

Features

- Dual data-rate of 1.25Gbps/1.063Gbps operation
- 3.3V single power supply
- 1310nm FP laser and PIN photodetector for 20km transmission
- Compliant with SFP MSA and SFF-8472 with simplex LC or SC receptacle
- Digital Diagnostic Monitoring:
Internal Calibration or External Calibration
- Compatible with SONET OC-24-LR-1
- Compatible with RoHS
- Operating Case Temperature:
Standard : 0°C ~70°C
Industrial -40°C ~85°C



Applications

- Gigabit Ethernet
- Fiber Channel
- Switch 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 data-rate of 1.25Gbps/1.0625Gbps and 20km transmission distance with SMF.

The transceiver consists of three sections: a FP 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	T_C	-40	85	°C
Operating Humidity		5	85	%

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units
Power Supply Voltage	V_{CC}	3.13	3.3	3.47	V
Power Supply Current	I_{CC}			300	mA
Operating Case Temperature	T_C	0		70	°C
		-40		85	°C
Date Rate - Gigabit Ethernet			1.25		Gbps
Date Rate – Fiber Channel			1.063		

Digital Diagnostic Functions

Parameter/Range	Symbol	Accuracy	Unit	Notes
Temperature/ 0 to +70	DMI_Temp	$\pm 3^\circ C$	°C	
Temperature / -40 to +85				
Voltage / 3.0 to 3.6	DMI_VCC	$\pm 3\%$	V	
Bias Current monitor/ 0 to 100	DMI_Ibias	$\pm 10\%$	mA	
TX power / -9 to -3	DMI_TX	± 3 dB	dBm	
RX power/ -23 to -3	DMI_RX	± 3 dB	dBm	

Optical Characteristics

<i>Parameter</i>	<i>Symbol</i>	<i>Min.</i>	<i>Typ.</i>	<i>Max.</i>	<i>Units</i>	<i>Note</i>
Transmitter						
Center Wavelength	λ_C	1260	1310	1360	nm	
Spectral Width (RMS)	σ			4	nm	
Average Output Power	<i>P_{out}</i>	-9		-3	dBm	1
Extinction Ratio	<i>ER</i>	9			dB	
Optical Rise/Fall Time (20%~80%)	t_r/t_f			0.26	ns	
Receiver						
Center wavelength	λ_C	1480		1580	nm	
Receiver Sensitivity	<i>P_{SENS}</i>			-23	dBm	2
Receiver Overload		-3			dBm	2
LOS Assert	<i>LOSA</i>	-35			dBm	
LOS De-assert	<i>LOSD</i>			-24	dBm	
LOS Hysteresis	<i>LOSH</i>	1		4	dB	

Notes:

1. The optical power is launched into SMF.
2. Measured with a PRBS 2⁷-1 test pattern @1250Mbps, BER ≤1×10⁻¹².

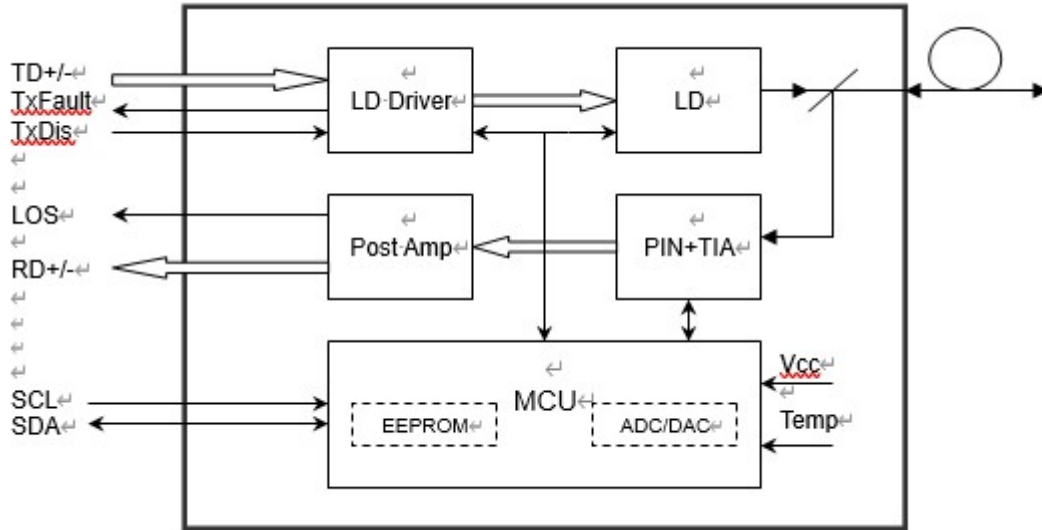
Electronical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Transmitter						
Input Differential Impedance	Z_{IN}	90	100	110	Ω	
Data Input Swing Differential	V_{IN}	400		1800	mV	1
Transmit Disable	Disable	V_D	2	V_{CC}	V	
	Enable	V_{EN}	0	0.8	V	
Transmit Fault	Fault		2.0	V_{CC}	V	
	Normal		0	0.8	V	
Receiver						
Data Output Swing Differential	V_{OUT}	400		1800	mV	2
LOS	<i>High</i>		2	V_{CC}	V	
	<i>Low</i>			0.8	V	

Notes:

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

Module Block Diagram



Pin Assignment

Pin	Symbol	Function/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	Not Connected	
8	LOS	Loss of Signal	4
9	V _{EER}	Receiver ground	
10	V _{EER}	Receiver ground	
11	V _{EER}	Receiver ground	
12	RD-	Inv. Received Data Out	5
13	RD+	Received 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+	Transmit Data In	6
19	TD-	Inv. Transmit Data In	6
20	V _{EET}	Transmitter Ground	

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

- TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and V_{cc}+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.
- 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, < 2.0V):	Undefined
High (2.0 to 3.465V):	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 V_{ccT} or V_{ccR}.

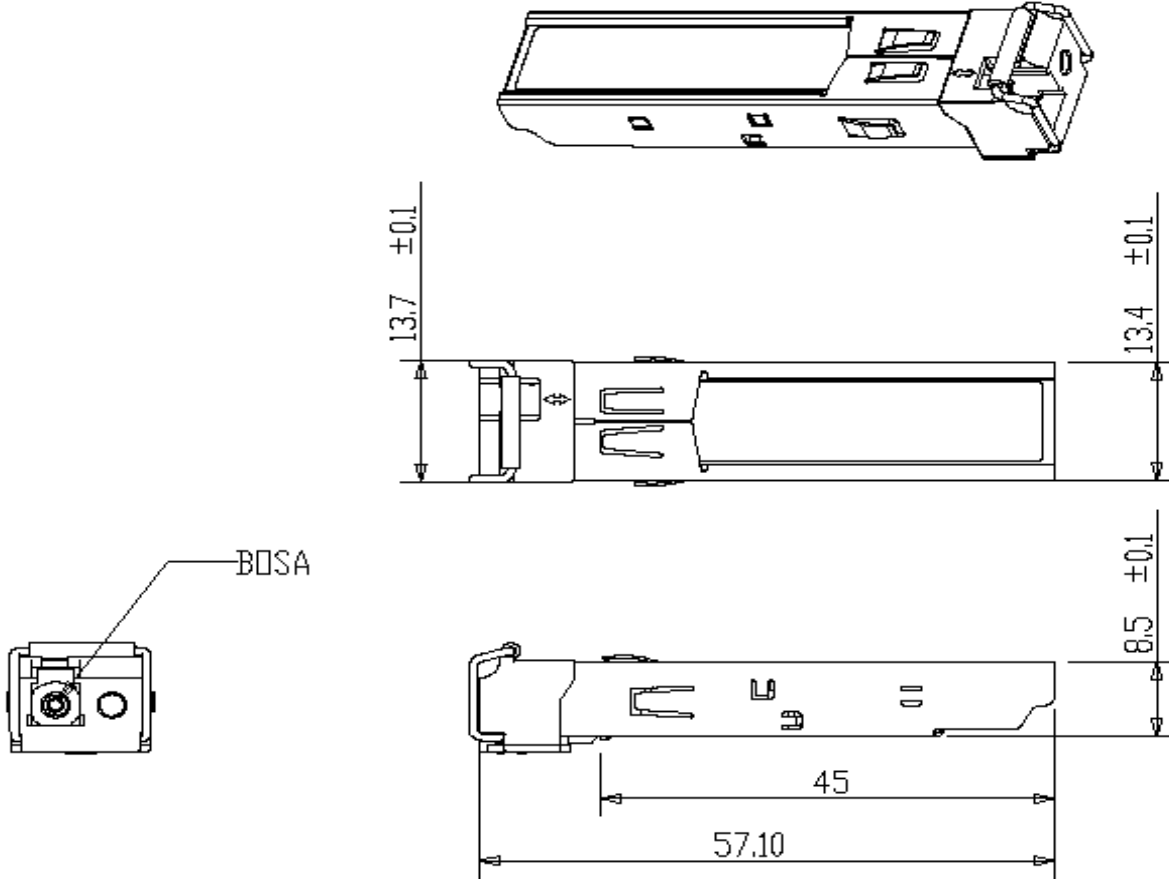
Mod-Def 0 is grounded by the module to indicate that the module is present

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~10k Ω 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 state, 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 100 Ω (differential) at the user SERDES.
6. TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100 Ω differential termination inside the module.

Dimensions:



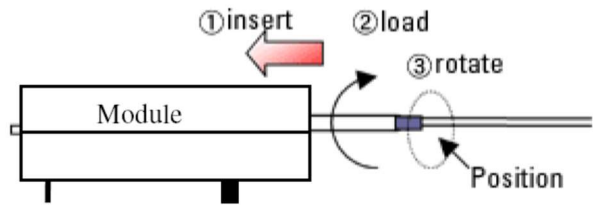
Optical Receptacle Cleaning Recommendations :

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

<i>Model Number</i>	<i>Part Number</i>	<i>Reach</i>	<i>TX/RX</i>	<i>Voltage</i>	<i>Temperature</i>
SFP-BWDM-20-31	OP6C-W20-B3-CMF	20 km	1310/1550	3.3V	0°C to 70 °C
SFP-BWDM-20-31-I	OP6C-W20-B3-IMF	20 km	1310/1550	3.3V	-40°C to 85 °C

Modification History

<i>Revision</i>	<i>Date</i>	<i>Description</i>
A1	Feb 2013	Initial Release

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