

**Leading Taiwanese Manufacturer Slim Type
Dual Optical Disk Drive
Engineering Specifications**

TSD80Y1

Revision 1.02

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Specifications in this document are subject to change without notice.

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1. Introduction

This document describes the engineering specifications of a leading Taiwanese OEM company TSD80Y1 DVD-Dual Drive. The TSD80Y1 is a slim internal GBAS type, with 12.7 mm-height and IDE/ATAPI interface.

2. Feature

- 12.7 mm Height, Internal **GBAS** type.
- Supports 12cm / 8cm discs.
- This drive supports DVD CSS (Contents Scramble Systems) disc.
- This drive reads digital data stored on CD-ROM, DVD-ROM and CD audio discs.
- This drive reads and records the digital data on DVD-R/RW and DVD+R/RW discs.
- This drive reads and records the digital data on CD-R/RW discs.
- This drive reads DVD-ROM single layer discs at maximum 8X speed, and DVD-ROM dual layer discs at maximum 8X speed.
- This drive records DVD-R disc at maximum 4X speed, and DVD-RW discs at maximum 4X speed.
- This drive records DVD+R disc at maximum 8X speed, and DVD+RW discs at maximum 4X speed.
- The drive read CD discs at maximum 24X speed.
- This drive records CD-R disc at maximum 24X speed, and CD-RW discs at maximum 24X speed.
- This drive supports ATA/ATAPI-5 and SFF-8090 Ver5.
- This drive shows a highest performance such as 60,000 hour MTBF.
- This drive can be used in a vertical position or horizontal position.
- This drive adopts RPC-II for its "Standard Specification Model".
- This drive supports **Burn-Proof** buffer under run prevention function.
- This drive supports Shock-BP.
- This drive supports PIO mode 4, DMA 2 and UDMA 33.
- 2 Mbyte internal buffer
- Up to 24x CD audio extraction
- Firmware upgradeable
- Power-saving feature
- Drawer Type Manual loading / Electrical Release
- Eject Key and two-colored LED
- Support DVD-MRW

3. Performance

3.1 Applicable Write Disc

Applicable Write Disc	DVD-R:	Disc at once, Incremental Write DVD-R (Ver2.0 for General)
	DVD-RW:	Disc at once, Incremental write, and Restricted overwrite DVD-RW (Ver1.1)
	DVD+R:	Disc at once, Sequential write
	DVD+RW:	Sequential write, Random write
	CD-R/RW:	Disc at once, Session at once, Track at once, and Packet write. CD-DA, CD+(E)G, CD-MIDI, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video-CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio)

3.2 Applicable Read Disc

Applicable Read Disc	DVD:	DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R Ver.1.0, Ver.2.0 (Read) DVD-RW Ver.1.1 (Read)
	CD:	CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, CD-I, CD-I Bridge (Photo-CD, Video-CD) Multisession CD (Photo-CD, CD-EXTRA, CD-R, CD-RW, Portfolio), CD-R, CD-RW

3.3 Data Capacity

User Data/Block	DVD-ROM:	2,048 Byte/Block
	CD-ROM:	2,048 Byte/Block (Mode 1) 2,336 Byte/Block (Mode 2)

Data Capacity/Disc:	(1 GB=2 ³⁰ Byte, 1 MB=2 ²⁰ Byte, 1 KB=2 ¹⁰ Byte)
DVD-5:	4.377 GB (4.700 Billion Byte)
DVD-9:	7.959 GB (8.545 Billion Byte)
DVD-10:	8.754 GB (9.400 Billion Byte)
DVD-18:	15.917 GB (17.091 Billion Byte)
DVD-R Ver.2.0, DVD-RW:	4.377 GB (4.700 Billion Byte)
CD (Mode-1):	656.5 MB (688.4 Million Byte)
CD (Mode-2):	748.8 MB (785.2 Million Byte)

3.4 Transfer Rate

(1 Kbyte=2¹⁰ Byte=1,024 Bytes, 1 Mbyte=2²⁰ Byte=1,048,576 Bytes)

Sustained Data Transfer Rate (Reading):		
DVD (Single Layer):	3-8X CAV	4050~10800 Kbyte/s
DVD (Dual layer):	2.5-6X CAV	3375~8100 Kbyte/s
DVD-VIDEO (CSS Disc):	1.7-4X CAV	2295~5400 Kbyte/s
DVD±R	3-8X CAV	4050~10800 Kbyte/s
DVD±RW:	2.5-6X CAV	3375~8100 Kbyte/s
CD-ROM/R (Mode-1):	10-24X CAV	1500~3600 Kbyte/s
CD-RW (Mode-1):	10-24X CAV	1500~3600 Kbyte/s
CD-DA Extraction:	10-24X CAV	1500~3600 Kbyte/s
CD-DA, Video-CD:	4-10X CAV	600~1500 Kbyte/s
Sustained Data Transfer Rate (Writing):		
DVD-R	1X/2X CLV, 4X ZCLV	1350/2700, 5400(max) Kbytes/s
DVD-RW	1X/2X CLV, 4X ZCLV	1350/2700 Kbytes/s
DVD+R	2.4X CLV, 4X ZCLV	1350/3240, 5400 Kbytes/s
	8X ZCLV	10800(max) Kbyte/s
DVD+RW	2.4X CLV, 4X ZCLV	1350/2700 Kbytes/s
CD-R/RW:	4X/8X CLV	600/1200 Kbytes/s
	10-12X PCAV	1500-1800 Kbytes/s
	10-16X PCAV	1500-2400 Kbytes/s
	10-24X PCAV	1500-3600 Kbytes/s
Burst Data Transfer Rate	16.7 Mbyte/s (PIO Mode 4)	
	16.7 Mbyte/s (Multiple word DMA transfer mode-2)	
	33.3 Mbyte/s (Ultra DMA)	

3.5 Access Time

Average Random Access Time	DVD*1:	130 ms (Typical).
	CD*2:	130 ms (Typical).
Average Random Seek Time	DVD*3:	130 ms (Typical).
	CD*4:	130 ms (Typical).
Average Full Stroke Access Time	DVD*5:	220 ms (Typical).
	CD*6:	220 ms (Typical).

3.6 Spin up Time (Focus Search Time and Disc Motor Start up Time)

DVD:	10.0 s (Typical)
CD:	10.0 s (Typical)

3.7 Data Buffer Capacity	2,048 Kbyte
3.8 Load/Eject	(a) Manual Load/Electrical Eject (Eject Button) (b) Eject by ATAPI command (c) Emergency Eject

- *1: Measured by performing multiple accesses which means reads of data blocks over whole area of the media from 0 (h) Frame to 1E7725(h) (4.089 Billion Byte:87 % of total area) Frame more than 3000 times. Includes positioning, setting, latency time and ECC implementation time (if required).
- *2: Measured by performing multiple accesses which means reads of data blocks over whole area of the media from 00 min 02 sec 00 Frame to 60 min 01 sec 74 Frame (552.96 Million Byte:87 % of total area at linear velocity of 1.3 m/s) more than 3000 times. Includes positioning, setting, latency time and ECC implementation time (if required).
- *3: Measured by performing multiple seek which means seeks of data block over whole area of the media from 0(h) Frame to 1E7725(h) Frame more than 3000 times. Includes positioning, setting time which is same definition as HDD.
- *4: Measured by performing multiple seek which means seeks of data block over whole area of the media from 00 min 02 sec 00 Frame to 60 min 01 sec 74 Frame more than 3000 times. Includes positioning, setting time which is same definition as HDD.
- *5: Measured by performing maximum accesses which means reads of each data block of 0 (h) Frame and 1E7725(h) Frame alternately more than 100 times. Includes positioning, setting, latency time and ECC implementation time (if required)
- *6: Measured by performing maximum accesses which means reads of each data block of 00 min 02 sec 00 Frame and 60 min 01 sec 74 Frame alternately more than 100 times. Includes positioning, setting, latency time and ECC implementation time (if required)

4. Environmental Conditions

This drive should be used under the conditions listed below.

- | | |
|---|-----------------|
| 4.1 Temperature (No condensation, gradient 10 °C max) | |
| (1) Operating Temperature | 5 °C to 50 °C |
| (2) Storage Temperature | -20 °C to 60 °C |
| (3) Shipping Temperature | -40 °C to 65 °C |
| 4.2 Humidity (No condensation) | |
| (1) Operating Humidity | 10 % to 80 % |
| (2) Storage Humidity | 10 % to 90 % |
| (3) Wet bulb Maximum Temperature | 27 °C |

4.3 Vibration

(1) Operating (no hard error)	0.3G (Sinewave, 5~500 Hz, 1 Oct/min)
(2) Operating (Write) (no hard error)	0.3G (Sinewave, 5~500 Hz, 1 Oct/min)
(3) Non-operating (no damage)	2.0G (Sinewave, 5~500 Hz, 1 Oct/min)

4.4 Shock

(1) Operating (no hard error)	2.0G (11ms, 10 sec. Interval, half sinewave write)
	5.0G (11ms, 10 sec. Interval, half sinewave read)
(2) Non-operating (no damage)	60G (11ms, half sine wave)
	210G (2ms, half sine wave)

4.5 Drop (Packaged, no damage)

Bulk package (20 sets)	61 cm drop (6 surfaces, 3 edges and 1 corner)
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4.6 Acoustic Noise

Operating	< 45 dBA (0.5m distance/Access)
	< 50 dBA (0.25m distance/Access)

4.7 ESD

Operating	8 KV (No intervention required)
	15 KV (No damage may occur)

5. Reliabilities

4.1 Error Rate

(1) Hard Read Error Rate (Byte Error Rate) -----

Allowing 5 Retries (default) -----

DVD:	10 ⁻¹⁵ Max
CD: Mode 1:	10 ⁻¹⁵ Max
Mode 2:	10 ⁻¹² Max

(2) Seek Error Rate --- Allowing 5 retries 10⁻⁶ Max (default)

4.2 MTBF 60,000 h

Assumptions:

Power On Hours	5,436 h/year
On/Off Cycles	313 cycles/year
Number of Access	600,000 accesses/year
Operating Duty Cycle (Read)	20 % of Power On Time (Reading/Seeking)
Operating Duty Cycle (Write)	2 % of Power On Time (Writing/Seeking)

4.3 MTTR 0.5 h

4.4 Drive Life 15,000 h or 5 years (earlier one)

- (1) Load/Eject 20,000 times or more
- (2) Interface connector Attach/Detach 500 times or more

6. CD Audio

6.1 General

- (1) Number of Channels 2 (stereo)
- (2) Sampling Frequency 44.1K Hz

6.2 Analog Out --- in case of the attenuator is set at 0 dB by the command ---

(1) Output Level	>0.7 V (rms Typ, 47K Ohm)
(2) Frequency Response	20~20K Hz +/- 3 dB
(3) Distortion	<0.1% (LPF 20K Hz, freq=1K Hz)
(4) Signal to Noise Ratio	>75 dB Typ (freq=1K Hz)
(5) Channel Separation	>65 dB Typ (LPF 20K Hz, freq=1K Hz)

6.3 Audio Modes

- (1) 16 Modes including 'Stereo', 'Lch Mono', 'Rch Mono' and 'Mute' are selectable by command. Default mode is 'Stereo'. Audio out is automatically muted in the digital data area and seek state.
- (2) 16 Steps of attenuation level for the Audio Output is selectable by command. Default level is 0 dB.

7. Power Requirements

7.1 Source Voltage +5V ± 5 % (Operating)

7.1.1 Spike 100 mVp-p Max.

7.1.2 Ripple 100 mVp-p Max.

7.2 Current Drain (Typical value)

7.2.1 Sleep $\frac{+5 V}{<30 \text{ mA (DVD/CD)}}$

7.2.2 Standby (Laser off, Motor off) 30 mA (DVD/CD)

7.2.3 Idle (Laser on, Motor on) 800 mA (DVD)

7.2.4 Continuous Read (Data) 1000 mA (DVD)
950 mA (CD)

7.2.5 100% Random Access 1200 mA (DVD)
1200 mA (CD)

7.2.6 Peak in executing Access 1,200 mA (DVD)

7.2.7 Write

1500 mA (CD-R)
1500 mA (DVD-R)

7.2.8 Eject (Peak)

1500 mA

8. Connector

Figure 1 shows the connector and Table 1 shows the interface pin assignments

Use Japan Aviation Electronics Industry Limited KX15-50KLD L or equivalent.

Conformable connector is Japan Aviation Electronics Industry Limited KX14-50 series.



Figure 1 Connector pin assignment

PIN	Signal	PIN	Signal
1	Audio L-CH	2	Audio R-CH
3	Audio GND	4	GND
5	/RESET	6	DD8
7	DD7	8	DD9
9	DD6	10	DD10
11	DD5	12	DD11
13	DD4	14	DD12
15	DD3	16	DD13
17	DD2	18	DD14
19	DD1	20	DD15
21	DD0	22	DMARQ
23	GND	24	/DIOR
25	/DIOW	26	GND
27	IORDY	28	/DMACK
29	INTRQ	30	/IOCS16
31	DA1	32	/PDIAG
33	DA0	34	DA2
35	/CS1FX	36	/CS3FX
37	/DASP	38	+5V
39	+5V	40	+5V
41	+5V	42	+5V
43	GND	44	GND

45	GND	46	GND
47	CSEL	48	GND
49	Vender ^{*1}	50	Vender ^{*1}

Table 1: Signal Assignment

Note 1: "Vender" signal should not be connected to any host system.

9. Support Command List

9.1 Support ATA Command Set

Opcode	Command Description
00h	Nop
08h	ATAPI Soft Reset
20/21h	Read Sector (s)
90h	Execute Drive Diagnostics
A0h	ATAPI Packet Command
A1h	ATAPI Identify Device
E0h	Standby Immediate
E1h	Idle Immediate
E5h	Check Power Mode
E6h	Sleep
ECh	ATA Identify Device
EFh	Set Feature

9.2 Support ATAPI Packet Commands

Opcode	Command Description
00h	TEST UNIT READY
03h	REQUEST SENSE
04h	FORMAT UNIT
12h	INQUIRY
1Bh	START / STOP UNIT
1Eh	PREVENT / ALLOW MEDIAL REMOVAL
23h	READ FORMAT CAPACITIES
25h	READ CAPACITY
28h	READ (10)
2Ah	WRITE (10)
2Bh	SEEK
35h	SYNCHRONIZE CACHE
3Bh	WRITE BUFFER
3Ch	READ BUFFER
42h	READ SUB-CHANNEL
43h	READ TOC / PMA / ATIP
44h	READ HEADER
45h	PLAY AUDIO (10)

46h	GET CONFIGURATION
47h	PLAY AUDIO MSF
4Ah	GET EVENT / STATUS NOTIFICATION
4Bh	PAUSE / RESUME
4Eh	STOP PLAY / SCAN
51h	READ DISC INFORMATION
52h	READ TRACK INFORMATION
53h	RESERVE TRACK
54h	SEND OPC INFORMATION
55h	MODE SELECT (10)
5Ah	MODE SENSE (10)
5Bh	CLOSE TRACK / SESSION
5Ch	READ BUFFER CAPACITY
5Dh	SEND CUE SHEET
A1h	BLANK
A3h	SEND KEY
A4h	REPORT KEY
A5h	PLAY AUDIO (12)
A6h	LOAD / UNLOAD MEDIUM
A8h	READ (12)
AAh	WRITE (12)
ACh	GET PERFORM
ADh	READ DVD STRUCTURE
B6h	GET STREAMING
B9h	READ CD MSF
BAh	SCAN
BBh	SET CD SPEED
BCh	PLAY CD
BDh	MECHANISM STATUS
BEh	READ CD
BFh	SEND DVD STRUCTURE

10. Safety Standards/Agency Approvals

UL	1950, 3rd Edition
C-UL	CSA C22.2 950-1995, 3rd Edition
TUV	EN60950 and EN60825-1
FCC	FCC CFR47, Part 15 class B
CE	CISPR 22: 1993 / EN 55022 : 1998
	EN50082-1 (1992)
	VCCI Class B ITE
	IEC 801-2 (1984), Test level:
	Air Discharge (2KV-15KV)
	Direct Contact (2KV-8KV)
	IEC 801-3 (1984), Test level:
	Level 2 (3V/m) Unmodulated 27-500MHz

IEC 801-4 (1988), Test level:
Power Supply (0.5KV- 1KV)

11. Mechanical Configuration

11.1 Installation Conditions

Mount the drive within 20° of the horizontal positions and within 10° of the vertical positions

11.2 Dimension and Mass

(1) External Dimensions (W x H x D) 128.0 x 12.7 x 126.1 mm without Front Panel

(2) Mass (Weight) 190 g (Typical) with Front Panel

11.3 Front panel

EJECT button, Emergency eject pinhole, dual-color LED for busy(green)/writing(red).

