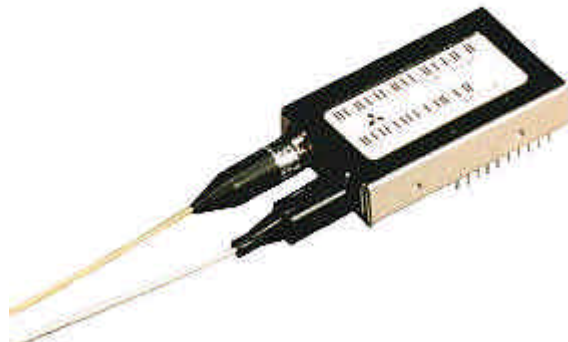


APPROVED	CHARGED
<i>S. Shibao</i>	<i>M. Nakamura</i>

OC-3 / STM-1 Transceiver Module

MF-156DF-TR123-030/-040/-050



Features:

1. Tx + Rx combined
2. Full SONET/SDH line up
3. Low voltage, low power consumption, low cost
4. 20-Pin DIP with fiber pigtail
5. Single +3.3V power supply and P-ECL compatible input and output
6. Temp.range:-40 to 85deg.
7. Clock recovery

Date		Approval	
'99/5/26		<i>S. Shibao</i>	
	*		
A	B	C	D

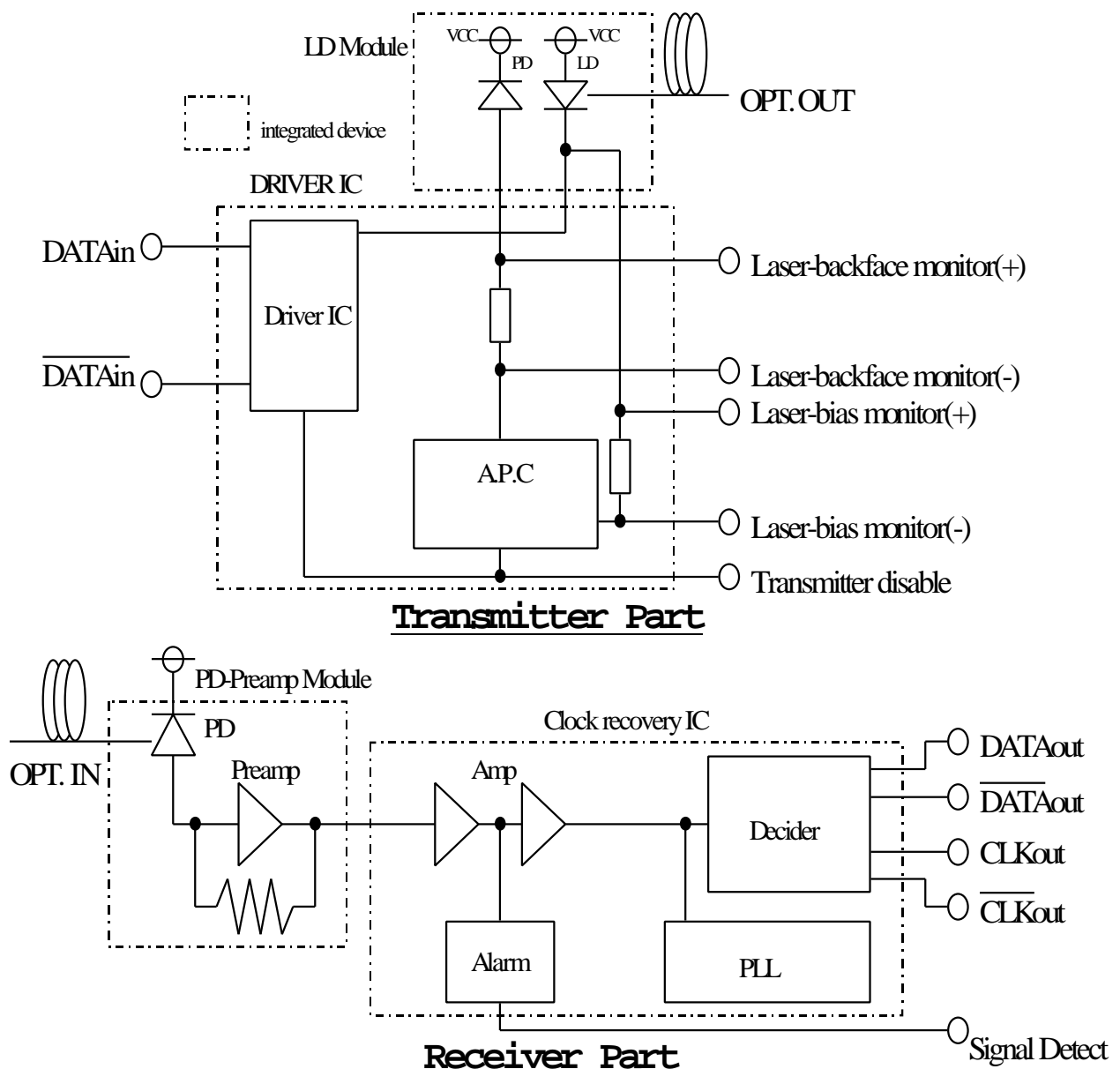
Description

This product is designed to provide high optical performance for SDH STM-1/SONET OC-3.

Transmitter uses uncooled laser in a hermetic pigtail coaxial module with driven by specific integrated circuit.

Receiver uses PIN preamp in a hermetic pigtail coaxial module and integrated circuits for reshaping, retiming and regenerating optical signal.

Block diagram



Absolute Maximum Ratings

Stress below listed absolute maximum rating may cause permanent damage to the transceiver.

This is a stress only and functional operation of the transceiver at these or any other conditions in excess of those given in the operational sections of this data sheet is not implied.

Exposure to Absolute Maximum Rating for extended periods may affect transceiver reliability.

Tc=25°C

Parameters	Note	Symbol	Ratings	Unit
Supply voltage		Vcc	5.0	V
PECL high output current		-	30	mA
PECL input voltage		-	0 to Vcc	V
Storage temperature		Tstg	-40 to 85	°C
Operating case temperature		Tc	-40 to 85	°C
Soldering Temperature		-	+250	°C
Soldering Time		-	10	sec
Relative humidity(non condensation)		-	5 to 85	%
Fiber bend radius		rF	30	mm

Electrical characteristics

All parameters are specified over the operating case temperature.

Measurement conditions are at 155.52Mb/s+/-20ppm, NRZ PN2²³-1 and 50% duty cycle data signal.

V_{cc}=+3.3V±5%, T_c=-40 to 85°C, Using a PRBS 2²³-1 pattern with a 50% Mark ratio, unless otherwise noted.

Transmitter

Parameters	Condition	Symbol	Min.	Typ.	Max.	Unit
Supply voltage		V _{cc}	3.135	3.3	3.465	V
Power consumption		P _c	-	230	610	mW
Input voltage	note 1	-	LVPECL(*)			-
Transmitter disable voltage	note 2	-	V _{cc} -1.165	-	V _{cc}	V
Transmitter enable voltage	note 2	-	0	-	0.8	V
Laser bias monitor voltage	note 3	-	-	-	0.55	V
Laser backface monitor voltage	note 3	-	-	-	0.20	V
Laser bias monitor and Laser backface monitor common mode voltage	note 3	-	0.0	-	3.0	V

Receiver

Parameters	Condition	Symbol	Min.	Typ.	Max.	Unit
Supply voltage		V _{cc}	3.135	3.3	3.465	V
Power consumption		P _c	-	500	700	mW
Output voltage	note 4	-	LVPECL(*)			-
Data/Clock external Load	note 4	RI	50	-	-	ohm
Data to clock phase	note 5	-	-0.8	-	+0.8	nsec.
Clock duty	note 5	-	45	-	55	%
SD output voltage	note 6	-	LVTTL(*)			-
SD activation time	note 7	T _{act}	-	-	95	μs
SD deactivation time	note 7	T _{deact}	-	-	300	ms

(*): Values shown are for V_{cc}=3.3V Level specifications will vary 1:1 with V_{cc}

Optical characteristics

Parameter	Specification						Unit
ITU code	S-1.1* ¹		L-1.1		L-1.2* ¹		
	Min.	Max.	Min.	Max.	Min.	Max.	
Optical Budget	0	14	10	29	10	29	dB
Transmitter							
Wavelength	1261	1360	1280	1335	1480	1580	nm
Optical power at pigtail	-14	-8	-4	0	-4	0	dBm
Optical power when disable	-	-45	-	-45	-	-45	dBm
Spectral width(rms)	-	4	-	-	-	-	nm
Spectral width(-20dB)	-	-	-	1	-	1	nm
SMSR	-	-	30	-	30	-	dB
Extinction ratio	8.2	-	10	-	10	-	dB
Optical wave form	ITU Mask compliant						-
Path penalty	-	1	-	1	-	1	dB
Dispersion	-	100	-	185	-	1900	ps/nm
Receiver							
	Min.		Typ.		Max.		
Sensitivity (At a BER of 1×10^{-10})	-		-38		-34		dBm
Overload	0		+3		-		dBm
Wavelength	1260		-		1580		nm
Signal Detect Threshold	Decreasing Light Input		-50		-41		dBm
	Increasing Light Input		-		-38		dBm
	Hysteresis		0.5		3		dB

*1: under development

Ordering information

Part number	ITUcode	Optical connector type
MF-156DS-TR123-030	S-1.1	FC / FC
MF-156DS-TR123-031	S-1.1	SC / SC
MF-156DS-TR123-032	S-1.1	ST / ST
MF-156DS-TR123-040	L-1.1	FC / FC
MF-156DS-TR123-041	L-1.1	SC / SC
MF-156DS-TR123-042	L-1.1	ST / ST
MF-156DS-TR123-050	L-1.2	FC / FC
MF-156DS-TR123-051	L-1.2	SC / SC
MF-156DS-TR123-052	L-1.2	ST / ST

Transceiver pin allocation

No.	Symbol	Description	No.	Symbol	Description
1	PDB	Photo Detector Bias	20	LBF+	Laser-backface monitor(+)
2	SD	Signal detect	19	LBF-	Laser-backface monitor(-)
3	NUC	No user connection	18	LBS+	Laser-bias monitor(+)
4	GND	Ground	17	LBS-	Laser-bias monitor(-)
5	VCC	Vcc	16	TDT-	Tx data(-)
6	RCK-	Rx clock(-)	15	TDT+	Tx data(+)
7	RCK+	Rx clock(+)	14	GND	Ground
8	RDT-	Rx data(-)	13	TD	Transmit disable
9	RDT+	Rx data(+)	12	Vcc	Vcc
10	NUC	No user connection	11	NUC	No user connection

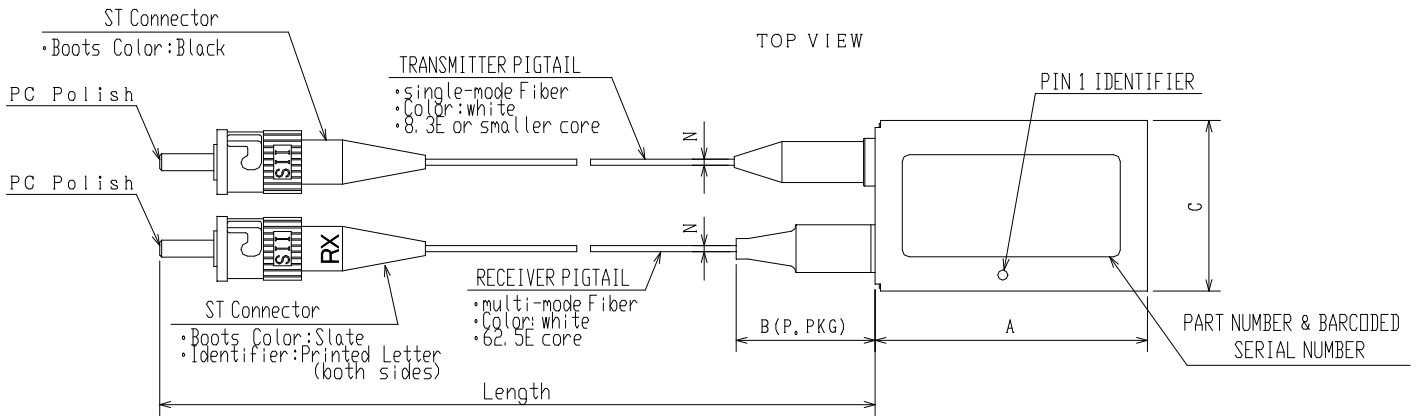
NOTE:NUC pin - OPEN(don't connect)

Pin Descriptions

Pin No.	Function	I/O	Pin description
4,14	GND	I	These pin are the module's ground connections. They should be connected to a low impedance ground plane(0V).
5,12	Vcc	I	This is the power supply pin for the module. It should be connected to +3.3V. Recommended power supply decoupling.
9,8	RDT+ & RDT-	O	There are Data output pin(Differential LVPECL output). Signal level of these pin are LVPECL level. Refer to electrical interface in NOTE4.
7,6	RCK+ & RCK-	O	There are recoverd clock output pin(Differential LVPECL output). Signal level of these pin are LVPECL level. Refer to electrical interface in NOTE4.
2	Signal Detect	O	When the optical input signal fall bellow the SD threshold level,The Signal Detect is deasserted and its output logic level changes form a LVTTL HIGH to LVTTL LOW. Refer to electrical interface in NOTE6.
1	Photo Detector Bias	I	This pin supplies the bias for the PIN Photo Detector and it should be connected to +3.3V. Additionally,by using External Resistor in series with this pin, it is possible to measure the photocurrent. Refer to electrical interface in NOTE8.
15,16	TDT+ & TDT-	I	This data input pin modulates the laser diode. When the TDT+ input is asserted,the laser diode is turned on. Signal level of these pin are LVPECL level and internal Vbb bias. Refer to electrical interface in NOTE1.
13	Transmit Disable	I	The transmitter is nomally enabled and only requires an external voltage to disable. Refer to electrical interface in NOTE2.
18,17	Laser-bias monitor(+), Laser-bias monitor(-)	O	The laser bias current is calculated as a ratio of the voltage to an internal 10 ohm sensing resistor. $I_b[mA]=\{LBS(+)-LBS(-)\}[mV]/10$ Refer to electrical interface in NOTE3.
20,19	Laser-backface monitor(+), Laser-backface monitor(-)	O	The laser backface monitor is calculated as a ratio of the voltage to an internal 200 ohm sensing resistor. $I_{bf}[mA]=\{LBF(+)-LBF(-)\}[mV]/200$ Refer to electrical interface in NOTE3.
3,10,11	NUC	-	These pin are No user connection and should be left open.

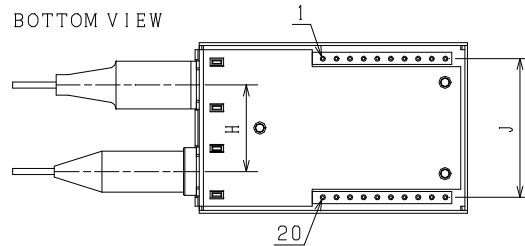
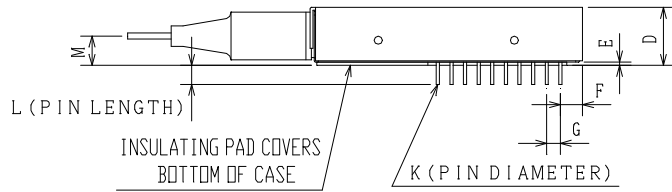
General Outline Drawing

Connector Type:FC/PC,SC/PC and ST/PC are available.



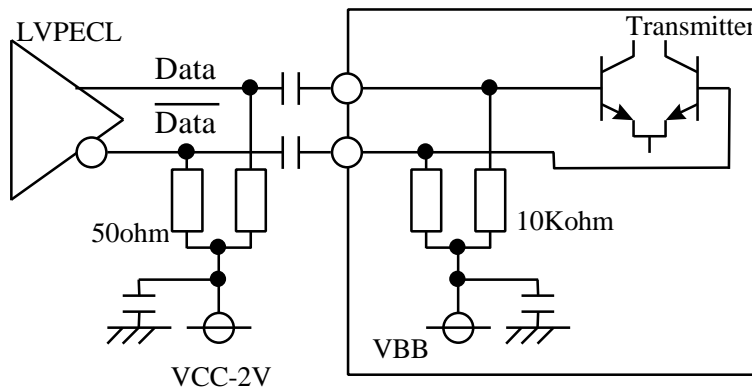
(inches)

Dimension	MIN	NOM	MAX
A	—	—	1.605
B	—	—	1.180
C	—	—	1.000
D	—	—	0.450
E	0.014	—	0.025
F	—	0.128	—
G	—	0.079	—
H	—	0.500	—
J	—	0.800	—
K	0.017	0.018	0.020
L	0.100	0.110	0.120
M	0.125	—	—
N	—	0.035	—
Length	22.5	23.5	24.5

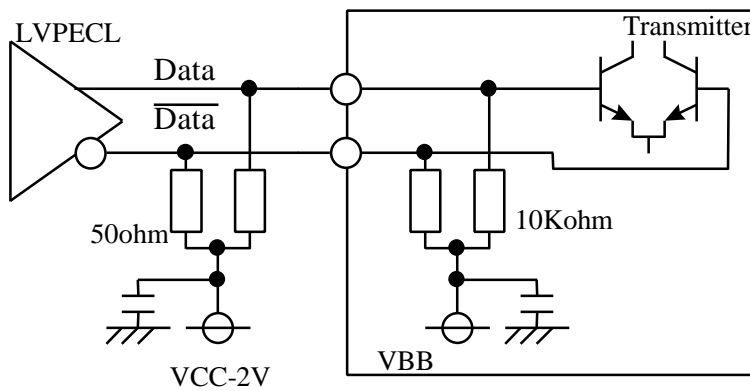


NOTE

NOTE1 LVPECL Input interface

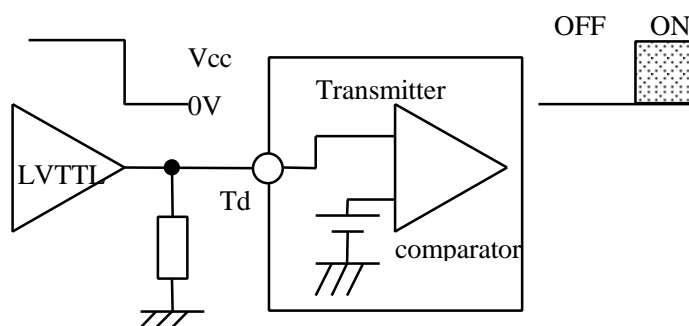


AC Coupled Interface



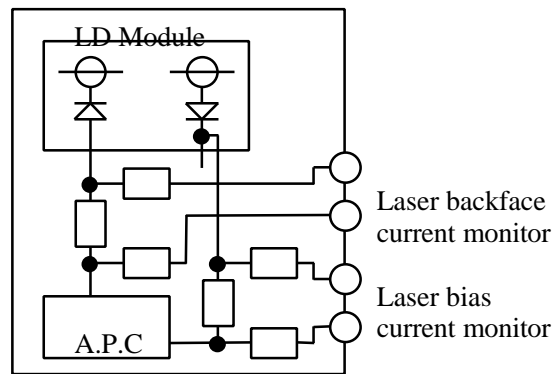
DC Coupled Interface

NOTE2 Transmitter disable interface

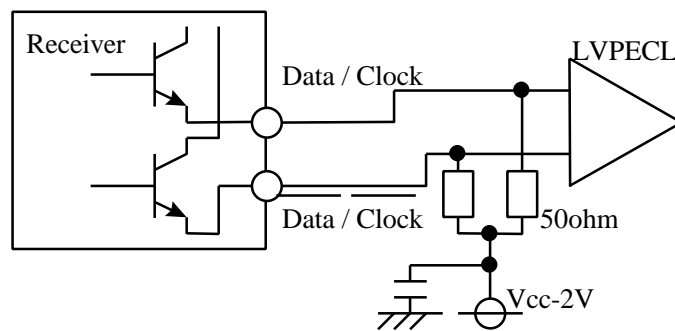


The transmitter is normally enabled and only an external voltage to disable.

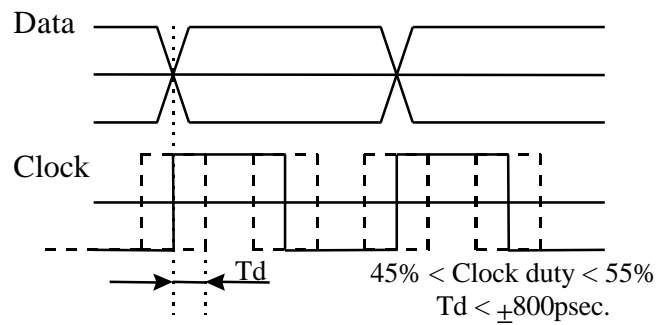
NOTE3 Laser bias / Laser backface monitor interface.



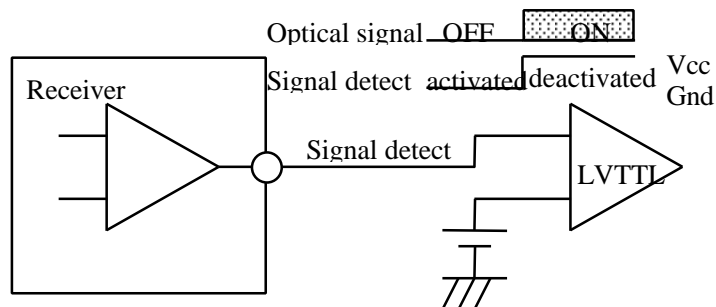
NOTE4 LVPECL Output interface



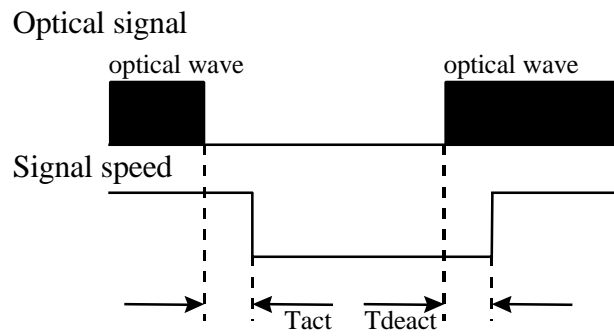
NOTE5 Data and Clock relationship



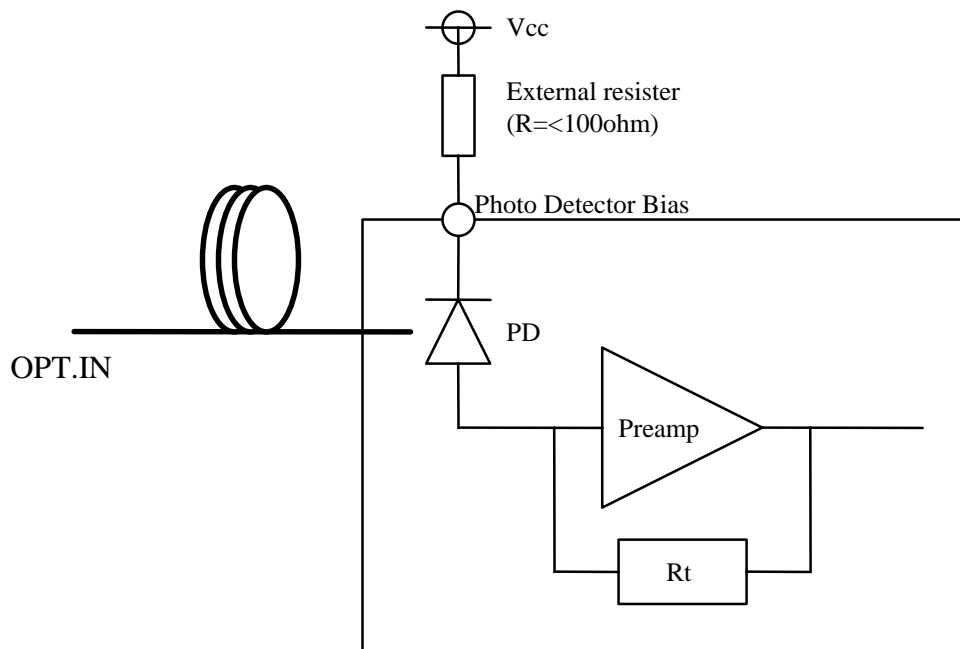
NOTE6 Signal detect interface



NOTE7 SD activation / deactivation time



NOTE8 Photo current monitor method



PD-Preamp Module

The photocurrent will be calculated based on the voltage drop across on external resistor connected between the monitoring pin and +3.3V.