

# Technical Specification for Optical Transceiver Module

## SCM6228-GL

<input type="checkbox"/> 155.52Mbps	<input type="checkbox"/> 622.08Mbps	<input checked="" type="checkbox"/> other 2488.32Mbps
<input type="checkbox"/> Short Haul	<input type="checkbox"/> Long Haul	<input checked="" type="checkbox"/> Intra office
<input type="checkbox"/> Intermediate Reach	<input type="checkbox"/> Long Reach	<input checked="" type="checkbox"/> Short Reach
<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 μm	<input type="checkbox"/> 1.55 μm	<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 )		

Applicable Part Numbers : SCM6228-GL-ZN, SCM6228-GL-CN

 **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 SCM6228-GL 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 9.4 mm
* Electrical Interface	AC for DATA and LVTTL for Signal Detect and Laser Disable
* Fiber Coupled Power	-3 ~ -10dBm into SMF
* Input Power Range	-3 ~ -18dBm
* Signal Detect (SD) Function	
* Connector Interface	LC Duplex Connector

### Applications

*Telecommunications	*Data communications
> SONET/SR, SDH/IO 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

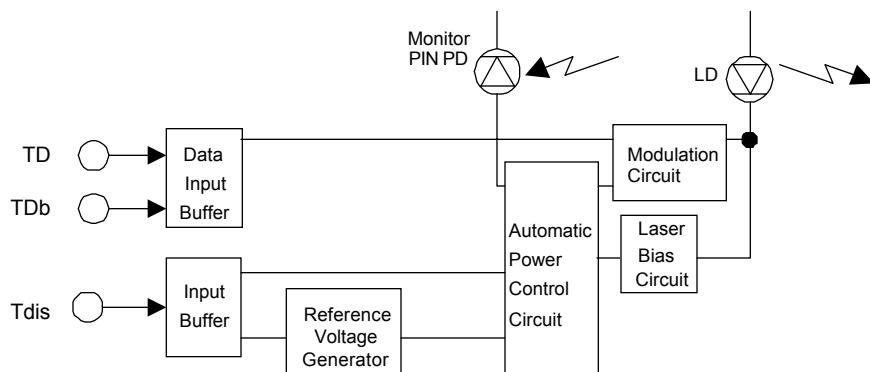


Figure 1-1. Block Diagram (Transmitter)

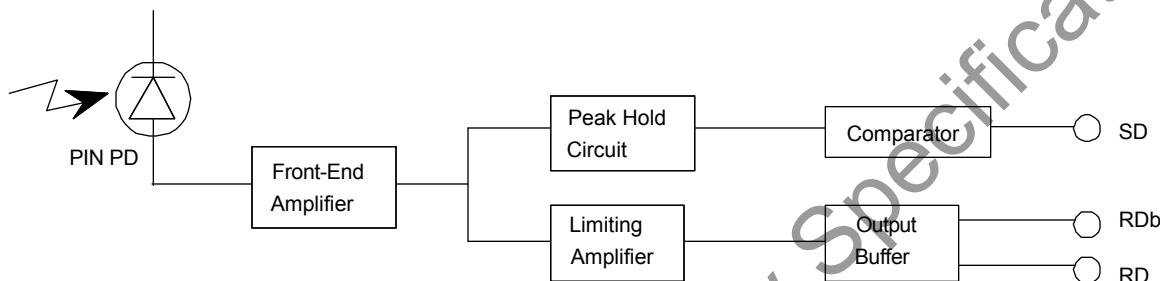


Figure 1-2. Block Diagram(Receiver )

### ⚠ 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.

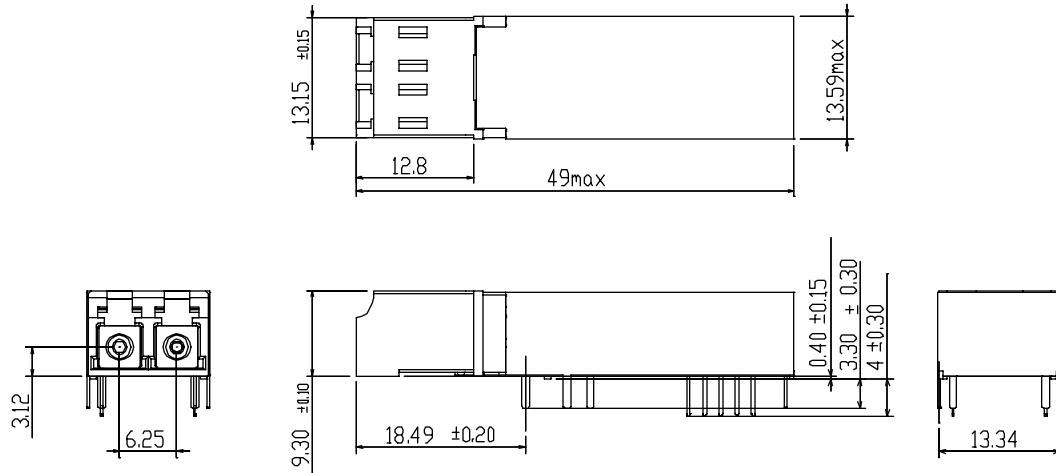


Figure 2-1. Outline Dimensions (SCM6228-GL-ZN)

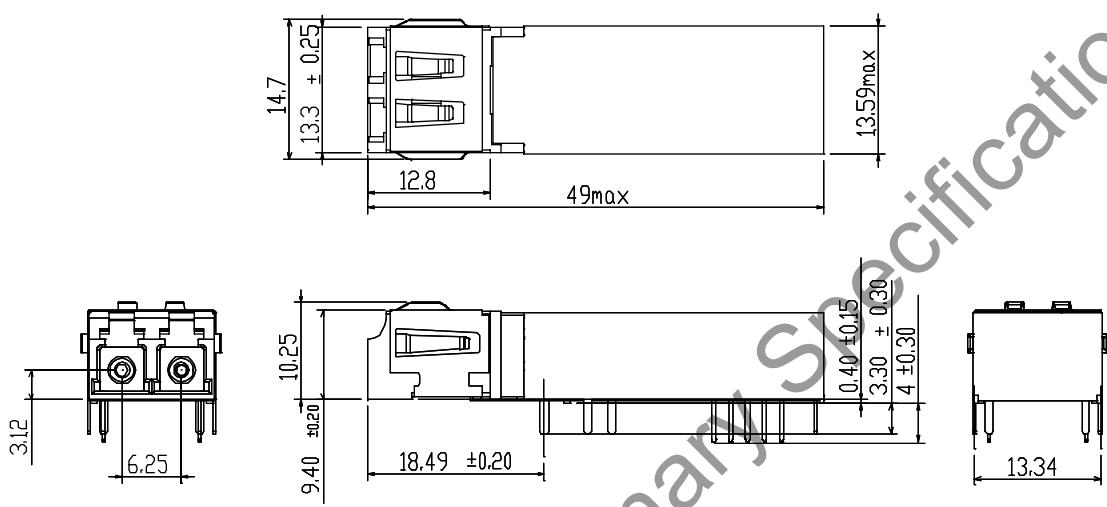


Figure 2-2. Outline Dimensions (SCM6228-GL-CN)

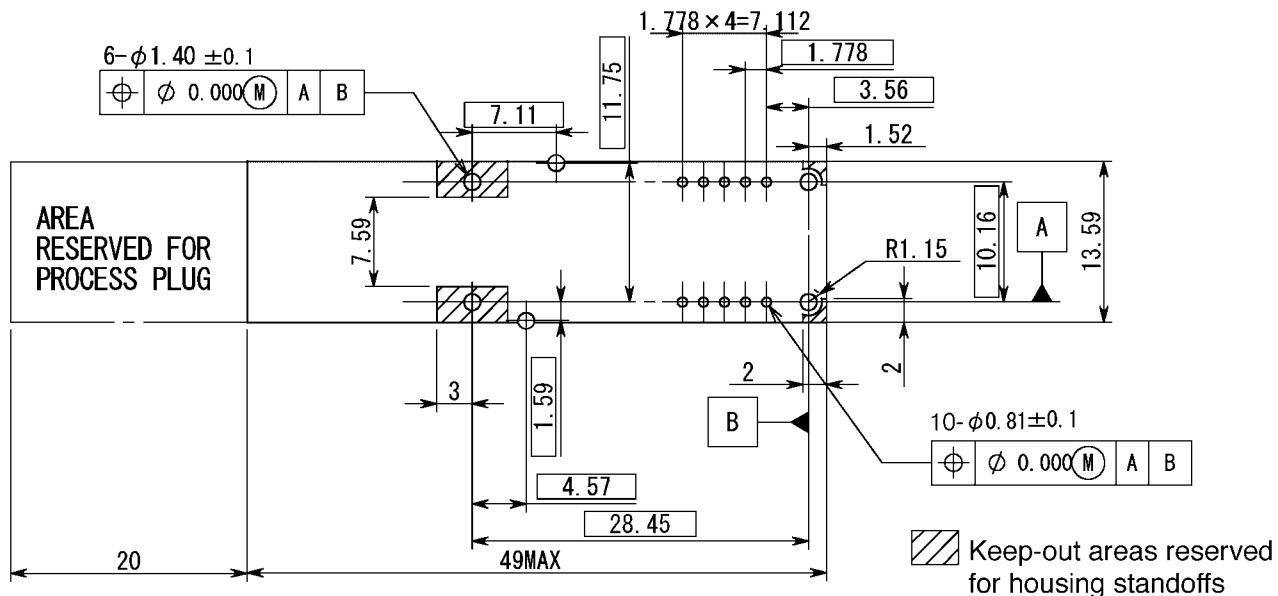


Figure 2-3. Recommended Footprint

#### 4. Pin Assignment

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

Notes:

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

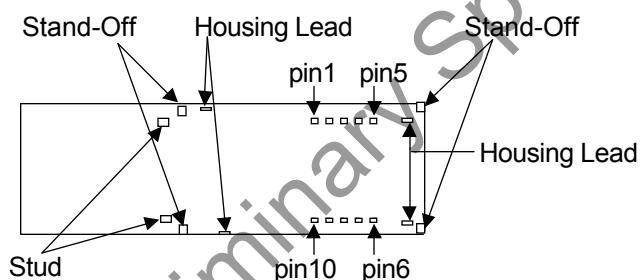


Figure 3. Bottom View

## 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	
Input Voltage	Vi	0	-	Vcc+0.5	V	2
Lead Soldering (Temperature) (Time)				260 10	°C sec.	3

## 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, 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		85	180	mA	1
Differential Input Voltage Swing (TD,TDb)	Vin	0.60		2.00	Vp-p	2
Signal Input Rise/Fall Time				120	psec	3

## Notes

1. Input bias current is not included. 50% duty cycle data. 2488.32Mbps
2. Vcc=+3.3V, Tc=25°C
3. 20 ~ 80%

### 6-2. Receiver side

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	Vcc	3.14	3.30	3.47	V	
Supply Current	Idrx		95	150	mA	
Differential Output Voltage Swing (RD,RDb)	Vout	0.80		2.00	Vp-p	1
SD	High	Vsoh	2.40		Vcc	
Output Voltage	Low	Vsol	0.0	0.5	V	
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. Vcc=+3.3V, Tc=25°C, Output load resistance RI=50Ω to Vcc-2V for RD, RDb.
2. 20~80%
3. 2488.32Mbps, PRBS 2^23-1, NRZ

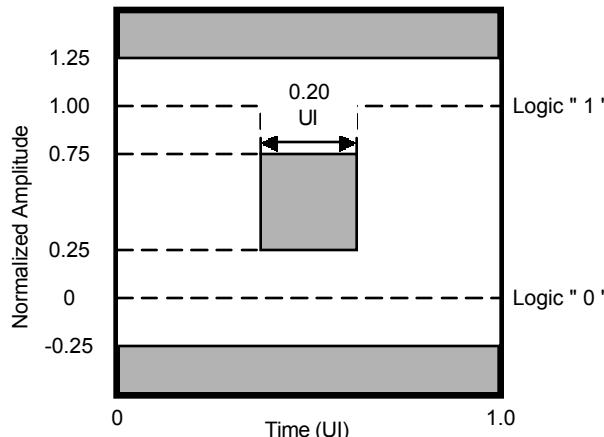
## 7. Optical Interface

( 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	$P_o$	-10.0		-3.0	dBm	1
Extinction Ratio	$Er$	8.2			dB	1
Center Wavelength	$\lambda_c$	1266		1360	nm	
Spectral Width (RMS)	$\Delta\lambda$			4	nm	
Eye Mask for Optical Output				Refer to Figure 4		

Note 1. Measured at 2488.32Mbps PRBS2<sup>23</sup>-1, 50% duty cycle, NRZ.



Relation between Input Signal and Optical Output Signal

Input Signal		Optical Output Signal
TD	TD <sub>b</sub>	
High	Low	ON (High)
Low	High	OFF (Low)
High	High	Undefined
Low	Low	Undefined

Figure 4 Eye Diagram Mask for Optical Output

### ⚠ 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	-	1266		1360	nm	
Minimum Sensitivity	$P_{min}$			-18.0	dBm	1, 2
Overload	$P_{max}$	-3.0			dBm	1, 2
SD Assert Level	$P_a$		-22		dBm	2
SD Deassert Level	$P_d$		-25		dBm	
SD Hysteresis	$P_{hys}$	0.5	3		dB	
Reflectance	$REF_r$			-14	dB	

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

2. Measured at 2488.32Mbps, PRBS 2<sup>23</sup>-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 ~ V <sub>cc</sub> )	Disabled (< -45dBm)

\*Note : Enabled for no Disable input (Pin 8 open)

## 9. Recommended Interface Circuit

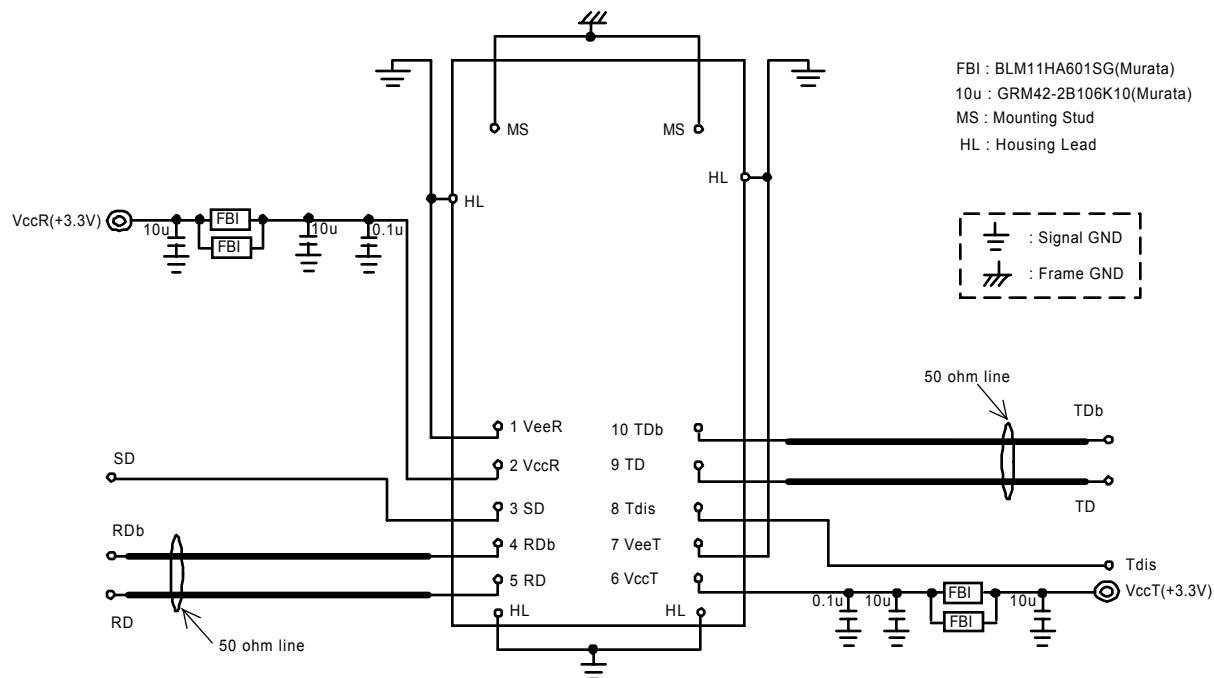


Figure 5-1. Recommended Interface Circuit

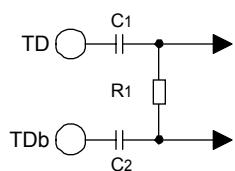


Figure 5-2. TD/TD<sub>b</sub> Input Circuit

$$R_1 = 100\Omega$$

$$R_2 = R_3 = 240\Omega$$

$$C_1 = C_2 = 0.1\mu F$$

$$C_3 = C_4 = 0.47\mu F$$

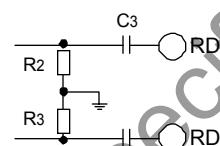


Figure 5-3. RD/RD<sub>b</sub> Output Circuit

## 10. Reliability Test Program

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

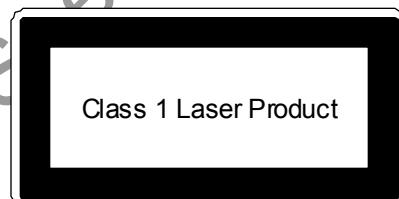
HEADING	TEST	REFERENCE	CONDITIONS	SAMPLING		
				LTPD	SS	C
Mechanical Integrity	Mechanical Shock	MIL-STD-883 Method 2002	5 times/axis 1,500G, 0.5ms	20	11	0
	Vibration	MIL-STD-883 Method 2007	Cond. A 20G, 20-2,000G Hz, 4min/cy, 4cy/axis	20	11	0
	Thermal Shock	MIL-STD-883 Method 1011	Delta T=100°C 0°C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

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.

## 13. Ordering Information

Ordering Number	Connector Type	EMI Shield Finger Option	Operating Case Temperature
SCM6228-GL-ZN	LC Duplex Receptacle, Metallized	Without Finger	-5°C ~ 70°C
SCM6228-GL-CN	LC Duplex Receptacle, Metallized	With Type-C Finger	

## 14. For More Information

### U.S.A.

ExeLight Communications, 4021 Stirrup Creek Drive, Suite 200 Durham, NC 27703

Tel. +1-919-361-1600 / Fax. +1-919-361-1619

E-mail: [info@exelight.com](mailto:info@exelight.com)

<http://www.exelight.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](mailto:photonics@sumielectric.com)

<http://www.sumielectric.com>

### Japan

Sumitomo Electric Industries, Ltd. ( International Business Division ), 3-12, Moto-Akasaka 1-chome Minato-ku Tokyo 107-8468

Tel. +81-3-3423-5771 / Fax. +81-3-3423-5099

E-mail: [product-info@ppd.sei.co.jp](mailto:product-info@ppd.sei.co.jp)

<http://www.sei.co.jp/Electro-optic/index.html>