LUXGLO

SFP+ Optical Transceiver, 10km

Features

♦ Supports rate from 1.25 Gb/ to 10.3 Gb/s bit rates

♦ Optical interface compliant to IEEE 802.3ae

♦ Electrical interface compliant to SFF-8431

♦ Hot Pluggable

♦ 1310nm DFB transmitter, PIN photo-detector

♦ Operating case temperature: 0 to 70 °C

♦ Low power consumption

♦ Applicable for 10km SMF connection

♦ All-metal housing for superior EMI performance

♦ Advanced firmware allow customer system encryption information to be stored in transceiver

♦ Cost effective SFP+ solution, enables higher port densities and greater bandwidth

♦ RoHS6 compliant (lead free)

Applications

♦ 10GBASE-LR at 10.3125Gbps

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.

Parameters	Symbol	Min.	Max.	Unit
Power Supply Voltage	V_{CC}	0	+3.6	V
Storage Temperature	Tc	-40	+85	°C
Operating Case Temperature	Tc	0	+70	°C
Relative Humidity	RH	5	95	%
RX Input Average Power	Pmax	-	0	dBm

Recommended operating environment

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

Parameter	Symbol	Min.	Typical	Max	Unit
Power Supply Voltage	V_{CC}	3.135	3.300	3.465	V
Operating Case Temperature	T_C	0	25	70	°C

Low Speed Characteristics

Parameter	Symbol	Min.	Typical	Max	Unit
Power Consumption				1	W
TX_Fault,RX_LOS	VOL	0		0.4	V
	VOH	Host_Vcc-0.5		Host_Vcc+0.3	V
TX_DIS	VIL	-0.3		0.8	V
	VIH	2.0		VCCT+0.3	V
RS0,RS1	VIL	-0.3		0.8	V
	VIH	2.0		VCCT+0.3	V

Optical characteristics

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

	Unit	Values
Operating Reach	**m**	**10K**
Transmit		
Center wavelength (range)	nm	1260 -1355
Side Mode Suppression Ratio (min)	dB	30
Launched power		
– maximum	dBm	+0.5
– minimum	dBm	-8.2 Notes1
– OMA	dBm	-5.2
– OMA-TDP (min)	dBm	-6.2
Transmitter and dispersion penalty	dB	0 Notes4
Average launch power of OFF transmitter (max)	dBm	-30
Extinction ratio (min)	dB	3.5 Notes2
RIN$_{12}$ OMA (max)	dB/Hz	-128
Optical Return Loss Tolerance (min)	dB	12
Receiver		
Center wavelength (range)	nm	1260-1355
Receive overload (max) in average power[1]	dBm	0.5
Receive sensitivity (min) in average power[1]	dBm	-14.4 Notes3
Receiver sensitivity (max) in OMA (footnote 2)	dBm	-12.6 Notes3
Receiver Reflectance (max)	dB	-12
Stressed receiver sensitivity (max) in OMA[2]	dBm	-10.3
Vertical eye closure penalty (min)[3]	dB	2.2
Stressed eye jitter (min)[2]	UIp-p	0.7
Receive electrical 3dB upper cutoff frequency (max)	GHz	12.3
Receiver power (damage, Max)	dBm	1.5

Notes:
1. The optical power is launched into SMF
2. Measured with a PRBS 2^{31}-1 test pattern@10.3125Gbps
3. Measured with a PRBS 2^{31}-1 test pattern@10.3125Gbps BER≤10^{-12}
4. In G.652 and G.655(NDSF)

Electrical characteristics

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

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Data Rate		1.250	10.3125	-	Gbps	
Power Consumption		-		1000	mW	
Transmitter						
Single Ended Output Voltage Tolerance		-0.3	-	4.0	V	
C common mode voltage tolerance		15	-	-	mV	
Tx Input Diff Voltage	VI	400		1600	mV	
Tx Fault	VoL	-0.3		0.4	V	At 0.7mA
Data Dependent Input Jitter	DDJ			0.10	UI	
Data Input Total Jitter	TJ			0.28	UI	
Receiver						
Single Ended Output Voltage Tolerance		-0.3	-	4.0	V	
Rx Output Diff Voltage	Vo	300		850	mV	
Rx Output Rise and Fall Time	Tr/Tf	30			ps	20% to 80%
Total Jitter	TJ			0.70	UI	
Deterministic Jitter	DJ			0.42	UI	
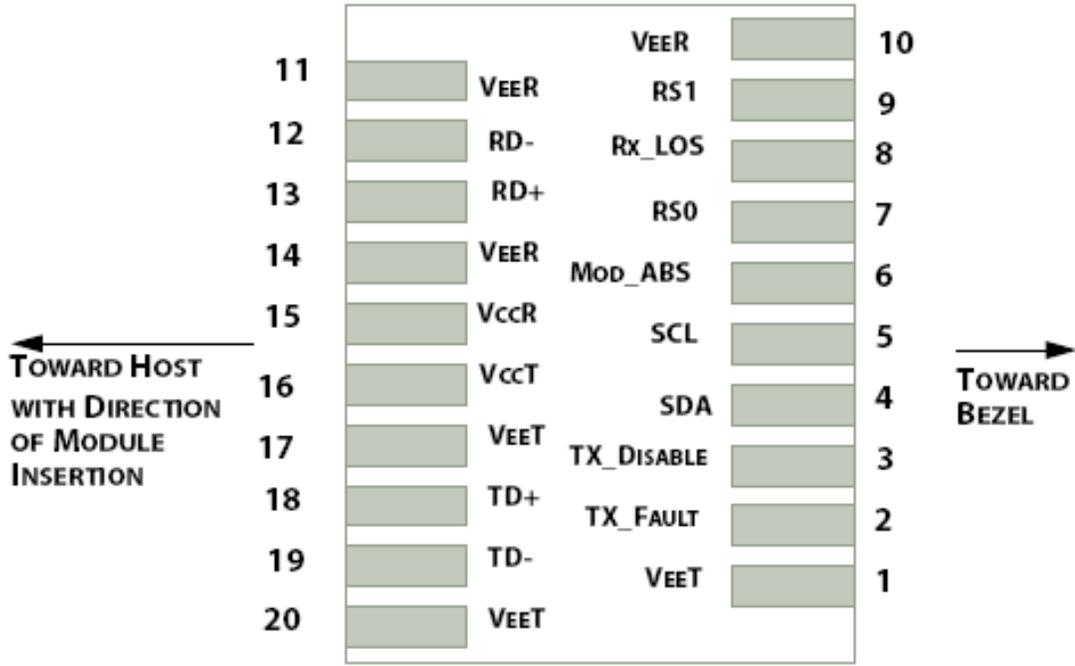
Figure 1: Interface to Host PCB
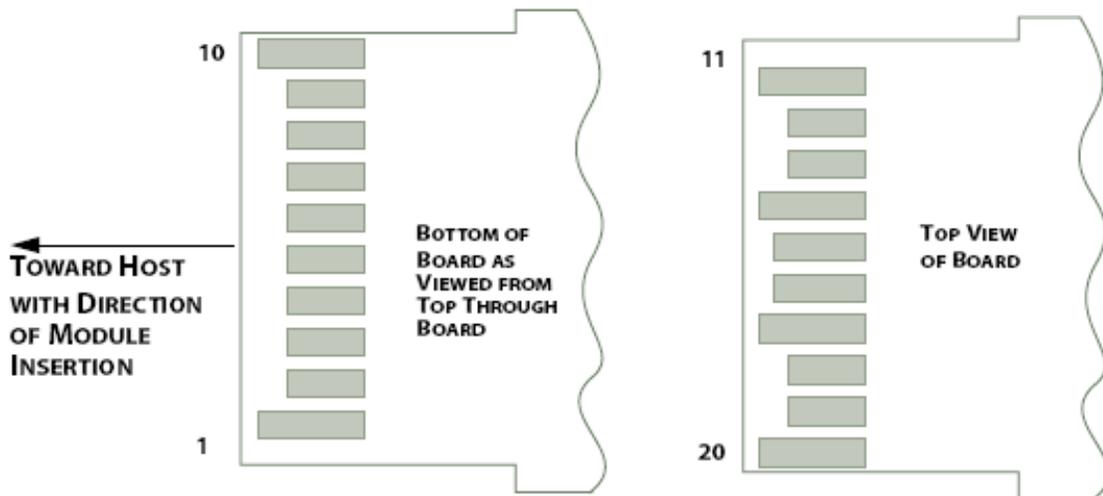
Figure 2: Module Contact Assignment

Pin definition

Pin	Symbol	Name/Description
1	VEET [1]	Transmitter Ground
2	Tx_FAULT [2]	Transmitter Fault
3	Tx_DIS [3]	Transmitter Disable. Laser output disabled on high or open
4	SDA [2]	2-wire Serial Interface Data Line
5	SCL [2]	2-wire Serial Interface Clock Line
6	MOD_ABS [4]	Module Absent. Grounded within the module
7	RS0 [5]	Rate Select 0
8	RX_LOS [2]	Loss of Signal indication. Logic 0 indicates normal operation
9	RS1 [5]	Rate Select 1
10	VEER [1]	Receiver Ground
11	VEER [1]	Receiver Ground
12	RD-	Receiver Inverted DATA out. AC Coupled
13	RD+	Receiver DATA out. AC Coupled
14	VEER [1]	Receiver Ground
15	VCCR	Receiver Power Supply
16	VCCT	Transmitter Power Supply
17	VEET [1]	Transmitter Ground
18	TD+	Transmitter DATA in. AC Coupled
19	TD-	Transmitter Inverted DATA in. AC Coupled
20	VEET [1]	Transmitter Ground

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 3.15Vand 3.6V.
[3]Tx_Disable is an input contact with a 4.7 kΩ to 10 kΩ pullup 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 to10 kΩ.Mod_ABS is asserted "High" when the SFP+ module is physically absent from a host slot.
[5] RS0 and RS1 are module inputs and are pulled low to VeeT with > 30 kΩ resistors in the module.

Ordering information:

MSA Standard:

Part Number	Product Description
SFP+LR-31-CE	1310nm, up to 10.3Gbps, SFP+ 10km, 0ºC ~ +70ºC
SFP+LR-31-IE	1310nm, up to 10.3Gbps, SFP+ 10km, -40ºC ~ +85ºC

Cross-Platform/OEM Compatible:

Part Number	Product Description
SFP+LR-31-CExx	1310nm, up to 10.3Gbps, SFP+ 10km, 0ºC ~ +70ºC
SFP+LR-31-IExx	1310nm, up to 10.3Gbps, SFP+ 10km, -40ºC ~ +85ºC

xx=TP, Cisco, Juniper & Ciena compatible
xx=AL, Alcatel compatible