

## Technical Specification for Optical Transceiver Module

### SCM7111-XC

- |   |   |  |
|---|---|--|
| <input checked="" type="checkbox"/> 155.52Mb/s  | <input type="checkbox"/> 622.08Mb/s                           | <input type="checkbox"/> other _____                                     |
| <input type="checkbox"/> Short Haul             | <input checked="" type="checkbox"/> Long Haul                 | <input type="checkbox"/> other _____                                     |
| <input type="checkbox"/> Intermediate Reach     | <input checked="" type="checkbox"/> Long Reach                | <input type="checkbox"/> other _____                                     |
| <input type="checkbox"/> Single 5.0 V           | <input checked="" type="checkbox"/> Single 3.3 V              | <input type="checkbox"/> other _____                                     |
| <input checked="" type="checkbox"/> 1.3 $\mu$ m | <input type="checkbox"/> 1.55 $\mu$ m                         | <input type="checkbox"/> other _____                                     |
| <input type="checkbox"/> Transmitter            | <input type="checkbox"/> Receiver                             | <input checked="" type="checkbox"/> Transceiver                          |
|   | ( <input type="checkbox"/> 2R / <input type="checkbox"/> 3R ) | ( <input checked="" type="checkbox"/> 2R / <input type="checkbox"/> 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.

	<b>Warning</b>	Wrong operation without following this instruction may lead to human death or serious injury.
	<b>Caution</b>	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

SCM7111-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 DFB-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 +3.3V
* Electrical Interface	LVPECL for TD, TDb, RD, RDb LVTTTL for SD
* Fiber Coupled Power	-5 ~ +0dBm for SMF
* Sensitivity	-8 ~ -34dBm
* Connector Interface	SC Duplex Connector

The features of SCM7111-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

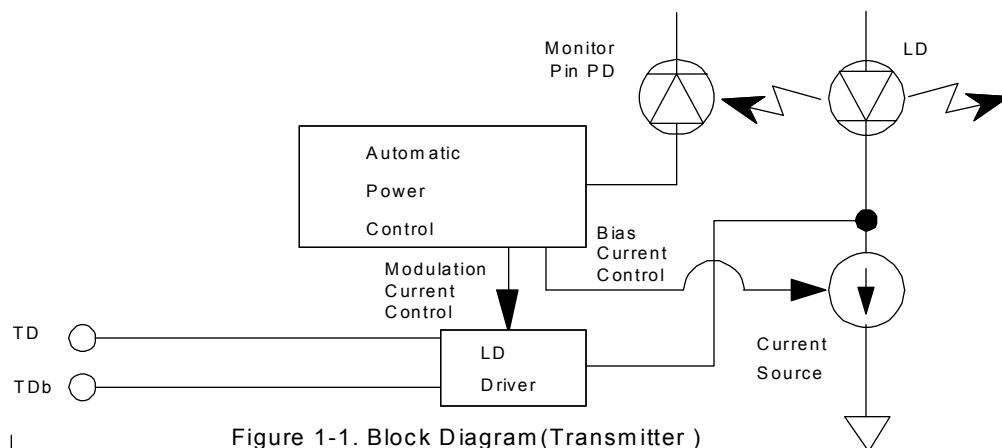


Figure 1-1. Block Diagram (Transmitter )

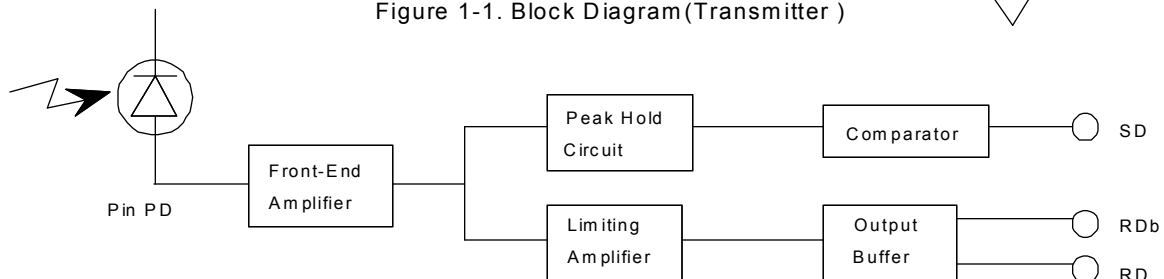


Figure 1-2. Block Diagram (Receiver )

### 3. Package Dimension

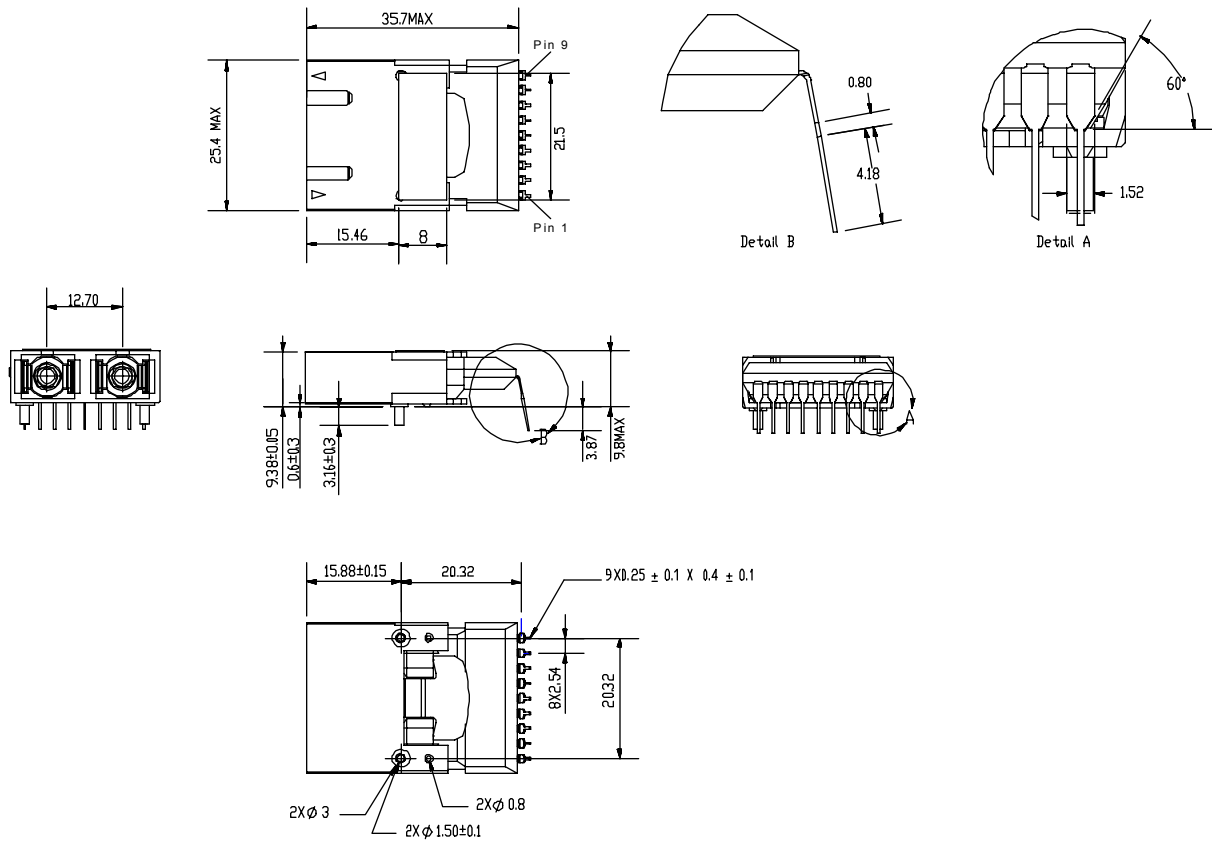


Figure 2. External View

### ⚠ 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	Veex	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

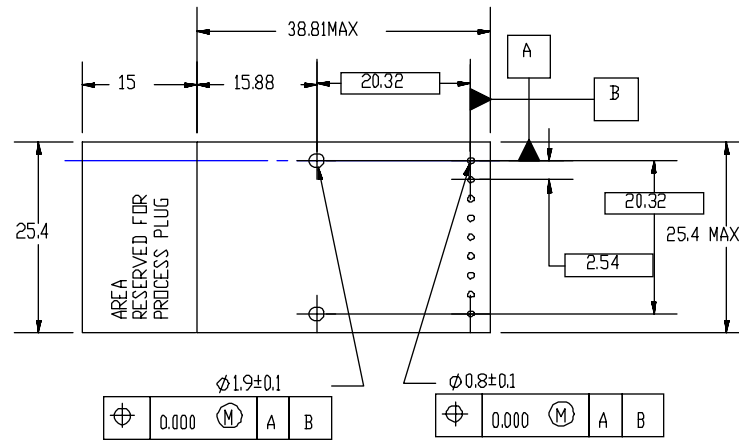


Figure 3 Footprint

## 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		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		30	mA	
	SD		20		
Lead Soldering	Temperature		260	°C	6
	Time		10	sec.	

Note 1. No condensation allowed. 2. SCM7111-XC 3. SCM7111-XC-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, Vcc-Vee = 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	Vcctx-Veetx	3.14	3.30	3.47	V	
Supply Current	Idtx		90	180	mA	1,2
			90	200		1,3
Input Voltage TD, TDb	High	Vih	Vcctx-1.17	Vcctx-0.73	V	4
	Low	Vil	Vcctx-1.95	Vcctx-1.45		
Input Current TD, TDb	High	Iih	-10	150	μA	4
	Low	Iil	-10	10		
Signal Input Rise / Fall Time				1.6	nsec.	5

Note 1. Input bias current is not included. 50% duty cycle data. 155.52Mbps, NRZ 2. SCM7111-XC 3. SCM7111-XC-W

4. Vcctx-Veetx=3.3V, Tc=25°C 5. 20 ~ 80%

## 6-2. Receiver side

Parameter	Symbol	min.	Typ.	Max.	Unit	Note
Supply Voltage	Vccrx-Veerx	3.14	3.30	3.47	V	
Supply Current	Idrx		75	125	mA	1
Data	High	Voh	Vccrx-1.10	Vccrx-0.86	V	2
Output Voltage	Low	Vol	Vccrx-1.86	Vccrx-1.62	V	
Data Rise / Fall Time of Output Signal	Trd / Tfd			1.6	nsec	3
SD Assert Time	Sa			100	μsec	4,7
SD Deassert Time	Sd			350	μsec	4,7
SD Output Voltage	High	SDVoh	Veerx+2.20	-	V	5
	Low	SDVol	-	Veerx+0.50	V	6

Note 1. Output current is not included. 50% duty cycle data. 155.52Mbps

2. Vccrx=+3.3V, Tc=25°C, Output load resistance

RL=50Ω to Vccrx-2V for RD, RDb .

3. 20 ~ 80%

4. Please refer to Figure 4

5. Io= 0.4mA, Vccrx - Veerx = +3.3V

6. Io= 2mA, Vccrx - Veerx = +3.3V

7. 50% Duty cycle data. 155.52Mbps, PRBS 2<sup>23</sup>-1, Pin = -34 ~ -8dBm

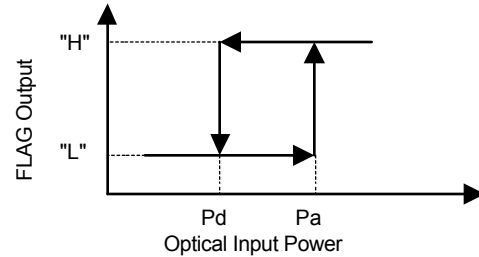


Figure 4. FLAG Assert Level and Deassert Level

## 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	-5.0		0.0	dBm	1
Extinction Ratio	Er	10.0			dB	1
Center Wavelength	λc	1280		1335	nm	
Spectral Width (-20dB)	Δλ20			1.0	nm	
Side Mode Suppression Ratio	Sr	30.0			dB	
Eye Mask for Optical Output	Compliant with ITU-T recommendation G.957					

Note 1. Measured at 155.52Mbps PRBS2<sup>23</sup>-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

### ⚠ 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.

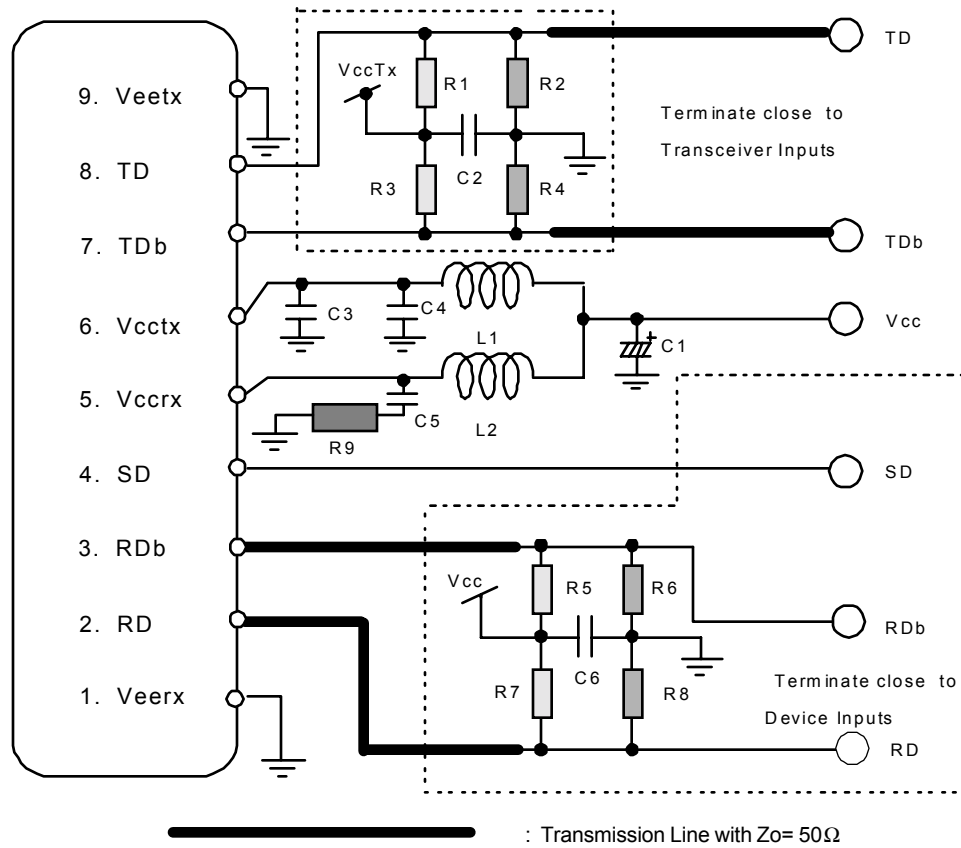
## 7-2. Receiver side

Parameter	Symbol	min.	Typ.	Max.	Unit	Note
Center Wavelength	-	1261		1580	nm	
Minimum Sensitivity	Pmin			-34.0	dBm	1,2
Overload	Pmax	-8.0			dBm	1,2
Flag Assert Level	Pa	-48	-36	-28	dBm	2
Flag deassert Level	Pd	-49	-39	-28	dBm	
Hysteresis	Hys	0.5	3		dB	

Note 1. BER=10<sup>-10</sup>

2. Measured at the bit rate of 155.52Mbps, PRBS 2<sup>23</sup>-1, NRZ, 50% Duty cycle data.

## 8. Recommended Interface Circuit



$R1 = R3 = R5 = R7 = 130\Omega$  ,  $R2 = R4 = R6 = R8 = 82\Omega$  ,  $R9 = 10\Omega$   
 $C1 = 100\mu F$  ,  $C3 = 2200\mu F$  ,  $C2 = C6 = 0.1\mu F$  ,  $C4 = C5 = 1\mu F$   
 $L1, L2$  : Ferrite Bead ZBF 253D-00 (TDK)

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
	Vibration	MIL-STD-883 Method 2007	1,500G, 0.5ms					
			Condition A	20%	11	0	11	0
	20 G	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	---	---	
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)	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.

 <b>Warning</b>	
	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.

 <b>Caution</b>	
	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
SCM7111-XC	SC Duplex Connector	Tc = 0 ~ 70°C
SCM7111-XC-W	SC Duplex Connector	Tc = -40 ~ 85°C

## 13. For More Information

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