

Technical Specification for Optical Transceiver Module

SCM7591-XC

<input checked="" type="checkbox"/> 155.52Mb/s	<input type="checkbox"/> 622.08Mb/s	<input type="checkbox"/> other _____
<input checked="" type="checkbox"/> Short Haul	<input type="checkbox"/> Long Haul	<input type="checkbox"/> other _____
<input checked="" 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 μ m	<input type="checkbox"/> 1.55 μ 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 the specification described hereinafter 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

SCM7591-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-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	155.52 Mbps, NRZ
* Duty Cycle	50%
* Power Supply Voltage	Single +3.3V
* Electrical Interface	PECL(Data)
* Fiber Coupled Power	-8 ~ -15dBm (Typ. -11dBm) for SMF
* Sensitivity	-8 ~ -28dBm
* Connector Interface	SC Duplex Connector

The features of SCM7591-XC are listed below.

* Features	Low Power Supply Voltage / Low Power Consumption Plastic Molded Package Multi-sourced Footprint
Transmitter.....	Uncooled Laser with Automatic Power Control IC Optical Output Shut-down (Disable) Laser Bias Current Monitor / Optical Output Power Monitor Class 1 Laser Product (IEC 825-1 and FDA 21 CFR 1040.10 and 1040.11)
Receiver.....	Wide Dynamic Range ITU-T G.957 / G.958 and Bellcore TA-NWT-000253 Compliant Signal Detect (FLAG) Function / Optical Input Power Monitor

2. Block Diagram

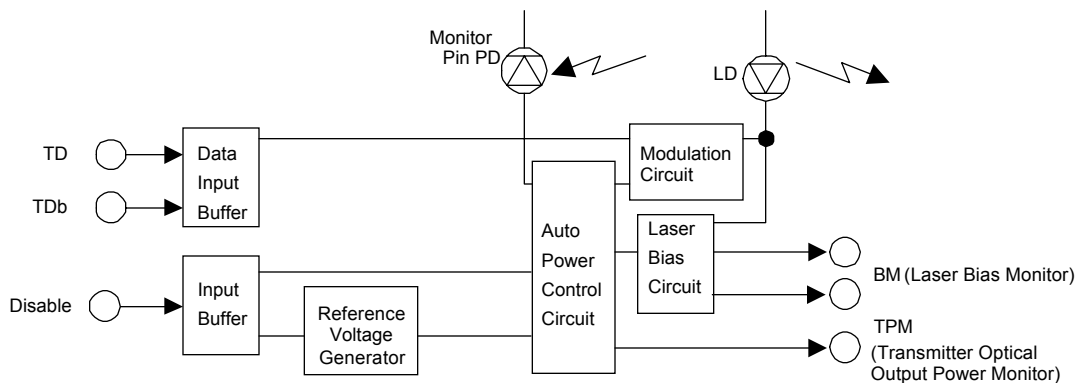


Figure 1-1. Block Diagram (Transmitter)

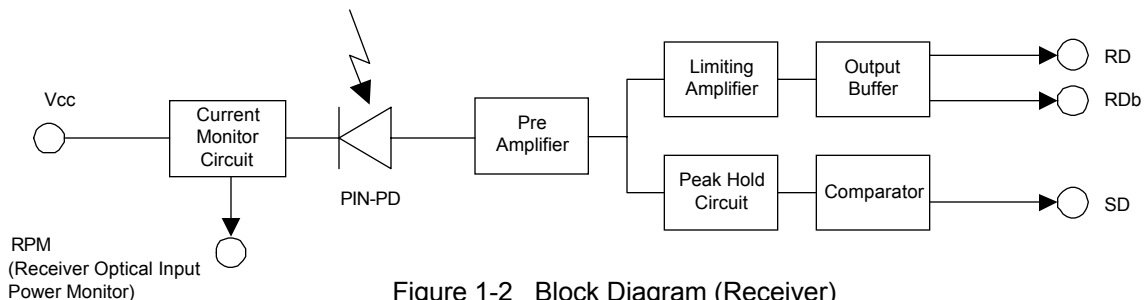


Figure 1-2 Block Diagram (Receiver)

3. Package Dimension

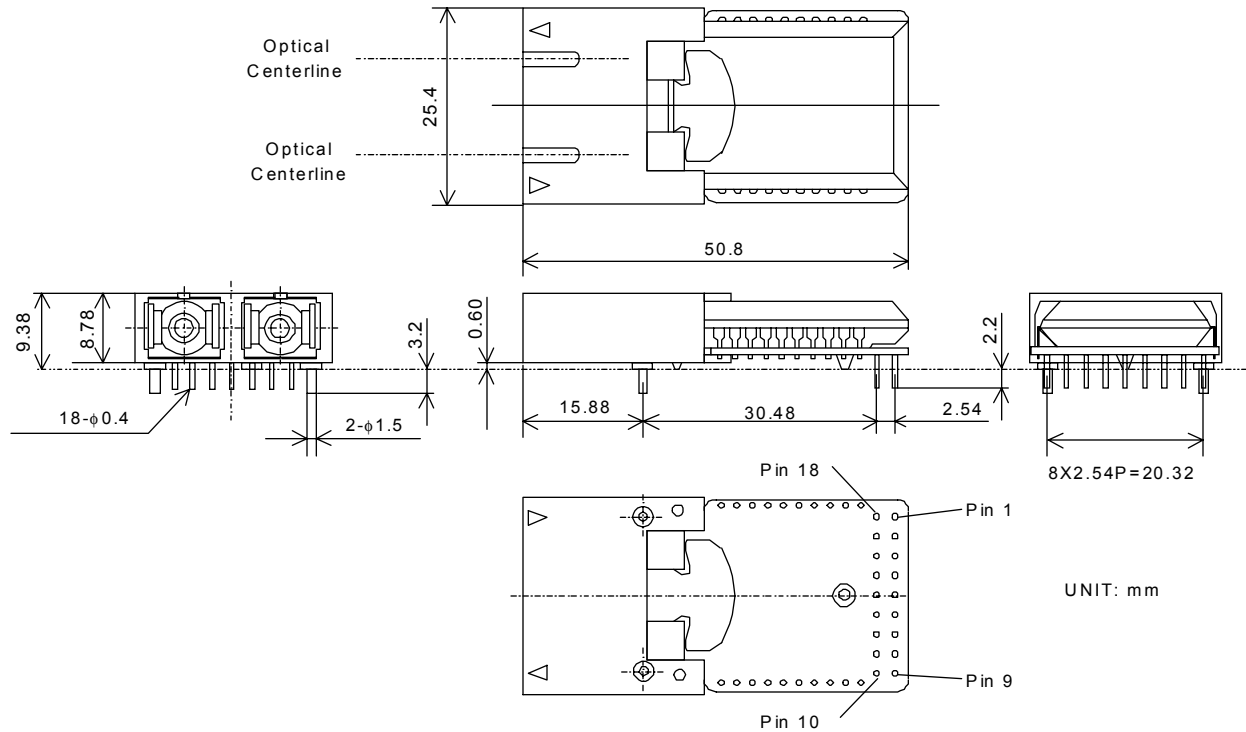


Figure 2. Package Dimension

⚠ 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. Pin Assignment

No.	Symbol	Function
1	NC	Non Connection (Internally)
2	NC	Non Connection (Internally)
3	NC	Non Connection (Internally)
4	NC	Non Connection (Internally)
5	BM(-)	Monitoring pin for LD Bias Monitor
6	BM(+)	Monitoring pin for LD Bias Monitor
7	Disable	LD Disable Input
8	RPM	Receiver Optical Input Power Monitor
9	TPM	Transmitter Optical Output Power Monitor
10	Veetx	Power Supply (-) for Transmitter : Connected to GND
11	TD	Transmitter Differential Data (Positive)
12	TDb	Transmitter Differential Data (Negative)
13	Vcctx	Power Supply (+) for Transmitter : Connected to +3.3V
14	Vccrx	Power Supply (+) for Receiver : Connected to +3.3V
15	FLAG(SD)	FLAG (Signal Detect)
16	RDb	Received Differential Data (Negative)
17	RD	Received Differential Data (Positive)
18	Veerx	Power Supply (-) for Receiver : Connected to GND

NC pins should be left open for additional functions in the future

5. Absolute Maximum Ratings

Parameter	Symbol	min.	Max	Unit	Note
Storage Case Temperature	Ts	-40	85	°C	1
Operating Case Temperature	Tc	-5	70	°C	1,2
		-40	85	°C	1,3
Supply Voltage	Vcc	0.0	4.0	V	4
Input Voltage	Vi	0.0	Vcc+0.5	V	5
Lead Soldering	Temperature		260	°C	6
	Time		10	sec.	

Note 1. No condensation allowed. 2.SCM7591-XC 3.SCM7591-XC-W

4. Vcc=+3.3V 5. TD, TDb, Disable 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 = 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	Vcc	3.14	3.30	3.47	V	
Supply Current	Idtx		70	140	mA	1, 2, 3, 4
			70	150		1, 2, 3, 5
Input Voltage	Vih	Vcc-1.17		Vcc-0.73	V	6, 7
TD, TDb		Vcc-1.95		Vcc-1.45		
Input Current	Iih	-10		150	μA	6, 7
TD, TDb		-10		10		
Signal Input Rise / Fall Time				1.5	nsec.	8
Disable Input Voltage	Vdi	2.0		Vcc	V	9
Disable Input Current	Idi	-10	140	200	μA	
Enable Input Voltage	Vei	0.0		0.8	V	
LD Bias Monitor Voltage	Vbm	0.01	0.05	0.50	V	7, 10
Optical Output Monitor	Low level			0.2	V	11
	Normal		0.6			
	High level	1.1				

Note 1. Input bias current is not included. 2. 50% duty cycle data 3. 155.52Mbps 4.SCM7591-XC 5.SCM7591-XC-W

6. Vcc=+3.3V 7. Tc=25°C 8. 20~80% 9. The transmitter is enabled as default state and requires an external voltage only to disable. (Refer to Section 8. Relation between Disable Input Voltage and Optical Output Power) 10. The Laser Bias Monitor Current are calculated as ratios of the corresponding voltages to their current-sensing resistor, 10Ω (See Figure 3). Upon Measuring or utilizing these values, please use a device whose Impedance is high enough (>1MΩ) compared with those resistors. 11. The relationship between the Output Power Change and the Transmitter Optical Power Monitor Voltage is shown in Figure 4.

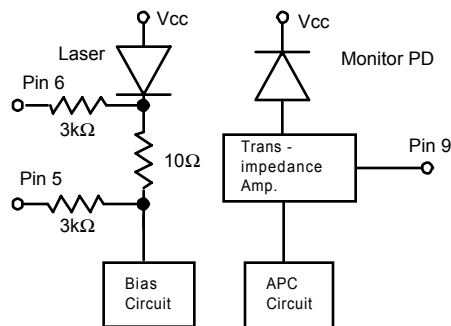


Figure 3. Monitor Pin

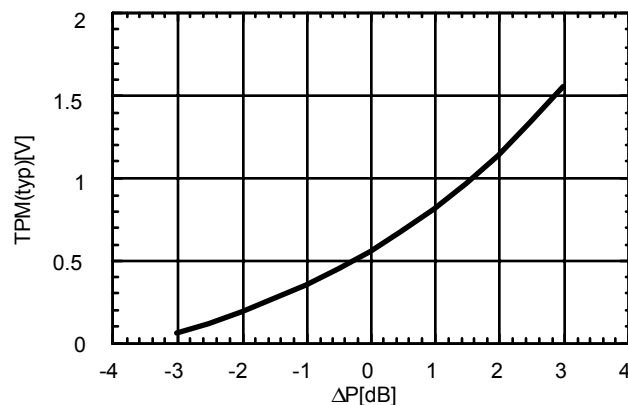


Figure 4. Output Power Change versus the Optical Output Monitor Voltage (typ.)

6-2. Receiver side

Parameter		Symbol	min.	Typ.	Max.	Unit	Note
Supply Voltage		Vcc	3.14	3.30	3.47	V	
Supply Current		I _{drx}		95	125	mA	1
Data and SD(FLAG)	High	V _{oh}	V _{cc} -1.10		V _{cc} -0.86	V	2
Output Voltage	Low	V _{ol}	V _{cc} -1.86		V _{cc} -1.62		
Data Rise / Fall Time		Trd / Tfd			1000	psec.	3
SD (FLAG) Assert Time		T _a			100	μsec	4
SD(FLAG) Deassert Time		T _d			350	μsec	
Optical Input Power Monitor	@-20dBm	V _{rpm}		2.5		V	5
	@-34dBm			0.1			

Note

- Output current is not included. 155.52Mbps, PRBS2²³-1.
- V_{cc}=+3.3V, T_c=25°C, Output load resistance R_L=50Ω to V_{cc}-2V for RD, RDb and FLAG.
- 20~80%
- 155.52Mbps, PRBS 2²³-1, NRZ
- The relationship between the Optical Input Power and the Optical Input Monitor Voltage is shown in Figure 5.

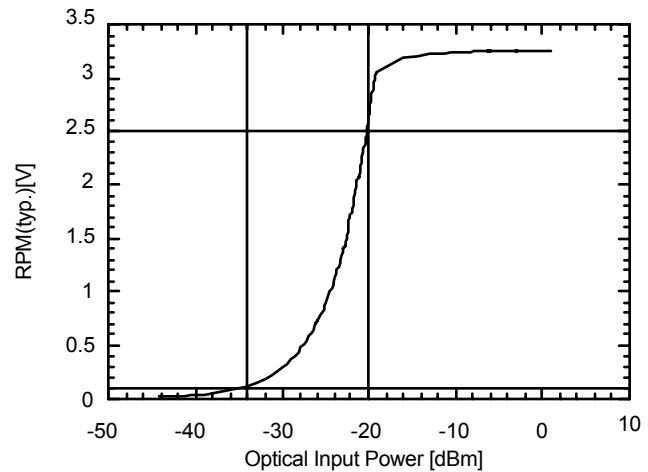


Figure 5. Input Power versus the Optical Input Monitor Voltage (typ.)

7. Optical Interface

(Unless otherwise specified, V_{cc} = 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	P _o	-15.0		-8.0	dBm	1
Extinction Ratio	E _r	8.2			dB	1
Center Wavelength	λ _c	1261		1360	nm	
Spectral Width (RMS)	Δλ			7.7	nm	
Eye Mask for Optical Output	Refer to Figure 6					

Note 1. Measured at 155.52Mbps PRBS2²³-1

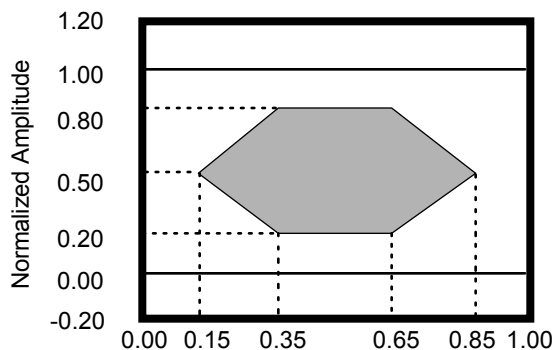


Figure 6 Optical Pulse Mask with Fourth Order Bessel-Thomson Filter Specified in ITU-T G.957

Relation between Input Signal and Optical Output Signal

Input Signal		Optical Output 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			-28.0	dBm	1, 2
Overload	Pmax	-8.0			dBm	1, 2
Flag Assert Level	Pa		-37		dBm	2
Flag Deassert Level	Pd		-40		dBm	
FLAG Hysteresis	Phys		3		dB	

Note 1. BER=10⁻¹⁰2. Measured at the bit rate of 155.52Mbps, PRBS 2²³-1, NRZ

8. Relation between Disable Input Voltage and Optical Output Power

Disable Input Voltage	Optical Output Power
"L"(0.0 ~ 0.8V)	Enabled
"H"(2.0V ~ Vcc)	Disabled (<-45dBm)

9. Reliability Test

GR-468-CORE Issue 1, December 1998 Laser Module

HEADING	TEST	REFERENCE	CONDITIONS	SAMPLING			ENV'T		Sumitomo Result	
				LTPD	SS	C	CO	RT/ UNC	SS	Pass/Fail
Mechanical Integrity	Mechanical Shock	MIL-STD-883 Method 2002	5 times/axis w/o TEC 1,500G, 0.5ms	20	11	0	R	R	11	Pass
	Vibration	MIL-STD-883 Method 2007	Cond. A 20G, 20-2,000G Hz, 4min/cy, 4cy/axis	20	11	0	R	R	11	Pass
	Thermal Shock	MIL-STD-883 Method 1011	Delta T=100degC 0degC to 100degC	20	11	0	R	R	11	Pass
	Solderability	MIL-STD-883 Method 2003	(steam aging not required)	20	11	0	R	R	11	Pass
Endurance	Accel. Aging (High Temp.)	(R)-4-53 Section 5.18	85degC; rated power 2,000 hrs. 5,000 hrs.	-	25 10	-	-	R O	25 25	Pass Pass
	Low Temp. Storage	-	min, storage T 2,000 hrs.	20	11	0	O	O	11	Pass
	Temperature Cycling	Section 5.20	-40degC to +85degC 500 pass/fail 1,000 for info.	20	11	0	-	R	11	Pass
	Damp Heat	MIL-STD-202 Method 103 or IEC-68-2-3	85degC/85%RH 1,000hrs.	20	11	0	R	R	11	Pass
	Cyc. Moist., Res.	Sec. 5.23	-	20	11	0	-	R	11	Pass
Special Tests	Internal Moisture	MIL-STD-883 Method 1018	Max. 5,000ppm water vapour	20	11	0	R	R	11	Pass
	ESD Threshold	Section 5.22	-	-	6	-	R	R	6	----

LTPD (in %); min. acceptable sample size(SS) and corresponding number of allowed failures (C)

CO; Conditional Objective

RT/UNC; Room Temp. / Uncontrol

R; Requirement

O; Objective

10. Laser Safety




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




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
SCM7591-XC	SC Duplex Connector	Tc = -5~70°C
SCM7591-XC-W	SC Duplex Connector	Tc = -40~85°C

13. For More Information

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(SCM7591-XC)