10Gb/s SFP+ ER 1550nm 40km Optical Transceiver

Features

- Up to 40km transmission distance
- Support Multi Rate 9.95 to 11.3Gbps bit rates
- 1550nm cooled EML transmitter with TEC, PIN 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 1.5W
- Operating case temperature: 0~+70°C

Applications

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

Compliance

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

Description

SFP-10G-ER is a high performance, cost effective modules, which is supporting Multi Rate 9.95 to 11.3Gbps, and transmission distance up to 40km on SM fiber. The transceiver consists of two sections: The transmitter section incorporates a EML laser driver and a 1550nm EML laser. The receiver section consists of a PIN photodiode integrated with a transimpedance preamplifier (TIA) and a Limiting Amplifier. The module is hot plug gable into the 20-pin connector. The high-speed electrical interface is base on low voltage logic, with nominal 100 Ohms differential impedance and AC coupled in the module.

The optical output can be disabled by LVTTL logic high-level input of TX_DIS. Transmit Fault (Tx_Fault) is provided to indicate that the module transmitter has detected a fault condition related to laser operation or safety. Loss of signal (RX_LOS) output is provided to indicate the loss of an input optical signal of receiver. A serial EEPROM in the transceiver allows the user to access transceiver monitoring and configuration data via the 2-wire SFP Management Interface. Digital diagnostics function are available via a 2-wire serial interface, as specified in SFF-8472.

Absolute Maximum Ratings

Table1-Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	Ts	-40	+85	℃
Supply Voltage	Vcc	0	+4	V
Relative Humidity(Non-condensing)	RH	+5	+85	%
Rx max Input Average Power	Pmax		0	dBm

Recommended Operating Conditions

Table2-Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	TC	0	25	+70	℃
Power Supply Voltage	VCC3	3.135	3.3	3.465	V
Power Supply Current	ICC3			450	mA
Power Consumption				1500	mW

Transmitter Operating Characteristic-Optical

Table3-Transmitter Operating Characteristic-Optical

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Operating Data Rate	DR	9.95	10.3125	11.3	Gb/s	
Output Center Wavelength	λ c	1530	1550	1565	nm	
Side Mode Suppression Ratio	SMSR	30			dB	

Spectral Width				1	nm	
Average Output Power	Po	-4.0		+4.0	dBm	
Optical Modulation Amplitude	OMA	-1.7				
Disabled Power	Poff			-30	dBm	
Extinction Ratio	ER	8.2			dB	
Eye Mask			5		%	
Relative Intensity Noise	RIN			-128	dB/Hz	
Operating Distance		40			km	
Transmitter and dispersion penalty				3	dB	
Optical return loss tolerance				21	dB	

Receiver Operating Characteristic-Optical

Table4-Receiver Operating Characteristic-Optical

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Operating Data Rate		9.95	10.3125	11.3	Gb/s	
Input Center Wavelength	lrc	1530		1565	nm	
Overload	Rovl	-1			dBm	
Sensitivity	Rsen			-16	dBm	
Sensitivity(OMA)				-14.1	dBm	
Stressed Receiver Sensitivity (OMA)				-11.3	dBm	
RX_LOS Assert Level	RLOSa	-30		-	dBm	
RX_LOS De-assert Level	RLOSd			-17	dBm	
RX_LOS Hysteresis	RLOSh	0.5			dB	
Optical Return Loss	ORL			-16	dB	

Electrical characteristics

Table5-Electrical characteristics

Parameter		Symbol	Min.	Typical	Max.	Unit	Note
Input differential impedance				100		Ω	
Differential data input swing		VI	190		700	mV	
Differential data output swing		V0	300		850	mV	
Tx Fault, LOS Output Voltage	High		2.0		VCC	V	
	Low		VEE		VEE+ 0.8	V	
Tx Disable， RS0,RS1	Low	VIL	2.0		VCC	V	
	High	VIH	VEE		VEE+ 0.8	V	

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.

Table6-Digital diagnostic specification table

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	-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.

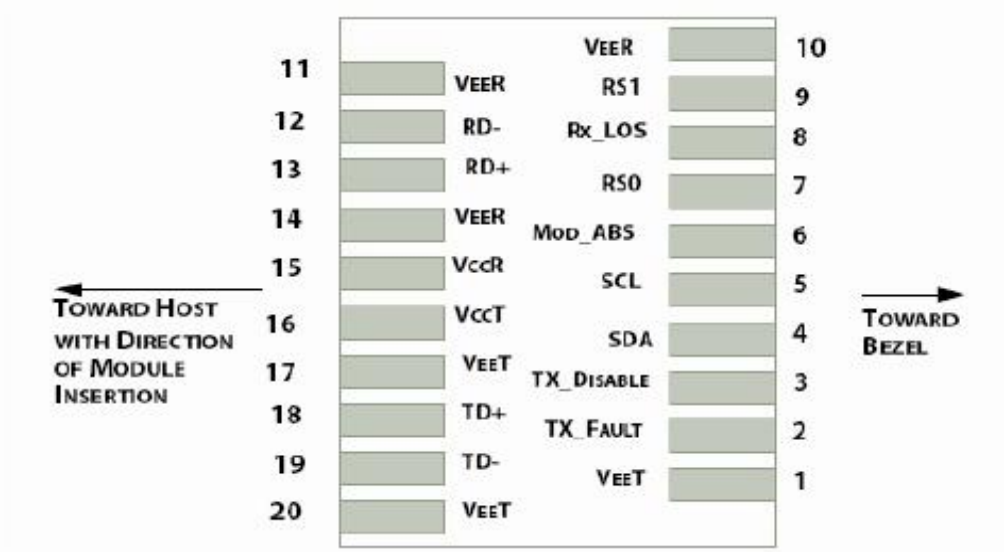

Figure1 Module Interface to Host

Pin Assignment

Table7-SFP+ Module PIN Definition

PIN	Logic	Symbol	Name / Description	Power Sequence Order	Note
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	
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	3rd	
5	LVTTL-I	SCL	2-Wire Serial Interface Clock	3rd	
6		MOD_ABS	Module Absent, connected to VeeT or VeeR in the module	3rd	2
7	LVTTL-I	RS0	Not used	3rd	
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication Active High	3rd	2
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

[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.

Mechanical specifications

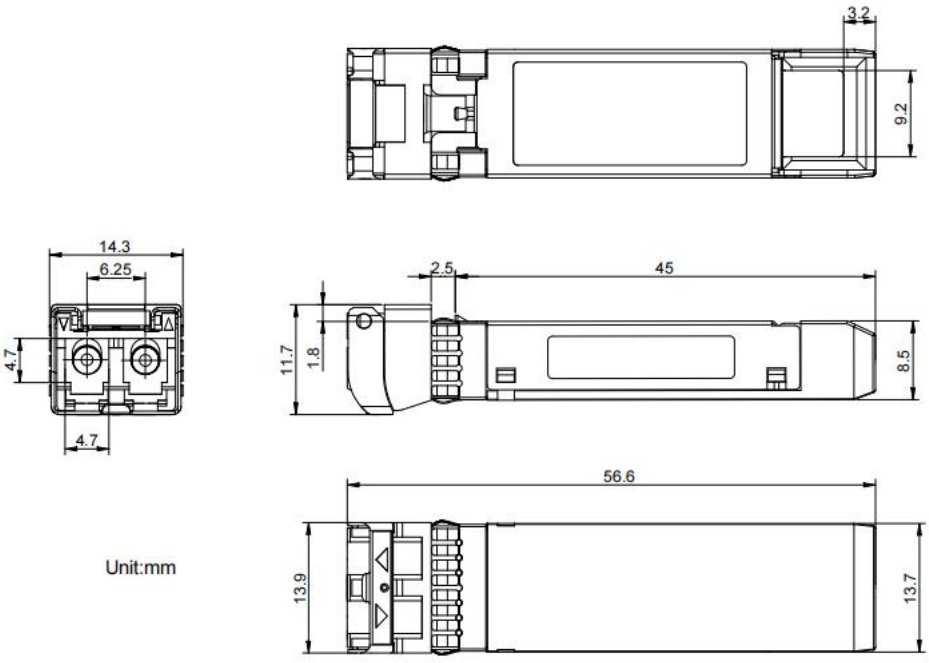

Figure2 Mechanical specifications

Further Information:

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3. NADDOD assumes no responsibility for the use or reliability of equipment or software not provided by NADDOD.