

**TEAC BD-C26SS-A93  
SLIME TYPE BD COMBO DRIVE**

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**HARDWARE SPECIFICATION**

**Rev. C**

22 sheets in Total

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## 1. SCOPE

This is hardware specification of the TEAC BD-C26SS-A93 built-in slim type BD Combo Drive (here in after referred to as drive).

## 2. OUTLINE

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

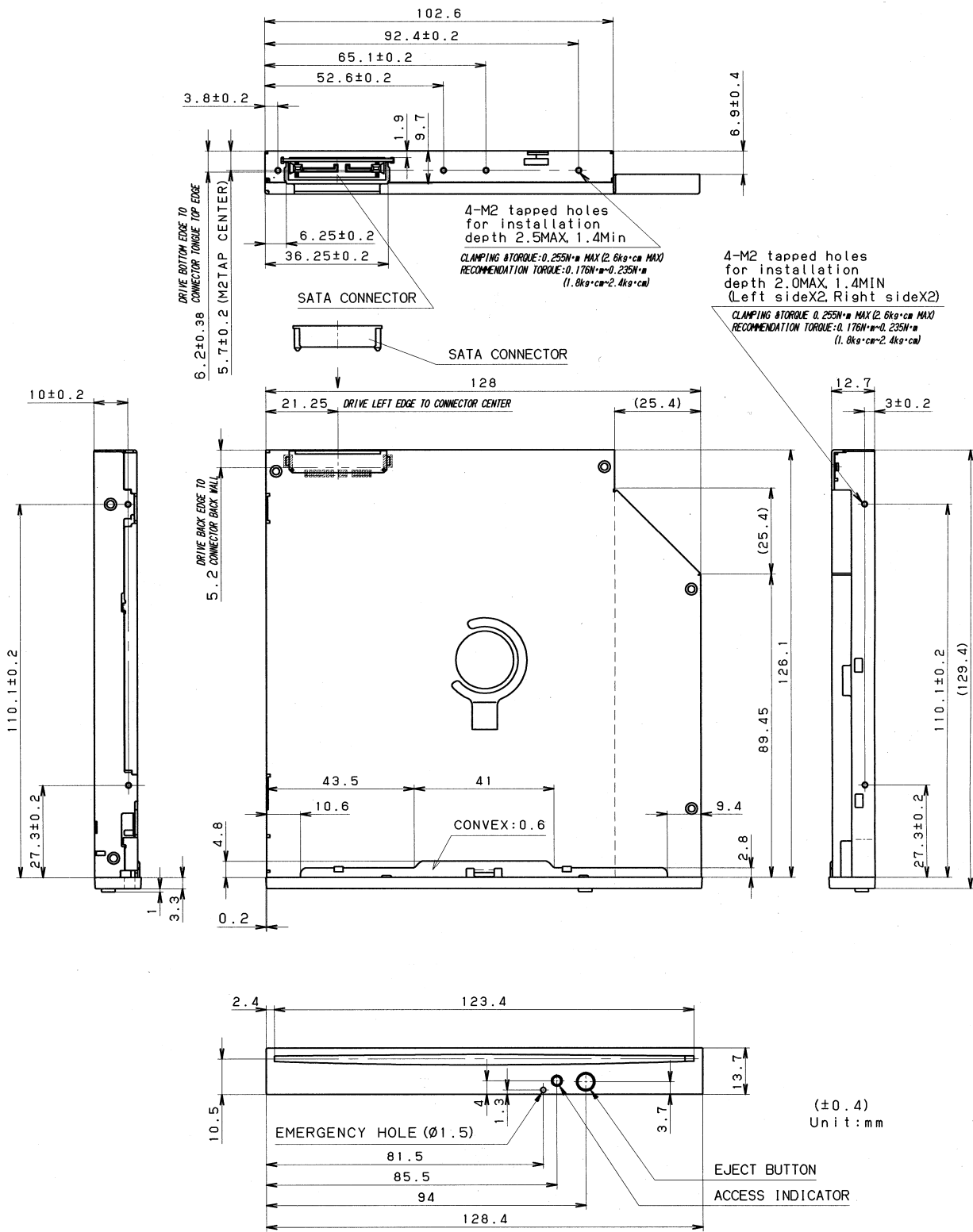
**(Table 2-1) Outline of the specification**

Model name	BD-C26SS-A93	
TEAC P/N	1977247A-93	
Applicable safety and EMC standards	UL, C-UL, TÜV, CE, CB-Scheme, C-tick, BSMI	
Interface transfer rate	1.5Gbps	
Random access time	250msec max (BD-ROM), 180msec max (DVD-ROM), 180msec max (CD-ROM)	
Spin speed	BD-ROM: 3,400min <sup>-1</sup> (typ), DVD-ROM/CD-ROM: 5,000min <sup>-1</sup> (typ)	
Host interface	Serial ATA	
Power source	+5VDC	
Starting time	BD-ROM: 20sec (max) DVD-ROM: 18sec (max) CD-ROM: 18sec (max)	
Readable discs	BD	BD-ROM, BD-ROM DL, BD-R, BD-R DL, BD-RE, BD-RE DL
	DVD	DVD-ROM, DVD-R, DVD-R DL, DVD-RW, DVD+R, DVD+R DL, DVD+RW, DVD-RAM
	CD	CD-DA, CD-ROM, CD-R, CD-RW
Recordable disc	DVD-R, DVD-R DL, DVD-RW, DVD-RAM (4.7GB), DVD+R, DVD+R DL, DVD+RW, CD-R, CD-RW	
Applicable format	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)
	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, Enhanced CD, I-Trax CD and UDF
Front bezel color	Black	
Eject button color	Black	
Access indicator	Green	
Laser class	Class 1 laser product	
Write methods	DVD	Disc at once, Incremental, Over write, Sequential, Random write
	CD	Disc at once, Session at once, Track at once, Packet write
RoHS directive	Compliant	

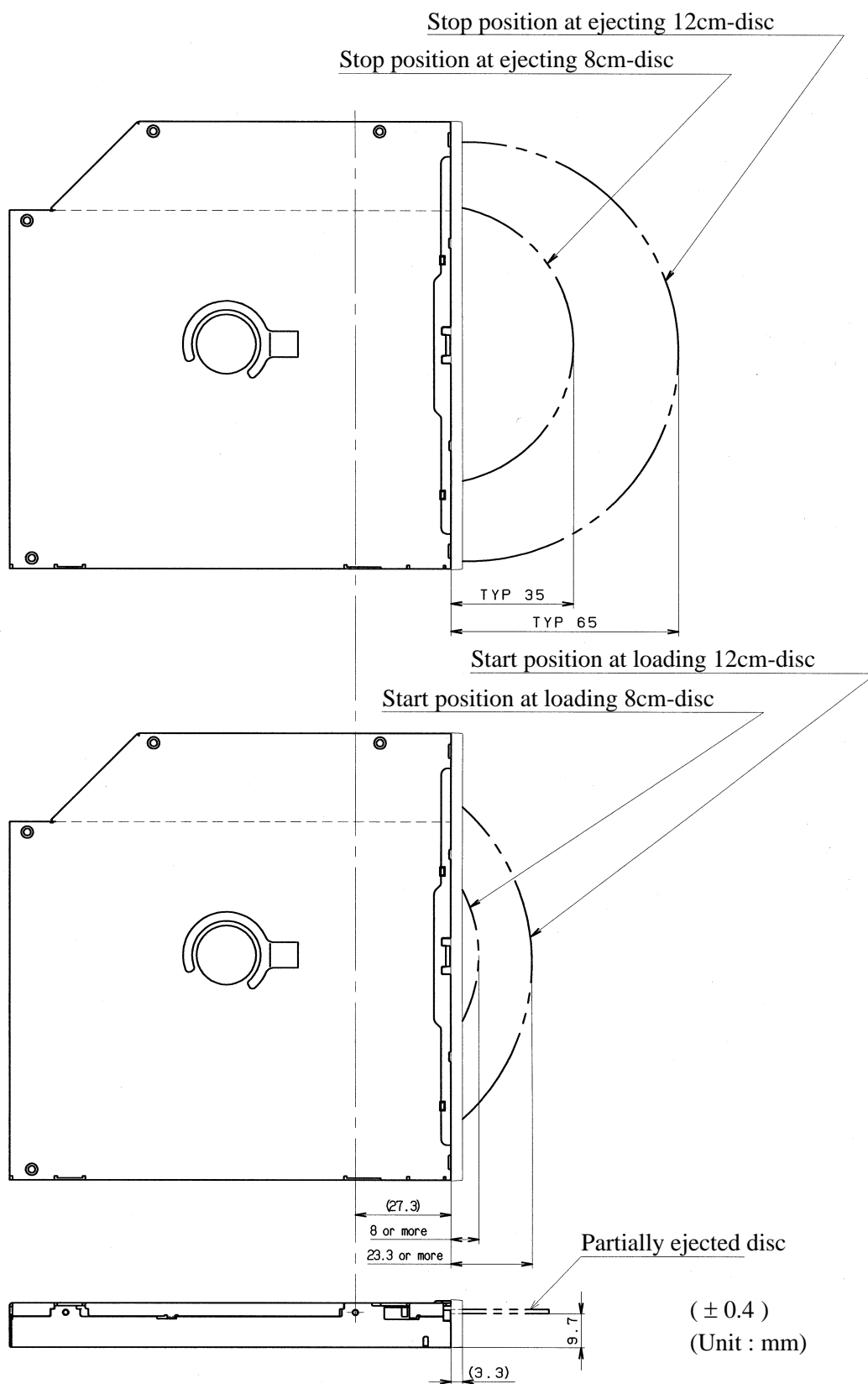
### 3. CONSTRUCTION

#### 3.1 External Construction

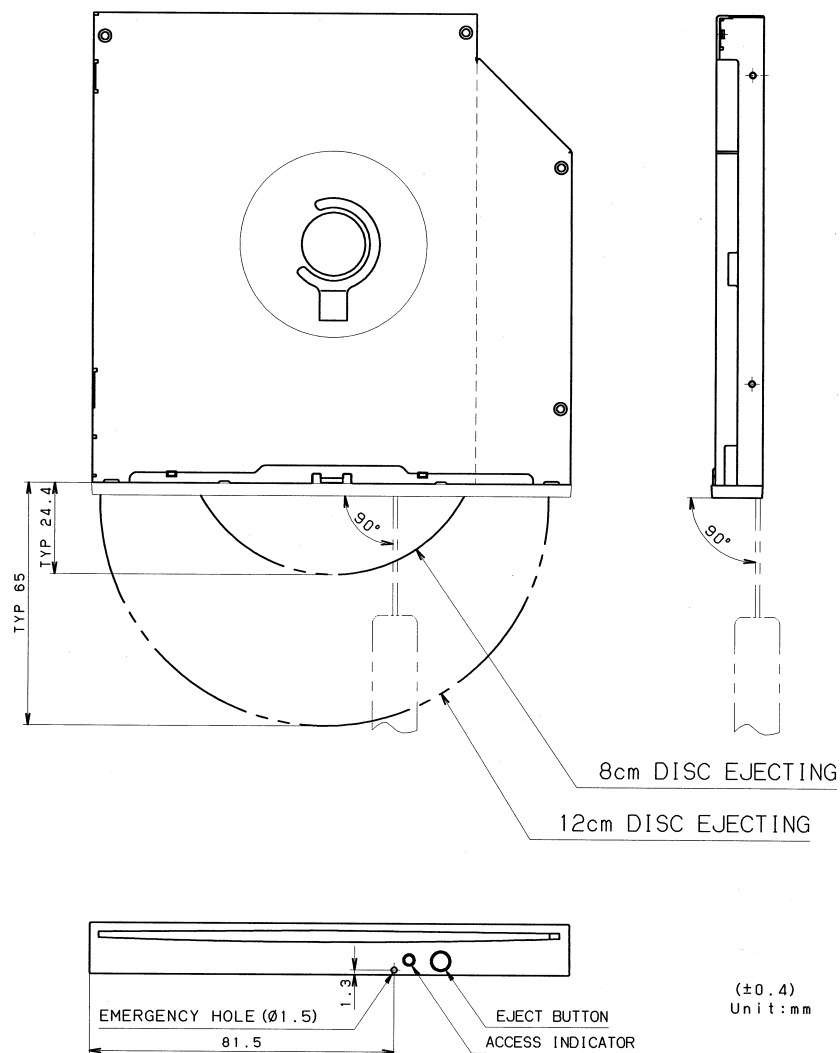
- (1) Dimensions
  - (a) Height : 12.7mm (excluding the front bezel)
  - (b) Width : 128mm (excluding the front bezel)
  - (c) Depth : 129.4mm (excluding the eject button)
- (2) Mass : 170g or less
- (3) Disc clamp system : Ball clamp
- (4) Loading : Power loading by pushing the disc  
[Caution] : Disc 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:**

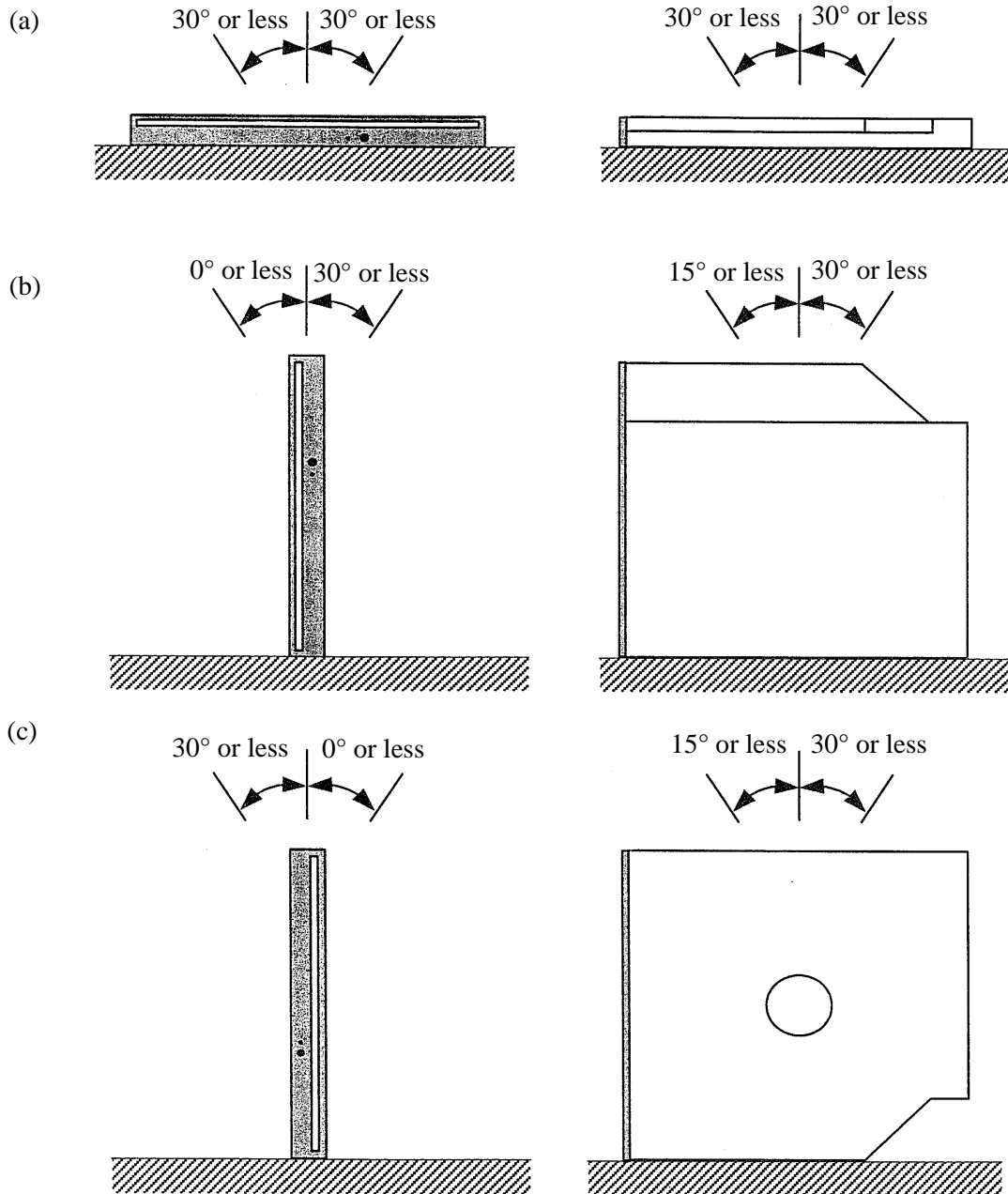
1. Prepare a metal rod that will not be easily bent with a diameter of 1 to 1.2mm and a sufficient length. (A length of 6 to 7cm excluding the holding area is most appropriate considering that the disc is to be ejected.)
2. Confirm that the rotation of the disc completely stops. (It is desirable to wait for a while after powering off.)
3. Insert the metal rod into the emergency hole between the eject button and the access indicator in a direction at right angles to the bezel face by approximately 12mm (including the bezel). The rod will stop going after some operation sound is heard.
4. Pull out the metal rod.
5. The disc will be ejected when the operations 3 to 4 are repeated approximately 15 to 18 times until no operation sound is heard. Then, manually take the disc out.

**Caution :** In the case of a 12cm disc, the outer section of the disc comes out at the point when insertion is repeated approximately 9 to 11 times. When you attempt to take the disc out at this point, the disc or the drive may be damaged.

**(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 Disc Type for Read/Write Application

(Table 4.1-1) Disc type for read/write application

Applicable Formats	BD-ROM ver2.0 UDF2.5, BD-R ver1.0 and ver2.0 UDF2.5, BD-RE ver2.0 and ver3.0 UDF2.5, BD-hybrid (only BD part), DVD-ROM, DVD-Video, DVD-Audio, DVD-R (Single/Multi-border), DVD+R (Single/Multi-session), DVD-RW, DVD+RW, DVD-RAM, CD-DA, CD-Text, CD-ROM (Mode1), CD-ROM XA Mode2 (Form1, Form2), CD-i, Video-CD (MPEG-1), Photo CD, Enhance CD, CD-Extra, I-Trax CD and UDF
Applicable Multi Type	BD-ROM, BD-ROM DL, BD-R, BD-R DL, BD-RE, BD-RE DL, BD-hybrid (only BD part), DVD-ROM (4.7G/8.54G) single layer on single/double side (Read only), DVD-ROM dual layer (PTP/OTP) on single/double side (Read only), DVD-R (3.9G, 4.7G for General and Authoring), DVD-RW, DVD+RW (4.7G), DVD+R, DVD+R DL, DVD-R DL, DVD-RAM, CD-ROM, CD-R, CD-RW
Disc Diameter	12cm and 8cm
Block Size	2,048 bytes/sector (BD), 2,048 bytes/sector (DVD), 2,048 bytes/block (CD Mode1 and Mode2 Form1), 2,336 bytes/block (Mode2), 2,328 bytes/block (Mode2 Form2), 2,352 bytes/block (CDDA)

### 4.2 Supported Write/Read Speed

Refer to Table 4.2-1 and Table 4.2-2 for the rotational speed.

(Table 4.2-1) Supported speed (write mode)

Media type for write	Write speed selected	Disc spin method for write
CD-R	10x, 16x, 24x	10x CLV, 16x/24x PCAV
Low speed CD-RW	4x	4x CLV
High speed CD-RW	10x	10x CLV
Ultra speed CD-RW	10x, 16x, 24x	10x CLV, 16x/ 24x ZCLV
Ultra <sup>+</sup> speed CD-RW	10x, 16x, 24x	10x CLV, 16x/ 24x ZCLV
DVD+R	2.4x, 4x, 6x, 8x	2.4x CLV, 4x-8x PCAV
DVD+R DL	2.4x, 4x	2.4x CLV, 4x ZCLV
DVD+RW	2.4x, 4x, 6x, 8x	2.4x CLV, 4-8x ZCLV
DVD-R	2x, 4x, 6x, 8x	2x CLV, 4-8x PCAV
DVD-R DL	2x, 4x	2x CLV, 4x ZCLV
DVD-RW	2x, 4x, 6x	2x CLV, 4x-6x ZCLV
DVD-RAM	2x, 3x, 5x	2x/3x CLV, 5x PCAV

**(Table 4.2-2) Supported speed (read/play mode)**

	Media type	CLV	CAV	
Read (or data extraction for copy)	BD-ROM SL	2x	4x, 6x	
	BD-ROM DL	2x	4x	
	BD-R SL	2x	4x, 6x	
	BD-R DL	2x	4x	
	BD-RE SL/DL	2x	4x	
	DVD-ROM SL	—	1.7-4x, 2.5-6x, 3.3-8x	
	DVD-ROM (dual layer)	—	1.7-4x, 2.5-6x	
	DVD+R	—	1.7-4x, 2.5-6x, 3.3-8x	
	DVD-R	—	1.7-4x, 2.5-6x, 3.3-8x	
	DVD+RW	—	1.7-4x, 2.5-6x, 3.3-8x	
	DVD-RW	—	1.7-4x, 2.5-6x, 3.3-8x	
	DVD+R DL	—	1.7-4x, 2.5-6x	
	DVD-R DL	—	1.7-4x, 2.5-6x	
	CD-ROM, Finalized CD-R	—	4.1-10x, 6.2-16x, 8.3-20x, 10.5-24x	
	CD-RW	Data	—	4.1-10x, 6.2-16x, 8.3-20x, 10-24x
		CD-DAE	—	4.1-10x, 6.2-16x, 8.3-20x, 10-24x
		Video CD	—	6.2-16x
Unfinalized CD-R/RW	8x	2.8-5x		
DVD-RAM	2x, 3x	2.1-5x		
PLAY	Video CD	2x	6.2x-16x	
	CD-DA		4.1x-10x	
	DVD SL/dual layer		1.7x-4x	
	BD		—	

### 4.3 Supported Write Methods

Following write methods are supported by this drive on following media

<Characteristics pertaining to DVD-R>

Disc at Once Recording

Incremental Recording

<Characteristics pertaining to DVD-RW>

Disc at Once Recording

Incremental Recording

Restricted Overwrite

<Characteristics pertaining to DVD+R/DVD+R DL>

Incremental Write

<Characteristics pertaining to DVD+RW>

Random Access Write

<Characteristics pertaining to DVD-R DL>

Disc at Once (un-interrupted)

Incremental

Layer Jump

<Characteristics pertaining to DVD-RAM>

Random Write

<Characteristics pertaining to CD-R/RW>

- Uninterrupted Write

Disc at Once

- Incremental Write [including Multi-session]

Track at Once

Session at Once

Fixed Packet

Variable Packet

## 5. PERFORMANCE

### 5.1 Operating Performance

- (1) Random access time : 250msec max (BD-ROM), 180msec max (DVD-ROM),  
180msec max (CD-ROM)
- (2) Disc speed : Refer to 4.2.
- (3) Data transfer rate
  - (a) Read sustained : 4,300 to 10,000kB/sec min (DVD-ROM)  
7,500-18,000KB/S (BD-ROM) : 1,450 to 3,500kB/sec min (CD-ROM)
  - (b) Burst sustained : 150MB/sec
  - (c) Programmed I/O : Mode 0 to 4
  - (d) Multi-word DMA : Mode 0 to 2
  - (e) Ultra DMA : Mode 0 to 5
- (4) Starting time
  - (a) When power is switched on/when disc is loaded
    - BD-ROM : 20sec max
    - DVD-ROM : 18sec max
    - CD-ROM : 18sec max
  - (b) Return time from the standby mode
    - BD-ROM : 4.5sec
    - DVD-ROM : 4.5sec
    - CD-ROM : 4.5sec
 It includes spin up and read TOC  
 Test Disc : A-BEX TCDR-704 CD / TDR-820B DVD
- (5) Data buffer capacity : 2MB

### 5.2 Acoustic Noise

Sound pressure (sequential/random read)  
 48dB (follow ISO-7779, bare drive)  
 Playing A-BEX SCD-3228 2.5g-mm unbalance

## 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 50°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 : 10 to 80% (non-condensing)  
provided that the maximum wet-bulb temperature is 29.4°C or less.
  - (b) During non-operation/transportation  
: 10 to 90% (non-condensing)  
provided that the maximum wet-bulb temperature is 29.4°C or less.
  - (c) During transportation (packaged)  
: 10 to 90% (non-condensing)  
provided that the maximum wet-bulb temperature is 29.4°C or less.
- (4) Vibrations
  - (a) Random vibration from 5 to 800 Hz, 90 second per axis (X, Y and Z)  
Operating : 1.0G RMS (CD-DA, no track jump)  
1.0G RMS (CD/DVD-ROM, no read error)  
0.7G RMS (CD-R/RW, no write error)  
0.7G RMS (DVD-R/RW, DVD+R/RW, no write error)
  - (b) Random vibration from 10 to 500 Hz, 15 min per axis (X, Y and Z)  
Non-Operating (with disc) : 3.5G RMS (no damage)
- (5) Shock
  - (a) Shock (11msec half-sine, 6 sec between shocks, 20 times per axis in the directions of X, Y and Z axis)  
Operating : 6G (CD/DVD-ROM, no damage, no read error)  
4G (CD-DA, no track jump)  
3G (CD-R/RW, no write error)  
3G (DVD-R/RW, DVD+R/RW, no write error)
  - (b) Shock (1 times per face, total 6 faces)  
Non-Operating (with disc) : 240G (2msec half-sine, no damage)  
100G (180 in/sec square wave, no damage)

## 7. RELIABILITY

- (1) Mean time between failures (MTBF) : 60,000POH or more (the frequency of use should be 10% at normal temperature and humidity)
- (2) Mean time to repair (MTTR) : 30minutes
- (3) Loading/ejecting life : 10,000times or more
- (4) Power ON/OFF life : 5,000 times or more
- (5) Laser diode life
  - (a) BD :  $1.0 \times 10^4$  [H]
  - (b) DVD :  $5.06 \times 10^4$  [H] (Tp: 10ns or less Duty: 30% or less Power = 205mW(pulse) 75°C)
  - (c) CD :  $1.75 \times 10^5$  [H] (Tp: 100ns or less Duty: 50% or less Power = 160mW(pulse) 75°C)
- (6) Seeking life :  $2 \times 10^6$  times or more (random access, 25°C, duty; 20% or less)
- (7) Error rate
  - (a) Read error rate
 

BD	: Once per $10^{12}$ bits or less
DVD	: Once per $10^{12}$ bits or less
CD	: Mode1 and Mode2 (Form1) : Once per $10^{12}$ bits or less
	Mode2 (Form2) and CDDA : 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, CB-Scheme
- (2) EMC standards  
CE, C-tick, BSMI

## 9. FRONT INDICATOR

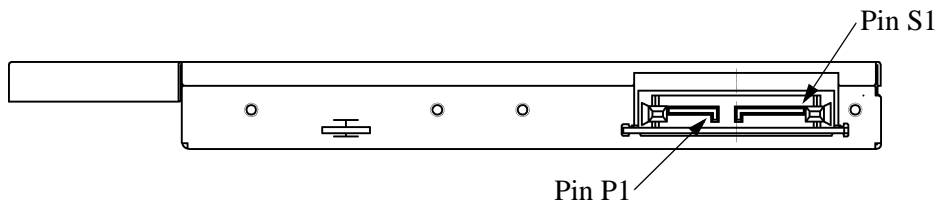
- (1) Location : Refer to Fig. 13.1-1.
- (2) Color : Green
- (3) Lighting conditions
  - Drive decode data from media.
  - Drive transfer data to host.
  - Drive start up.
  - Slot-in and slot-out.
  - During write.
  - Update firmware.

## 10. INTERFACE CONNECTOR

- (1) Connector on the drive : MOLEX 47300-1040 or equivalent  
 (2) Applicable connector on the host : MOLEX 47300-2010 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		



**(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, 1kHz to 10MHz
- (3) Current consumption : Refer to Table 11-1.

**(Table 11-1) Current consumption**

Mode	Average	Max	
Spindle motor startup		1500 mA	Spikes less 2ms
Disc eject at max speed		1500 mA	Spikes less 2ms
Continuous read at max speed	1000 mA		
Continuous write at max speed	1000 mA		
Random access at max speed	1000 mA		
Idle (laser on, motor on)	600 mA		
Standby (laser off, motor off, DIPM on)	80 mA		
Sleep (minimum current, DIPM on)	80 mA		



## 12. SERIAL ATA INTERFACE

### 12.1 Outline

- (1) Applicable standard
- |                                       |                                     |
|---------------------------------------|-------------------------------------|
| Serial ATA International Organization | : Serial ATA Revision 2.6           |
| ANSI standard                         | : T13/1532D (ATA-7)                 |
| SFFC                                  | : SFF-8020i Rev. 2.6 and SFF-8090v6 |

### 12.2 Electrical Characteristics

Refer to Serial ATA Revision 2.6.

#### 12.2.1 Serial ATA options

- |                                   |       |
|-----------------------------------|-------|
| (1) Asynchronous Signal Recovery  | :Yes. |
| (2) Software Setting Preservation | :Yes  |
| (3) Interface Power Management    |       |
| device initiated                  | :Yes  |
| host initiated                    | :Yes  |
| (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
4A	GET EVENT STATUS NOTIFICATION
12	INQUIRY
BD	MECHANISM STATUS
55	MODE SELECT
5A	MODE SENSE
4B	PAUSE/RESUME
45	PLAY AUDIO (10)
A5	PLAY AUDIO (12)
47	PLAY AUDIO MSF
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
4E	STOP PLAY/SCAN
35	SYNCHRONIZE CACHE
00	TEST UNIT READY
2A	WRITE (10)
AA	WRITE (12)

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

CODE	COMMAND
AD	READ DVD STRUCTURE
23	READ FORMAT CAPACITIES
A4	REPORT KEY
A3	SEND KEY
A7	SET READ AHEAD
46	GET CONFIGURATION
AC	GET PERFORMANCE
BF	SEND DVD STRUCTURE
B6	SET STREAMING

### 13. POWER MANAGEMENT SPECIFICATION

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

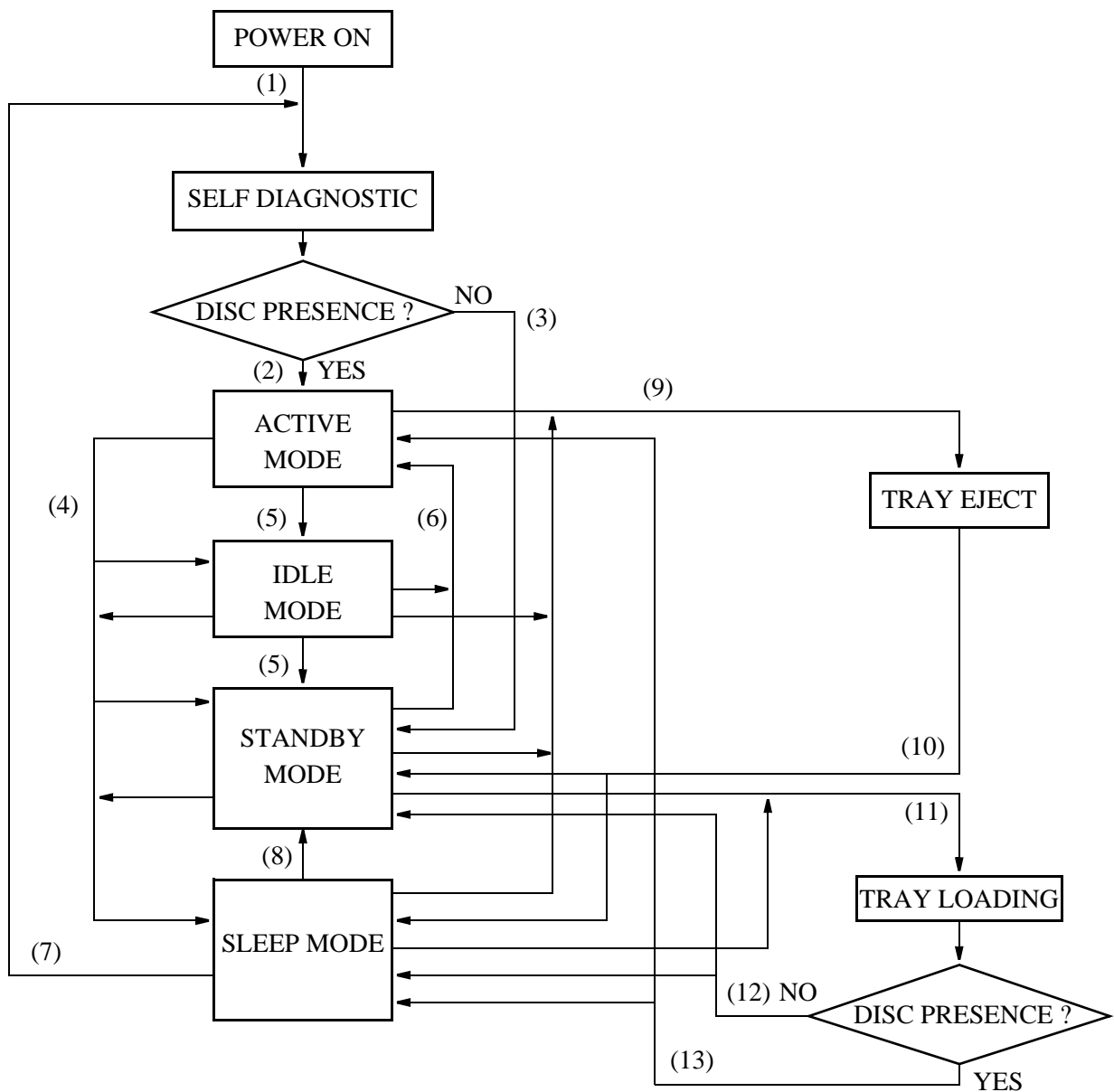
#### 13.1 Power Management Modes

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

##### 13.1.1 Transition in power management mode

The transition in the power management mode is shown in Fig. 13.1.1-1.



(Fig. 13.1.1-1) Transition in power management mode

- (1) When the RESET signal is released, the disc detection is performed after self-diagnostics are completed.
- (2) If the disc is loaded, the mode will switch to the active mode and starting operation will begin.
- (3) If the disc is not loaded, the mode will switch to the standby mode.
- (4) Using the power management command (IDLE, IDLE IMMEDIATE, STANDBY, STANDBY IMMEDIATE, SLEEP), the transition from the active mode to the idle, standby or sleep mode, from the idle mode to the standby or sleep mode, or from the standby mode to the idle or sleep mode is possible.
- (5) The transition from the active mode to the idle mode or from the idle mode to the standby mode is also performed by the timer the has. The timer will be initialized to the specified value when disc detection operation is under way or when a command which requires disc access is executed. The timer will not be initialized when a command which does not require disc access is executed in the active mode.
- (6) The resumption from the idle or standby mode to the active mode is initiated when a command which requires disc access is executed.
- (7) The resumption after the sleep mode is possible only after the RESET signal, the SRST (bit 2 of the DEVICE Control Register) or the ATAPI SOFT RESET command is detected. If resumption after the sleep mode is initiated using the RESET signal, an operation similar to when the power is switched ON occurs.
- (8) If resumption after the sleep mode is initiated using the SRST or the ATAPI SOFT RESET command, the drive enters the standby mode.
- (9) Tray ejection in each of the active, idle, standby and sleep modes is possible.
- (10) If the tray is ejected in the active, idle or standby mode, the drive enters the standby mode when the tray is out or the sleep mode when the tray is ejected in the sleep mode.
- (11) If the tray is inserted when the tray is out, the disc detection operation is performed.
- (12) If no disc is loaded, the drive will resume a mode when the tray is out.
- (13) If the disc is loaded, the drive will resume the active mode. However, the drive resumes the sleep mode following the TOC read only when the tray is ejected in the sleep mode.

### 13.2 Active Mode

A state in which the drive is capable of responding in the shortest possible time to an access using a command, and all the electrical circuitry of the drive, the pickup, spindle motor and sled motor are operating. In the following cases, the drive will enter the active mode:

- (1) While it is being booted after the power is switched ON and self diagnosis is under way.
- (2) While the booting operation or Reading of the TOC is under way when the tray is inserted and the disc is loaded.
- (3) While the booting operation or Reading of the TOC is in progress with the power ON and the disc loaded.
- (4) While an command that requires disc access is being executed.
- (5) Until the drive switches over to other power management mode using the timer in the drive or the command after either (2), (3) or (4) above is performed.

### 13.3 Idle Mode

The idle mode has the same operational functions as the active mode. However, the current consumption is reduced by lowering the rotational speed of the spindle motor in the idle mode.

The transition to the idle mode comes in the following two ways:

- (1) When using the timer in the drive:
  - After executing (2), (3) and (4) in 14.2, if the specified time elapses by the timer in the drive, the mode will switch from the active mode to the idle mode.
  - The specified time of the timer is set to 8 seconds.
- (2) When using the power management command (IDLE, IDLE IMMEDIATE):

The transition from the active or standby mode is possible using the power management command (IDLE, IDLE IMMEDIATE).

For details, refer to the Software Specification.

### 13.4 Standby Mode

Except for the functions required for the reception of a command, all other functions are in the power save condition. And although the command can be received, a time is required to restore the functions that are in the power save condition for the command that requires disc access. The transition to the standby mode comes in the following three ways:

- (1) When using the timer in the drive:

After executing (2), (3) and (4) in 13.2, if the specified time elapses by the timer in the drive, the mode will switch from the active to the standby mode via the idle mode.

Although the specified time of the timer can be preset using the STANDBY command or MODE SELECT command, it is set to 32 seconds by default. The transition time to the idle mode is included in the preset value of the timer.

For details, refer to the Software Specification. The timer will be initialized to the specified value after executing (2), (3) and (4) in 13.2. The timer will not be initialized when a command which does not require disc access is executed in the active mode.

- (2) When using the power management command (STANDBY, STANDBY IMMEDIATE) or START/STOP UNIT command:

The transition from the active or idle mode is possible using the power management command (STANDBY, STANDBY IMMEDIATE) or START/STOP UNIT command.

For details, refer to the Software Specification.

- (3) When the power is switched ON or a disc is not detected by the disc detection operation while the tray is being retracted, the drive will enter the standby mode.

### 13.5 Sleep Mode

The drive enters a state in which all functions are stopped and no command can be received.

The transition to the sleep mode is possible using the SLEEP command.

For details, refer to the Software Specification. The resumption from the sleep mode is possible using the RESET signal, the SRST (bit 2 of the Device Control Register) or the ATAPI SOFT RESET command.

#### 13.5.1 Tray ejection/insertion in the sleep mode

If the eject button is pressed in sleep mode, the tray will be ejected before sleep mode is entered. If the tray is inserted while in this state, disc detection is performed; If the disc is loaded on the tray, the start-up operation is performed before sleep mode is entered. If the disc is not loaded on the tray, sleep mode is entered.

## 14. OTHERS

### 14.1 RoHS Compliance

The drive complies with European directive "2002/95/EC".