



**FEATURES**

- Single fiber bi-directional data links asymmetric TX 2488Mbps/RX1244Mbps application
- 1490nm continuous-mode DFB laser transmitter and 1310nm burst-mode APD-TIA receiver
- Small Form Factor Pluggable package with SC/UPC Connector
- Reset burst-mode receiver design support more than 15dB dynamic range
- -40 to 85°C operating case temperature
- Single 3.3V power supply
- Digital diagnostic monitoring interface
- Digital burst RSSI function to monitor the input optical power level
- LVPECL compatible data input/output interface
- LVTTTL transmitter disable control
- LVTTTL transmitter laser fault alarm
- LVTTTL receiver Signal Detect (SD) indication
- Low EMI and excellent ESD protection
- Class I laser safety standard IEC-60825 compliant
- RoHS-6 compliance

**APPLICATIONS**

- Gigabit-capable Passive Optical Networks (GPON) 20Km 13~28dB attenuation range.

**STANDARDS**

- Complies with SFP Multi-Source Agreement (MSA) SFF-8074i
- Complies with ITU-T G.984.2 Amendment 1
- Complies with SFF-8472 Rev 9.5
- Complies with FCC 47 CFR Part 15, Class B
- Complies with FDA 21 CFR 1040.10 and 1040.11

**ABSOLUTE MAXIMUM RATING**

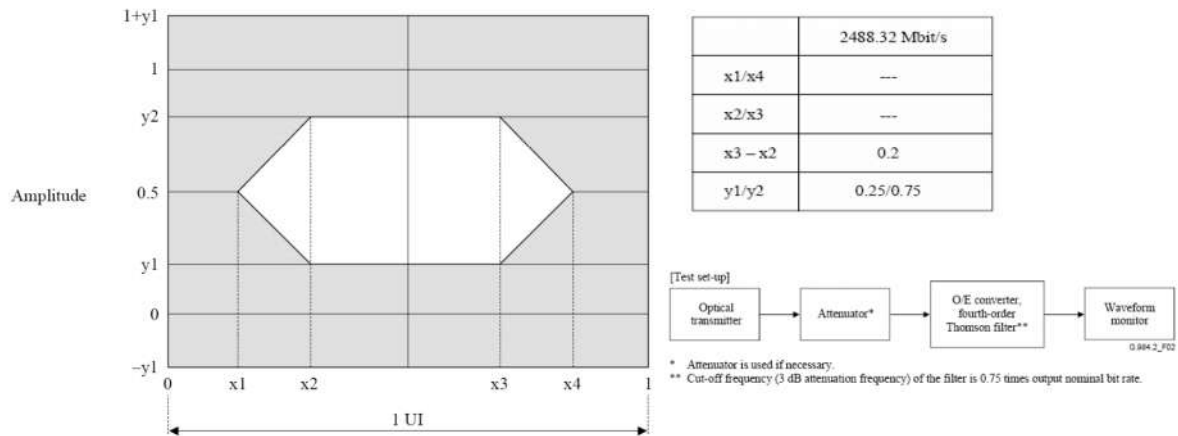
Parameter	Symbol	Min.	Max.	Unit	Notes
Storage Ambient Temperature	$T_{STG}$	-40	85	°C	
Operating Case Temperature	$T_c$	-40	85	°C	
Operating Humidity	OH	5	95	%	
Power Supply Voltage	$V_{CC}$	0	3.6	V	
Receiver Damaged Threshold		+4		dBm	

**RECOMMENDED OPERATING CONDITION**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage	$V_{CC}$	3.13	3.3	3.47	V	
Operating Case Temperature	$T_c$	-40		85	°C	
Operating Humidity Range	OH	5		95	%	
Data Rate			Tx 2488.32 Rx 1244.16		Mbit/s	

**TRANSMITTER OPTICAL CHARACTERISTICS**

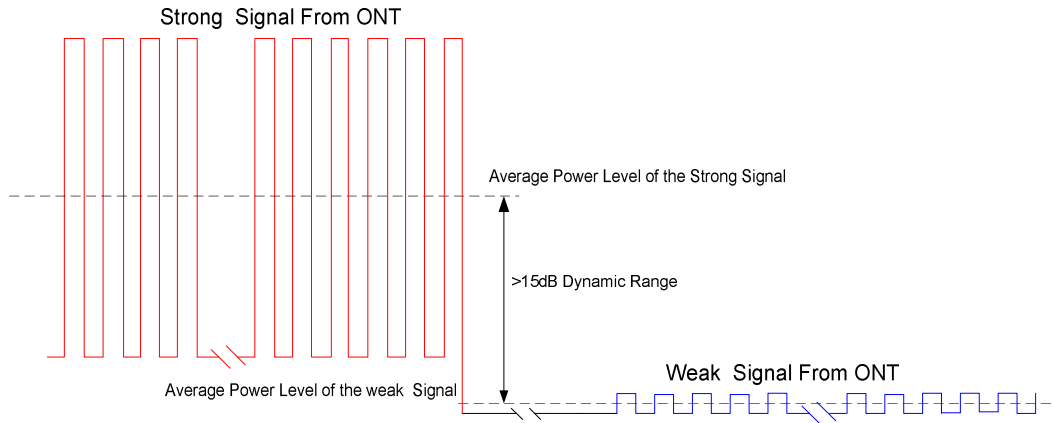
Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Optical Center Wavelength	$\lambda_c$	1480		1500	nm	
Optical Spectrum Width (-20dB)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Launch Optical Power	AOP	+2.5		+5	dBm	BOL, Room Temperature
		+1.5		+5	dBm	EOL, -40~85°C
Power-OFF Transmitter Optical Power				-39	dBm	Launched into SMF
Extinction Ratio	ER	8.2			dB	PRBS 2 <sup>23</sup> -1+72CID @2.488Gbit/s
Tolerance to Transmitter Incident Light		-15			dB	
Transmitter Reflectance				-10	dB	
Transmitter and Dispersion Penalty	TDP			1	dB	Transmit on 20km SMF
Optical Waveform Diagram	ITU-T G.984.2					Figure 1

**TRANSMITTER EYE MASK DEFINITIONS AND TEST PROCEDURE**

**Figure 1 Transmitter Eye Mask Definitions and Test Procedure**
**TRANSMITTER ELECTRICAL CHARACTERISTICS**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Input Differential Swing		200		1600	mV	LVPECL input, AC coupled
Input Differential Impedance		90	100	110	$\Omega$	
Power Supply Current				220	mA	Load free
Transmitter Disable Voltage - Low		0		0.8	V	
Transmitter Disable Voltage - High		2.0		V <sub>CC</sub>	V	
Transmitter Fault Alarm Voltage - Low		0		0.4	V	
Transmitter Fault Alarm Voltage - High		2.4		V <sub>CC</sub>	V	

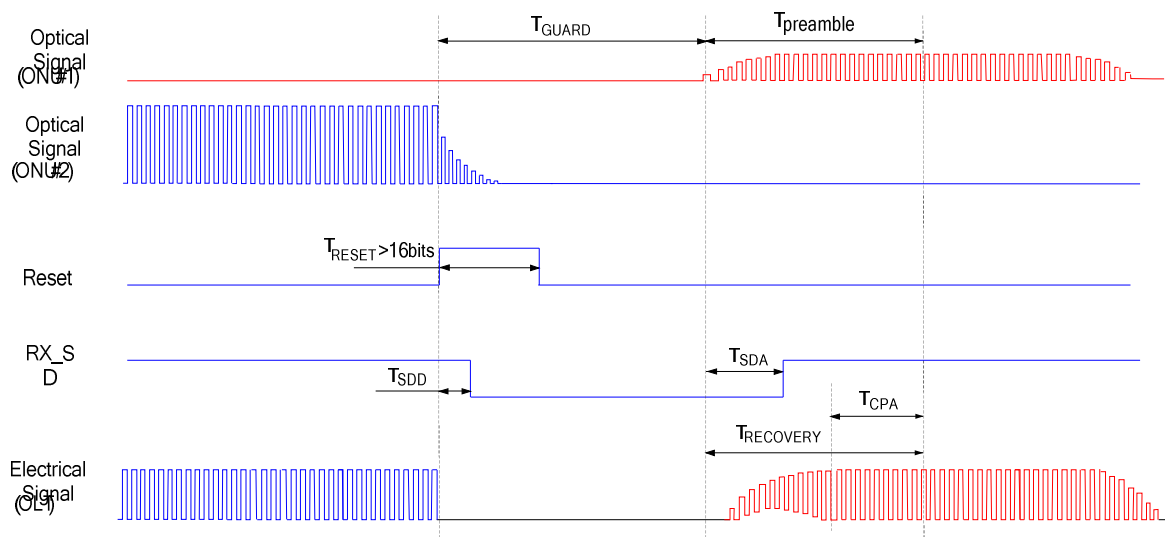
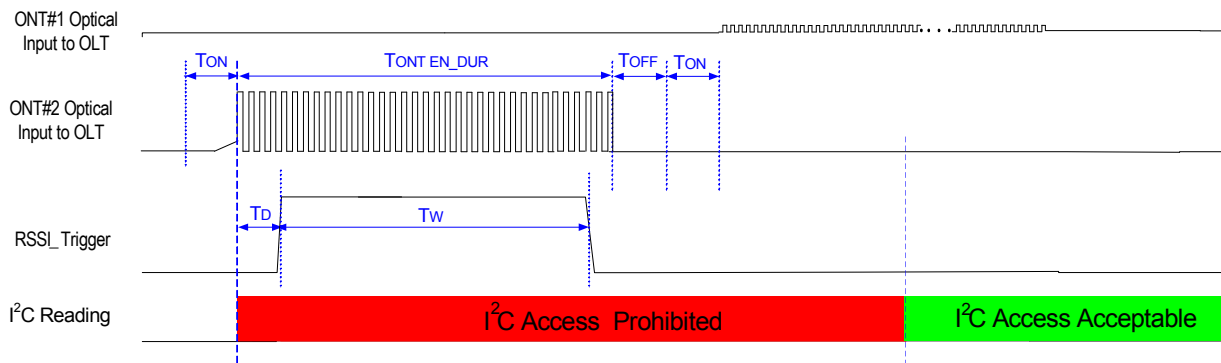
**RECEIVER OPTICAL CHARACTERISTICS**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Wavelength		1260		1360	nm	
Sensitivity	SEN			-28	dBm	PRBS 2 <sup>23</sup> -1+72CID@1244Mbps
Saturation Optical Power	SAT	-8			dBm	BER $\leq 1 \times 10^{-10}$
Dynamic Range		15			dB	Figure 2
Signal Detect Assert Level				-30	dBm	
Signal Detect De-Assert Level		-45			dBm	
Signal Detect Hysteresis		0.5		6	dB	
Receiver Reflectance				-12	dB	

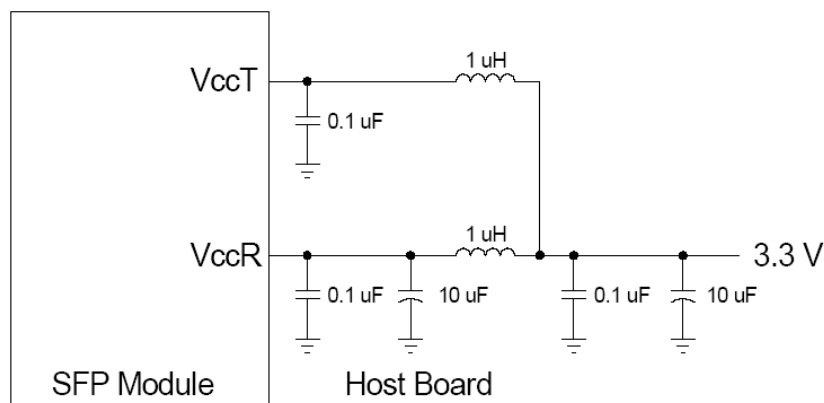
**BURST MODE RECEIVER DYNAMIC RANGE IN GPON SYSTEM**

**Figure 2 Burst Mode Receiver Dynamic Range in GPON System**
**RECEIVER ELECTRICAL CHARACTERISTICS**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Current				350	mA	Load free
Data Output Voltage – Low (-Vcc)		-1.81		-1.62	V	
Data Output Voltage – High (-Vcc)		-1.02		-0.88	V	
Data Output Differential Swing		400		1600	mV	LVPECL output, DC coupled
Reset width	T <sub>RESET</sub>	16			bits	
Reset-Low		0		0.4	V	
Reset-High		2.4		Vcc	V	
Receiver Amplitude Recovery Time	T <sub>RECOVERY</sub>			32	bits	Refer to the Reset signal falling edge
Signal Detect Assert Time				50	ns	
Signal Detect De-assert Time				12.8	ns	Refer to the Reset signal rising edge
Signal Detect Voltage-Low		0		0.4	V	
Signal Detect Voltage-High		2.4		Vcc	V	
RSSI Trigger-Low		0		0.8	V	
RSSI Trigger-High		2.0		Vcc	V	
RSSI Trigger width	T <sub>w</sub>	350	375	400	ns	
RSSI Trigger Delay	T <sub>D</sub>		500		ns	Refer to first bit of the preamble
Optical Signal During Time	TONT EN_DUR EN_DUR		2600		ns	TONT EN_DUR ≥ T <sub>D</sub> + T <sub>w</sub> For RSSI Measurement
I2C Access Prohibited Time		100		500	μs	
RX Power Monitor Range		-30		-8	dBm	Note 1

Note 1: RSSI result is provided by access to EEPROM A2H 104~105Byte the unit is 0.1uW. Please refer to the SFF-8472 V9.5 for the detail information.

**TIMING PARAMETER DEFINITIONS IN BURST MODE SEQUENCE**

**Figure 3 Burst Receiver Timing Sequence**
**RSSI TIMING SEQUENCE**

**Figure 4 RSSI TIMING SEQUENCE**

PIN DESCRIPTION			
PIN	Name	Description	Notes
1	V <sub>EE</sub> T	Transmitter Ground	
2	TX Fault	Transmitter Fault Indication	High: abnormal; Low: normal
3	TX Disable	Transmitter Disable	High: transmitter disable; Low: transmitter enable
4	MOD-DEF2	Module Definition 2	The data line of two wire serial interface
5	MOD-DEF1	Module Definition 1	The clock line of two wire serial interface
6	MOD-DEF0	Module Definition 0	Connected to Ground in the transceiver
7	Reset	Receiver Reset	High: reset the receiver
8	SD	Signal Detect	High: signal detected; Low: loss of signal;
9	RSSI Trigger	RSSI Trigger for Transceiver A/D	High: enable RSSI A/D conversion
10	V <sub>EE</sub> R	Receiver Ground	
11	V <sub>EE</sub> R	Receiver Ground	
12	RD-	Inv. Receiver Data Out	LVPECL logic output, DC coupled
13	RD+	Receiver Data Out	LVPECL logic output, DC coupled
14	V <sub>EE</sub> R	Received Ground	
15	V <sub>CC</sub> R	Receiver Power	
16	V <sub>CC</sub> T	Transmitter Power	
17	V <sub>EE</sub> T	Transmitter Ground	
18	TD+	Transmit Data In	LVPECL logic input, AC coupled
19	TD-	Inv. Transmit Data In	LVPECL logic input, AC coupled
20	V <sub>EE</sub> T	Transmitter Ground	

**SFP RECOMMENDED HOST BOARD POWER SUPPLY FILTERING NETWORK**

**Figure 5 SFP Recommended Host Board Power Supply Filtering Network**

SFP PIN (GOLDEN FINGER) DRAWING

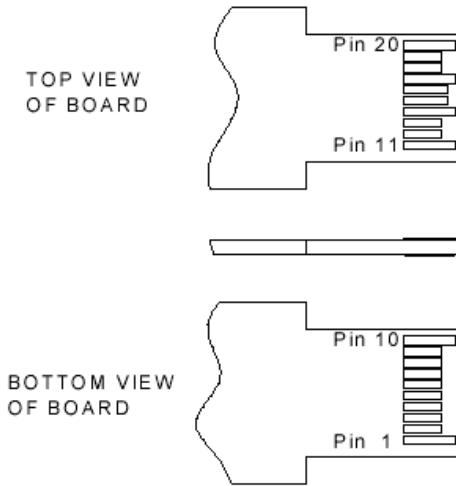


Figure 6 SFP Pin (Golden Finger) Drawing

TYPICAL INTERFACE CIRCUIT

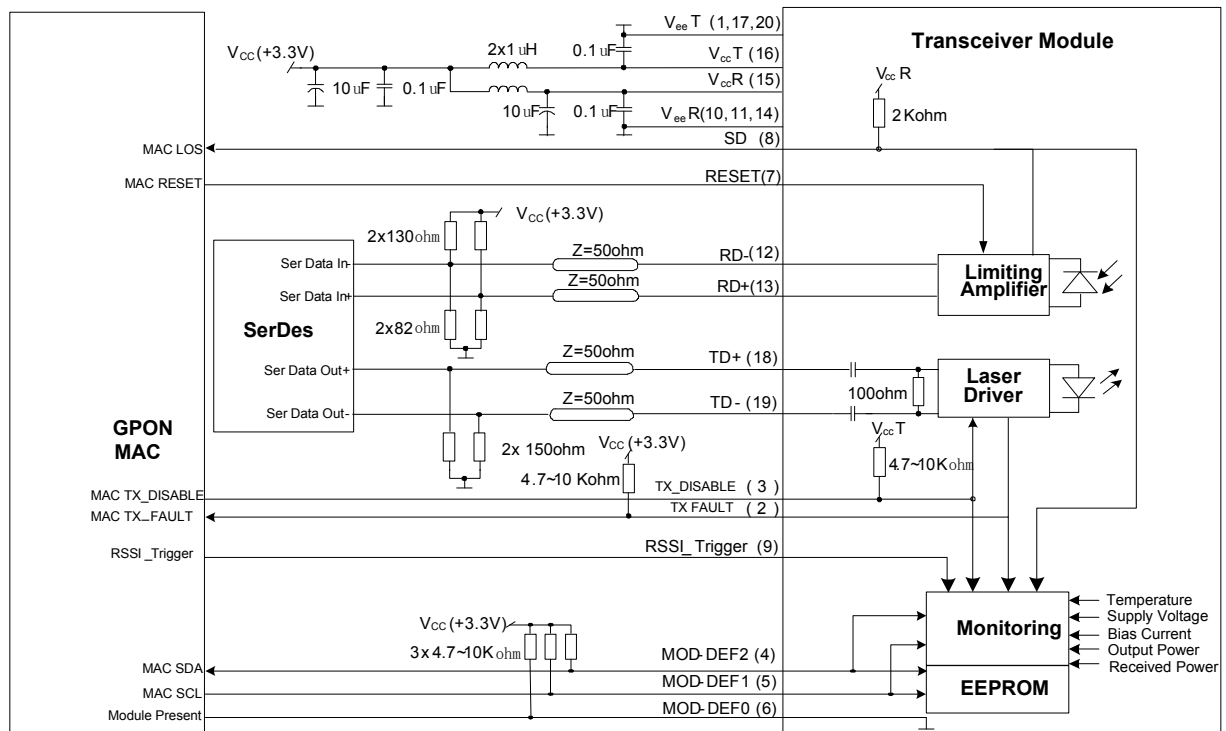


Figure 7 Typical Interface Circuit

PACKAGE OUTLINE

Unit:mm

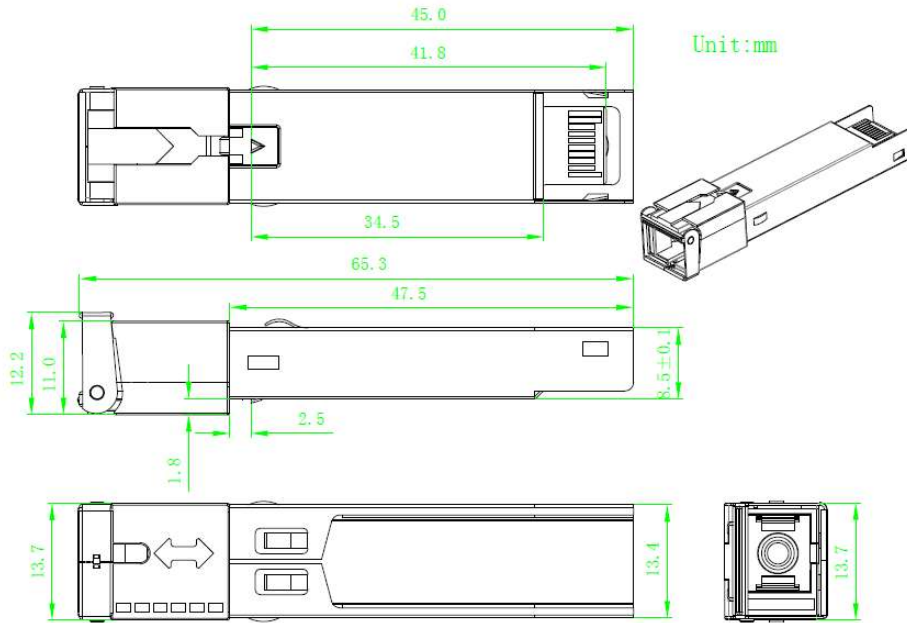


Figure 8 Package Outline

EEPROM INFORMATION

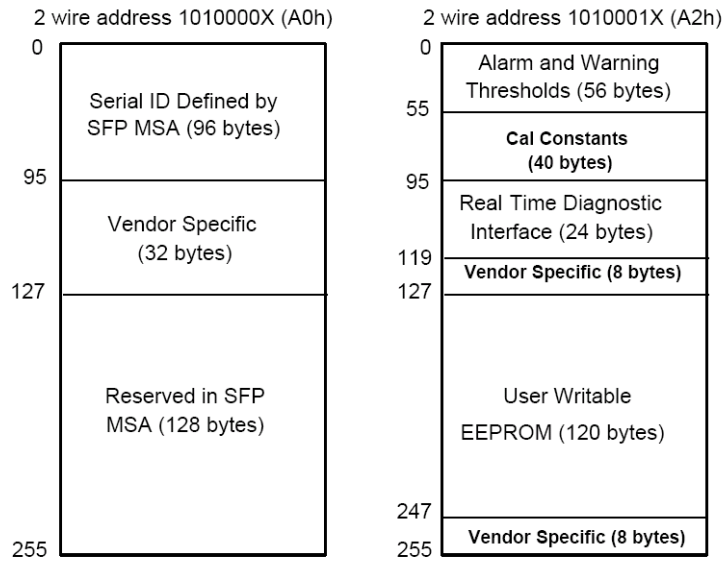


Figure 9 EEPROM Memory Map Specific Data Field Descriptions

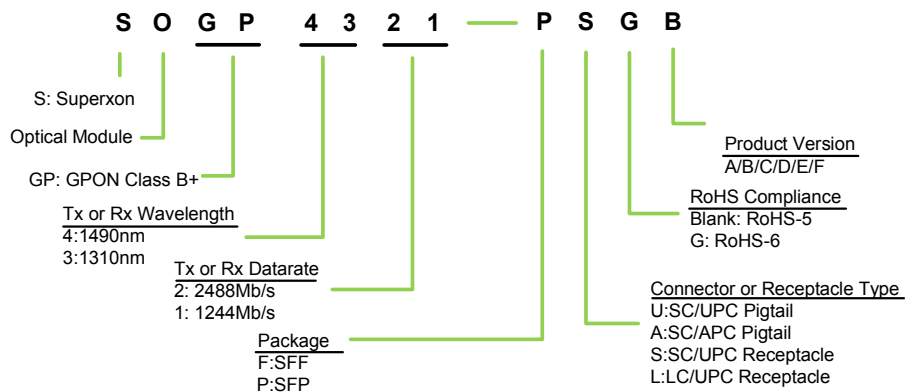


**DIGITAL DIAGNOSTIC MONITORING INTERFACE**

Parameter	Range	Accuracy	Calibration	Note
Temperature	-40 to 85°C	±3°C	Internal	1LSB = 1/256°C
Voltage	3.0 to 3.7V	±3%	Internal	1LSB = 0.1mV
Bias Current	0 to 100mA	±10%	Internal	1LSB = 2uA
TX Power	1.5 to 5dBm	±2dB	Internal	1LSB = 0.1uW
RX Power Monitor	-30 to -8dBm	±3dB	External	1LSB = 0.1uW

Note : The digital diagnostic monitoring interface defines 256-byte memory map in EEPROM, which makes use of the 8 bit address 1010001X(A2h). Please refer to the SFF-8472 Rev 9.5 for the detail information.

**ORDERING INFORMATION**



**WARNINGS**

- Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.
- Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

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