Features

- Dual data-rate of 1.25Gbps/ 1.063Gbps operation
- Simplex LC Connector Bi-Directional SFP+ Optical Transceiver
- Single 3.3V Supply
- Up to 60km on 9/125um SMF
- 1550nm DFB Laser transmitter,1310nm receiver
- Compliant with SFP MSA and SFF-8472 with simplex LC receptacle
- Digital Diagnostic Monitoring
- RoHS compliant
- Operating case temperature: 0°C ~ 70°C

Applications

- Gigabit Ethernet
- Fiber Channel
- Switched to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

Description

The SFP- BIDI transceivers are high performance, cost effective modules supporting dual-rate of 1.25Gbps/1.0625Gbps and 60km 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

Parameters	Symbol	Min.	Max.	Units
Supply Voltage	V_{CC}	-0.5	4.5	V
Storage Temperature	Tc	-40	85	°C
Operating Humidity		5	85	%

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units
Supply Voltage	V_{CC}	3.13	3.3	3.47	V
Supply Current	Icc			300	mA
Operating Case Temperature	T_C	0		70	°C
Data Rate-Gigabit Ethernet		-	1.25		Gbps
Data Rate-Fiber Channel			1.063		Gbps

Digital Diagnostic Functions

Parameter	Symbol	Accuracy	Unit	Notes
Temperature monitor absolute error	DMI_Temp	± 3	°C	
Supply voltage monitor absolute error	DMI_VCC	±0.3	V	
TX power	DMI_TX	± 3 dB	dBm	
RX power	DMI_RX	± 3 dB	dBm	
Bias Current monitor	DMI_Ibias	± 10%	mA	

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Transmitter						
Center Wavelength	λC	1530	1550	1570	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Spectral Width (-20dB)	Δλ			1	nm	
Average Output Power	Pout	-2		4	dBm	1
Extinction Ratio	ER	9			dB	
Optical Rise/Fall Time (20~80%)	tr/tf			0.26	ns	
Receiver						
Center wavelength	λ_C	1260	1310	1360	nm	
Receiver Sensitivity				-25	dBm	2
Receiver Overload	P_{MAX}	-3			dBm	2
LOS Assert	LOS_A	-35			dBm	
LOS De-assert	LOS_D			-25	dBm	
LOS Hysteresis	LOS_H	1		4	dB	

Notes:

1. The optical power is launched into SMF
2. Measured with a PRBS2^7-1 test pattern @1250Mbps, BER≦1x10^{-12}

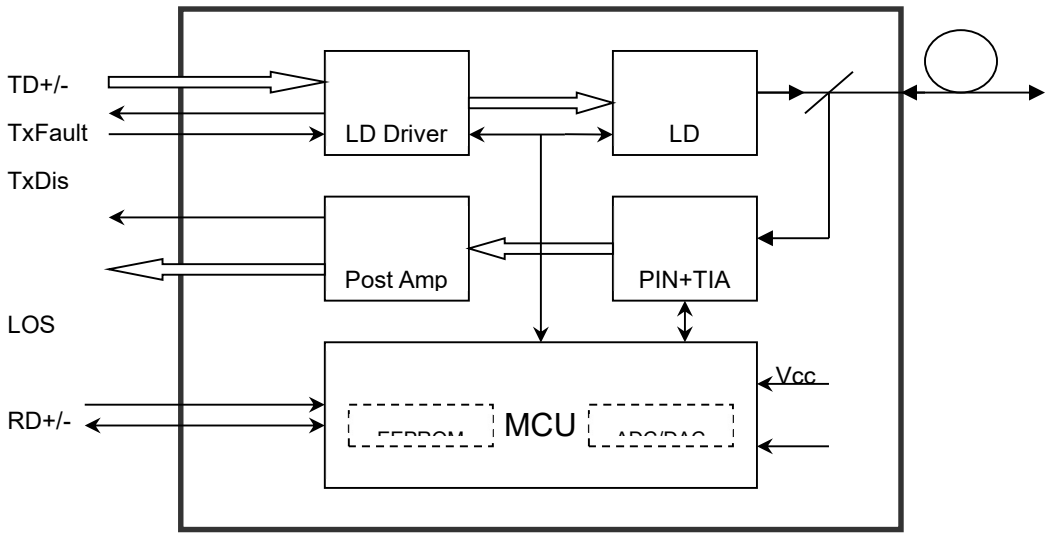
Electronical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Transmitter						
Input Swing Differential	Z_{IN}	90	100	110	Ω	
Single ended data input swing	Vin_PP	400		1800	mV	1
Disable Voltage	V_D	2		Vcc	V	
Enable Voltage	V_{EN}	0		0.8	V	
Receiver						
Single Ended Data Output Swing	V_{OUT_PP}	400		1800	mV	2
LOS-High		2		Vcc	V	
LOS-Low				0.8	V	

Notes:

1. PECL input, internally AC-coupled and terminated.
2. Internally AC-coupled.

Block Diagram of Transceiver



Pin Assignment

Pin	Symbol	Description	Note
1	V_{EET}	Transmitter ground	
2	TX_FAULT	Transmitter Fault Indication	1
3	TX DISABLE	Transmitter Disable	2
4	MOD_DEF(2)	SDA Serial Data Signal	3
5	MOD_DEF(1)	SCL Serial Clock Signal	3
6	MOD_DEF(0)	TTL Low	3
7	Rate Select	No connection required	
8	LOS	Loss of Signal indication	4
9	V_{EER}	Receiver ground	
10	V_{EER}	Receiver ground	
11	V_{EER}	Receiver ground	
12	RD-	Receiver Inverted Data out	5
13	RD+	Receiver Data out	5
14	V_{EER}	Receiver ground	
15	V_{CCR}	Receiver power supply	
16	V_{CCT}	Transmitter power supply	
17	V_{EET}	Transmitter Ground	
18	TD+	Transmitter Data in	6
19	TD-	Receiver Inverted Data in	6
20	V_{EET}	Transmitter Ground	

Notes:

1. TX Fault is an open collector output, which should be pulled up with a 4.7k ~10KΩ resistor on the board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 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 4.7k ~10kΩ resistor. Its states are:

   Low (0 to 0.8V): Transmitter on

   (>0.8V, <0.2V): Undefined

   High (2.0 to 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.

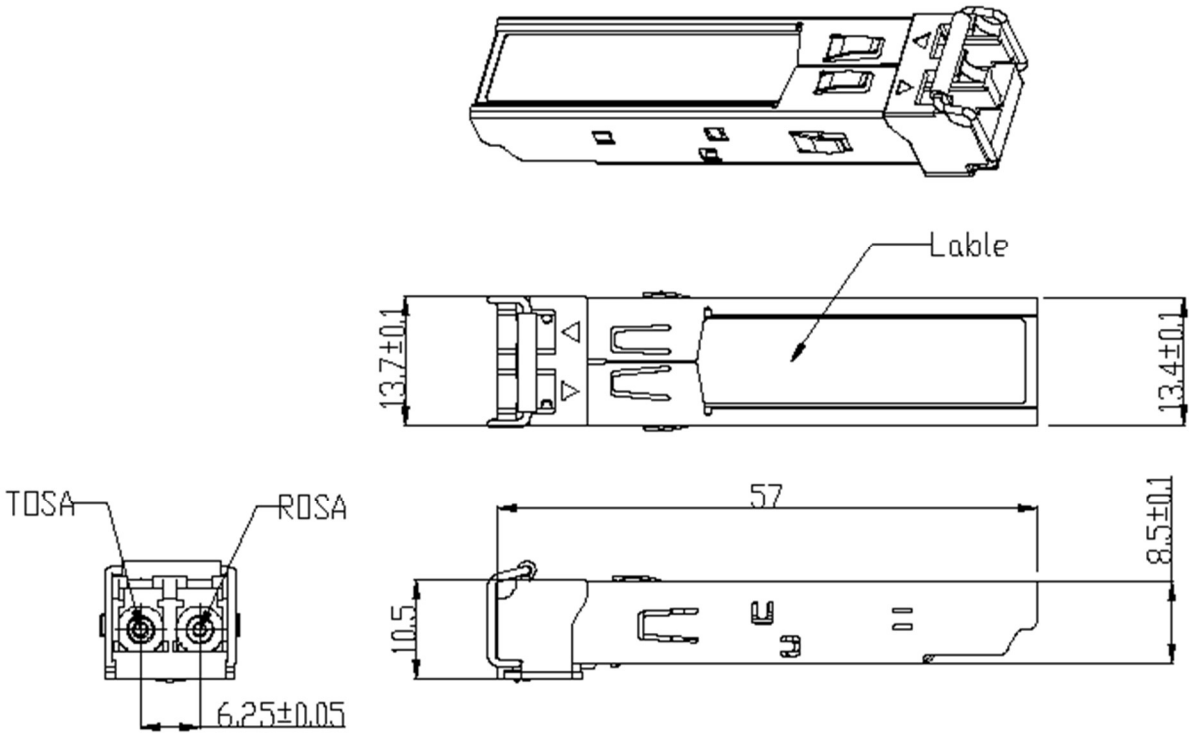
Mod-Def 0 is grounded by the module to indicate that the module is present

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 is an open collector output, which should be pulled up with a 4.7k ~ 10kΩ resistor. Pull up voltage between 2.0V and Vcc+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low states, the output will be pulled to less than 0.8V.
5. RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
6. Td-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Dimensions

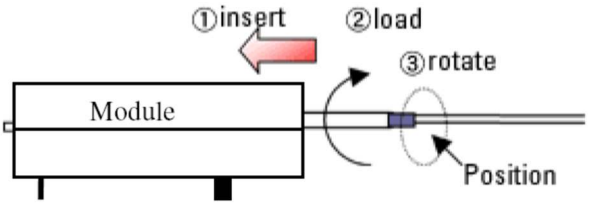


Optical Receptacle Cleaning Recommendations :

All fiber stubs inside the receptacle portions were cleaned before shipment. In the event of contamination of the optical ports, the recommended cleaning process is the use of forced nitrogen. If contamination is thought to have remained, the optical ports can be cleaned using a NTT international Cletop® stick type and HFE7100 cleaning fluid. Before the mating of patch-cord, the fiber end should be cleaned up by using Cletop® cleaning cassette.

Cleaning of patch-cord

Cleaning of fiber stub



1. Insert
   Ensure that stick is held straight when inserting into sleeve.
2. Load
   Apply sufficient pressure (approx 600-700g) to ensure ferrule a little depressed in sleeve.
3. Rotate
   Rotate stick clockwise 4-5 times, while ensuring direct contact with ferrule end-face is maintained.

Notice: Number of possible wipes:
Maintenance (repair) ~1 use / piece
Equipment construction: 4 uses / piece (max.)

Note: The pictures were extracted from NTT-ME website. And the Cletop® is a trademark registered by NTT-ME

Ordering Information

Model Number	Part Number	Reach	TX/RX	Voltage	Temperature
SFP-BWDM-60D	OP6C-W60-B5-CMF	60 km	1550/1310	3.3V	0°C to 70 °C

Modification History

Revision	Date	Description
A1	Feb.2013	Initial Release

Note: All information contained in this document is subject to change without notice.