



Technical Specification for 2.5Gbps Fiber Optic Receiver Module

SDT9878-R_ _

- | | | |
|--|--|---|
| ☐ 155.52Mb/s | ☐ 622.08Mb/s | ☒ other <u>2488.32Mbps</u> |
| ☐ Short Haul | ☒ Long Haul | ☐ other _____ |
| ☐ Intermediate Reach | ☒ Long Reach | ☐ other _____ |
| ☒ Single 5.0 V | ☐ Single 3.3 V | ☐ other _____ |
| ☒ 1.3 μ m | ☒ 1.55 μ m | ☐ other _____ |
| ☐ Transmitter | ☒ Receiver | ☐ Transceiver |
| | (☐ 2R / ☒ 3R) | (☐ 2R / ☐ 3R) |



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.

indicates prohibition of actions. Action details are explained thereafter.

indicates compulsory actions or instructions. Action details are explained thereafter.

1. General

The features of SDT9878-R_ _ are listed below:

- * SDH STM-16 L-16.2 / SONET OC-48 LR-2 Compliant
- * Power Supply Voltage Single +5V
- * Low Power Supply Current 310mA (typ.)
- * Compact Package Size 58.4 X 26.8 X 8.5 mm
- * Built-in Clock Recovery
- * Signal Detect (FLAG) Function
- * Optical Connector Interface FC / SC connector

2. Block Diagram

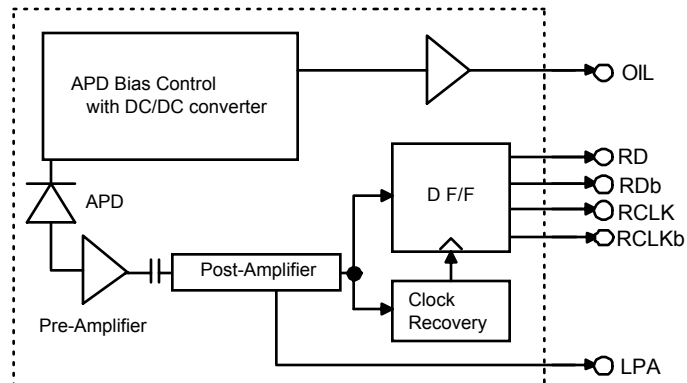


Figure 1 Block Diagram

3. Package Dimension

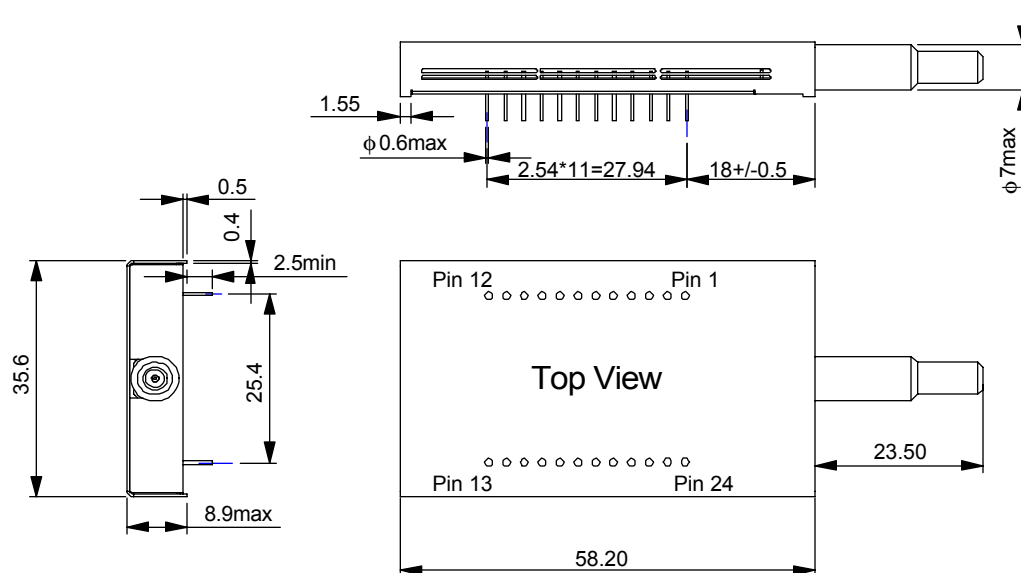


Figure 2 Package Dimension

⚠ 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
1	NIC	No Internal Connection
2	NUC	No User Connection
3	LPA	Loss of Power Alarm
4	GND	Ground
5	RCLKb	False clock output
6	RCLK	True clock output
7	GND	Ground
8	Vccd	Positive power supply (Digital)
9	GND	Ground
10	RD	True data output
11	RDb	False data output
12	GND	Ground

No.	Symbol	Function
24	NUC	No User Connection
23	OIL	Optical Input Level
22	Vcca	Positive power supply (Analogue)
21	NUC	No User Connection
20	GND	Ground
19	GND	Ground
18	NIC	No Internal Connection
17	GND	Ground
16	GND	Ground
15	GND	Ground
14	GND	Ground
13	NUC	No User Connection

5. Absolute Maximum Ratings

Parameter	Symbol	min.	Max	Unit	Note
Storage Case Temperature	Ts	-40	85	°C	1
Operating Case Temperature	Tc	-5	75	°C	1
Supply Voltage	Vccd, Vcca	0.0	6.0	V	2
Maximum Input Power	Pmax		-5.0	dBm	
Lead Soldering	Temperature		260	°C	3
	Time		10	sec.	

Note 1. No condensation allowed. 2. GND=0.0V

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, V_{cca} , V_{ccd} = 4.75 to 5.25 V, @2488.32Mbps, PRBS2²³-1, 50% duty and all operating temperature shall apply.)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V_{cca} , V_{ccd}	4.75	5.00	5.25	V	
Supply Voltage for MON	V_{mon}	3.00	5.00	5.25	V	
Supply Current (V_{cca} and V_{ccd})	I_{drx}		310	400	mA	1, 2
Output Voltage Swing (RD, RDb)	V_{ord}	0.30		0.80	V	3, 4
Output Voltage Swing (RCLK, RCLKb)	V_{orc}	0.30		0.80	V	3, 4
Output Voltage (FLAG, FLAGb)	High	V_{oflgh}	$V_{cc}-0.20$	V_{cc}	V	3
	Low	V_{oflgl}	0	0.20	V	
Output Signal Rise / Fall Time (RD, RDb, 20% - 80%)	T_{rd}/T_{fd}		120	180	ps	
Output Signal Rise / Fall Time (RCLK, RCLKb, 20% - 80%)	T_{rc}/T_{fc}		120	180	ps	
Clock / Data Output Skew	T_{skew}	160	200	270	ps	5
Output Clock Duty	C_{duty}	45	50	55	%	6
Clock Jitter (RMS)	T_{jc}			0.010	UI	6
Optical Input Level	V_{oil}		0.6		V	7
			0.02		V	8

1. 2488.32Mbps, PRBS 2²³-1 2. Output current is not included. 3. V_{ccd} , V_{cca} = 5.0V, T_c = 25°C 4. R_I = 50 Ω , Single end out. 5. Please refer to Figure 3.
6. 2488.32Mbps, PRBS 2²³-1, NRZ 7. P_{in} =-9dBm 8. P_{in} =-28dBm

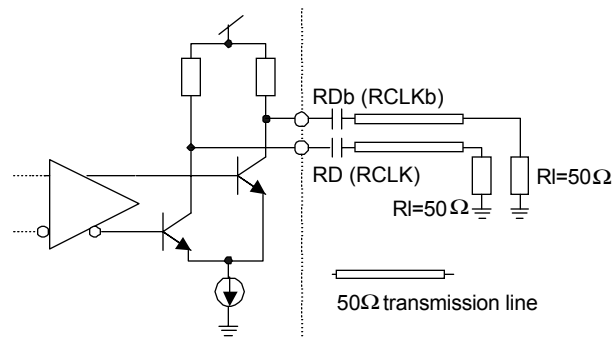
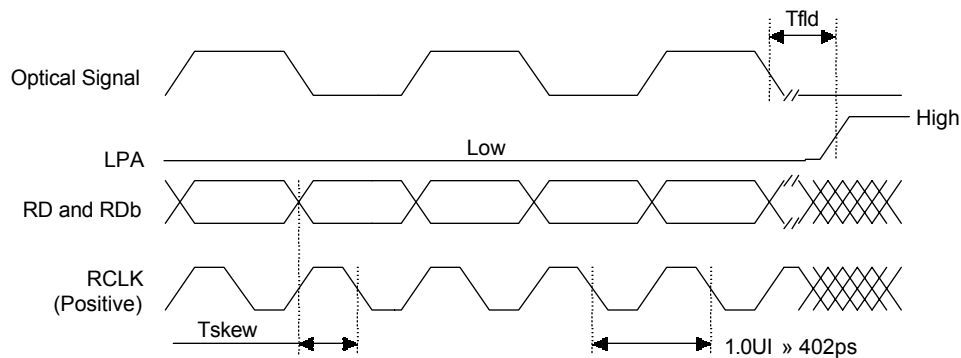


Figure 3 Data and Clock Output Interface (CML Interface)



Optical Input	Data Output	
	RD	RDb
"H"	"H"	"L"
"L"	"L"	"H"

Figure 4 Output Timing Chart

7. Optical Interface

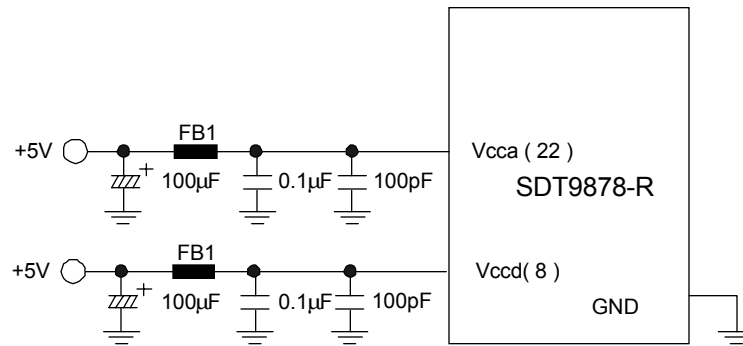
(Unless otherwise specified, Vcca, Vccd = 4.75 to 5.25 V, @2488.32Mbps, PRBS2^23-1,50% duty and all operating temperature shall apply.)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Bit Rate Range		2488.32+/-50ppm			Mbps	
Center Wavelength Range	λ_c	1280		1335	nm	
		1500		1580		
Minimum Sensitivity	Pmin			-28.0	dBm	1
Overload	Pmax	-8.0			dBm	1
Dispersion Penalty	Dp			2.0	dB	2,3
Input Jitter Tolerance	Compliant with Bellcore 253-CORE and ITU G-958					
Consecutive Identical Digit	CID	72	100		bits	
LPA Deactive Level	Pa	-50.0	-35.0	-28.0	dBm	4
LPA Active Level	Pd	-50.0	-36.5	-28.0	dBm	5
LPA Deassertion Time	Tlpa	2.3		100	μ s	6
Optical Reflectance	Or			-27	dB	

1. BER = 10^{-10} 2. Less than 2dB penalty is guaranteed when connected to SDT8078-T@-@@.

3. 80km SMF 4. BER>1.0E-4 5. BER>1.0E-3 6. Refer to Figure 4

8. Recommended User Interface



C1, C2: 10 μ F (Panasonic EEFCD1B100R)

L1 : 100 μ H (TDK SLF7045T-101MR50), Series Resistance < 3 Ω , I_{max} > 120mA

FB1 : Ferrite Bead (TDK ZBF253D-00), Series Resistance < 0.1 Ω , I_{max} > 1A

Figure 5 Recommended Power Supply Filtering

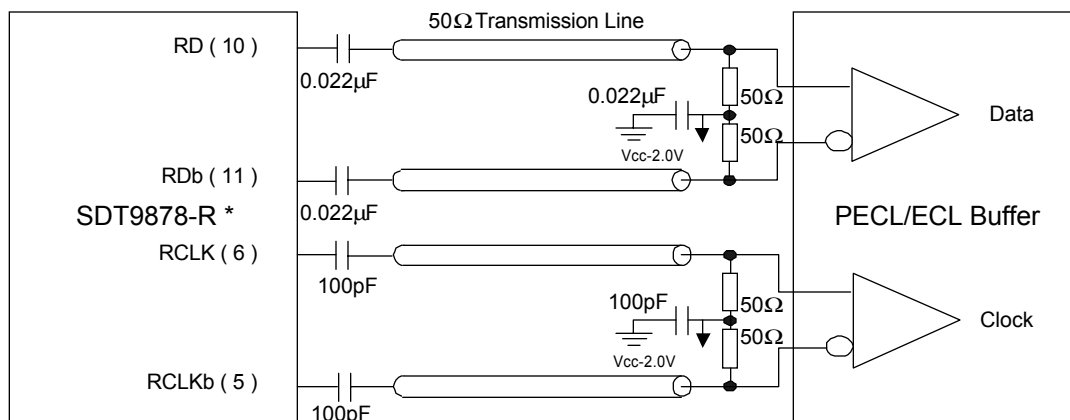


Figure 6 Recommended interface with PECL / ECL Device

* SDT9878 has internal pull-down resistors.

9. Fiber Pigtail Specification

Parameter	Min.	Typ.	Max.	Unit	Note
Core Diameter		9.5		μm	
Cladding Diameter		125		μm	
Outer Diameter		0.9		mm	
Optical Cord Tensile Beak Strength			9.8	N	
Bend Radius	30			mm	

⚠ 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.

10. Reliability Test (Plan)

Bellcore TA-NWT-000983 Issue 2, December 1993								
Heading	Test	Reference	Condition	Sampling			SEI Results	
				LTPD	SS	C	SS	F/C
Mechanical Integrity	Shock	MIL-STD-883 Method 2002	Condition B					
			5 times/axis					
			500G, 1.0 ms	20%	11	0	11	0
	Vibration	MIL-STD-883 Method 2007	1,500G, 0.5ms	20%	11	0	---	---
			Condition A	20%	11	0	11	0
			20 G					
Endurance	Thermal Shock	MIL-STD-883 Method 1011	20-2,000 Hz					
			4 min/cycle; 4 cycles/axis					
			ΔT=100°C	20%	11	0	11	0
	Solderability	MIL-STD-883 Method 2003	(steam aging not required)	20%	11	0	11	0
	Fiber Pull		1 Kg; 3 times; 5sec.	20%	11	0	---	---
			2 Kg; 3 times; 5sec.	20%	11	0	---	---
	Accel. Aging (High Temp.)	(R)-453 Section 5.18	+85°C; rated power					
			>5,000hrs.	---	25	---	25	0
			>10,000hrs.	---	10	---	---	---
Special Tests	High Temp. Storage	-----	max. storage T (T=85°C)	20%	11	0	---	---
			>2,000					
	Low Temp. Storage	-----	min. storage T (T=-40°C)	20%	11	0	11	0
			>2,000					
	Temperature Cycling	Section 5.20	- 40°C to +85°C					
			400 times pass/fail	20%	11	0	---	---
			500 times for info.	---	11	---	---	---
	Damp Heat (if using epoxy)	MIL-STD-202 M103 or IEC 68-2-3	500 times pass/fail	20%	11	0	11	0
			1000 times for info.	---	11	---	11	0
Special Tests	Cyclic Moisture Resistance	Section 5.23	40°C , 95%, 56days	20%	11	0	11	0
			or 85°C /85%RH 2,000hrs	20%	11	0	---	---
			-----	20%	11	0	11	0
Special Tests	Internal Moisture	MIL-STD-883 Method 1018	< 5,000 ppm water vapor	20%	11	0	11	0
Special Tests	Flammability	TR357:Sec. 4.4.2.5	-----	---	---	---	---	OK
Special Tests	ESD Threshold	Section 5.22	-----	---	6	---	6	0

11. Ordering Information

Connector	Pigtail Length : mm	Tc = -5 ~ 75°C
SC Connector	600 +/- 50	SDT9878-RC-QN
SC Connector	990 +/- 100	SDT9878-RC-YN
FC / PC Connector	600 +/- 50	SDT9878-RD-QN
FC / PC Connector	990 +/- 100	SDT9878-RD-YN

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 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. For More Information

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