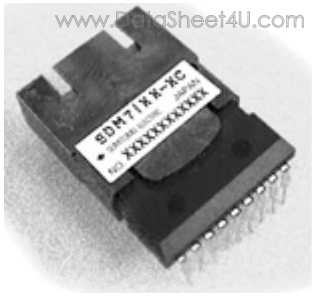
Specification: TS-S97D022C
Date : August , 2000



Technical Specification
for
Optical Transceiver Module

SDM7101-XC

SDM7101-GC

☑ 155.52Mb/s	☐ 622.08Mb/s	☐ other _____
☑ Short Haul Intermediate Reach	☐ Long Haul Long Reach	☐ other _____
☑ 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

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

SDM7101-XC / SDM7101-XC-W is a series of compact and high speed performance digital optical transceiver module ideally designed for versatile high speed network applications. 1300nm high speed InGaAsP FP-LD and InGaAs PIN-PD are provided as a light source and a detector, respectively. Transceiver module has PC board mountable package with electrical and optical interfaces.

* Data Rate	155.52Mbps,NRZ
* Duty Cycle	50%
* Power Supply Voltage	Single+5.0V
* Electrical Interface	PECL
* Fiber Coupled Power	-8 ~ -15dBm (Typ. -11dBm) for SMF
*Sensitivity	~ -34dBm (Typ. -38dBm)
* Connector Interface	SC Duplex Connector

The features of SDM7101-XC / SDM7101-XC-W are listed below.

* Features
  - Low Power Consumption
  - Low Profile (9.8mm Max) Plastic Molded Package
  - Multi-sourced Footprint
  - Transmitter..... Uncooled Laser with Automatic Power Control IC
    Class 1 Laser Product (IEC 825-1 and FDA 21 CFR 1040.10 and 1040.11)
  - Receiver..... Wide Dynamic Range
    Signal Detect (FLAG) Function

2. Block Diagram

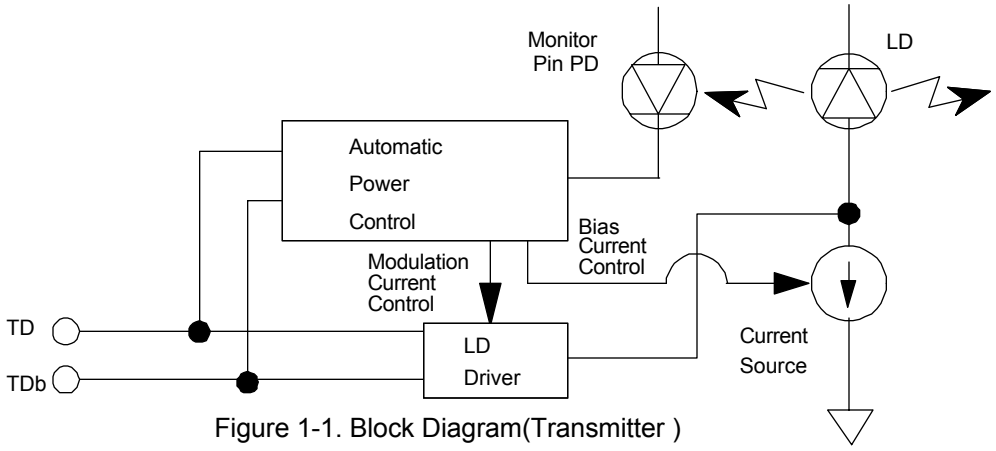


Figure 1-1. Block Diagram(Transmitter)

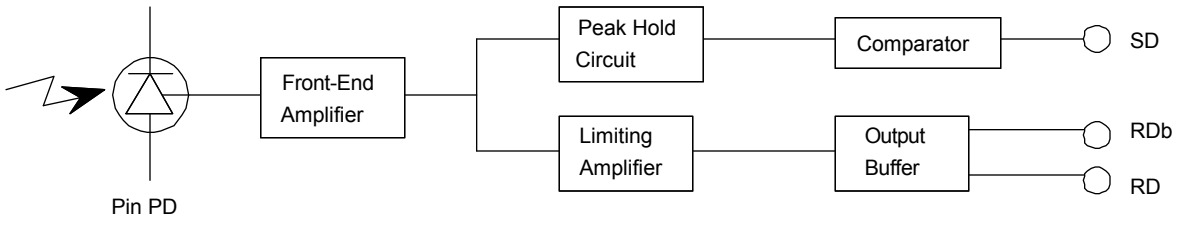


Figure 1-2. Block Diagram(Receiver)

3. Package Dimension

All dimensions are in mm.

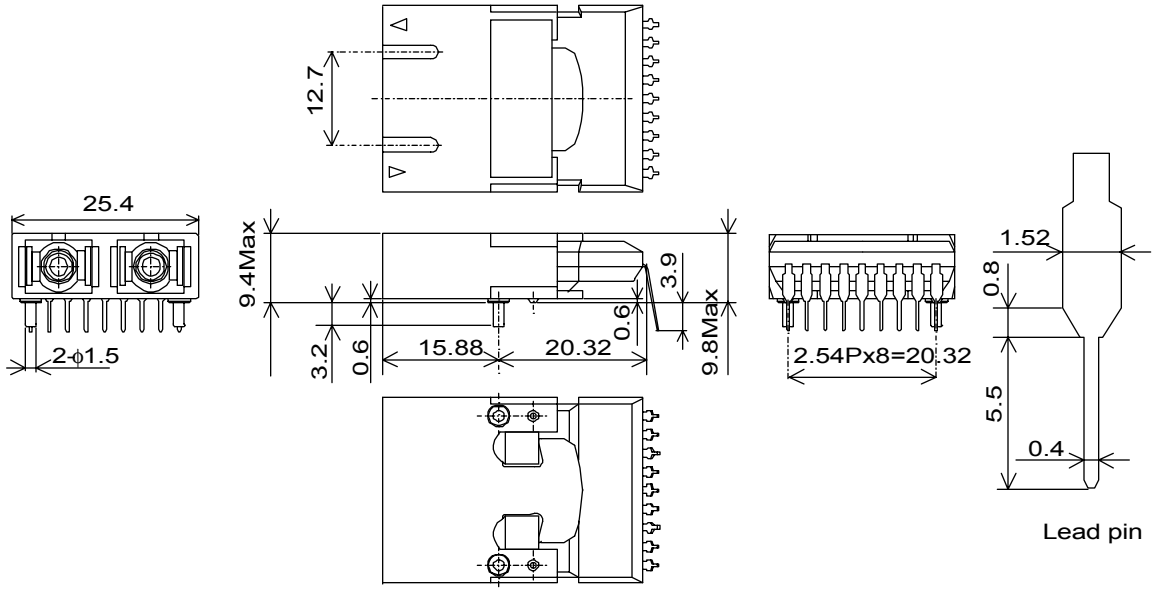
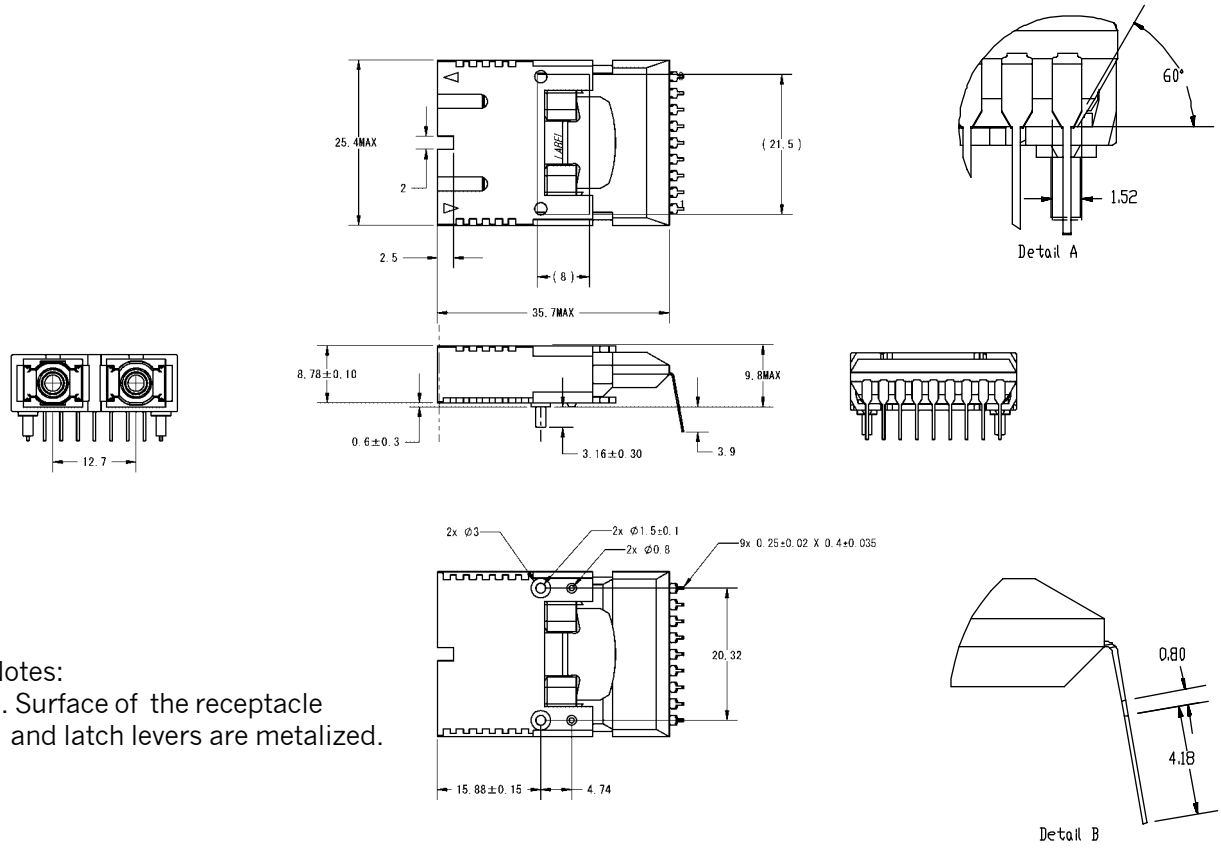


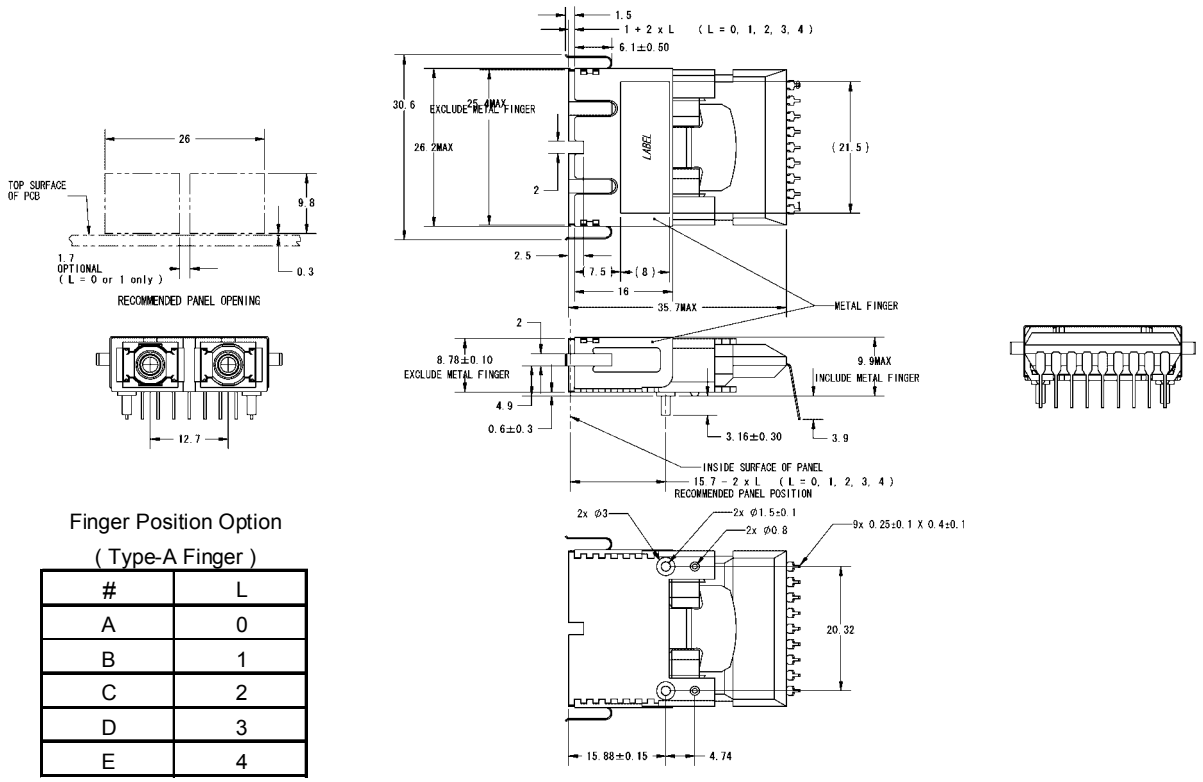
Figure2-1. Outline Dimensions (SDM7101-XC)



Notes:
1. Surface of the receptacle and latch levers are metalized.

Figure2-2. Outline Dimensions (SDM7101-GC-ZN / SDM7101-GC-ZW)

All dimensions are in mm.



Finger Position Option

(Type-A Finger)

#	L
A	0
B	1
C	2
D	3
E	4

Figure2-3. Outline Dimensions (SDM7101-GC-#N / SDM7101-GC-#W)

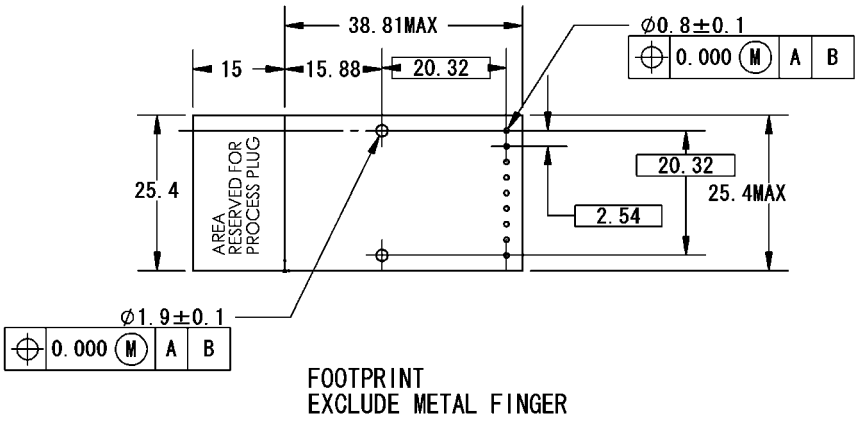


Figure2-4.RecommendedFootprint

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

4. 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	FLAG(SD)	FLAG (Signal Detect)
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 (Negative)
8	TD	Transmitter Differential Data (Positive)
9	Veetx	Power Supply (-) for Transmitter : Connected to GND

5. 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, 2
		-40	85	°C	1, 3
Supply Voltage	Vcc-Vee	0.0	6.0	V	4
Input Voltage	Vi	Vee	Vcc+0.5	V	5
Lead Soldering (Temperature)			260	°C	6
(Time)			10	sec.	

Note 1. No condensation allowed. 2. SDM7101-XC 3. SDM7101-XC-W 4. Vcc>Vee, Vcc=+5.0V, Vee=GND
5. TD, TDb 6. 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.

6. Electrical Interface

(Unless otherwise specified, Vcc_{TX}-Vee_{TX} = Vcc_{RX}-Vee_{RX} = 4.75 to 5.25 V and all operating temperature shall apply.)

6-1. Transmitterside

Parameter		Symbol	min.	Typ.	Max.	Unit	Note
Supply Voltage		Vcc_{TX}-Vee_{TX}	4.75	5.00	5.25	V	
Supply Current		Idtx		70	150	mA	1
Input Voltage	High	Vih	Vcc_{TX}-1.17		Vcc_{TX}-0.73	V	2
TD, TDb	Low	Vil	Vcc_{TX}-1.95		Vcc_{TX}-1.45		
Input Current	High	Iih	-10		150	µA	2
TD, TDb	Low	Iil	-10		10		
Signal Input Rise / Fall Time					1.6	nsec.	3

Note 1. Input bias current is not included. 50% duty cycle data. 155.52Mbps 2. Vcc_{TX}-Vee_{RX}=5.0V, Tc=25°C 3. 20 ~ 80%

6-2. Receiver side

Parameter		Symbol	min.	Typ.	Max.	Unit	Note
Supply Voltage		Vcc_{RX}-Vee_{RX}	4.75	5.00	5.25	V	
Supply Current		Idrx		60	110	mA	1
Data & SD	High	Voh	Vcc_{RX}-1.03		Vcc_{RX}-0.88	V	2
Output Voltage	Low	Vol	Vcc_{RX}-1.81		Vcc_{RX}-1.62		
Data Rise / Fall Time of Output Signal		Trd / Tfd			1.6	nsec	3
SD Assert Time		Sa			100	µsec	4
SD Deassert Time		Sd			350	µsec	4

Note 1. Output current is not included. 50% duty cycle data, 155Mbps, NRZ
Note 2. Vccrx=+5.0V, Tc=25°C, Output load resistance
RI=50Ω to Vccrx-2V for RD, RDb and SD.
Note 3. 20 ~ 80%
Note 4. Please refer to Figure 4
Note 5. 50% duty cycle data, 155Mbps, PRBS2^{23}-1, NRZ, Pin = -34 ~ -8dBm

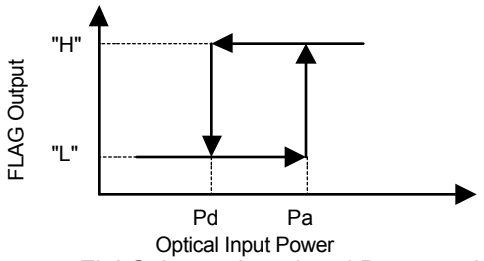


Figure 4. FLAG Assert Level and Deassert Level

7. Optical Interface

(Unless otherwise specified, Vcc-Vee = 4.75 to 5.25 V and all operating temperature shall apply.)

7-1. Transmitterside

Parameter	Symbol	min.	Typ.	Max.	Unit	Note
Average Output Power to SMF	Pos	-15.0	-11.0	-8.0	dBm	1
Extinction Ratio	Er	8.2			dB	1
Center Wavelength	λc	1261		1360	nm	
Spectral Width (RMS)	Δλ			7.7	nm	
Eye Mask for Optical Output	Refer to Figure 5					

Note 1. Measured at 155.52Mbps PRBS2^23-1, 50% duty cycle data, NRZ

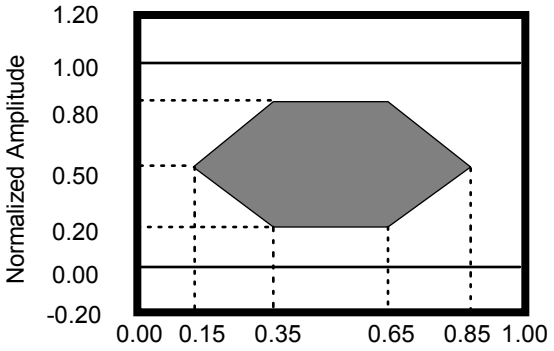


Figure 5. Optical Pulse Mask with Fourth Order Bessel-Thomson Filter Specified in ITU-T G.957

Relation between Input Signal and Optical Output Signal

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

⚠ Warning

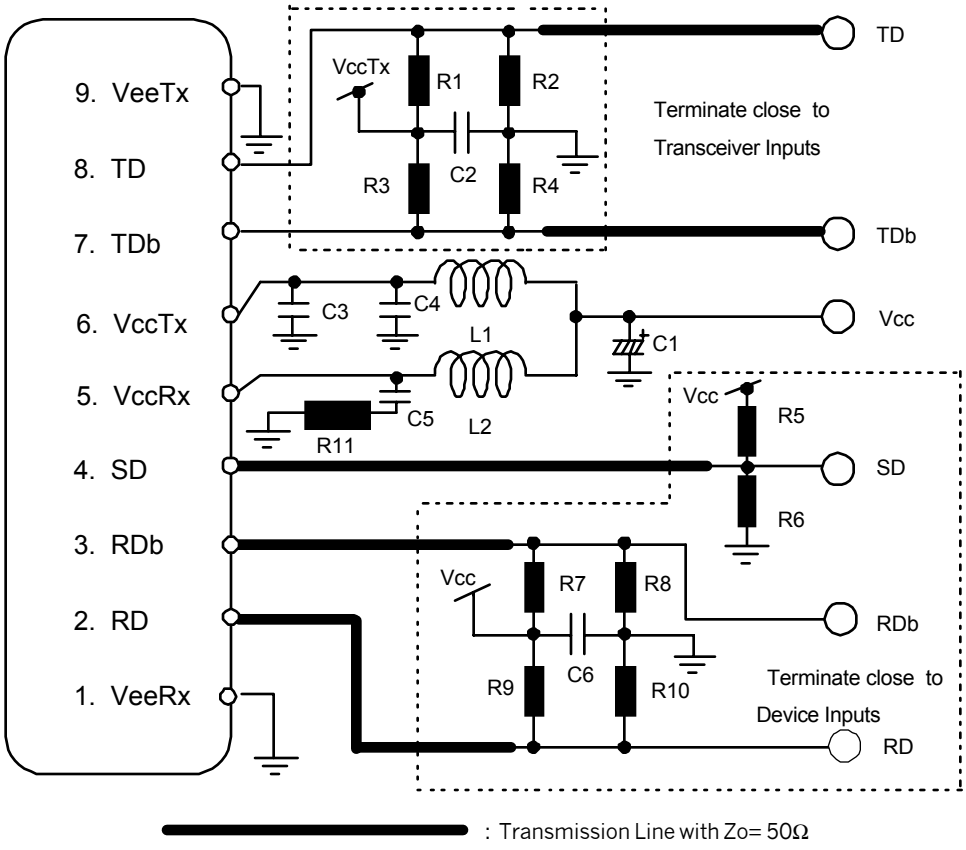
Do not look at the laser beam projection area (e.g. end of optical connector) with naked eyes or through optical equipment while the power is supplied to this product. Otherwise, your eyes may be injured.

7-2. Receiver side

Parameter	Symbol	min.	Typ.	Max.	Unit	Note
Center Wavelength	-	1261		1580	nm	
Minimum Sensitivity	Pmin			-34.0	nm	1, 2
Overload	Pmax	-8.0			nm	1, 2
Flag Assert Level	Pa	-48	-37	-34	dBm	2
Flag deassert Level	Pd	-49	-40	-34	dBm	

Note 1. BER=10^-10, 2. Measured at the bit rate of 155.52Mbps, PRBS 2^23-1, NRZ
Note 2. 50% duty cycle data

8. Recommended Inteface Circuit



R1 = R3 = R5 = R7 = R9 = 82Ω , R2 = R4 = R6 = R8 = R10 = 130Ω , R11=10Ω
C1 = 100 μF, C3 = 2200 pF, C2 = C6 = 0.1 μF, C4 = C5 = 1 μF
L1, L2 : Ferrite Bead ZBF 253D-00 (TDK)

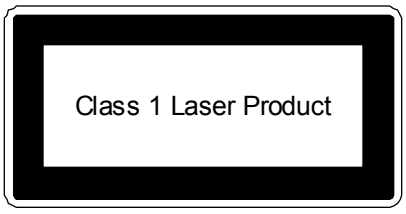
Figure 6 Recommended Interface Circuit

9. Reliability Test

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

10. Laser Safety

This product uses a semiconductor laser system and is a laser class 1 product acc. FDA, complies with 21CFR1040. 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. 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.

⚠ Warning

- Be sure to carry out correct soldering for connection to peripheral circuits in order to prevent contact failure or short-circuit. Otherwise, a strong laser beam may cause eye injury, overheating or fire.
- Do not put this product or components of this product into your mouth. This product contaions material harmful to health.

⚠ Caution

- Be sure to turn the power off when you touch this product connected to the printed circuit boards. Otherwise, electric shock may occur.
- Dispose this product or equipment including this product properly as an industrial waste according to the regulations.

12. Ordering Information

Ordering Number	Connector type	Operating Temparature
SDM7101-XC	SC Duplex Connector, Non-metallized.	Tc = 0 ~ 70°C
SDM7101-XC-W		Tc = -40 ~ 85°C
SDM7101-GC-##	SC Duplex Connector, Metallized. See chart below for detail.	

SDM7101-GC-# #

- Operating Case Temperature Option
  - N : 0°C ~ -70°C
  - W : -40°C ~ 85°C
- EMI Shield Finger Option
  - Z : Without Finger
  - A ~ E : With Type-A Finger
    - *Letter specifies finger position.
    - Refer to Figure2-3 for detail.

13. For More Information

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