E-SFP+-ER

10GBASE-ER SFP+ 1550nm 40km Transceiver

Features

- Compliant with SFF-8413 and IEE802.3ae
- Data rate selectable ≤4.25Gbps or 9.95Gbps to 10.3Gbps bit rates
- Cooled EML transmitter and PIN receiver
- link length up to 40km
- Low Power Dissipation 1.5W Maximum
- -5ºC to 70ºC Operating Case Temperature
- Single 3.3V power supply
- Diagnostic Performance Monitoring of module temperature, supply
- Voltages, laser bias current, transmit optical power, receive optical power
- RoHS compliant and lead free
- Duplex LC receptacle
- RoHS compliant and lead free

Applications

- 10GBASE-ER/EW (with/without FEC)
- 10G Fiber Channel (with/without FEC)
- Other optical links

1. Absolute maximum rating

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature	TS	-40		+85	°C
Case Operating Temperature	TA	0		70	°C
Maximum Supply Voltage	Vcc	-0.5		4	V
Relative Humidity	RH	0		85	%

2. Optical characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Center Wavelength	λt	1530	1550	1565	nm	
spectral width	△λ			0.3	nm	
Average Optical Power	Pavg	0		+5	dBm	1
Optical Power OMA	Poma	-2.1			dBm	
Laser Off Power	Poff			-30	dBm	
Extinction Ratio	ER	8.5			dB	
Transmitter Dispersion Penalty	TDP			3.0	dB	2
Relative Intensity Noise	Rin			-128	dB/Hz	3
Optical Return Loss Tolerance		21			dB	
Receiver Section:						
Center Wavelength	λr	1260		1600	nm	
Receiver Sensitivity	Sen			-16	dBm	4
Los Assert	LOSA	-42		-	dBm	
Los Dessert	LOSD			-22	dBm	
Los Hysteresis	LOSH	0.5			dB	
Overload	Sat	-1			dBm	5
Receiver Reflectance	Rrx			-26	dB	

Notes:

1.Trade-offs are available between spectral width, center wavelength and minimum OMA.

2. The optical power is launched into MMF

3. Measured with a PRBS 231-1 test pattern @10.3125Gbps

4. Measured with a PRBS 231-1 test pattern @10.3125Gbps, BER≤10-12.

3. Electrical characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Supply Voltage	Vcc	3.135		3.465	V	
Supply Current	Icc			450	mA	
Power Consumption	P			1.5	W	
Transmitter Section						
Input differential impedance	Rin		100		Ω	1
Tx Input Single Ended DC Voltage Tolerance (Ref VeeT)	V	-0.3		4	V	
Differential input voltage swing	Vin,pp	180		700	mV	2
Transmit Disable Voltage	VD	2		Vcc	V	3
Transmit Enable Voltage	VEN	Vee		Vee+0.8	V	
Receiver Section						
Single Ended Output Voltage Tolerance	V	-0.3		4	V	
Rx Output Diff Voltage	Vo	300		850	mV	
Rx Output Rise and Fall Time	Tr/Tf	30			ps	4
LOS Fault	VLOS fault	2		VccHOST	V	5

LOS Normal	VLOS norm	Vee		Vee+0.8	V	5

Notes:

1.TX data input pins. AC coupling.

2. Into 100 ohms differential termination.

4. Pin definition

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-8083, or stacked connector with equivalent with equivalent electrical performance. Host PCB contact assignment is shown in Figure 2 and contact definitions are given in Table 2. SFP+ module contacts mates with the host in the order of ground, power, followed by signal as illustrated by Figure 3 and the contact sequence order listed in Table 2.

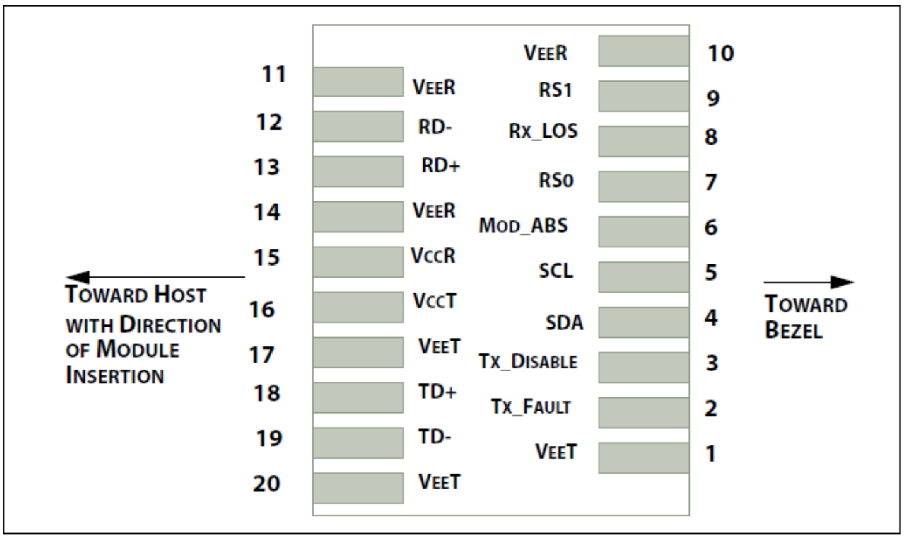

Figure 1: Interface to Host PCB

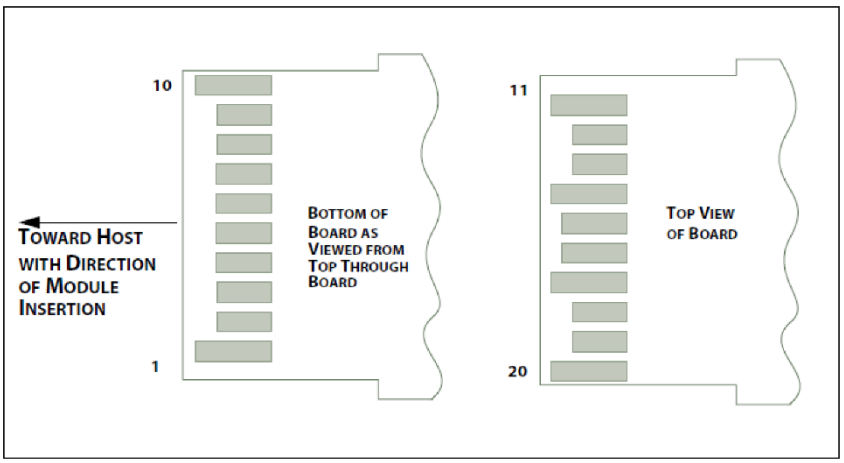

Figure2: Module Contact Assignment

5. Pin Descriptions

Pin	Symbol	Description	Ref.
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault.	2
3	TDIS	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line (MOD-DEF2)	4
5	SCA	2-wire Serial Interface Clock (MOD-DEF1)	4
6	MOD_ABS	Module Absent, connected to VEET or VEER	4
7	RS0	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	5
9	RS1	No connection required	
10	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	VEET	Transmitter Ground (Common with Receiver Ground)	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 4.7k – 10k Ohms 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 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V.
MOD_ABS pulls line low to indicate module is plugged in.

5. LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.