2.6Gbps Single Mode CWDM SFP Transceiver (60km)

Features

a. Transceiver unit with independent

- CWDM DFB Laser diode transmitter
- InGaAs PIN photodiode receiver

b. Meet SFP MSA and SFF-8472 with single LC receptacle

c. Digital Diagnostic Monitoring

d. Hot-pluggable

e. Metal enclosure for lower EMI

f. +3.3V Single power supply

g. Qualified to meet the intent of Bellcore reliability practices

h. LVPECL logic interface simplifies interface to external circuitry

i. LVTTL logic Signal level R_X LOS

j. Color Coded Bail Latch: Violet

Application

a. ATM

b. SONET/SDH

c. Ethernet

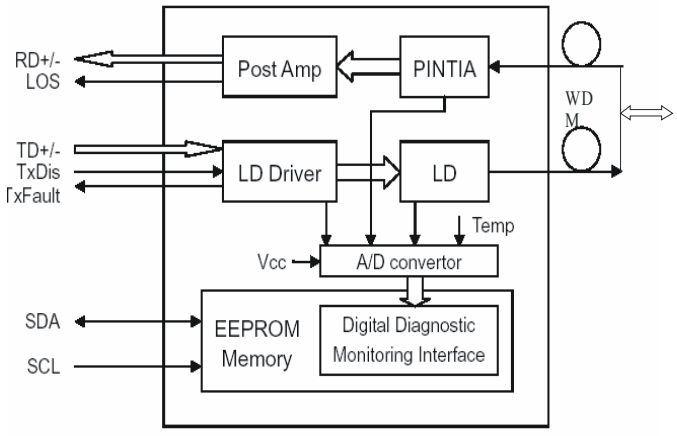
d. Switches

e. Routers

f. Hubs

General

The optical transceiver is compliant with the Small Form- Factor Pluggable (SFP) Multi-Source Agreement (MSA) and SFF-8472. It offer a simple and convenient way to interface PCBs to single mode fiber optic cables in Coarse Wavelength Division Multiplexing(CWDM) applications. There are eight center wavelengths available 1310, 1330, 1350, 1370, 1390, 1410, 1430, 1450, 1470, 1490, 1510, 1550, 1570, 1590, 1610 nm.



Transmitter Section

Transmitter is designed for single mode fiber and operates at CWDM wavelength of 1310, 1330, 1350, 1370, 1390,1410, 1430, 1450, 1470, 1490, 1510, 1550, 1570, 1590, 1610 nm. The transmitter module uses a DFB laser diode and full IEC825 and CDRH class 1 eye safety. The output power can be disabled via the single TxDis pin. Logic LVTTL HIGH level disables the transmitter. It contains APC function, temperature compensation circuit, LVPECL data inputs,LVTTL Txdis input and Tx fault Output interface.

Receiver Section

The receiver section uses a hermetic packaged front end receiver (InGaAs PIN and preamplifier). The postamplifier is AC coupled to preamplifier through a capacitor and a low pass filter. The capacitor and LPF are enough to pass the signal from 5Mb/s to 1260Mb/s without significant distortion or performance penalty. The LPF limits the preamplifier bandwidth to improve receiver sensitivity. As the input optical is decreased, LOS will switch from low to high. As the input optical power is increased from very low levels, LOS will switch back from high to low.

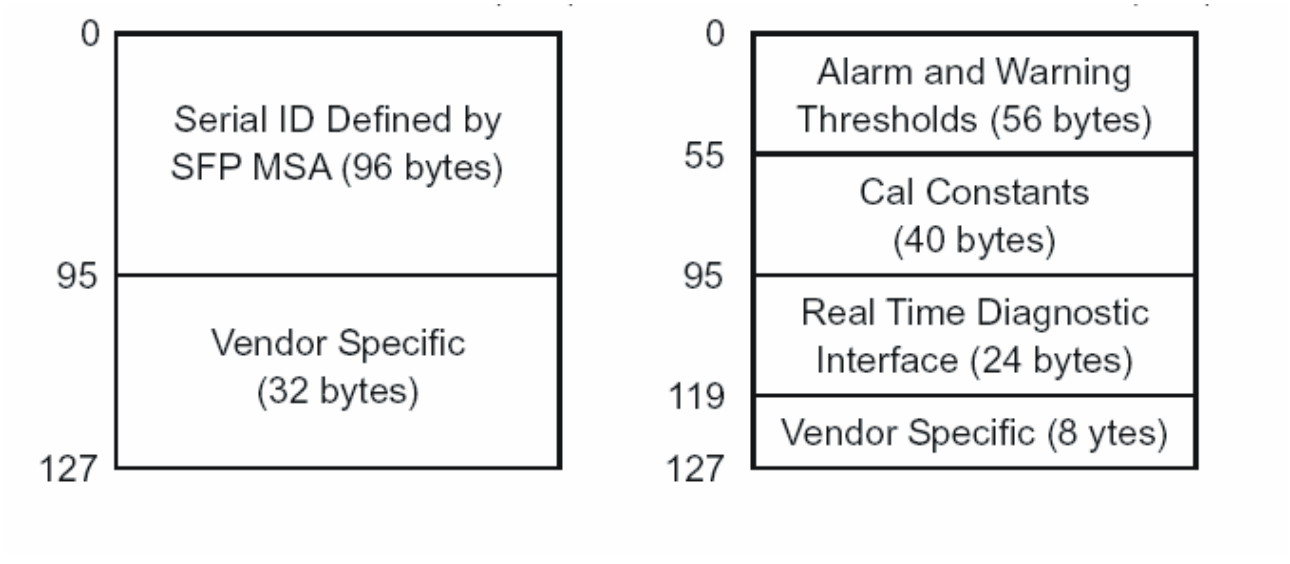
EEPROM Section

The optical transceiver contains an EEPROM. It provides access to sophisticated identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information

The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C01A/02/04 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL, Mod Def 1). The positive edge clocks data into those segments of the EEPROM that are not write protected within the SFP transceiver. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. The diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56 – 95 at wire serial bus address A2h. The digital diagnostic memory map specific data field define as following.

Memory Map:



2 wire address 1010000x (A0h)

2 wire address 1010001x (A2h)

Performance Specifications

Table1. Absolute Maximum Ratings/Operating Environment

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_S	-40	+85	℃
Operating Temperature	T_{op}	0	+70	℃
Supply Voltage	V_{CC}	-0.5	+3.6	V
Voltage at any Input Pin	V_{IN}	0	Vcc	V
Power Supply Voltage	V_{CC}	+3.1	+3.5	V

Note: Stress in excess of maximum absolute ratings can cause permanent damage to the module

Table 2. Transmitter electrical and optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Central Wavelength	λ_C	1304	1310	1317.5	nm
		1324	1330	1337.5	
		1344	1350	1357.5	
		1364	1370	1377.5	
		1384	1390	1397.5	
		1404	1410	1417.5	
		1424	1430	1437.5	
		1444	1450	1457.5	
		1464	1470	1477.5	
		1484	1490	1497.5	
		1504	1510	1517.5	
		1524	1530	1537.5	
		1544	1550	1557.5	
		1564	1570	1577.5	
		1584	1590	1597.5	
		1604	1610	1617.5	
Spectral Width	$\Delta\lambda$	-	-	1	nm
Side Mode Suppression Ratio	$SMSR_{MIN}$	30	-	-	dB
Output Power	P_o	-3	-	+2	dBm
Extinction Ratio	ER	8.2	-	-	dB

Transmit Fault Output-Low	TX_FAULTL	0	-	0.8	V
Transmit Fault Output-High	TX_FAULTH	2.0	-	V_{CC}	V
Power supply current	I_{CC}	-	70	180	mA
Data Input Voltage	Vpp	300	-	1600	mV

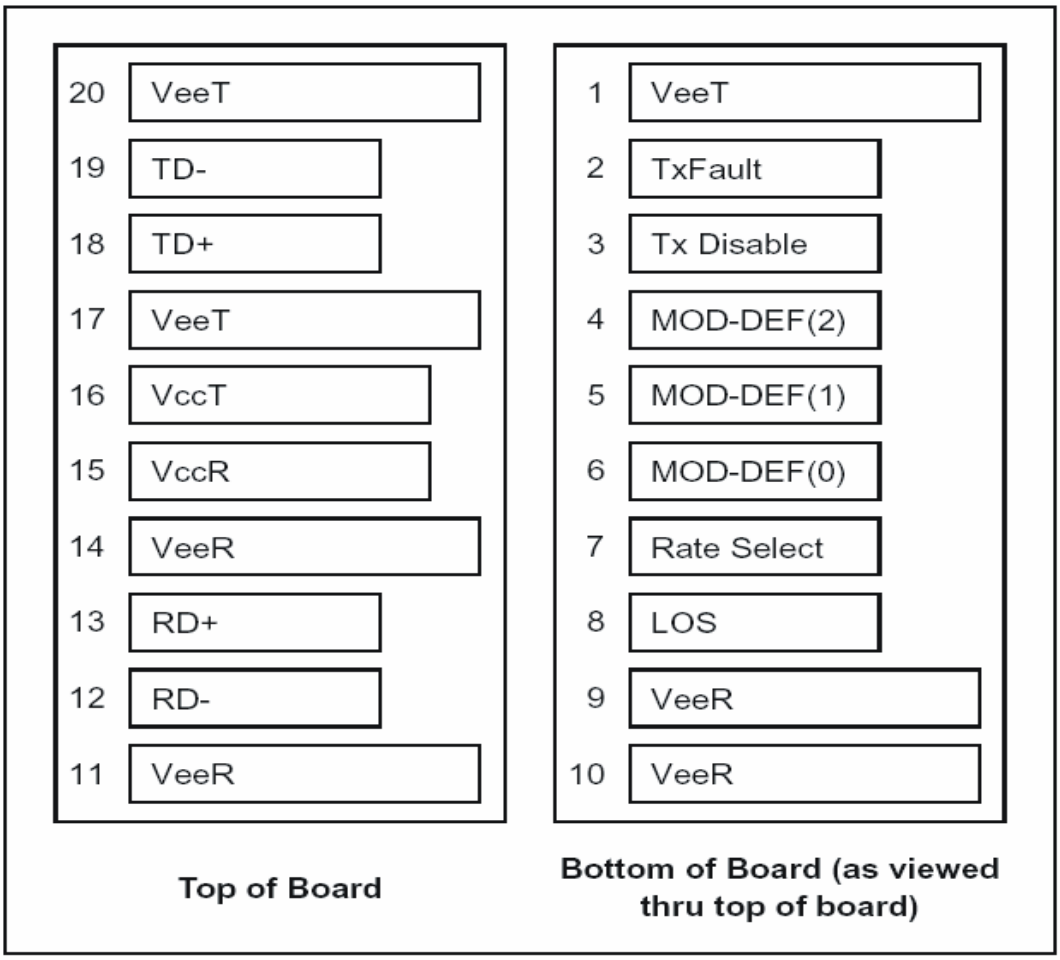
Table 3. Receiver optical-electrical characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Wavelength Range	λ	1270	-	1620	nm
MIN. Input Power (Sensitivity)	P_{MIN}	-	-	-25	dBm
MAX. Input Power	P_{MAX}	-7	-	-	dBm
Signal Detect-Asserted	P_A	-	-	-32	dBm
Signal Detect-De-Asserted	P_D	-42	-	-	dBm
Signal Detect Hysteresis	P_{HYS}		1		dB
Receiver Jitter Generation (peak to peak)				160*	ps

* - Jitter added by receiver (peak to peak). Measured at -23dBm average Rx sensitivity, PRBS 27- 1 test pattern.

Pin Definition

Pin Out Diagram



Pin Function Definitions

Pin No.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2
4	MOD-DEF2	Module Definition 2	3	Note 3
5	MOD-DEF1	Module Definition 1	3	Note 3
6	MOD-DEF0	Module Definition 0	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	VeeR	Receiver Ground	1	Note 5
10	VeeR	Receiver Ground	1	Note 5
11	VeeR	Receiver Ground	1	Note 5
12	RD-	Inv. Received Data Out	3	Note 6

13	RD+	Received Data Out	3	Note 6
14	VeeR	Receiver Ground	1	Note 5
15	VccR	Receiver Power	2	Note 7
16	VccT	Transmitter Power	2	Note 7
17	VeeT	Transmitter Ground	1	Note 5
18	TD+	Transmit Data In	3	Note 8
19	TD-	Inv Transmit Data In	3	Note 8
20	VeeT	Transmitter Ground	1	Note 5

Note:

1. **TX Fault is an open collector/drain output, which should be pulled up with a 4.7K–10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V**.
2. **TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7–10 KΩ resistor. Its states are:**

   Low (0 – 0.8V): Transmitter on

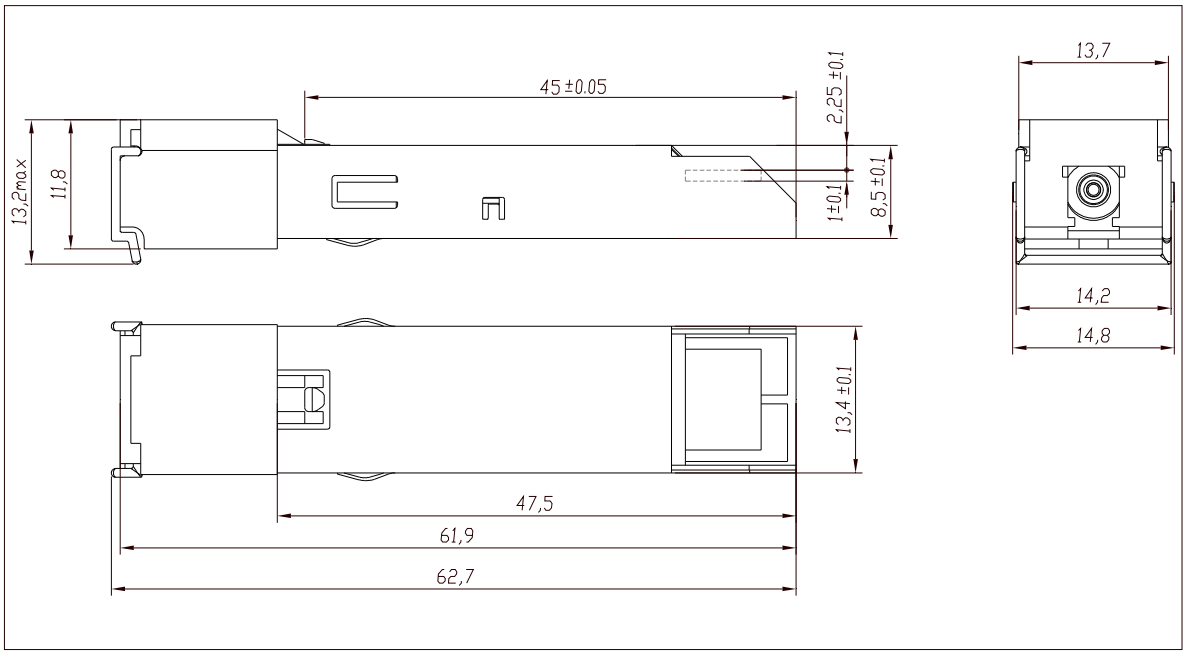
   (>0.8, < 2.0V): Undefined

High (2.0 – 3.465V): Transmitter Disabled

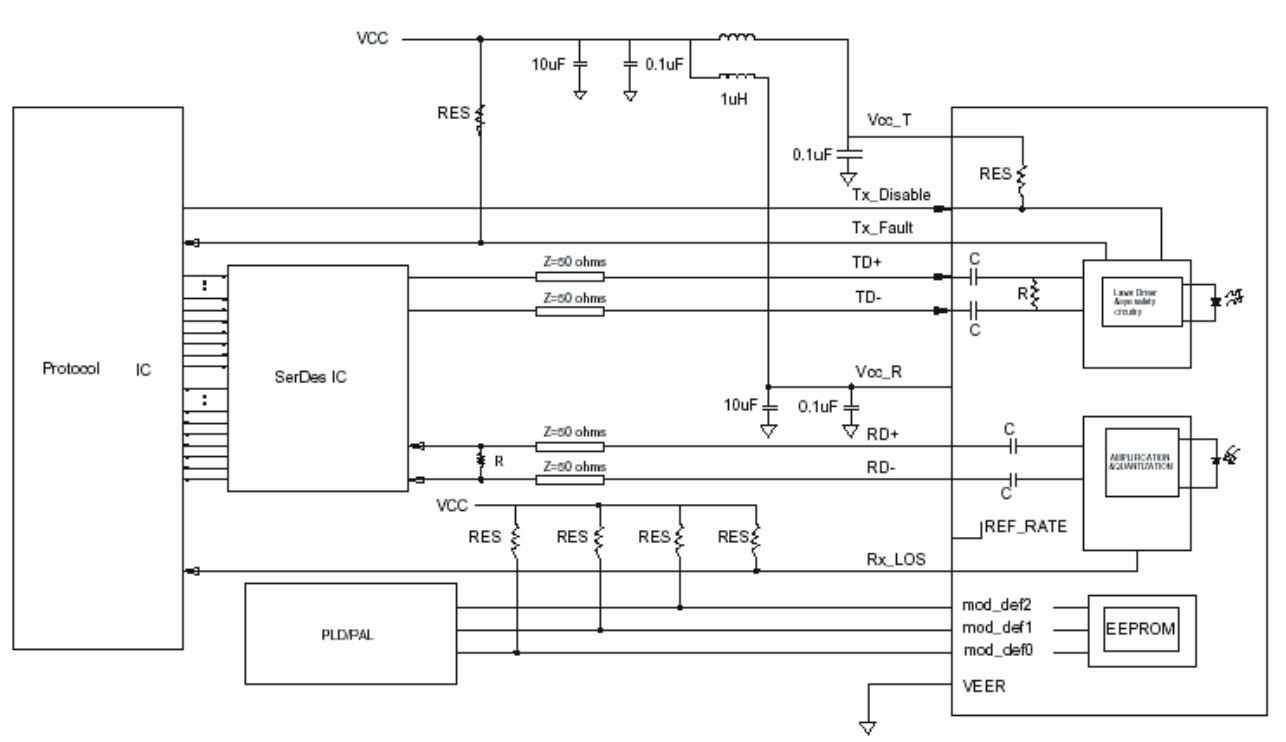
   Open: Transmitter Disabled

3. **Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K – 10KΩ resistor on the host board. The pull-up voltage shall be VccT or VccR. Mod-Def 0 is grounded by the module to indicate that the module is present Mod-Def 1 is the clock line of two wire serial interface for serial ID Mod-Def 2 is the data line of two wire serial interface for serial ID**
4. **LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor. Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity(as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.**
5. **VeeR and VeeT may be internally connected within the SFP module.**
6. **RD-/+: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.**
7. **VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at the SFP input pin with3.3V supply voltage. When the recommended supply filtering network is used, hotplugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.**
8. **TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.**

Package information



Recommended Circuit



Note: 4.7K ohms<RES<10K ohms

Recommended Board Layout Hole Pattern