

TOSHIBA CD-ROM DRIVE

XM-3301B Product Specification

CONFIDENTIAL

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TOSHIBA CORPORATION
Consumer Products Business Development Division



Contents

| | |
|--|----|
| 1. Introduction | 1 |
| 2. Features | 2 |
| 3. Specifications | 3 |
| 3.1. Performances | 3 |
| 3.2. Environmental Conditions | 4 |
| 3.2.1. Temperature and Humidity | 4 |
| 3.2.2. Dust and Dirt | 5 |
| 3.2.3. Vibration | 5 |
| 3.2.4. Atmospheric Pressure and Altitude | 5 |
| 3.2.5. Shock | 5 |
| 3.3. Installation Conditions | 5 |
| 3.4. Dimensions and Weight | 5 |
| 3.5. Reliability | 7 |
| 3.5.1. Error Rate | 7 |
| 3.5.2. MTBF | 7 |
| 3.5.3. MTTR | 7 |
| 3.5.4. Drive Life | 7 |
| 4. Configuration | 7 |
| 4.1. Electrical Parts | 7 |
| 4.2. Optical Pickup | 7 |
| 4.3. Spindle Motor | 7 |
| 4.4. Feed Motor | 7 |
| 4.5. CD Caddy Loading Motor | 7 |
| 5. Functions | 9 |
| 5.1. CD-ROM Data Configurations | 9 |
| 5.2. Power On/Off Timing | 9 |
| 6. Interface | 9 |
| 6.1. Signal Line | 9 |
| 6.1.1. Signal Line Termination | 11 |
| 6.1.2. Driver/Receiver | 11 |
| 6.1.3. Connector | 11 |

| | |
|--------------------------------------|----|
| 7. Power Requirements | 11 |
| 7.1. Source Voltage | 11 |
| 7.1.1. Spike | 11 |
| 7.1.2. Ripple | 11 |
| 7.2. Current Drain | 11 |
| 7.3. Connector | 16 |
| 7.4. Fuse for Terminator Power | 16 |
| 8. Audio | 16 |
| 8.1. Line Output | 16 |
| 8.1.1. Connector | 16 |
| 8.2. Headphones Output | 16 |
| 8.2.1. Connector | 16 |
| 8.3. Audio Modes | 16 |
| 9. Mode Select Headers | 17 |
| 9.1. SCSI-ID | 17 |
| 9.2. Parity | 17 |
| 9.3. Media Eject Prevention | 18 |
| 9.4. Audio Playback | 18 |
| 9.5. Terminator Power | 18 |
| 9.6. Header Short-Pin | 18 |
| 9.7. Recognition of Setting | 18 |
| 10. Busy Indicator | 19 |
| 11. Connections | 20 |
| 11.1. Power Supply Cable | 20 |
| 11.2. Interface Cable | 20 |
| 11.3. Audio Cable | 20 |
| 11.4. Terminators | 20 |
| 12. Maintenance | 20 |
| 12.1. Disc | 20 |
| 12.2. Optical Pickup | 20 |
| 13. Safety Standards | 20 |
| 14. Electrostatic Discharge | 21 |
| 15. Accessories | 21 |
| 16. Packaging | 21 |

1. Introduction

This document describes Toshiba's CD-ROM Drive XM-3301B. This drive reads digital data saved on CD-ROM discs and can be configured within computer systems.

The CD-ROM disc is single sided and has a 12 cm or 8 cm diameter. It can hold approximately 600M bytes or 200M bytes of information. Optical discs offer long life and high durability because the disc is read by LASER, eliminating physical contact with the disc.

A CD-ROM disc can also hold mixed audio signals as well as the data. The XM-3301B has capability for reproducing audio CD (such as music Compact Disc) and also this drive can be used as an independent audio CD player disconnected from the computer system.

[This document may be revised without notice.]

2. Features

- (1) Built-in SCSI-2 Interface Controller
- (2) Closed Enclosure and Door against Contamination
- (3) 5-1/4 inch Half Height Form Factor
- (4) High System Reliability Through Advanced CIRC Error Correction
- (5) Snap-on Bezel
- (6) Media Removal Prevent Function
- (7) Emergency Eject
- (8) Built-in MODE-1 ECC and MODE-2 EDC(command selectable)
- (9) Embedded CD-ROM XA type ECC
- (10) Efficient Data Transmission Through 64K bytes Buffer Memory
- (11) Automatic Lens Cleaner
- (12) High Speed Access by New Retrieval System with Learning Method
- (13) Broader Allowance for Mounting(H ± 45 deg,V ± 45 deg)
- (14) Low Power Consumption
- (15) Remote SCSI-ID Jumper Block
- (16) 16-Modes Output for CD Audio
- (17) Software Volume Control
- (18) Continuous Volume Control for Headphones Output
- (19) MTBF 25,000H(POH)
- (20) CD-CADDY Auto Loading
- (21) Easy Serviceability
- (22) Can be used as an Independent CD Audio Player Disconnected from PC
- (23) Built-in Terminator

3. Specifications

3.1. Performances

| | |
|---|--------------------------|
| (1) Standard Disc Format | YELLOW-BOOK and RED-BOOK |
| (2) Transfer Rate | |
| Average | 150k bytes/Sec(Mode 1) |
| Maximum | 1.5M bytes/Sec |
| Blocks/Sec | 75 blocks/Sec |
| (3) Data Capacity(YELLOW-BOOK) | |
| User Data/Block | 2048 bytes/block(Mode 1) |
| | 2336 bytes/block(Mode 2) |
| (4) Access Time | |
| Average Access Time *1 | 325 mSec TYP |
| | 350 mSec MAX(Tentative) |
| Maximum Average Access Time ** | 480 mSec TYP |
| | 650 mSec MAX |
| (5) Spin up Time (Focus Search Time and Disc Motor Start up Time) | |
| | 1 Sec TYP |
| | 1.5 Sec MAX |
| (6) Data Buffer Capacity | |
| Standard | 64k Bytes |

*1 : Measured by performing multiple random access which means reads of data blocks over the whole area of the media from 00 Min 02 Sec 00 B1k to 60 Min 01 Sec 74 B1k more than 3000 times. Includes positioning, setting, and latency time. TYP value is for the average drive and MAX value is absolute maximum average time for any one drive.

*2 : Measured by performing multiple maximum access which means reads of data blocks from 00 Min 02 Sec 00 B1k to 60 Min 01 Sec 74 B1k more than 100 times. Includes positioning, setting, and latency time. TYP value is for the average drive and MAX value is absolute maximum average time for any one drive.

| | |
|--------------------------------|---------------------------------------|
| (7) Optical Pickup | Semiconductor Laser and 3-beam System |
| (8) Disc Motor | DC Motor |
| (9) Feed Motor | DC Motor |
| (10) Disc Loading | CD-Caddy Auto Front Loading |
| (11) Disc Revolutions(approx.) | 200 to 500 rpm (CLV) |
| (12) Air Flow | None |
| (13) Acoustic Noise | 40 dB(A) MAX at 1 meter |
| (14) Power Supply | +12 V and +5 V (details in Section 7) |

3.2. Environmental Conditions

This drive should be used under the conditions listed below.

3.2.1. Temperature and Humidity

| | |
|------------------------------------|--|
| (1) Operating Temperature | 5 deg C to 50 deg C |
| (2) Storage Temperature | -10 deg C to 65 deg C |
| (3) Shipping Temperature(Packaged) | -40 deg C to 65 deg C |
| (4) Operating Temperature Gradient | 11 deg/Hour(max) |
| (5) Storage Temperature Gradient | 20 deg/Hour(max) |
| (6) Shipping Temperature Gradient | 20 deg/Hour(max) |
| (7) Operating Humidity | 8 % to 80 % |
| (8) Storage Humidity | 5 % to 95 % |
| (9) Shipping Humidity | 5 % to 95 % |
| (10) Condensation | In all the above conditions there must be no condensation. |

3.2.2. Dust and Dirt Unspecified

3.2.3. Vibration(Tentative)

- (1) Operating (1 Oct/Min) ---no soft error within 5 retries---
 - 5 to 17 Hz 0.44 mm p-p
 - 17 to 150 Hz 0.25 G o-p
 - 150 to 200 Hz Linear interpolation
 - 200 to 500 Hz 0.33 G o-p
- (2) Non-operating (1 Oct/Min) ---no damage must result---
 - 5 to 10 Hz 5 mm p-p
 - 10 to 500 Hz 1 G o-p
- (3) Shipping(Packaged)(1 Oct/Min) ---no damage must result---
 - 10 to 20 Hz 2 mm p-p XYZ/30 min each

3.2.4. Atmospheric Pressure and Altitude

- (1) Operating 0 to 3000 meter
- (2) Shipping 0 to 12000 meter

3.2.5. Shock

- (1) Operating ---no soft error within 5 retries---
 - 2 G(Half sine wave 11 mS/10 Sec interval)
 - data read recoverable---
 - 10 G(Half sine wave 11 mS/10 Sec interval)
- (2) Non-operating (with no CD-Caddy loaded) ---no damage must result---
 - 50 G(Half sine wave 11 mS)
- (3) Drop(Packaged) ---no damage must result---
 - a. Palletized Package 2 drops at 200 mm & 10 drops at 50 mm (Z)
 - b. Individual Package 0.9 meter drops once for each 6-surfaces,
1-edge and 1-corner

3.3. Installation Conditions

Mount the drive within 45 degrees of the horizontal or vertical (left or right side down) positions, keeping the Front Bezel Plane vertical.

3.4. Dimensions and Weight ---See Figure 1 for details---

- (1) External Dimensions(W x H x D) 146 mm x 41.5 mm x 203 mm
- (2) Weight
 - 1.1 kgram (Net)
 - TBD (Individual Packaged)
 - TBD (Bulk Packaged)

XM-3301B EXTERNAL DIMENSIONS (Unit:mm)

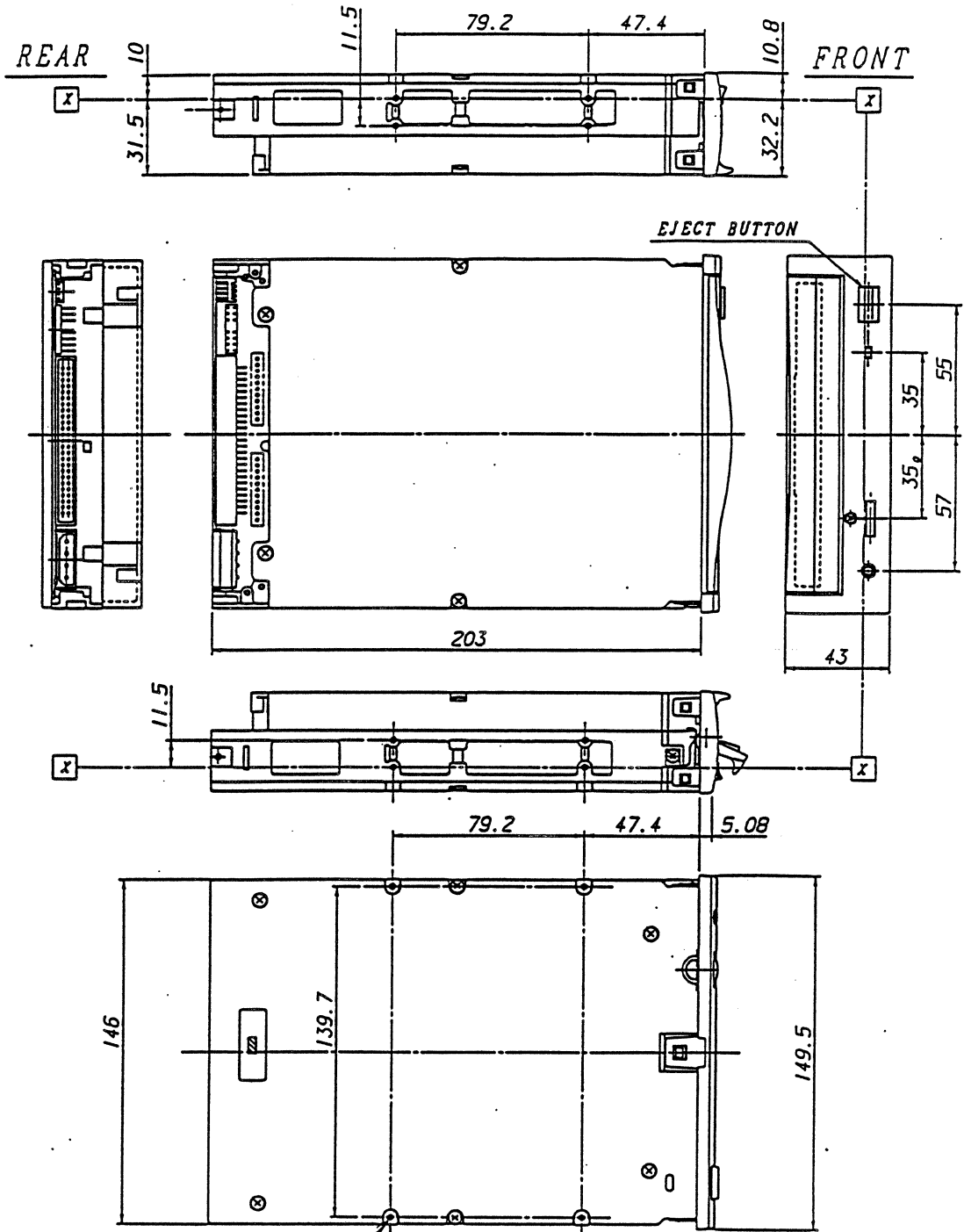
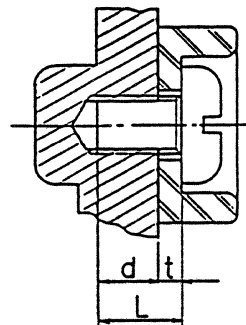


Figure 1 # 6-32 UNC (12 Locations)



$L \leq t + 3.5$

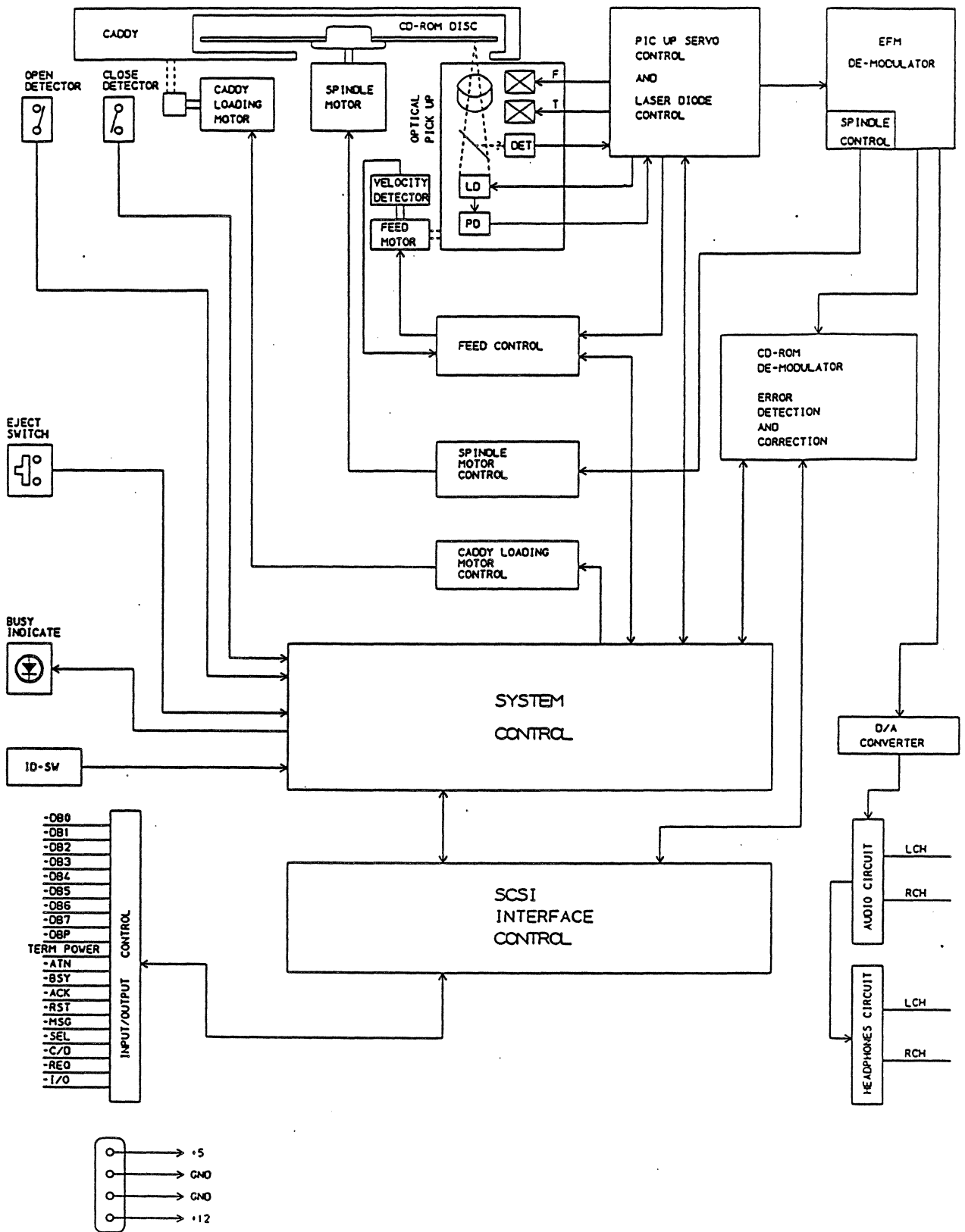


Figure 3 Configuration

5. Functions

5.1. CD-ROM Data Configurations

Figure 4 shows how the data is structured in program units. 1 block=1/75 Sec.

5.2. Power ON/OFF Timing

Synchronize the two (+12V and +5V) power supplies' ON/OFF timing within ± 100 mSec.

Figure 5 shows the initialization sequence.

6. Interface

- (1) The interface is based on ANSI standard X3.131-1986 SCSI(SCSI-1) and SCSI-2 X3T9.2/86-109 Revision 10c.
- (2) 39 types of commands are usable including CD-ROM unique commands.
- (3) The CD-ROM drive is usually runs as the target.
- (4) The 64 K byte data buffer handles both high speed and low speed data transmission.
- (5) The largest block size on playback is 2352 bytes. The data length for each block is changeable by command.
- (6) On command execution, DIDCONNECT processing and RECONNECT processing can be specified.
- (7) Command link functions are usable.

For further details, see the "TOSHIBA CD-ROM SCSI INTERFACE SPECIFICATIONS VER. 5.0".

6.1. Signal Line

- (1) Logical levels of every Inputs and Outputs are logically false signals.

Input Low = 0.0 to +0.4 V = Logic '1'(true)

Input High = +2.5 V to +5.25 V = Logic '0'(false)

Output Low \geq 48 mA

Output High = Open collector(high impedance)

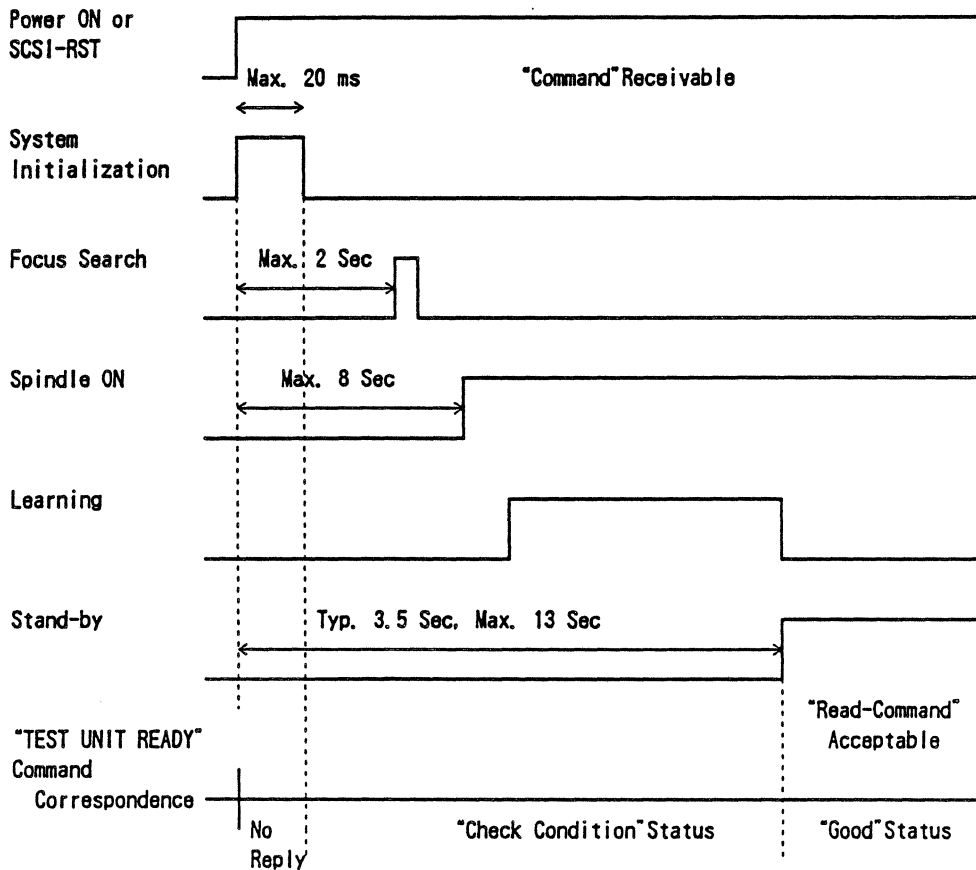
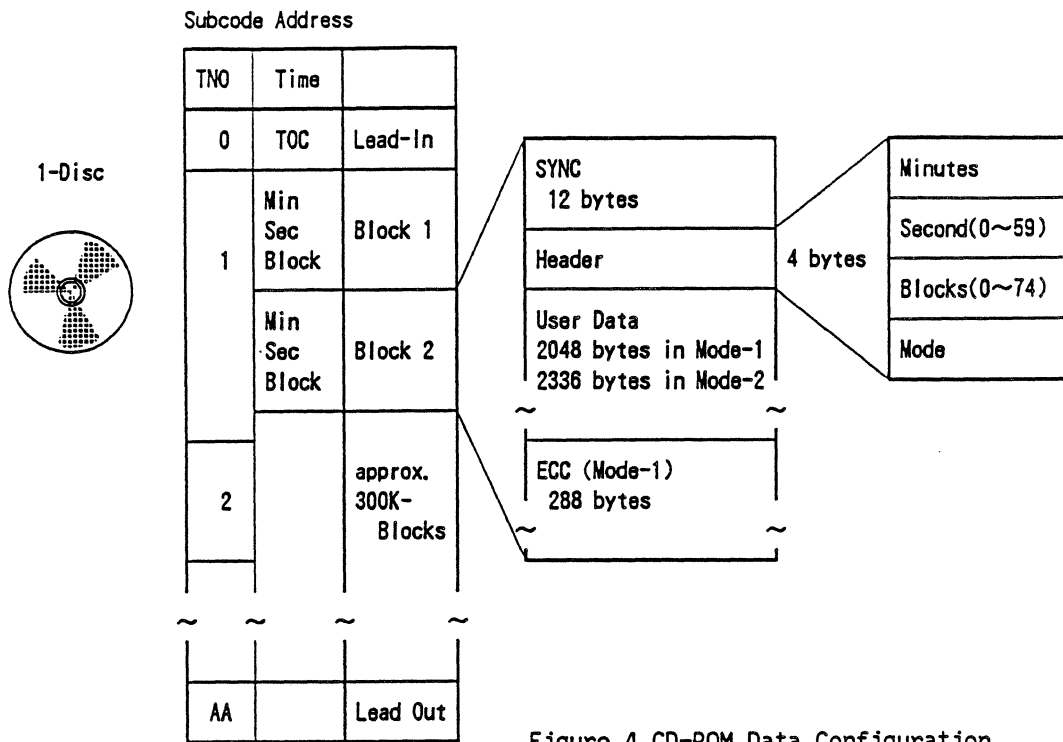


Figure 5 Initialization Sequence

- (2) The terminator power line has a 1A fuse within the drive to protect the power supply. This is shown in Figure 6.

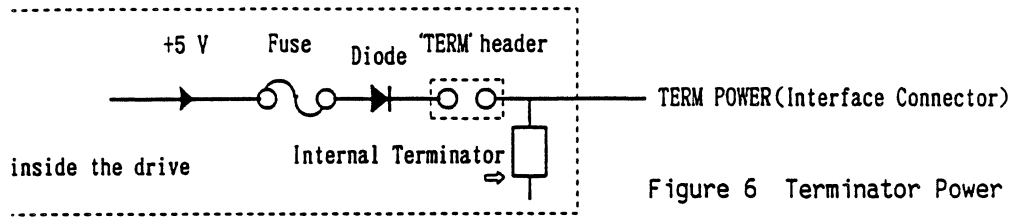


Figure 6 Terminator Power

6.1.1. Signal Line Termination

Figure 7 shows the method for daisy chain connection and Figure 8 shows the method for radial connection. Always connect the terminator for SCSI interface because of the open collector configuration output drive.

Also be sure to attach the frame ground for grounding with the host system.

6.1.2. Driver Receiver

Figure 9 shows how the signal lines should be set up and used.

6.1.3. Connector

Figure 10 shows the connector and Figure 11 shows the interface pin assignments.

7. Power Requirements

| | |
|---------------------|--|
| 7.1. Source Voltage | DC +12 V $\pm 5\%$ ($\pm 8\%$ for startup time) |
| | DC +5 V $\pm 5\%$ |
| 7.1.1. Spike | +12 V : 150 mV _{p-p} , Max |
| | +5 V : 50 mV _{p-p} , Max |
| 7.1.2. Ripple | +12 V : 150 mV _{p-p} , Max |
| | +5 V : 50 mV _{p-p} , Max |

7.2. Current Drain (Typical value) ---excluding 'Term Power' current---

| | <u>+12 V</u> | <u>+5 V</u> |
|-------------------|------------------|------------------|
| 7.2.1. Idle State | 0.10 A (Average) | 0.48 A (Average) |
| | 0.25 A (Maximum) | 0.73 A (Maximum) |
| 7.2.2. Read State | 0.09 A (Average) | 0.48 A (Average) |
| | 0.16 A (Maximum) | 0.56 A (Maximum) |
| 7.2.3. Seek State | 0.22 A (Average) | 0.49 A (Average) |
| | 0.77 A (Maximum) | 0.79 A (Maximum) |

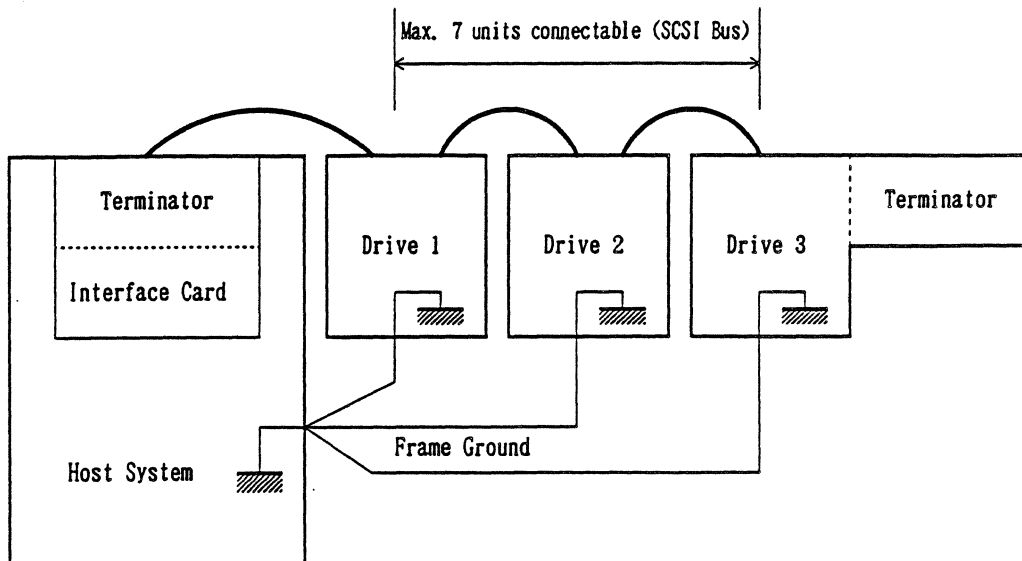


Figure 7 Daisy Chain Connection

---Disconnect the Internal Terminators from the drive if XM-3301Bs are used as Drive 1 and/or Drive 2.---

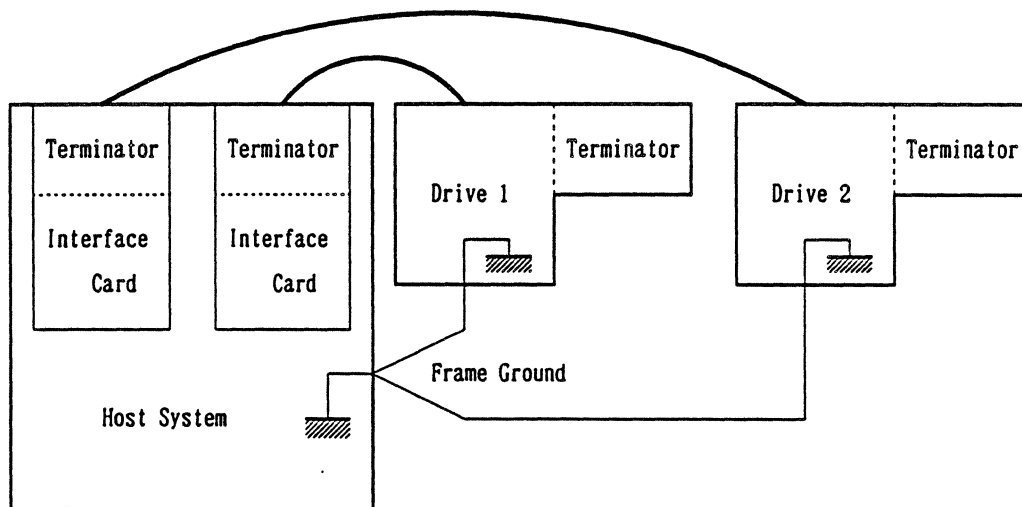


Figure 8 Radial Connection

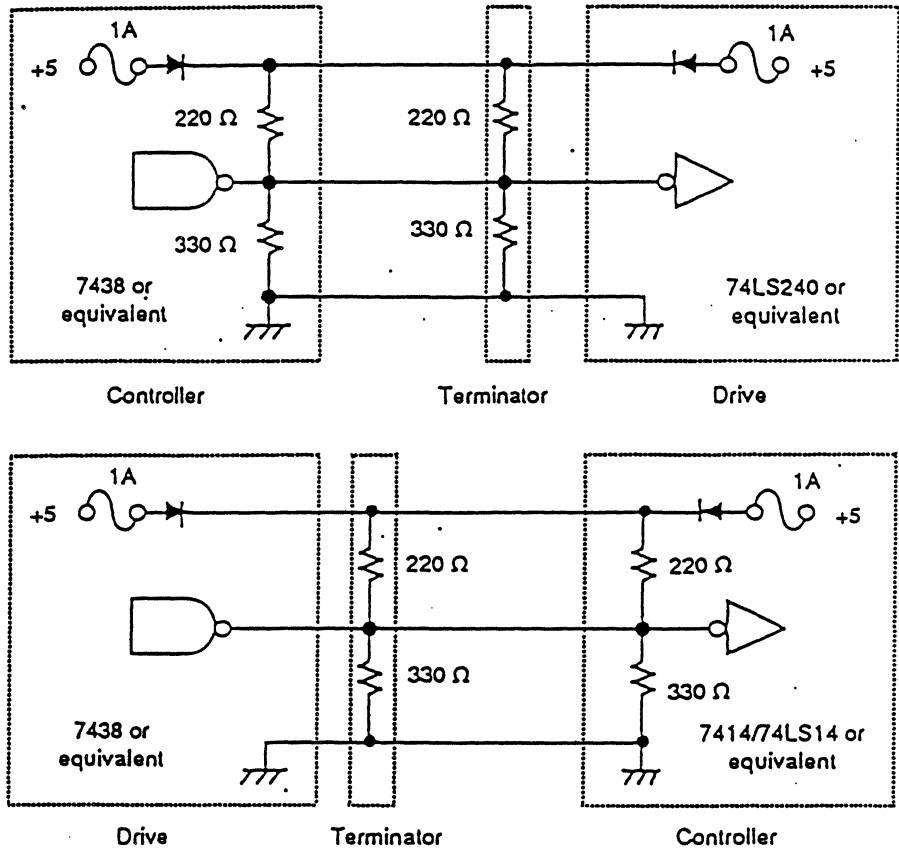


Figure 9 Driver Receiver

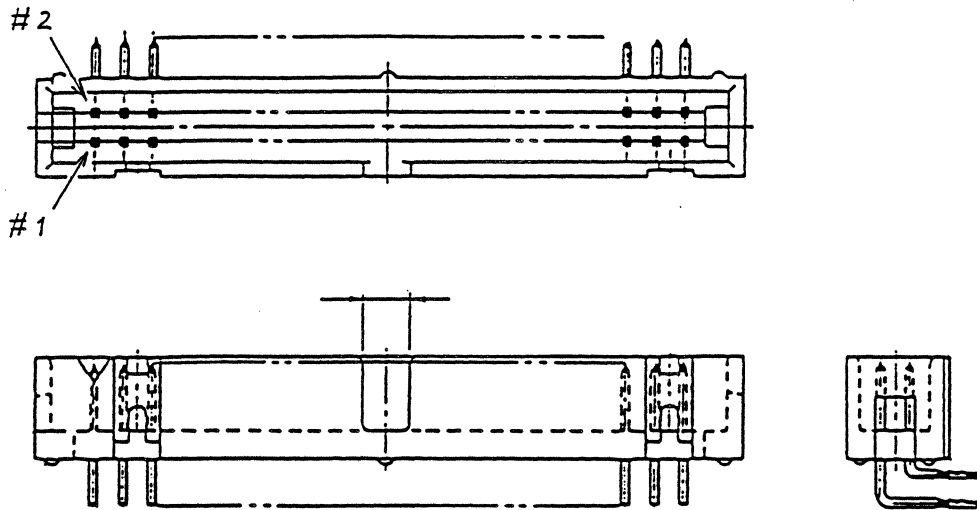


Figure 10 Interface Connector

| PIN No | SIGNL NAME | PIN No | SIGNL NAME |
|--------|-----------------|--------|---------------|
| 2 | -DB 0 | 1 | GND |
| 4 | -DB 1 | 3 | " |
| 6 | -DB 2 | 5 | " |
| 8 | -DB 3 | 7 | " |
| 10 | -DB 4 | 9 | " |
| 12 | -DB 5 | 11 | " |
| 14 | -DB 6 | 13 | " |
| 16 | -DB 7 | 15 | " |
| 18 | -DBP | 17 | " |
| 20 | GND | 19 | " |
| 22 | GND | 21 | " |
| 24 | GND | 23 | " |
| 26 | TERMPower (+5V) | 25 | NO CONNECTION |
| 28 | GND | 27 | GND |
| 30 | GND | 29 | " |
| 32 | -ATN | 31 | " |
| 34 | GND | 33 | " |
| 36 | -BSY | 35 | " |
| 38 | -ACK | 37 | " |
| 40 | -RST | 39 | " |
| 42 | -MSG | 39 | " |
| 44 | -SEL | 41 | " |
| 46 | -C/D | 43 | " |
| 48 | -REQ | 45 | " |
| 50 | -I/O | 49 | " |

Figure 11 Interface Connector Pin Assignment

7.3. Connector

Figure 12 shows the external appearance of the Power Supply Connector.

Use AMP JAPAN P/N 174552-1, MOLEX JAPAN P/N 53109-0410 or equivalent.

PIN #1 : +12 V
PIN #2 : +12 V return
PIN #3 : +5 V return
PIN #4 : +5 V

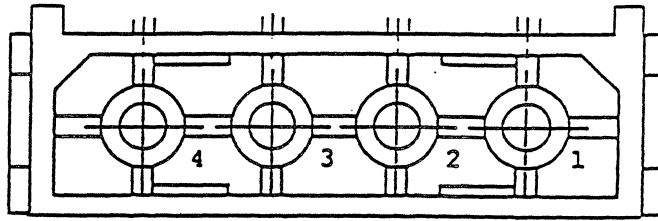


Figure 12 Power Supply Connector

7.4. Fuse for Terminator Power

1 A /125 V S.O.C. Co., Ltd Type SSFC or equivalent.

8. Audio

8.1. Line Output ---in case of the attenuator is set at 0 dB by the command---

| | |
|---------------------------|------------------------------------|
| (1) Output Level | 0.5 V rms (Typ) |
| (2) Type | Unbalanced |
| (3) Load Impedance | 10 k Ω min. |
| (4) Frequency Response | 20 Hz to 20kHz \pm 3 dB |
| (5) Distortion | 0.03 % Max.(at 1 kHz w/30 kHz LPF) |
| (6) Signal to Noise Ratio | 84 dB Typ (JIS A-weighted) |

8.1.1. Connector

3P connector(ELco International Co.,Ltd, 8283 Series or equivalent)

8.2. Headphones Output ---in case of the attenuator is set at 0 dB by the command---

| | |
|-----------------------------|-----------------------------------|
| (1) Output Level | 0.65 V rms (Typ) |
| (2) Level Adjust Controller | Continuous Type(Thumb Wheel Knob) |
| (3) Load Impedance | 100 Ω (Nominal) |

8.2.1. Connector

3.5 mm diam. Stereo Headphone Jack

8.3. Audio Mode

(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(both Line Out and Headphones Out together) is selectable by command. Default level is -12 dB.

9. Mode Select Headers

Set up of SCSI-ID number, Parity Check function, Eject Button Inhibit function and CD-Audio Playback mode etc. are available by shorting these Headers.

| ID1 | ID2 | ID4 | PRTY | PRV/ALW | TEST | TERM |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Figure 13 Mode Select Headers

9.1. SCSI-ID (ID1, ID2, ID4)

This 3 bit binary header sets the SCSI-ID number. When setting numbers, follow the application software instructions.

| Header | LSB | | MSB |
|--------|-----|-----|-----|
| | ID1 | ID2 | ID4 |
| 0 | O | O | O |
| 1 | S | O | O |
| 2 | O | S | O |
| 3 | S | S | O |
| 4 | O | O | S |
| 5 | S | O | S |
| 6 | O | S | S |
| 7 | S | S | S |

O :open S :short

9.2. Parity (PRTY)

To enhance data bus reliability, set this Header to 'S' to activate the parity bit check function on SCSI data bus. This setting cannot be used if no parity generation function is provided on the I/F card.

| Header | Description |
|--------|--|
| O | The drive does not check parity although the output data is issued the parity bit. |
| S | The drive checks parity, and also the output data is issued the parity bit. |

O :open S :short

9.3. Media Eject Prevention(PRV/ALW)

This Header Setting enables or disables the media(CD-Caddy) removal.

| Header | Description |
|--------|--|
| O | Allow the CD-Caddy removal. |
| S | Prevent the CD-Caddy removal. Eject Button is ignored. |

O :open S :short

9.4. Audio Playback(TEST)

This Header Setting selects the drive operation between normal CD-ROM and CD-Audio player mode. When 'S' is selected, command from the host computer is ignored. Also CD-Audio disc or audio tracks in CD-ROM disc is playable by the command when the Header is set for 'O'.

| Header | Description |
|--------|---|
| O | Normal operation mode to connect the host computer. |
| S | (ID1, ID2, ID4, PRTY, and PRV/ALW Headers should be set for O) CD-Audio disc playback mode. Allows repeated play from beginning of the program area up to the last when the disc is loaded. Pushing the Eject Button for shorter than 1 sec. allows proceeding to beginning of the next track number but not acceptable during access. Pushing the Button more than 2 sec. stops playing and ejects the CD-Caddy. |

O :open S :short

9.5. Terminator Power (TERM)

This Header Setting selects termination power(+5 V) Shared/None mode.

| Header | Description |
|--------|---|
| O | No termination power is supplied from the drive. |
| S | Termination power is supplied to the internal terminator and also supplied to the other peripherals through SCSI Interface Connector (Pin No.26). |

O :open S :short

9.6. Header Short Pin

Use P/N HIF3GA-2.54SP made by Hirose Electric Co.,(Hirose USA) or equivalent.

9.7. Recognition of Setting

As the Setting Recognition performed only right after power On, turn power Off and then power On again whenever change is made.

10. Busy Indicator

The LED at Front Bezel (Busy Indicator) indicates the drive status.

- (1) Continuously Off when no CD-Caddy is loaded.
- (2) After CD-Caddy is loaded, Busy Indicator start blinking at 0.8 Sec.intervals, and then...

(2-1) Turns Off when the drive in the 'Data Read' or 'Stand-by' status.

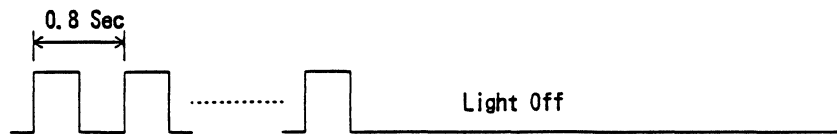


Figure 14 Data Read or Stand-by

- (2-2) Turns On when no disc in the CD-Caddy, disc is set upside down in the CD-Caddy or extremely dirty or badly scratched disc is set in the CD-Caddy.

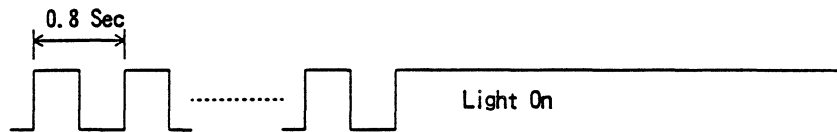


Figure 15 Media Problem

- (2-3) Still blinking at 3.2 Sec.intervals when cleaning for disc or optics in the drive is required.

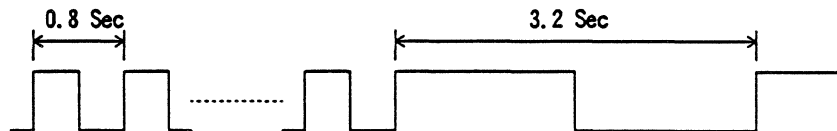


Figure 16 Maintenance Required

- (3) When playing an audio track, Busy Indicator is blinking at 1.6 Sec.intervals.

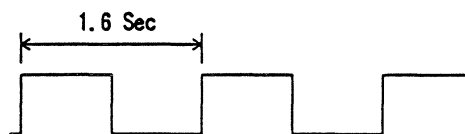


Figure 17 CD-Audio Playback

- (4) When performing 'Data Access' Busy Indicator keep turn On, and then start blinking at 0.2 Sec.intervals during 'Data Transfer'.

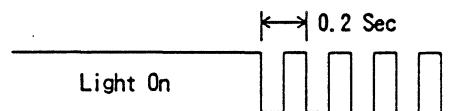


Figure 18 Data Access and Data Transfer

11. Connections

11.1. Power Supply Cable

- | | |
|-------------|--|
| (1) Housing | AMP JAPAN P/N 1-480424-0 or equivalent |
| (2) Contact | AMP JAPAN P/N 170148-2 or equivalent |
| (3) Cable | AWG 18 to 20 |
| Length | Max. 2 meters |

11.2. Interface Cable

- | | |
|--------------------|--|
| (1) Connector | SCSI standard |
| (2) Cable | 50 core type |
| Specific Impedance | 100 Ω \pm 10 % (without shield) |
| Length | Max. of 6 meters for total SCSI bus length |

11.3. Audio Cable

Unbalanced and shielded

- | | |
|-----------------|-------------------|
| (1) Capacitance | Less than 1000 pF |
| (2) Length | Max. 3 meters |

11.4. Terminators

Kyocera Corp. P/N SRDSF-11PC-331/221J or equivalent. See Figure 19 for details.

- | | |
|------------------------|------------------------|
| (1) Pull up resistor | 220 Ω \pm 5 % |
| (2) Pull down resistor | 330 Ω \pm 5 % |

12. Maintenance

In case of Figure 16 (Page 19), cleaning for disc or optics in the drive is required.

12.1. Disc

Try to avoid touching the read area of the disc as dirt and smears will degrade the disc accessing speed.

If the disc is dirty, wipe it with a soft cloth.

12.2. Optical Pickup

A dirty Optical Pickup will also increase the access time.

When the Pickup is dirty, gently wipe the objective lens of the Pickup.

13. Safety Standards

- | | |
|------------|---|
| (1) Safety | IEC 950 UL 1950 CSA 22.2 No.220 |
| (2) Laser | FDA 21, IEC Pub 825 |
| (3) EMI | Based upon FCC 15J-B Based upon VDE 0871 |

14. Electrostatic Discharge

| | |
|----------------------|---------------|
| Standard | IEC-801 |
| (1) Operating | 10 kV or less |
| (2) Damage including | 20 kV or more |

15. Accessories

1-Instruction Manual
1-CD-Caddy
2-Terminators(installed)
1-Short Pin(installed in'TERM'header)

16. Packaging

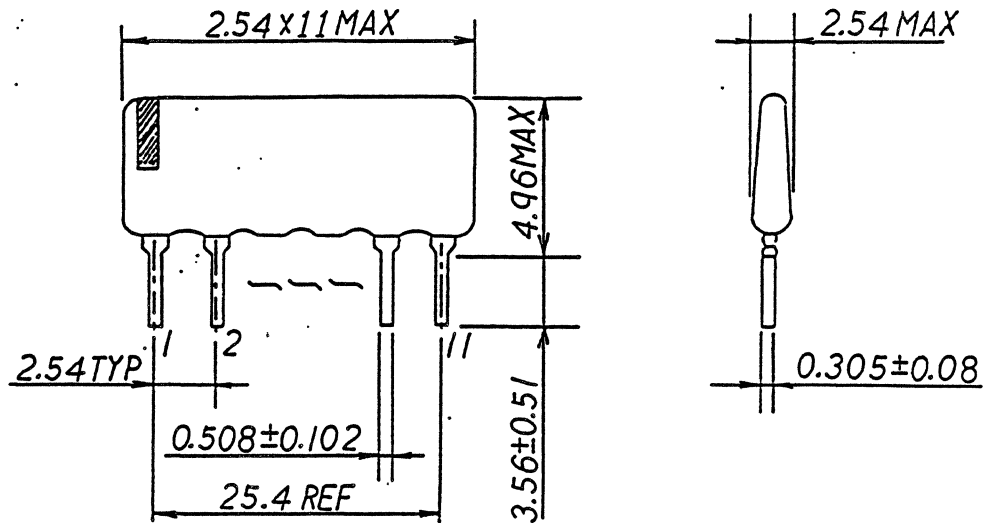
10 units with 10 CD-Caddy in a Bulk Pack
16 Bulk Packs on one Pallet.
(Individual Packaging available)

PART NAME: SRDSF-11PC-331/221J SUPPLIER: KYOCERA CORPORATION

RATING

| Item | Value | Unit |
|--------------------------------|------------------|------|
| Rated power(Ta=70°C) | 125 | mW |
| Maximum rated voltage | 100 | V |
| Nominal resistance value | R1=330 R2=220 | Ω |
| tolerance | ±5 | % |
| number of pins | 11 | |
| Operating free-air temperature | -55~125 | °C |

DIMENSIONS (UNIT: mm)



CIRCUIT DIAGRAM

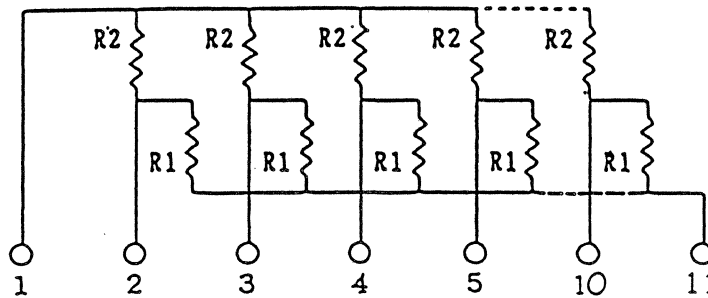


Figure 19 Terminator