Technical Specification
for
Optic Transceiver Module
SDM4201-XC

● 155.52 Mb/s	❒ 622.08 Mb/s	❒ other
● Short Haul Intermediate Reach	❒ Long Haul Long Reach	❒ other
❒ Transmitter	❒ Receiver	● Transceiver
	❒ 2R / ❒ 3R	● 2R / ❒ 3R

SUMITOMO ELECTRIC INDUSTRIES, LTD.

SUMITOMO Electric reserves the right to make changes in the specification described hereinafter without prior notice.

1. General

SDM4201-XC is a series of compact and high speed performance digital optical transceiver module ideally designed for versatile high speed network applications including ATM (Asynchronous Transfer Mode) and FDDI(Fiber Distributed Data Interface). 1300nm high speed InGaAsP-LED 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 10Mbps to 156 Mbps, NRZ
- Duty Cycle 50% (40 to 60% for FDDI PMD)
- Power Supply Voltage Single +5V
- Electrical Interface PECL
- Fiber Coupled Power ≥19dBm(Avg.) for GI-62.5/125/0.275
- Sensitivity ≥3ldBm(Avg.) for 125Mbps, FDDI
  ≥30dBm(Avg.) for 155.52Mbps ATM
- Connector InterfaceSC Duplex Connector

2. Block Diagram

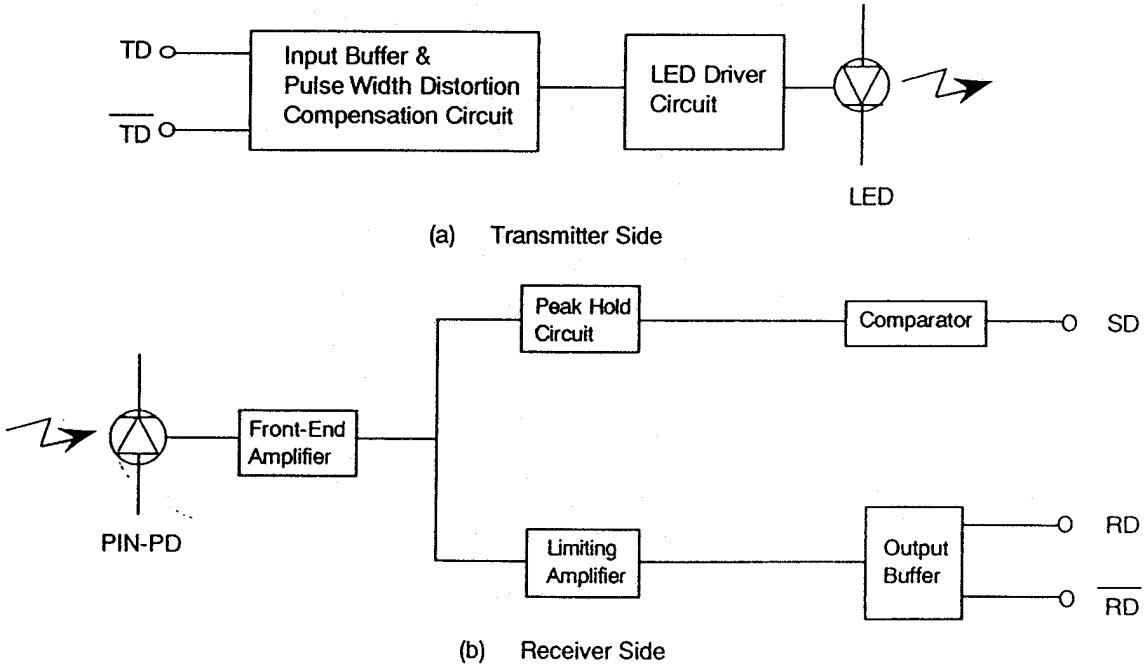


Figure 1 Block Digram

3. Maximum Absolute Ratings

Table 1 Maximum Absolute Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Storage Temperature Operating Ambient Temperature	Ts Ta	-40 0	85 70	°C °C	1
Supply Voltage	Vcc	-0.2	7	V	
Input Voltage	Vi	0	Vcc+0.5	V	2
Output Current (RD+, RD- and SD)	Io		30	mA	
Lead Soldering (Temperature) (Time)	L_{temp} L_{time}		260 10	°C sec	3

Note: 1. Please pay attention to the atmosphere because the dew on the module may cause some electrical damages.
2. TD+ & TD-
3. Measured on lead-pins at 2mm (0.079inch) off the package bottom.

4. Electrical Interface (Ta=0 to 70°C, Vcc=4.75 to 5.25V, Vee=GND, unless otherwise specified)

4.1 Transmitter Side

Table 2 Electrical Interface of Transmitter Side

Parameter	**Symbol**	**Min.**	**Typ**	**Max**	**Unit**	**Note**
Supply Voltage	V_{ccTX}	4.75	5.00	5.25	V	
Supply Current	I_{ccTX}	90	130	170	mA	
Input Voltage (High) (Low)	V_{IH} V_{IL}	V_{ccTX} - 1. 17 V_{ccTX} -1.95		V_{CCTX} -0.73 V_{CCTX} -1.45	V	1
Input Current (High) (Low)	I_{IH} I_{IL}			200 150	µA	1
Rise / Fall Time	Trin &Tfin			1.6	nsec	2

Notes
1. V_{ccTX} =5.00V, Ta =25°C
2. 20-80%

4.2 Receiver Side

Table 3 Electrical Interface of Receiver Side

Parameter	Symbol	Min.	Typ	Max	Unit	Note
Supply Voltage	V_{CCRX}	4.75	5.00	5.25	V	
Supply Current	I_{CCRX}	40	60	110	nA	1
Output Voltage (High) (RD+, RD- & SID) (Low)	V_{OH} V_{OL}	V_{CCRX} -1.03 V_{CCRX} -1.81		V_{CCRX} -0.88 V_{CCRX} -1.62	V	2,3
Rise / Fall Time of Output Signal	Trout & Tfout			1.6	nsec	4

Notes

1. Output currents are not included.
2. Output load resistor (R_L =50Ω) is connected to V_{CCRX} - 2.0V.
3. V_{CCRX} =5.00V, Ta =25°C
4. 20-80%

5. Optical Interface

(Ta=0 to 70°C, Vcc=4.75 to 5.25V, Vee=GND, unless otherwise specified)

5.1 Transmitter Side

Table 4 Optical Interface of Transmitter Side

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Averaged Output Power	*Po*	*-19*	-16	-14	dBm	1
Extinction Ratio	*Re*	*10*			dB	1
Eye Opening	Et	5.2		6.4	nsec	2
Rise Time (10 - 90 %) Fall Time (10 - 90 %)	Tr Tf			3.0 3.0	nsec	3
Center Wavelength Spectral Width (RMS)	λ_{CE} $\Delta\lambda$	1260		1360 75	nm	
Optical Pulse Mask	Refer to Figure 2					

Notes

1. Measured at the end of loom length 62.5/125 μm (NA=0.275) graded index fiber cable using 25Mbps 1010 signal at the beginning of life.

2. Measured using 155.52Mbps PRBS 2^{23-1}. Peak to peak value at BER=2.5x 10^{-10}. 3. Measured using 155.52Mbps 1010 signal.

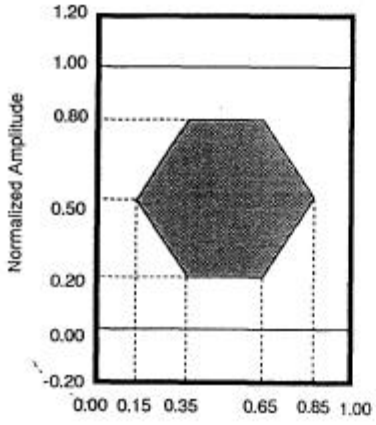


Figure 2 Optical Pulse Mask with Fourth Oreder

Table 5 Relation between Input Signal and Optical Output Signal

Input Signal TD	Input Signal $\overline{TD}$	Optical Output Signal
High	Low	ON (High)
Low	High	OFF (Low)
High	High	Undefined
Low	Low	Undefined

5.2 Receiver Side

Table 6 Optical Interface of Receiver Side

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Averaged Input Power	Pin	-30		-14	dBm	1
Eye Opening	Er	1.7			nsec	1
SD Assert Level SD Deassert Level SD Hysteresis	Pa Pd Phys	 -45 1.5	-33 -36 3	-31	dBm dBm dB	2
SD Assert Time SD Deassert Time	Sa Sd		10	100 350	µsec µsec	2,3

Notes
1. BER=1.0 x 10 155.52Mbps, PRBS 2 -1, The input DDJ is 0.7nsec(peak-to-peak), DCD is 0.8nsec, RJ is 0.6nsec(peak-to-peak).
2. 155.52Mbps, 1010 Signal
3. Refer to Figure 3

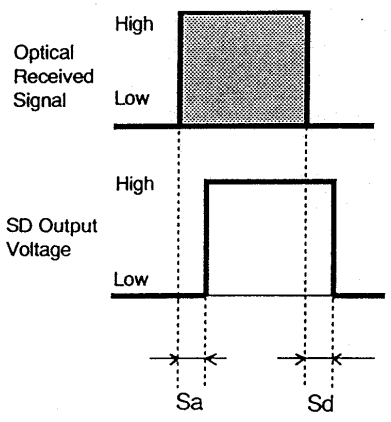


Figure 3 SD Timing Chart

Table 7. Relation between Optical Received Signal and Data Output

Optical Received Signal	Data Output	
	RD	RDb
High (ON)	High	Low
Low (OFF)	Low	High

6. External View and Pin Assignment

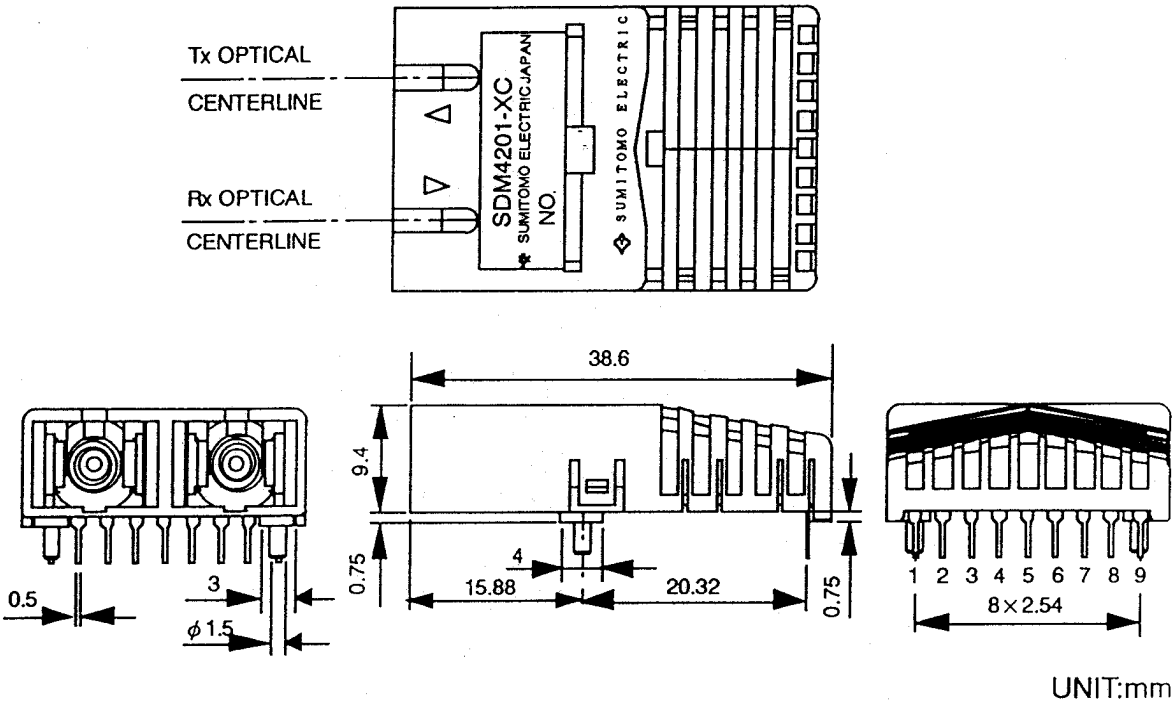


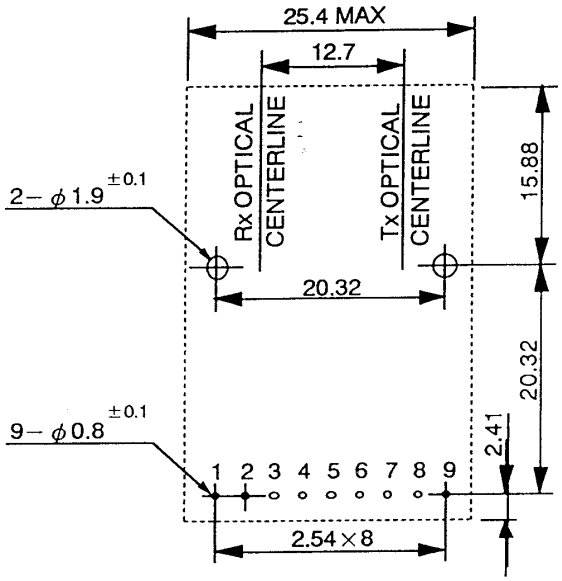
Figure 4 External View

Table **8 Pin**

Function

No	Symbol	Function
1	V_{EERX}	Power Supply (-) for Receiver: Connected to GND
2	RD+	Received Differential Data (positive)
3	RD-	Received Differential Data (negative)
4	SD	Signal Detect
5	V_{CCRX}	Power Supply for Receiver : Connected to +5V
6	V_{CCTX}	Power Supply for Transmitter: Connected to +5V
7	TD-	Transmitting Differential Data (negative)
8	TD+	Transmitting Differential Data (positive)
9	V_{EETX}	Power Supply (-) for Transmitter -. Connected to G N D

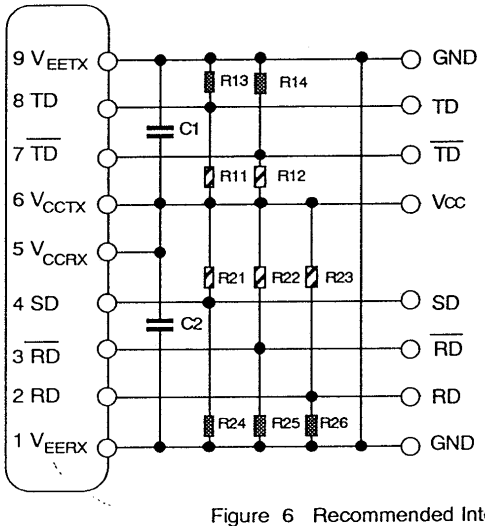
7. Footprint



UNIT:mm

Figure 5 Footprint

8. Recommended Interface Circuit



R11, R12, R21, R22, R23 : 82Ω (>1/8W)
R13, R14, R24, R25, R26 : 130Ω (>1/8W)
C1, C2 : 0.1μF (Ceramic chip capasitor)
V_{CC} : 4.75 - 5.25 V / DC Input

Ripple filter is enough with only capacitors shown in this figure.
In a case that noises occurring by a power supply and other IC make sensitivity degraded, some measures are required.

Figure 6 Recommended Interface Circuit

9. Jitter Specification for FDDI

Refer to ISO/IEC 9314-3, Information processing systems - Fiber Distributed Data Interface (FDDI), Part 3 Physical Layer Medium Dependent (PMD).

9.1 Transmitter

Table 9 Transmitter Side

Parameter	Symbol	Min	Typ	Max	Unit	Note
Eye Opening	E_{t2}	6.1		8.0	nsec	1

Note 1. 125 Mb/s, DDJ Test Pattern, Peak to peak value at BER=$2.5x10^{-10}$

9.2 Receiver

Table 10 Receiver Side

Parameter	Symbol	Min	Typ	Max	Unit	Note
Average Input Power	P_{in2}	-31		-14	dBm	1
Eye Opening	E_{r2}	2.1			nsec	1

Note 1. 125Mbps, DDJ Test Pattern, Peak to peak value at BER=2.5×10^{-10} .
The input DDJ is 1.2nsec(peak-to-peak), DCD is l.0nsec(peak-to-peak), RJ is 0.76nsec(peak-to-peak).

10. Ordering Information

Table 11 Ordering Information

Part Number	Description
SDM4201-XC	**SC Duplex Receptical**

11. Precaution

The components should be handled in the same manner as ordinary semiconductor devices to prevent the electro-static damages. For safe keeping and carrying, the components should be packaged with ESD proof material. To assemble the components on PCB, the workbench, the soldering iron and the human body should be grounded.

The signal input and output terminals should not be short-circuited to supply voltage or ground.

The accessory cap should be attached to the connector part while the optical connector is not in use, because dust on the optical interface port may let the optical power or sensitivity degrade.

Please pay special attention to the atmosphere condition of the components because the dew on the module may cause some electrical damages.

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.

12. Warnings and Cautions.

Use the product with the rated voltage. If the voltage exceeds the specification, overheating or fire may occur.

Do not use this product in an area where the temperature exceeds the rated maximum, where there is much moisture, where there is corrosive gas, or other extreme conditions. Otherwise, failure, overheating or fire may occur.

Do not look at the laser beam projection area with naked eyes or through optical equipment while the power supply is connected to the device. Eye injury may result.

Do not disassemble this product. 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 body.

Be sure to carry out correct soldering and connection to peripheral circuits to prevent contact failure or short-circuit. A strong laser beam may cause eye injury. Overheating or fire may occur.

Be sure to turn off the power when connecting this product to PC boards. Electric shock may occur.

Do not put this product in your mouth. This product contains material harmful to health.

Dispose of this product or equipment including this product properly as an industrial waste according to the regulations.

13. For More Information

U.S.A.

Sumitomo Electric Lightwave Corp.
78 Alexander Drive
Research Triangle Park, NC 27709
U.S.A.
Tel. (919)541-8100
Fax. (919)541-8376
www.sumitomoelectric.com

Europe
Sumitomo Electric Europe S. A.
Unit 11, Magnolia House
Spring Villa Park, Spring Villa Road
Edgware, Middlesex, HA8 7EB
United Kingdom
Tel. (081)905-6160
Fax. (081)905-6195

Japan
Sumitomo Electric Industries, Ltd.
(International Business Division)
3-12, Moto-Akasaka 1 -chome
Minato-ku Tokyo 107
Japan
Tel. (03)3423-5771
Fax. (03)3423-5099