10Gb/s SFP+ ZR 1550nm100km Optical Transceiver

Features

- 1550nm EML transmitter and APD receiver
- Up to 100km on 9/125μm SMF
- Hot-pluggable SFP+ footprint
- Duplex LC/UPC type pluggable optical interface
- ROHS-10 compliant and lead-free
- Support Digital Diagnostic Monitoring interface
- Single +3.3V power supply
- Compliant with SFF+MSA and SFF-8472
- Metal enclosure, for lower EMI
- Meet ESD requirements, resist 8KV direct contact voltage
- Operating case temperature: -0~+70°C

Applications

- 10GBASE-ZR/ZW & 10G Ethernet
- SDH STM64
- Other Optical Links

Description

SFP-10G-ZR-100 is designed for use in 10-Gigabit Ethernet links up to 100km over single mode fiber. The module consists of 1550 EML Laser, APD and Preamplifier in a high-integrated optical sub-assembly. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

The transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, and received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts 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.

Absolute Maximum Ratings

Table1-Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	Ts	-40	+85	℃
Relative Humidity(Non-condensing)	RH	+5	+95	%
Power Supply Voltage	VCC	-0.5	+3.6	V

Recommended Operating Conditions

Table2-Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	TC	0	25	+70	℃	
Power Supply Voltage	VCC3	3.135	3.3	3.465	V	
Data Rate			10.3125		Gb/s	
Control Input Voltage High		2		Vcc	V	
Control Input Voltage Low		0		0.8	V	
Link Distance (SMF)	D			100	km	

Electrical Characteristics

Table3-Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Power Consumption	p			1.6	W	
Supply Current	Icc			480	mA	
Transmitter						

Single-ended Input Voltage Tolerance	Vcc	-0.3		4.0	V	
AC Common Mode Input Voltage Tolerance (RMS)		15			mV	
Differential Input Voltage Swing	Vin,pp	180		700	mVpp	
Differential Input Impedance	Zin	90	100	110	Ohm	1
Transmit Disable Assert Time				10	us	
Transmit Disable Voltage	Vdis	Vcc- 1.3		Vcc	V	
Transmit Enable Voltage	Ven	Vee		Vee +0.8	V	2
Receiver						
Differential Output Voltage Swing	Vout,pp	300		850	mVpp	
Differential Output Impedance	Zout	90	100	110	Ohm	3
Data output rise/fall time	Tr/Tf	28			ps	4
LOS Assert Voltage	VlosH	Vcc- 1.3		Vcc	V	5
LOS De-assert Voltage	VlosL	Vee		Vee +0.8	V	5
Power Supply Rejection	PSR	100			mVpp	6

Notes:
[1] Connected directly to TX data input pins. AC coupled thereafter.
[2] Or open circuit.
[3] Input 100 ohms differential termination.
[4] These are unfiltered 20-80% values.
[5] Loss of Signal is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
[6] Receiver sensitivity is compliant with power supply sinusoidal modulation of20 Hz to 1.5 MHz up to specified value applied through the recommended power supply filtering network.

Optical Characteristics

Table4-Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Center Wavelength	λ C	1530	1550	1565	nm	1
Optical Spectral Width	Δ λ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	PAVG	1		5	dBm	2
Optical Extinction Ratio	ER	8.2			dB	
Transmitter and Dispersion Penalty	TDP			4.0	dB	
Transmitter OFF Output Power	Poff			-30	dBm	
Transmitter Eye Mask	Compliant with IEEE802.3ae					
Receiver						
Center Wavelength	λ C	1270		1610	nm	
Receiver Sensitivity (Average Power)	Sen			-24.5	dBm	3
Input Saturation Power (overload)	Psat	-8			dBm	
Receiver Reflectance	Rrx			-27		
LOS Assert	LOSA	-35			dBm	

LOS De-assert	LOSD			-26	dBm	
LOS Hysteresis	LOSH	0.5			dB	

Notes:

[1] Class 1 Laser Safety per FDA/CDRH and IEC-825- 1 regulations.

[2] Launched power (avg.) is power coupled into a single mode fiber with master connector (Before of Life).

[3] Measured with Light source 1550nm, ER=8.2dB; BER =<-10^- 12 @10.3125Gbps, PRBS=2^31- 1 NRZ.

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.

Table5-Digital diagnostic specification

Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	℃	Over operating temp
Laser power monitor absolute error	DMI_TX	-3	3	dB	
RX power monitor absolute error	DMI_RX	-3	3	dB	-7dBm to -24dBm range
Supply voltage monitor absolute error	DMI_VCC	-1	1	V	Full operating range
Bias current monitor	DMI_Ibias	-10	10	%	

Mechanical Dimensions

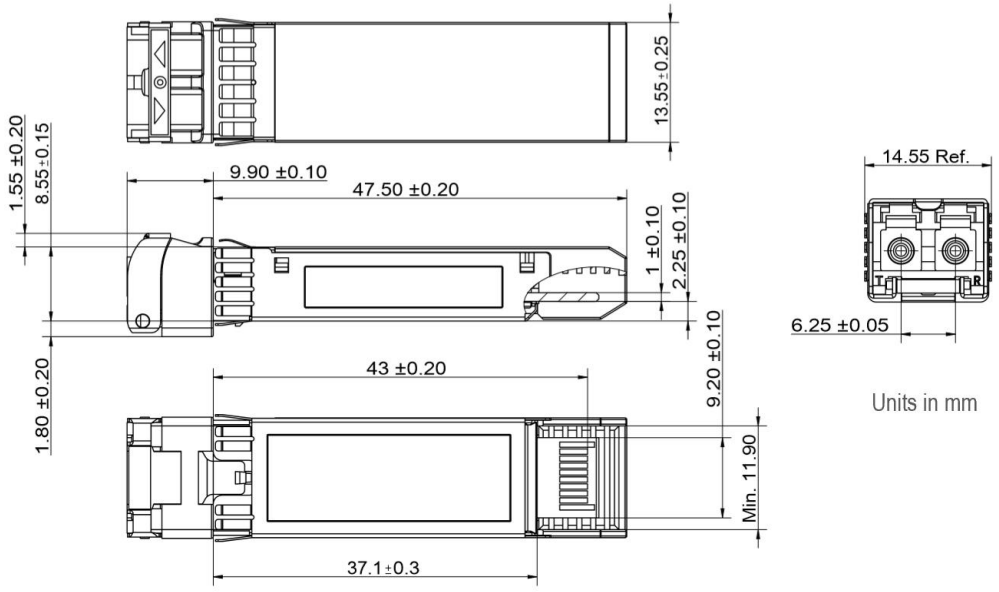

Figure1 Mechanical Outline

Pin Assignment

Table6-SFP+ Module PIN Definition

PIN	Logic	Symbol	Name / Description	Power Sequence Order	Notes
1		VeeT	Module Transmitter Ground	1st	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	3rd	2
3	LVTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	3rd	3
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	3rd	4
5	LVTTL-I	SCL	2-Wire Serial Interface Clock	3rd	4
6		MOD_ABS	Module Absent, connected to VeeT or VeeR in the module	3rd	4
7	LVTTL-I	RS0	Not used	3rd	5
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication Active High	3rd	6
9	LVTTL-I	RS1	Not used	3rd	
10		VeeR	Module Receiver Ground	1st	1
11		VeeR	Module Receiver Ground	1st	1
12	CML-O	RD-	Receiver Inverted Data Output	3rd	
13	CML-O	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

Notes:

[1] Circuit ground is internally isolated from chassis ground.

[2] TFAULT is an open collector/drain output, which should be pulled up with a 4.7kΩ- 10kΩ resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V.A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to ＜0.8V.

[3] Laser output disabled on TDIS ＞2.0V or open, enabled on TDIS ＜0.8V.

[4] Should be pulled up with 4.7kΩ- 10kΩ on host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.

[5] Internally pulled down per SFF-8431 Rev 4.1.

[6] LOS is open collector output. It should be pulled up with 4.7kΩ- 10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Pin Description

The SFP+ modules are hot-pluggable. 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.

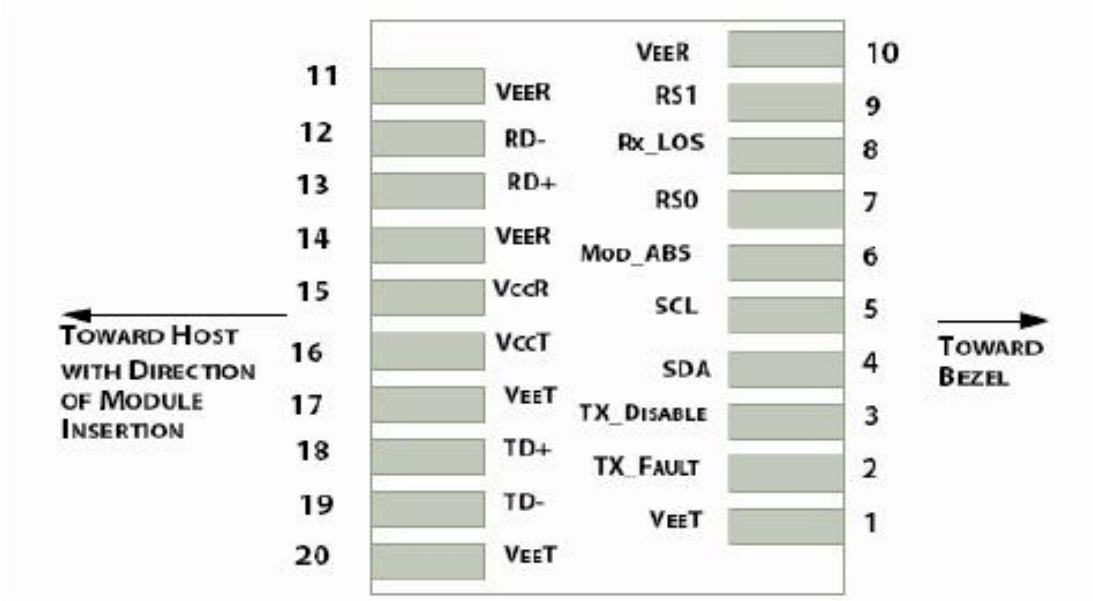

Figure2 Pin View

Monitoring Specification

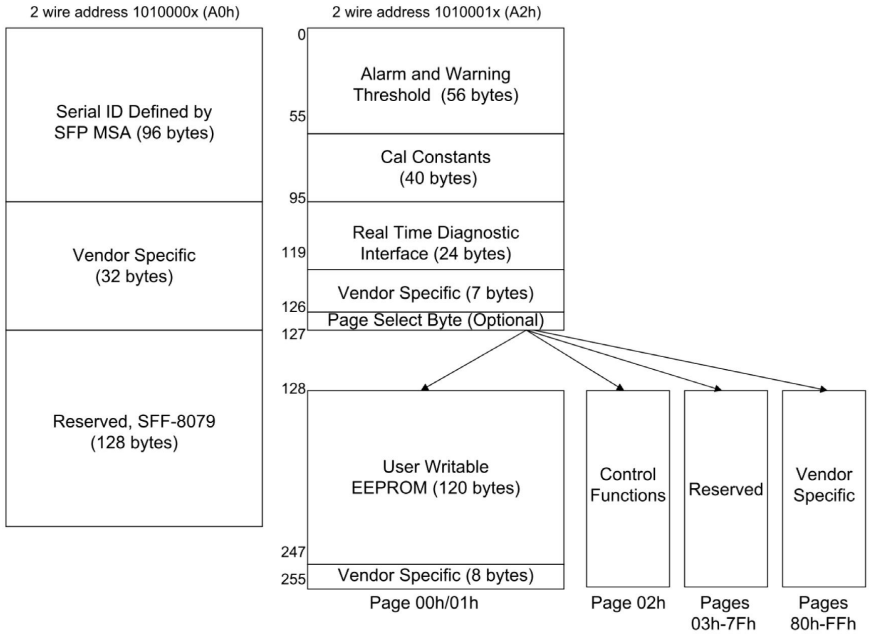

Figure3 Memory map

Further Information:

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