



## 10GBase ZR/ZW SFP+ Optical Transceivers

### Features:

- +3.3V single power supply
- 1550nm DFB LASER With EML, APD Receiver.
- Transmission distance up to 80KM
- LC-Duplex Optical Receptacle
- Hot Pluggable
- Compliant with SFP+ MSA Operating case
- Compliant with IEEE 802.3ae 10GBASE-ZR Application
- Temperature range: 0°C~70°C
- Power dissipation < 1.5W
- RoHS

### Applications:

- 10GBASE-ZR/ZW 10Gigabit Ethernet
- 10G Fiber Channel
- 10G Storage System

### 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	
Operating Relative Humidity	RH			85	%	
Case Operating Temperature	Tcase	-5		70	°C	
Receiver Damage Threshold		6			dBm	

**Specifications (tested under recommended operating conditions, unless otherwise noted)**
**Electrical Characteristics**

Parameter	Symbol	Min	Typ	Max	Unit	Note
Supply Voltage	Vcc3	3.13		3.47	V	
Supply Current	Icc			450	mA	
Module total power	P			1.5	W	1
<b>Transmitter</b>						
Input differential impedance	Rin		100		Ω	1
Differential data input swing	Vin,pp	300		1200	mV	
Transmit Disable Voltage	VD	2.0		Vcc3	V	
Transmit Enable Voltage	VEN	GND		GND+ 0.8	V	
Transmit Disable Assert Time				10	us	
Transmit Disable De-assert Time				2	ms	
<b>Receiver</b>						
Differential data output swing	Vout-pp	500	650	800	mV	2
Data output rise and fall time	Tr,Tf			38	ps	3
LOS Fault	Vlos-fault	2		Vcc-host	V	4
LOS Normal	Vlos-nor	GND		GND+0.8	V	4

**Notes:**

1. Connected directly to TX data input pins.,
2. Input 100Ω differential termination.
3. These are unfiltered 20-80% values
4. LOS is an open collector output. Should be pulled-up with 4.7k Ω-10 k Ω on the host board. Normal, operation is logic 0, loss of signal is 1.

**Optical Characteristics**

Parameter	Symbol	Min	Typ	Max	Unit	Note
<b>Transmitter</b>						
Average Optical Power	P <sub>AVE</sub>	0		5.0		
Optical Wavelength	λ	1530	1550	1565	nm	
Side-Mode Suppression ratio	SMSR	30			dB	
Optical Extinction Ratio	ER	6.0			dB	
Transmitter and Dispersion	TDP			3.0	dB	

Penalty						
Average Launch power of OFF transmitter	$P_{OFF}$			-30	dBm	
Tx Jitter	$T_{Xj}$	Per 802.3ae requirements				
Relative Intensity Noise	RIN			-128	dB/Hz	
<b>Receiver</b>						
Receiver Sensitivity	$R_{SENS}$			-23.0	dBm	1
Input Saturation Power (Overload)	$P_{sat}$	-7			dBm	
Wavelength Range	$\lambda_C$	1260		1600	nm	
Receiver Reflectance	$R_{rx}$			-27	dB	
LOS De-Assert	$LOS_D$			-24	dBm	
LOS Assert	$LOS_A$	-32			dBm	
LOS Hysteresis		0.5		4.0	dB	

**Notes:**

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

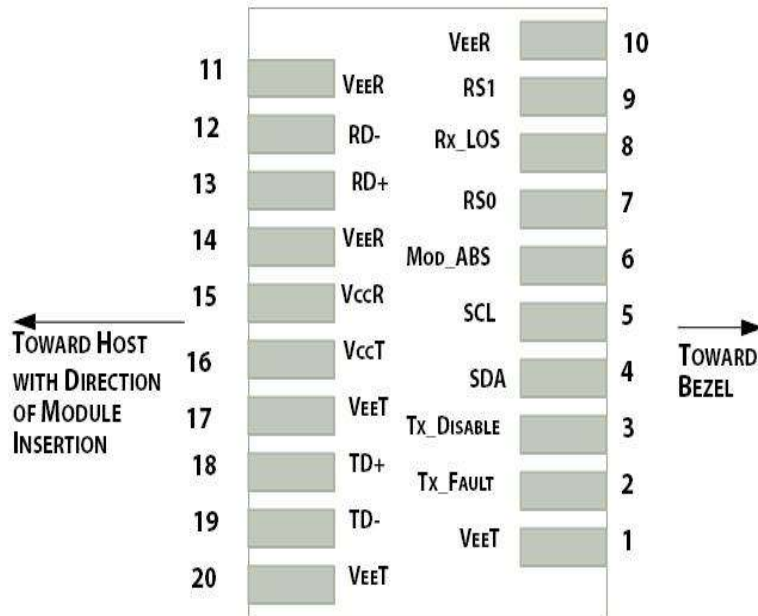
**General Specifications**

Parameter	Symbol	Min	Typ	Max	Units	Note
Bit Rate	BR		10.3125			1
Bit Error Ratio	BER			$10^{-12}$		2
Maximum Supported Distances	Lmax		80		km	3

**Notes**

1. 1,10GBASE-ZR/ZW
2. 2,Tested with a  $2^{31} - 1$  PRBS
3. 3,SMF fiber, 1550nm wavelength

### Pin Definition



### Diagram of Host Board Connector Block Pin Numbers and Name

Pin	Symbol	Name/Description	Ref
1	VEET	Transmitter 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	2
5	SCL	2-wire Serial Interface Clock Line	2
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	No connection required	
8	RX_LOS	Loss of Signal indication. Logic 0 indicates normal operation	2
9	RS1	No connection required	
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	Transmitter Power Supply	
17	VEET	Transmitter Ground	1
18	TD+	Transmitter DATA in. AC Coupled	
19	TD-	Transmitter Inverted DATA in. AC Coupled	
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 kΩ to 10 kΩ. Mod\_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.

### Digital Diagnostic Functions

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

- Transceiver temperature
- Laser bias current
- Transmitted optical power
- 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.

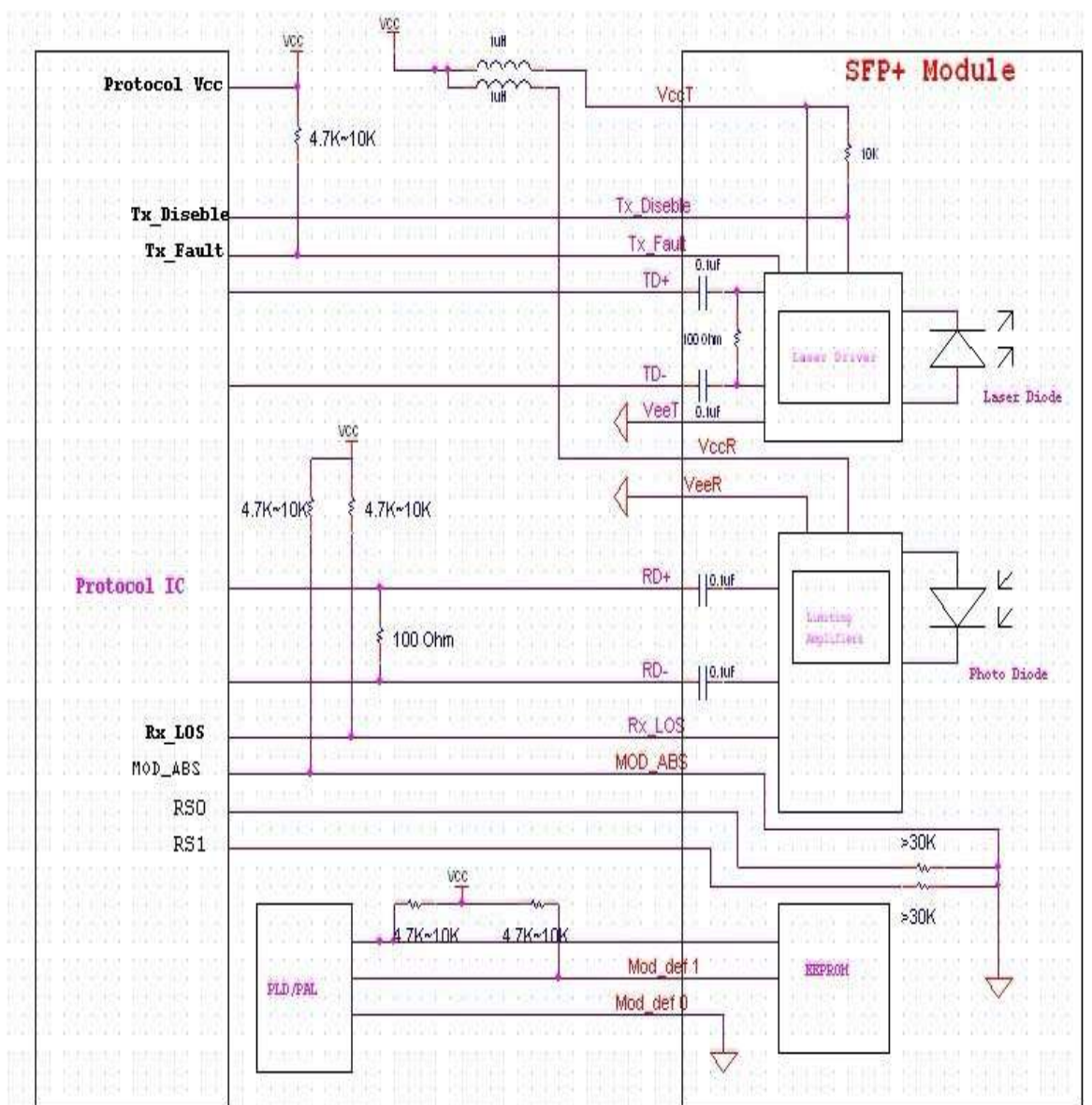
The SFP MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit

address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged.

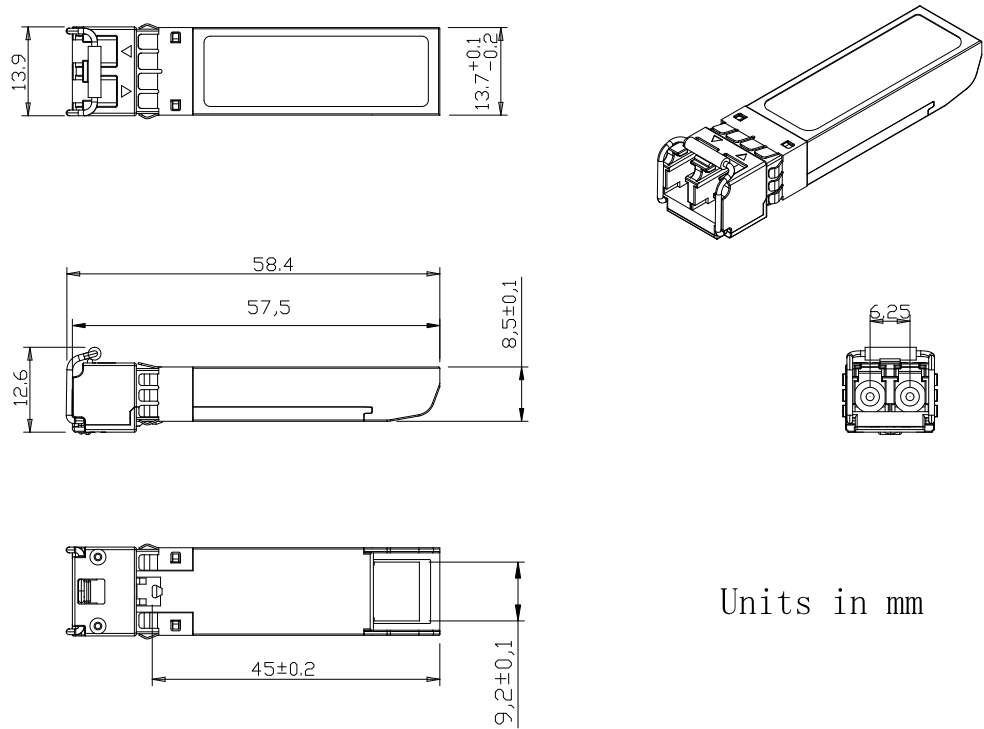
The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface.

The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

### Host - Transceiver Interface Block Diagram



### Package Outline



Units in mm

### Regulatory Compliance

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
Laser Eye Safety	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1, 2	Class 1 laser product
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards

### Sum Up

Part No	Specification									
	Package	Data rate	Laser	Optical Power	Detector	Sensitivity	Temp	Reach	Other	Application code
EGS-SFP+ZR-C	SFP+	9.95~10.3 Gbps	1550nm DFBwith EML	0~ 5dBm	APD	-23dBm	0~70°C	80KM	DDM RoHS	10GBASE-ZR/ZW