MITSUBISHI (OPTICAL DEVICES)

MF-156DF-T12-20x/29x/23x
MF-156DS-R13-17x

SONET/SDH TRANSMITTER & RECIEVER

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 pigtail fiber
- Single +5V power supply and P-ECL compatible input and output
- Operating case temperature range -40 to 85°C
- With clock recovery and digital alarm function

APPLICATION

Short haul and long haul telecommunication systems for SDH STM-1 / SONET OC-3.

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.

(Tc=25°C)

Parameters	Symbol	Ratings	Unit
Supply voltage	Vcc	+6 to 0	V
PECL high output current	-	-50 to 0	mA
PECL input voltage	-	0 to Vcc+0.4	V
Storage temperature	Tstg	-40 to 85	°C
Operating case temperature	Tc	-40 to 85	°C
Soldering Temperature	-	+260	°C
Soldering Time	-	10	sec
Relative humidity(non condensation)	-	10 to 80	%
Fiber bend radius from package	rF	32	mm

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 PECL compatible.
The transmitter disable input signal level is CMOS/TTL compatible.
The Signal Detect output signal level is PECL level compatible.

Transmitter

Parameters	Condition	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	-	Vcc	4.75	5.0	5.25	V
Power consumption	-	Pc	-	0.5	1.3	W
PECL input voltage	note 1	-	PECL			-
Transmitter Disable voltage	note 2	Vd	Vcc-2.0V	-	Vcc	V
Transmitter Enable voltage	note 2	Ve	0	-	0.8	V
Laser bias monitor voltage	note 3	Vb	0.01	-	0.45	V
Laser backface monitor voltage	note 3	Vbf	0.01	-	0.20	V

Receiver

Parameters	Condition	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	-	Vcc	4.75	5.0	5.25	V
Power consumption	-	Pc	-	1.0	1.5	W
PECL input voltage	note 4,5	-	PECL			-
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			-
Signal Detect Response Time: Decreasing Light Input	note 5,7	SDRTd	-	-	100	us
Signal Detect Response Time: Increasing Light Input	note 5,7	SDRTi	-	-	100	us
Photo Bias Current Responsity	note 8	PBr	0.6	-	-	A/W

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	14	0	29	0	30	dB
Transmitter							
Wavelength	1261	1360	1280	1335	1480	1580	nm
Optical source	MLM		SLM(MLM)		SLM		-
Optical power at pigtail	-14	-8	-5	0	-4	0	dBm
Optical power when disable	-	-45	-	-45	-	-45	dBm
Spectral width(rms)	-	4	-	-(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	-		-36		-34		dBm
Overload	0		+1		-		dBm

ORDERING INFORMATION

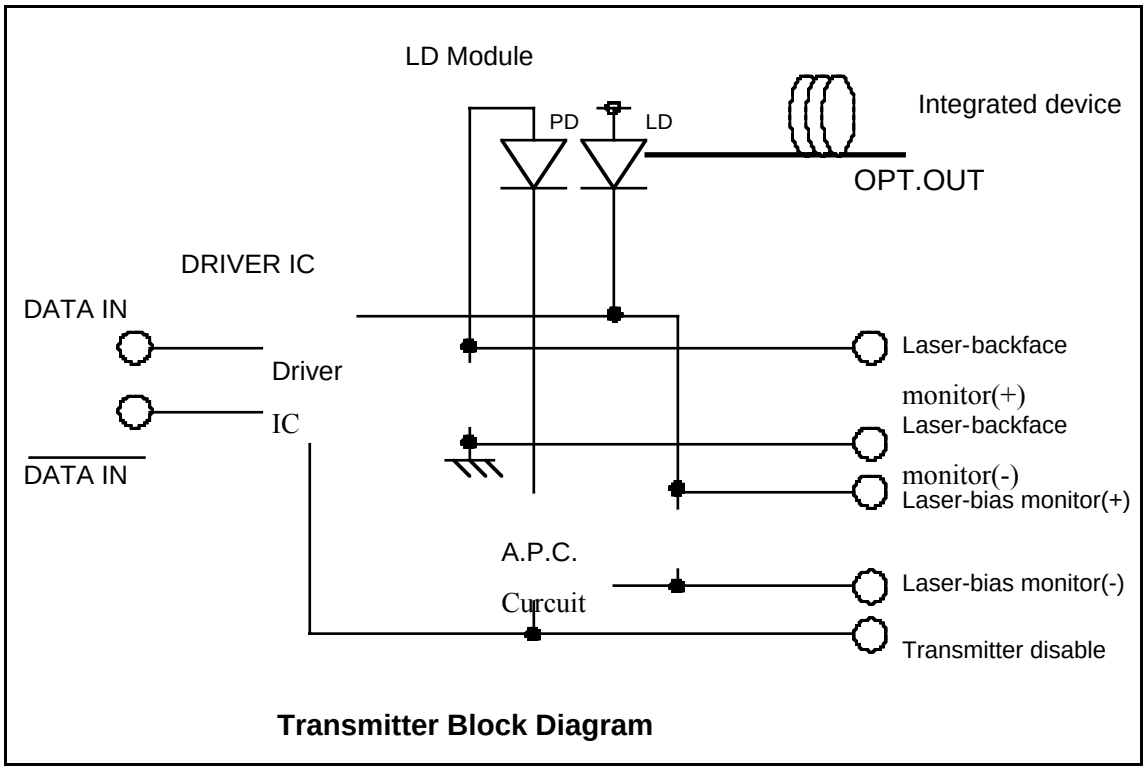
Transmitter

Part number	ITU-code	Optical connector type
MF-156DF-T12-200	S-1.1	FC
MF-156DF-T12-201	S-1.1	SC
MF-156DF-T12-202	S-1.1	ST
MF-156DF-T12-290	L-1.1	FC
MF-156DF-T12-291	L-1.1	SC
MF-156DF-T12-292	L-1.1	ST
MF-156DF-T12-230	L-1.2	FC
MF-156DF-T12-231	L-1.2	SC
MF-156DF-T12-232	L-1.2	ST

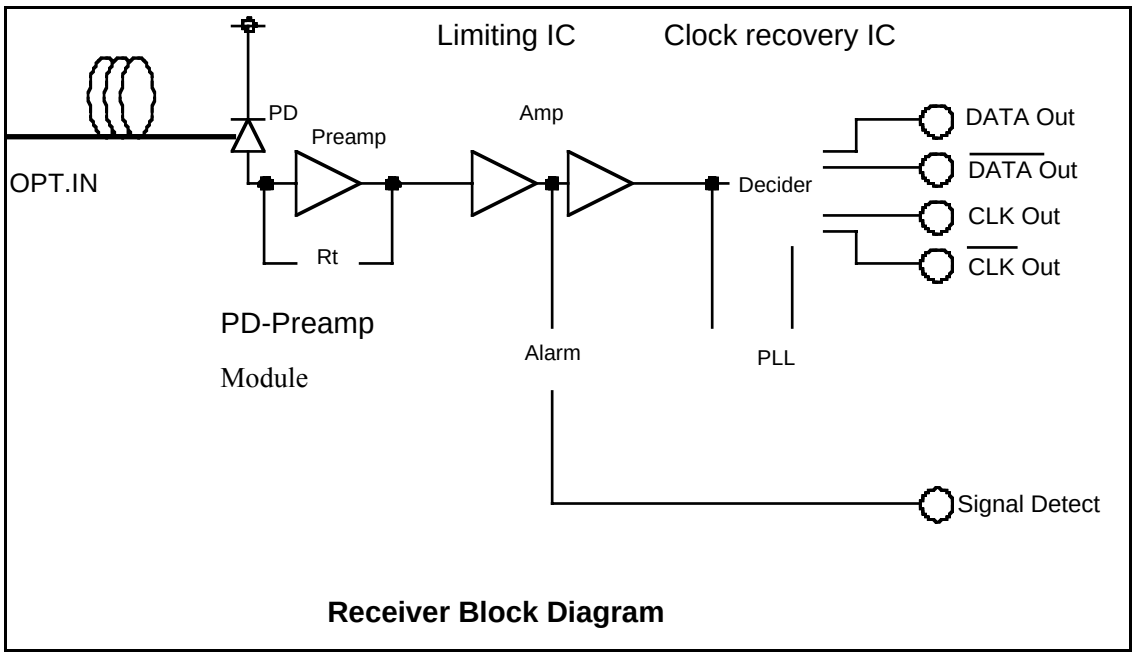
Receiver

Part number	ITU-code	Optical connector type
MF-156DS-R13-170	STM-1	FC
MF-156DS-R13-171	STM-1	SC
MF-156DS-R13-172	STM-1	ST

BLOCK DIAGRAM



Transmitter Block Diagram



Receiver Block Diagram

TRANSMITTER PIN ALLOCATION

No.	Symbol	Description	No.	Symbol	Description
1	NC	No user connection	20	NC	No user connection
2	Lbs(+)	Laser-bias monitor(+)	19	Lbf(+)	Laser-backface monitor(+)
3	NC	No user connection	18	Vcc	Vcc
4	Lbs(-)	Laser-bias monitor(-)	17	Lbf(-)	Laser-backface monitor(-)
5	GND	Ground	16	Data	Data
6	Vcc	Vcc	15	$\overline{\text{Data}}$	$\overline{\text{Data}}$
7	Td	Transmitter disable	14	GND	Ground
8	Vcc	Vcc	13	GND	Ground
9	Vcc	Vcc	12	Vcc	Vcc
10	NC	No user connection	11	GND	Ground

TRANSMITTER PIN DESCRIPTIONS

Pin No.	Function	I/O	Pin description
5,11, 13,14	GND	I	These pin are the module's ground connections. They should be connected to a low inpedance ground plane(0V).
6,8,9, 12,18	Vcc	I	This is the power supply pin for the module. It should be connected to +5.0V. Recommended power supply decoupling.
15,16	Data & $\overline{\text{Data}}$	I	This data input pin modulates the laser diode. When the Data input is asserted,the laser diode is turned on. Signal level of these pin are PECL level and internal Vbb bias. Refer to electrical interface in NOTE1.
7	Transmitter disable	I	The transmitter is nomally enabled and only requires an external voltage to disable. Refer to electrical interface in NOTE2.
2,4	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. Ib[mA]={Lbs(+)-Lbs(-)}[mV]/10 Refer to electrical interface in NOTE3.
17,19	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. Ibf[mA]={Lbf(+)-Lbf(-)}[mV]/200 Refer to electrical interface in NOTE3.
1,3, 10,20	NC	-	These pin are No user connection and should be left open.

RECEIVER PIN ALLOCATION

No.	Symbol	Description	No.	Symbol	Description
1	GND	Ground	20	NC	No user connection
2	GND	Ground	19	NC	No user connection
3	GND	Ground	18	NC	No user connection
4	CLK	Clock	17	NC	No user connection
5	$\overline{\text{CLK}}$	$\overline{\text{Clock}}$	16	GND	Ground
6	GND	Ground	15	GND	Ground
7	Data	Data	14	$\overline{\text{SD}}$	$\overline{\text{Signal Detect}}$
8	GND	Ground	13	GND	Ground
9	$\overline{\text{Data}}$	$\overline{\text{Data}}$	12	SD	Signal Detect
10	PDB	Photo Detector Bias	11	Vcc	Vcc

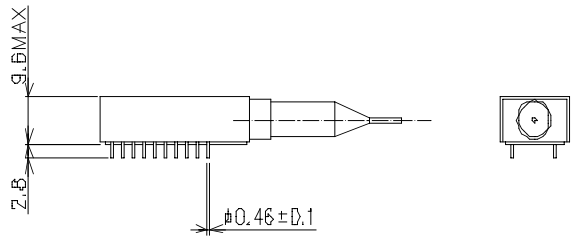
RECEIVER PIN DESCRIPTIONS

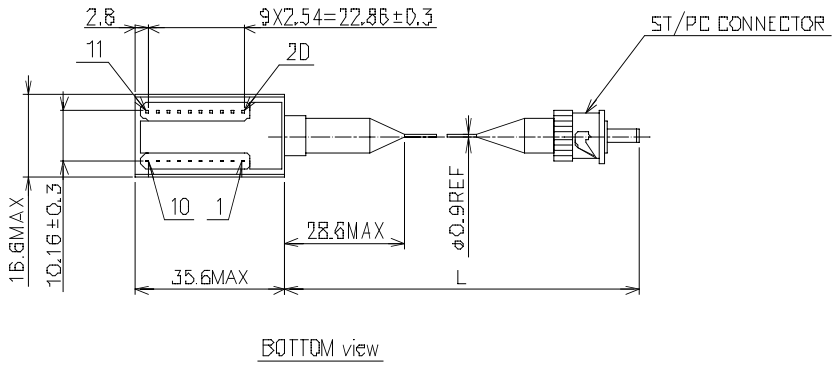
Pin No.	Function	I/O	Pin description
1,2,3, 6,8,13, 15,16	GND	I	These pin are the module's ground connections. They should be connected to a low inpedance ground plane(0V).
11	Vcc	I	This is the power supply pin for the module. It should be connected to +5.0V. Recommended power supply decoupling.
7,9	Data & $\overline{\text{Data}}$	O	There are Data output pin(Differential PECL output). Signal level of these pin are PECL level. Refer to electrical interface in NOTE4.
4,5	Clock & $\overline{\text{Clock}}$	O	There are recoverd clock output pin(Differential PECL output). Signal level of these pin are PECL level. Refer to electrical interface in NOTE4.
12,14	Signal Detect & $\overline{\text{Signal Detect}}$	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 PECL HIGH to PECL LOW. Signal Detect pin is differential PECL output pin. Refer to electrical interface in NOTE5.
10	Photo Detector Bias	I	This pin supplies the bias for the PIN Photo Detector and it should be connected to +5.0V. Additionally,by using External Resistor in series with this pin, it is possible to measure the photocurrent. Refer to electrical interface in NOTE8.
17,18, 19,20	NC	-	These pin are No user connection and should be left open.

GENERAL OUTLINE DRAWING

Transmitter / Receiver (FC/PC,SC/PC and ST/PC connector are availabe)

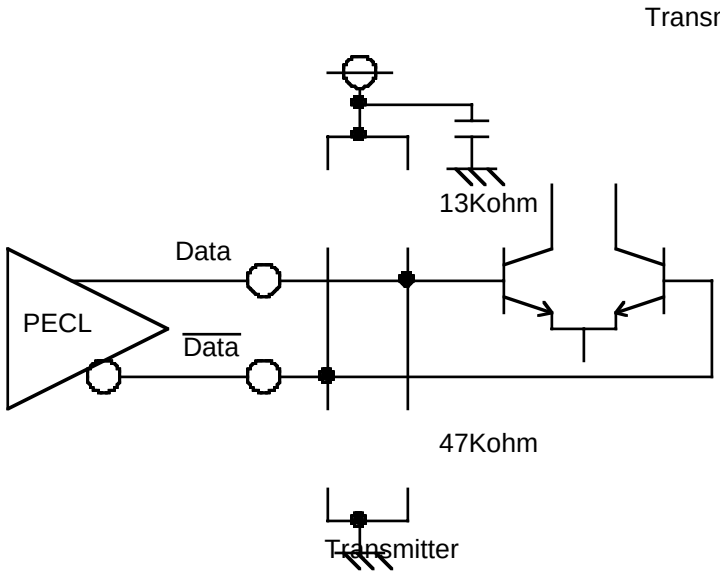
NOTE:TOLERANCES UNLESS NOTED +/-0.5
DIMENSIONS ARE IN MILLIMETERS
L=550+/-100



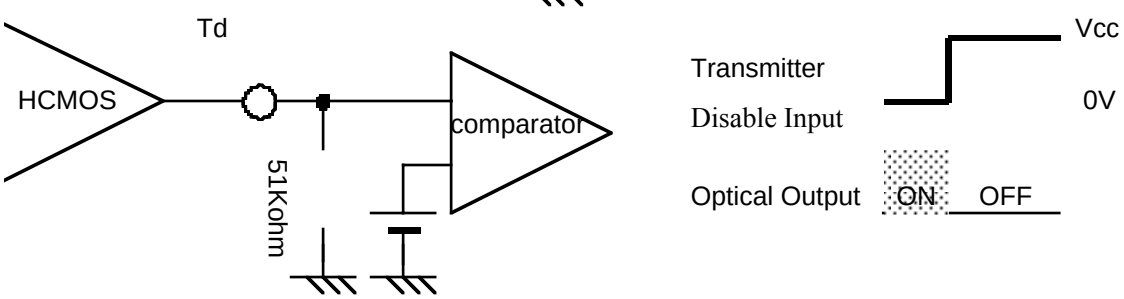


NOTE

NOTE1: PECL Input Interface



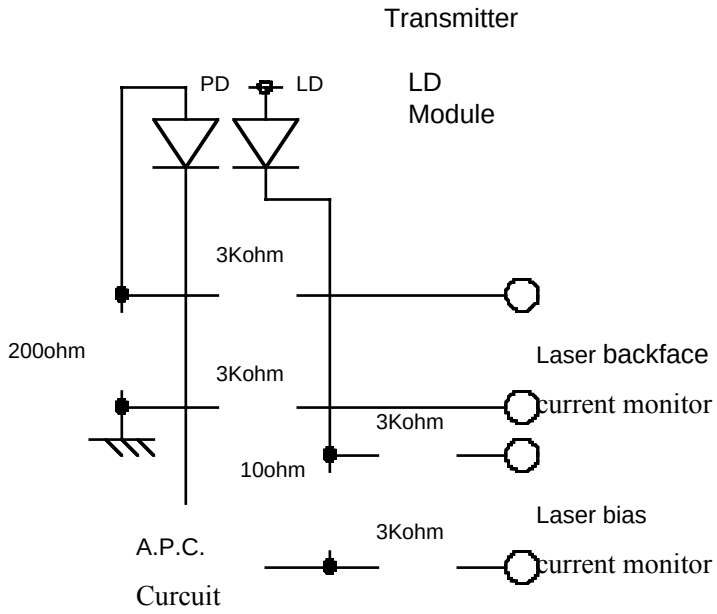
NOTE2:



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

Transmitter disable Interface

NOTE3: Laser bias / Laser backface monitor Interface.



NOTE4: PECL Output interface

