



Technical Specification for Optical Transceiver Module

SCM6308

- | | | |
|---|---|--|
| ☐ 155.52Mbps | ☐ 622.08Mbps | ☒ other 2488.32Mbps |
| ☒ 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 (2 X 10) |
| | (☐ 2R / ☐ 3R) | (☒ 2R / ☐ 3R) |

Applicable Part Numbers : SCM6308-XL-ZN, SCM6308-XL-DN



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

Features and applications of SCM6308 are listed below.

Features

* Multi Bit Rate Operation	155Mbps ~ 2.5Gbps
* Power Supply Voltage	Single +3.3V
* Compact Package Size	49.0 X 13.59 X 9.8 mm (max.)
* Electrical Interface	AC for DATA and LVTTTL for Signal Detect and Laser Disable
* Fiber Coupled Power	-5 ~ 0dBm into SMF
* Input Power Range	0 ~ -18dBm
* Monitor Functions	Laser Bias Monitor, Rear Facet Monitor
* Laser Disable Function	
* Signal Detect (SD) Function	
* Connector Interface	LC Duplex Connector

Applications

*Telecommunications	*Data communications
> SONET/IR, SDH/SH Application	>High Speed Rack-to-Rack Data Links
> ATM Application	
> Shelf-to-Shelf Multi Bit Rate Application	
> Subscriber Loop	
> Metropolitan Area Network	

2. Block Diagram

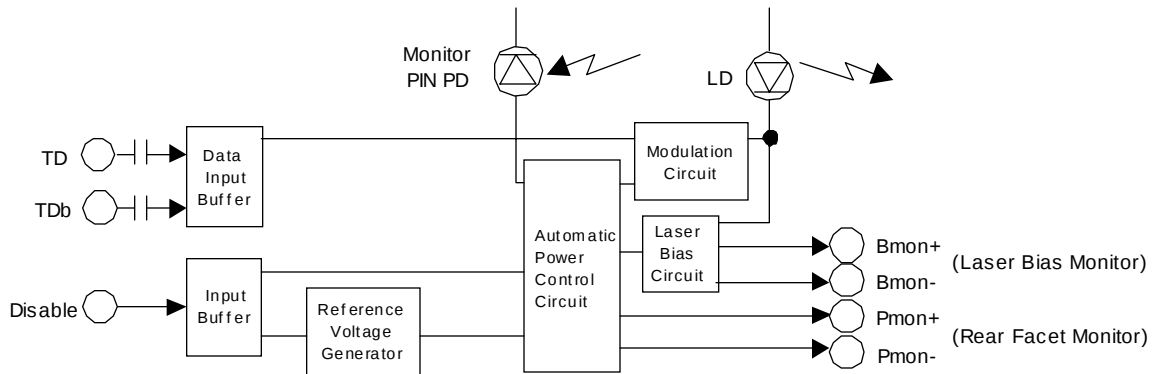


Figure 1. Block Diagram (Transmitter)

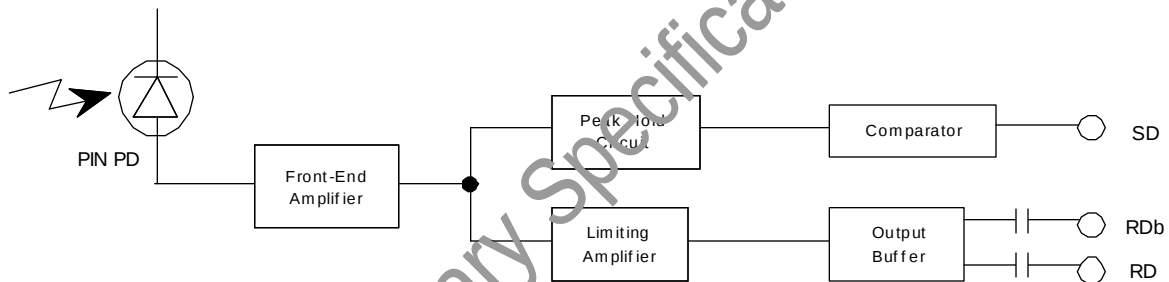


Figure 2. Block Diagram (Receiver)

⚠ 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.

3. Package Dimension

*All dimensions are in mm.

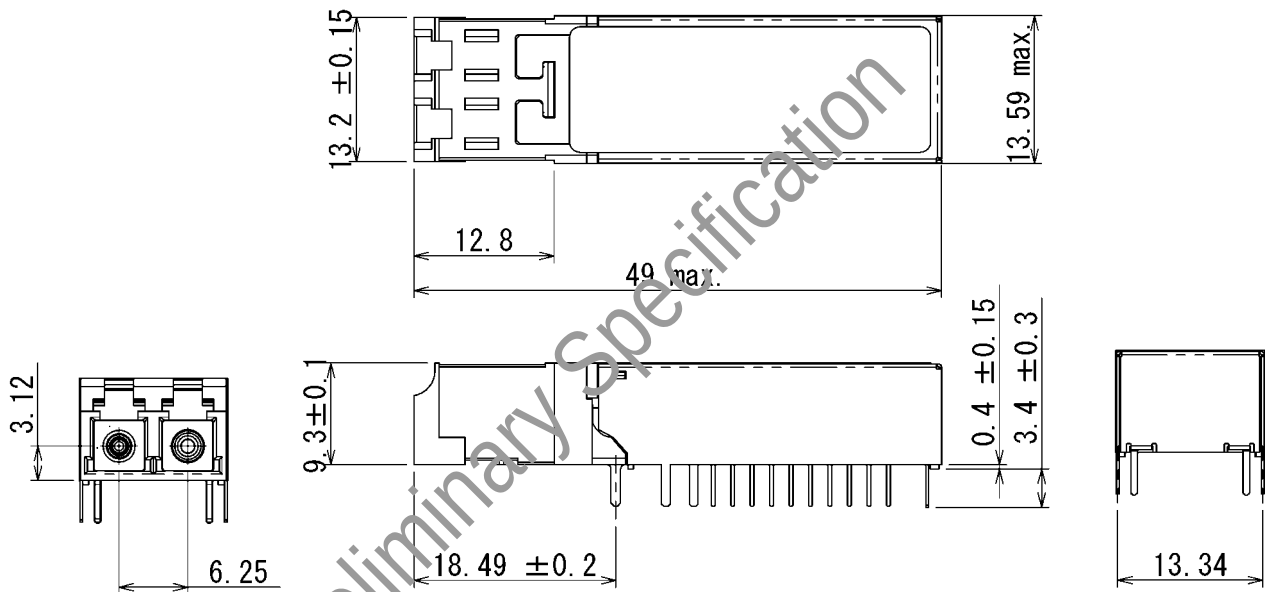


Figure 3. Outline Dimensions (SCM6308-XL-ZN)

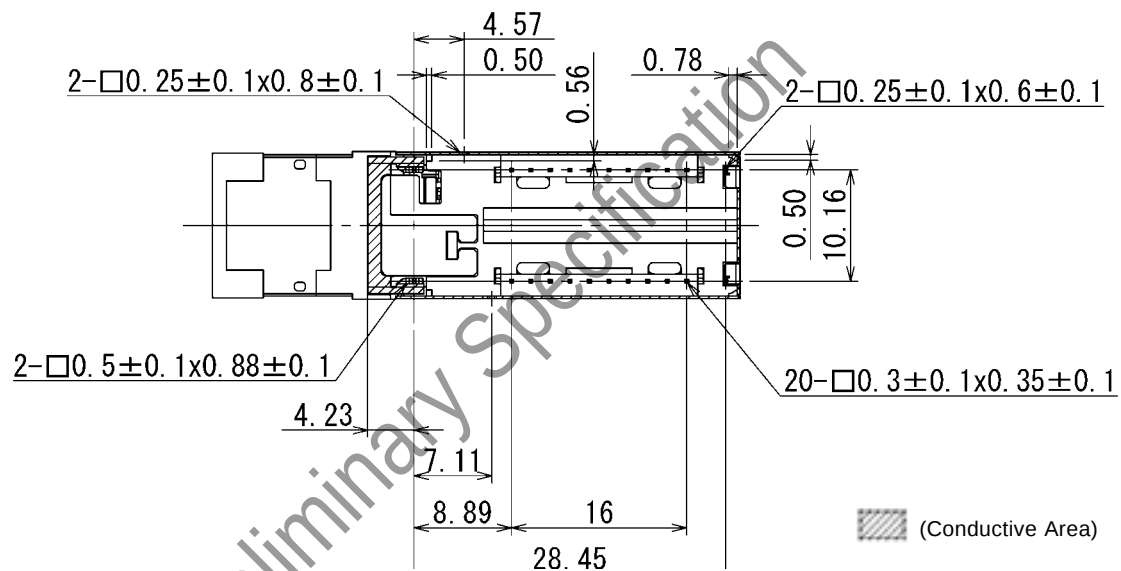
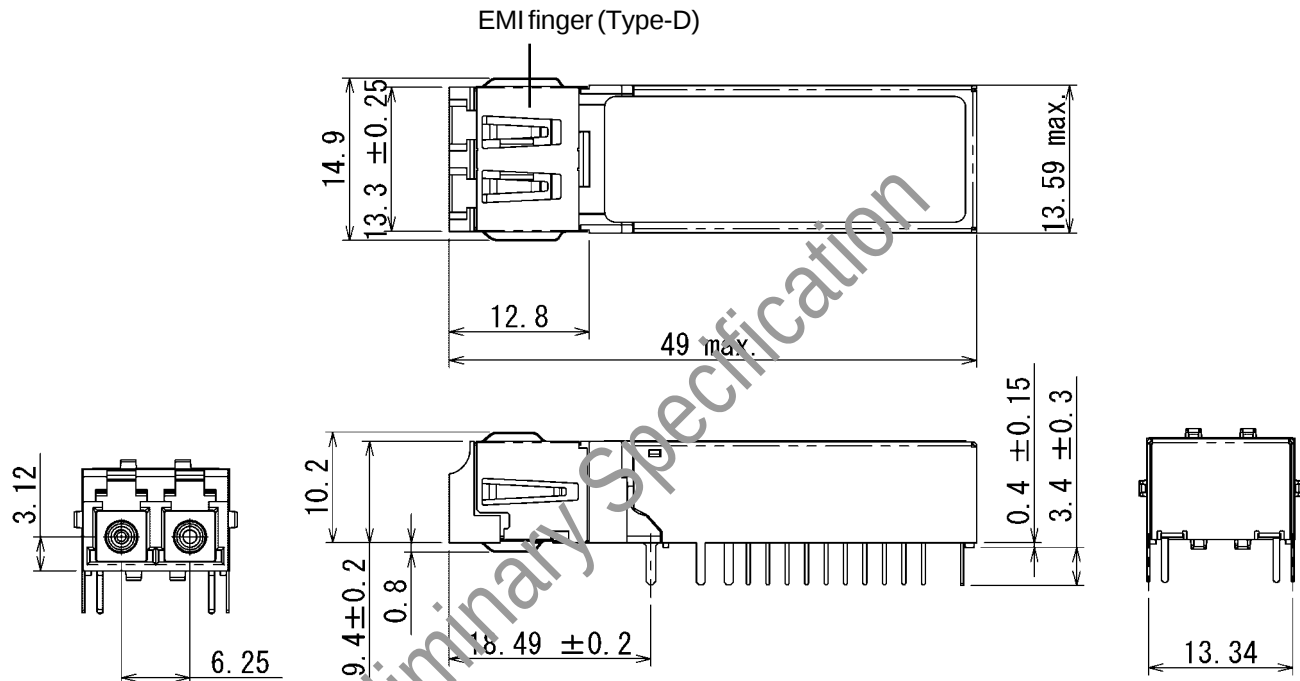


Figure 4. Bottom Side (SCM6308-XL-ZN)



Type-D EMI finger is an option for transceivers to be used on the card-edge with the receptacle protruding through a panel opening. It has fingers on four sides to make electrical contact with the sides of the bezel opening for grounding purpose.

Figure 5. Outline Dimensions (SCM6308-XL-DN)

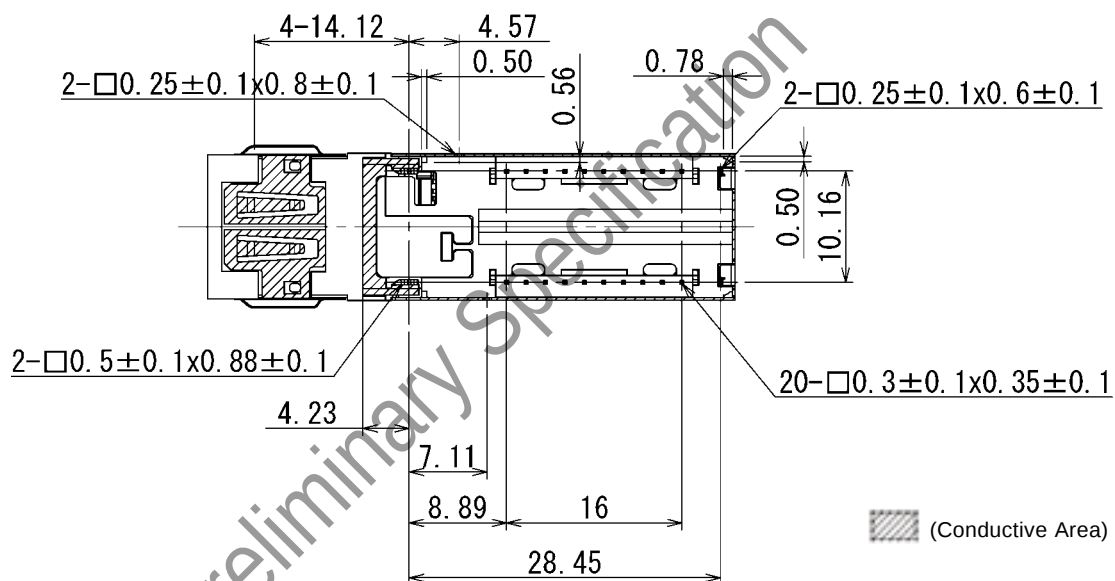
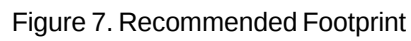


Figure 6. Bottom Side (SCM6308-XL-DN)



4. Pin Assignment

No.	Symbol	I/O/P	Level	Description
1	VpdR	P	+3.3V DC	DC Bias Supply for Receiver PIN-PD. Must be tied to Vcc.
2	VeeR	P	GND	Power Supply (-) for Receiver.
3	VeeR	P	GND	Power Supply (-) for Receiver.
4	NC			No User Connection.
5	NC			No User Connection.
6	VeeR	P	GND	Power Supply (-) for Receiver.
7	VccR	P	+3.3V DC	Power Supply (+) for Receiver.
8	SD	O	LVTTL	Signal Detect. High level indicates presence of optical input signal (Active High).
9	RDb	O	AC	Inverted Receiver Output Data. Internally AC Coupled and biased LVPECL.
10	RD	O	AC	Non-Inverted Receiver Output Data. Internally AC Coupled and biased LVPECL.
11	VccT	P	+3.3V DC	Power Supply (+) for Transmitter.
12	VeeT	P	GND	Power Supply (-) for Transmitter.
13	Tdis	I	LVTTL/LVCMOS	Transmitter Disable (Active High). Defaults to logic 0 (enable TX) when left open.
14	TD	I	AC	Non-Inverted Transmitter Input Data. Internally AC Coupled and 100Ohm (Differential) terminated input.
15	TDb	I	AC	Inverted Transmitter Input Data. Internally AC Coupled and 100Ohm (Differential) terminated input.
16	VeeT	P	GND	Power Supply (-) for Transmitter.
17	Bmon-	O	Analog Voltage	LDBias Current Monitor. Voltage difference between pins 17 and 18 is proportional to the laser bias current.
18	Bmon+	O	Analog Voltage	
19	Pmon-	O	Analog Voltage	Rear Facet Monitor. Transmitter output power can be monitored, in terms of rear facet monitor PD current, by measuring voltage difference between pins 19 and 20.
20	Pmon+	O	Analog Voltage	

Notes:

1. I/O/P stand for signal input, signal output, and DC power/bias supply, respectively.
2. Refer to figure 11 for details of Bmon and Pmon outputs.

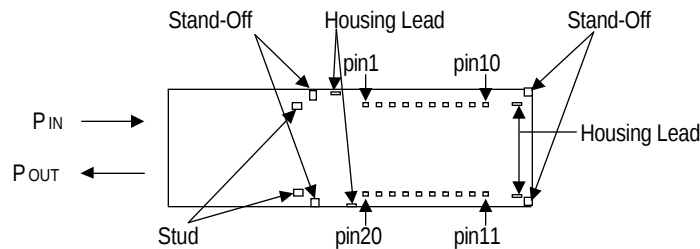


Figure 9. Bottom View

- * Mounting Studs are provided for mechanical support to the circuit board.
It is recommended that the holes in the circuit board be connected to frame ground.
- * Stand-Offs provide gap between the circuit board and the module to help escape residual water after aqueous wash.

5. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Case Temperature	Ts	-40		85	°C	1
Operating Case Temperature	Tc	-5	-	70	°C	1
Supply Voltage	Vcc	0.0	-	4.0	V	
PIN-PD Bias Voltage	VpdR		-	7.0	V	
Input Voltage	Vi	0.0	-	Vcc+0.5	V	2
Lead Soldering	Temperature	Ltemp		260	°C	3
	Time	Ltime		10	sec.	

Notes

1. No condensation allowed.
2. Tdis
3. 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, $V_{cc} = 3.135$ to 3.465 V and all operating temperature shall apply.)

6-1. Transmitter side

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V_{cc}	3.135	3.30	3.465	V	
Supply Current	I_{dtx}		95	200	mA	1, 2
Differential Input Voltage Swing (TD,TD _b)	V_{in}	0.4		2.00	V _{p-p}	3
Signal Input Rise/Fall Time	t_r / t_f			120	psec	4
Tdis Input Voltage	High	V_{di}	2.0	V_{cc}	V	5
	Low	V_{ei}	0.0	0.8	V	
Turn-on Time	t_{on}			1	ms	6
Turn-off Time	t_{off}			10	μs	6
LD Bias Monitor Voltage	V_{bm}	5		700	mV	1, 7
Rear Facet Monitor Voltage	V_{rfm}	10		200	mV	1, 7

Notes

- 50% duty cycle data.
- 2488.32Mbps
- Refer to Figure 12.
- 20 ~ 80%
- LVTTTL input. Refer to Section 8, "Relation between Disable Input Voltage and Optical Output Power", for detail.
- Refer to Figure 10.
- The Laser Bias Monitor Current and Rear Facet Monitor Current are calculated as ratios between the corresponding voltages and current sensing resistors, 200Ω , as shown in the Figure 11.

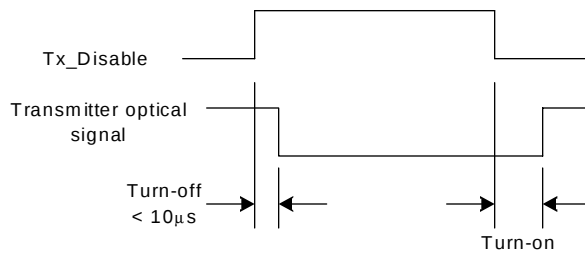
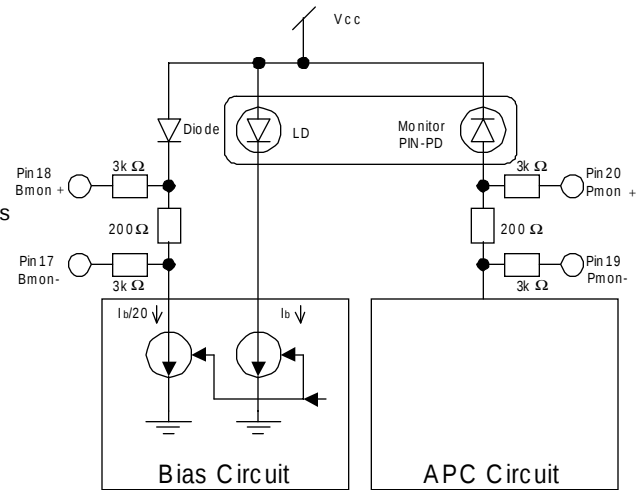


Figure 10. Definition of Turn-on / Turn-off Time



Resistance values are typical.

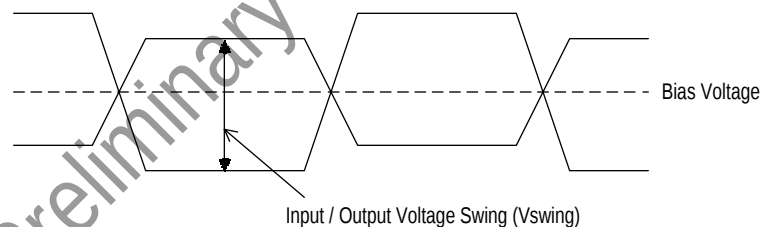
Figure 11. Bmon / Pmon Circuit Detail

6-2. Receiver side

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V_{cc}	3.135	3.30	3.465	V	
Supply Current	I_{drx}		95	150	mA	
PIN-PD Bias Voltage	V_{pdR}	2.40	3.3	5.25	V	
Differential Output Voltage Swing (RD,RD _b)	V_{out}	0.8		1.9	V _{p-p}	
SD Output Voltage	High	V_{soh}	2.40	V_{cc}	V	
	Low	V_{sol}	0.0	0.5	V	
Data Rise / Fall Time	t_r / t_f		140 / 120		psec	1
SD Assert Time	t_a	2.3		100	μsec	2
SD Deassert Time	t_d	2.3		350	μsec	

Notes

- 20~80%
- 2488.32Mbps, PRBS 2²³-1, NRZ



Differential Input / Output Voltage Swing (V_{in} / V_{out}) = 2 X V_{swing}

Figure 12. Definition of Differential Input / Output Voltage Swing

7. Optical Interface

(Unless otherwise specified, Vcc = 3.135 to 3.465 V and all operating temperature shall apply.)

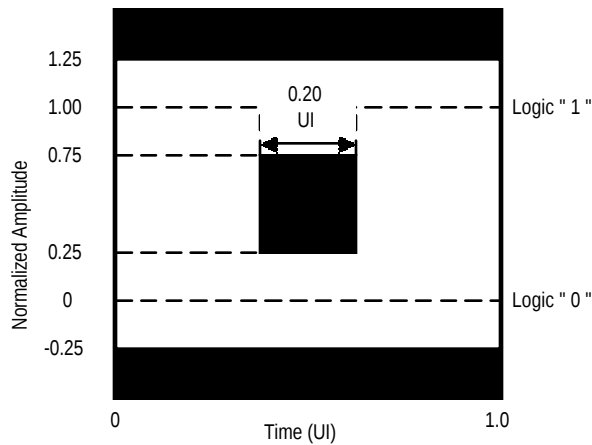
7-1. Transmitter side

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Average Output Power	Po	-5.0		0.0	dBm	1
Extinction Ratio	Er	8.2			dB	1
Center Wavelength	λ_c	1260		1360	nm	
Spectral Width (-20dB Width)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	Sr	30			dB	
Eye Mask for Optical Output	Compliant with Bellcore GR-253 CORE and ITU G957					
Jitter Generation	Tjpk			0.1	Ulp-p	2
	Tjrms			0.01	Ulrms	

Note 1. Measured at 2488.32Mbps PRBS2²³-1, 50% duty cycle, NRZ, Tdis = L (Tdis = H : Max -45dBm)

2. SONET OC-48c data pattern filled with a 2²³-1 PRBS payload.

Measured with a bandpass filter having a high-pass cutoff frequency of 12kHz and a low-pass cutoff frequency of 20MHZ.



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 13. 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	-	1260		1580	nm	
PD Responsivity		0.7		1.1	A/W	
Minimum Sensitivity	Pmin			-18.0	dBm	1, 2
Overload	Pmax	0			dBm	1, 2
SD Assert Level	Pa		-22		dBm	2
SD Deassert Level	Pd		-25		dBm	
SD Hysteresis	Phys	0.5	3		dB	
Reflectance	REFr		-14		dB	

Notes

1. BER=10⁻¹⁰

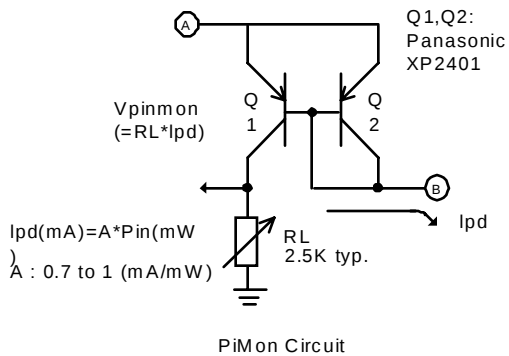
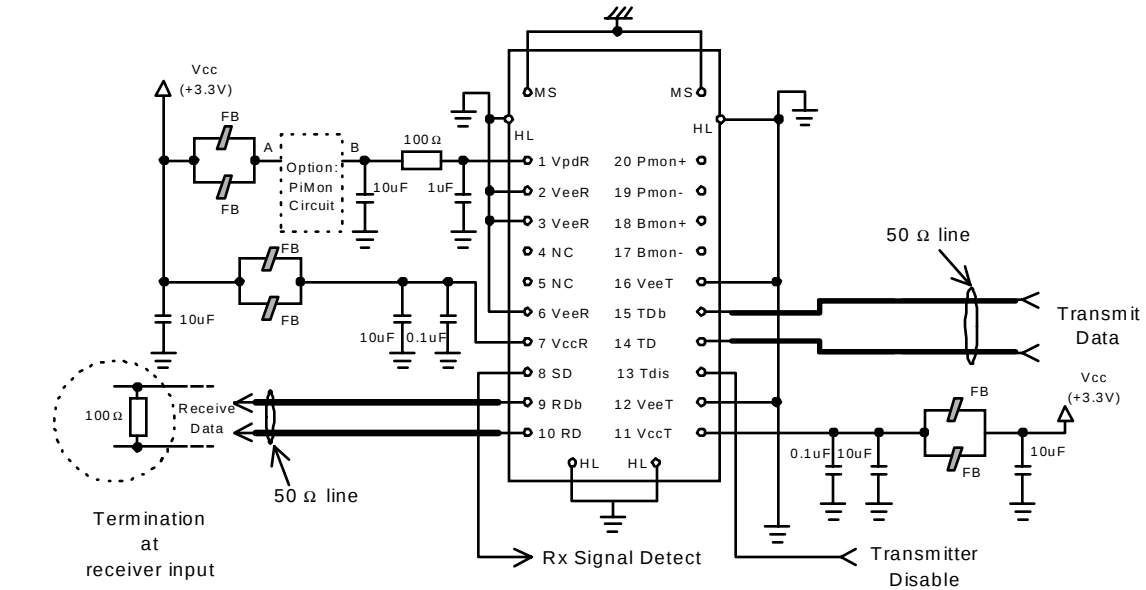
2. Measured at 2488.32Mbps, PRBS 2²³-1, NRZ

8. Relation between Disable Input Voltage and Optical Output Power

Disable Input Voltage	Optical Output Power
"L"(0 ~ 0.8V)	Enabled
"H"(2.0V ~ Vcc)	Disabled (<-45dBm)

*Note : Enabled for no Disable input (Pin 13 open)

9. Recommended Interface Circuit



FB : BLM11HA601SG(Murata)

MS : Mounting Stud

HL : Housing Lead

Notes:

- (1) 0.1u capacitors on VccR/VccT lines should be as close as possible to module pins.
- (2) 50W line pattern and component placements on RD/RDb and TD/TDb lines should be symmetrical for better impedance matching.
- (3) VeeR and VeeT are not internally connected to each other.



Figure 14. Recommended Interface Circuit

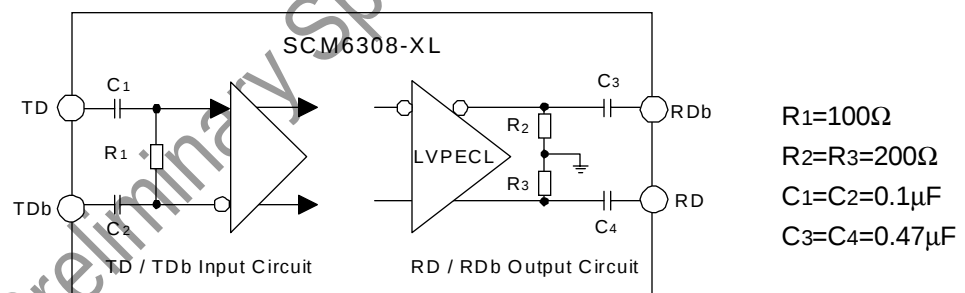


Figure 15. Data Input / Output Circuit

10. Reliability Test Program

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

HEADING	TEST	REFERENCE	CONDITIONS	SAMPLING		
				LTPD	SS	C
Mechanical Integrity	Mechanical Shock	MIL-STD-883 Method 2002	5 times/axis 1,500G, 0.5ms	20	11	0
	Vibration	MIL-STD-883 Method 2007	Cond. A 20G, 20-2,000 Hz, 4min/cy, 4cy/axis	20	11	0
	Thermal Shock	MIL-STD-883 Method 1011	Delta T=100°C 0°C to 100°C	20	11	0
	Solderability	MIL-STD-883 Method 2003	(steam aging not required)	20	11	0
Endurance	Accel. Aging (High Temp.)	(R)-4-53 Section 5.18	85°C; rated power 1,000 hrs. for pass/fail 2,000, 5,000 hrs. for info.	-	25 10	-
	Low Temp. Storage	-	min. storage T 1,000 hrs. for pass/fail 2,000 hrs. for info.	20	11	0
	Temperature Cycling	Section 5.20	-40°C to +85°C 500 for pass/fail 1,000 for info.	20 -	11 11	0 -
	Damp Heat	MIL-STD-202 Method 103 or IEC-60068-2-3	85°C/85%RH 1,000hrs.	20	11	0
	Cyc. Moist. Res.	Sec. 5.23	-	20	11	0
Special Tests	Internal Moisture	MIL-STD-883 Method 1018	Max. 5,000ppm water vapour	20	11	0
	ESD Threshold	Section 5.22	-	-	6	-

SS : Sample Size

C : Maximum number of failure allowed to pass the test.

11. 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 60825-1.

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.

12. Other Precaution

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

13. Ordering Information

Ordering Number	Connector Type	EMI Shield Finger Option	Operating Case Temperature
SCM6308-XL-ZN	LC Duplex Receptacle, Metallized	Without Finger	-5°C ~ 70°C
SCM6308-XL-DN	LC Duplex Receptacle, Metallized	With Type-D Finger	

14. For More Information

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