



Technical Specification for Optical Transceiver Module

SCM7102-XC

SCM7102-GC

☐ 155.52Mbps	☒ 622.08Mbps	☐ other _____
☒ Short Haul	☐ Long Haul	☐ other _____
☐ Intermediate Reach	☒ Long Reach	☐ other _____
☐ Single 5.0 V	☒ Single 3.3 V	☐ other _____
☒ 1.3 μ m	☐ 1.55 μ m	☐ other _____
☐ Transmitter	☐ Receiver	☒ Transceiver
	(☐ 2R / ☐ 3R)	(☒ 2R / ☐ 3R)



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.

indicates prohibition of actions. Action details are explained thereafter.

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

1. General

SCM7102-XC 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	622.08Mbps, NRZ
* Duty Cycle	50%
* Power Supply Voltage	Single +3.3V
* Electrical Interface	LVPECL for TD, TDb, RD, RDb LVTTTL for SD
* Fiber Coupled Power	-8 ~ -15dBm (Typ. -11dBm) for SMF
* Sensitivity	~ -28dBm (Typ. -34dBm)
* Connector Interface	SC Duplex Connector

The features of SCM7102-XC 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 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

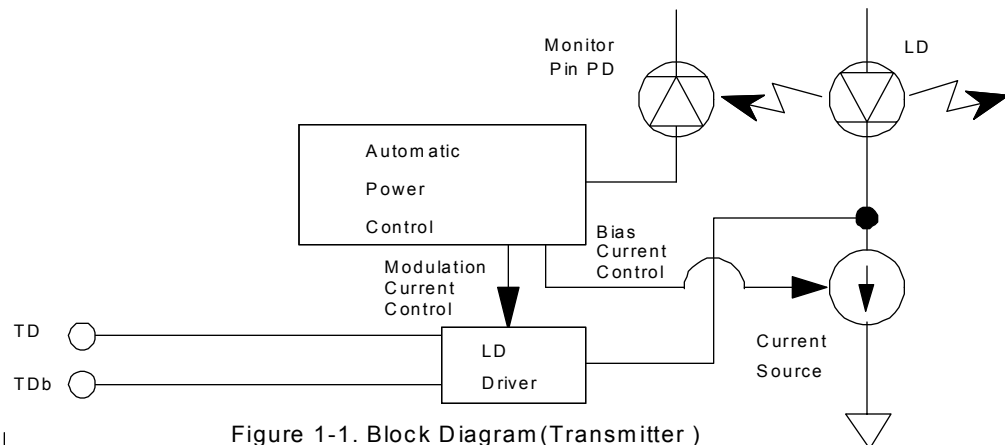


Figure 1-1. Block Diagram (Transmitter)

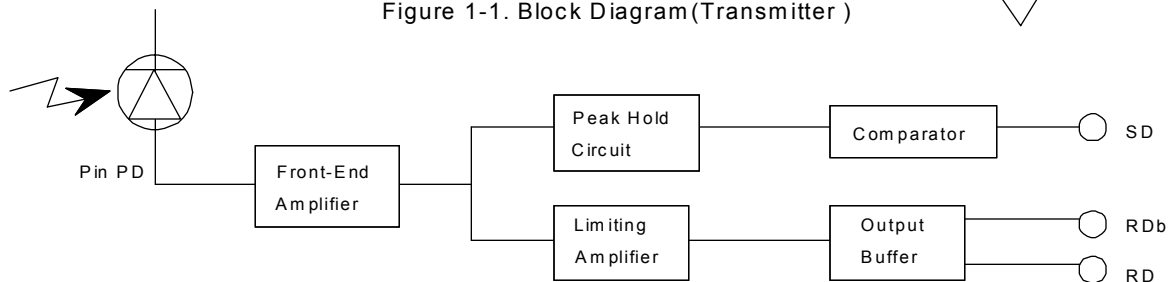


Figure 1-2. Block Diagram (Receiver)

3. Package Dimension

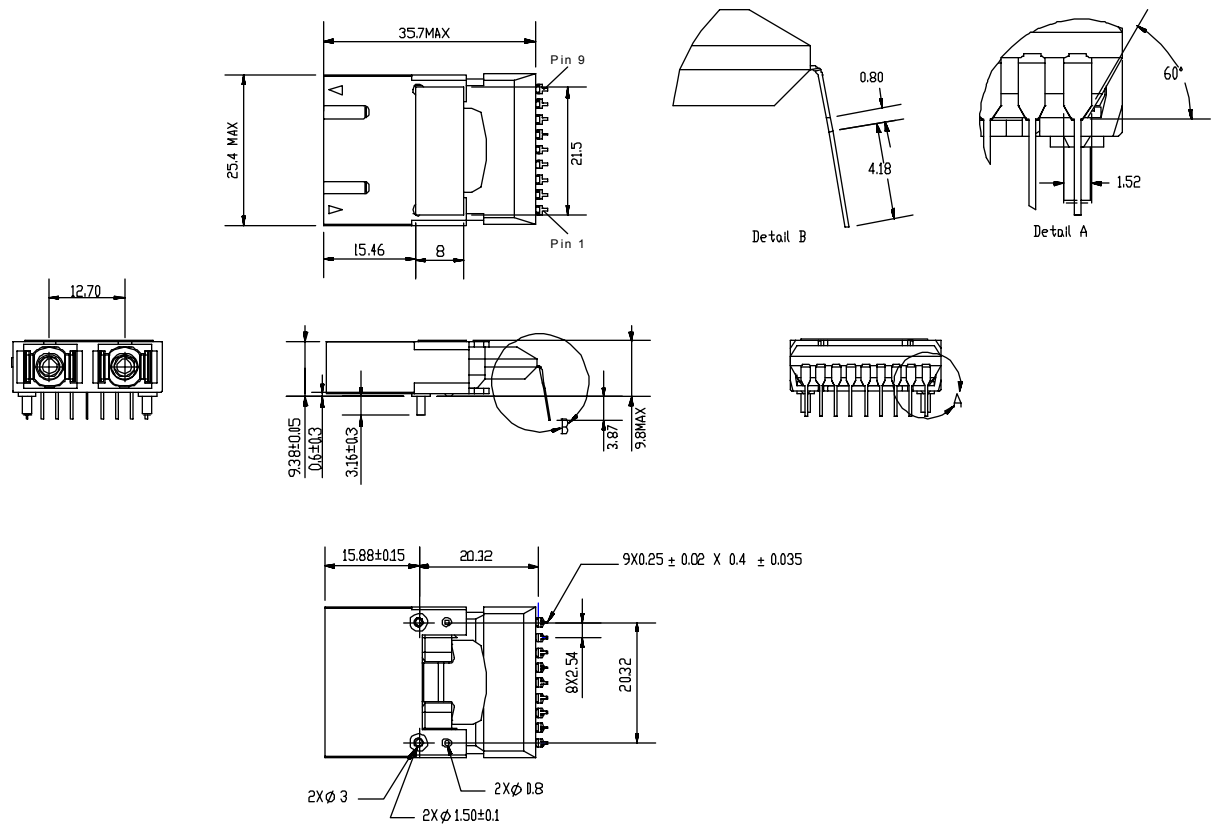
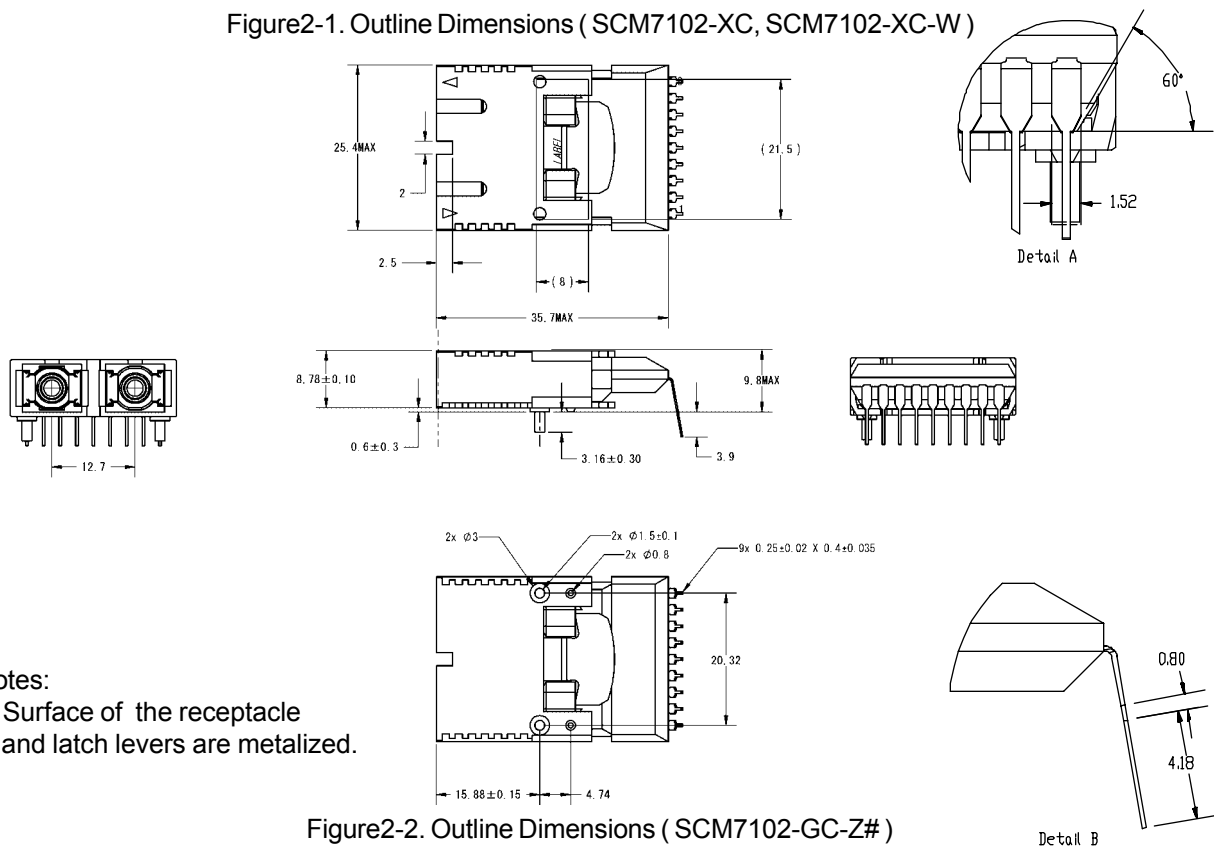


Figure2-1. Outline Dimensions (SCM7102-XC, SCM7102-XC-W)



Notes:

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

Figure2-2. Outline Dimensions (SCM7102-GC-Z#)

(SCM7102-XC, SCM7102-GC)

All dimensions are in mm.

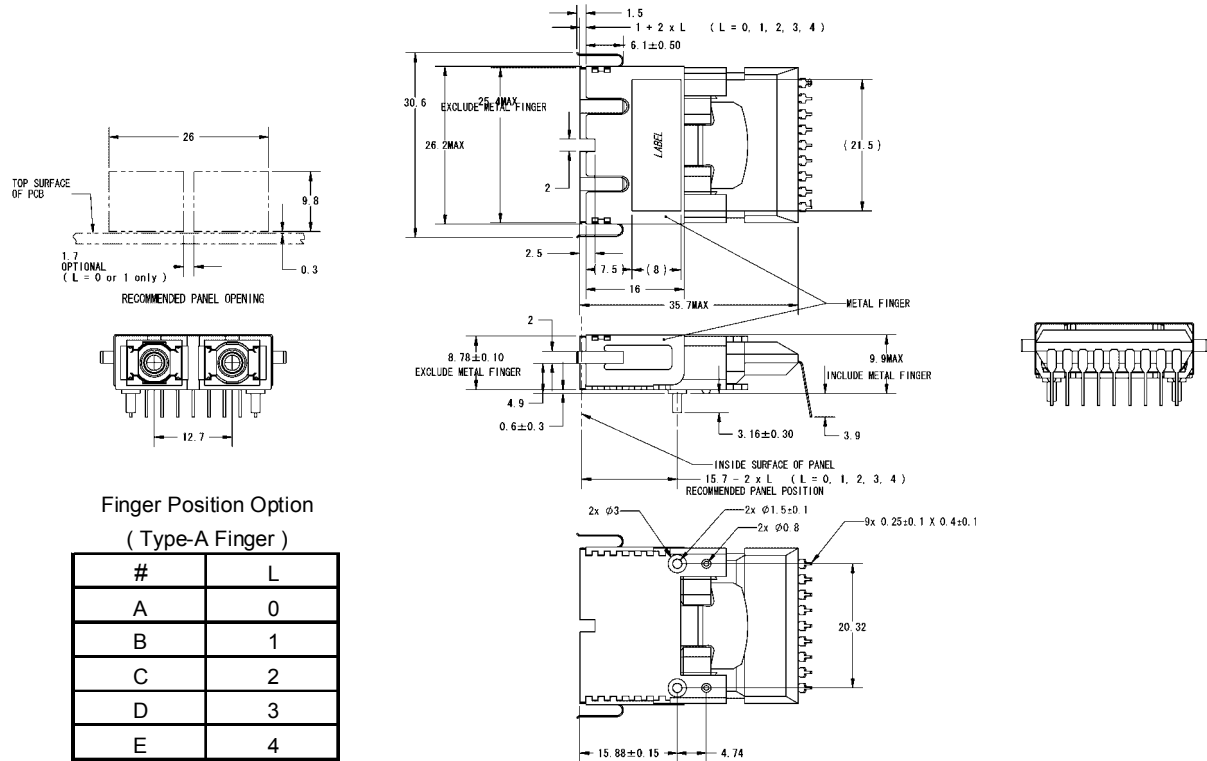


Figure2-3. Outline Dimensions (SCM7102-GC-#N, SCM7102-GC-#W)

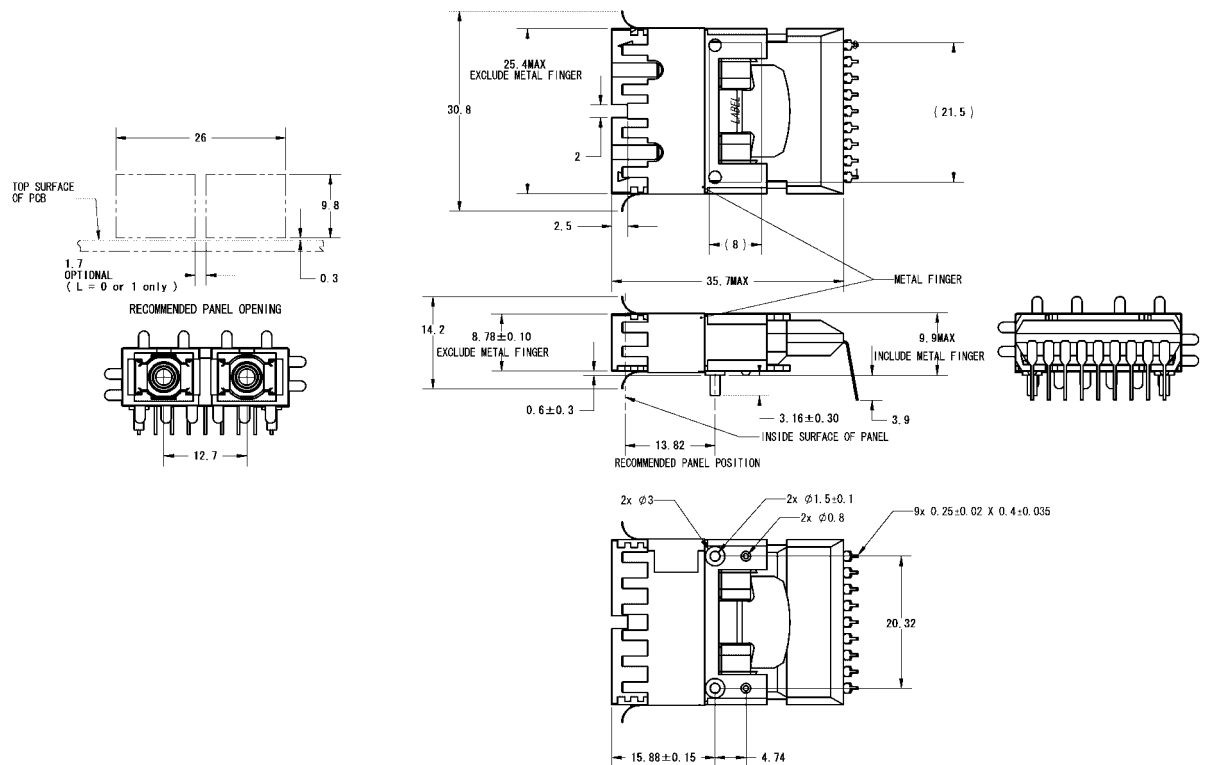


Figure2-4. Outline Dimensions (SCM7102-GC-G#)
(SCM7102-XC, SCM7102-GC)

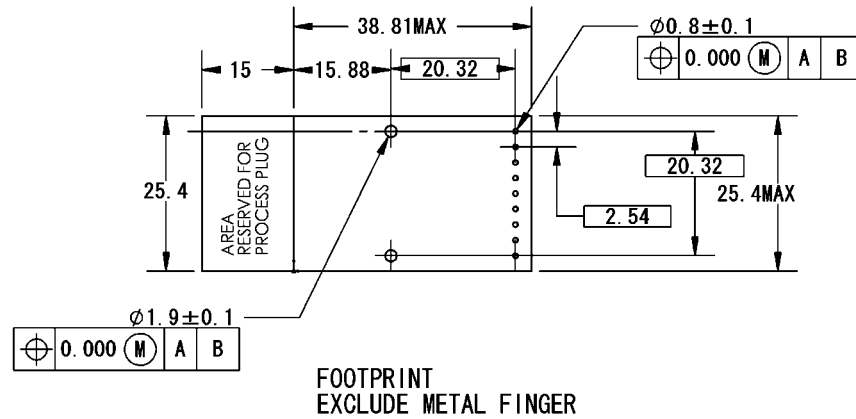


Figure2-5. Recommended Footprint

⚠ 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 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 +3.3V
6	VccTx	Power Supply (+) for Transmitter : Connected to +3.3V
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 Temperature	Tc	0	70	°C	1, 2
		-40	85	°C	1, 3
Supply Voltage	Vcc-Vee	0.0	4.0	V	4
Input Voltage	Vi	Vee	Vcc+0.5	V	5
Output Current	RD, RDb	Io	30	mA	
	SD		20		
Lead Soldering	Temperature		260	°C	6
	Time		10	sec.	

Note 1. No condensation allowed. 2. SCM7102-XC, SCM7102-GC-#N 3. SCM7102-XC-W, SCM7102-GC-#W

4. Vcc>Vee 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, $V_{CC}-V_{EE} = 3.14$ to 3.47 V and all operating temperature shall apply.)

6-1. Transmitter side

Parameter		Symbol	min.	Typ.	Max.	Unit	Note
Supply Voltage		$V_{CC_{TX}}-V_{EE_{TX}}$	3.14	3.30	3.47	V	
Supply Current		I_{dtx}		70	150	mA	1, 2
				70	190		1, 3
Input Voltage TD, TDb	High	V_{ih}	$V_{CC_{TX}}-1.17$		$V_{CC_{TX}}-0.73$	V	4
	Low	V_{il}	$V_{CC_{TX}}-1.95$		$V_{CC_{TX}}-1.45$		
Input Current TD, TDb	High	I_{ih}	-10		150	μA	4
	Low	I_{il}	-10		10		
Signal Input Rise / Fall Time					0.5	nsec.	5

Note 1. Input bias current is not included. 50% duty cycle data. 622.08Mbps, NRZ

2. SCM7102-XC, SCM7102-GC-#N 3. SCM7102-XC-W, SCM7102-GC-#W 4. $V_{CC_{TX}}-V_{EE_{TX}}=3.3V$, $T_c=25^{\circ}C$ 5. 20 ~ 80%

6-2. Receiver side

Parameter		Symbol	min.	Typ.	Max.	Unit	Note
Supply Voltage		$V_{CC_{RX}}-V_{EE_{RX}}$	3.14	3.30	3.47	V	
Supply Current		I_{dRX}		75	125	mA	1, 2
				75	145		1, 3
Data Output Voltage	High	V_{oh}	$V_{CC_{RX}}-1.10$		$V_{CC_{RX}}-0.86$	V	4
	Low	V_{ol}	$V_{CC_{RX}}-1.86$		$V_{CC_{RX}}-1.62$		
Data Rise / Fall Time of Output Signal		Trd / Tfd			0.5	nsec	5
SD Assert Time		Sa			100	μsec	6,9
SD Deassert Time		Sd			350	μsec	6,9
SD Output Voltage	High	SDV_{OH}	$V_{EE_{RX}}+2.20$		-	V	7
	Low	SDV_{OL}	-		$V_{EE_{RX}}+0.50$		8

Note 1. Output current is not included. 50% duty cycle data. 622.08Mbps

2. SCM7102-XC, SCM7102-GC-#N

3. SCM7102-XC-W, SCM7102-GC-#W

4. $V_{CC_{RX}}=+3.3V$, $T_c=25^{\circ}C$, Output load resistance

$R_L=50\Omega$ to $V_{CC_{RX}}-2V$ for RD, RDb .

5. 20 ~ 80%

6. Please refer to Figure 3

7. $I_O = 0.4mA$, $V_{CC_{RX}} - V_{EE_{RX}} = +3.3V$

8. $I_O = 2mA$, $V_{CC_{RX}} - V_{EE_{RX}} = +3.3V$

9. 50% Duty cycle data. 622.08Mbps, PRBS $2^{23}-1$, $P_{in} = -28 \sim -8dBm$

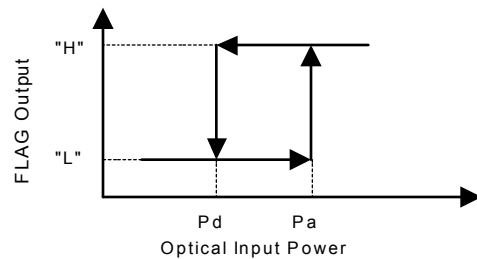


Figure 3. FLAG Assert Level and Deassert Level

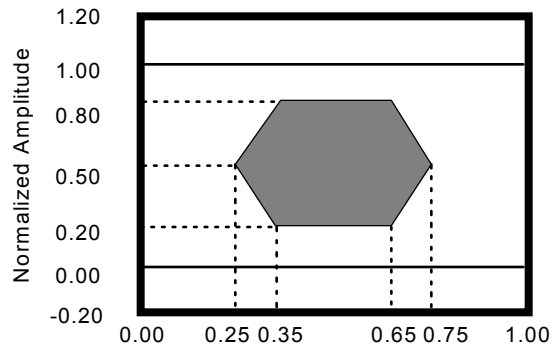
7. Optical Interface

(Unless otherwise specified, Vcc-Vee = 3.14 to 3.47 V and all operating temperature shall apply.)

7-1. Transmitter side

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	λ_c	1274		1356	nm	
Spectral Width (RMS)	$\Delta\lambda$			2.5	nm	
Eye Mask for Optical Output	Refer to Figure 4					

Note 1. Measured at 622.08Mbps PRBS2²³-1, 50% duty cycle data,NRZ



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

Figure 4. Optical Pulse Mask with Fourth Order

Bessel-Thomson 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	Symbol	min.	Typ.	Max.	Unit	Note
Center Wavelength	-	1261		1580	nm	
Minimum Sensitivity	Pmin		-34.0	-28.0	nm	1,2
Overload	Pmax	-8.0			nm	1,2
Flag Assert Level	Pa	-48	-36	-28	dBm	2
Flag deassert Level	Pd	-49	-39	-28	dBm	

Note 1. BER=10⁻¹⁰

2. Measured at the bit rate of 622.08Mbps, PRBS 223-1, NRZ, 50% Duty cycle data.

8. Recommended Interface Circuit

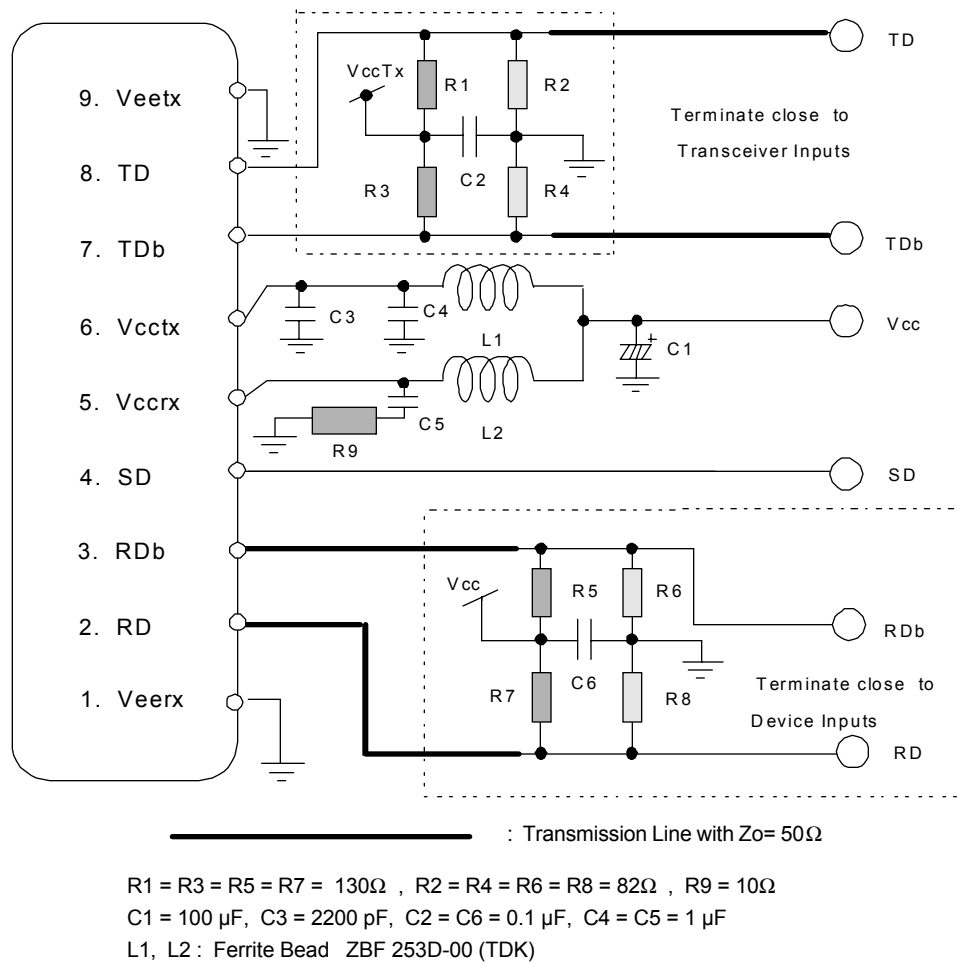


Figure 5. Recommended Interface Circuit

9. Reliability Test

Bellcore TA-NWT-000983 Issue 2, December 1993								
Heading	Test	Reference	Condition	Sampling			SEI Results	
				LTPD	SS	C	SS	F/C
Mechanical Integrity	Mechanical Shock	MIL-STD-883 Method 2002	Condition B					
			5 times/axis	20%	11	0	---	---
	500G, 1.0 ms	20%	11	0	11	0		
	1,500G, 0.5ms							
	Vibration	MIL-STD-883 Method 2007	Condition A	20%	11	0	11	0
			20 G					
Endurance	Accel. Aging (High Temp.)	(R)-453 Section 5.18	20-2,000 Hz					
			4 min/cycle; 4 cycles/axis					
	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	---	---	
Special Tests	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)	20%	11	0	---	---
			>2,000					
	Low Temp. Storage	-----	min. storage T (T=-40°C)	20%	11	0	11	0
			>2,000					
	Temperature Cycling	Section 5.20	- 40°C to +85°C					
			400 times pass/fail	20%	11	0	---	---
			500 times for info.	---	11	---	---	---
Damp Heat (if using epoxy)	MIL-STD-202 M103 or IEC 68-2-3	500 times pass/fail	20%	11	0	11	0	
		1000 times for info.	---	11	---	11	0	
		40°C , 95%, 56days	20%	11	0	11	0	
Cyclic Moisture Resistance	Section 5.23	or 85°C /85%RH 2,000hrs	20%	11	0	---	---	
		-----	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 acceptable FDA, complies with 21CFR1040. 10 and 1040.11. Also this product is a laser class 1 product acceptable IEC 825-1.

Class 1 Laser Product

⚠ Caution



If this product is used under conditions not recommended in the specification or this product is used with unauthorized revision, classification 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 contains 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
SCM7102-XC	SC Duplex Connector, Non-metallized.	Tc = 0 ~ 70°C
SCM7102-GC-#N	SC Duplex Connector, Metallized. See chart below for detail.	
SCM7102-XC-W	SC Duplex Connector, Non-metallized.	Tc = -40 ~ 85°C
SCM7102-GC-#W	SC Duplex Connector, Metallized. See chart below for detail.	

SCM7102 - GC - # *

└ 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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(SCM7102-XC, SCM7102-GC)