MITSUBISHI (OPTICAL DEVICES)

MF-156STA-xxxxx
MF-156SRA-xxxxx

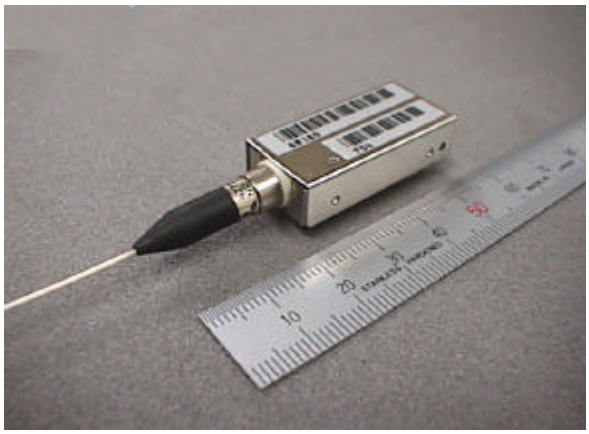
SONET / SDH TRANSMITTER / RECEIVER MODULE

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 drivered by specific integrated circuit.

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



Features

- SONET,SDH system from intra-office to long-leach application fully line up
- Low cost and Low power consumption
- Multisourced 20-Pin DIP with Single-mode pigtail fiber
- Single +3.3V power supply and LVP-ECL compatible input and output
- Operating case temperature range -40 to 85deg.
- With clock recovery and digital alarm function

Applications

SONET,SDH system from intra-office to long-leach application fully line up : S-1.1, L-1.1, L-1.2

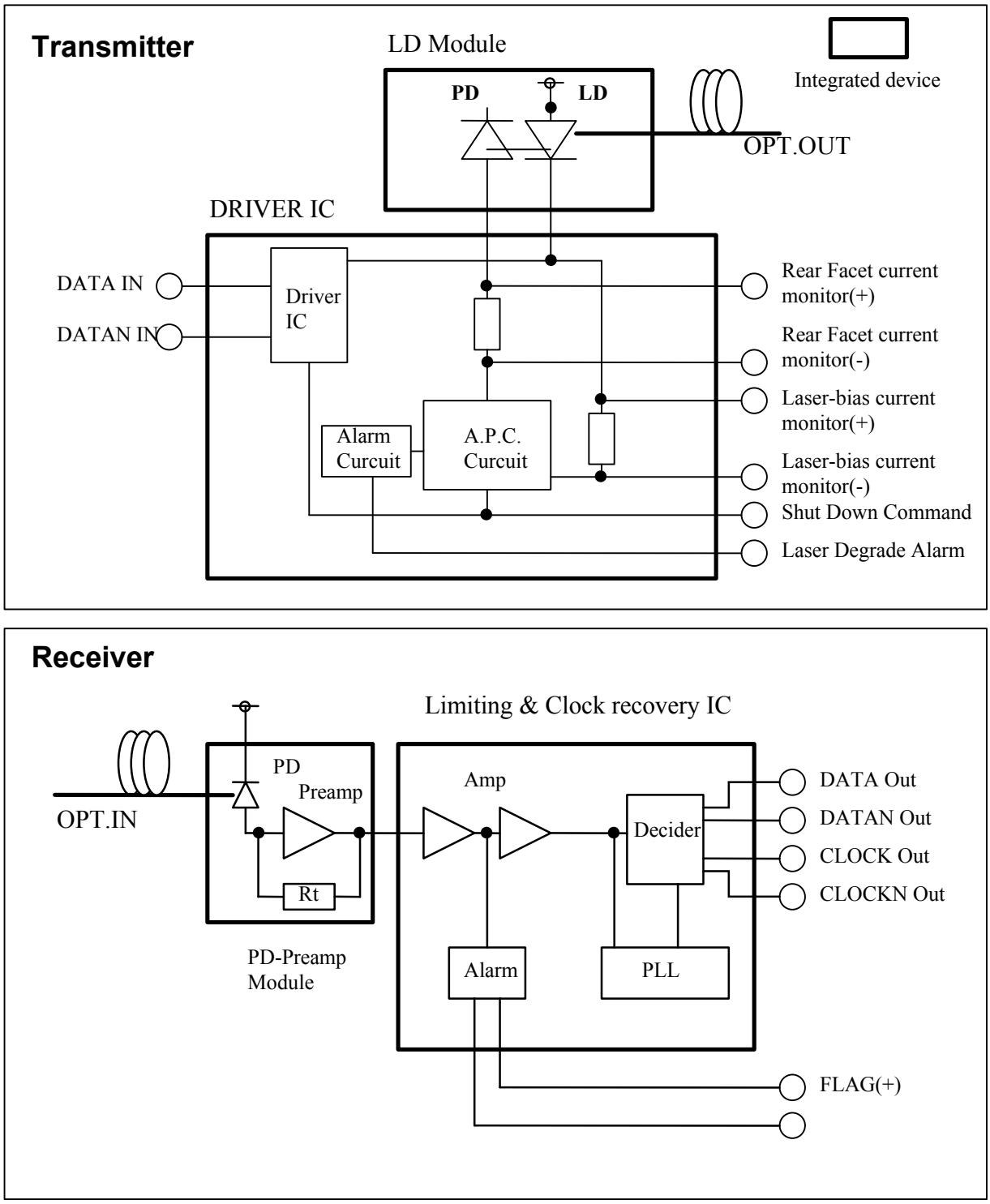
Absolute Maximum Ratings

Stress below listed absolute maximum rating may cause permanent damage to the module.
This is a stress only and functional operation of the module at these or any other conditions in excess of those given in the operational sections of this data sheet.
Exposure to Absolute Maximum Rating for extended periods may affect module reliability.

Ta=25deg.

Parameters	Note	Symbol	Ratings	Unit
Supply voltage		Vcc	+4 to 0	V
LVPECL high output current		-	-50 to 0	mA
LVPECL input voltage		-	0 to Vcc+0.4	V
Storage temperature		Tstg	-40 to 85	deg.
Operating case temperature		Tc	-40 to 85	deg.
Soldering Temperature		-	+260	deg.
Soldering Time		-	10	sec
Relative humidity(non condensation)		-	10 to 80	%
Fiber bend radius from package		rF	32	mm

Block diagram



Electrical characteristics

All parameters are specified over the operating case temperature.
Measurement conditions are at 155.52Mb/s+/-20ppm, NRZ $PN2^{23}$-1 and 50%duty cycle data signal.
The DATA input/output and CLOCK output signal levels are LVPECL compatible.
The transmitter SHUT DOWN COMMAND input signal level is LVTTL compatible.
The LDA(Laser Degrade Alarm) output signal level is LVTTL compatible.
The FLAG(+/-) output signal level are LVTTL compatible.

Transmitter

Parameters	Condition	Symbol	Min.	Typ.	Max.	Unit
Supply voltage		Vcc	3.13	3.3	3.47	V
Power consumption		Pc	-	-	200	mA
LVPECL High / Low input voltage	note 1	Vih1	Vcc-1.17	-	Vcc-0.73	V
		Vil1	Vcc-1.95	-	Vcc-1.45	V
SDC High / Low Input voltage	note 2	Vih2	+2	-	Vcc	V
		Vil2	0	-	+0.8	V
LDA High / Low Output voltage	note 8	Voh	2.4	-	Vcc	V
		Vol	0.0	-	0.4	V
Laser bias monitor voltage	note 3	Vb	-	0.1	-	V
Rear Facet monitor voltage	note 3	Vbf	-	0.1	-	V

Receiver

Parameters	Condition	Symbol	Min.	Typ.	Max.	Unit
Supply voltage		Vcc	3.13	3.3	3.47	V
Power consumption		Pc	-	-	200	mA
LVPECL High / Low output voltage	note 4,5	Voh1	Vcc-1.10	-	Vcc-0.86	V
		Vol1	Vcc-1.86	-	Vcc-1.5	V
Data/Clock external Load	note 4	RI	50			ohm
Data to clock phase	note 6	Tcda	-800	-	800	psec.
Clock duty	note 6	-	45	-	55	%
Jitter		-	ITU Rec.compliant			-
FLAG High / Low output voltage		Voh2	2.4	-	Vcc	V
		Vol2	0	-	0.4	V
FLAG Activation time	note 5,7		-	200	-	μs
FLAG Deactivation time	note 5,7		-	-	100	ms

Optical characteristics

Parameter	Specification						Unit
ITU code	S-1.1		L-1.1		L-1.2		
	Min.	Max.	Min.	Max.	Min.	Max.	
Optical Budget	0	20	0	29	10	30	dB
Transmitter							
Wavelength	1261	1360	1280	1335	1480	1580	nm
Optical source	MLM		SLM		SLM		-
Optical power at pigtail	-14	-8	-5	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	SONET/SDH Mask compliant						-
Path penalty (dispersion=ITU-T compliant)	-	1	-	1	-	1	dB
Receiver							
	Min.		Typ.		Max.		
Wavelength	1260				1580		nm
Sensitivity	-		-		-34		dBm
Overload	0		-		-		dBm

Ordering information

Transmitter	ITUcode	Optical connector type			Receiver	Optical connector type		
Part number		FC	SC	ST	Part number	FC	SC	ST
MF-156STA-	S-1.1	004VA	004WA	004SA	MF-156SRA-	002VA	002WA	002SA
	L-1.1	005VA	005WA	005SA				
	L-1.2	006VA	006WA	006SA				

Transmitter pin allocation

No.	Symbol	Description	No.	Symbol	Description
1	NUC	No user connection	20	NUC	No user connection
2	BM (+)	Laser-bias current monitor(+)	19	RFM (+)	Rear Facet current monitor(+)
3	NUC	No user connection	18	Vcc	Vcc
4	BM (-)	Laser-bias current monitor(-)	17	RFM (-)	Rear Facet current monitor(-)
5	GND	Ground	16	D	TRUE Data input
6	Vcc	Vcc	15	DN	FALSE Data Input
7	SDC	SHUT DOWN COMMAND	14	GND	Ground
8	Vcc	Vcc	13	NIC	No Internal Connection
9	Vcc	Vcc	12	Vcc	Vcc
10	LDA	LASER DEGRADE ALARM	11	NIC	No Internal Connection

Pin Descriptions

Pin No.	Function	I/O	Pin description
5,14	GND	I	These pins are the module's ground connections. They should be connected to a low impedance ground plane(0V).
6,8,9, 12,18	Vcc	I	This is the power supply pin for the module. It should be connected to +3.3V. Recommended power supply decoupling.
15,16	D & DN	I	This data input pin modulates the laser diode. When the D 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.
7	SDC	I	The transmitter is nomally enabled and only requires an external voltage to disable. Refer to electrical interface in NOTE2.
2,4	BM(+), BM(-)	O	The laser bias current is calculated as a ratio of the voltage to an internal 10 ohm sensing resistor. Ib[mA]={BM(+)-BM(-)}[mV]/10 Refer to electrical interface in NOTE3.
17,19	RFM(+), RFM(-)	O	The Rear Facet current monitor is calculated as a ratio of the voltage to an internal 200 ohm sensing resistor. Ibf[mA]={RFM(+)-RFM(-)}[mV]/200 Refer to electrical interface in NOTE3.
10	LDA	O	This pin activates when the bias current has reached the maximum operating value at each temperature. The alarm shall not acrivate in shutdown condition. Refer to electrical interface in NOTE8.
1,3,20	NUC	-	These pins are No user connection and should be left open.
11,13	NIC	-	These pins are No Internal connection.

Receiver pin allocation

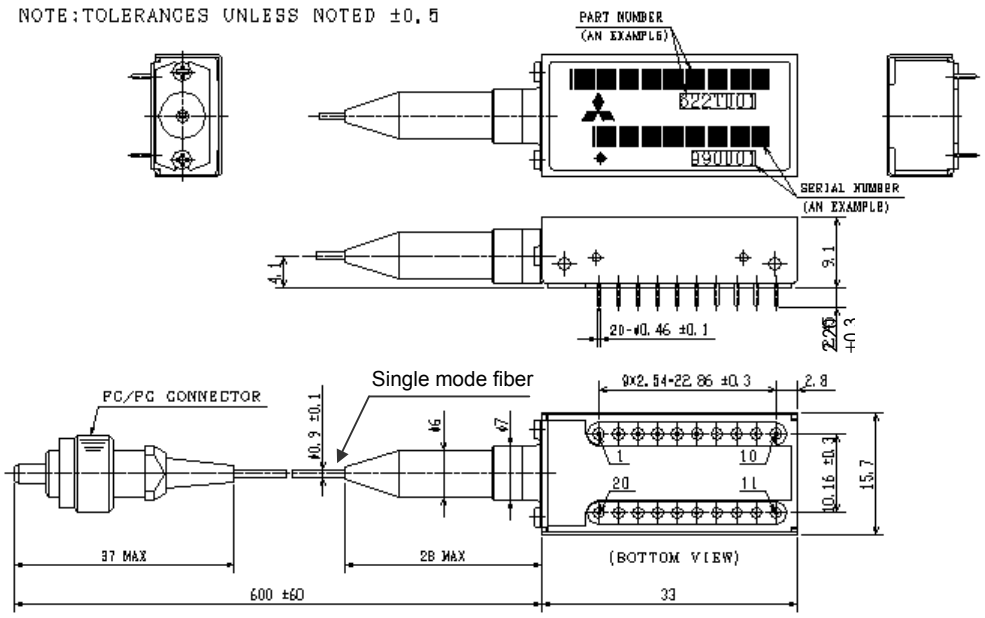
No.	Symbol	Description	No.	Symbol	Description
1	GND	Ground	20	NUC	No User Connection
2	GND	Ground	19	NUC	No User Connection
3	GND	Ground	18	NUC	No User Connection
4	CK	TRUE Clock output	17	NUC	No User Connection
5	CKN	FALSE Clock output	16	GND	Ground
6	GND	Ground	15	GND	Ground
7	D	TRUE Data output	14	FLAGN	Differential Flag output(-)
8	GND	Ground	13	NIC	No Internal Connection
9	DN	FALSE Data output	12	FLAG	Differential Flag output(+)
10	NUC	No User Connection	11	Vcc	Vcc

Pin Descriptions

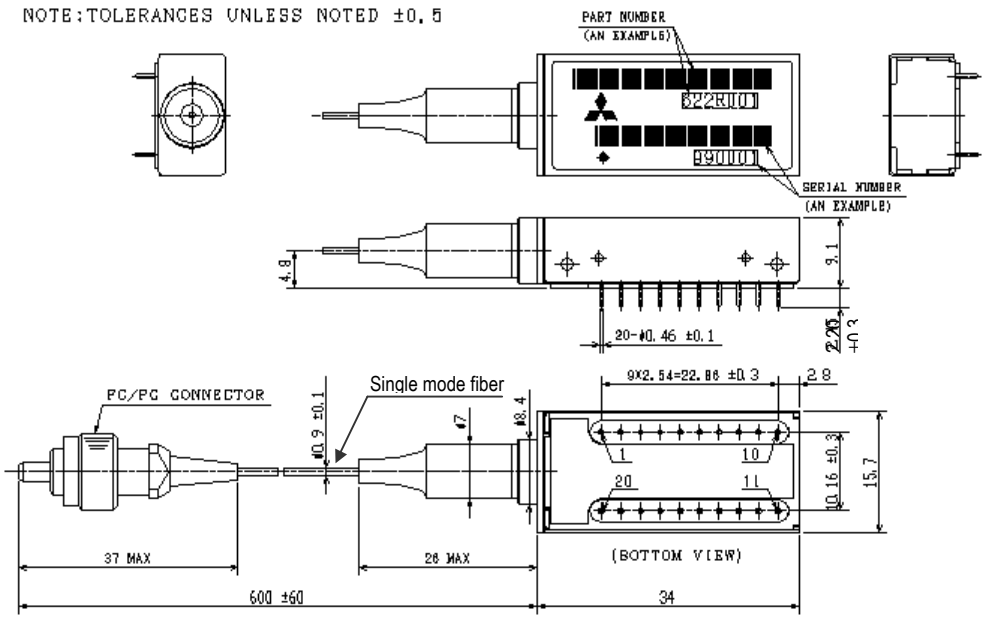
Pin No.	Function	I/O	Pin description
1,2,3,6, 8,15,16	GND	I	These pins are the module's ground connections. They should be connected to a low impedance ground plane(0V).
11	Vcc	I	This is the power supply pin for the module. It should be connected to +3.3V. Recommended power supply decoupling.
7,9	D & DN	O	There are Data output pin(Differential LVPECL output). Signal level of these pin are LVPECL level. Refer to electrical interface in NOTE4.
4,5	CK & CKN	O	There are recoverd clock output pin(Differential LVPECL output). Signal level of these pin are LVPECL level. Refer to electrical interface in NOTE4.
12,14	FLAG & FLAGN	O	When the optical input signal fall bellow the FLAG threshold level, The FLAG is deasserted and its output logic level changes form a LVTTL HIGH to LVTTL LOW. FLAGN pin is differential LVTTL output pin. Refer to electrical interface in NOTE5.
10,17, 18,19,20	NUC	-	These pins are No user connection and should be left open.
13	NIC	-	This pin is No Internal connection.

General Outline Drawing

DIMENSIONS ARE IN MILLIMETERS



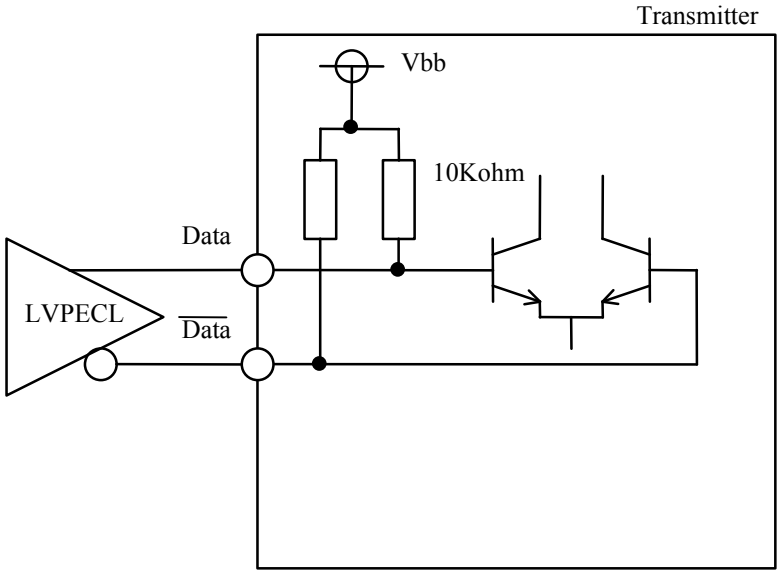
Transmitter



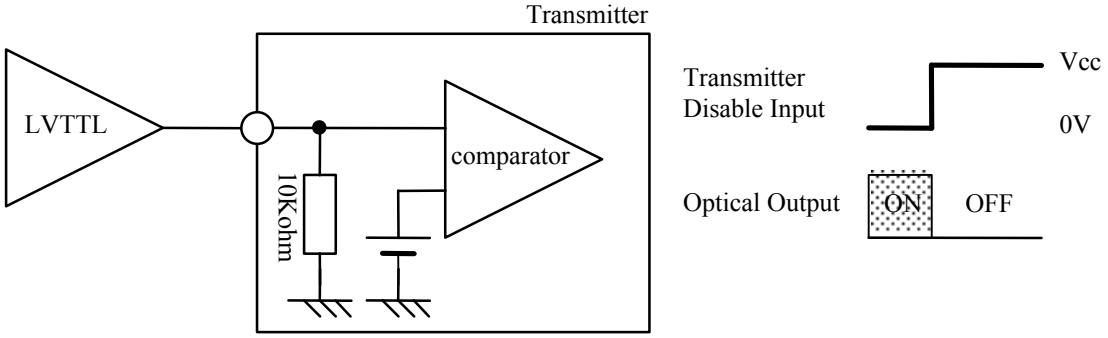
Receiver

NOTE

NOTE1 LVPECL Input Interface

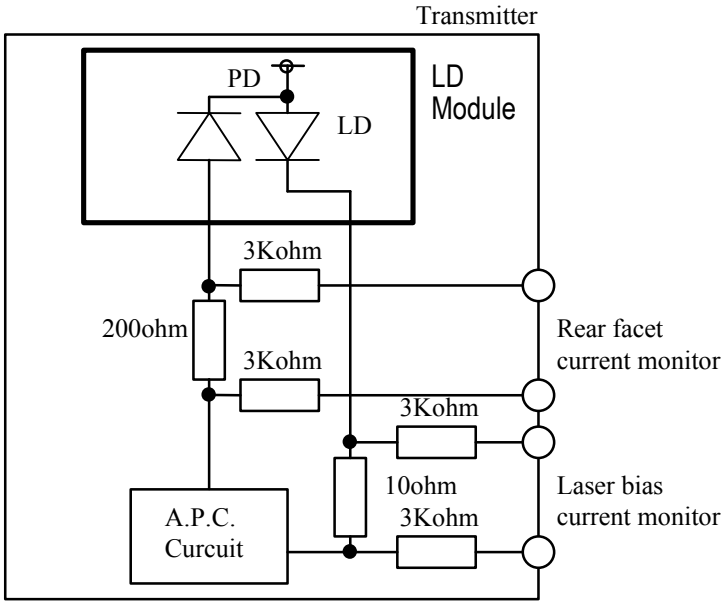


NOTE2 SDC Interface



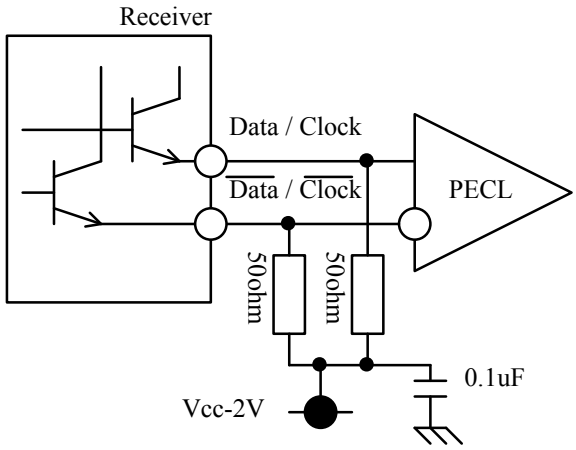
The transmitter is normally enabled and only requires an external voltage to disable.

NOTE3 Laser bias current / Rear Facet current monitor Interface.

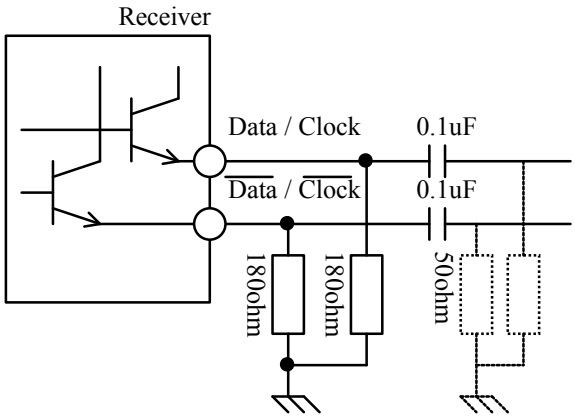


NOTE4 LVPECL Output interface

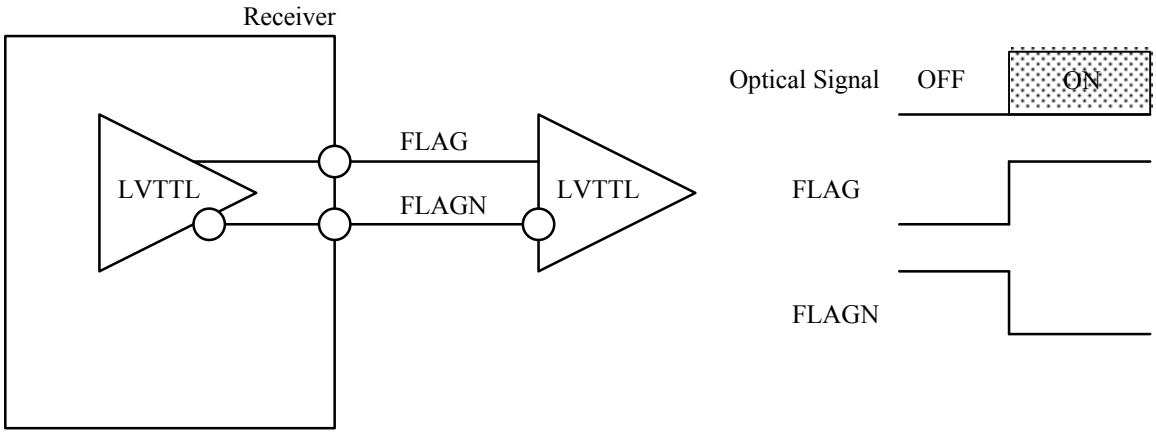
DC-coupled



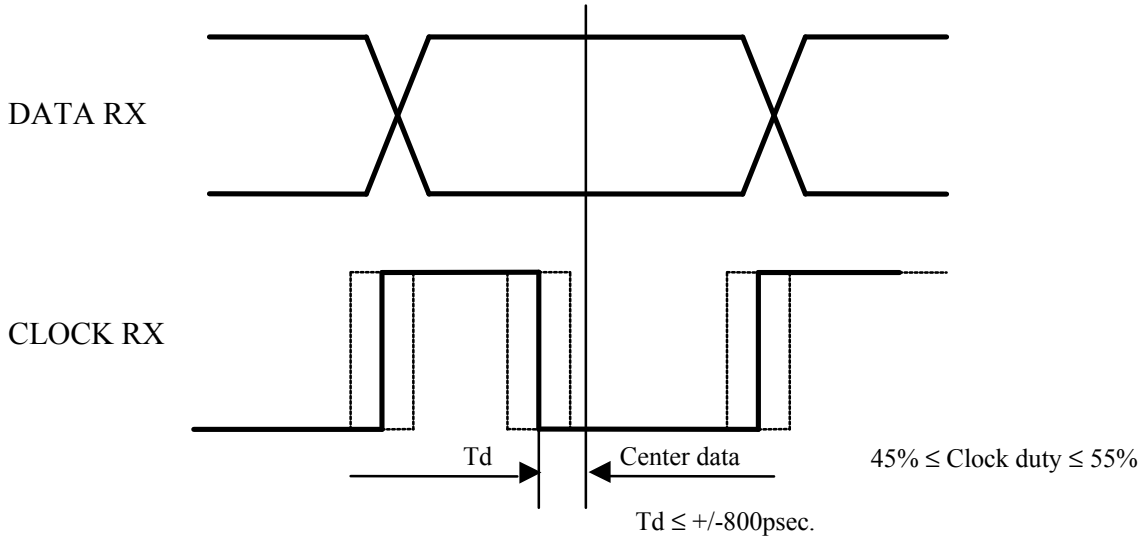
AC-coupled



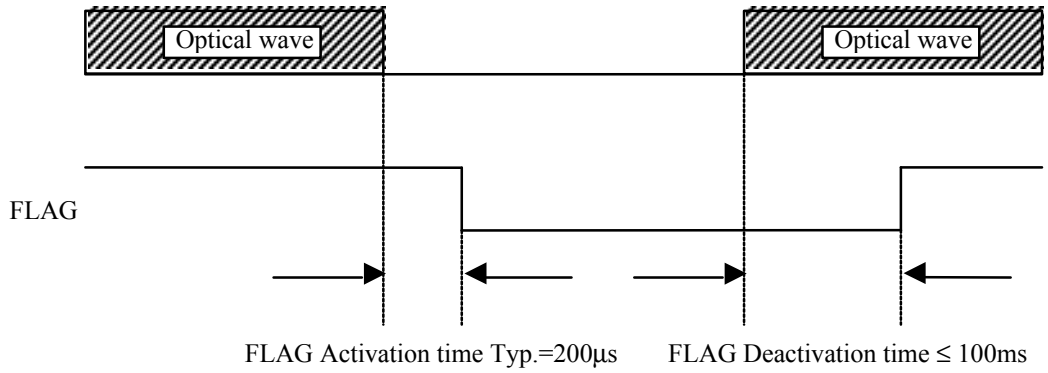
NOTE5 FLAG Interface



NOTE6 Data and Clock relationship



NOTE7 **FLAG** Response time:



NOTE8 LDA Interface