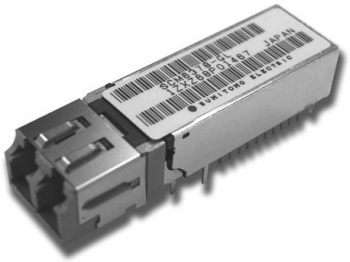


Technical Specification
for
Optical Transceiver Module

SCM6378-GL

☐ 155.52Mbps	☐ 622.08Mbps	☑ other 2488.32Mbps
☐ 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 (2 X 10)
	(☐ 2R / ☐ 3R)	(☑ 2R / ☐ 3R)

Applicable Part Numbers : SCM6378-GL-ZN, SCM6378-GL-DN

SUMITOMO ELECTRIC

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 SCM6378-GL are listed below.

Features

* SDH STM-16 L-16.2 / SONET OC-48 LR-2 Compliant
* Power Supply Voltage Single +3.3V
* Buit-in DC-DC and APD Bias Control Circuit
* Operating Case Temperature -5~+70degC
* Compact Package Size 49.0 X 13.59 X 9.8 mm (max.)
* Electrical Interface AC for DATA and LVTTL for Signal Detect and Laser Disable
* Fiber Coupled Power -2.0 ~ 3.0dBm (SMF)
* Input Power Range -9 ~ -28dBm
* Optical Reflectance -27dB (max.)
* Monitor Functions Laser Bias Monitor, Rear Facet Monitor, OIL(Optical Input Level)Monitor
* Laser Disable Function
* Signal Detect (SD) Function
* Connector Interface LC Duplex Connector

Applications

> SONET/LR, SDH/LH Application
> ATM Application
> Subscriber Loop
> Metropolitan Area Network

2. Block Diagram

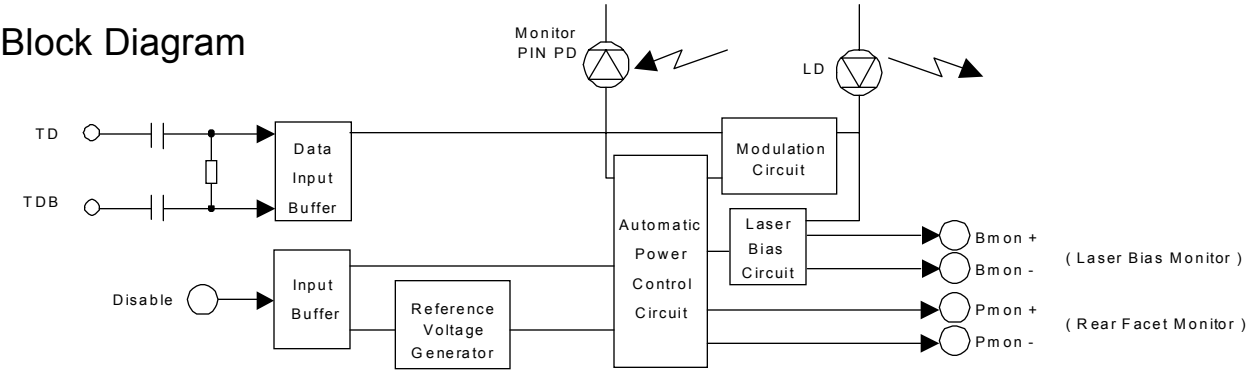


Figure 1. Block Diagram (Transmitter)

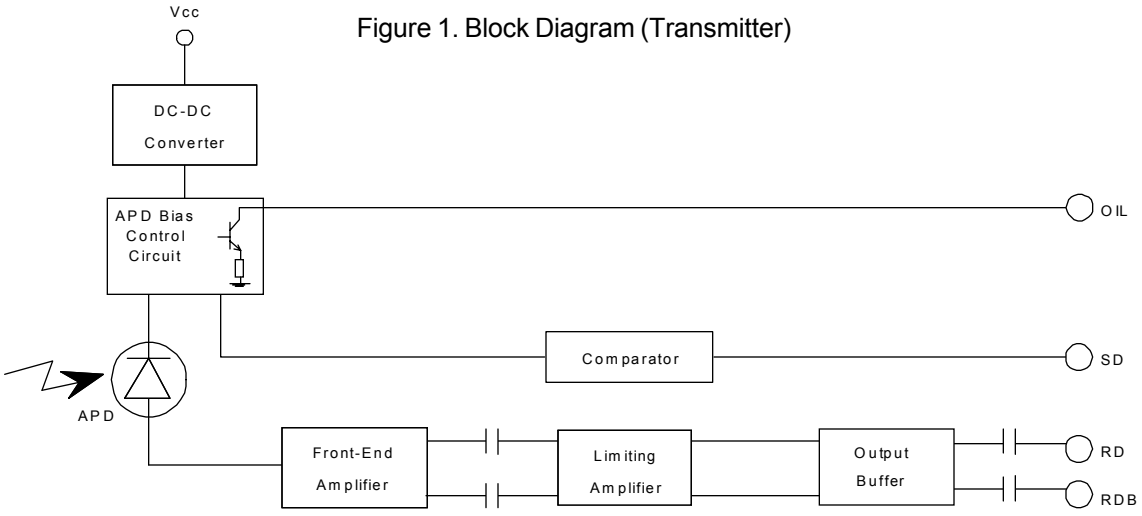


Figure 2. Block Diagram (Receiver)

⚠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

3.1 SCM6378-GL-ZN

All dimensions are in mm.

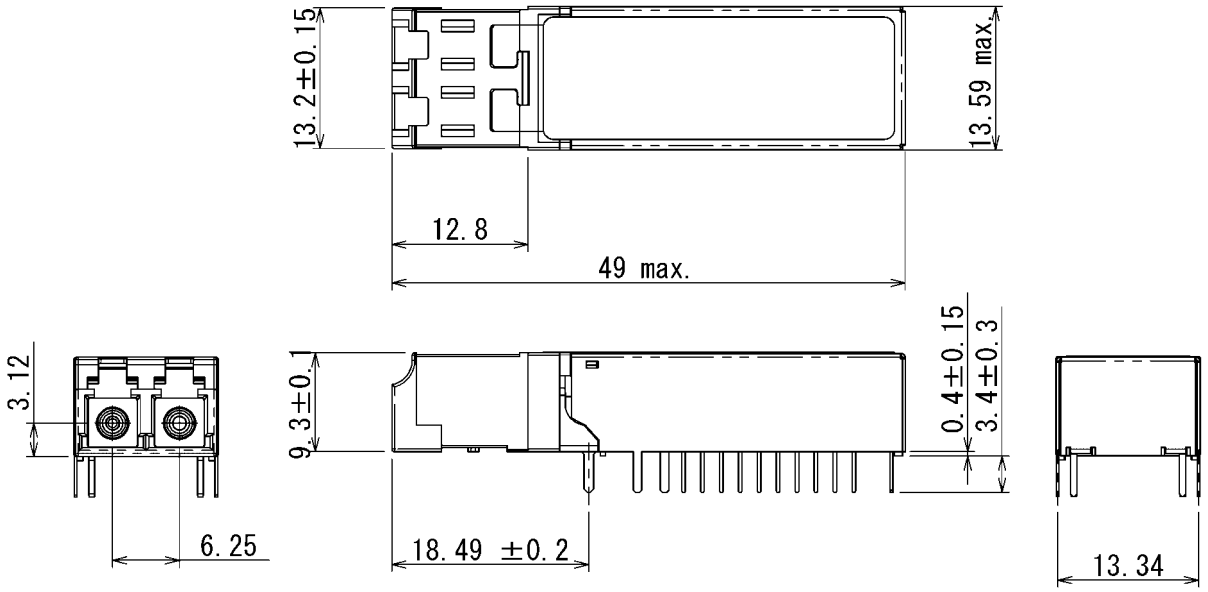


Figure 3. Outline Dimensions (SCM6378-GL-ZN)

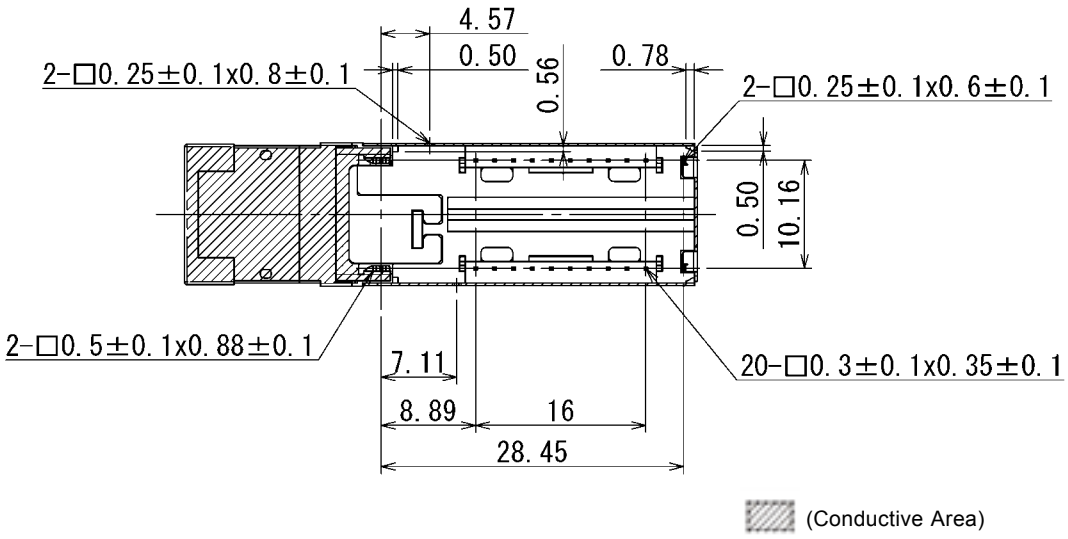
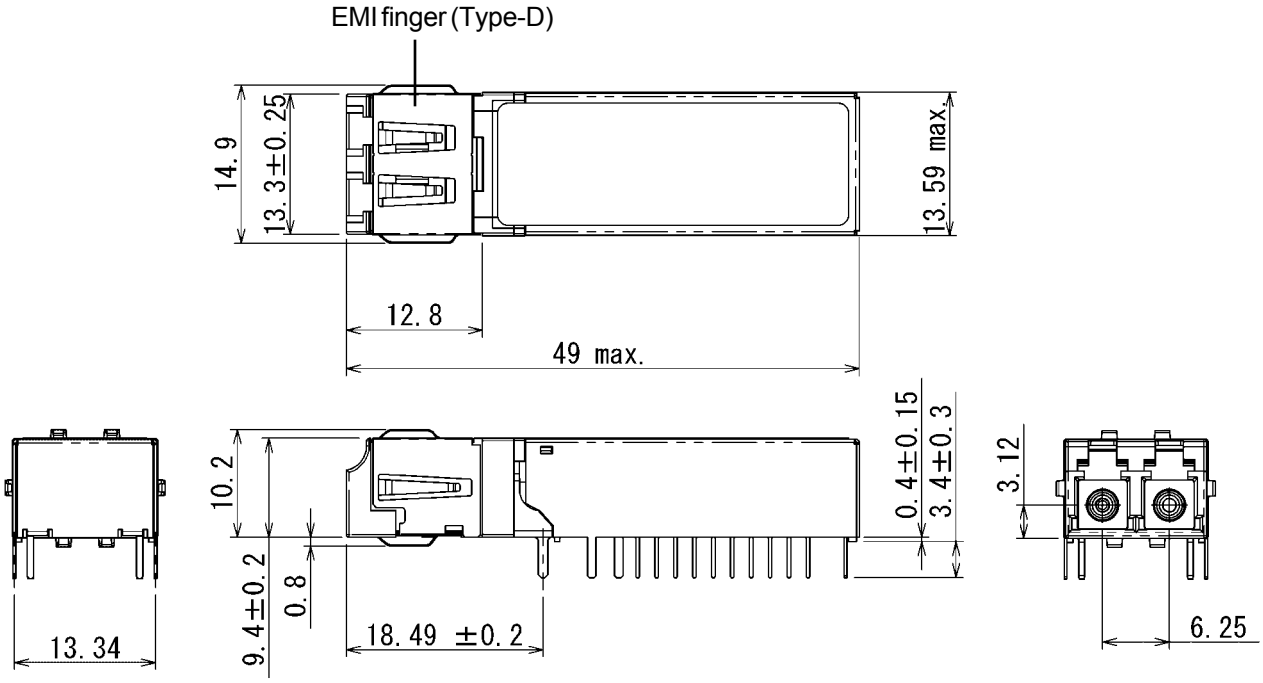


Figure 4. Bottom Side (SCM6378-GL-ZN)

3.2 SCM6378-GL-DN

All dimensions are in mm.



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 (SCM6378-GL-DN)

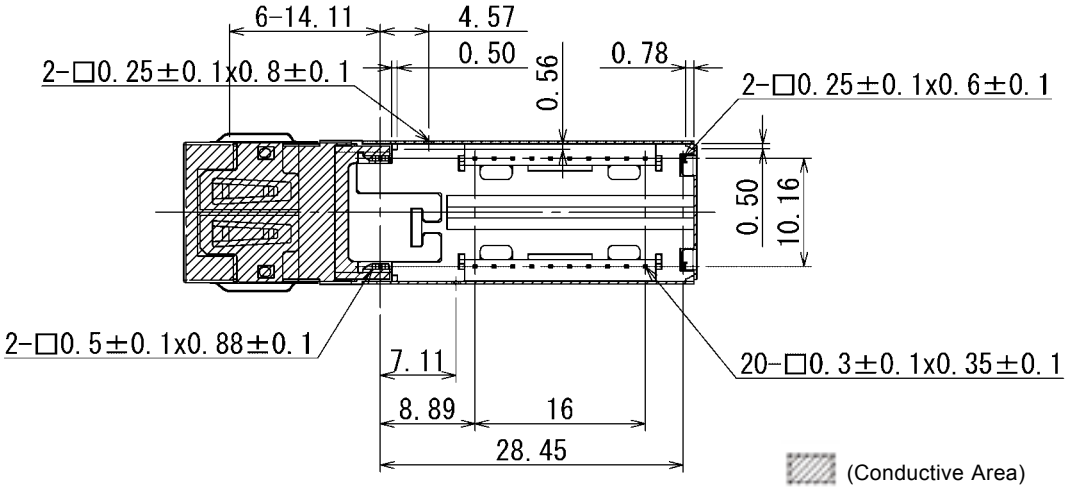


Figure 6. Bottom Side (SCM6378-GL-DN)

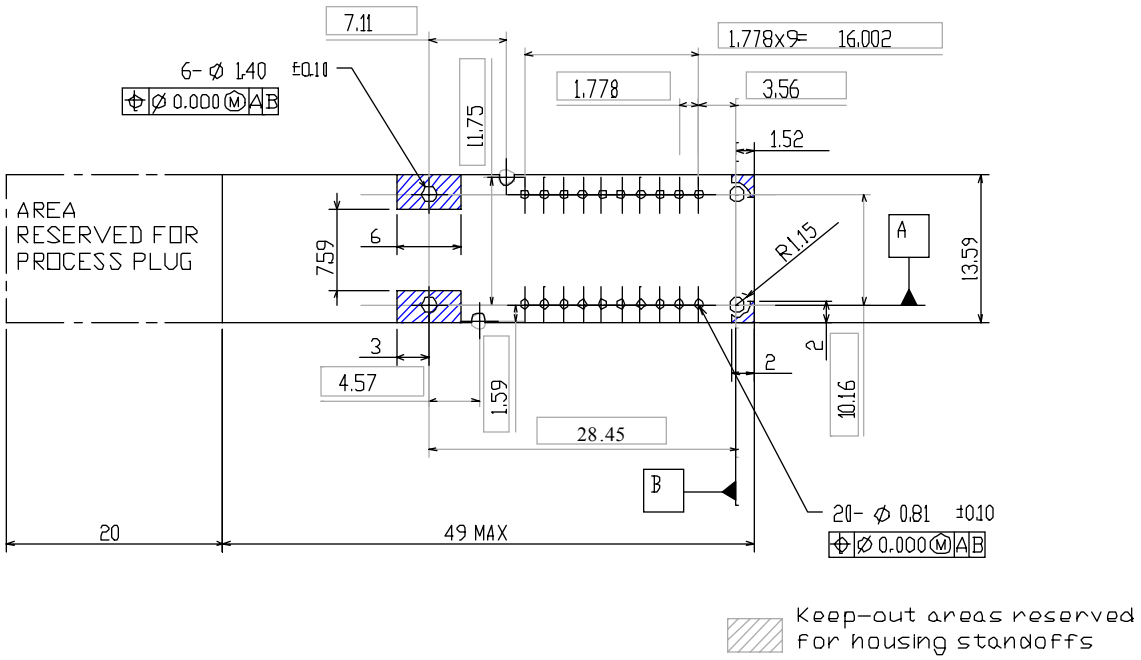


Figure 7. Recommended Footprint

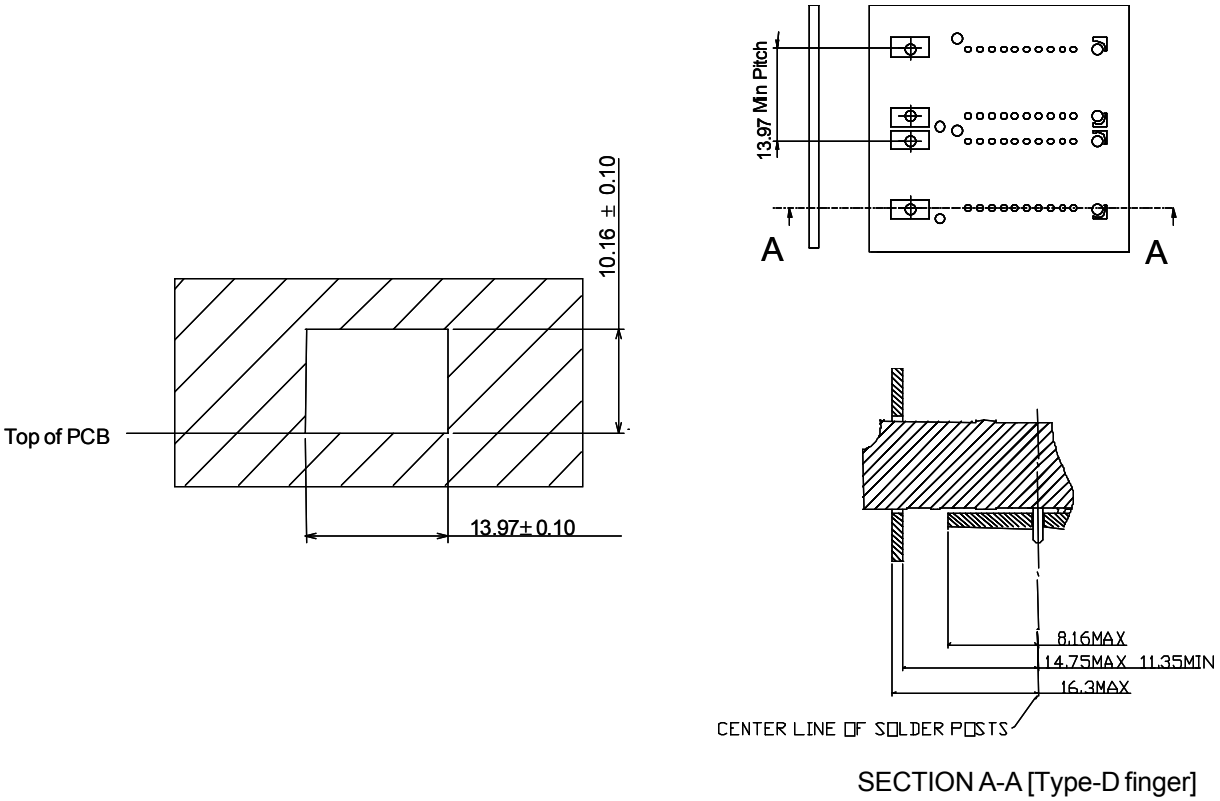


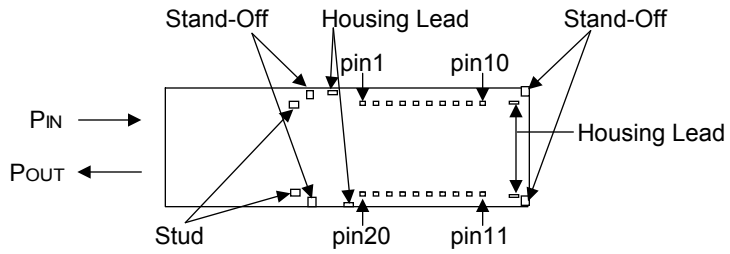
Figure 8. Recommended Bezel Design for Systems Using SFF Transceivers

4. Pin Assignment

No.	Symbol	I/O/P	Level	Description
1	OIL	P	+3.3V DC	**Optical Input Level for Receiver APD**
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	**LD Bias Current Monitor**. Voltage difference between pins 17 and 18 is proportional to the laser bias current.
18	Bmon+	O		
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		

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.
3. Pin1 must be tied to Vcc.



* 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.

Figure 9. Pin Location (Bottom View)

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	
Optical Input Power		Pin			-5.0	dBm	
OIL Bias Voltage		Vmon	2.4	-	7.0	V	
Disable Input Voltage		Vi	0.0	-	Vcc+0.5	V	
Lead Soldering	Temperature				260	°C	2
	Time				10	sec.	

Notes

1. No condensation allowed.
2. 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

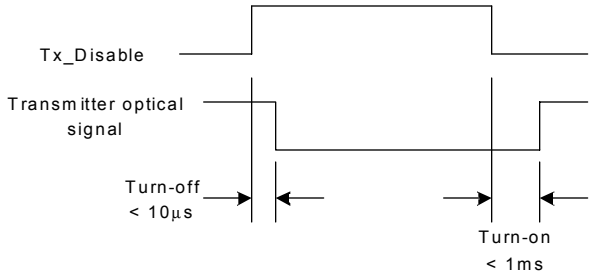
(Unless otherwise specified, Vcc = 3.135 to 3.465 V and all operating temperature shall apply.)

6-1. Transmitter side

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage		Vcc	3.135	3.30	3.465	V	
Supply Current		Idtx		95	200	mA	1, 2
Differential Input Voltage Swing (TD,TDb)		Vin	0.4		2.00	Vp-p	3
Differential Input Impedance		Rin	75	100	125	Ω	
Signal Input Rise/Fall Time		tr / tf			120	psec	4
Tdis Input Voltage	High	Vdi	2.0		Vcc	V	5
	Low	Vei	0.0		0.8	V	
Turn-on Time		ton			1	ms	6
Turn-off Time		toff			10	μs	6
LD Bias Monitor Voltage		Vbm	5		700	mV	2, 7
Rear Facet Monitor Voltage		Vrfm	10		200	mV	2, 7

Notes

1. 50% duty cycle data. 2. 2488.32Mbps 3. Refer to Figure 12. 4. 20 ~ 80%
5. LVTTL input. 6. Refer to Figure 10.
7. The Laser Bias Monitor Current and Rear Facet Monitor Current are calculated as ratios between the corresponding voltages and current sensing resistors, as shown in the Figure 11. High input impedance (> 1MΩ) device is required to measure this voltage.



Note: The maximum delay until the modulated optical signal reaches 90% of the final value.

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

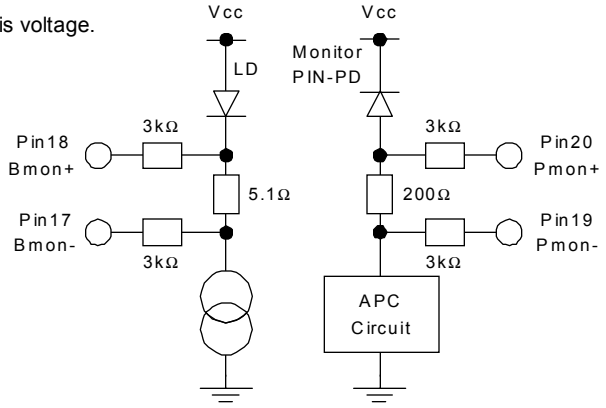


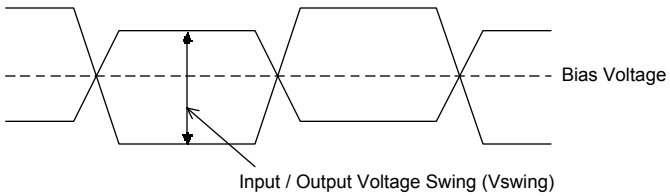
Figure 11. Bmon / Pmon Circuit Detail

6-2. Receiver side

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage		Vcc	3.135	3.30	3.465	V	
Supply Current		Idrx		110	200	mA	
OIL Bias Voltage		Vmon	2.40	3.3	5.25	V	
Differential Output Voltage Swing (RD,RDb)		Vout	0.8		1.9	Vp-p	1
SD Output Voltage	High	Vsoh	2.40		Vcc	V	
	Low	Vsol	0.0		0.5		
Data Rise / Fall Time		tr / tf		140 / 120		psec	2
SD Assert Time		ta	2.3		100	μsec	3
SD Deassert Time		td	2.3		350	μsec	

Notes

1. Refer to Figure 12.
2. 20~80%
3. 2488.32Mbps, PRBS 2^23-1, NRZ



Differential Input / Output Voltage Swing (Vin / Vout) = 2 X Vswing

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 (Enable)	Po	-2.0		3.0	dBm	1
Average Output Power (Disable)	Pdis			-45	dBm	
Extinction Ratio	Er	8.2			dB	1
Center Wavelength	λc	1500		1580	nm	
Spectral Width (-20dB Width)	Δλ			1	nm	
Dispersion Penalty	Dp			2.0	dB	2
Side Mode Suppression Ratio	Sr	30			dB	
Eye Mask for Optical Output	Compliant with Bellcore GR-253 CORE and ITU G.957					
Jitter Generation	Tjpk			0.1	Ulp-p	3
	Tjrms			0.01	Ulrms	

Note 1. Measured at 2488.32Mbps PRBS2^23-1, 50% duty cycle, NRZ

2. Maximum dispersion values correspond to the approximate worst-case dispersion (~1600ps/nm) at 1550nm.

3. SONET OC-48c data pattern filled with a 2^23 -1 PRBS payload.
Measured with a bandpass filter having a high-pass cutoff freguency of 12kHZ and a low-pass cutoff freguency of 20MHZ.

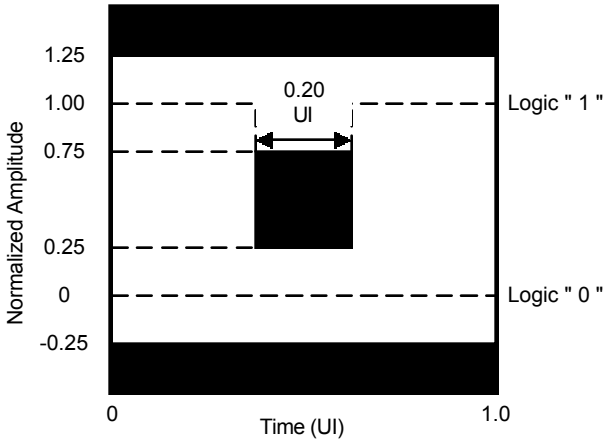


Figure 13. Eye Diagram Mask for Optical Output (ITU-T G.957)

⚠ 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	-	1500		1580	nm	
Minimum Sensitivity	Pmin			-28.0	dBm	1, 2
Overload	Pmax	-9.0			dBm	1, 2
Optical Input Level Current	Imon	200	400	850	uA	3
		2	11	23	uA	4
		0	1.5	6	uA	5
SD Assert Level	Pa	-44.7	-35	-28.0	dBm	2
SD Deassert Level	Pd	-45.0	-36	-28.3	dBm	
SD Hysteresis	Phys	0.3	1.5	6.0	dB	
Optical Reflectance	Or			-27	dB	

Note 1. BER=10^-10

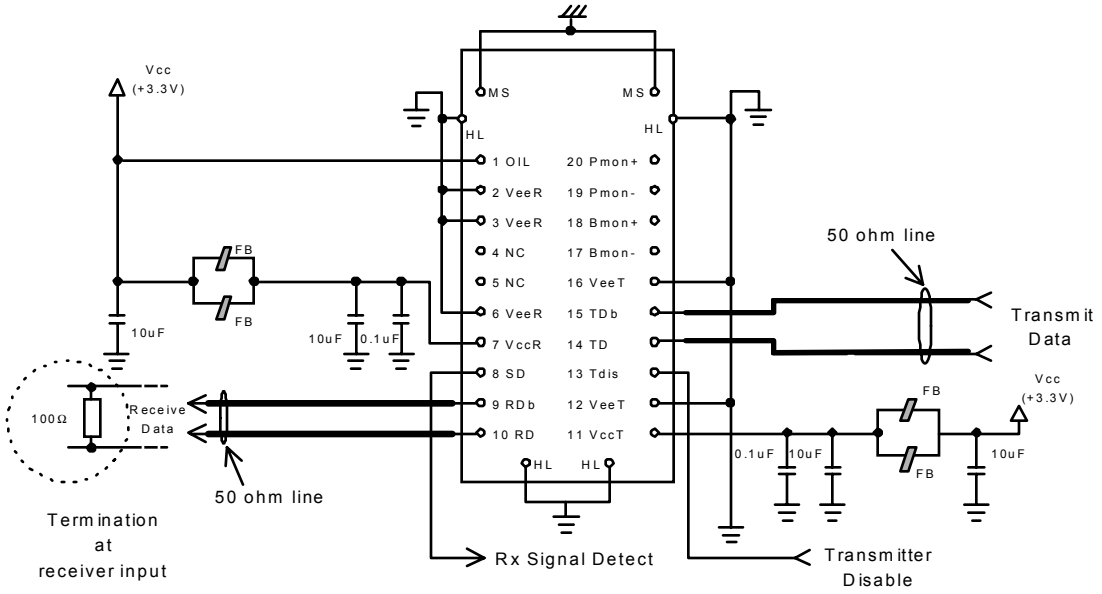
2. Measured at 2488.32Mbps, PRBS 2^23-1, NRZ

3. -9dBm

4. -28dBm

5. -∞dBm

8. Recommended Interface Circuit



FB : BLM18HG601SN1(Murata)

MS : Mounting Stud

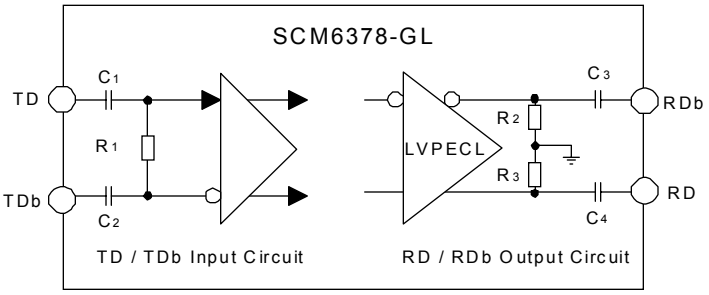
HL : Housing Lead

Notes:

(1) 0.1uF capacitors on VccR/VccT lines should be as close as possible to module pins.
(2) 50Ω 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.

: Signal GND
: Frame GND

Figure 14. Recommended Interface Circuit



$R_1 = 100\Omega$
$R_2 = R_3 = 240\Omega$
$C_1 = C_2 = C_3 = C_4 = 0.47\mu F$

Figure 15. Data Input / Output Circuit

9. Reliability Test Program

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

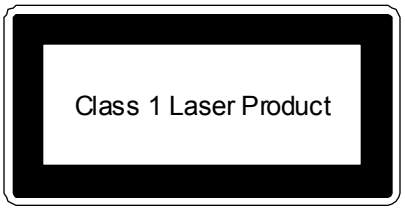
HEADING	TEST	REFERENCE	CONDITIONS	SAMPLING		
				LTPD	SS	C
Mechanical Integrity	Mechanical Shock	MIL-STD-883 Method 2002	5 times/axis 1,500G, 0.5ms	20	11	0
	Vibration	MIL-STD-883 Method 2007	Cond. A 20G, 20-2,000 Hz, 4min/cy, 4cy/axis	20	11	0
	Thermal Shock	MIL-STD-883 Method 1011	Delta T=100°C 0°C to 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.

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 60825.



⚠ 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.

11. 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 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	EMI Shield Finger Option	Operating Case Temperature
SCM6378-GL-ZN	LC Duplex Receptacle	Without Finger	-5°C ~ 70°C
SCM6378-GL-DN	LC Duplex Receptacle	With Type-D shield Finger	

13. For More Information

U.S.A.
ExceLight Communications, 4021 Stirrup Creek Drive, Suite 200 Durham, NC 27703
Tel. +1-919-361-1600 / Fax. +1-919-361-1619
E-mail: info@excelight.com
http://www.excelight.com

Europe
Sumitomo Electric Europe Ltd., 220, Centennial Park, Elstree, Herts, WD6 3SL, United Kingdom
Tel.+44-208-953-8681
Fax.+44-208-207-5950
E-mail: photonics@sumielectric.com
http://www.sumielectric.com

Japan
Sumitomo Electric Industries, Ltd. (Business Development), 1, Taya-cho, Sakae-ku
Yokohama,244-8588
Tel. +81-45-853-7154 / Fax. +81-45-851-1932
E-mail: product-info@ppd.sei.co.jp
http://www.sei.co.jp/Electro-optic/index_e.html