

## Technical Specification for 5.0V / 156Mbps Fiber Optic Transmitter Module

### SDT8211-T\_-Q\_

- |  |   |   |
|--|---|---|
| <input checked="" type="checkbox"/> 155.52Mb/s   | <input type="checkbox"/> 622.08Mb/s                           | <input type="checkbox"/> other _____                          |
| <input type="checkbox"/> Short Haul              | <input checked="" type="checkbox"/> Long Haul                 | <input type="checkbox"/> other _____                          |
| <input type="checkbox"/> Intermediate Reach      | <input checked="" type="checkbox"/> Long Reach                | <input type="checkbox"/> other _____                          |
| <input checked="" type="checkbox"/> Single 5.0 V | <input type="checkbox"/> Single 3.3 V                         | <input type="checkbox"/> other _____                          |
| <input checked="" type="checkbox"/> 1.3 $\mu$ m  | <input type="checkbox"/> 1.55 $\mu$ m                         | <input type="checkbox"/> other _____                          |
| <input checked="" type="checkbox"/> Transmitter  | <input type="checkbox"/> Receiver                             | <input type="checkbox"/> Transceiver                          |
|  | ( <input type="checkbox"/> 2R / <input type="checkbox"/> 3R ) | ( <input type="checkbox"/> 2R / <input type="checkbox"/> 3R ) |



SUMITOMO Electric reserves the right to make changes in the specification described hereinafter 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.

	<b>Warning</b>	Wrong operation without following this instruction may lead to human death or serious injury.
	<b>Caution</b>	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.

(SDT8211-T\_-Q\_)

## 1. General

SDT8211-T\_-Q\_ is a compact and high performance digital fiber optic transmitter module ideally designed for high speed data communication systems or telecommunication transmission systems. including SDH STM-1 L-1.1 and SONET OC-3 LR-1. The device also meets GR-253-CORE requirement and ITU-T G. 957 / G. 958 recommendation.

* Data Rate	155.52Mbps
* Power Supply Voltage	Single +5V ( or -5V )
* Electrical Interface	PECL ( or ECL )
* Laser Diode	1300nm FP-LD
* Connector Interface	FC / SC connector
* Pin Configuration	20 pin Dual in Line

The features of SDT8211-T\_-Q\_ are listed below.

* Features	Low Power Consumption
	Plastic Molded Package
	Uncooled Laser with Automatic Optical Power Control Circuit
	Optical Output Shut-down ( Disable )
	Laser Bias Monitor
	Laser Rear Facet Monitor
	Multi-sourced Footprint

## 2. Block Diagram

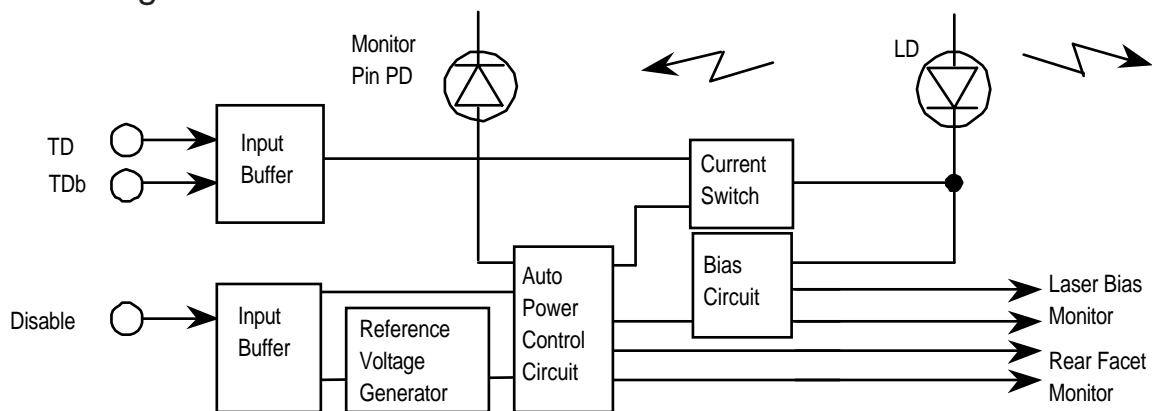


Figure 1 Block Diagram

## 3. Package Dimension

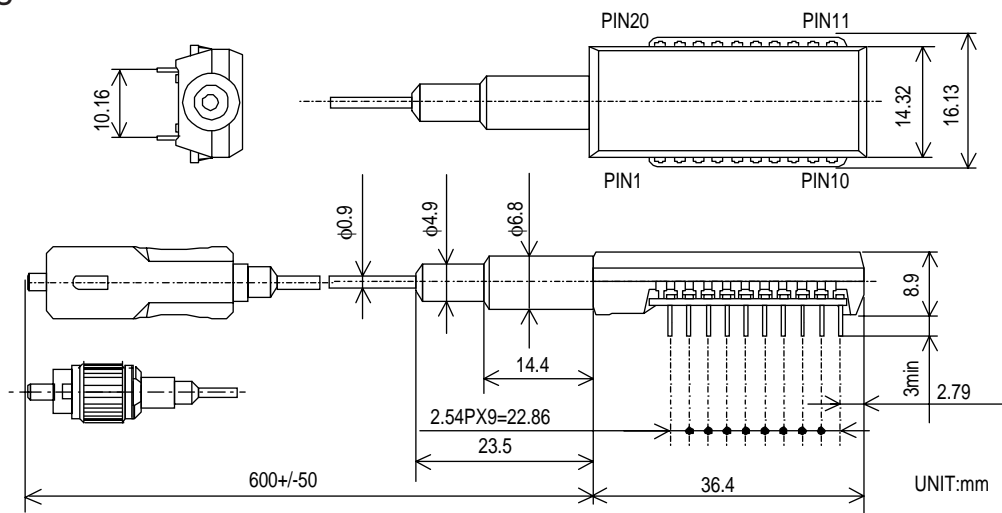


Figure 2. External View

### ⚠ 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

## 4. Pin Assignment

No.	Symbol	Function	No.	Symbol	Function
1	NC	Non Connection	11	NC	Non Connection
2	BM (+)	LD Bias Current Monitor (Refer to Figure 3)	12	Vcc	Power Supply (+)*
3	NC	Non Connection	13	NC	Non Connection
4	BM (-)	LD Bias Current Monitor (Refer to Figure 3)	14	Vee	Power Supply (-)*
5	Vee	Power Supply (-)*	15	TDb	Negative Data Input (Refer to Section 6)
6	Vcc	Power Supply (+)*	16	TD	Positive Data Input (Refer to Section 6)
7	Disable	LD Disable Input (Refer to Section 9)	17	RFM (-)	Rear Facet Current Monitor (Refer to Figure 3)
8	Vcc	Power Supply (+)*	18	Vcc	Power Supply (+)*
9	Vcc	Power Supply (+)*	19	RFM (+)	Rear Facet Current Monitor (Refer to Figure 3)
10	NC	Non Connection	20	NC	Non Connection

\*Note: If +5V is used, connect Vcc to +5V and Vee to GND.

If -5V is used, connect Vcc to GND and Vee to -5V.

## 5. Absolute Maximum Ratings

Parameter	Symbol	Min.	Max	Unit	Note
Storage Case Temperature	Ts	-40	85	°C	1
Operating Case Temperature	Tc	0.0	70	°C	1, 2
		-40	85	°C	1, 3
Supply Voltage	Vcc-Vee	0.0	7.0	V	4
Input Voltage	Vi	Vee	Vcc+0.5	V	5
Lead Soldering (Temperature) (Time)			260	°C	6
			10	sec.	

Note

1. No condensation allowed
2. SDT8211-T\_-QN
3. SDT8211-T\_-QW
4. Vcc > Vee, Vee = GND for Vcc = +5V or Vcc = GND for Vee = -5V.
5. TD, TDb and Disable
6. Measured on lead-pin at 2mm off of 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,  $V_{cc}-V_{ee} = 4.75$  to  $5.25$  V and all temperatures shall apply. )

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	$V_{cc}-V_{ee}$	4.75	5.00	5.25	V	
Supply Current	$I_{dtx}$		70	150	mA	1, 2
Input Voltage	High	$V_{ih}$	$V_{cc}-1.17$	$V_{cc}-0.73$	V	3, 4, 5
	Low	$V_{il}$	$V_{cc}-1.95$	$V_{cc}-1.45$	V	
TD, TDb						
Transmitter Disable Voltage	$V_d$	$V_{cc}-2.0$		$V_{cc}$	V	6
Transmitter Enable Voltage	$V_{en}$	$V_{ee}$		$V_{ee}+0.4$	V	6
LD Bias Monitor Voltage	$V_{bm}$	0.01		0.45	V	5, 7
Rear Facet Monitor Voltage	$V_{rfm}$	0.01		0.20	V	2, 7

- Note
1. Input bias current is not included in Supply Current. 155.52Mbps.
  2. 50% duty cycle data
  3.  $V_{cc}-V_{ee}=5V$
  4.  $T_c=25^{\circ}C$
  5. 10-90%
  6. The transmitter is enabled as default state and requires an external voltage only to disable.  
( Refer to 9. Relation between Disable Input Voltage and Optical Output Power )
  7. The Laser Bias and Rear Facet Monitor currents are calculated as ratios of the corresponding voltages to thier current-sensing resistors,  $10\Omega$  and  $200\Omega$ , respectively ( See Figure 3 ). Upon measuring or utilizing these values, use a device whose input impedance is high enough (  $>1M\Omega$  ) compared with those resistors.

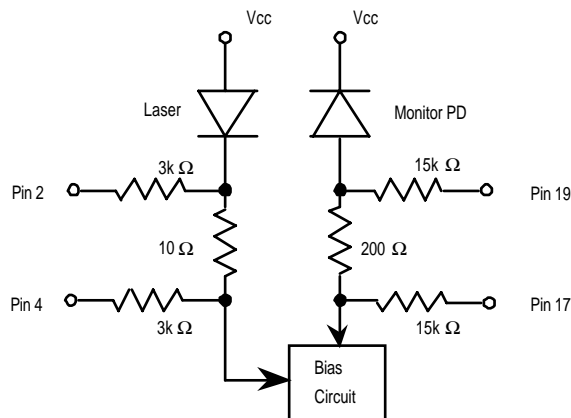


Figure 3 Monitor Circuit Schematic Diagram

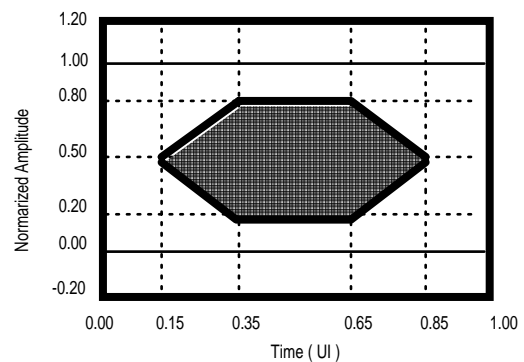


Figure 4 Eye Mask for Optical Output with Fourth Order Bessel-Thomson Filter Specified in ITU-T G.957

### ⚠ 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.

### ⚠ Warning

- Use the product with the rated voltage described in the specification. If the voltage exceeds the maximum rating, overheating or fire may occur.

## 7. Optical Interface

( Unless otherwise specified, Vcc-Vee = 4.75 to 5.25 V and all temperatures shall apply. )

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Average Output Power	P <sub>oe</sub>	-5.0		0.0	dBm	1
Extinction Ratio	Er	10.0			dB	2
Center Wavelength	$\lambda_c$	1280		1335	nm	3
		1270		1345	nm	4
Spectral Width (RMS)	$\Delta\lambda$			4.0	nm	3
				2.5	nm	4
Eye Mask for Optical Output	Refer to Figure 4					

Note 1. Measured at the bit rate of 155.52Mbps (2<sup>23</sup>-1)PRBS NRZ 2. 50% duty cycle data

3. SDT8211-T\_-QN

4. SDT8211-T\_-QW : Center wavelength value is wider than SONET/SDH specification, but long reach transmission is guaranteed because the spectral width is limited to 2.5nm.

### 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.

## 8. Relation between Input Signal and Optical Output Power

Input Signal		Optical Output Power
TD	TD <sub>b</sub>	
"H"	"L"	ON ( "H" )
"L"	"H"	OFF ( "L" )
"H"	"H"	undefined
"L"	"L"	undefined

## 9. Relation between Disable Input Voltage and Optical Output Power

Disable Input Voltage [ V ]	Optical Output Power
"L" (V <sub>ee</sub> ~ V <sub>ee</sub> +0.8)	Enabled
"H" (V <sub>ee</sub> +2.0 ~ V <sub>cc</sub> )	Disabled ( <-45dBm )

Note 1. Enabled for no Disable input ( Pin 7 opened )

## 10. Fiber Pigtail Specification

Parameter	Min.	Typ.	Max.	Unit	Note
Mode Field Diameter		9.5		μm	
Cladding Diameter		125		μm	
Outer Jacket Diameter		0.9		mm	
Optical Fiber Tensile Break Strength			9.8	N	1
Bend Radius	30			mm	

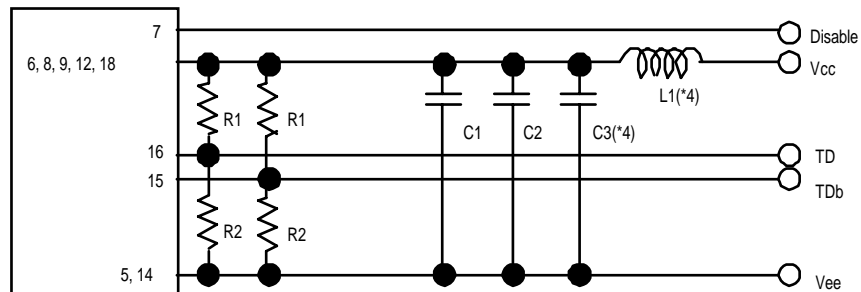
Note 1. Strength between receiver body and optical fiber should be less than 9.8 N.

### Caution



Do not give undue force or impact to the optical fiber pigtail. A broken optical fiber may injure skin or human body, or a strong laser beam may cause eye injury. Operate the equipment carefully. Use assisting tools or prospective aids as required.

## 11. Recommended User Interface



C1 = 0.022 $\mu$ F / (Ceramic Chip Capacitor)

C2 = 1 $\mu$ F / (Ceramic Chip Capacitor)

R1 = 82 $\Omega$  ( 1/8 W )

R2 = 130 $\Omega$  ( 1/8 W )

Note : 1. Terminated resistors (R1, R2) should be located as close to the module as possible.

2. 50 $\Omega$  impedance lines are recommended for TD and TDb.

3. Please refer to Figure 3 for Pin 2, 4, 17, 19.

4. C3 = 470 $\mu$ F, L1 = 100 $\mu$ H are effective when ripple of power supply is large.

Figure 5 Recommended User Interface

### 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.

## 12. Reliability Test


Bellcore TA-NWT-000983 Issue 2, December 1993								
Heading	Test	Reference	Condition	Sampling			SEI	Results
				LTPD	SS	C	SS	F/C
Mechanical Integrity	Mechanical Shock	MIL-STD-883 Method 2002	Condition B 5 times/axis 500G, 1.0 ms 1,500G, 0.5ms	20%	11	0	---	---
				20%	11	0	11	0
				20%	11	0	---	---
	Vibration	MIL-STD-883 Method 2007	Condition A 20 G 20-2,000 Hz 4 min/cycle; 4 cycles/axis	20%	11	0	11	0
	Thermal Shock	MIL-STD-883 Method 1011	T=100°C	20%	11	0	11	0
	Solderability	MIL-STD-883 Method 2003	(steam aging not required)	20%	11	0	11	0
Endurance	Accel. Aging (High Temp.)	(R)-453 Section 5.18	+85°C; rated power >5,000hrs. >10,000hrs.	---	25	---	25	0
				---	10	---	---	---
	High Temp. Storage	-----	max. storage T (T=85°C) >2,000hrs.	20%	11	0	---	---
	Low Temp. Storage	-----	min. storage T (T=-40°C) >2,000hrs.	20%	11	0	11	0
	Temperature Cycling	Section 5.20	- 40 °C to +85°C 400 times pass/fail 500 times for info. 500 times pass/fail 1,000 times for info.	20%	11	0	---	---
				---	11	---	---	---
				20%	11	0	11	0
				---	11	---	---	---
	Damp Heat (if using epoxy)	MIL-STD-202 M103	40 °C , 95%, 56days	20%	11	0	11	0
		IEC 68-2-3	85°C /85%RH, 2000hrs.	20%	11	0	---	---
	Cyclic Moisture Resistance	Section 5.23	-----	20%	11	0	11	0
Special Tests	Internal Moisture	MIL-STD-883 Method 1018	< 5,000 ppm water vapor	20%	11	0	11	0
	Flammability	TR357:Sec. 4.4.2.5	-----	----	----	---	----	OK
	ESD Threshold	Section 5.22	-----	----	6	---	6	0

## 13. Laser Safety

This product uses a semiconductor laser system and is a laser class 1 product acc. FDA, complies with 21CFR1040. 10 and 1040.11. Also this product is a laser class 1 product acc. IEC 825-1.

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.

## 14. Ordering Information







Connector type	Ordering Number	
	Tc = -0 ~ 70°C	Tc = -40 ~ 85°C
FC - PC	SDT8211-TD-QN	SDT8211-TD-QW
SC - PC	SDT8211-TC-QN	SDT8211-TC-QW

## 15. 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.

## 16. For More Information

### U.S.A.

Sumitomo Electric Lightwave Corp., 78 Alexander Drive, Research Triangle Park, NC 27709

Tel. (919)541-8100 / Fax. (919)541-8376

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

<http://www.sumitomoelectric.com>

### Europe

Sumitomo Electric Europe Ltd., Unit 11, Magnolia House, Spring Villa Park, Spring Villa Road

Edgware, Middlesex, HA8 7EB, United Kingdom

Tel. (0181)905-6167 / Fax. (0181)905-6120

### Japan

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

Tel. (03)3423-5771 / Fax. (03)3423-5099

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

[http://www.sei.co.jp/Electro-optic/eopd\\_home\\_e.html](http://www.sei.co.jp/Electro-optic/eopd_home_e.html)