

# 10Gb/s SFP+ ER 1310nm 40km Optical Transceiver

## Features

- Up to 40km transmission distance
- Support Multi Rate 9.95 to 11.3Gbps bit rates
- 1310nm DFB transmitter , APD receiver
- SFI electrical interface
- Hot pluggable
- SFP+ MSA package with duplex LC connector
- Very low EMI and excellent ESD protection
- +3.3V power supply
- Power consumption less than 1.2W
- Operating case temperature: 0~+70°C

## Applications

- 10GBASE-ER/EW
- 10GBASE-ER/EW + FEC
- 10G Storage system

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## Compliance

- Compliant with IEEE 802.3ae-2002 10G Base-ER
- Compliant with SFF-8431 & SFF-8432 & SFF-8472

## Description

SFP-10G-ER-31 is designed to transmit and receive serial optical data links up from 6.1Gb/s to 10.52Gb/s data rate over 30km single mode fiber. The Transceiver is compliant with SFF-8432, 10G FC, FC-PI-4, IEEE802.3ae and applicable portions of SFF-8431. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

## Absolute Maximum Ratings

<b>Table1-Absolute Maximum Ratings</b>					
Parameter	Symbol	Min.	Max.	Unit	
Storage Temperature	Ts	-40	+85	°C	
Supply Voltage	Vcc	-0.5	+3.6	V	
Relative Humidity(Non-condensing)	RH	0	+85	%	

## Recommended Operating Conditions

<b>Table2-Recommended Operating Conditions</b>					
Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	TC	0	25	+70	°C
Power Supply Voltage	VCC3	3.135	3.3	3.465	V
Module Supply Current	ICC3			300	mA

## Transmitter Operating Characteristic-Optical

<b>Table3-Transmitter Operating Characteristic-Optical</b>						
Parameter	Symbol	Unit	Min	Typical	Max	Note
Operating Data Rate	DR	Gb/s	9.95	10.3125	11.3	
Output Center Wavelength	$\lambda_c$	nm	1260	1310	1335	
Side Mode Suppression Ratio	SMSR	dB	30			DFB LD
Spectral Width(20dB)	$\Delta\lambda$	nm			1	DFB LD
Optical Output Power	P <sub>AV</sub>	dBm	0		5	
Extinction Ratio	ER	dB	3.5			
Average launch power of OFF transmitter	POFF	dBm			-40	

## Receiver Operating Characteristic-Optical

Parameter	Symbol	Unit	Min	Typical	Max	Note
Center Wavelength	$\lambda_c$	nm	1260		1610	
Average Receiver Sensitivity 1	PAVG	dBm			-18	
Receiver Reflectance	RREFL	dB			-12	
Assert LOS	LosA	dBm	-30			
De-Assert LOS	LosD	dBm			-18	
LOS Hysteresis		dB	0.5			

[1] Sensitivity for 10.31G PRBS 231-1 and BER better than or equal to  $10E^{-12}$ .

## Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff.

Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	°C	Over operating temp
Laser power monitor absolute error	DMI_TX	-3	3	dB	
RX power monitor absolute error	DMI_RX	-3	3	dB	-1dBm to -16dBm range
Supply voltage monitor absolute error	DMI_VCC	-1	1	V	Full operating range
Bias current monitor	DMI_Ibias	-10	10	%	

## Pin Description

The SFP+ modules are hot-pluggable. Hot pluggable refers to plugging in or unplugging a module while the host board is powered. The SFP+ host connector is a 0.8 mm pitch 20 position right angle improved connector specified by SFF-8431, or stacked connector with equivalent electrical performance. Host PCB contact assignment is shown in Figure 1 and contact definitions are given in Table7. SFP+ module contacts mates with the host in the order of ground, power, followed by signal as illustrated by Figure 2 and the contact sequence order listed in Table7.

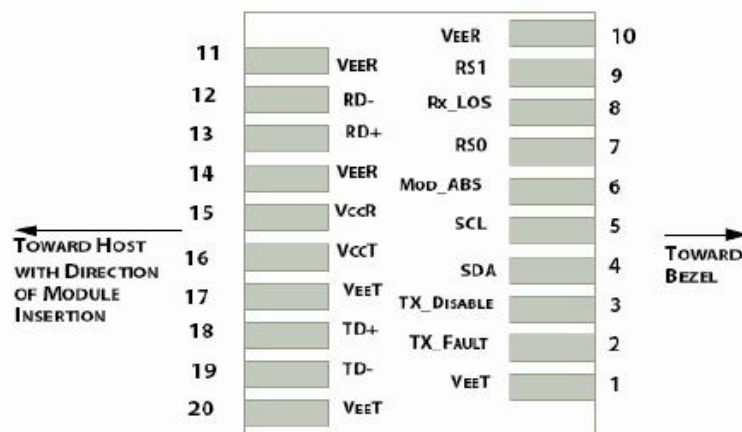


Figure1 Module Interface to Host

## Pin Assignment

PIN	Logic	Symbol	Name / Description	Power Sequence Order	Note
1		VeeT	Module Transmitter Ground	1st	1
2	LVTTTL-0	TX_Fault	Module Transmitter Fault	3rd	2
3	LVTTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	3rd	
4	LVTTTL-I/O	SDA	2-Wire Serial Interface Data Line	3rd	
5	LVTTTL-I	SCL	2-Wire Serial Interface Clock	3rd	
6		MOD_ABS	Module Absent, connected to VeeT or VeeR in the module	3rd	2
7	LVTTTL-I	RS0	Not used	3rd	
8	LVTTTL-0	RX_LOS	Receiver Loss of Signal Indication Active High	3rd	2
9	LVTTTL-I	RS1	Not used	3rd	
10		VeeR	Module Receiver Ground	1st	1
11		VeeR	Module Receiver Ground	1st	1
12	CML-0	RD-	Receiver Inverted Data Output	3rd	
13	CML-0	RD+	Receiver Data Output	3rd	
14		VeeR	Module Receiver Ground	1st	1
15		VccR	Module Receiver 3.3 V Supply	2nd	
16		VccT	Module Receiver 3.3 V Supply	2nd	
17		VeeT	Module Transmitter Ground	1st	1
18	CML-I	TD+	Transmitter Non-Inverted Data Input	3rd	
19	CML-I	TD-	Transmitter Inverted Data Input	3rd	
20		VeeT	Module Transmitter Ground	1st	1

[1] Module ground pins GND are isolated from the module case.

[2] Shall be pulled up with 4.7K-10Kohms to a voltage between 3.13V and 3.47V on the host board.

## Typical Application Circuit

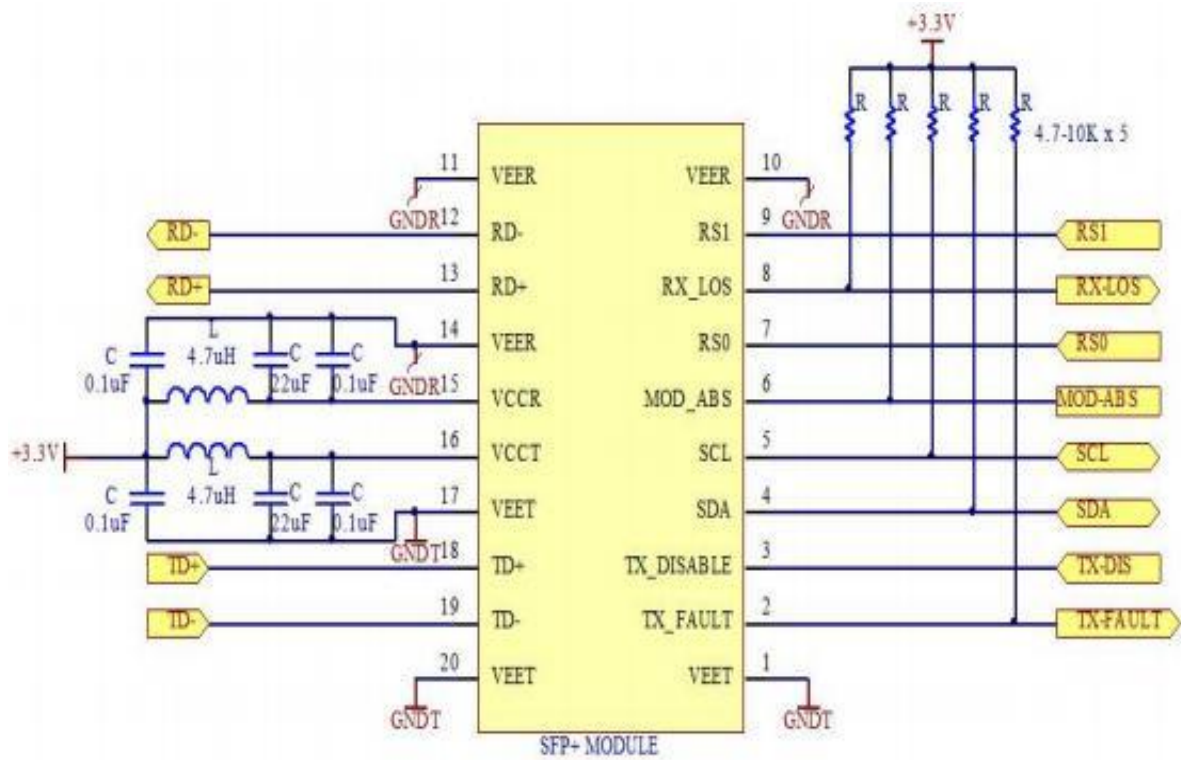


Figure2 Typical Application Circuit

## Monitoring Specification

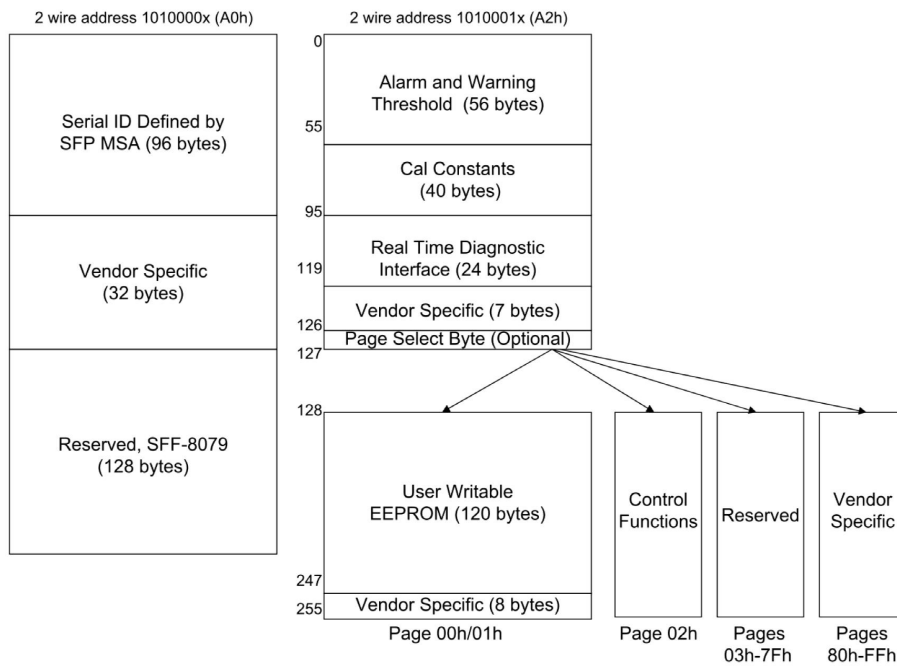
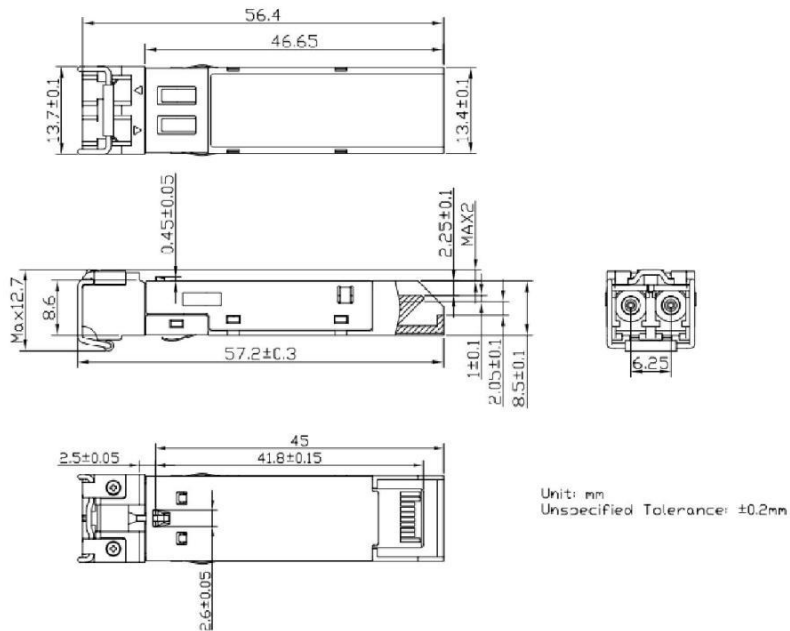


Figure3 Memory map

## Mechanical Dimensions



## Further Information:

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