



## Product Features

- Data-rate 1.25Gbps
- CWDM DFB wavelengths laser and PIN photo-detector for 80km transmission
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle  
Hot-pluggable SFP footprint
- Duplex LC/UPC type pluggable optical interface
- RoHS compliant and lead-free
- Single +3.3V power supply
- Compatible with SONET OC-24-LR-1
- Support Digital Diagnostic Monitoring interface
- Case operating temperature: 0°C to +70°C / -40°C to +85°C

## Applications

- Gigabit Ethernet
- Fiber Channel
- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other Optical Links

## General

**SFP-CWDM-80-xxxx** - are high performance transceivers, cost effective modules supporting data-rate of 1.25Gbps and 80km transmission distance with SMF.

The transceiver consists of three sections: an uncooled CWDM DFB laser transmitter, a PIN photodiode integrated with a trans-impedance pre-amplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements. The transceivers are compatible with SFP Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA.

## Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Supply Voltage	Vcc	-0.5	4.0	V	
Storage Temperature	Ts	-40	85	°C	
Relative Humidity	RH	0	85	%	

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

## General Operating Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Data Rate	DR		1250		Gb/s	
Supply Voltage	Vcc	3.13	3.3	3.47	V	
Supply Current	Icc5			220	mA	
Operating Case Temp.	Tc	0		70	°C	
Operating Case Temp.	Tl	-40		85	°C	

## Electrical Input/Output Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
<b>Transmitter</b>						
Diff. input voltage swing		120		820	mVpp	1
Tx Disable input	H	VIH	2.0	Vcc+0.3	V	
	L	VIL	0	0.8		
Tx Fault output	H	VOH	2.0	Vcc+0.3	V	2
	L	VOL	0	0.8		
Input Diff. Impedance	Zin		100		Ω	
<b>Receiver</b>						
Diff. output voltage swing		340	650	800	mVpp	3
Rx LOS Output	H	VOH	2.0	Vcc+0.3	V	2
	L	VOL	0	0.8		

### Notes:

1. TD+/- are internally AC coupled with 100Ω differential termination inside the module.
2. Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10kΩ resistors on the host board. Pull up voltage between 2.0V and Vcc+0.3V.
3. RD+/- outputs are internally AC coupled, and should be terminated with 100Ω (differential) at the user SERDES.

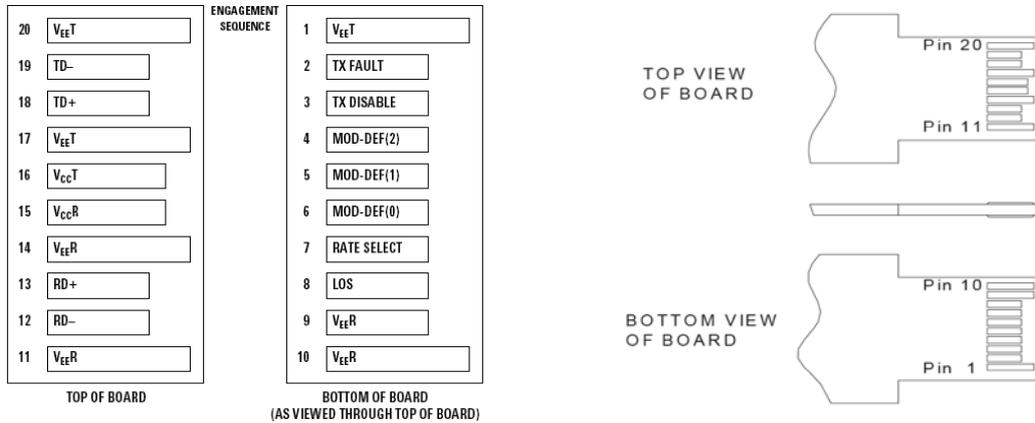
## Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
<b>Transmitter</b>						
Operating Wavelength	$\lambda$		1xx0		nm	3
Ave. output power (Enabled)	PAVE	0		5	dBm	1
Extinction Ratio	ER	10			dB	1
Side-Mode Suppression Ratio	SMSR	30			dB	
RMS spectral width	$\Delta\lambda$			1	nm	
Rise/Fall time (20%~80%)	Tr/Tf			0.26	ns	2
Output Optical Eye	Compliant with IEEE802.3 z (class 1 aser safety)					
<b>Receiver</b>						
Operating Wavelength	$\lambda$	1270		1610	nm	
Receiver Sensitivity	PSEN1			-24	dBm	4
Overload	PAVE	-3			dBm	
LOS Assert	Pa	-40			dBm	
LOS De-assert	Pd			-26	dBm	5
LOS Hysteresis	Pd-Pa	0.5		6	dB	

**Notes:**

- 1.Measure at 2<sup>7</sup>-1 NRZ PRBS pattern
- 2.Transmitter eye mask definition
- 3.“XX” is: 45,47,49,51,53,55,57,59 and 61; “ $\Delta\lambda$ ” is 7.5
- 4.Measured with Light source 1XX0 nm, ER=9dB; BER = <math>10^{-12}</math> @PRBS=2<sup>7</sup>-1 NRZ
- 5.When LOS de-asserted, the RX data+/- output is High-level (fixed)

## Pin Definitions and Functions



Pin	Symbol	Name/Description	Notes
1	V <sub>ee</sub> T	Tx ground	
2	Tx Fault	Tx fault indication, Open Collector Output, active "H"	1
3	Tx Disable	LVTTL Input, internal pull-up, Tx disabled on "H"	2
4	MOD-DEF2	2 wire serial interface data input/output (SDA)	3
5	MOD-DEF1	2 wire serial interface clock input (SCL)	3
6	MOD-DEF0	Model present indication	3
7	Rate select	No connection	
8	LOS	Rx loss of signal, Open Collector Output, active "H"	4
9	V <sub>ee</sub> R	Rx ground	
10	V <sub>ee</sub> R	Rx ground	
11	V <sub>ee</sub> R	Rx ground	
12	RD-	Inverse received data out	5
13	RD+	Received data out	5
14	V <sub>ee</sub> R	Rx ground	
15	V <sub>cc</sub> R	Rx power supply	
16	V <sub>cc</sub> T	Tx power supply	
17	V <sub>ee</sub> T	Tx ground	
18	TD+	Transmit data in	6
19	TD-	Inverse transmit data in	6
20	V <sub>ee</sub> T	Tx ground	

**Notes:**

- When high, this output indicates a laser fault of some kind. Low indicates normal operation. And should be pulled up with a 4.7 – 10KΩ resistor on the host board.
- 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 – 10KΩ resistor. Its states are:  
 Low (0 – 0.8V): Transmitter on ( $>0.8, <2.0V$ ): Undefined  
 High (2.0V~V<sub>cc</sub>+0.3V): Transmitter Disabled Open: Transmitter Disabled
- 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 between 2.0V~V<sub>cc</sub>+0.3V.  
 Mod-Def 0 has been 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. When high, this output indicates loss of signal (LOS). Low indicates normal operation.
5. 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.
6. 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.

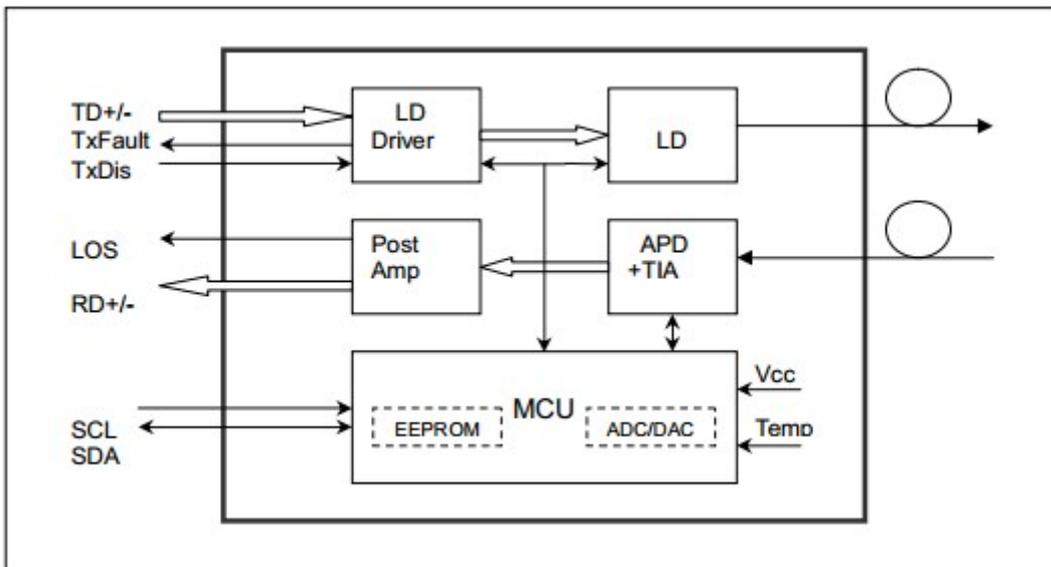
## Diagnostics

Parameter	Symbol	Units	Min.	Max.	Accuracy	Note
Transceiver temperature	DTemp-E	°C	0	+70	±5°C	1
Transceiver supply voltage	DVoltage	V	3.0	3.6	±3%	
Transmitter bias current	DBias	mA	2	80	±10%	2
Transmitter output power	DTx-Power	dBm	+7	+2	±3dB	
Receiver average input power	DRx-Power	dBm	-29	0	±3dB	

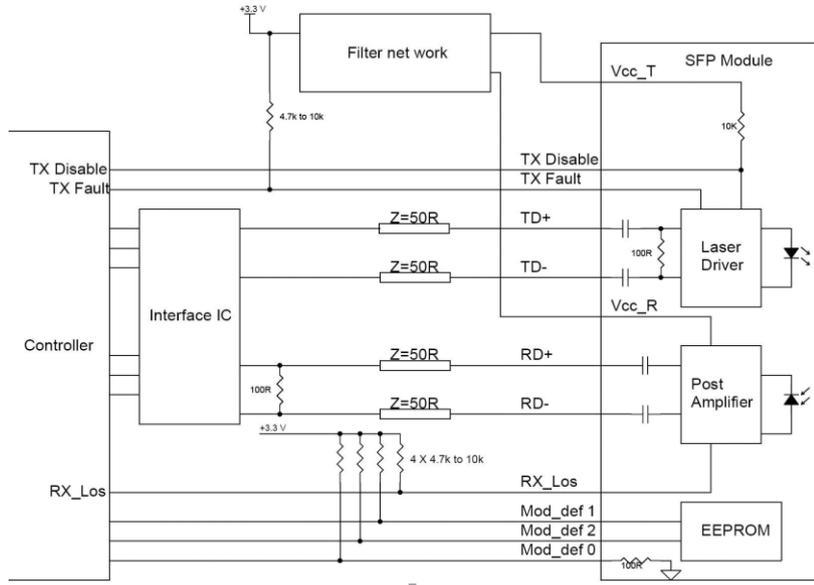
### Notes:

1. When Operating temp.=0~70 °C, the range will be min=-5, Max=+75
2. The accuracy of the Tx bias current is 10% of the actual current from the laser driver to the laser
3. Internal/ External Calibration compatible.

## Functional Diagram



## Typical Interface Circuit



## Package Dimensions

