Technical Specification
for
2.5Gbps Cooled Laser Transmitter Module

SDT9978-T

Data Rate:	OC-3	**OC-48**	Other _____
Application:	**DWDM**	SupervisoryChannel	Other _____
Wavelength:	Fixed	**2 Channel-Selectable**	Other _____
Output Power:	**+1dBm**	+7dBm	Other _____
Dispersion:	**1600ps/nm**	3000ps/nm	Other _____
Supply Voltage:	Single 5.0 V	Single 3.3 V	Other **5.0V and 3.3V**
Function:	Transceiver	**Transmitter**	Other _____
Package:	Original	**MSA**	Other _____

SUMITOMO ELECTRIC

Sumitomo Electric reserves the right to make changes in the 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 SDT9978-T are listed below:

* 2 Wavelengths selectable ITU-T G.692 ; 100GHz grid
* Optical Output Power ; +1dBm(typ.)
* Power Supply Voltage +5V and +3.3V
* Low Power Consumption 4.0W (typ.) 24pin Metal Package
* Wavelength Selection Comand (WSC)
* Optical Output Shut-down Function (SDC)
* Laser Degrade Alarm. (LDA)
* Laser / Rear Facet Monitor Function. (BACK)
* Clocked / Non-clocked mode selector (SELC)
* Optical Connector Interface SC, MU connectors

2. Block Diagram

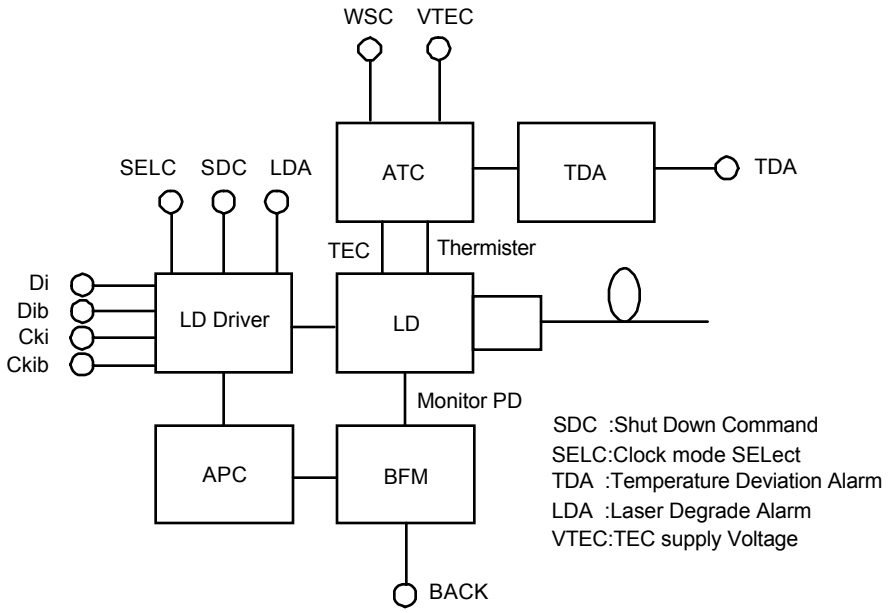


Figure 1 Block Diagram

*Clocked Operation Mode

Data Input				Optical
Di	DiB	CKi	CKib	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

Data Input		Optical
Di	DiB	Output
H	L	H
L	H	L

H:High Level, L:Low Level

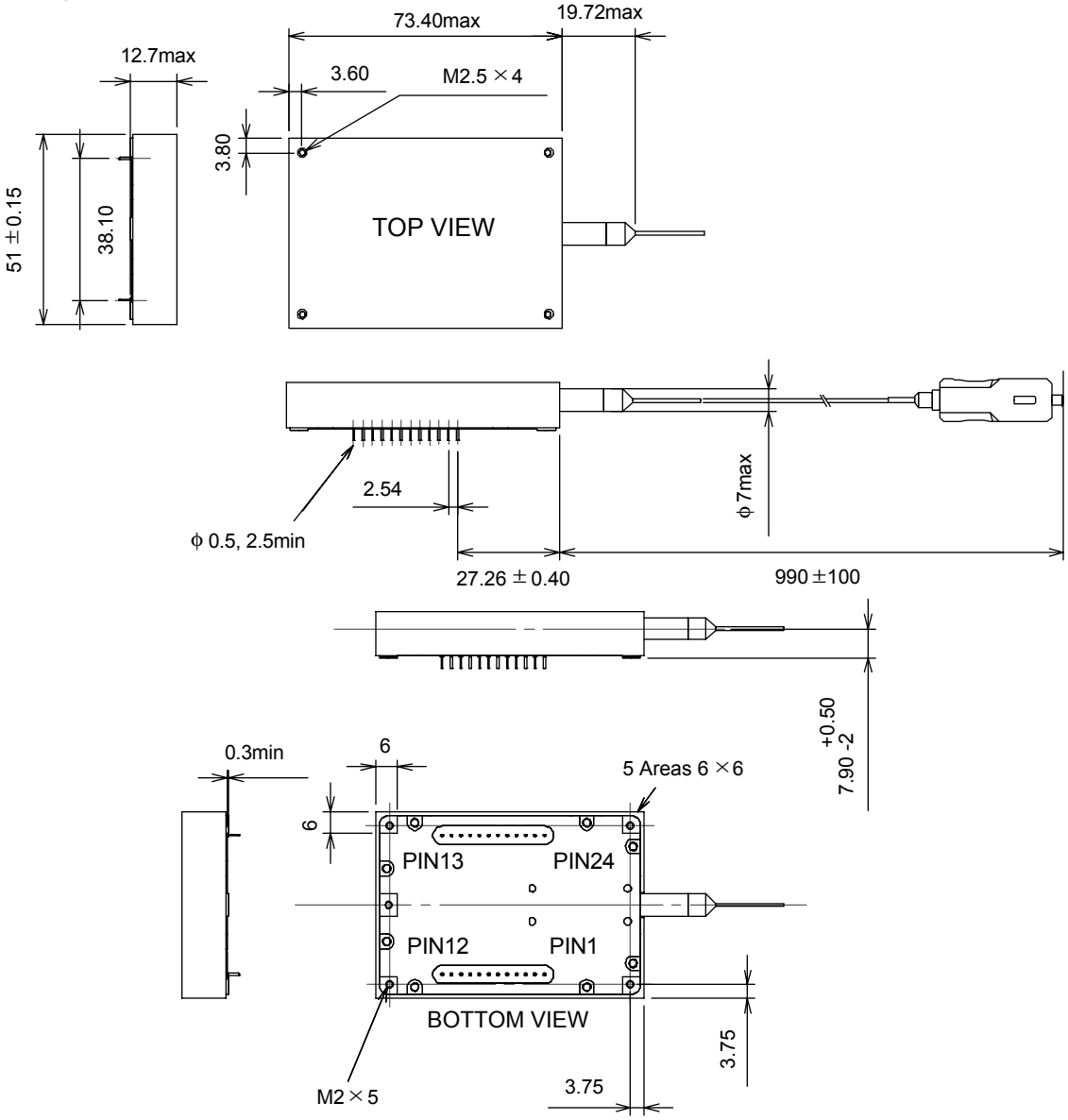
*WSC Operation Mode

WSC	Channel Wavelength
H	n-1
L	nominal n

H:High Level, L:Low Level

(Example) n : F600
n-1 : F590
(*)refer to Table1

3. Package Dimension



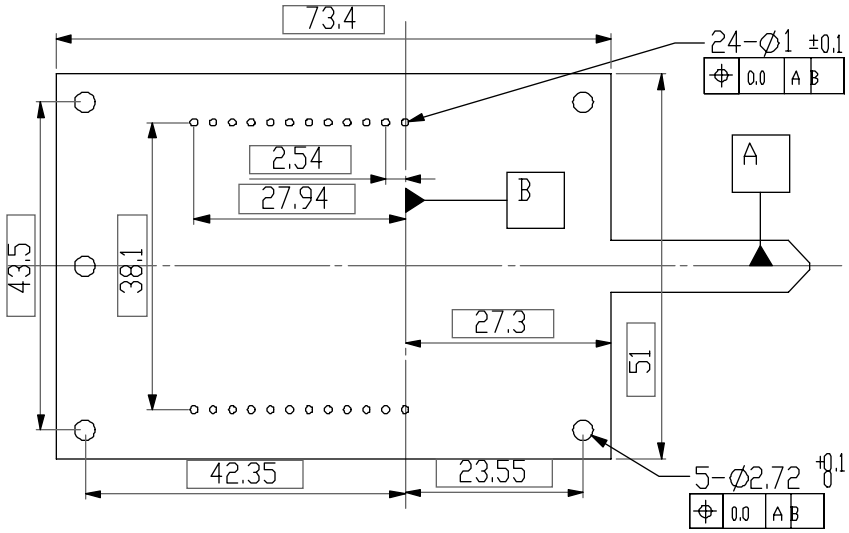


Figure 2 Package Dimension

unit : mm

⚠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

Function	Symbol	No.		No.	Symbol	Function
Ground (TEC)	GND	1		24	Vcc	Positive power supply
Monitoring for back facet PD current	BACK (+)	2		23	GND	Ground
Laser Degrade Alarm (*1)	LDA	3		22	Ckib	False clock input
Shut Down Command (*2)	SDC	4		21	GND	Ground
Clock mode select (*3)	SELC	5		20	Cki	True clock input
Ground	GND	6		19	GND	Ground
Temperature Deviation Alarm (*4)	TDA	7		18	Dib	False data input
No User Connection	NUC	8		17	GND	Ground
No User Connection	NUC	9		16	Di	True data input
Wavelength Selection Command (*5)	WSC	10		15	GND	Ground
Ground	GND	11		14	VTEC	TEC supply voltage
No Internal Connection	NIC	12		13	Vcc	Positive power supply

Logic state descriptions

*1	LDA	H	normal
		L	Laser end of life condition
*2	SDC	H	shut down mode
		L	operating mode (default)
*3	SELC	H	non clocked mode
		L	clocked mode (default)
*4	TDA	H	temperature deviation alarm
		L	normal
*5	WSC	H	(n-1) ITU-T channel
		L	(n) ITU-T channel (default)

NOTE: When SDC, SELC and WSC are left open, they are default state respectively.

Pins designated NUC (No User Connection) must not to be tied to GND or any other circuit potential.

5. Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device.

Parameters		Symbol	Min.	Max.	Unit	Note
Storage Case Temperature		Ts	-40	85	degC	
Operating Case Temperature		Tc	-5	70	degC	1
Supply Voltage		Vcc	0	6.0	V	
TEC Supply Voltage		Vtec	0	3.5	V	
TEC Supply Current		Itec	0	1.3	A	
input Voltage		Vi	0	Vcc+0.5	V	
Lead Soldering	temperature		-	260	degC	
	time		-	10	sec	

⚠ 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 = 4.75 to 5.25 V Vtec = 3.1 to 3.5 V @2488.32Mbps, PRBS2^23-1, 50% duty and all operating temperature shall apply.)

Parameters		Symbol	Min.	Typ.	Max.	Unit	Note
Supply voltage		Vcc	4.75	5.0	5.25	V	
Supply current		Icc			300	mA	1
TEC supply voltage		Vtec	3.1	3.3	3.5	V	
TEC supply current		Itec			1300	mA	
Power dissipation				4.0	6.0	W	
Input Voltage DATA & CLOCK (single)			0.5	0.8	1.0	Vp-p	
Clock duty cycle			40		60	%	
Bit rate					2.5	Gb/s	
Normalized back face voltage				500		mV	
Normalized back face accuracy			-10		10	%	
Setup Time		ts		100		ps	2
Hold Time		th		0		ps	2
Input current			-20		400	μA	3
Command Logic Level	High		2.0		Vcc	V	3
(TTL Input)	Low		0.0		0.8		
Alarm Logic Level	High		4.4		Vcc	V	4
(CMOS Output)	Low		0.0		0.6		

Note1. Termination Current is not Included.
Note2. Refer to Figure 3
Note3. SDC, SELC, WSC
Note4. LDA, TDA

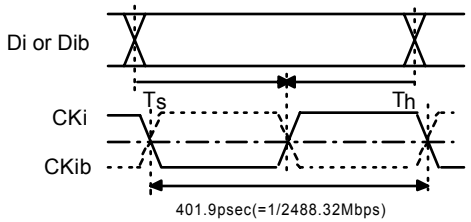


Figure 3 Input Data and Clock Timing

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.)

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Center Wavelength Range		1528.77		1563.86	nm	
Wavelength deviation (BOL)		-50		50	pm	1
Wavelength deviation (EOL)		-100		100	pm	1
Average Optical output power		-1.5		3	dBm	
Shutdown optical power			-50	-40	dBm	
Spectral width (at 20dB down)			0.3	0.5	nm	
SMSR		30			dB	
Extinction ratio	ER	8.2			dB	
Dispersion		1600			ps/nm	
Return loss				24	dB	

Note1 Clocked-mode, Mark Ratio 50%

⚠ 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

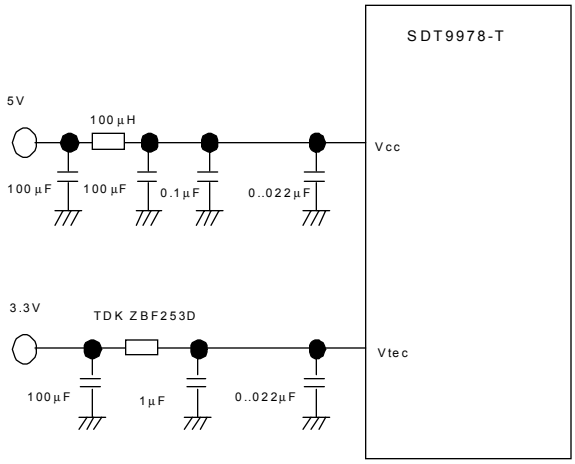


Figure 4 Recommended Power Supply Filtering

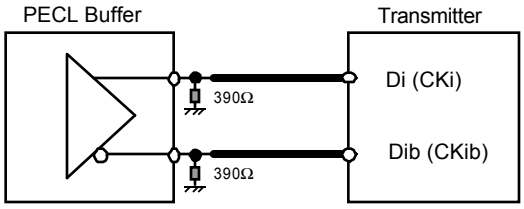


Figure 5 Data and Clock Interface with PECL Device

9. Fiber Pigtail Specification

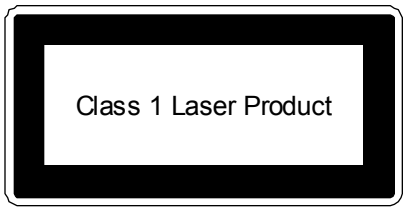
Parameter	Min.	Typ.	Max.	Unit	Note
Core Diameter		9.5		µm	
Cladding Diameter		125		µm	
Outer Diameter		0.9		mm	
Fiber Length	890	990	1090	mm	
Optical Cord Tensile Break Strength			9.8	N	1
Bend Radius	30			mm	

⚠ 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. 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.

11. Ordering Information

Operating Case Temperature	Topr = -5~70°C	
Connector Type	SC - PC	MU - PC
Ordering Number	SDT9978 - TC - XXXX	SDT9978 - TM - XXXX

XXXX : Refer to Table 1

Channel No.	Frequency(THz)	Wavelength(nm)
F610	196.10	1528.773
F600	196.00	1529.553
F590	195.90	1530.334
F580	195.80	1531.116
F570	195.70	1531.898
F560	195.60	1532.681
F550	195.50	1533.465
F540	195.40	1534.250
F530	195.30	1535.036
F520	195.20	1535.822
F510	195.10	1536.609
F500	195.00	1537.397
F490	194.90	1538.186
F480	194.80	1538.976
F470	194.70	1539.766
F460	194.60	1540.557
F450	194.50	1541.349
F440	194.40	1542.142
F430	194.30	1542.936
F420	194.20	1543.730
F410	194.10	1544.526
F400	194.00	1545.322

Channel No.	Frequency(THz)	Wavelength(nm)
F390	193.90	1546.119
F380	193.80	1546.917
F370	193.70	1547.715
F360	193.60	1548.515
F350	193.50	1549.315
F340	193.40	1550.116
F330	193.30	1550.918
F320	193.20	1551.721
F310	193.10	1552.524
F300	193.00	1553.329
F290	192.90	1554.134
F280	192.80	1554.940
F270	192.70	1555.747
F260	192.60	1556.555
F250	192.50	1557.363
F240	192.40	1558.173
F230	192.30	1558.983
F220	192.20	1559.794
F210	192.10	1560.606
F200	192.00	1561.419
F190	191.90	1562.233
F180	191.80	1563.047
F170	191.70	1563.863

Table 1

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 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.

13. For More Information

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