

Features

- Support 9.95Gb/s to 10.3Gb/s data rates
- Simplex LC Connector Bi-Directional SFP+ Optical Transceiver
- Single 3.3V Supply
- Up to 10km on 9/125um SMF
- 1330nm DFB Laser transmitter, 1270nm receiver
- Compliant with IEEE 802.3ae 10GBASE-LR and 10GBASE-LW
- SFP+ MSA SFF-8431 Compliant
- Digital Diagnostic SFF-8472 Compliant
- RoHS compliant and Lead Free
- Operating case temperature: 0°C ~70°C



Applications

- 10GBASE-LR at 10.3125Gbps
- 10GBASE-LW at 9.953Gbps
- Other Optical Links

Description

The SFP+ BWDM series single mode transceiver is small form factor pluggable module for duplex optical data communications such as 10GBASE-LR/LW defined by IEEE 802.3ae. It is with the SFP+ 20-pin connector to allow hot plug capability.

The SFP+ BWDM module is designed for single mode fiber and operates at a nominal wavelength of 1330nm; The transmitter section uses a multiple quantum well DFB, which is class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated InGaAs detector (IDP) mounted in an optical header and a limiting post-amplifier IC.

Absolute Maximum Ratings

Parameters	Symbol	Min.	Max.	Units
Supply Voltage	V_{CC}	-0.5	3.6	V
Storage Temperature	T_c	-40	85	°C
Operating Case Temperature	T_c	0	70	°C
Relative Humidity	RH	0	85	%

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units
Supply Voltage	V_{CC}	3.0	3.3	3.6	V
Supply Current	I_{CC}		300	420	mA
Operating Case Temperature	T_c	0	25	70	°C
Module Power Dissipation	P_m	-	1	1.5	W

Note:

1. Supply current is shared between VCCTX and VCCR_X
2. In-rush is defined as current level above steady state current requirements.

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_I_{bias}	± 10%	mA	

Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Transmitter						
Optical Wavelength	λ_C	1320	1330	1340	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Average Output Power	Pop	-8.2		0.5	dBm	1.2
Extinction Ratio	ER	3.5			dB	
Eye Mask		Compliant with IEEE 802.3				
Transmitter Dispersion Penalty	TDP			3.2	dB	
Launch Power of OFF Transmitter	P _{OUT_OFF}			-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Receiver						
Center wavelength	λ_C	1260	1270	1280	nm	
Average Receiver Power	PSENS			-14.1	dBm	2.3
Receiver Overload	P _{MAX}			0.5	dBm	
LOS Assert	LOS _A	-30			dBm	
LOS De-assert	LOS _D			-15	dBm	
LOS Hysteresis	LOS _H	0.5			dB	

Notes:

1. Output is coupled into a 9/125um SMF.
2. Average Receiver Power (Min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant.
3. Measured with a PRBS2³¹-1 test pattern @10.3125Gbps, BER≤10⁻¹²

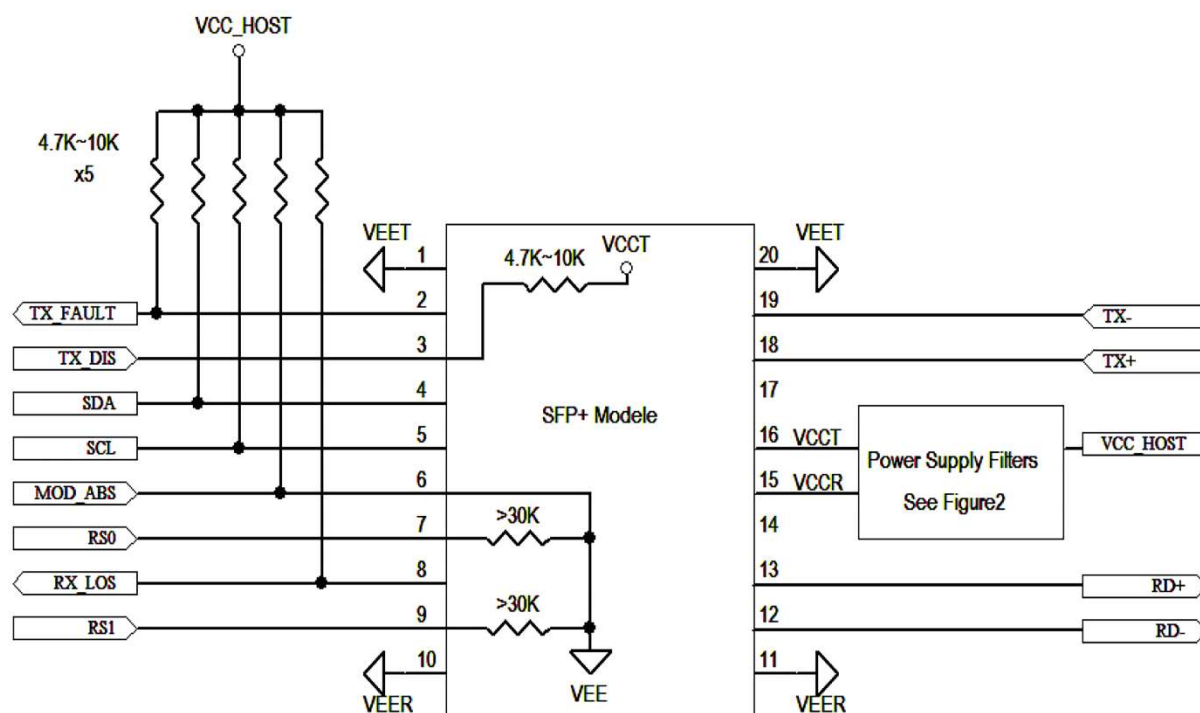
Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Supply Voltage	V_{CC}	3		3.6	V	1
Supply Current	I_{CC}			420	mA	1
Transmitter						
Input differential impedance	R_{IN}		100		Ω	2
Single ended data input swing	V_{in_PP}	150		1200	mVpp	
Transmit Disable Voltage	V_D	2		V_{CC}	V	
Transmit Enable Voltage	V_{EN}	V_{EE}		$V_{EE}+0.8$	V	3
Receiver						
Output Differential impedance	R_{out}		100		Ω	2
Single Ended Data Output Swing	V_{OUT_PP}	300		700	mV	4
LOS Fault	$V_{LOS\ fault}$	2		V_{CC_HOST}	V	5
LOS Normal	$V_{LOS\ norm}$	V_{EE}		$V_{EE}+0.8$	V	5

Notes:

1. Module power consumption never exceeds 1W..
2. AC coupled.
3. Or open circuit.
4. Into 100 ohm differential termination.
5. LOS is LVTTTL. Logic 0 indicates normal operation; logic1 indicates no signal detected.

Block Diagram of Transceiver



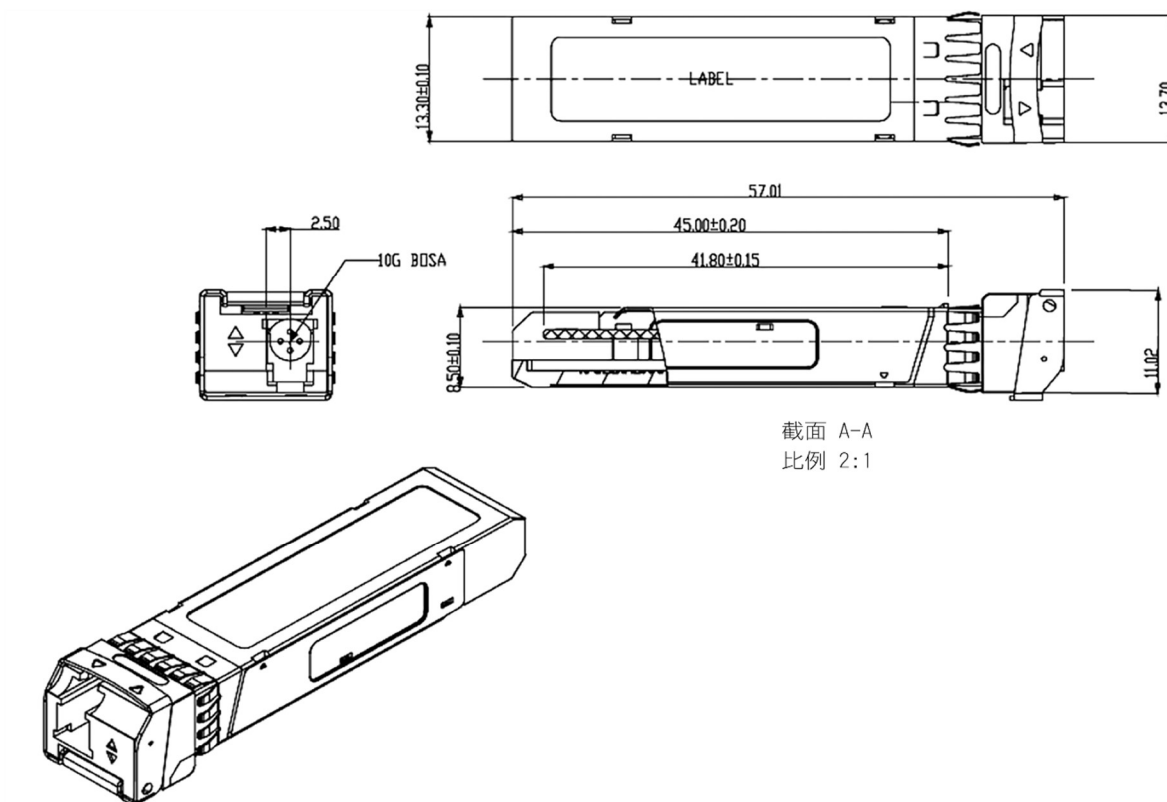
Pin Assignment

Pin	Name	Description	Notes
1	V _{EET}	Transmitter ground (common with receiver ground)	1
2	TX_FAULT	Transmitter Fault	2
3	TX_DISABLE	Transmitter Disable. Laser output disabled on high or open	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	RS0 for Rate Select: Open or Low = Module supports ≤4.25Gbps High = Module supports 9.95 Gb/s to 10.3125 Gb/s	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation	5
9	RS1	No connection required	1
10	V _{EER}	Receiver ground (common with transmitter ground)	1
11	V _{EER}	Receiver ground (common with transmitter ground)	1
12	RD-	Receiver Inverted DATA out. AC coupled	
13	RD+	Receiver Non-inverted DATA out. AC coupled	
14	V _{EER}	Receiver ground (common with transmitter ground)	1
15	V _{CCR}	Receiver power supply	
16	V _{CCT}	Transmitter power supply	
17	V _{EET}	Transmitter ground (common with receiver ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC coupled	
19	TD-	Transmitter Inverted DATA in. AC coupled	
20	V _{EET}	Transmitter ground (common with receiver ground)	1

Notes:

- Module circuit ground is isolated from module chassis ground within the module.
- should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.
- TX Disable is an input contact with a 4.7k~10kΩ pullup to V_{ccT} inside the module.
- Mod_ABS is connected to V_{eeT} or V_{eeR} in the SFP+ module. The host may pull this contact up to V_{cc_Host} with a resistor in the range 4.7 kΩ to 10 kΩ. Mod_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.
- RS0 and RS1 are module inputs and are pulled low to V_{eeT} with > 30 kΩ resistors in the module.

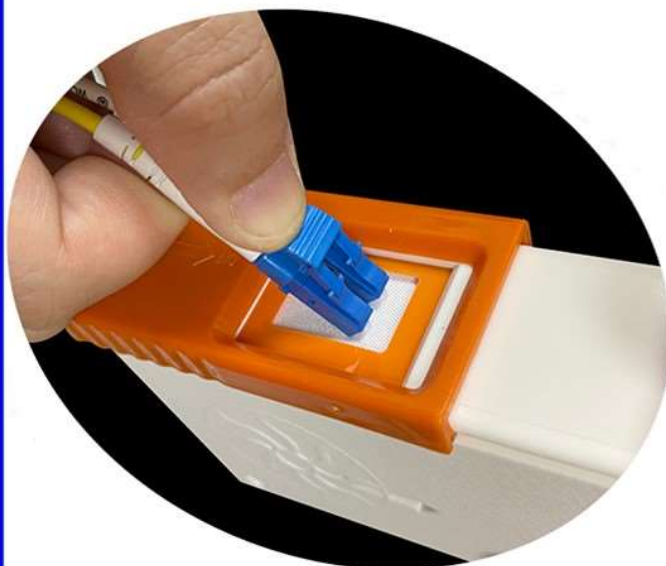
Dimensions



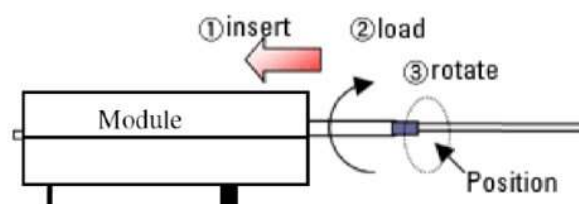
Optical Receptacle Cleaning Recommendations :

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>TX/RX</i>	<i>Voltage</i>	<i>Reach</i>	<i>Temperature</i>
SFP+-BWDM-10-33	OPAK-W10-33-CF	1330/1270	3.3V	10 km	0°C to 70 °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.