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NOTE: This specification is subject to change without prior notice.

# Specification of Blu-ray Drive

## Model SW-5582-CXX

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Note	

(Document No.: SP5582C-12)

**Panasonic Shikoku Electronics Co., Ltd.**  
**Storage Products Business Unit**

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## 1.0 General

This document describes the information on the SW-5582-CXX, BD-R/RE, DVD-RAM/R/RW, +R/+RW and CD-R/RW drive with ATA Packet Interface.

The SW-5582-CXX can read the following types of disc:

- Blu-ray: BD-ROM (SL/DL)  
BD-R (SL/DL)  
BD-RE (SL/DL)
  
- DVD: DVD-5  
DVD-9  
DVD-10  
DVD-R (3.95G/4.7G)  
DVD-R DL  
DVD-RAM (4.7G)  
DVD-RW  
+R  
+R DL  
+RW
  
- CD: CD-Audio  
CD-ROM (mode 1 and mode 2)  
CD-ROM XA (mode 2, form 1 and form 2)  
CD-I (mode 2, form 1 and form 2)  
CD-I Ready  
CD-I Bridge  
CD-R  
CD-RW  
Photo CD  
Video CD  
Enhanced Music CD  
CD-TEXT

The SW-5582-CXX can read/write in CLV mode for BD-R/RE, and can operate in CAV mode for DVD discs, and can write in CLV or Z-CLV mode for DVD-RAM/R/RW, +R/+RW and CD-R/RW discs, and can read in CAV mode for CD discs.

The SW-5582-CXX supports the following BD/DVD/CD discs and writing methods.

BD:	BD-RE BD-R	Random Access Sequential Recording Random Recording Sequential Recording with
Logical-		Over Write
DVD:	DVD-RAM DVD-R 4.7GB for General (Ver.2.0) DVD-R DL DVD-RW (Ver.1.1 / 1.2)  +R/+R DL  +RW	Random Access Disc at Once, Incremental Disc at Once Disc at Once, Incremental, & Restricted Overwrite Sequential Recording Multi-Session Random Write
CD:	CD-R, CD-RW	Disc at Once Session at Once Track at Once Fixed/Variable packet writing Multi-session

The SW-5582-CXX has audio circuits and Analog audio output in the integrated I/F connector located on the rear of the drive, but does not have the ADPCM audio circuits. The MPEG data is not decoded.

CD-DA data can be transferred via IDE I/F.

The outline of mechanical dimensions of the drive SW-5582-CXX is as follows.

- H: 41.3 mm [typ.] (excluding Front Panel)
- W: 146 mm [typ.] (excluding Front Panel)
- D: 190 mm [typ.] (excluding Front Panel)

This drive is a tray type drive that accepts to load either 120 mm disc or 80 mm disc for reading and writing. When the 120 mm disc is mounted vertical orientation, certainly attach the disc to the rib on the tray. The 80 mm disc should be loaded on the drive that is mounted horizontal orientation.

This drive is designed only for bare discs, which are marked by Blu-ray logo, DVD logo, CD logo, CD-R logo and CD-RW logo. Don't insert any other abnormal shaped discs (These discs will not be able to be loaded or ejected.).

## **2.0 Performance and Functional Specification**

### **2.1 Key feature**

#### **2.1.1 Data Format**

The BD-R/RE, DVD-RAM/R/RW, +R/+RW and CD-R/RW drive (SW-5582-CXX) is capable of reading and writing, decoding and encoding Error Correction Code in real time and transferring over the IDE interface, the industry standard data format for compact disc in the following formats:

1. BD-RE Disc as defined by " Blu-ray Disc Rewritable Format Ver. 2.1"
2. BD-R Disc as defined by " Blu-ray Disc Recordtable Format Ver. 1.1"
3. BD-ROM Disc as defined by " Blu-ray Disc Read-Only Format Ver. 1.3"
4. DVD Disc as defined by "DVD Specification for Read-only Disc Ver. 1.0".
5. DVD-R Disc as defined by "DVD Specification for Recordable Disc Ver. 2.1".
6. DVD-R DL disc as defined by "DVD Specification for Recordable Disc for Dual Layer Ver. 3.0".
7. DVD-RW Disc as defined by "DVD Specification for Rerecordable Disc Ver.1.2".
8. DVD-RAM Disc as defined by "DVD Specification for Rewritable Disc Ver. 2.1".
9. +R Disc as defined by "DVD+R 4.7Gbytes Basic Format Specifications Version 1.3".
10. +RW Disc as defined by "DVD+RW 4.7Gbytes Basic Format Specifications Version 1.3".
11. +R DL Disc as defined by " DVD+R DL 8.5Gbytes Basic Format Specifications Version 1.0".
12. CD-DA as defined by " Red Book".
13. CD-ROM data in Mode 1 & Mode 2 as defined by "Yellow Book".
14. CD-ROM XA data Form 1 & Form 2.
15. Disc containing combinations of Formats 1, 2, and 3 above in accordance to the current ISO and CD-ROM XA standards.
16. CD-I as defined by "Green Book", CD-I Bridge & CD-I Ready.
17. Single & multiple session discs as defined by "Orange Book Part2/3".
18. CD Rewritable discs as defined by "Orange Book Part3".
19. Video CD as defined by "White Book".
20. Enhanced Music CD as defined by "Blue Book".
21. CD-TEXT mode.

### **2.1.2 Error Correction**

The SW-5582-CXX is capable of performing real time error correction on the industry standard data format for a disc in the following formats:

1. BD-RE/R/ROM standards.
2. DVD-RAM/ROM/R/RW standards.
3. +R, +RW standards
4. CD-DA standard Red Book audio.
5. CD-ROM data in Mode 1.
6. CD-ROM data in Mode 2.
7. CD-ROM data in Mode 2, Form 1.
8. CD-ROM data in Mode 2, Form 2.
9. Disc containing combinations of Formats 1, 2, 3, 4 and 5 above in accordance to current ISO and CD-ROM XA standards.

### **2.1.3 IDE Interface**

The SW-5582-CXX has an IDE interface that conforms to the ATA Packet Interface for BD-ROM/R/RE, DVD-ROM/RAM/R/RW, +R/+RW and CD-ROM/R/RW.

The IDE interface shall also comply with ANSI ATA/ATAPI-6.

## 2.1.4 Transfer Rate

	Read	Write
BD-ROM (single/double layer)	2X CLV	-
	9 MB/s	-
BD-R (single/double layer)	2X CLV	2X CLV
	9 MB/s	9 MB/s
BD-RE (single/double layer)	2X CLV	2X CLV
	9 MB/s	9 MB/s
DVD-ROM (single/double layer)	3.3X to 8X CAV	-
	4 570 KB/s to 11 080 KB/s	-
DVD-R (4.7G) (single layer)	3.3X to 8X CAV	6X to 8X Z-CLV
	4 570 KB/s to 11 080 KB/s	8 310KB/s to 11 080KMB/s
DVD-R DL (double layer)	3.3X to 8X CAV	4X CLV
	4 570 KB/s to 11 080 KB/s	5 540KB/s
DVD-R (3.95G)	3.3X to 8X CAV	-
	4 570 KB/s to 11 080 KB/s	-
DVD-RW	3.3X to 8X CAV	6X CLV
	4 570 KB/s to 11 080 KB/s	8 310KB/s
DVD-RAM (4.7G)	5X Z-CLV	5X Z-CLV
	6 925 KB/s	6 925 KB/s
+R (single layer)	3.3X to 8X CAV	6X to 8X Z-CLV
	4 570 KB/s to 11 080 KB/s	8 310KB/s to 11 080KMB/s
+R DL (double layer)	3.3X to 8X CAV	4X CLV
	4 570 KB/s to 11 080 KB/s	5 540KB/s
+RW	3.3X to 8X CAV	6X to 8X Z-CLV
	4 570 KB/s to 11 080 KB/s	8 310KB/s to 11 080KMB/s
CD-ROM (*1)	13.2X to 32X CAV	-
	1 980 KB/s to 4 800 KB/s	-
CD-R (*1)	13.2X to 32X CAV	12X to 24X Z-CLV
	1 980 KB/s to 4 800 KB/s	1 800KB/s to 3 600 KB/s
CD-RW (*1) (Ultra speed RW)	10.3X to 24 CAV	12X to 16X Z-CLV
	1 545 KB/s to 3 600 KB/s	1 800KB/s to 2 400 KB/s
DVD-Video (with CSS)	2.4X to 6X CAV	-
CD-DA	10.3X to 24X CAV	-

Note (\*1): in case of mode 1 form 2 data

### **2.1.5 Disc Access Indicator**

The SW-5582-CXX has a LED on the Front Panel and it indicates "BUSY".

### **2.1.6 Data Buffer**

The SW-5582-CXX has a data buffer that is implemented as a ring buffer. This buffer has a size of 8 Mbyte.

### **2.1.7 Load Eject Mechanism**

The SW-5582-CXX has a motor powered tray to load and unload the disc. The tray can be operated by the Eject button or START/STOP UNIT command through the IDE interface. And the drive has a 2 mm diameter pinhole for the emergency tray eject.

### **2.1.8 Audio Feature**

The SW-5582-CXX can play audio via a Line Out connector located on the rear of the drive. Volume control is provided by software control.

### **2.1.9 CD-DA Audio on I/F Feature**

CD-DA digital data is available through the IDE interface and an error flag can be transferred with CD-DA data. The CD-DA digital data has all normal CD-DA error correction, interpolation and de-emphasis performed prior to being transmitted on the IDE bus. In case of writing, on the other hand, the CD-DA digital data, which is transmitted on IDE bus, is encoded by normal CD-DA error correction and then added Sub-code data according to circumstances prior to being written on the CD-R/RW media.

## 2.1.10 Writing Method

The SW-5582-CXX supports following Writing Method;

BD:

BD-RE	Random Access
BD-R	Sequential Recording Random Recording Sequential Recording with Logical Over Write

DVD:

DVD-RAM	Random Access
DVD-R 4.7GB for General (Ver.2.0)	Disc at Once, Incremental
DVD-R DL	Disc at Once
DVD-RW (Ver.1.1 / 1.2)	Disc at Once, Incremental, & Restricted Overwrite
+R/+R DL	Sequential Recording
	Multi-Session
+RW	Random Write

CD:

Disc at Once  
Session at Once  
Track at Once  
Multi-Session  
Fixed/Variable Packet Writing

## 2.2 Performance

### 2.2.1 Data/Audio Capacity

#### BD

Data Capacity	BD-ROM	Single Layer	25 Gbytes
		Double Layer	50 Gbytes
	BD-RE	Single Layer	25 Gbytes
		Double Layer	50 Gbytes
	BD-R	Single Layer	25 Gbytes
		Double Layer	50 Gbytes

#### DVD:

Data Capacity	DVD-RAM	4.7 Gbytes	
	DVD-R	3.95 Gbytes	
	DVD-R DL	4.7 Gbytes	
	DVD-R DL	8.54 Gbytes	
	DVD-RW	4.7 Gbytes	
	DVD-ROM	Single Layer	4.7 Gbytes
		Dual Layer	8.5 Gbytes
		Single Layer Double Side	9.4 Gbytes
	+R	4.7 Gbytes	
	+R DL	8.5Gbytes	
	+RW	4.7Gbytes	

Note: Data Capacity and Playing Time are dependent on linear velocity and Track pitch of the disc.

#### CD:

Data Capacity	703 Mbyte (Mode 1)
	797 Mbyte (Mode 2)
Playing Time	79 min 58 s

Note: Data Capacity and Playing Time depends on linear velocity and Track pitch of the disc. Maximum Data capacity for writing is depend on each CD-R/RW media vender and Data format.

### 2.2.2 Transfer Rate (Burst Rate)

PIO	Mode4 (16.67 Mbyte/s)
Multiword DMA	Mode2 (16.67 Mbyte/s)
Ultra DMA	Mode2 (33.33 Mbyte/s)
	Mode4 (66.67 Mbyte/s)

### 2.2.3 Access Time

#### **BD-ROM SL:** (Disc: BD-ROM SL)

Random (*1)	Typical	210 ms
	Average Max.	1 150 ms
Full Stroke (*2)	Typical	400 ms
	Average Max.	1 350 ms

Notes: (\*1) Average of Data read over the whole area from starting data recorded area (LBA: 0) to maximum data recorded area (LBA: B9FADF), more than 2 000 times including latency and layered error correction time.

(\*2) From starting data recorded area (LBA: 0) to maximum data recorded area (LBA: B9FADF), more than 2 000 times including latency and layered error correction time.

#### **DVD-5:** (Disc: MKE-D551)

Random (*3)	Typical	170 ms
	Average Max.	220 ms
Full Stroke (*4)	Typical	300 ms
	Average Max.	360 ms

Notes: (\*3) Average of Data read over the whole area from starting data recorded area (LBA: 0) to maximum data recorded area (LBA: 23197F), more than 2 000 times including latency and layered error correction time.

(\*4) From starting data recorded area (LBA: 0) to maximum data recorded area (LBA: 23197F), more than 2 000 times including latency and layered error correction time.

#### **DVD-RAM (4.7 G):**

Random (*5)	Typical	350 ms
	Average max.	2 500 ms
Full Stroke (*6)	Typical	1 100 ms
	Average max.	3 900 ms

Notes: (\*5) Average of Data read over the whole area from starting data recorded area (LBA: 0) to maximum data recorded area (LBA: 22211F), more than 2 000 times including latency and layered error correction time.

(\*6) From starting data recorded area (LBA: 0) to maximum data recorded area (LBA: 22211F), more than 2 000 times including latency and layered error correction time.

**CD-ROM:** (Disc: MNSU-005)

Random (*7)	Typical	160 ms
	Average Max.	180 ms
Full Stroke (*8)	Typical	250 ms
	Average Max.	350 ms

Notes: (\*7) Average of Data read over the whole area from 00 min 02 s 00 block to 59 min 58 s 74 block, more than 2 000 times including latency and layered error correction time.

(\*8) From 00 min 02 s 00 block to 59 min 58 s 74 block more than 2 000 times including latency and layered error correction time.

**2.2.4 Spin Up and Spin Down Time****Spin Up Time**

From loading to ready (Not include tray close time.)	Typical	12 s (BD-ROM, DVD-5, CD)
	Max.	16 s (BD-ROM, DVD-5, CD)

From standby mode to ready	Typical	3 s
	Max.	5 s

Spin Down Time	Typical	4 s
	Max.	5 s

Test Discs:    BD-ROM: BD-ROM SL  
                   DVD-5: MKE-D551  
                   CD: MNSU-005

## **3.0 Audio Specifications (CD-Audio)**

### **3.1 Analog Audio**

#### **3.1.1 General**

Number of Channels	2 (Stereo)
Sampling Frequency	44.1 kHz
Quantization	16 bit linear

#### **3.1.2 Line Out**

Output Levels	Typical 0.65 V [rms] ( $R_L = 47\text{ k}\Omega$ )
Frequency Response	20 Hz ~ 20 000 Hz ( $\pm 3\text{ dB}$ )
Signal to Noise Ratio	Min. 80 dB
Distortion	Max. 0.1 % (at 1 kHz)
Channel Separation	Min. 65 dB (at 1 kHz)

## 4.0 Environment

### 4.1 Temperature (Ventilation 0.13 m<sup>3</sup>/min ~ 0.19 m<sup>3</sup>/min)

Operating	Read Only Media	+5 °C ~ +55 °C (center of top cover)
	Writable Media	+5 °C ~ +50 °C (center of top cover)
Non-Operating		-30 °C ~ + 60 °C

### 4.2 Humidity

Operating (non-condensing)	10% [RH] ~ 80 % [RH] (max. wet bulb temp. is 29 °C)
Non-Operating (non-condensing)	5 % [RH] ~ 90 % [RH]

### 4.3 Vibration

#### 4.3.1 Operating

The SW-5582-CXX meet the uncorrectable error rate specification (described in section 6.1) with continuous sine wave vibration at following frequency range, magnitude and direction specified below;

5 Hz ~ 500 Hz (Sweep rate is 1 octave/min.)	Read: 1.96 m/s <sup>2</sup> {0.2 G} [peak] (Along X, Y and Z axis)
	Write: 0.98 m/s <sup>2</sup> {0.1 G} [peak] (Along X, Y and Z axis)

#### 4.3.2 Non-Operating

The SW-5582-CXX will withstand continuous sine wave vibration at a frequency range, magnitude and direction specified below.

5Hz ~ 500 Hz (Sweep rate is 1 octave/min.)	9.8 m/s <sup>2</sup> {1.0 G} [peak] (Along X, Y and Z axis)
---	--

## 4.4 Shock

### 4.4.1 Operating

The SW-5582-CXX meet the uncorrectable error rate specification (described in section 6.1 exclude CD-DA) with a half sine wave shock at a magnitude, interval and direction specified below.

11 ms half sine wave (Input interval is 10 s.)	Read: $49.0 \text{ m/s}^2$ {5.0 G} [peak] (Along X, Y and Z axis)
---	--

	Play Audio: $9.8 \text{ m/s}^2$ {1.0 G} [peak] (Along X, Y and Z axis)
--	---

	Write: $4.9 \text{ m/s}^2$ {0.5 G} [peak] (Along X, Y and Z axis)
--	--

### 4.4.2 Non-Operating

The SW-5582-CXX will withstand shock with a half sine wave shape at magnitude, interval and direction specified below.

11 ms half sine wave	$490 \text{ m/s}^2$ {50 G} [peak]
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## 4.5 Acoustic Noise

Microphone locates 1m above the drive.

Access mode	50 dB [max.] (A filter)
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## 5.0 Power Requirements

### 5.1 Source Voltage

Voltage	+5 V [DC]	+12 V [DC]
Tolerance	±0.25 V	±1.2 V
Ripple	100 mV <sub>[p-p]</sub>	200 mV <sub>[p-p]</sub>

### 5.2 Current

	+5 V [DC]			+12 V [DC]		
	max. / typ. (mA) *1			max. / typ. (mA) *1		
	BD	DVD	CD	BD	DVD	CD
Hold Track	600 / 450	800 / 600	800 / 600	400 / 250	600 / 350	1000 / 550
Read	600 / 450	800 / 600	800 / 600	400 / 250	600 / 350	1000 / 550
Write	900 / 650	1100 / 800	950 / 700	850 / 300	1400 / 700	1000 / 500
Seeking	650 / 450	800 / 600	800 / 600	1850 / 950	1200 / 500	1250 / 600
Spin Up	950 / 500	850 / 500	800 / 500	2200 / 500	2100 / 300	2200 / 350
Standby	110	110	110	75	75	75
Sleep	110	110	110	75	75	75

Used Test Disc for Measurement

CD: Read MNSU-005

Write:CD-R

DVD: Read MKE-D551

Write:DVD-R

BD: Read BD-ROM

Write:BD-R

**Notes** (\*1): max. ; Pulse width = 2 ms or more

## **6.0 Reliability and Serviceability**

### **6.1 Uncorrectable Error Rates**

The SW-5582-CXX will meet the following error rates when reading from a following conditions disc

CD that has a maximum block error rate of 3 in 10 E<sup>2</sup>  
 Mode 1 and Mode 2 Form 1      Less than 1 in 10 E<sup>12</sup>  
 Mode 2 Form 2 and CD Audio      Less than 1 in 10 E<sup>9</sup>

DVD that has a maximum 280 PI errors in 8 ECC blocks  
 Less than 1 in 10 E<sup>12</sup>

### **6.2 Design Life**

Traverse mechanism	2 000 000 seek or more (full stroke) (*1)
Tray loading mechanism	30 000 cycle or more

(\*1) The 3 s of time interval between each seeks should be taken.

### **6.3 Mean Time Between Failures (MTBF)**

MTBF is defined as following condition.

Read and Access duty is 10 % of POH.

MTBF      50 000 POH

### **6.4 Mean Time To Repair (MTTR)**

MTTR      30 min

## **7.0 Mechanical Specification**

### **7.1 Drive Unit**

#### **7.1.1 Outer Dimensions**

Height of drive	41.3 mm [typ.] (excluding Front Panel)
Width of drive	146.0 mm [typ.] (excluding Front Panel)
Depth of drive	190.0 mm [typ.] (excluding Front Panel)

#### **7.1.2 Weight**

Weight of drive	985g [typ.]
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#### **7.1.3 Mounting Orientation**

##### Horizontal

This drive will be capable of operation when mounted within  $\pm 5^\circ$  of the (left to right) horizontal position. In addition, the drive will be capable of operating with up to  $\pm 5^\circ$  tilts applied to the front to back dimension.

##### Vertical

This drive will be capable of operating with up to  $\pm 5^\circ$  tilts applied to the front to back dimension.

Drive upper frames is facing the gravity direction: less than  $0^\circ$

Drive lower frames is facing the gravity direction: less than  $5^\circ$

#### **7.1.4 Load/Eject Mechanism**

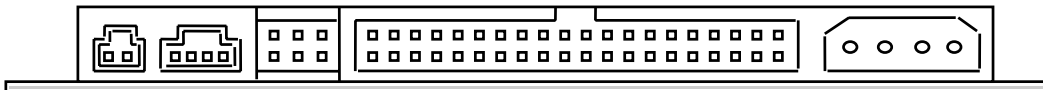
Tray Insertion Force	4.5 N [typ.]
Emergency Eject Force	10.0 N [typ.]
Tray Open Time	1.2 s [typ.] 3.0 s [max.]
Tray Close Time	1.0 s [typ.] 3.0 s [max.]

## 7.1.5 Color

Tray	PSEC standard Ivory (B-Wh-2)
Bezel	PSEC standard Ivory (B-Wh-2)
Tray Escutcheon	PSEC standard Ivory (B-Wh-2)
Eject Button	PSEC standard Ivory (B-Wh-2)

## 7.2 Connector

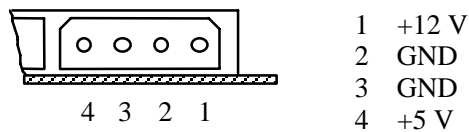
The SW-5582-CXX has a combined Power/Jumper/IDE Interface/Audio out connector. It consists of a 4-pin Power Connector, a 40-pin Interface Connector, a 6-pin Master/Slave Jumper, a 4-pin Analog audio Connector and a 2-pin Not Used Connector as shown below.



*Figure 1 - Combined Power/IDE/Jumper/Audio Connector*

### 7.2.1 Power Connector

The power connector is a four-conductor male plug. The pin assignments are shown *Figure 2*.



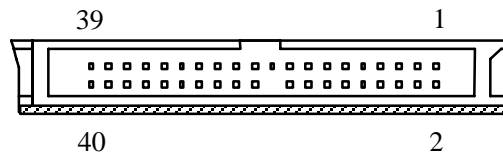
*Figure 2 - Power Connector*

Recommended part numbers for the mating connector to 18 AWG cable are shown below.

Connector (4 pin):	AMP 1-480424-0 or equivalent.
Contacts (loose piece):	AMP 60619-4 or equivalent.
Contacts (strip):	AMP 61117-4 or equivalent.

## 7.2.2 IDE Connector

The I/O connector is a 40-pin connector as shown *Figure 3* with pin assignments as shown in *Table 1*. The connector is keyed to prevent the possibility of installing it upside down. A key is provided by the removal of pin 20.



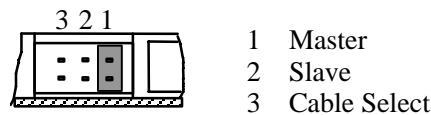
*Figure 3 - IDE Connector*

Recommended part numbers for the mating connector are shown below.

Connector (40 pin)	3M 3417-7000 or equivalent
Strain relief	3M 3448-2040 or equivalent
Flat cable (stranded 28 AWG)	3M 3365-40 or equivalent
Flat cable (stranded 28 AWG)	3M 3517-40 (shielded) or equivalent

## 7.2.3 Master/Slave Jumper

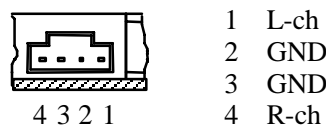
The drive has a 6-pin jumper to enable CSEL, Master and Slave modes. The default position is Master.



*Figure 4 - Jumper*

## 7.2.4 Analog Audio Connector

The Analog Audio Connector is a four-conductor male plug. The pin assignments are shown *Figure 5*.



*Figure 5 - Analog Audio Connector*

Recommended part numbers for the mating connector are shown below.

Connector (4 pin)	Molex 70066 "C" or "G" or equivalent
-------------------	--------------------------------------

## **8.0 Agency/Safety Certifications**

### **8.1 Safety**

UL 60950-1  
 CSA 22.2 No.60950-1  
 TUV (EN60950-1)  
 SEMKO (EN60950-1)  
 CB Scheme IEC60950-1

### **8.2 Electromagnetic Compatibility (EMC)**

CE Marking (EMC Directive 89/336/EEC)  
 EN55022 (CISPR Pub. 22)  
 EN55024

EN61000-4-2	Test-spec.: 4 kV for contact discharge 8 kV for air discharge
EN61000-4-3	Test Spec.: 3 V/m (Modulation: AM80 % 1 kHz)
EN61000-4-4	Test-Spec.: AC 1 kV DC 0.5 kV I/F 0.5 kV (Min. 1min)
EN61000-4-5	Test-Spec.: AC line to line 1 kV line to ground 2 kV (1 time / 30 seconds)
EN61000-4-6	Test-Spec.: 3 V [rms] (Modulation: AM80 % 1 kHz)
EN61000-4-8	Test-Spec.: 1 A/m (1 min)
EN61000-4-11	Test-Spec.: Min. 10 s (3 times)

### **8.3 Laser Safety**

21 CFR Subchapter J as a Class 1 laser device  
 IEC 60825-1/EN60825-1

## 9.0 IDE Interface Description

### 9.1 Interface signals

Signal	Pin	I/O	
RESET-	1	I	Drive reset
GROUND	2	-	
DD7	3	I/O	Drive data bus - bit 7
DD8	4	I/O	Drive data bus - bit 8
DD6	5	I/O	Drive data bus - bit 6
DD9	6	I/O	Drive data bus - bit 9
DD5	7	I/O	Drive data bus - bit 5
DD10	8	I/O	Drive data bus - bit 10
DD4	9	I/O	Drive data bus - bit 4
DD11	10	I/O	Drive data bus - bit 11
DD3	11	I/O	Drive data bus - bit 3
DD12	12	I/O	Drive data bus - bit 12
DD2	13	I/O	Drive data bus - bit 2
DD13	14	I/O	Drive data bus - bit 13
DD1	15	I/O	Drive data bus - bit 1
DD14	16	I/O	Drive data bus - bit 14
DD0	17	I/O	Drive data bus - bit 0
DD15	18	I/O	Drive data bus - bit 15
GROUND	19	-	
(KEYPIN)	20	-	
DMARQ	21	O	DMA Request
GROUND	22	-	
DIOW-	23	I	Drive I/O write
GROUND	24	-	
DIOR-	25	I	Drive I/O read
GROUND	26	-	
IORDY	27	O	I/O channel ready
SPSYNC:CSEL	28	-	
DMACK-	29	I	DMA acknowledge
GROUND	30	-	
INTRQ	31	O	Drive interrupt
IOCS16-	32	O	Drive 16-bit I/O
DA1	33	I	Drive address bus bit 1
PDIAG-	34	I/O	Passed diagnostics
DA0	35	I	Drive address bus bit 0
DA2	36	I	Drive address bus bit 2
CS0-	37	I	Drive chip select 0
CS1-	38	I	Drive chip select 1
DASP	39	I/O	Drive active/Drive 1 present
GROUND	40	-	

*Table 1 - interface signal description*

## 9.2 DC Characteristics

Parameter	Signal Level	
	Low	High
Input Voltage	0.0 V [DC] ~ 0.8 V [DC]	2.0 V [DC] ~ 5.25 V [DC]
Input Current Sink	4 mA [min.]	
Hysteresis	0.2 V [DC] [typ.]	
Output Voltage	0.0 V [DC] ~ 0.5 V [DC]	2.4 V [DC] ~ 5.25 V [DC]
Output Current		-0.4 mA [min.]
<b>Note:</b> Cable capacitive loading is 40 pF max.		

*Table 2 - IDE Interface DC characteristics*

## 10.0 IDE Commands

### 10.1 IDE ATA (Task File) Commands

Command	Op. Code
ATAPI SOFT RESET	08h
CHECK POWER MODE	E5h
EXECUTE DRIVE DIAGNOSTICS	90h
IDLE IMMEDIATE	E1h
NOP	00h
PACKET COMMAND	A0h
ATAPI IDENTIFY DEVICE	A1h
SET FEATURES	EFh
SLEEP	E6h
STANDBY IMMEDIATE	E0h

*Table 3 - ATA Commands*

## 10.2 IDE ATAPI Commands

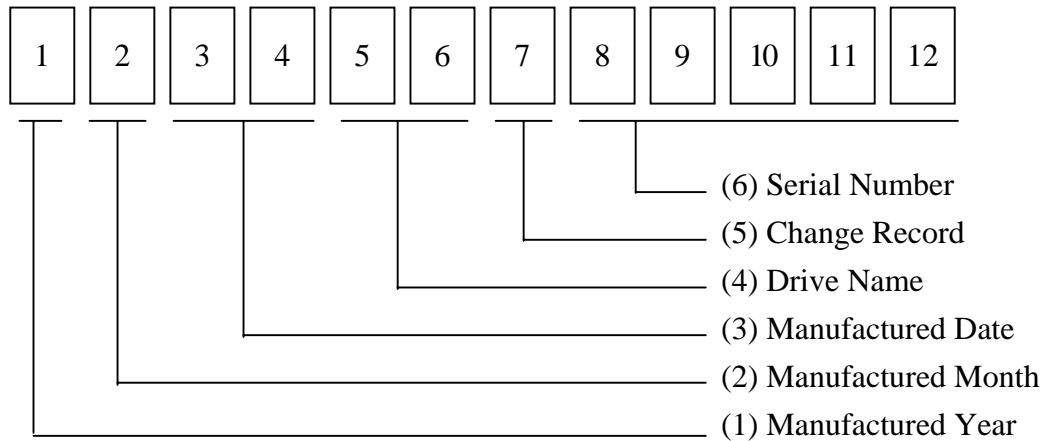
Command Description	Op. Code
BLANK	A1h
CLOSE TRACK/RZONE/SESSION/BORDER	5Bh
FORMAT UNIT	04h
GET CONFIGURATION	46h
GET EVENT STATUS NOTIFICATION	4Ah
GET PERFORMANCE	Ach
INQUIRY	12h
MECHANISM STATUS	BDh
MODE SELECT (6)	15h
MODE SELECT (10)	55h
MODE SENSE (6)	1Ah
MODE SENSE (10)	5Ah
PAUSE/RESUME	4Bh
PLAY AUDIO (10)	45h
PLAY AUDIO (12)	A5h
PLAY AUDIO MSF	47h
PREVENT/ALLOW MEDIUM REMOVAL	1Eh
READ (6)	08h
READ (10)	28h
READ (12)	A8h
READ BUFFER	3Ch
READ BUFFER CAPACITY	5Ch
READ CAPACITY	25h
READ CD	BEh
READ CD MSF	B9h
READ DEFECT DATA	37h
READ DISC INFORMATION	51h
READ DVD STRUCTURE	ADh
READ FORMAT CAPACITIES	23h
READ HEADER	44h
READ SUB-CHANNEL	42h
READ TOC/PMA/ATIP	43h
READ TRACK/RZONE INFORMATION	52h
REPAIR RZONE	58h
REPORT KEY	A4h
REQUEST SENSE	03h
REZERO UNIT	01h
RESERVE TRACK/RZONE	53h
SCAN	BAh
SEEK (6)	0Bh
SEEK (10)	2Bh

*Table 4 - ATAPI Commands (1/2)*

Command Description	Op. Code
SEND CUE SHEET	5Dh
SEND DVD STRUCTURE	BFh
SEND KEY	A3h
SEND OPC INFORMATION	54h
SET CD SPEED	BBh
SET READ AHEAD	A7h
SET STREAMING	B6h
START STOP UNIT	1Bh
STOP PLAY/SCAN	4Eh
SYNCHRONIZE CACHE (FLUSH)	35h
TEST UNIT READY	00h
VERIFY (10)	2Fh
VERIFY (12)	AFh
WRITE (6)	0Ah
WRITE (10)	2Ah
WRITE (12)	AAh
WRITE AND VERIFY (10)	2Eh
WRITE AND VERIFY (12)	A Eh
WRITE BUFFER	3Bh

*Table4 - ATAPI Commands (2/2)*

## 11.0 Manufactured Number



### (1) Manufactured Year

Examples                    2006 → 6                    2007 → 7

### (2) Manufactured Month

Examples

Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	2	3	4	5	6	7	8	9	X	Y	Z

### (3) Date

Date is indicated by 2 figures.

### (4) Drive Name

SW-5582-CXX → 00

### (5) Change Record

One special letter of alphabet is assigned from A to Z.  
 Now change Record is "A".

### (6) Serial Number

From 00001 to 99999

