

Features

- Compliant with IEEE802.3ae 10G BASE-SW/SR
- 850nm VCSEL transmitter, PIN photo-detector
- FC 2G/4G/8G compatible, hardware/software rate select function implemented
- 1G/10G dual rate function
- Electrical interface compliant to SFF 8431 specifications for enhanced 8.5 and 10Gigabit small form factor pluggable module "SFP+"
- 2-wire interface for management specifications compliant with SFF 8472 digital diagnostic monitoring interface for optical transceivers
- All-metal housing for superior EMI performance
- Low power consumption
- Advanced firmware allow customer system encryption information to be stored in transceiver
- Cost effective SFP+ solution, enables higher port densities and greater bandwidth
- RoHS Compliant



Applications

- Data Center Interconnect
 - Enterprise Ethernet LAN Networks
 - Fiber Channel Storage Area Networks
- Computer cluster cross-connect

Description

This SFP-SX / SFP+ SR dual rate SFP+ optical transceivers are based on 1G and 10G Ethernet standard, which are compliant with SFF-8431, IEEE 802.3-2012 10GBASE-SR/SW and 1000BASE-SX and provide a quick and reliable interface for the 1G and 10G Ethernet application. The digital diagnostics functions are available via the 2-wire serial bus, as specified in SFF-8472.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units	Note
Storage Temperature	T_c	-40	85	°C	
Operating Case Temperature	T_c	0	70	°C	
Supply Voltage	V_{cc}	0	3.6	V	
Relative Humidity	RH	5	95	%	
RX Input Average Power	P_{max}	---	1.5	dBm	

Recommended Operating Conditions

Parameter	Symbol	Min.	Max.	Units	Note
Case Operating Temperature	T_c	0	70	°C	
Supply Voltage	V_{cc}	3.135	3.465	V	
Supply Current	I_{cc}	---	250	mA	
Power Consumption		---	800	mW	

Link Distances

Parameter	Fiber Type	Modal Bandwidth @ 850nm (MHz-km)	Distance Range (m)
10.3 Gbps	62.5/125 μ m MMF	160	2-26
	62.5/125 μ m MMF	200 (OM1)	2-33
	50/125 μ m MMF	400	2-66
	50/125 μ m MMF	500 (OM2)	2-82
	50/125 μ m MMF	2000 (OM3)	2-300

Diagnostics

Parameter	Symbol	Accuracy	Unit	Notes
Temperature	Temp	± 3	°C	Over operating Temp
Voltage	VCC	± 0.08	V	Full operating range
Bias Current	Bias	± 10	mA	
TX Power	TX	± 3 dB	dBm	
RX Power	RX	± 3 dB	dBm	-1dBm to -12dBm range

Transmitter Electro-optical Characteristics

$V_{CC} = 3.135\text{ V to } 3.465\text{ V}$, $T_C = 0\text{ }^{\circ}\text{C to } 70\text{ }^{\circ}\text{C}$

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Data Rate		---	10.3125	---	Gbps	
Output Optical Power (RS1=high)	P_{avgH}	-6.5	---	-1	dBm	>4.25G datarate
Output Optical Power (RS1=low)	P_{avgL}	-8	---	-3	dBm	≤4.25G datarate
Center Wavelength	λ_c	840	850	860	nm	
Spectral Width (RMS)	P_m	---	---	0.45	nm	2
Relative Intensity Noise	RIN	---	---	-128	dB/Hz	12dB reflection
Optical Power OMA	P_{oma}	---	-1.5		dBm	1
Laser Off Power	P_{OFF}	---	---	-30	dBm	
Extinction Ratio (RS1=high)	ERH	3.5	---	---	dB	>4.25G datarate
Extinction Ratio (RS1=low)	ERL	9	---	---	dB	≤4.25G datarate
Transmitter Dispersion Penalty	TDP	---	---	3.9	dB	
Optical Return Loss Tolerance		---	---	12	dB	
Single Ended Output Voltage Tolerance		-0.3	---	4	V	
C common mode voltage tolerance		15	---	---	mV	
TX Input Diff Voltage	V_I	180		700	mV	
TX Fault	VoL	-0.3		0.4	V	At 0.7mA
Data Dependent Input Jitter	DDJ			0.1	UI	
Data Input Total Jitter	TJ			0.28	UI	

Note 1: per Tradeoff table 52.8, IEEE 802.3ae 2005

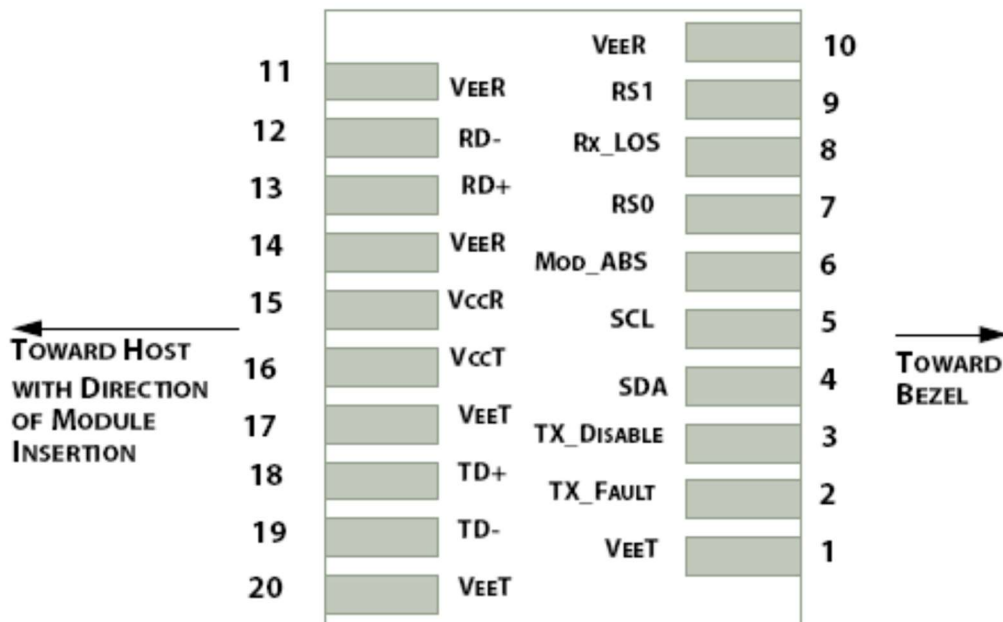
Note 2: Trade-offs are available between spectral width, center wavelength and minimum OMA

Receiver Electro-optical Characteristics

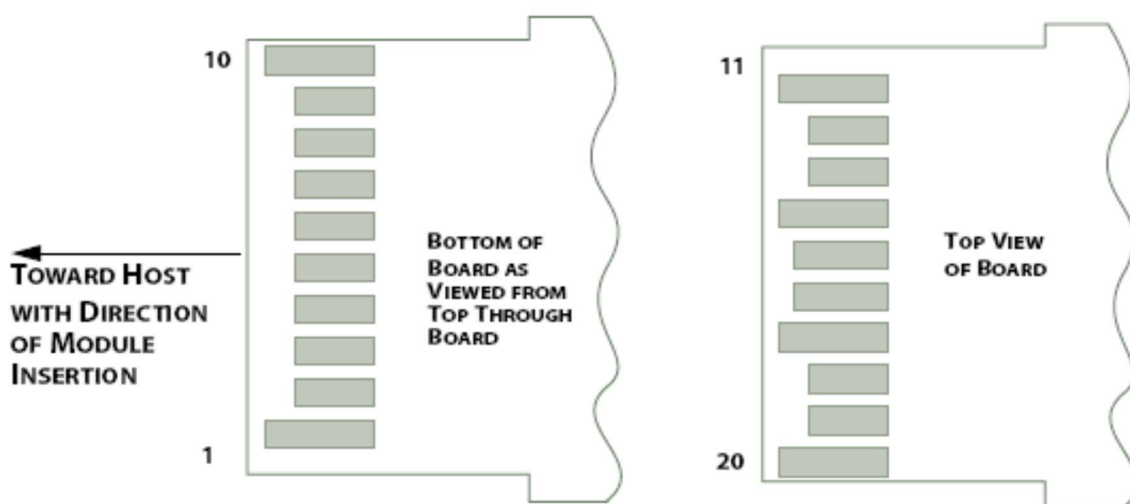
$V_{CC} = 3.135\text{ V to }3.465\text{ V}$, $T_C = 0\text{ }^{\circ}\text{C to }70\text{ }^{\circ}\text{C}$

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Receiver Sensitivity (OMA, RSO=high)	P_{sensH}	---	---	-11.1	dBm	>4.25G datarate
Receiver Sensitivity (OMA, RSO=loss)	P_{sensL}	---	---	-17.1	dBm	≤4.25G datarate
Stressed Sensitivity (OMA)		---	---	-7.5	dBm	
Operating Center Wavelength	λ_C	840	850	860	nm	
Overload	P_{IN}	---	---	-1	dBm	
Receiver Reflectance		---	---	-12	dB	
Loss of Signal-Asserted	P_A	-30	---	---	dBm	
Loss of Signal-Deasserted	P_D	---	---	-12	dBm	
Loss of Signal-Hysteresis	P_H	0.5	---	---	dB	
Single Ended Output Voltage Tolerance		-0.3		4	V	
RX Output Diff Voltage	V_O	300		850	mV	
RX Output Rise and Fall Time	T_r/T_f	30			ps	20% to 80%
Total Jitter	T_J			0.7	UI	
Deterministic Jitter	D_J			0.42	UI	

Pin Assignment



Module Interface to Host



Module Contact Assignment

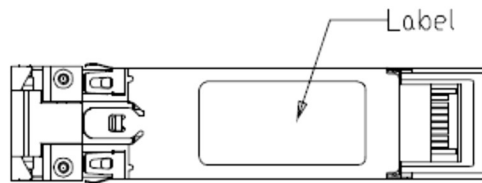
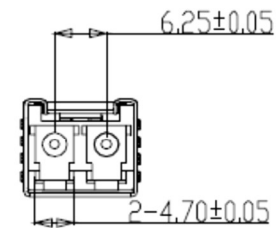
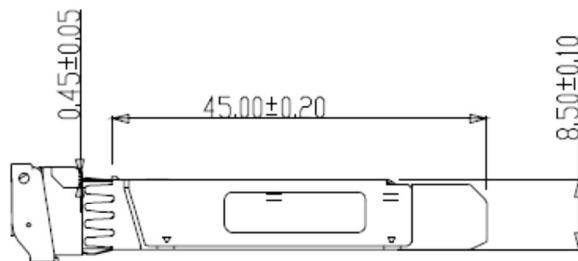
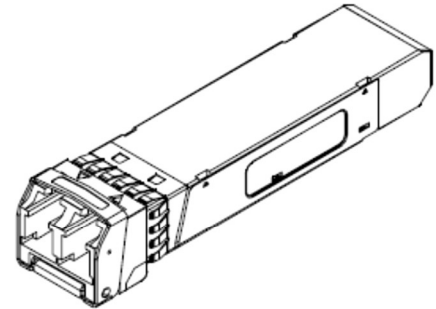
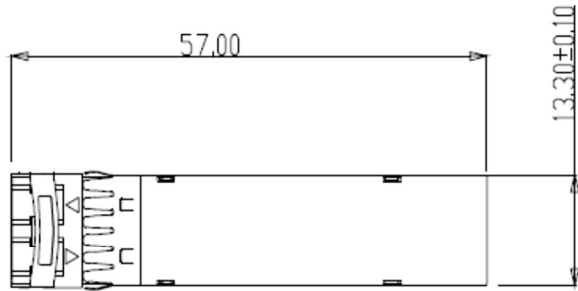
Pin Descriptions

<i>PIN</i>	<i>Logic</i>	<i>Symbol</i>	<i>Name / Description</i>	<i>Note</i>
1		VeeT	Module Transmitter Ground	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	
3	LVTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
5	LVTTL-I	SCL	2-Wire Serial Interface Clock	2
6		MOD_DEF0	Module Definition, Grounded in the module	
7	LVTTL-I	RS0	Not used	
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication Active High	
9	LVTTL-I	RS1	Not used	
10		VeeR	Module Receiver Ground	1
11		VeeR	Module Receiver Ground	1
12	CML-O	RD-	Receiver Inverted Data Output	
13	CML-O	RD+	Receiver Data Output	
14		VeeR	Module Receiver Ground	1
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Receiver 3.3 V Supply	
17		VeeT	Module Transmitter Ground	1
18	CML-I	TD+	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	Transmitter Inverted Data Input	
20		VeeT	Module Transmitter Ground	1

Note:

1. Module ground pins GND are isolated from the module case.
2. Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.45V on the host board.

Dimensions



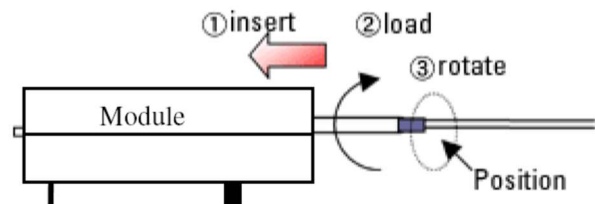
Optical Receptacle Cleaning Recommendations :

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>Data Rate</i>	<i>Part Number</i>	<i>Reach</i>	<i>Input/Output</i>	<i>Signal Detect</i>	<i>Voltage</i>	<i>Temperature</i>
10G / 1G	OPAT-MX3-85-CF	33/82/300m	AC/AC	TTL	3.3V	0°C to 70 °C

Modification History

<i>Revision</i>	<i>Date</i>	<i>Description</i>
A1	Dec.2023	Initial Release

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