. (excluding dual layers and multi-border)
  (b) Return time from the standby mode
    CD-ROM : 4sec or less
    DVD-ROM : 4sec or less
(5) Data buffer capacity : 0.5MB

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/s^2 (0.3G) or less
When installed vertically : 1.96m/s^2 (0.2G) or less
provided that the sweep frequency is 10 to 500Hz and sweep rate, 1oct/min.
excepting recording mode.

(b) Transportation (packaged) : 19.6m/s^2 (2G) or less provided that the sweep frequency is 10 to 500Hz and sweep rate, 1oct/min.

(5) Shock

(a) During operation (free from malfunction) : When installed horizontally: 68.6m/s^2 (7G) or less (half-sine shock pulse; 11msec, intervals; 10sec)
When installed vertically : 49m/s^2 (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/s^2 (2G) or less (half-sine shock pulse; 11msec, intervals; 10sec)

(c) During non-operation/transportation : 588m/s^2 (60G) or less (half-sine shock pulse; 11msec)
1,960m/s^2 (200G) or less (half-sine shock pulse; 2msec)
However, tray ejection is allowed.

(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 10,000 hours or more (Duty 48%, Pp=350mW, Tc=85°C)
(b) DVD : MTTF 10,000 hours or more (Duty 33%, Pp=320mW, Tc=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
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, C-tick, BSMI, KC

9. FRONT INDICATOR

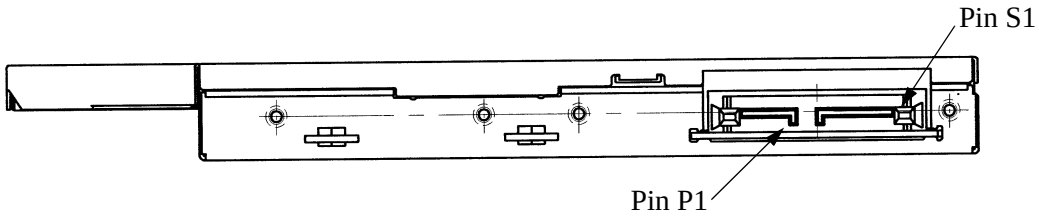
(1) Location : Refer to Fig. 3.1-1.
(2) Color : Green
(3) Lighting conditions
(a) Continuous on
• During seek.
• During read.
(b) Flashing twice in a second
• During write.
• During ejection.
• During disc initialization.

10. INTERFACE CONNECTOR

(1) Connector on the drive : MOLEX 47300 series or equivalent
(2) 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 (1KΩ Pull Down)
P2	+5V	
P3		
P4	MD/DA	Manufacturing Diagnostic / 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 ±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	49/49 (mA)	–
Write 24x (CD-R)	0.8	–
Active	0.7	–
Random access (Duty 100%)	1.0	1.3
During starting/seek	–	1.5
During eject	–	0.7

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 3.0.

12.2.1 Serial ATA options

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

12.3 Command Set

12.3.1 ATA command

Refer to Table 12.3.1-1.

(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 Table 12.3.2-1.

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

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)
3C	READ BUFFER
5C	READ BUFFER CAPACITY
25	READ CD/DVD CAPACITY
BE	READ CD
B9	READ CD MSF
51	READ DISC INFORMATION
AD	READ DVD STRUCTURE
23	READ FORMAT CAPACITIES
01	REZERO UNIT
44	READ HEADER
42	READ SUB-CHANNEL
43	READ TOC/PMA/ATIP
52	READ TRACK/RZONE INFORMATION
58	REPAIR TRACK
A4	REPORT KEY
03	REQUEST SENSE
53	RESERVE TRACK/RZONE
2B	SEEK
5D	SEND CUE SHEET
BF	SEND DVD STRUCTURE
A3	SEND KEY
54	SEND OPC INFORMATION
BB	SET CD-ROM SPEED
A7	SET READ AHEAD

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

CODE	COMMAND
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)
3B	WRITE BUFFER

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

Bahnstrasse 12, 65205 Wiesbaden - Erbenheim, Germany

14.2 Safety of Laser Products

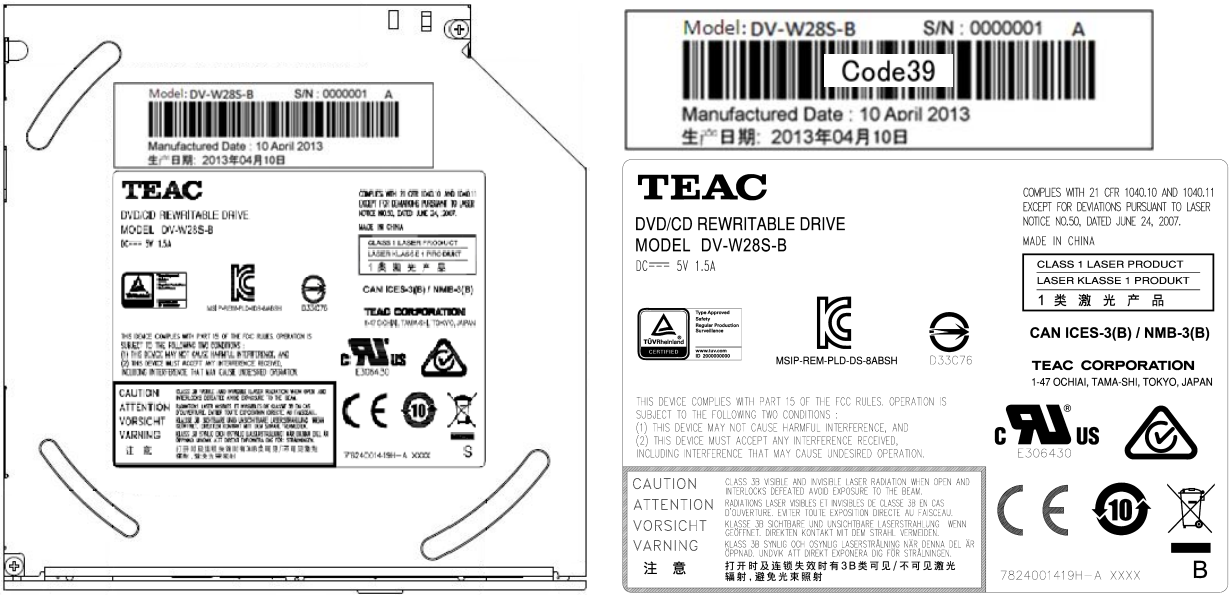
When selling this unit or a system with this unit to an end user, print the following text in the instruction manual or enclose the separate sheet on which the following text is printed with the instruction manual.

This product complies with Standard IEC60825-1:2007.
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
Manufacturer	: Lite-Space Technology Co., Ltd.
Laser output	: Less than 90mW (DVD) and 160mW (CD) on the objective lens
Wavelength	: 785nm (CD) typ. 661nm (DVD) typ.
Standard	: IEC60825-1 : 2007



(Fig. 14.2-1)