Technical Specification
for
Optical Transceiver Module

SCM6408

☐ 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 5)
	(☐ 2R / ☐ 3R)	(☑ 2R / ☐ 3R)

Applicable Part Numbers : SCM6408-GL-ZN, SCM6408-GL-CN, SCM6408-GL-DN
SCM6408-GL-ZW, SCM6408-GL-CW,SCM6408-GL-DW

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 SCM6408 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 LVTTL for Signal Detect and Laser Disable
* Fiber Coupled Power -5 ~ 0dBm into SMF
* Input Power Range 0 ~ -18dBm
* Laser Disable Function
* Signal Detect (SD) Function
* Connector Interface LC Duplex Connector

Applications

*Telecommunications
> SONET/IR, SDH/SH Application
> ATM Application
> Shelf-to-Shelf Multi Bit Rate Application
> Subscriber Loop
> Metropolitan Area Network

*Data communications
>High Speed Rack-to-Rack Data Links

2. Block Diagram

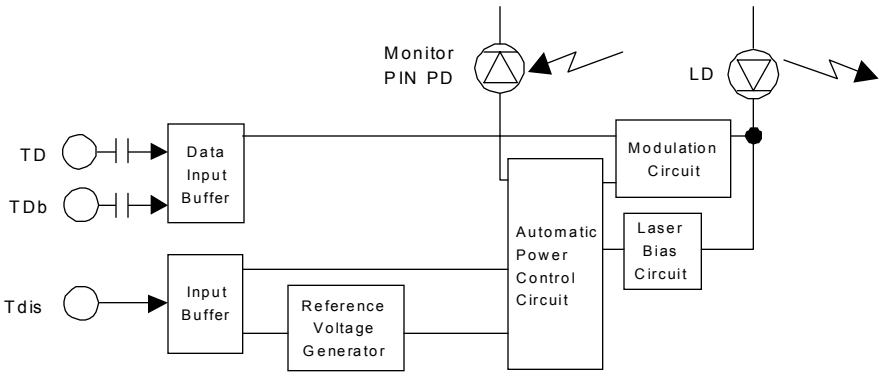


Figure 1. Block Diagram (Transmitter)

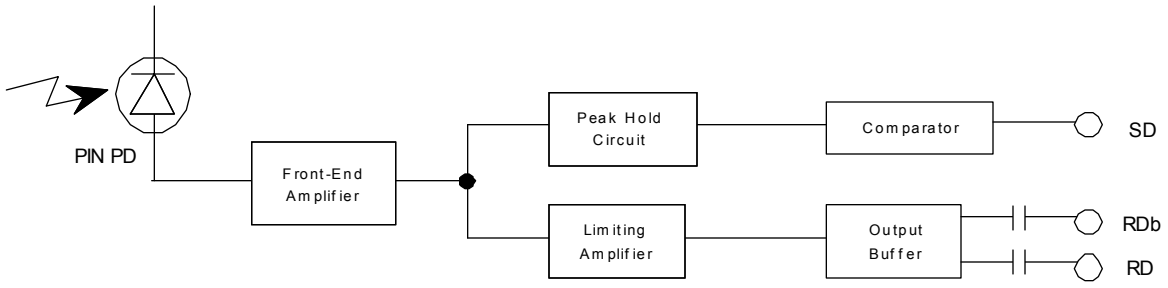


Figure 2. Block Diagram (Receiver)

⚠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 SCM6408-GL-Z#

All dimensions are in mm.

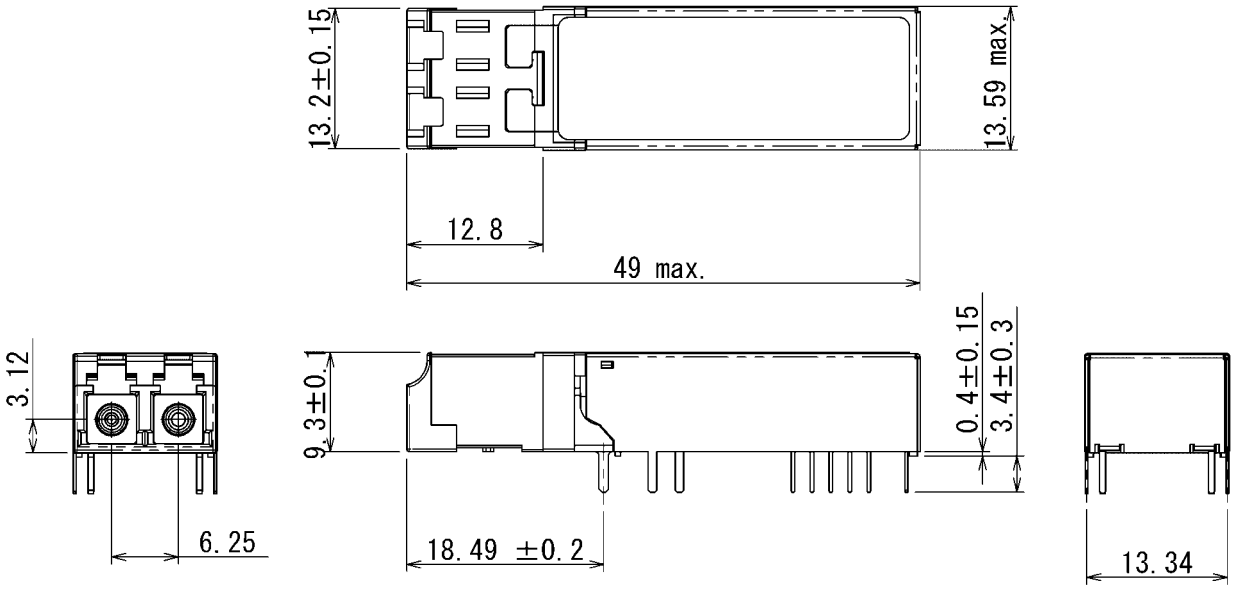


Figure 3. Outline Dimensions (SCM6408-GL-ZN)

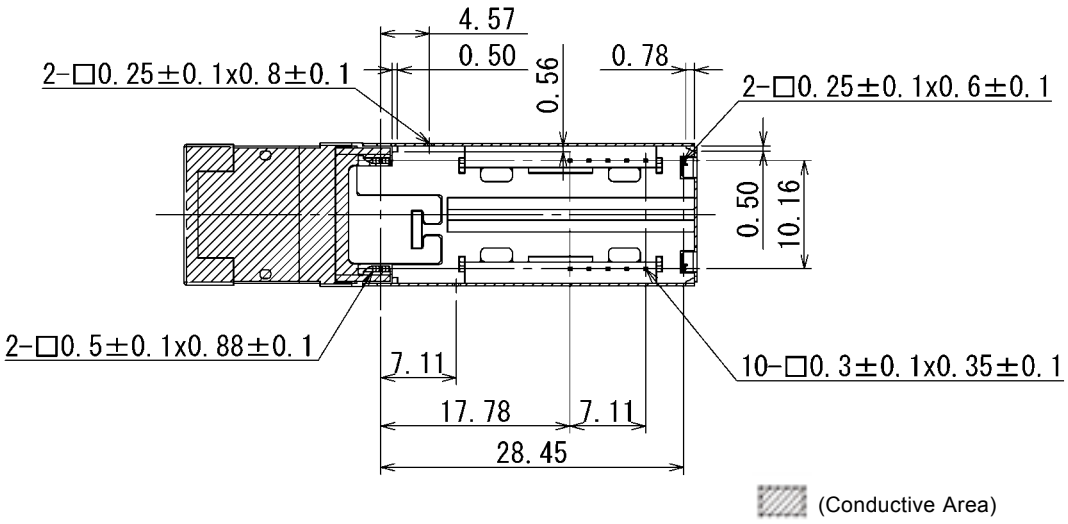
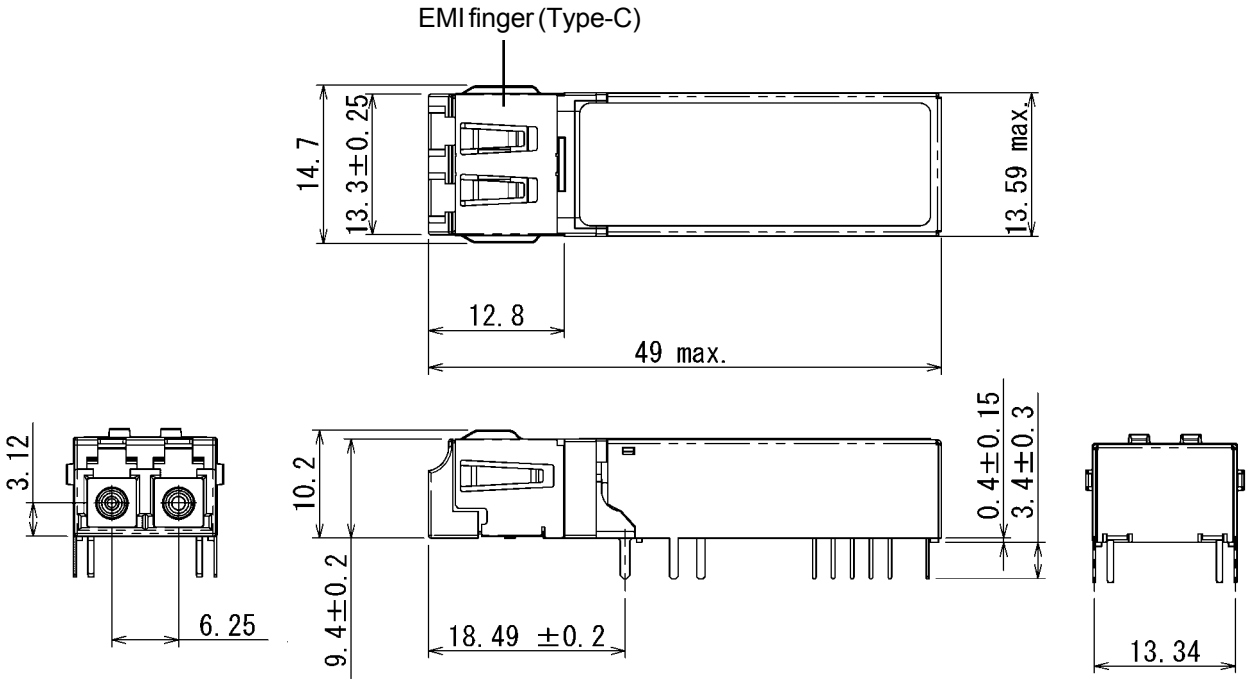


Figure 4. Bottom Side (SCM6408-GL-ZN)

3.2 SCM6408-GL-C#

All dimensions are in mm.



Type-C 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 three sides to make electrical contact with the sides of the bezel opening for grounding purpose.

Figure 5. Outline Dimensions (SCM6408-GL-CN)

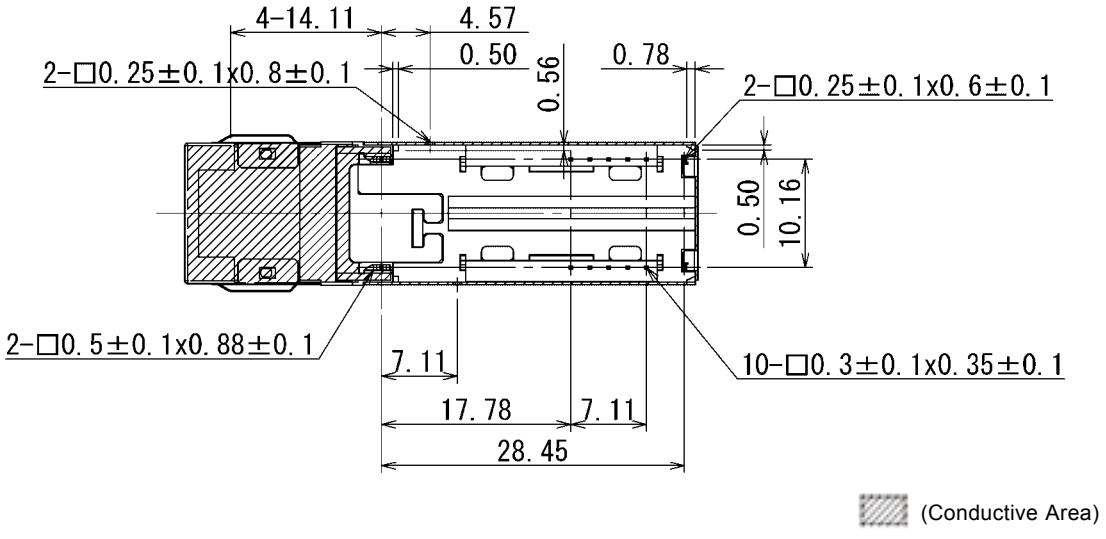
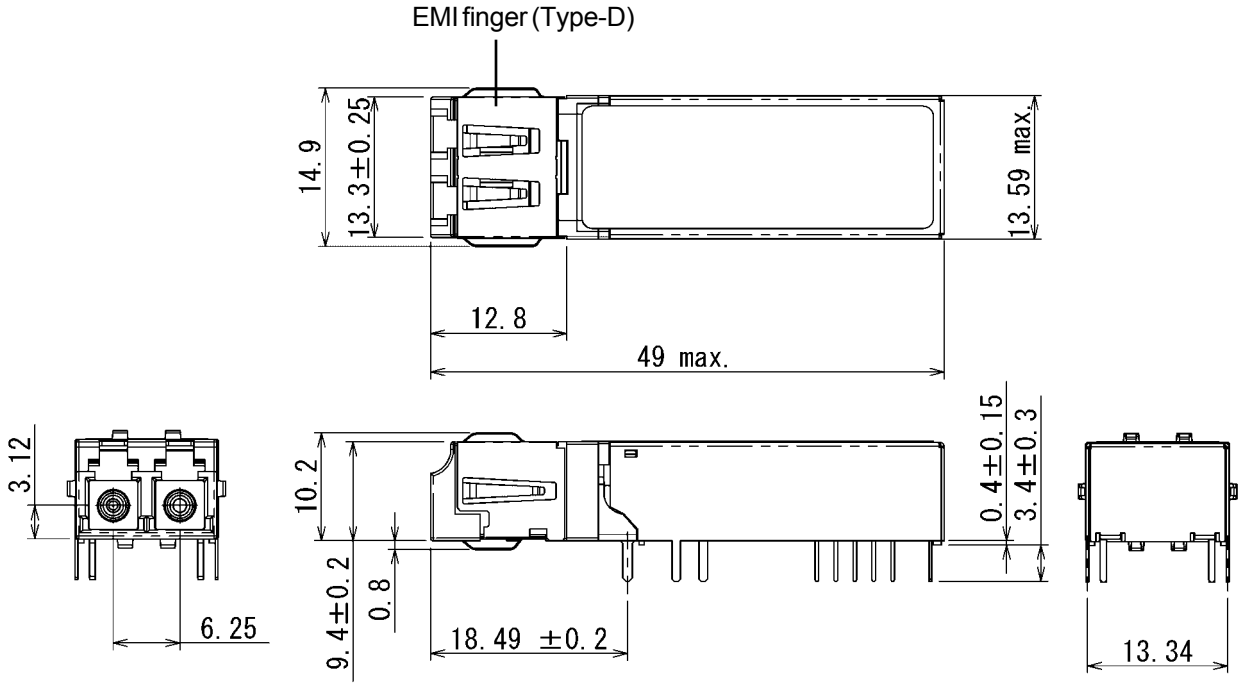


Figure 6. Bottom Side (SCM6408-GL-CN)

3.3 SCM6408-GL-D#

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 7. Outline Dimensions (SCM6408-GL-DN)

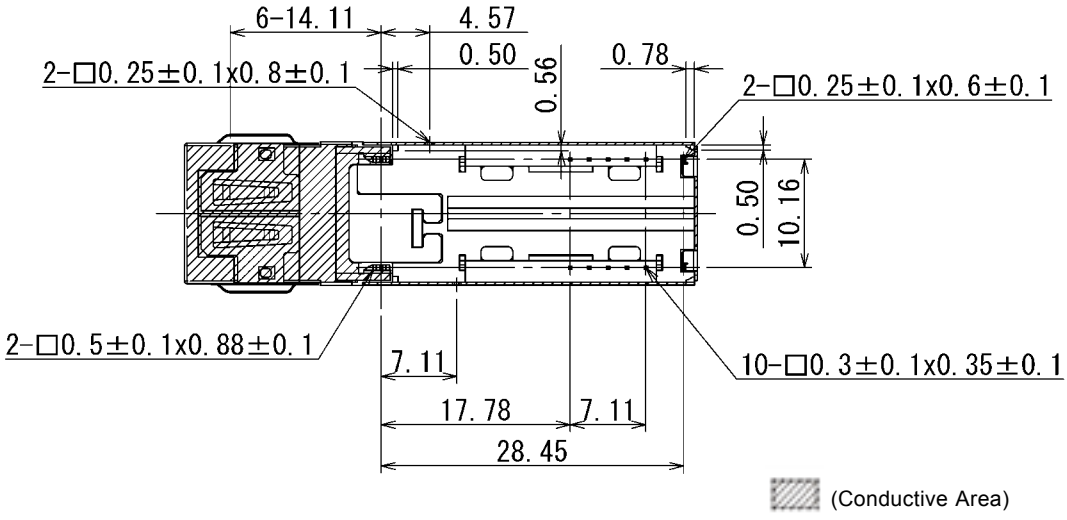


Figure 8. Bottom Side (SCM6408-GL-DN)

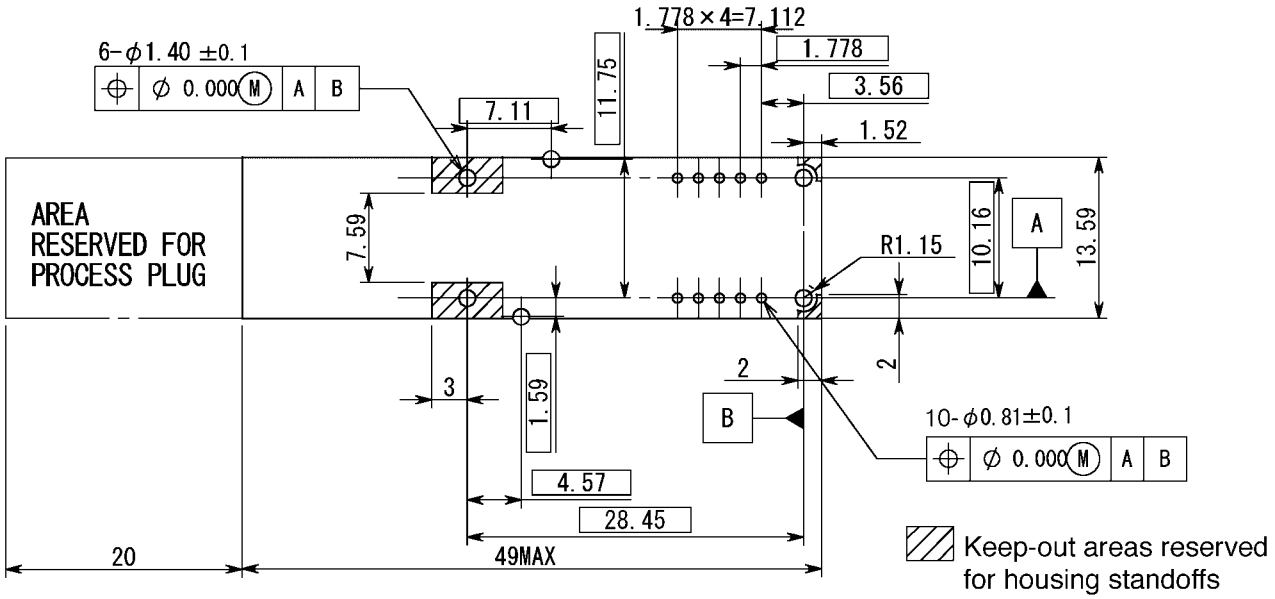


Figure 9. Recommended Footprint

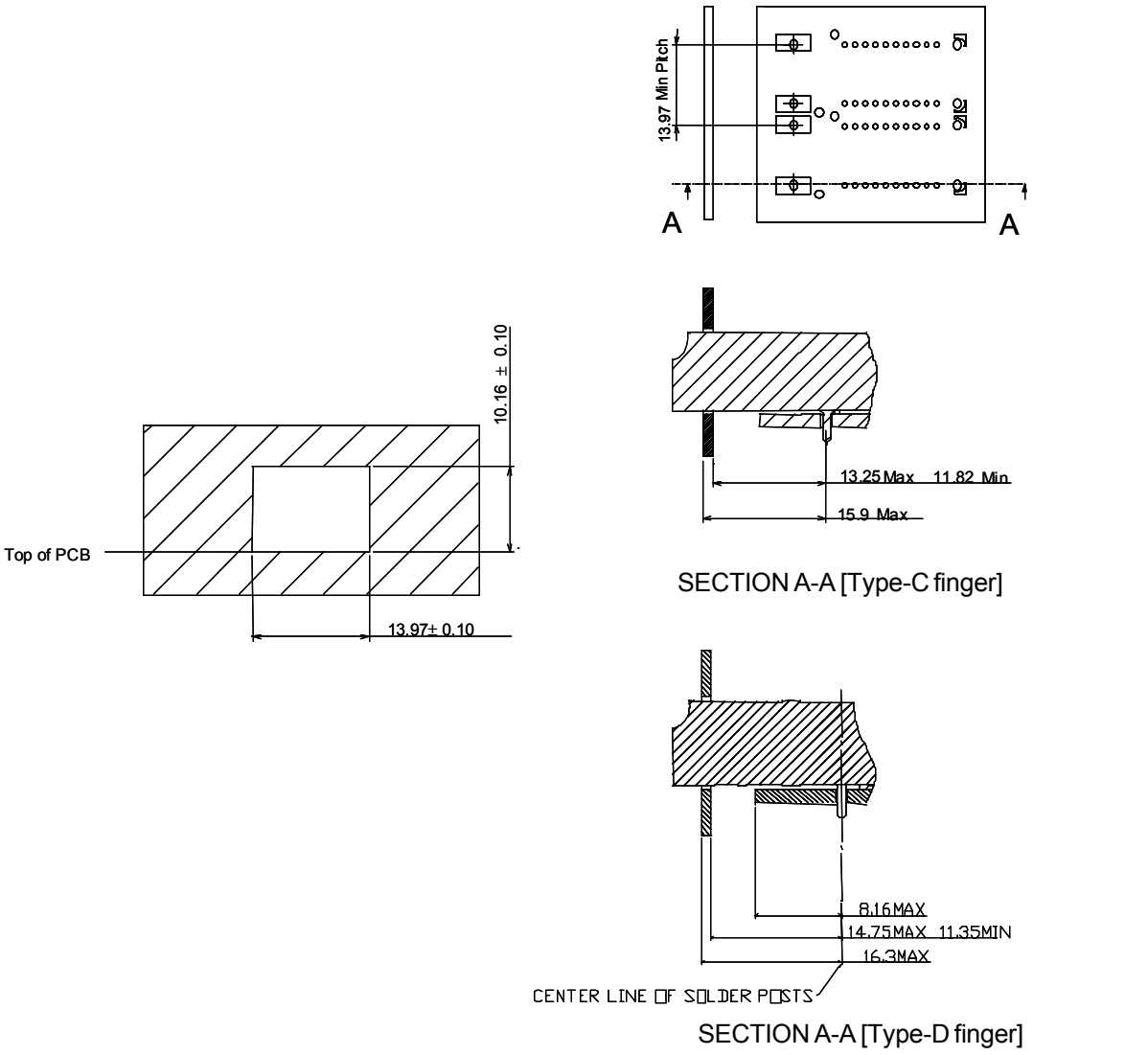
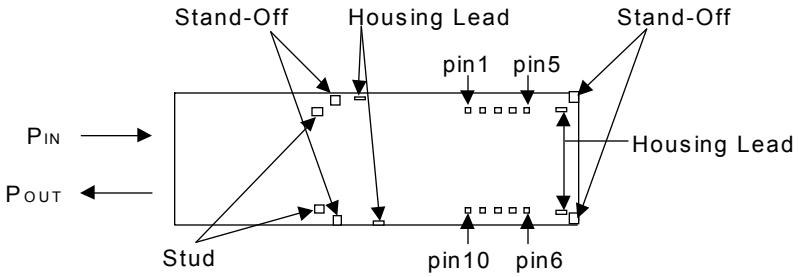


Figure 10. Recommended Bezel Design for Systems Using SFF Transceivers

4. Pin Assignment

No.	Symbol	I/O/P	Level	Description
1	VeeR	P	GND	**Power Supply (-) for Receiver.**
2	VccR	P	+3.3V DC	**Power Supply (+) for Receiver.**
3	SD	O	LVTTL	**Signal Detect.** High level indicates presence of optical input signal (Active High).
4	RDb	O	AC	**Inverted Receiver Output Data.** Internally AC Coupled and biased LVPECL.
5	RD	O	AC	**Non-Inverted Receiver Output Data.** Internally AC Coupled and biased LVPECL.
6	VccT	P	+3.3V DC	**Power Supply (+) for Transmitter.**
7	VeeT	P	GND	**Power Supply (-) for Transmitter.**
8	Tdis	I	LVTTL/LVCMOS	**Transmitter Disable (Active High).** Defaults to logic 0 (enable TX) when left open.
9	TD	I	AC	**Non-Inverted Transmitter Input Data.** Internally AC Coupled and 100Ohm (Differential) terminated input.
10	TDb	I	AC	**Inverted Transmitter Input Data.** Internally AC Coupled and 100Ohm (Differential) terminated input.

Notes:
1. I/O/P stands for signal input, signal output, and DC power/bias supply, respectively.



* 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 11. 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	2, 6
			-40	-	85		3, 6
Supply Voltage		Vcc	0.0	-	4.0	V	
Input Voltage		Vi	0.0	-	Vcc+0.5	V	4
Lead Soldering	Temperature	Ltemp			260	°C	5
	Time	Ltime			10	sec.	

Notes
1. No condensation allowed. 2. SCM6408-GL-#N 3. SCM6408-GL-#W ; 1m/s air flow recommended 4. Tdis
5. Measured on lead pin at 2mm (0.079in.) off the package bottom 6. Refer to Section 9-2 for Tc definition.

⚠ 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
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

Notes
1. 50% duty cycle data.
2. 2488.32Mbps
3. Refer to Figure 13.
4. 20 ~ 80%
5. LVTTL input. Refer to Section 8, "Relation between Disable Input Voltage and Optical Output Power", for detail.
6. Refer to Figure 12.

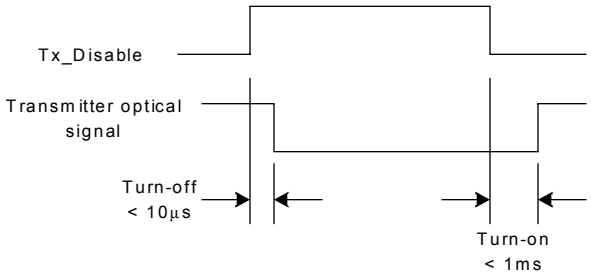
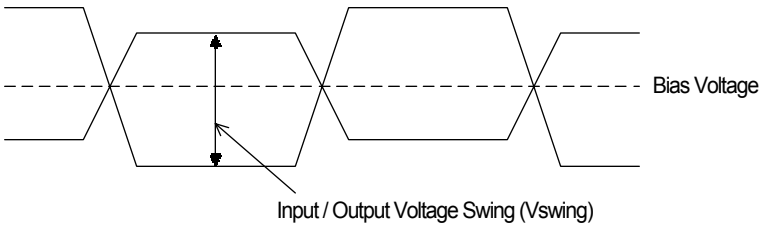


Figure 12. Definition of Turn-on / Turn-off Time

6-2. Receiver side

Parameter		Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage		Vcc	3.135	3.30	3.465	V	
Supply Current		Idrx		95	150	mA	
Differential Output Voltage Swing (RD,RDb)		Vout	0.8		1.9	Vp-p	
SD Output Voltage	High	Vsoh	2.40		Vcc	V	
	Low	Vsol	0.0		0.5		
Data Rise / Fall Time		tr / tf		140 / 120		psec	1
SD Assert Time		ta	2.3		100	µsec	2
SD Deassert Time		td	2.3		350	µsec	

Notes
1. 20~80%
2. 2488.32Mbps, PRBS 2^23-1, NRZ



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

Figure 13. Definition of Differential Input / Output Voltage Swing

7. Optical Interface

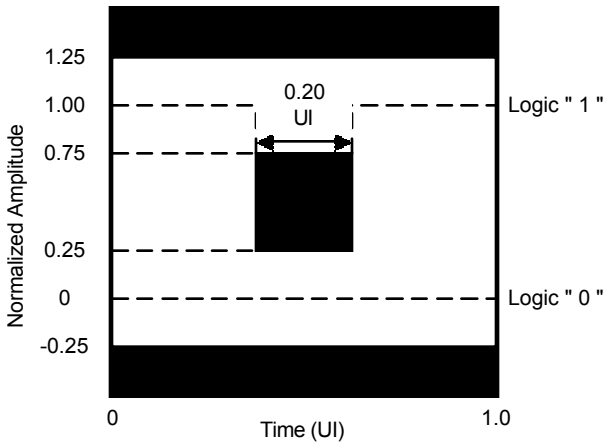
(Unless otherwise specified, Vcc = 3.135 to 3.465 V and all operating temperature shall apply.)

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	λc	1260		1360	nm	
Spectral Width (-20dB Width)	Δλ			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 PRBS2^23-1, 50% duty cycle, NRZ, Tdis = L (Tdis = H : Max -45dBm)

2. 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.



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 14. 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	
Minimum Sensitivity	Pmin		-24.0	-18.0	dBm	1, 2
Overload	Pmax	0			dBm	1, 2
SD Assert Level	Pa		-27.0	-18.0	dBm	2
SD Deassert Level	Pd	-40.0	-29.5		dBm	
SD Hysteresis	Phys	0.5	2.5		dB	
Reflectance	REFr		-14		dB	

Notes
1. BER=10^-10
2. Measured at 2488.32Mbps, PRBS 2^23-1, 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 8 open)

9. Recommended Information

9-1. Interface Circuit

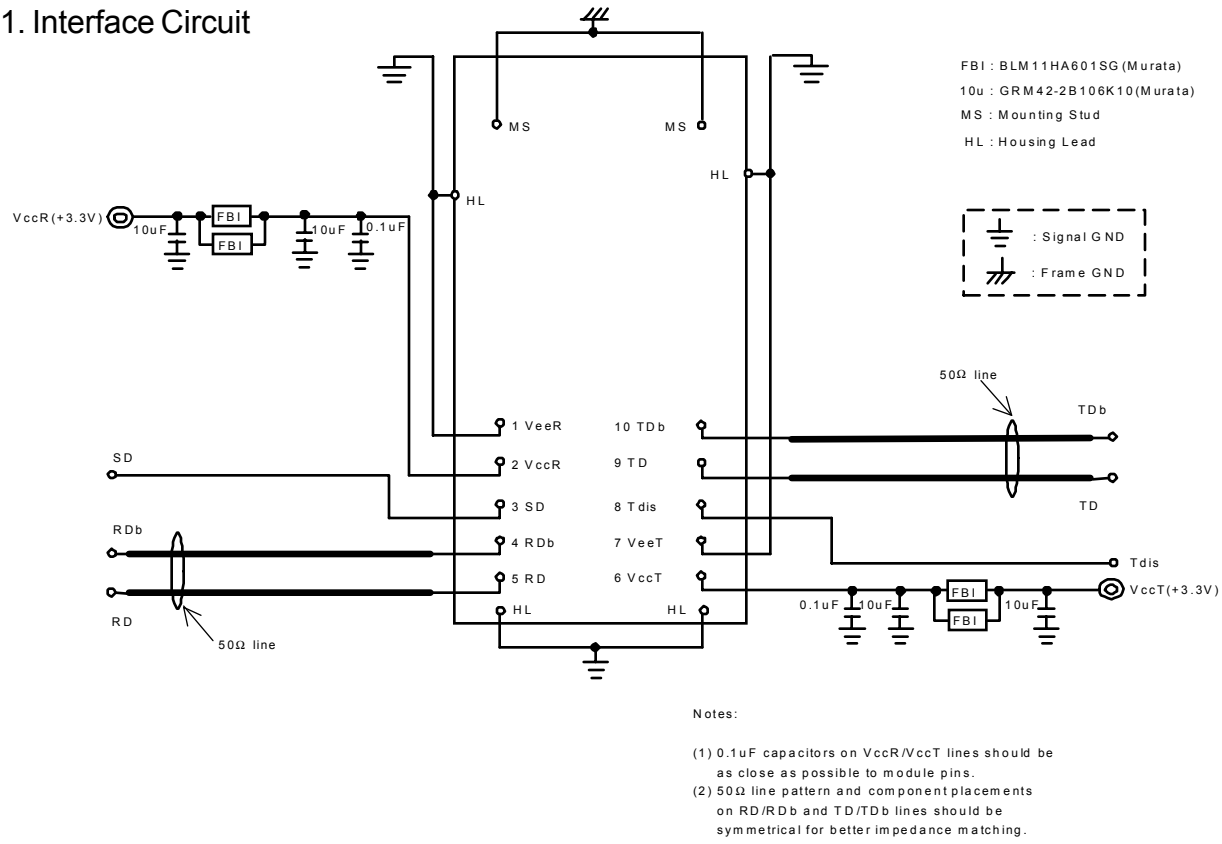
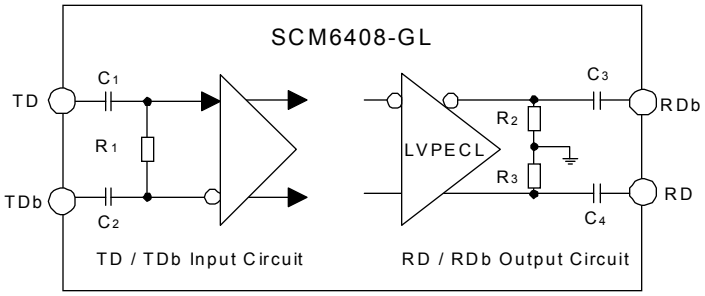


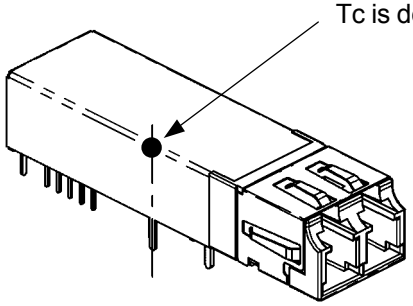
Figure 15. Recommended Interface Circuit



R_1=100Ω
R_2=R_3=200Ω
C_1=C_2=0.1μF
C_3=C_4=0.47μF

Figure 16. Data Input / Output Circuit

9-2. Tc Definition



Forced convection (minimum 1.0m/s) is recommended to ensure Tc be kept below its absolute maximum rating where the ambient temperature is close to the maximum allowed Tc.

10. Reliability Test Program

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

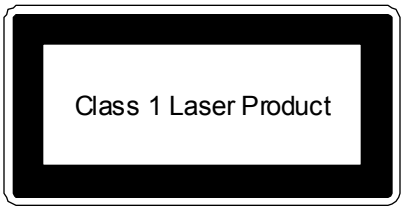
HEADING	TEST	REFERENCE	CONDITIONS	SAMPLING		
				LTPD	SS	C
Mechanical Integrity	Mechanical Shock	MIL-STD-883 Method 2002	5 times/axis 1,500G, 0.5ms	20	11	0
	Vibration	MIL-STD-883 Method 2007	Cond. A 20G, 20-2,000 Hz, 4min/cy, 4cy/axis	20	11	0
	Thermal Shock	MIL-STD-883 Method 1011	Delta T=100°C 0°C to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



⚠ 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.

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 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.

13. Ordering Information

SCM6408 - GL - □□ (LC Duplex Receptacle, Metallized)

- Operating Case Temperature
  - N : Tc=-5~70 °C
  - W : Tc=-40~85 °C
- EMI Shield Finger Option
  - Z : Without Finger
  - C : With Type-C Finger
  - D : With Type-D Finger

14. For More Information

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