

Product Features

- Supports 1.25Gbps/1.0625Gbps bit rates
- Bi-Directional LC/PC connector
- Hot pluggable SFP footprint
- 1490nm DFB laser and 1550nm APD photo detector
- 1550nm DFB laser and 1490nm APD photo detector
- Applicable for 120Km SMF connection
- Low power consumption, < 1.0W
- Digital Diagnostic Monitor Interface
- Compliant with SFP MSA and SFF-8472
- Very low EMI and excellent ESD protection
- Operating case temperature:
Commercial: 0 to 70 °C
Industrial: -40 to 85 °C

Applications

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

General

SFP-WDM-SM-120*D-LC - are high performance transceivers, cost effective modules supporting dual data-rate of 1.25Gbps/1.0625Gbps and 120km transmission distance with SMF. The transceiver consists of three sections: a DFB laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (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	V _{cc}	-0.5	4.0	V	
Storage Temperature	T _s	-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	V _{cc}	3.13	3.3	3.47	V	
Supply Current	I _{cc5}			220	mA	
Operating Case Temp.	T _c	0		70	°C	
Operating Case Temp.	T _I	-40		85	°C	

Electrical Input/Output Characteristics

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Transmitter						
Diff. input voltage swing		120		820	mVpp	1
Tx Disable input	H	V _{IH}	2.0	V _{cc} +0.3	V	
	L	V _{IL}	0	0.8		
Tx Fault output	H	V _{OH}	2.0	V _{cc} +0.3	V	2
	L	V _{OL}	0	0.8		
Input Diff. Impedance	Z _{in}		100		Ω	
Receiver						
Diff. output voltage swing		340	650	800	mVpp	3
Rx LOS Output	H	V _{OH}	2.0	V _{cc} +0.3	V	2
	L	V _{OL}	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 V_{cc}+0.3V.
3. RD+/- outputs are internally AC coupled, and should be terminated with 100Ω (differential) at the user SERDES.

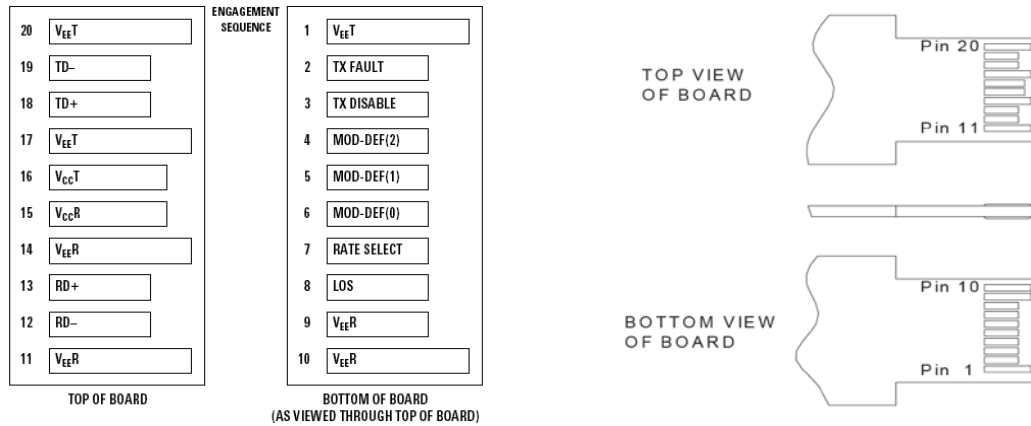
Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note	
Transmitter							
Operating Wavelength	SFP-WDM-SM-120AD-LC	λ	1470	1490	1510	nm	
	SFP-WDM-SM-120BD-LC	λ	1530	1550	1570	nm	
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	
Dispersion penalty	TDP			3.9	dB		
Output Optical Eye	Compliant with IEEE802.3 z (class 1 aser safety)						
Receiver							
Operating Wavelength	SFP-WDM-SM-120AD-LC	λ	1530	1550	1570	nm	
	SFP-WDM-SM-120BD-LC	λ	1470	1490	1510	nm	
Receiver Sensitivity	PSEN1			-32	dBm	3	
Overload	PAVE	-7			dBm	3	
LOS Assert	Pa	-45			dBm		
LOS De-assert	Pd			-34	dBm		
LOS Hysteresis	Pd-Pa	0.5			dB		

Notes:

- 1.Measured at 1250Mb/s with PRBS 2 223 – 1NRZ test pattern.
- 2.Unfiltered, measured with a PRBS223 – 1 test pattern @1.25Gbps
- 3.Measured at 1250Mb/s with PRBS 223 – 1 NRZ test pattern for BER < 1x10-12

Pin Definitions and Functions



Pin	Symbol	Name/Description	Notes
1	VeeT	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	VeeR	Rx ground	
10	VeeR	Rx ground	
11	VeeR	Rx ground	
12	RD-	Inverse received data out	5
13	RD+	Received data out	5
14	VeeR	Rx ground	
15	VccR	Rx power supply	
16	VccT	Tx power supply	
17	VeeT	Tx ground	
18	TD+	Transmit data in	6
19	TD-	Inverse transmit data in	6
20	VeeT	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~Vcc+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~Vcc+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.

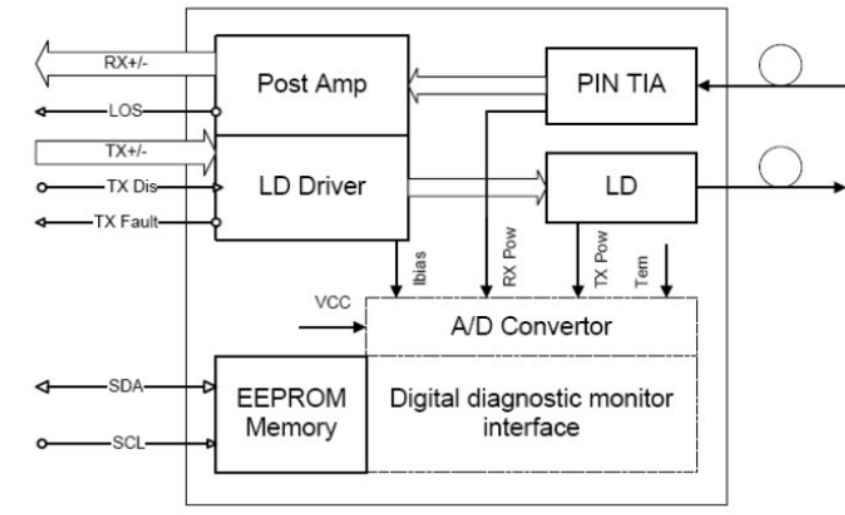
Diagnostics

Parameter	Symbol	Units	Min.	Max.	Accuracy	Note
Transceiver temperature	DTemp-E	°C	-45	+90	±5°C	1
Transceiver supply voltage	DVoltage	V	2.8	4.0	±3%	
Transmitter bias current	DBias	mA	2	80	±10%	2
Transmitter output power	DTx-Power	dBm	-3	+8	±3dB	
Receiver average input power	DRx-Power	dBm	-35	0	±3dB	

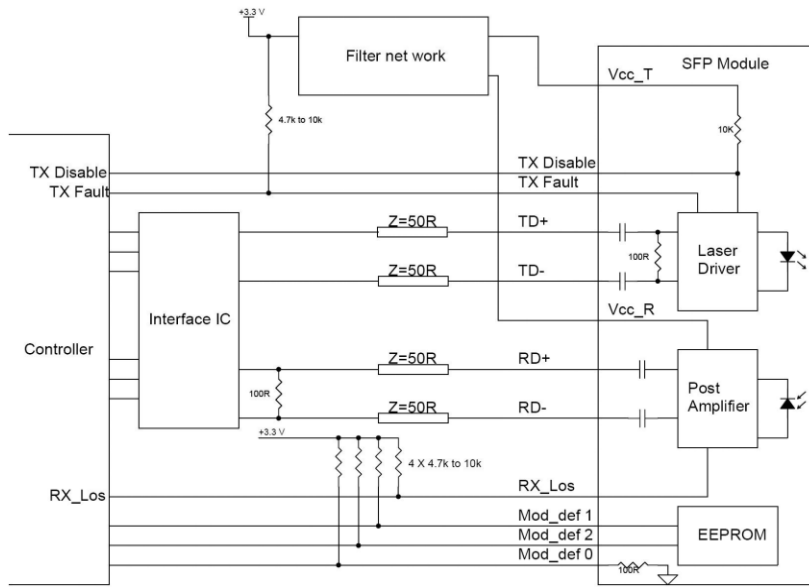
Notes:

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.

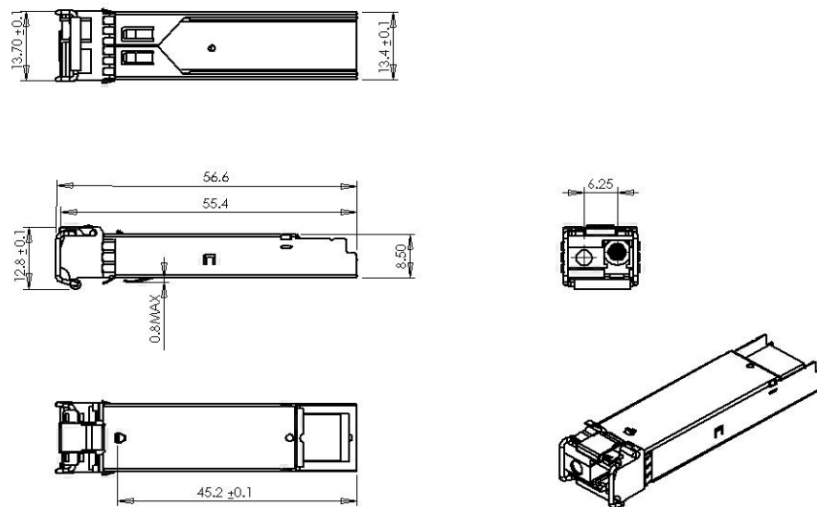
Functional Diagram



Typical Interface Circuit



Package Dimensions



Ordering Information

Part Number	Output Power	Rec. Sens	Data Rate	Wavelength	Distance
SFP-WDM-SM-120AD-LC	0~ +5 db	-32db	1.25G	TX1490/RX1550nm	120km
SFP-WDM-SM-120BD-LC	0~ +5 db	-32db	1.25G	TX1550/RX1490nm	120km