Technical Specification
for
2.5Gbps Fiber Optic Receiver Module

SDT9391-R

☐ 155.52Mb/s	☐ 622.08Mb/s	☑ other 0.1～2.7Gbps
☐ Short Haul Intermediate Reach	☑ Long Haul Long Reach	☑ other DTVfunction
☑ 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.

❗ indicates prohibition of actions. Action details are explained thereafter.

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

1. General

The features of SDT9391-R are listed below:

* SDH STM-16 L-16.1, L-16.2 & L-16.3 / SONET OC-48 LR-1, LR-2, LR-3 Compliant
* Power Supply Voltage Single +5V
* Low Power Supply Current 160mA(typ.)
* Compact Package Size 58.4 X 26.8 X 8.5 mm
* Differential PECL output
* Signal Detect (FLAG) Function
* Built-in DC / DC converter
* Optical Input Power Monitor Function
* Decision Threshold Voltage (DTV) adjustment function
* Optical Connector Interface FC / SC / MU connectors

2. Block Diagram

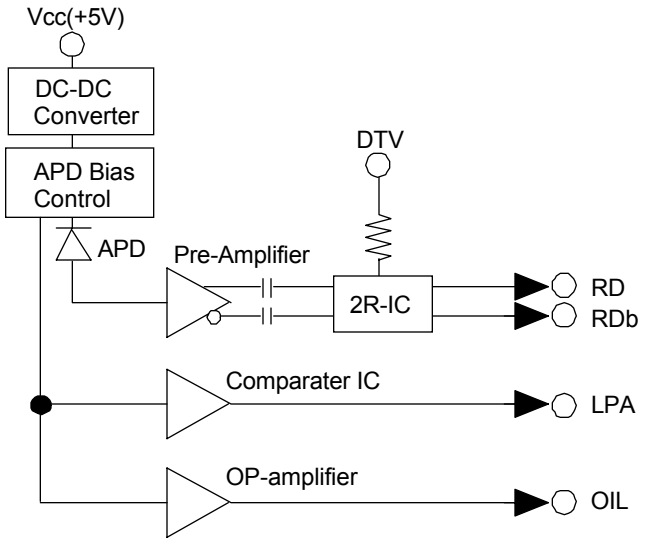


Figure 1 Block Diagram

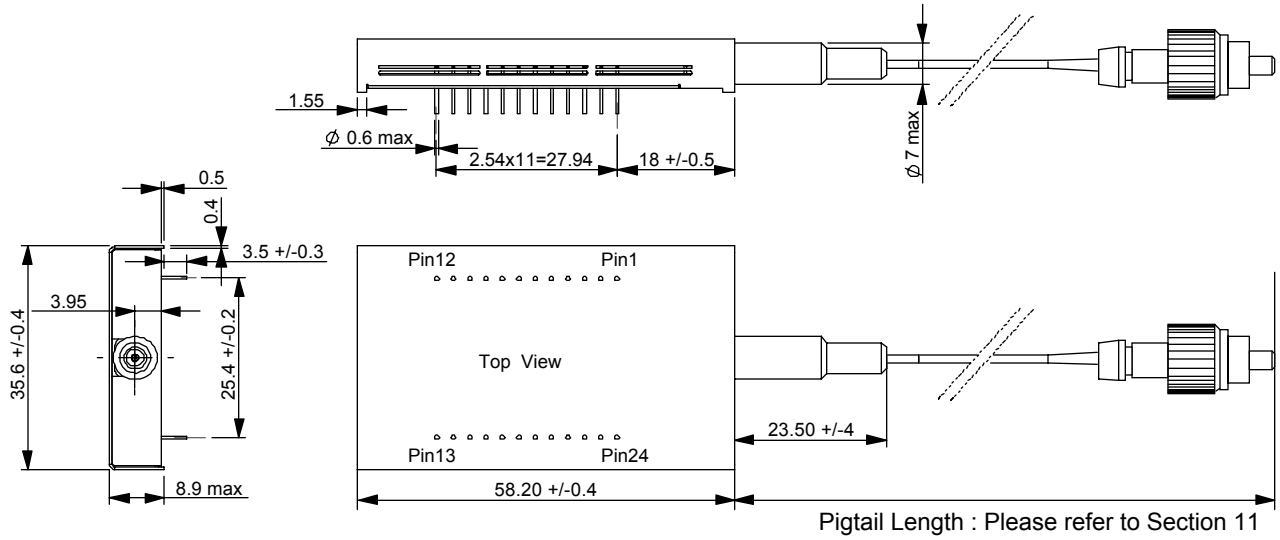


Figure 2 Package Dimension

⚠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	NIC	No Internal Connection
6	NIC	No Internal Connection
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	DTV	Decision Threshold Voltage

5. Absolute Maximum Ratings

Parameter	Symbol	min.	Max	Unit	Note
Storage Case Temperature	Ts	-40	85	°C	1
Operating Case Temperature	Tc	0	70	°C	
Supply Voltage	Vccd, Vcca	0.0	6.0	V	2
Maximum Input Power	Pmax		-5	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

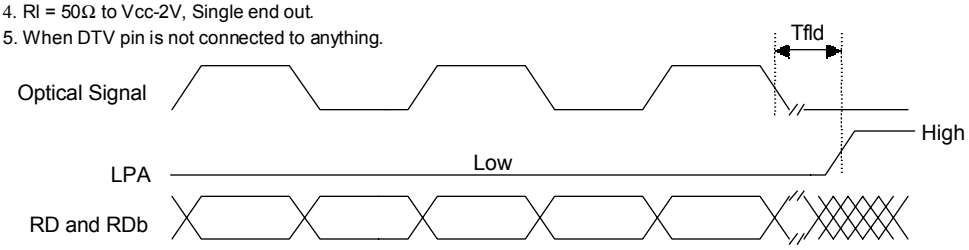
Do not store the product in the area where temperature exceeds the maximum rating, where there is too much moisture or dampness, where there is acid gas or corrosive gas, or other extreme conditions. Otherwise, failure, overheating or fire may occur.

6. Electrical Interface

(Unless otherwise specified, 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
Supply Voltage		Vcca, Vccd	4.75	5.00	5.25	V	
Supply Current (Vcca and Vccd)		Idrx		160	300	mA	1, 2
Output Voltage Level	High	Voh	Vcc-1.1		Vcc-0.65	V	3, 4
(RD, RDb)	Low	Vol	Vcc-1.8		Vcc-1.3	V	3, 4
Output Voltage (LPA)	High	Voflgh	Vcc-0.4		Vcc	V	3
	Low	Voflgl	0		0.40	V	3
Output Signal Rise / Fall Time (RD, RDb, 20% - 80%)		Trd/Tfd		130	180	ps	
Nominal DTV Level				3.9		V	5
Input Power Monitor Voltage	@-∞dBm	Voil		3	15	mV	
	@-32dBm	Voil		30		mV	
	@-28dBm	Voil		40		mV	
	@-8dBm	Voil		1.35		V	

1. 2488.32Mbps, PRBS 2^23-1 2. Output current is not included. 3. Vccd, Vcca = 5.0V, Tc = 25°C
4. Rl = 50Ω to Vcc-2V, Single end out.
5. When DTV pin is not connected to anything.



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

Figure 3 Output Timing Chart

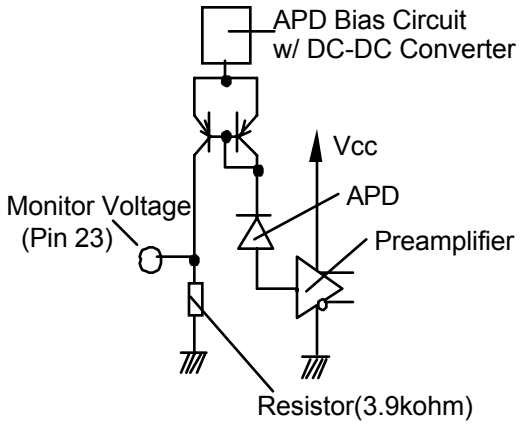


Figure 4 Input Power Monitoring Circuit

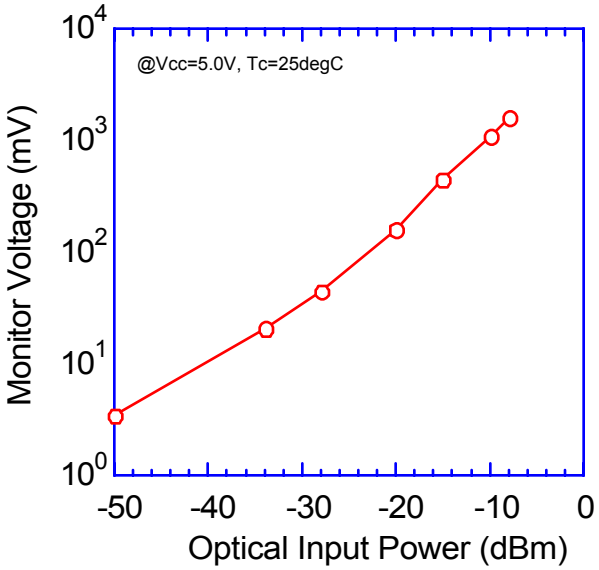


Figure 5 Change of Monitor Voltage in Optical Input Power

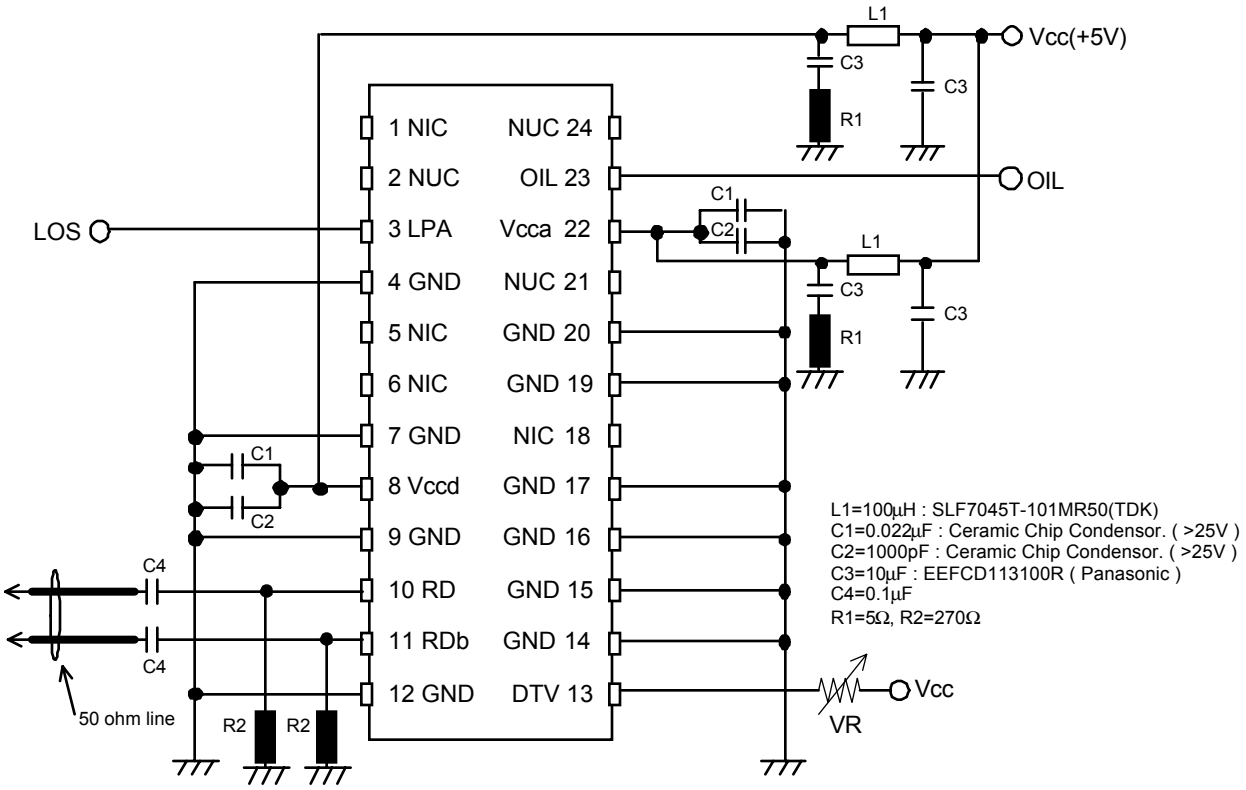
7. Optical Interface

(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		0.1		2.7	Gbps	
Center Wavelength Range	λc	1260		1360	nm	
		1430		1580		
Minimum Sensitivity	Pmin		-32.0	-28.0	dBm	1
Overload	Pmax	-8.0			dBm	1
LPA Deassert Level	Pa	-49.0	-33.0	-28.0	dBm	
LPA Assert Level	Pd	-49.0	-35.0	-28.0	dBm	
Hysteresis	Hys	0.5	2.0	6.0	dB	
LPA Deassertion Time	Tlpa	2.3		100	μs	2
Optical Reflectance	Or			-27	dB	

1. BER = 10^-10 2. Refer to Figure 4

8. Recommended User Interface



1. Power supply filter and termination resistors should be located as close as possible to the lead pins of module.
2. The impedance of transmission line (RD & RDb) should be 50ohm.
   Since the data outputs (RD & RDb) are open emitters, termination resistors R2 (1/8W) are required as shown above.

Figure 6 Recommended User 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 Break Strength			9.8	N	
Bend Radius	30			mm	

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

⚠ 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	Mechanical Shock	MIL-STD-883 Method 2002	Condition B 5 times/axis					
			500G, 1.0 ms	20%	11	0	11	0
			1,500G, 0.5ms	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	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. Ordering Information

Connector	Pigtail Length : mm	Tc = 0 ~ 70°C
SC Connector	600 +/- 50	SDT9391-RC-QN
FC / PC Connector	600 +/- 50	SDT9391-RD-QN
FC / PC Connector	990 +/- 100	SDT9391-RD-YN
MU-J Connector (without a cover)	600 +/- 50	SDT9391-RM-QN
MU Connector (with a cover)	600 +/- 50	SDT9391-RU-QN

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 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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