

Features

- Compliant with IEEE 802.3-2012 10GBASE-SR/SW and 1000Base-SX
- Compliant with SFF-8431
- Hot-pluggable SFP+ footprint
- 850nm VCSEL laser transmitter
- Duplex LC connector
- Built-in digital diagnostic functions
- Single power supply 3.3V
- RoHS Compliant
- Class 1 laser product complies with EN 60825-1
- Operating case temperature: 0°C ~70°C



Applications

- 10GBASE-SR/SW Ethernet
- 1000Base-SX Ethernet

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

Recommended Operating Environment

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Power Supply Voltage	V_{cc}	3.135	3.3	3.465	V	
Power Supply Current	T_c			250	mA	
Operating Case Temperature	TC	0	25	70	°C	

Digital Diagnostic Functions

Parameter	Symbol	Accuracy	Unit	Notes
Temperature monitor absolute error	DMI_Temp	± 3	°C	
Supply voltage monitor absolute error	DMI_VCC	±0.1	V	
TX power	DMI_TX	± 3 dB	dB	
RX power	DMI_RX	± 3 dB	dB	
Bias Current monitor	DMI_Ibias	± 10%	mA	

Optical Characteristics (1G Operation)

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Transmitter						
Output Optical Power	PTX	-9.5		-1	dBm	1
Optical Center Wavelength	λ_C	840	850	860	nm	
Rise/Fall Time (20%-80%)	tr/ta			260	ps	
Extinction Ratio	ER	9			dB	
Spectral Width (RMS)	$\Delta\lambda$			0.45	nm	
Relative Intensity Noise	RIN			-120	dB/Hz	
Transmitter Jitter	TJ					2
Launch Power of OFF Transmitter	POUT_OFFH			-30	dB	3
Receiver						
Center wavelength	λ_C	840		860	nm	
Receiver Sensitivity @1.25Gb/s	RX_{SEN}			-17	dBm	4
Receiver Overload	P_{OL}	0.5			dBm	
Optical Return Loss	ORL	12			dB	
LOS Assert	LOS_A	-30			dBm	
LOS De-assert	LOS_D			-18	dBm	
LOS Hysteresis	LOS_H	0.5			dB	

Notes:

1. Class 1 product
2. According to IEEE 802.3-2012 requirement
3. Average
4. Measure with worst ER; BER<10⁻¹²;2⁷-1 PRBS

Optical Characteristics (10G Operation)

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Transmitter						
Optical Center Wavelength	λ_c	840	850	860	nm	
Average Optical Power	P_{avg}	-6.5		-1	dBm	
Optical Power OMA	P_{OMA}		-1.5		dBm	1
Laser Off Power	P_{OFF}			-30	dBm	
Extinction Ratio	ER	3.5			dB	
Spectral Width (RMS)	$\Delta\lambda$			0.45	nm	1
Relative Intensity Noise	RIN			-128	dB/Hz	12dB reflectoin
Transmitter Dispersion Penalty	TDP			3.9	dB	
Optical Return Loss Tolerance				12	dB/dB	
Receiver						
Center wavelength	λ_c	840	850	860	nm	
Receiver Sensitivity	RX_{SEN}			-11.1	dBm	
Receiver Overload	P_{OL}	0.5			dBm	
Receiver Reflectance	TR_{RX}			-12	dB	
LOS Assert	LOS_A	-30			dBm	
LOS De-assert	LOS_D			-12	dBm	
LOS Hysteresis	LOS_H	0.5			dB	

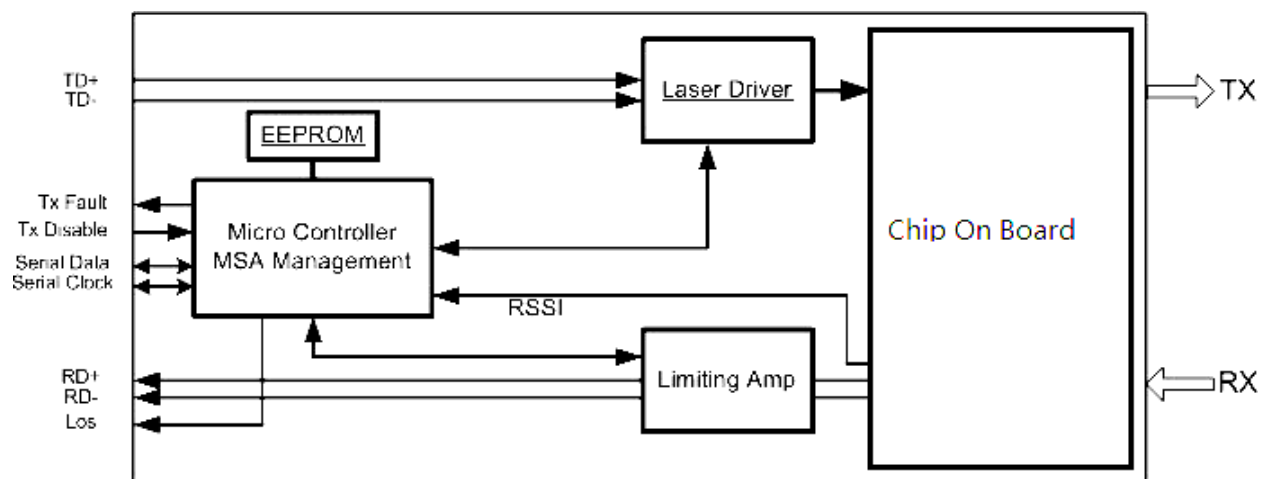
Notes:

1. Per Tradeoff Table 52.8, IEEE 802.3ae 2005

Electro Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Transmitter						
Single ended data input swing	V_{in_PP}		600	800	mV	
Single Ended Output Voltage Tolerance		-0.3		4	V	
C Common Mode Voltage Tolerance		15			mV	
TX Input Different Voltage	V_I	180		700	mV	
TX Fault	V_{oL}	-0.3		0.4	V	At 0,7mA
Data Dependent Input Jitter	DDJ			0.1	UI	
Data Input Total Jitter	TJ			0.28	UI	
Receiver						
Single Ended Data Output Swing	V_{OUT_PP}	-0.3		4	V	
RX Output Different Voltage	V_o	300		850	mV	
Output Rise and Fall time (20% to 80%)	T_r, T_f	30			ps	
Total Jitter	TJ			0.7	UI	
Deterministic Jitter	DJ			0.42	UI	

Block Diagram of Transceiver



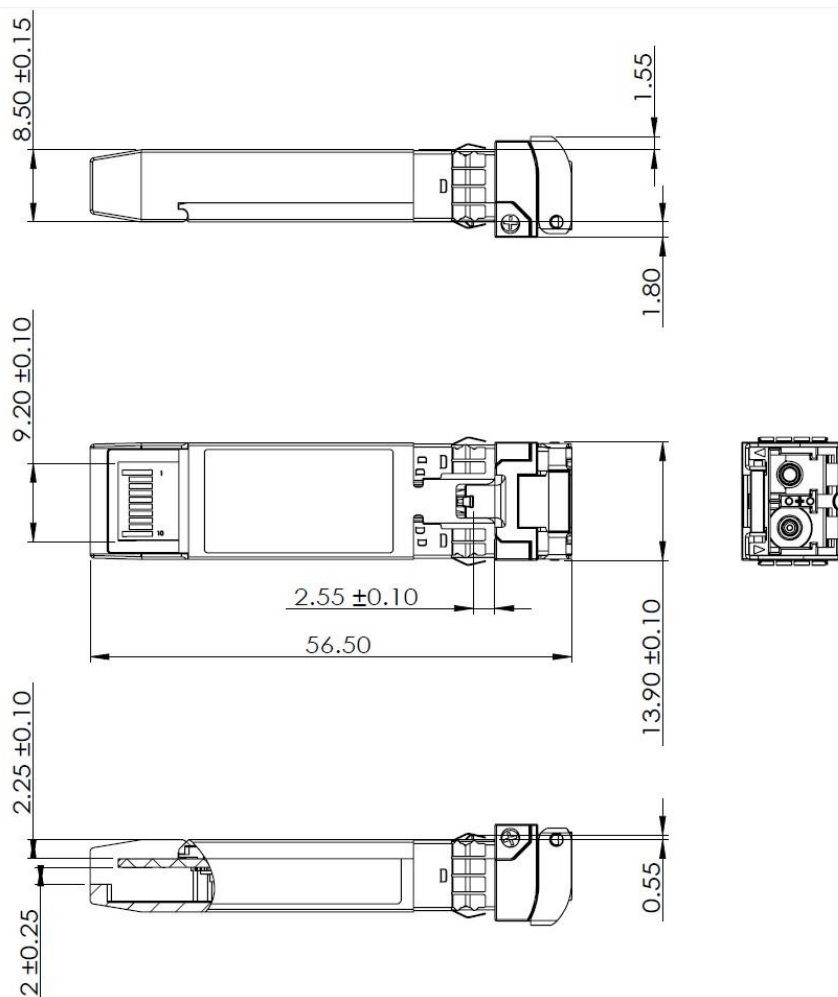
Pin Assignment

PIN	Logic	Symbol	Name / Description	Note
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

Notes:

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



ALL DIMENSIONS ARE $\pm 0.2\text{mm}$ UNLESS OTHERWISE SPECIFIED UNIT: mm

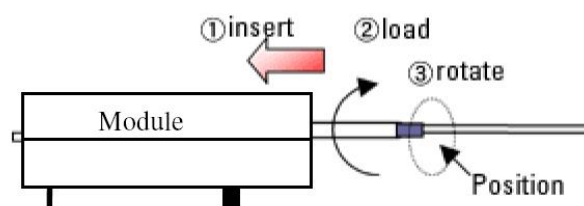
Optical Receptacle Cleaning Recommendations

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>Wavelength</i>	<i>Temperature</i>
SFP-1G/10G-SR(dual rate)	OPAT-MX3-85-CB	850nm	0 to 70 °C

Modification History

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

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