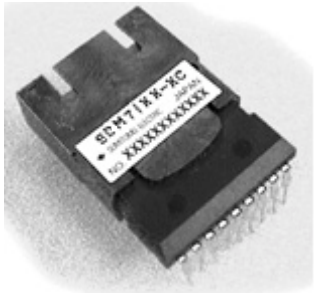
Specification : TS-S98D008F
Date : April, 2001



Technical Specification

for

3.3V / 1.25Gbps Optical Transceiver Module

SCM7104-XC

SCM7104-GC

☐ 155.52Mbps	☐ 622.08Mbps	☑ other 1.25Gbps
☑ 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 the 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 nearby.

⃠ indicates compulsory actions or instructions. Action details are explained near by.

1. General

SCM7104-XC is a series of compact and high speed performance digital optical transceiver module ideally designed for versatile high speed network applications. 1310nm 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. SCM7104-XC is specifically designed to be used in Gigabit Ethernet applications.

- Data Rate 100 ~ 1,250Mbps, NRZ
- Duty Cycle 50%
- Power Supply Voltage Single +3.3V
- Electrical Interface LVPECL
- Fiber Coupled Power -11.5dBm ~ -3dBm for MMF(*)
  -9.5dBm ~ -3dBm for SMF
  *Transmitter shall be coupled through a single mode fiber offset-launch mode-conditioning patch cord.
- Sensitivity -20dBm ~ -3dBm
- Connector Interface SC Duplex Connector
- Compliant with Specifications for IEEE 802.3z Gigabit Ethernet

The features of SCM7104-XC are listed below.

- Features Single 3.3V Operation
  Low Power Consumption
  Applicable for both SMF (2~10,000m) and MMF (2~550m)
  Low Profile (9.4mm Max) Plastic Molded Package
  Multi-sourced 1x9 Footprint
  Transmitter..... Uncooled Laser with Automatic Power Control IC
  Class 1 Laser Product
  (IEC 825 and FDA 21 CFR 1040.10 & 1040.11)
  Receiver..... Wide Dynamic Range
  Signal Detect Function

2. Block Diagram

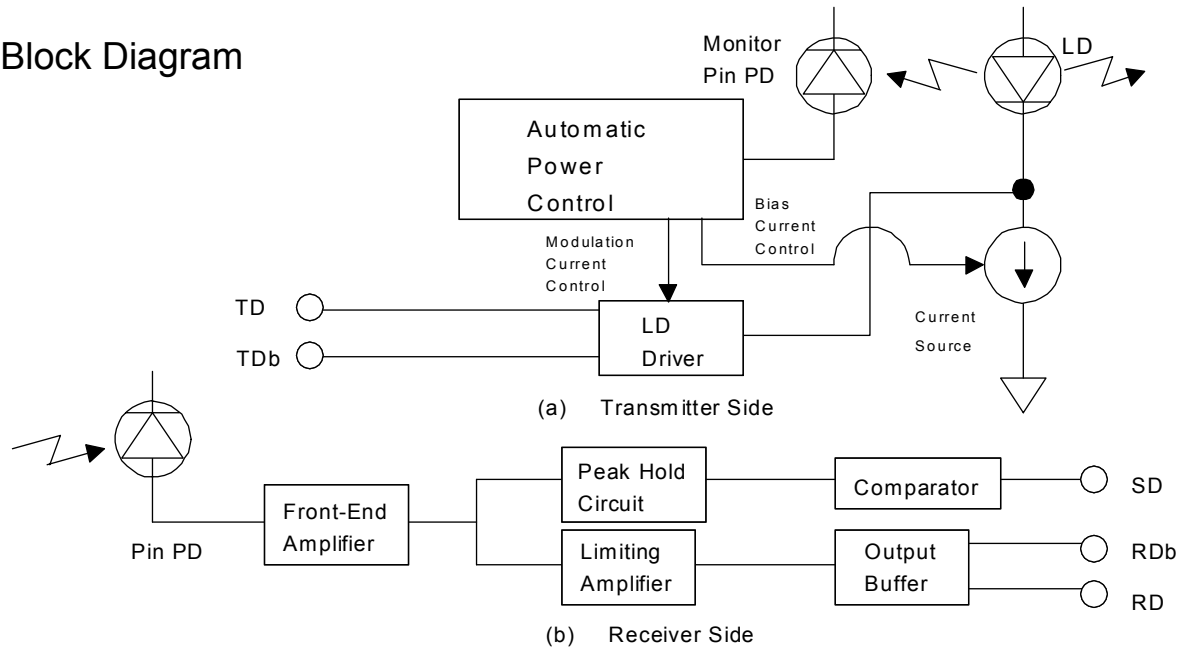


Figure 1 Block Diagram

3. Package Dimension

All dimensions are in mm.

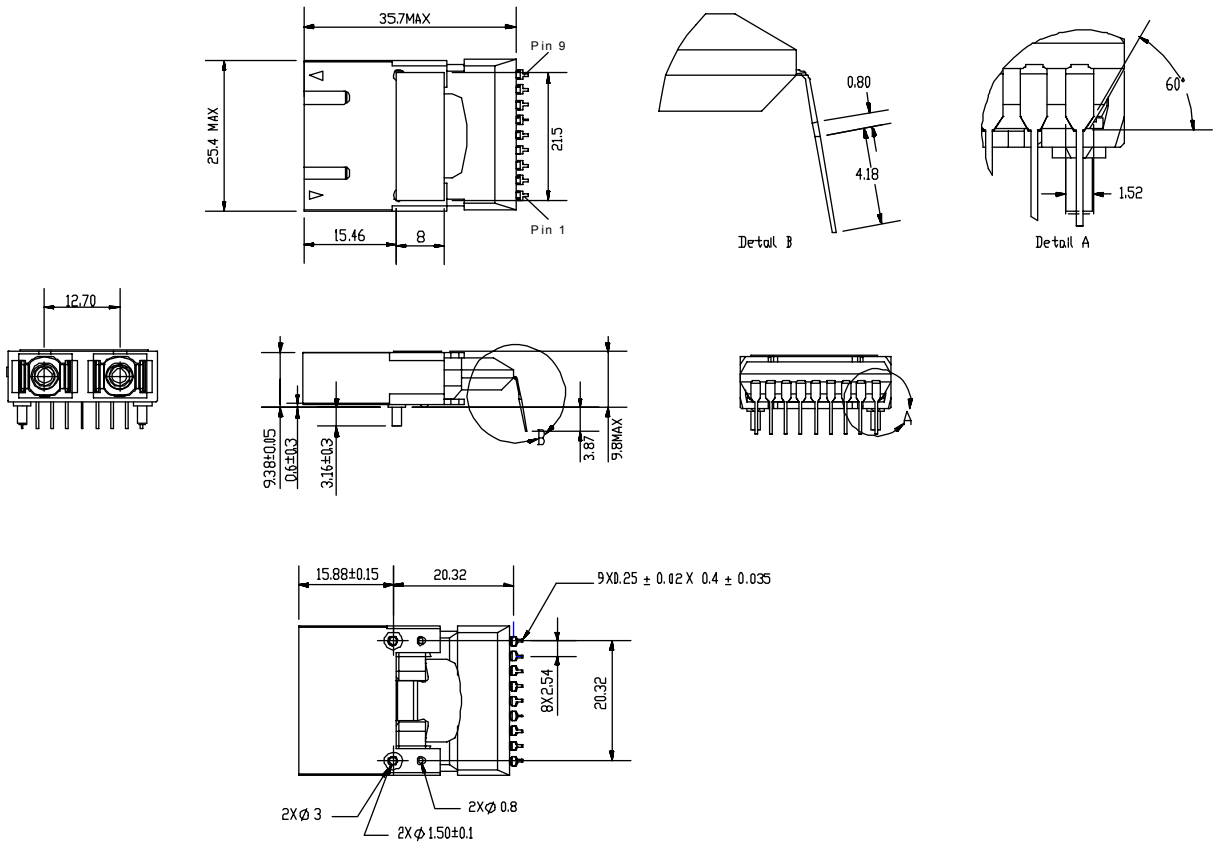
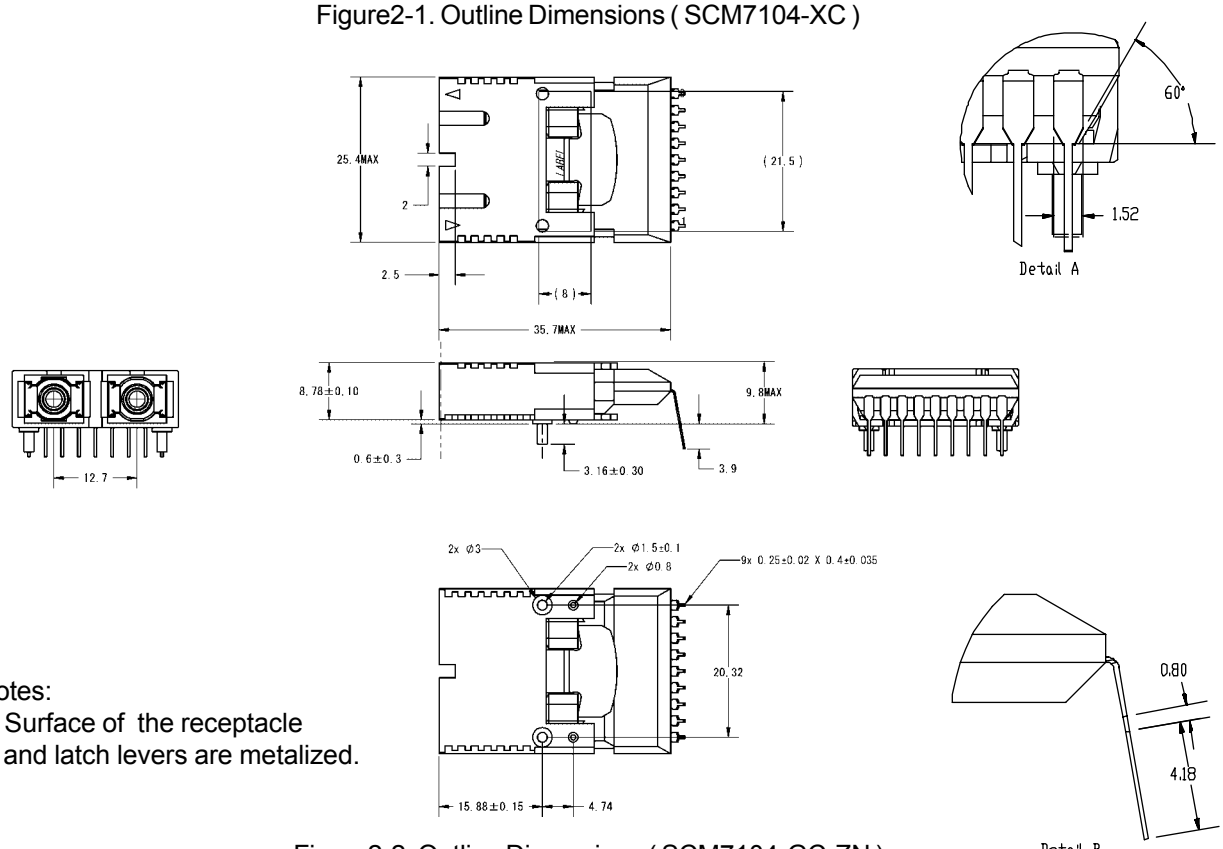


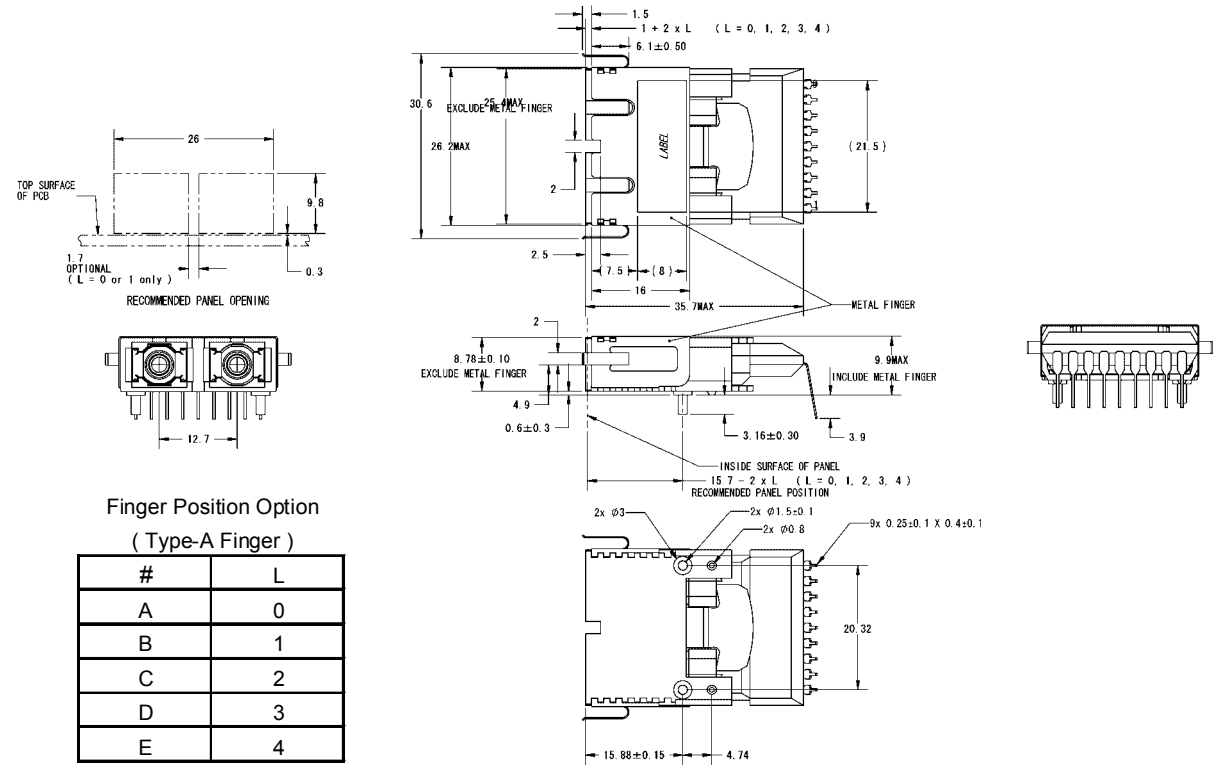
Figure2-1. Outline Dimensions (SCM7104-XC)



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

Figure2-2. Outline Dimensions (SCM7104-GC-ZN)

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 (SCM7104-GC-#N)

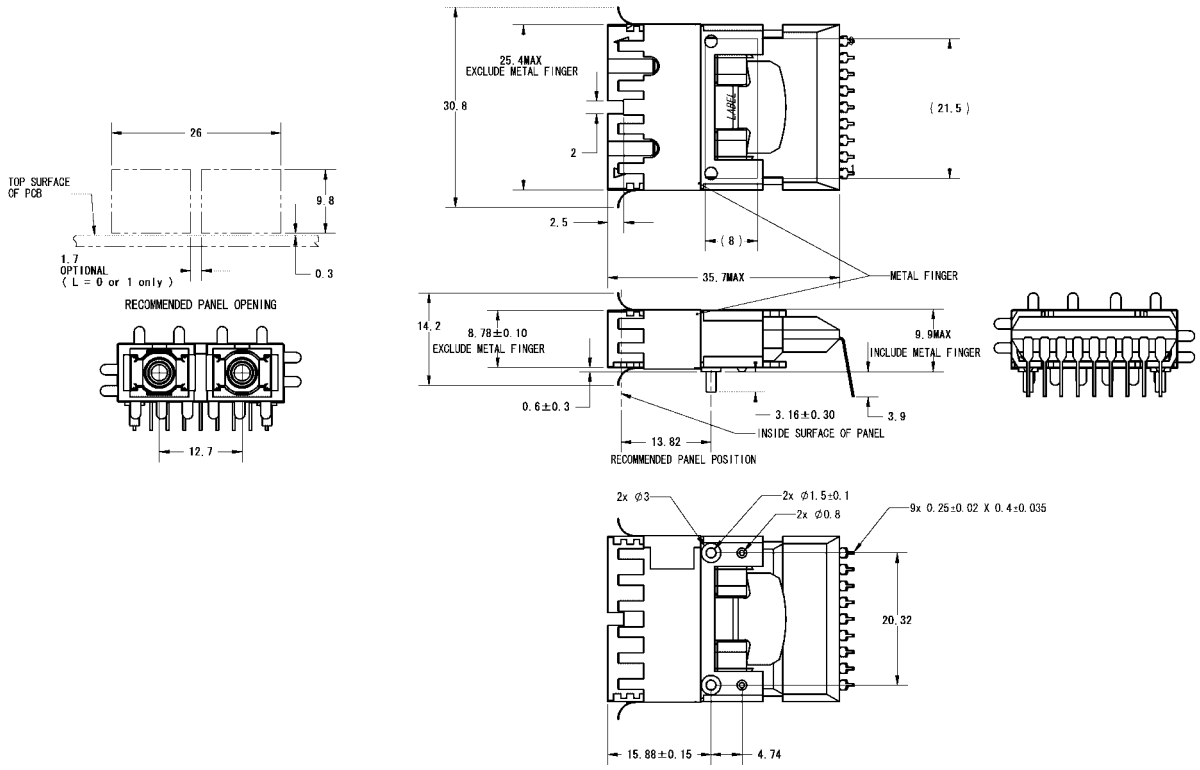


Figure2-4. Outline Dimensions (SCM7104-GC-GN)

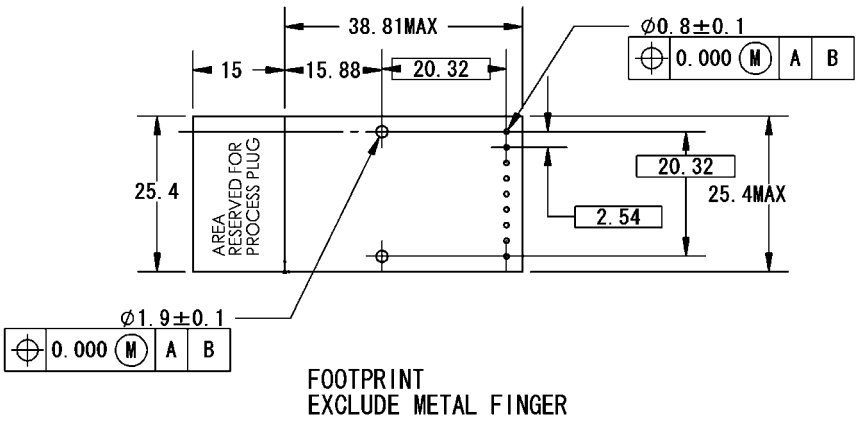


Figure2-5. Recommended Footprint

⚠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 Assignments

No.	Symbol	Function
1	Veerx	Power Supply (-) for Receiver : Connected to GND
2	RD	Received Differential Data (Positive)
3	RDb	Received Differential Data (Negative)
4	SD	Signal Detect
5	Vccrx	Power Supply (+) for Receiver : Connected to +3.3V
6	Vcctx	Power Supply (+) for Transmitter : Connected to +3.3V
7	TDb	Transmitting Differential Data (Negative)
8	TD	Transmitting 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 Ambient Temperature	Ta	0	70	°C	1
Supply Voltage	Vcc-Vee	0	4.0	V	2
Input Voltage	Vi	Vee	Vcc+0.5	V	3
Output Current (RD, RDb, SD)	Io		30	mA	
Lead Soldering (Temperature) (Time)			260 10	°C sec.	4

Note 1. No condensation allowed. 2. Vcc > Vee, Vee = GND for Vcc = +3.3V
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.

6. Electrical Interface

(Ta=0 to 70C, V_{ccTX}=V_{ccRX}=3.14 to 3.47V, V_{eeTX}=V_{eeRX}=GND, unless otherwise specified)

6.1 Transmitter Side

Parameter		Symbol	min.	Typ.	Max.	Unit	Note
Supply Voltage		Vcc_{tx}	3.14	3.30	3.47	V	
Supply Current		Icc_{tx}		70	140	mA	
Input Voltage	High	Vih	Vcc_{tx}-1.17		Vcc_{tx}-0.73	V	1
	Low	Vil	Vcc_{tx}-1.95		Vcc_{tx}-1.45		
Input Current	High	Iih	-10		150	μA	1
	Low	Iil	-10		10		
Signal Input Rise / Fall Time					240	psec.	2

Note 1. Veetx = +3.3V, Ta=25°C 2. 20 ~ 80%

6.2 Receiver Side

Parameter		Symnol	Min.	Typ.	Max.	Unit	Note
Supply Voltage		V_{ccRX}	3.14	3.30	3.47	V	
Supply Current		I_{ccRX}		95	125	mA	1
Output Voltage	(High)	V_{OH}	V_{ccRX}- 1.10		V_{ccRX}- 0.86	V	2,3
(RD, RDb, SD)	(Low)	V_{OL}	V_{ccRX}- 1.86		V_{ccRX}- 1.62		
Rise/Fall Time of Output Signal		T_{rout} T_{fout}		230		psec	6

Note 1. Output current are not included.
Note 2. Output load resistor (R = 50 Ω) is connected to VccRX - 2.0V
Note 3. VccRX = +3.3 V, Ta = 25°C, Note 4. IOH = 0.4 mA, VCC - VEE = 3.3V
Note 4. 20 ~ 80 %

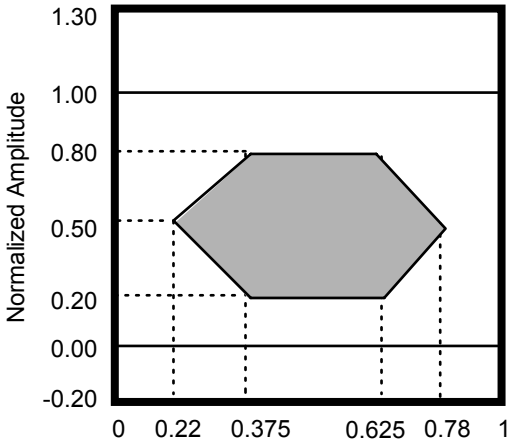
7. Optical Interface

(Ta=0 to 70°C, V_{ccTX}=V_{ccRX}=3.14 to 3.47V, V_{eeTX}=V_{eeRX}=GND, unless otherwise specified)

7.1 Transmitter Side

Parameter	Symbol	min.	Typ.	Max.	Unit	Note
Output Power to SMF/ MMF	Po	-9.5 / -11.5		-3.0 / -3.0	dBm	1, 2
Extinction Ratio	Er	9.0			dB	1
Center Wavelength	λc	1270		1355	nm	
Spectral Width (RMS)	Δλ			2.8	nm	
Relative Intensity Noise	RIN			-120	dB/Hz	
Rise/Fall Time (20~80%)	tr/tf			0.26	ns	3

Note 1. Measured with 1,250Mbps PRBS 2^23-1 NRZ, 50% duty cycle data,NRZ
Note 2. With MMF links, Transmitter shall be coupled through a singlemode fiber offset-launch mode-conditioning patch cord.
Note 3. 1.25Gbps 1010 Signal.Refer to Figure 3



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

Figure 3. Optical Pulse Mask with Fourth Order Bessel Thompson Filter Specified in ITU-T G.957

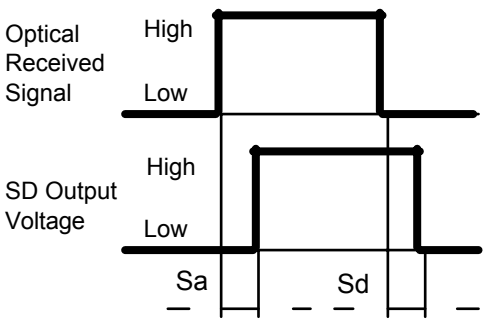
⚠ Warning

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	Symnol	Min.	Typ.	Max.	Unit	Note
Receiver Power	Pin	-20.0		-3.0	dBm	1
SD Assert Level	Pa	-30.0		-19.0	dBm	
SD Deassert Level	Pd	-30.0		-19.0	dBm	2
SD Hysteresis	Phys		3.0		dB	
SD Assert Time	Sa			100	μsec	2, 3
SD Deassert Time	Sd			350	μsec	

Note 1. BER = 1.0 X 10^{-12}, 1.25Gbps, PRBS 2^7-1
Note 2. 1.25Gbps, PRBS 2^7-1
Note 3. Refer to Figure 4

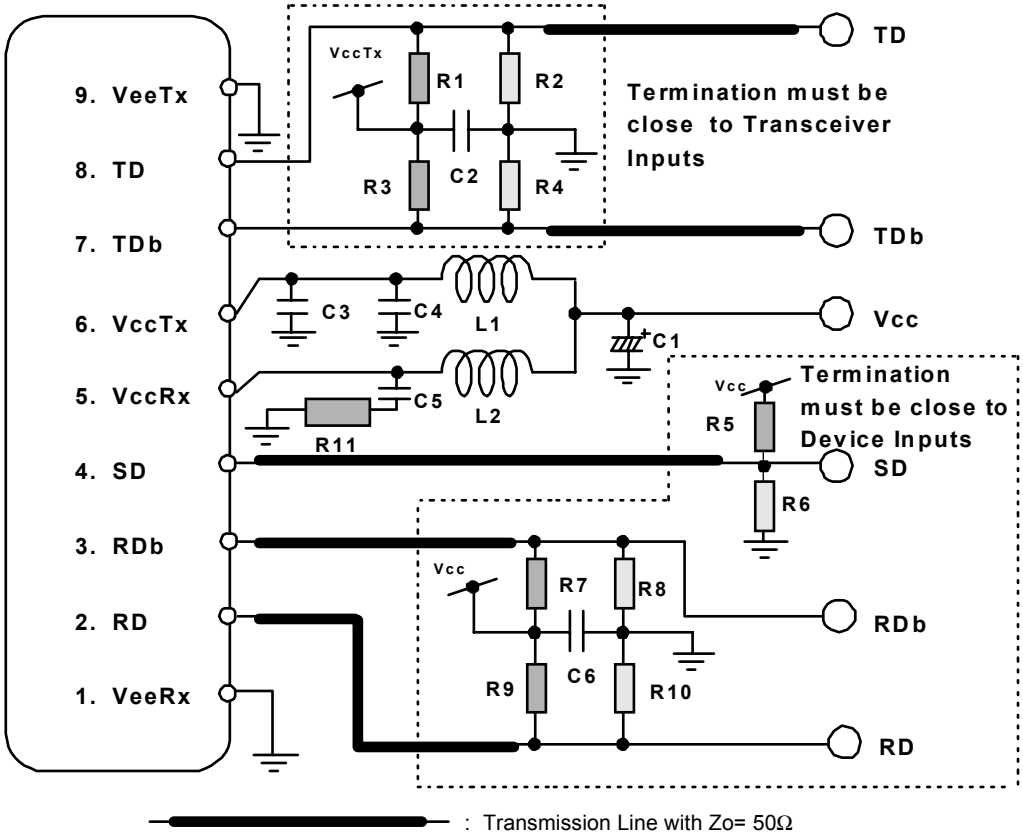


Relation between Optical Received Signal and Data Output

Optical Received Siganl	Data Output	
	RD	RDb
High (ON)	High	Low
Low (OFF)	Low	High

Figure 4. SD Timing Chart

8. Recommended Interface Circuit

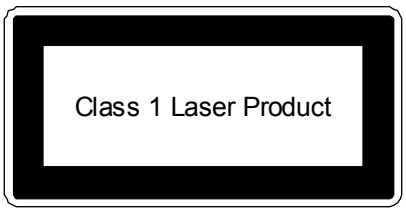


R1 = R3 = R5 = R7 = R9 = 130Ω , R2 = R4 = R6 = R8 = R10 = 82Ω , R11=10Ω
C1 = 100 µF, C3 = 2200 pF, C2 = C6 = 0.1 µF, C4 = C5 = 1 µF
L1, L2 : Ferrite Bead ZBF 253D-00 (TDK)

Figure 5. Recommended Interface Circuit

9.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 60825-1.



⚠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.

10. Reliability

Bellcore TA-NWT-000983 Issue 2, December 1993								
Heading	Test	Reference	Condition	Sampling			SEI Result	
				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

11.Other Precaution

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

The govermental 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 diposed 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 Temperature
SCM7104-XC	SC Duplex Connector, Non-metallized.	Tc = 0 ~ 70°C
SCM7104-GC-#N	SC Duplex Connector, Metallized. See chart below for detail.	

SCM7104-GC-# N

N : Operating Case Temperature Option
0°C ~ 70°C

EMI Shield Finger Option
Z : Without Finger
A ~ E : With Type-A Finger
*Letter specifies finger position.
Refer to Figure2-3 for detail.
G : With Type-G Finger (Figure 2-4)

13. For More Information

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