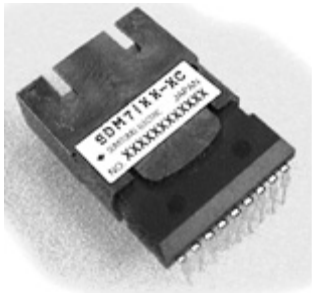


Technical Specification
for
2.5Gbps Fiber Optic Transceiver Module

SDM7128-XC

☐ 155.52Mb/s	☐ 622.08Mb/s	☑ other 2488.32Mbps
☐ Short Haul Intermediate Reach	☐ Long Haul Long Reach	☑ other Intra Office Short reach
☑ Single 5.0 V	☐ Single 3.3 V	☐ other _____
☑ 1.3 µm	☐ 1.55 µm	☐ other _____
☐ Transmitter	☐ Receiver	☑ Transceiver
	(☐ 2R / ☐ 3R)	(☑ 2R / ☐ 3R)

SUMITOMO ELECTRIC INDUSTRIES, LTD.

Sumitomo Electric reserves the right to make changes in this specification without prior notice.

#Safety Precaution Symbols This specification uses various picture symbols to prevent possible injury to operator or other persons or damage to properties for appropriate use of the product. The symbols and definitions are as shown below. Be sure to be familiar with these symbols before reading this specification.

⚠ Warning	Wrong operation without following this instruction may lead to human death or serious injury.
⚠ Caution	Wrong operation without following this instruction may lead to human injury or property damage.

Example of picture symbols ❗ indicates prohibition of actions. Action details are explained thereafter.

⃠ indicates compulsory actions or instructions. Action details are explained thereafter.

1. General

The SDM7128-XC is a fiber optic transceiver module designed for high-speed digital transmission. These products use a 1.3 μm InGaAsP / InP, FP-LD Laser Diode and InGaAsP, PIN-PD Photodiode as a light source and detector, respectively. The transceiver module is a PC board mountable package with electrical and optical interfaces. These modules are designed for short reach, intra office applications.

Features

*InGaAsP / InP, FP-LD Laser Diode1.3 μm operation
*Low Power Consumption
*Low Profile Plastic Molded Package
*Industrial Standard 1x9 Pin Footprint
*Automatic Optical Power Control
*Signal Detect (FLAG) Function
*Single +5.0V Power Supply
*SC Duplex Connector Receptacle
*Class 1 Laser Product (IEC 825-1 and FDA 21 CFR 1040.10 and 1040.11)
*Operating Case Temperature of 0°C to 70°C

Applications

*****Telecommunications
>SONET/SR, SDH/IO Application
>ATM Application
>156Mbps to 2.5Gbps Shelf-to-Shelf Links
>Subscriber Loop
>Metropolitan Area Network

*Data Communications
>High Speed Rack-to-Rack Data Links

2. Block Diagram

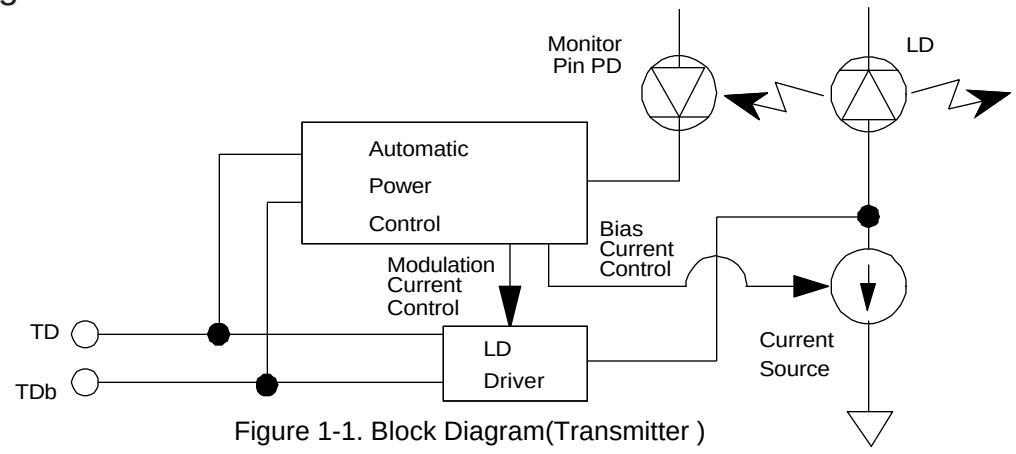


Figure 1-1. Block Diagram(Transmitter)

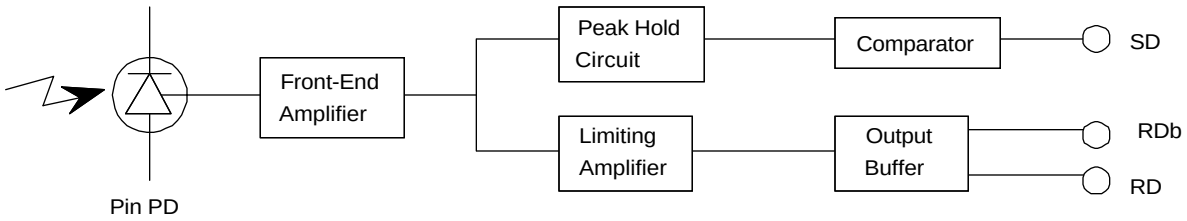


Figure 1-2. Block Diagram(Receiver)

3. Package Dimension

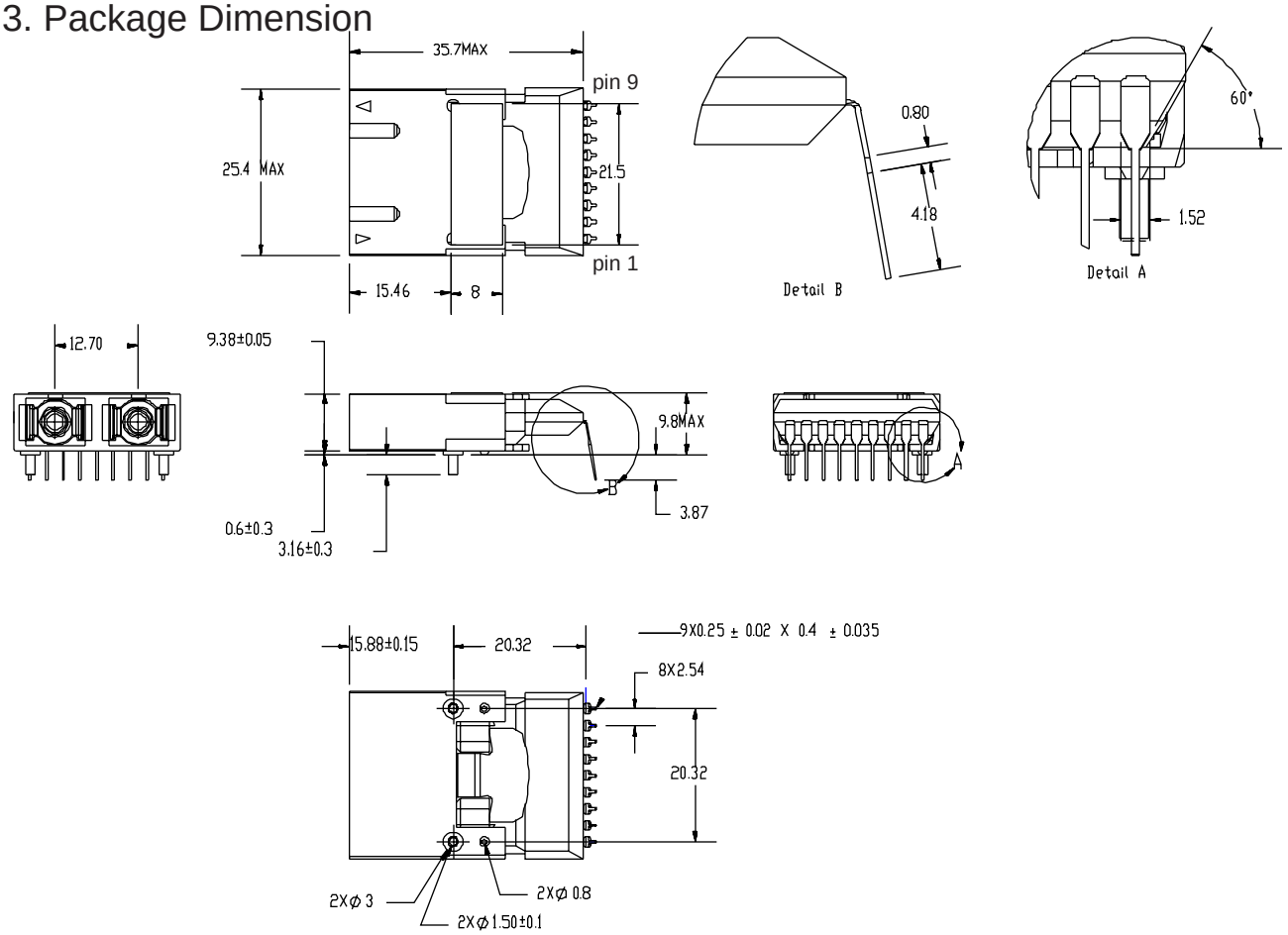


Figure 2. External View

⚠Caution
⃠ Do not disassemble this product. Otherwise, failure, electrical shock overheating or fire may occur. Handle the lead pin carefully. Use assisting tools or prospective aids as required. A lead pin may injure skin or human body

4. Footprint

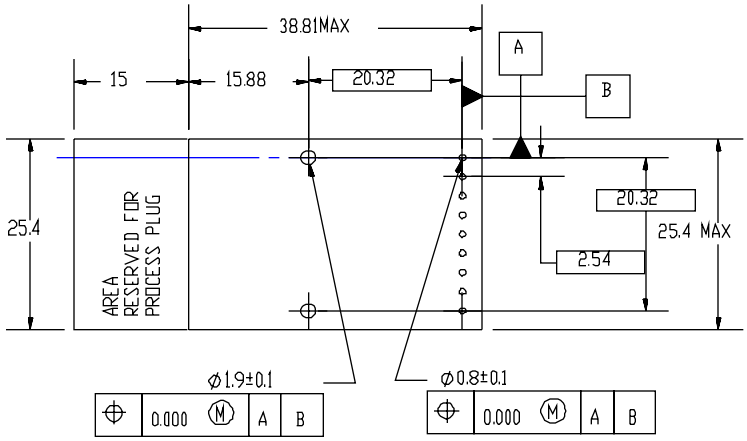


Figure 3 Footprint

5. Pin Assignment

No.	Symbol	Function
1	Veerx	Power Supply (-) for Receiver : Connected to GND
2	RD	Differential Data Output (Positive)
3	RDb	Differential Data Output (Negative)
4	SD(FLAG)	Signal Detect (FLAG)
5	Vccrx	Power Supply (+) for Receiver : Connected to +5.0V
6	Vcctx	Power Supply (+) for Transmitter : Connected to +5.0V
7	TDb	Transmitter Differential Data Input (Negative)
8	TD	Transmitter Differential Data Input (Positive)
9	Veetx	Power Supply (-) for Transmitter : Connected to GND

6. Absolute Maximum Ratings

Parameter	Symbol	min.	Max	Unit	Note
Storage Case Temperature	Ts	-40	85	°C	1
Operating Case Teperature	Tc	0	70	°C	1
Supply Voltage	Vcc-Vee	0.0	6.0	V	2
Input Voltage	Vi	Vee	Vcc+0.5	V	3
Output Current (RD, RDb)	Ioutrd		30	mA	
Output Current (SD)	Ioutsd		20	mA	
Lead Soldering (Temperature)			260	°C	4
(Time)			10	sec.	

Note 1. No condensation allowed. 2. Vcc>Vee
3. TD, TDb 4. Measured on lead pin at 2mm (0.079in.) off the package bottom

⚠ Warning

Use the product with the rated voltage described in the specification. If the voltage exceeds the maximum rating, overheating or fire may occur.

⚠ Caution

Do not store the product in the area where temperature exceeds the maximum rating, where there is too much moisture or dampness, where there is acid gas or corrosive gas, or other extreme conditions. Otherwise, failure, overheating or fire may occur.

7. Electrical Interface

(Unless otherwise specified, Vcc = 4.75 to 5.25 V, Vee = GND, @2488.32Mbps, PRBS2^23-1,50% duty and all operating temperature shall apply.)

7-1. Transmitter side

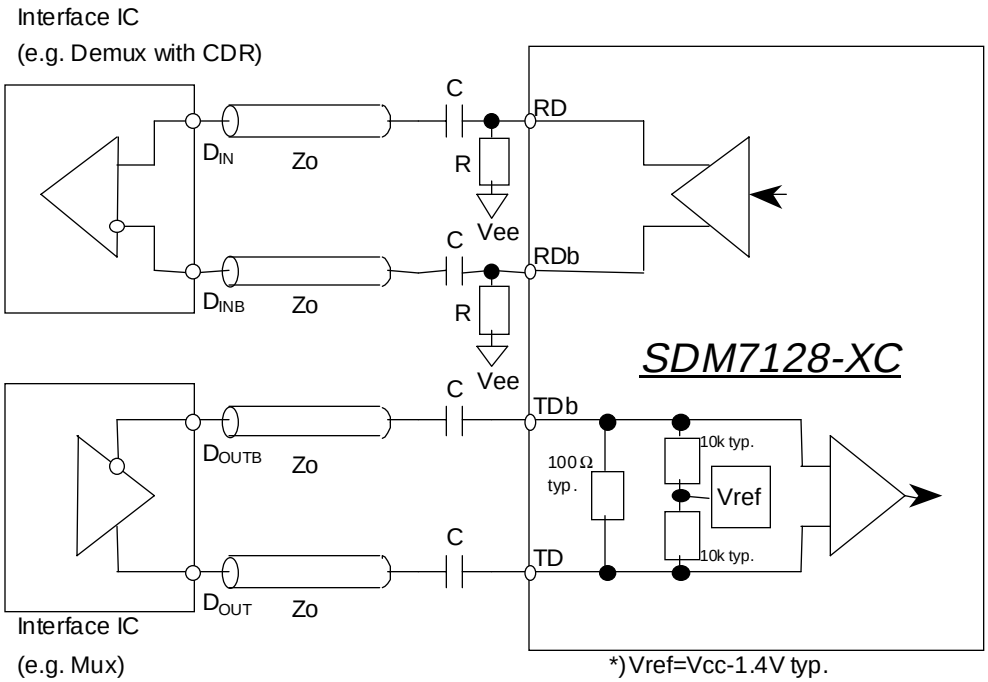
Parameter	Symbol	min.	Typ.	Max.	Unit	Note
Supply Voltage	Vcc-Vee	4.75	5.00	5.25	V	
Supply Current	Idtx		150	200	mA	1
Input Voltage Swing (TD, TDb)	Vin	0.45		1.20	Vp-p	2
Imput Impedance	Rin		100		Ω	3
Signal Input Rise / Fall Time				0.12	nsec.	4

Note 1. Input bias current is not included. 50% duty cycle data. 2488.32Mbps 2. Vcc-Vee=5.0V, Tc=25°C 3. 20 ~ 80%
3. Measured between TD and TDb. 4. 20 ~ 80%

7-2. Receiver side

Parameter		Symbol	min.	Typ.	Max.	Unit	Note
Supply Voltage		Vcc-Vee	4.75	5.00	5.25	V	
Supply Current		Idrx		100	200	mA	1
Data	High	Vordh	Vcc-1.10		Vcc-0.65	V	2
Output Voltage	Low	Vordl	Vcc-1.80		Vcc-1.30		
SD	High	Vosdh	Vee+2.40			V	2, 3
Output Voltage	Low	Vosdl			Vee+0.50		
Data Rise / Fall Time of Output Signal		Trd / Tfd		0.20		nsec	4

Note 1. Output current is not included. 2. Vcc=+5.0V, Tc=25°C, Output load resistance Rl=50Ω to Vccrx-2V for RD and RDb.
3. Ioh = -0.2mA, Iol = 2mA 4. 20 ~ 80%



C=0.1µF (@622.08, 1250, 2125, 2488.32Mbps), 0.47µF (@155.52Mbps)
R=390Ω
Zo=50Ω Transmission Line

Figure 4. Electrical Data Interface

8. Optical Interface

(Unless otherwise specified, Vcc = 4.75 to 5.25 V, Vee = GND, @2488.32Mbps, PRBS2^23-1,50% duty and all operating temperature shall apply.)

8-1. Transmitter side

Parameter	Symbol	min.	Typ.	Max.	Unit	Note
Average Output Power to SMF	Pos	-10.0	-6.5	-3.0	dBm	1
Extinction Ratio	Er	9.0			dB	1
Center Wavelength	λc	1266		1360	nm	
Spectral Width (RMS)	Δλ			4.0	nm	
Eye Mask for Optical Output	compliant with ITU-T recommendation G.957					

Note 1. Measured at 2488.32Mbps PRBS2^23-1, 50% duty cycle data

Relation between Input Signal and Optical Output Signal

Input Signal		Optical Output Signal
TD	TDb	
High	Low	ON (High)
Low	High	OFF (Low)
High	High	Undefined
Low	Low	Undefined

⚠ Warning

Do not look at the laser beam projection area (e.g. end of optical connector) with naked eyes or through optical equipment while the power is supplied to this product. Otherwise, your eyes may be injured.

8-2. Receiver side

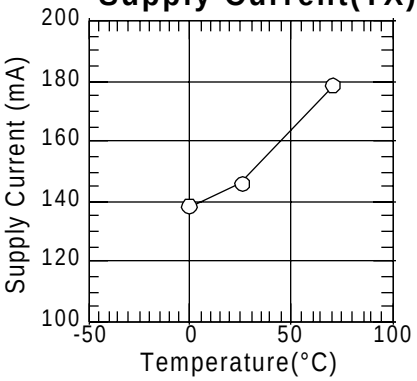
Parameter	Symbol	min.	Typ.	Max.	Unit	Note
Center Wavelength	-	1260		1580	nm	
Minimum Sensitivity	Pmin		-21.0	-18.0	nm	1
Overload	Pmax	-3.0	-1.0		nm	1
SD Assert Level	Pa		-25		dBm	
SD deassert Level	Pd		-27		dBm	

Note 1. BER=10^-10, 2. Measured at the bit rate of 2488.32Mbps, PRBS 2^23-1, NRZ

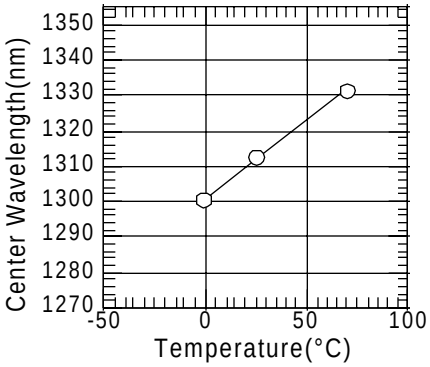
9. Characteristic Information

@2488.32Mbps, PRBS2^23-1,50% duty, Vcc=+5.0V, Vee=GND

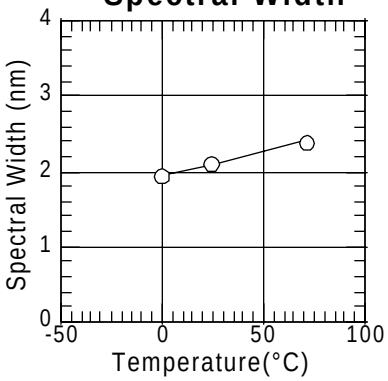
Supply Current(TX)



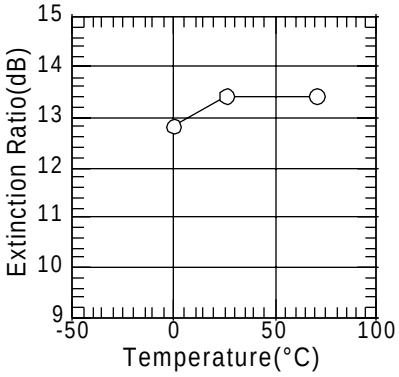
Center Wavelength



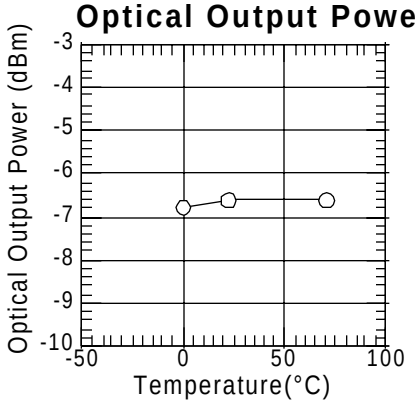
Spectral Width



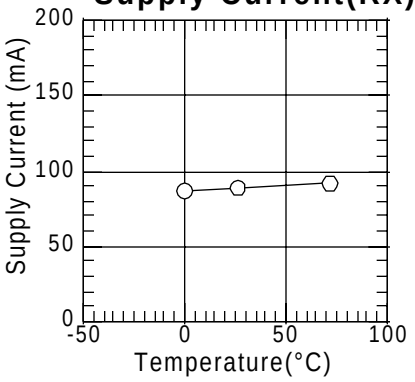
Extinction Ratio



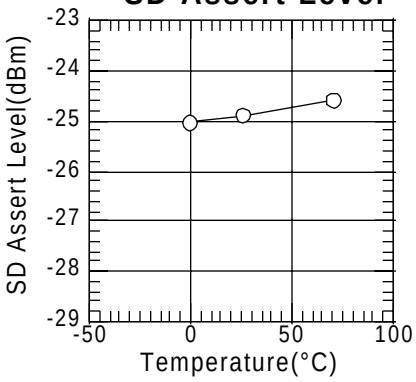
Optical Output Power



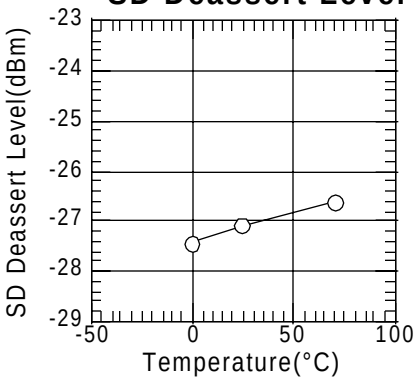
Supply Current(RX)



SD Assert Level

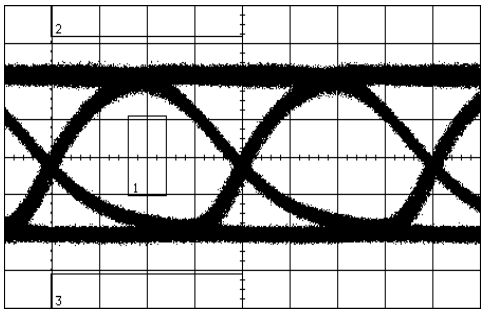


SD Deassert Level



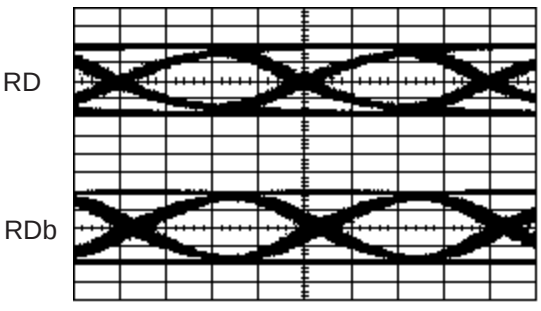
Typical Output Waveform

Transmitter

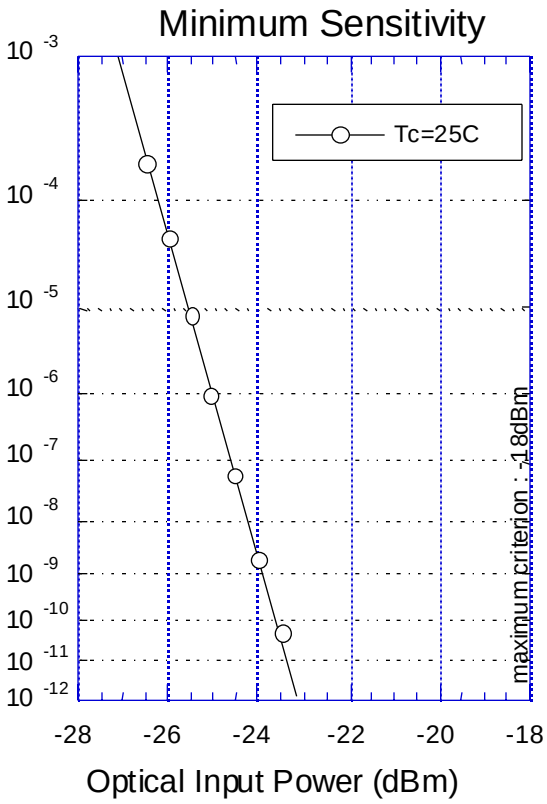


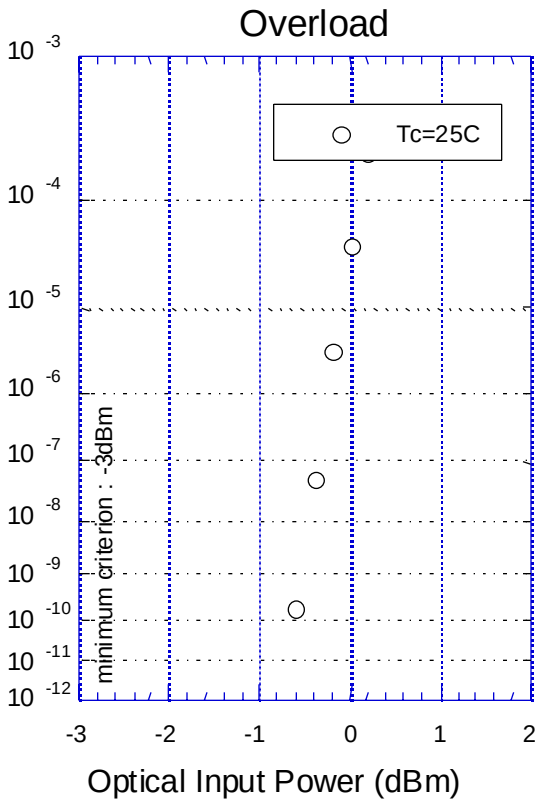
Hor. : 100ps/div. with 4th order Bessel-Thompson Filter

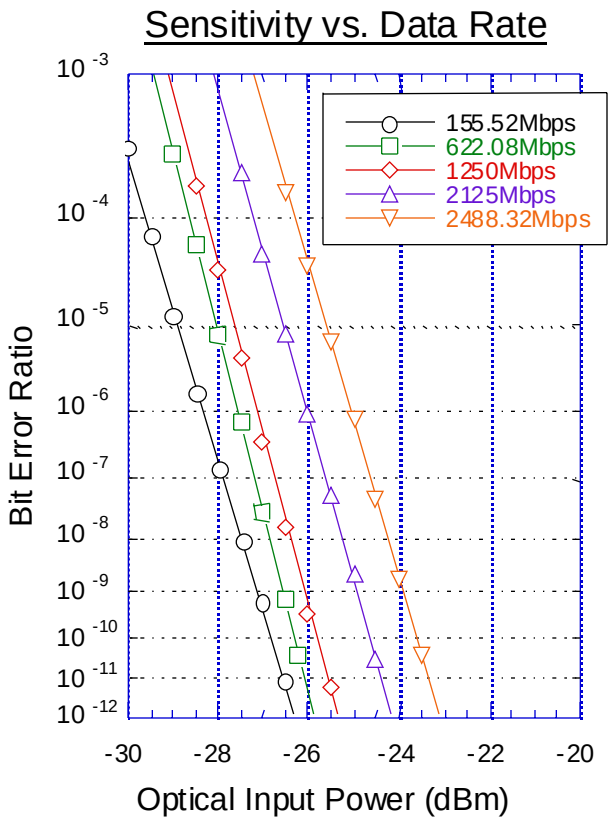
Receiver



Pin=-18dBm, Ver. : 200mV/div, Hor. : 100ps/div.

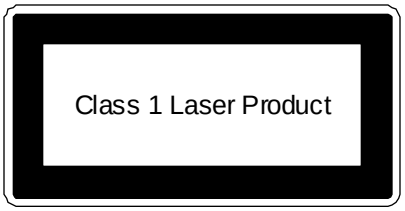

Minimum Sensitivity
Tc=25C
maximum criterion : -18dBm
Optical Input Power (dBm)


Overload
Tc=25C
minimum criterion : -3dBm
Optical Input Power (dBm)


Sensitivity vs. Data Rate
155.52Mbps
622.08Mbps
1250Mbps
2125Mbps
2488.32Mbps
Bit Error Ratio
Optical Input Power (dBm)

10. Laser Safety

This product uses a semiconductor laser system and is a laser class 1 product acc. FDA, complies with 21CFR 1040. 10 and 1040.11. Also this product is a laser class 1 product acc. IEC 825-1.



⚠Caution

⃠ If this product is used under conditions not recommended in the specification or this product is used with unauthorized revision, classfication for laser product safety standard is invalid. Classify the product again at your responsibility and take appropriate actions.

11.Reliability Test (Under Qualification)

Bellcore TA-NWT-000983 Issue 2, December 1993								
Heading	Test	Reference	Condition	Sampling			SEI Plan	
				LTPD	SS	C	SS	F/C
Mechanical Integrity	Mechanical Shock	MIL-STD-883 Method 2002	Condition B 5 times/axis					
			500G, 1.0 ms	20%	11	0	---	---
			1,500G, 0.5ms	20%	11	0	11	0
	Vibration	MIL-STD-883 Method 2007	Condition A 20 G 20-2,000 Hz 4 min/cycle; 4 cycles/axis	20%	11	0	11	0
	Thermal Shock	MIL-STD-883 Method 1011	ΔT=100°C	20%	11	0	11	0
	Solderability	MIL-STD-883 Method 2003	(steam aging not required)	20%	11	0	11	0
	Fiber Pull		1 Kg; 3 times;5sec.	20%	11	0	---	---
			2 Kg; 3 times; 5sec.	20%	11	0	---	---
Endurance	Accel. Aging (High Temp.)	(R)-453 Section 5.18	+85C; rated power >5,000hrs.	---	25	---	25	0
			>10,000hrs.	---	10	---	---	---
	High Temp. Storage	----------	max. storage T (T=85°C) >2,000	20%	11	0	---	---
	Low Temp. Storage	----------	min. storage T (T=-40°C) >2,000	20%	11	0	11	0
	Temperature Cycling	Section 5.20	- 40°C to +85°C					
			400 times pass/fail	20%	11	0	---	---
			500 times for info.	---	11	---	---	---
			500 times pass/fail	20%	11	0	11	0
			1000 times for info.	---	11	---	11	0
	Damp Heat (if using epoxy)	MIL-STD-202 M103 or IEC 68-2-3	40°C , 95%, 56days	20%	11	0	11	0
			or 85°C /85%RH 2,000hrs.	20%	11	0	---	---
	Cyclic Moisture Resistance	Section 5.23	----------	20%	11	0	11	0
Special Tests	Internal Moisture	MIL-STD-883 Method 1018	< 5,000 ppm water vapor	20%	11	0	11	0
	Flammability	TR357:Sec. 4.4.2.5	----------	----	----	---	----	OK
	ESD Threshold	Section 5.22	----------	----	6	---	6	0

12. Ordering Information

Ordering Number	Connector type	Operating Temparature
SDM7128-XC	SC Duplex Connector	Tc = 0 ~ 70°C

13. Other Precaution

Under such a strong vibration environment as in automobile, the performance and reliability are not guaranteed.

The governmental approval is required to export this product to other countries. To dispose of these components, the appropriate procedure should be taken to prevent illegal exportation.

This module must be handled, used and disposed of according to your company's safe working practice.

14. For More Information

U.S.A.
Sumitomo Electric Lightwave Corp, 78 Alexander Drive, Research Triangle Park, NC 27709
Tel. (919)541-8100 / Fax. (919)541-8376
E-mail: info@sumitomoelectric.com
http://www.sumitomoelectric.com

Europe
Sumitomo Electric Europe Ltd., Unit 11, Magnolia House, Spring Villa Park, Spring Villa Road
Edgware, Middlesex, HA8 7EB, United Kingdom
Tel. (0181)905-6120
Fax. (0181)905-6167

Japan
Sumitomo Electric Industries, Ltd. (International Business Division), 3-12, Moto-Akasaka 1-chome
Minato-ku Tokyo 107-8468
Tel. (03)3423-5771 / Fax. (03)3423-5099
E-mail: product-info@yfocs.sei.co.jp
http://www.sei.co.jp/Electro-optic/eopd_home_e.html