Technical Specification
for
2.5Gbps Fiber Optic Transmitter Module

SDT9078-T_-__

☐ 155.52Mb/s	☐ 622.08Mb/s	☑ other 2488.32Mbps
☐ Short Haul Intermediate Reach	☑ Long Haul Long Reach	☑ other STM-16 L-16.2 OC-48 LR-2
☑ Single 5.0 V	☐ Single 3.3 V	☐ other _____
☐ 1.3 µm	☑ 1.55 µm	☐ other _____
☑ Transmitter	☐ Receiver	☐ Transceiver
	(☐ 2R / ☐ 3R)	(☐ 2R / ☐ 3R)

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

The features of SDT9078-T_-__ are listed below:

* SDH STM-16 L-16.2 / SONET OC-48 LR-2 Compliant
* Power Supply Voltage Single +5V
* Low Power Supply Current 150mA (typ.)
* Compact Package Size 43.5 X 31.2 X 8.9mm
* Pin Configuration 24 pin Dual in Line, Multi Sourced Foot print
* Uncooled Laser Diode with Automatic Optical Power Control Circuit
* Laser Diode 1550nm InGaAsP / InP DFB-LD
* Optical Output Shut-down Function (Disable Function)
* Laser Bias Current Alarm Function.
* Laser Bias Monitor / Rear Facet Monitor Function.
* Clocked / Non-clocked mode selector
* Optical Connector Interface FC / SC connector

2. Block Diagram

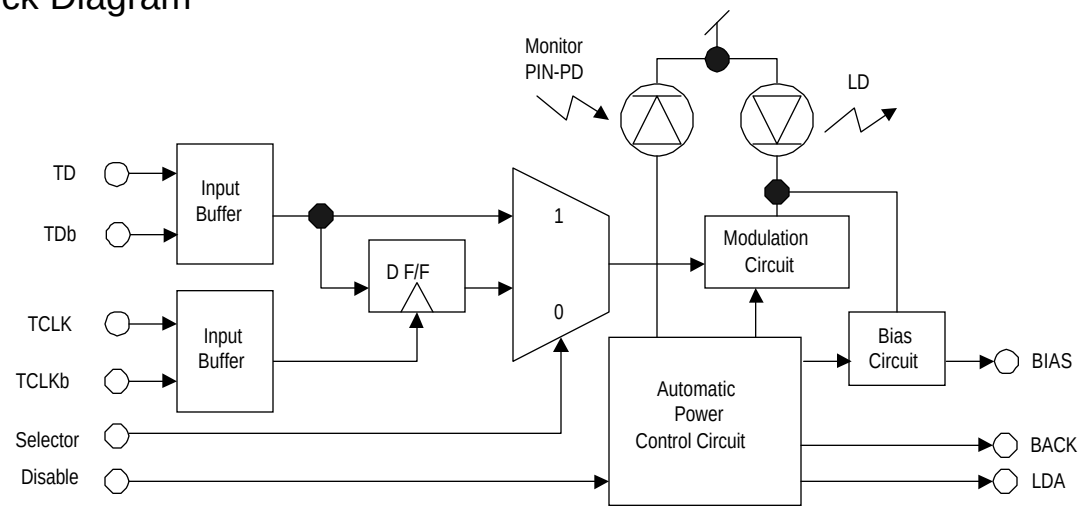


Figure 1 Block Diagram

*Clocked Operation Mode
(Vs=Vslct)

Data Input				Optical
TD	TDb	TCLK	TCLKb	Output
H	L	↗	↘	H
L	H	↗	↘	L
ϕ	ϕ	L	H	Q0

H:High Level, L:Low Level, ϕ:H or L
Q0:Previous optical output status before data input condition defined

*Non-Clocked Operation Mode
(Vs=Vnslct)

Data Input		Optical
TD	TDb	Output
H	L	H
L	H	L

H:High Level, L:Low Level

3. Package Dimension

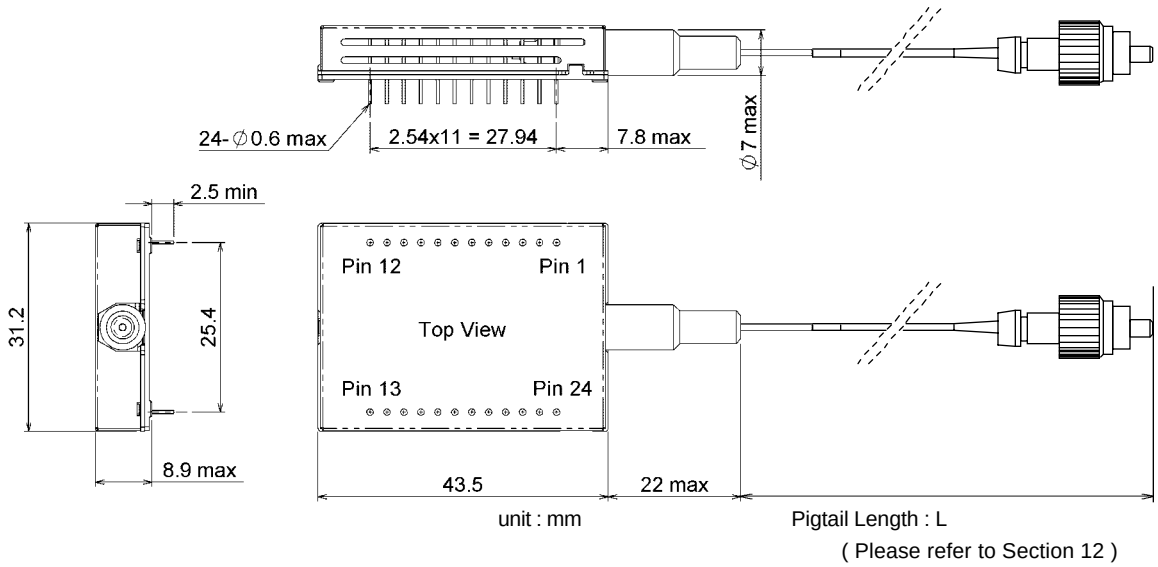


Figure 2 Package Dimension

⚠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	Vee	Negative power supply
2	BACK	Monitoring for back facet PD current
3	BIAS	Monitoring for LD current
4	SDC	Shut Down Command
5	SELC	Clock mode select
6	GND	Ground
7	NUC	No User Connection
8	LDA	Laser Degrade Alarm
9	NUC	No User Connection
10	NUC	No User Connection
11	GND	Ground
12	Vee	Negative power supply

No.	Symbol	Function
24	Vcc	Positive power supply
23	GND	Ground
22	TCLKb	False clock input
21	GND	Ground
20	TCLK	True clock input
19	GND	Ground
18	TDb	False data input
17	GND	Ground
16	TD	True data input
15	GND	Ground
14	NUC	No User Connection
13	Vcc	Positive power supply

5. Absolute Maximum Ratings

Parameter	Symbol	min.	Max	Unit	Note
Storage Case Temperature	Ts	-40	85	°C	1
Ambient Temperature	Ta	0	70	°C	1
Supply Voltage	Vcc-Vee	0.0	6.0	V	2
Input Voltage	Vi	Vee	Vcc	V	3
Lead Soldering (Temperature)			260	°C	4
(Time)			10	sec.	

Note 1. No condensation allowed. 2. Vcc>Vee, Vcc=+5.0V for Vee=GND
3. Data, Clock, Disable and Selector 4. Measured on lead pins 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-Vee = 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
Supply Voltage		Vcc-Vee	4.75	5.00	5.25	V	
Supply Current		Id		150	220	mA	1
Input Impedance (Data and Clock)		Rin		50		Ω	2
Input Voltage	High	V_{IH}	Vcc-1.00	Vcc-0.90	Vcc-0.70	V	
(Data and Clock, for ECL or PECL interface)	Low	V_{IL}	Vcc-1.90	Vcc-1.70	Vcc-1.60	V	
Differential Input Voltage Swing for AC coupled interface		Vin	0.45	0.80	1.20	Vp-p	
Input Signal Rise Time (20% - 80%)		Tr		100	120	ps	
Input Signal Fall Time (20% - 80%)		Tf		100	120	ps	
Set up Time (for clocked mode)		Tset	140			ps	3
Hold Time (for clocked mode)		Thold	70			ps	3
Disable Input Voltage	Enable	Vdisbl	Vee+2.00		Vcc	V	4
	Disable	Venbl	Vee		Vee+0.8	V	
Selector Input Voltage	Clocked	Vslct	Vee		Vee+0.8	V	5
	Non Clocked	Vnclct	Vee+2.00		Vcc	V	
LD Bias Alarm Output Voltage	Abnormal	Valml	Vee		Vee+0.5	V	6
	Normal	Valmh	Vcc-1.00		Vcc	V	
LD Bias Monitor Voltage		Vbm	0.01	0.30	1.60	V	
Normalized Back Face Voltage		Vbf	0.225	0.5	1.1	V	

1. Termination current is not included. 2. Measured between each signal input and Vee. Refer to Figure 3.
3. Refer to Figure 4. 4. Default (Open) normal operation. 5. Default (Open) clocked mode. 6. Alarm will be launched when LD bias current exceeds 70mA typ.

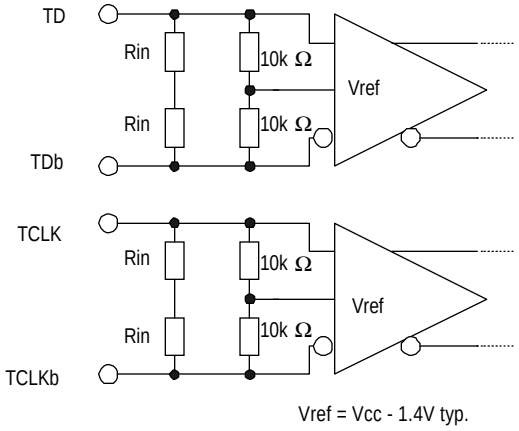


Figure 3 Data and Clock Input Interface

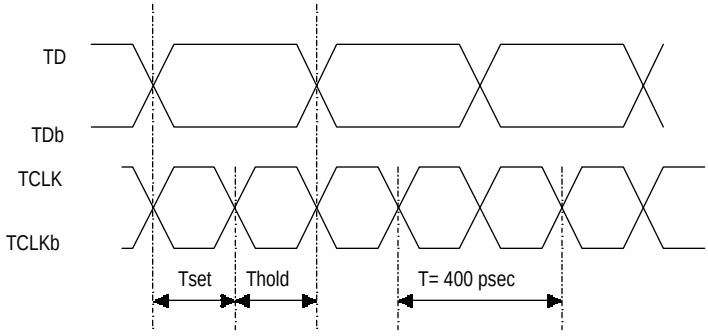


Figure 4 Input Data and Clock Timing

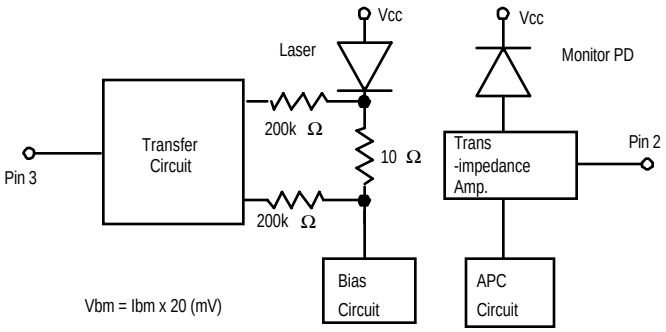


Figure 5 BM and RFM Interface

7. Optical Interface

(Unless otherwise specified, Vcc-Vee = 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
Optical Output Power	Po	-2.0		3.0	dBm	
Optical Output Power (disable)	Podis			-45.0	dBm	
Extinction Ratio	Er	8.2			dB	
Center Wavelength	λc	1500		1580	nm	
Spectral Width (-20dB)	Δλ20			1.0	nm	
Side Mode Suppression Ratio	Sr	30.0			dB	
Dispertion Penalty	Dp			2.0	dB	1
Output Eye Diagram	Compliant with Bellcore G-253 CORE and ITU G957					2

Note1. Less than 2dB penalty is guaranteed when connected to SDT8948-R@-@@.

Note2. Refer to Figure 6 for the eye diagram mask

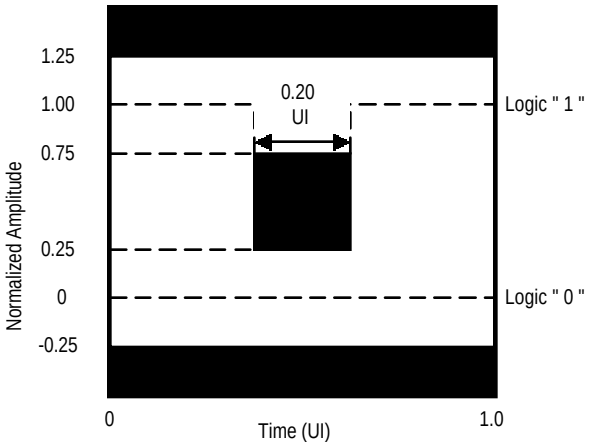


Figure 6 Eye Diagram Mask for Optical Output

⚠ 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.

8. Recommended User Interface

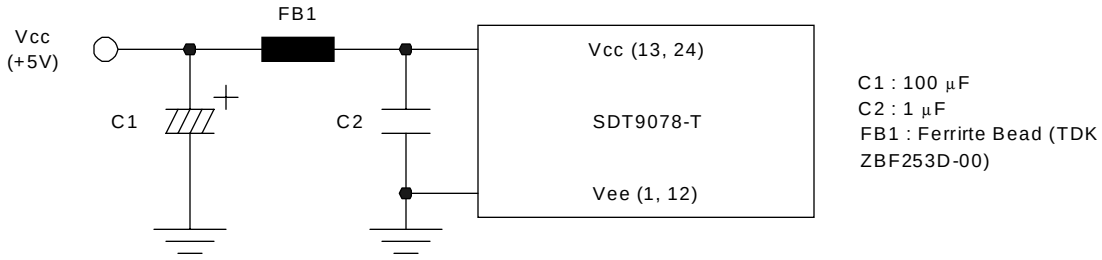


Figure 7 Recommended Power Supply Filtering

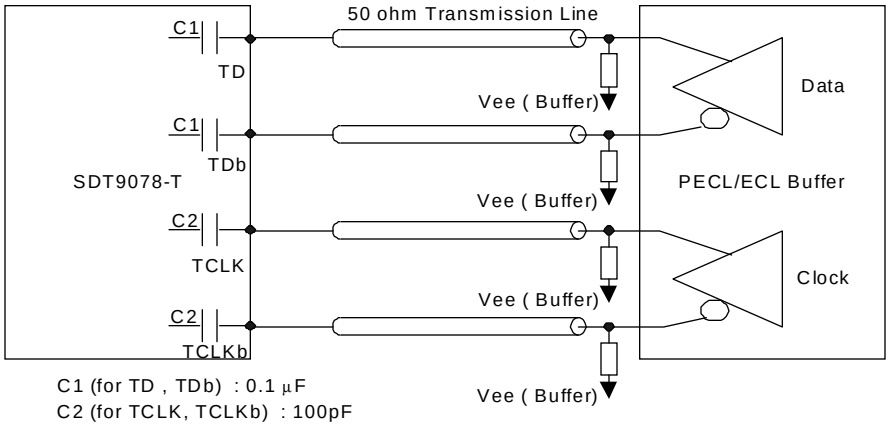


Figure 8 Data and Clock Interface with PECL/ECL Device (AC coupled Interface)

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.

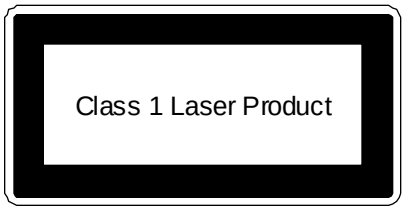
10. Reliability Test (Plan)

Bellcore TA-NWT-000983 Issue 2, December 1993								
Heading	Test	Reference	Condition	Sampling			SEI Result	
				LTPD	SS	C	SS	F/C
Mechanical Integrity	Mechanical Shock	MIL-STD-883 Method 2002	Condition B 5 times/axis					
			500G, 1.0 ms	20%	11	0	---	---
			1,500G, 0.5ms	20%	11	0	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	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	---	---
Endurance	Accel. Aging (High Temp.)	(R)-453 Section 5.18	+85C; rated power >5,000hrs.	---	25	---	25	0
			>10,000hrs.	---	10	---	---	---
	High Temp. Storage	----------	max. storage T (T=85°C) >2,000	20%	11	0	---	---
	Low Temp. Storage	----------	min. storage T (T=-40°C) >2,000	20%	11	0	11	0
	Temperature Cycling	Section 5.20	- 40°C to +85°C 400 times pass/fail	20%	11	0	---	---
			500 times for info.	---	11	---	---	---
			500 times pass/fail	20%	11	0	11	0
			1000 times for info.	---	11	---	11	0
	Damp Heat (if using epoxy)	MIL-STD-202 M103 or IEC 68-2-3	40°C , 95%, 56days	20%	11	0	11	0
			or 85°C /85%RH 2,000hrs.	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

11. 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.



⚠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. Ordering Information

Connector	Pigtail Length : L	Ta = 0 ~ 70°C
SC Connector	600 +/- 50	SDT9078-TC-QN
SC Connector	990 +/- 100	SDT9078-TC-YN
FC / PC Connector	600 +/- 50	SDT9078-TD-QN
FC / PC Connector	990 +/- 100	SDT9078-TD-YN

13. 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 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.

14. For More Information

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