

MITSUBISHI (OPTICAL DEVICES)

# MF-156DS-TR123-030/040/050

SONET/SDH TRANSCEIVER

## DESCRIPTION

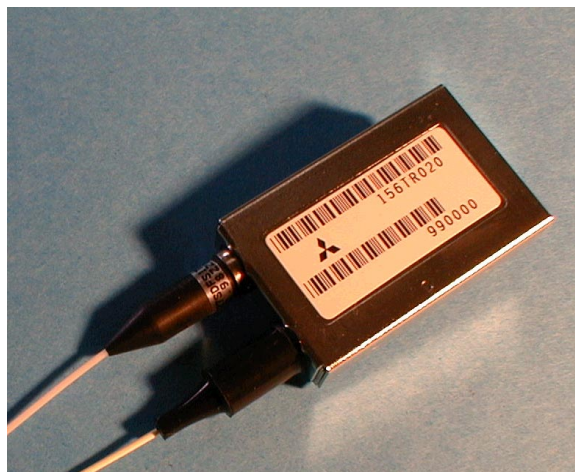
This product is designed to provide high optical performance for SDH STM-1/SONET OC-3.

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

- Tx + Rx combined
- Full SONET/SDH line up
- Low voltage, low power consumption, low cost
- 20-PIN DIP with fiber pigtail
- Single +3.3V power supply and P-ECL compatible input and output
- Temp range:-40 to 85°C
- Clock recovery



## 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 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)

Parameter	Symbol	Rating	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

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### ELECTRICAL CHARACTERISTICS

All parameters are specified over the operating case temperature.

Measurement conditions are at 155.52Mb/s+/-20ppm, NRZ PN2<sup>23</sup>-1 and 50%duty cycle data signal.

V<sub>cc</sub>=+3.3V+/-5%, T<sub>c</sub>=-40 to 85 °C, Using a PRBS 2<sup>23</sup>-1 pattern with a 50% Mark ratio, unless otherwise noted.

#### Transmitter

Parameters	Condition	Symbol	Min.	Typ.	Max.	Unit
Supply voltage		V <sub>cc</sub>	3.135	3.3	3.465	V
Power consumption		P <sub>c</sub>	-	230	610	mW
Input voltage	note 1	-	LVPECL(*)			-
Transmitter disable voltage	note 2	-	V <sub>cc</sub> -1.165	-	V <sub>cc</sub>	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 <sub>cc</sub>	3.135	3.3	3.465	V
Power consumption		P <sub>c</sub>	-	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	-	LVTTTL(*)			-
SD activation time	note 7	T <sub>act</sub>	-	-	95	us
SD deactivation time	note 7	T <sub>deact</sub>	-	-	300	ms

(\*): Values shown are for V<sub>cc</sub>=3.3V Level specifications will vary 1:1 with V<sub>cc</sub>

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**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	10	29	10	29	dB
<b>Transmitter</b>							
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
<b>Receiver</b>							
Sensitivity	-	-34	-	-34	-	-34	dBm
Overload	-8(#)	-	-8(#)	-	-8(#)	-	dBm
Wavelength	1260	1580	1260	1580	1260	1580	nm

(\*): Under development (#): target 0dBm

**ORDERING INFORMATION**

Part number	ITU-code	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

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**TRANSCEIVER PIN ALLOCATION**

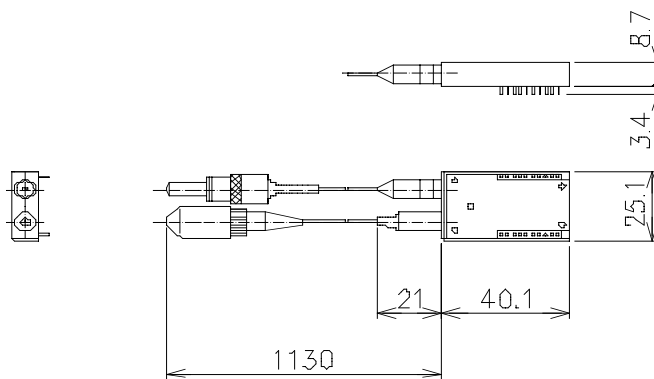
No.	Symbol	Description	No.	Symbol	Description
1	PDB	No user connection	20	LBF+	Laser-backface monitor(+)
2	SD	Signal detect	19	LBF-	Laser-backface monitor(-)
3	NUC	No user connection	18	LBS+	Laser-bias monitor(+)
4	GND	Ground	17	LBS-	Laser-bias monitor(-)
5	VCC	Vcc	16	TDT-	Tx data(-)
6	RCK-	Rx clock(-)	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)

**GENERAL OUTLINE DRAWING**

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

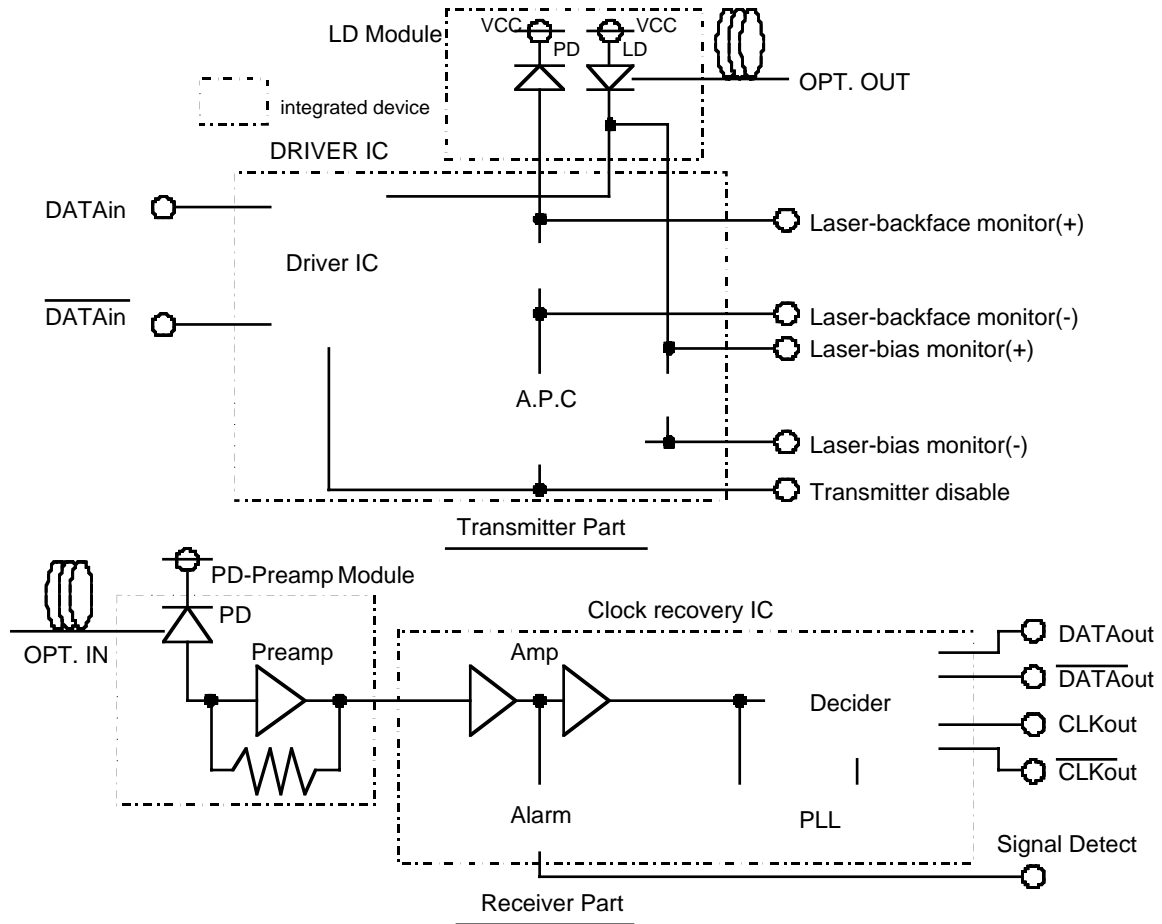
NOTE: TOLERANCES UNLESS NOTED +/-0.5  
DIMENSIONS ARE IN MILLIMETERS  
L=550+/-100



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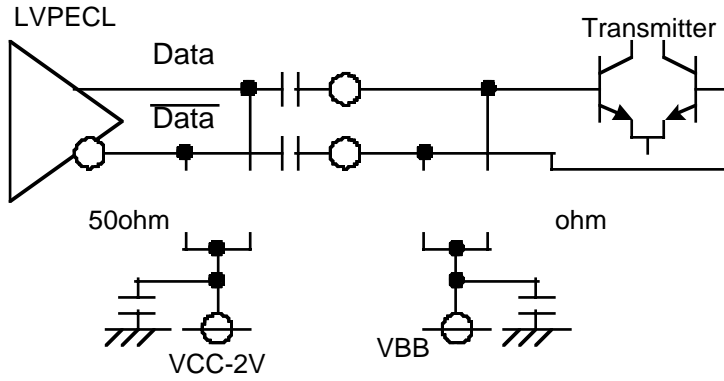
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**BLOCK DIAGRAM**

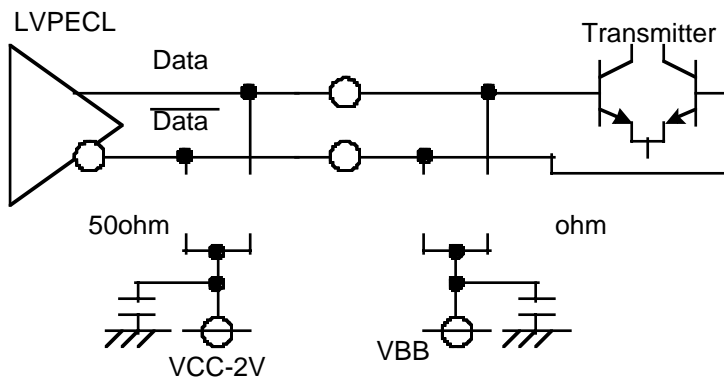


**NOTE**

**NOTE1: LVPECL Input interface**

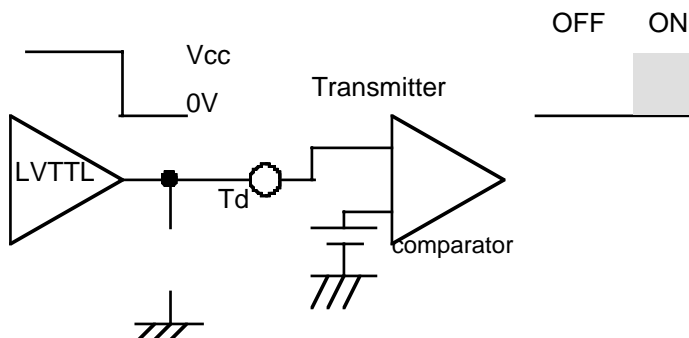


AC Coupled Interface



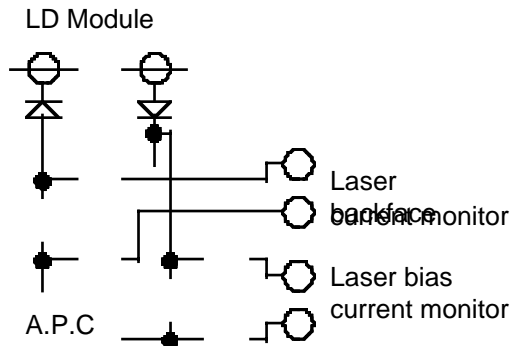
DC Coupled Interface

**NOTE2: Transmitter disable interface**

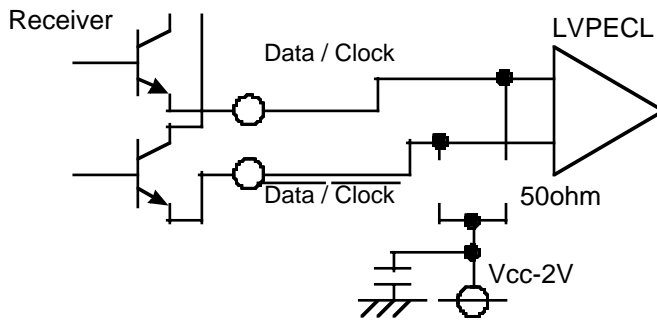


The transmitter is normally enabled and only requires an external voltage to disable.

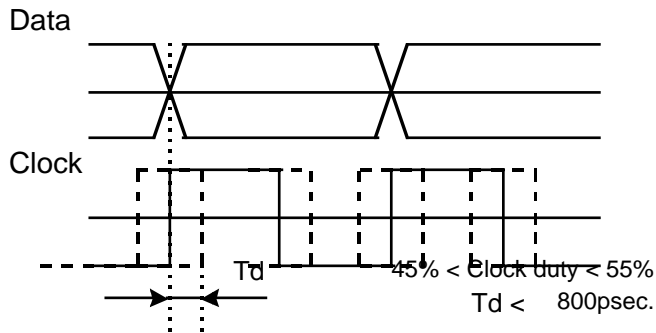
**NOTE3: Laser bias / Laser backface monitor interface.**



**NOTE4: LVPECL Output interface**



**NOTE5: Data and Clock relationship**



**NOTE6: Signal detect interface**

