

# 10Gb/s 80Km SFP+ ZR Optical Receiver

## PRODUCT FEATURES

- Up to 11.1Gbps Data Links
- Power dissipation < 0.5W
- APD receiver
- Metal enclosure, for lower EMI
- 2-wire interface with integrated Digital Diagnostic monitoring
- Hot-pluggable SFP+ footprint
- Specifications compliant with SFF 8472
- Compliant with SFP+ MSA with LC connector
- Single 3.3V power supply
- Case operating temperature range:0°C to 70°C

## APPLICATIONS

- 10G Base-ZR/ZW
- 10G Storage system

## STANDARD

- Compliant to SFF-8431
  - Compliant with IEEE 802.3ae 10GBASE-ZR and 10GBASE-ZW
  - RoHS Compliant
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## PRODUCT DESCRIPTION

SFP+ ZR transceivers is 1550nm InGaAs-APD photo-detector receiver based 10Gigabit SFP+ transceiver, which is designed to receive optical data over single mode optical fiber for link length up to 80km. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the SFF-8472, which allows real-time access to device operating parameters such as transceiver temperature, received optical power and transceiver supply voltage.

### I. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
Maximum Supply Voltage	Vcc3	-0.5		4.0	V	
Storage Temperature	Ts	-40		85	°C	
Relative Humidity	RH	5		95	%	

### II. Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Tcase	0	-	70	°C	Without air flow
Power Supply Voltage	VCC	3.14	3.3	3.47	V	
Power Supply Current	ICC	-		150	mA	
Data Rate	BR		10.3125		Gbps	

### III. Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
<b>Receiver</b>						
Receiver Sensitivity	$R_{SEN}$			-23.0	dBm	1
Input Saturation Power (Overload)	Psat	-6			dBm	
Wavelength Range	$\lambda_C$	1270		1610	nm	
Receiver Reflectance	$R_{rx}$			-27	dB	
LOS De-Assert	$LOS_D$			-26	dBm	
LOS Assert	$LOS_A$	-32			dBm	
LOS Hysteresis		0.5		6	dB	

Notes:

1. Measured with conformance test signal for BER =  $10^{-12}$ .@10.3125Gbps, PRBS=2<sup>31</sup>-1,NRZ

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
Supply Voltage	Vcc3	3.13		3.47	V	
Supply Current	Icc			150	mA	
Module total power	P			0.5	W	
<b>Receiver</b>						
Differential data output swing	Vout-pp	500	650	800	mV	1
Data output rise and fall time	Tr,Tf	30			ps	
LOS Fault	Vlos-fault	2		Vcc-host	V	
LOS Normal	Vlos-nor	GND		GND+0.8	V	

## IV. Electrical Characteristics

Notes:

1. LOS is an open collector output. Should be pulled-up with 4.7k  $\Omega$ -10 k  $\Omega$  on the host board. Normal operation is logic 0, loss of signal is lo

## V. Pin Descriptions

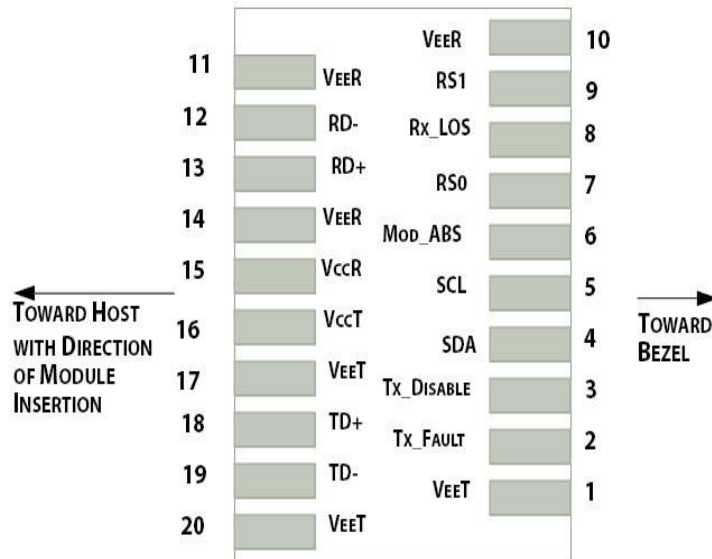


Diagram of Host Board Connector Block Pin Numbers and Name

Pin	Symbol	Name/Description	NOTE
1	VEET	Transmitter Ground	1
2	Tx_FAULT	No connection required	2
3	Tx_DIS	No connection required	3
4	SDA	2-wire Serial Interface Data Line	2
5	SCL	2-wire Serial Interface Clock Line	2
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	Rate select 0	5
8	RX_LOS	Loss of Signal indication. Logic 0 indicates normal operation	2
9	RS1	No connection required	6
10	VEER	Receiver Ground	1
11	VEER	Receiver Ground	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver DATA out. AC Coupled	
14	VEER	Receiver Ground	1
15	VCCR	Receiver Power Supply	
16	VCCT	No connection required	
17	VEET	Transmitter Ground	1
18	TD+	No connection required	
19	TD-	No connection required	
20	VEET	Transmitter Ground	1

Notes:

1. Module circuit ground is isolated from module chassis ground within the module.
2. Should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.13V and 3.6V.
3. Tx\_Disable is an input contact with a 4.7 kΩ to 10 kΩ pull-up to VccT inside the module

4. Mod\_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc\_Host with a resistor in the range 4.7 k $\Omega$  to 10 k $\Omega$ . Mod\_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.
5. Internally pulled down per SFF-8431 Rev 4.1.
6. LOS is open collector output. It should be pulled up with 4.7k $\Omega$  – 10k $\Omega$  on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

## VI. Digital Diagnostic Functions

As defined by the SFP+ MSA, SFP+ transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- Transceiver temperature
- Received optical power
- Transceiver supply voltage

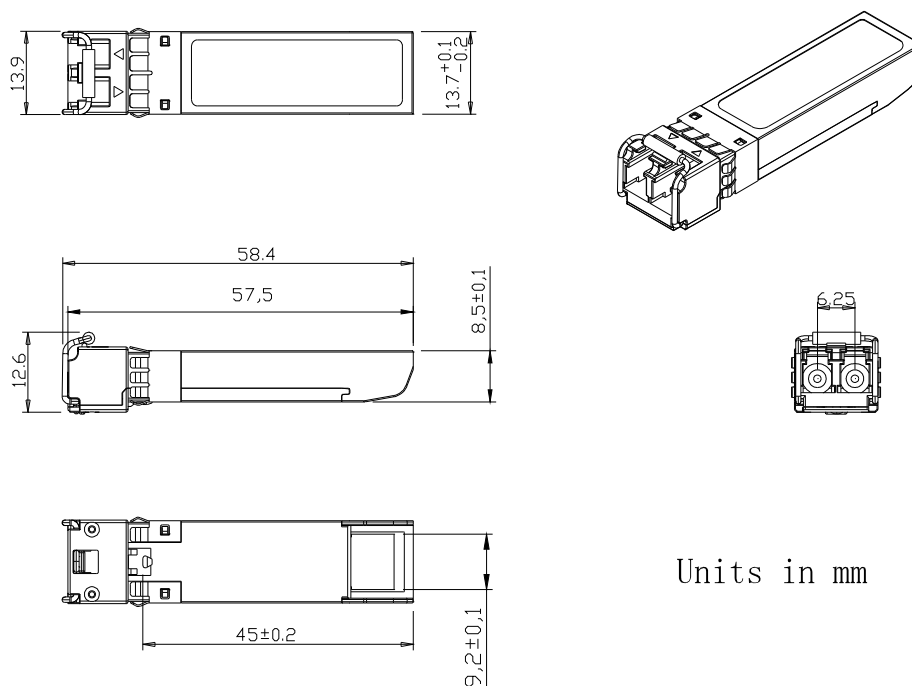
It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range. The operating and diagnostics information is monitored and reported by a Digital Diagnostics

Transceiver Controller (DDTC) inside the transceiver, which is accessed through the 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL pin) is generated by the host. The positive edge clocks data into the SFP+ transceiver into those segments of its memory map that are not write-protected. The negative edge clocks data from the SFP+ transceiver. The serial data signal (SDA pin) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially. The 2-wire serial interface provides sequential or random access to the 8 bit parameters, addressed from 000h to the maximum address of the memory.

## VII. Host - Transceiver Interface Block Diagram

## VIII. Outline Dimensions

SFP+ transceivers are compliant with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).



Units in mm

## IX. Regulatory Compliance

SFP+ transceivers are Class 1 Laser Products. They are certified per the following standards:

Feature	Reference	Performance
Electrostatic discharge (ESD)	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards

### Appendix A. Document Revision

Version No.	Date	Description
1.0	2010-09-01	Preliminary datasheet

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2.0	2011-09-10	Update format and company's logo
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