10GBASE-ZR SFP+ 1550nm 80Km DOM Transceiver

SFP-10G-ZR-LL

Application

- 10G Ethernet ZR and 10G Fibre Channel
- OTN G.709 OTU1e/2/2e FEC bit rates
- 8.5Gb/s Fibre Channel

Features

- Hot-pluggable SFP+ footprint
- Supports 8.5 and 9.95 to 11.3 Gb/s
- 80km link length
- 0/70° C case temperature range
- Cooled 1550nm EML laser
- Limiting electrical interface receiver
- Duplex LC connector
- Built-in digital diagnostic functions
- RoHS-6 compliant (lead-free)

Description

10GGBASE-ZR SFP+ transceivers are Enhanced Small Form Factor Pluggable SFP+ transceivers designed for use in 10-Gigabit multi-rate links up to 80km of G.652 single mode fiber. They support 10G Ethernet ZR and 10G Fibre Channel.

Digital diagnostics functions are available via a 2-wire serial interface. The optical transceiver is compliant per the RoHS Directive 2011/65/EU.

Product Specifications

I.General Specifications

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Bit Rate	BR	8.5		11.3168	Gb/s	1
Max. Supported Link Length	L_{MAX}			80	km	2

Notes:

1. Tested with a 231 –1 PRBS pattern at the BER defined in Table IV.
2. Over G.652 single mode fiber.

II. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Maximum Supply Voltage	Vcc	-0.5		4.0	V	
Storage Temperature	T_S	-40		85	° C	
Case Operating Temperature	T_{OP}	0		70	° C	
Relative Humidity	RH	0		85	%	1
Receiver Optical Damage Threshold	RxDamage	5			dBm	

Note:

1. Non-condensing.

III. Electrical Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit	Ref.
Supply Voltage	Vcc	3.13		3.30	V	
Supply Current	P_{diss}			1.5	W	1
			Transmitter			
Input differential impedance	R_{in}	80	100	110	Ω	1
Differential data input swing	Vin,pp	120		850	mV	2
Transmit Disable Voltage	V_D	V_{CC}-0.8		Vcc	V	
Transmit Enable Voltage	V_{EN}	0		0.8	V	
			Receiver			
Differential data output swing	Vout,pp	300		850	mV	2
Output rise time and fall time	Rout	80	100	120	Ω	
LOS asserted	$V_{LOS\ A}$	V_{CC}-0.8		Vcc	V	4
LOS de-asserted	$V_{LOS\ D}$	0		0.8	V	4
Power Supply Noise Tolerance	VccT/VccR		Per SFF-8431 Rev 4.1		mVpp	5

Notes:

1. 70℃case temperature and beginning of life
2. Internally AC coupled.
3. 20℃–80%. Measured with Module Compliance Test Board and OMA test pattern. Use of four 1’s and four 0’s sequence in the PRBS 9 is an acceptable alternative. SFF-8431 Rev 4.1.
4. LOS is an open collector output. Should be pulled up with 4.7kΩ–10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1.
5. See Section 2.8.3 of SFF-8431 Rev 4.1.

IV. Optical Characteristics (TOP = 0 to 70 ℃, VCC = 3.14 to 3.46 V)

Parameter	Symbol	Min	Typ.	Max	Unit	Note
Transmitter (Tx)						
Average Launch Power	P_{OUT}	0		5	dBm	
Optical Wavelength	λ	1530	1550	1565	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Optical Extinction Ratio		9			dB	
Average Launch power of OFF transmitter	P_{OFF}			-30	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Receiver (Rx)						
Optical Center Wavelength	λ_C	1260		1600	dBm	4
Overload (Average Power)	P_{AVE}	-7			dBm	
Receiver Reflectance	Rrx				dB	
LOS De-Assert LOS De-Assert	LOS_D			-23.5	dBm	
LOS Assert	LOS_A	-37		-30	dBm	
LOS Hysteresis	LOS_H	0.5		6	dB	
Rx Sensitivity	R_{SENS1}			-23	dBm	

Notes:

1. Per Tradeoff Table 52.8, IEEE 802.3ae 2005
2. Average Power figures are informative only, per IEEE802.3ae.
3. Measured into Type A1a (50/125 μm multimode) fiber per ANSI/TIA/EIA-455-203-2.
4. Measured with worst ER; BER<10 -12 ; 231 – 1 PRBS.
5. Per IEEE 802.3ae.

V. Digital Diagnostic Specifications

10GBASE-ZR SFP+ transceivers can be used in host systems that require either internally or externally calibrated digital diagnostics.

Parameter	Symbol	Min	Max	Units	Accuracy	Ref.
Transceiver temperature	ΔDD_{Temp}	--5	+70	ºC	±5ºC	1
Transceiver supply voltage	$\Delta DD_{Voltage}$	-2.8	4.0	V	±3%	
Transmitter bias current	ΔDD_{Bias}	0	127	mA	±10%	2
Transmitter output power	$\Delta DD_{Tx\text{-}Power}$	-1	+5	dBm	±2dB	
Receiver average optical input power	$\Delta DD_{Rx\text{-}Powe}$	-28	-5	dBm	±2dB	

Notes:

1. Internally measured.
2. The accuracy of the Tx bias current is 10% of the actual current from the laser driver to the laser.

Parameter	Symbol	Min	Typ.	Max	Units	Ref.
Dynamic Range for Rated Accuracy						
Internally measured transceiver temperature	DD_{Temp}	-40		85	°C	
Internally measured transceiver supply voltage	$DD_{Voltage}$	3.14		3.46	V	
Measured TX bias current	DD_{Bias}	0		20	mA	
Measured TX output power	$DD_{Tx-Power}$	-9		-2.5	dBm	
Measured RX received average optical power	$DD_{Rx-Power}$	-20		0	dBm	
Max Reporting Range						
Internally measured transceiver temperature	DD_{Temp}	-40		125	°C	
Internally measured transceiver supply voltage	$DD_{Voltage}$	2.8		4.0	V	
Measured TX bias current	DD_{Bias}	0		20	mA	
Measured TX output power	$DD_{Tx-Power}$	-10		-3	dBm	
Measured RX received average optical power	$DD_{Rx-Powe}$	-22		0	dBm	

Note:

1. Accuracy of Measured Tx Bias Current is 10% of the actual Bias Current from the laser driver to the laser.

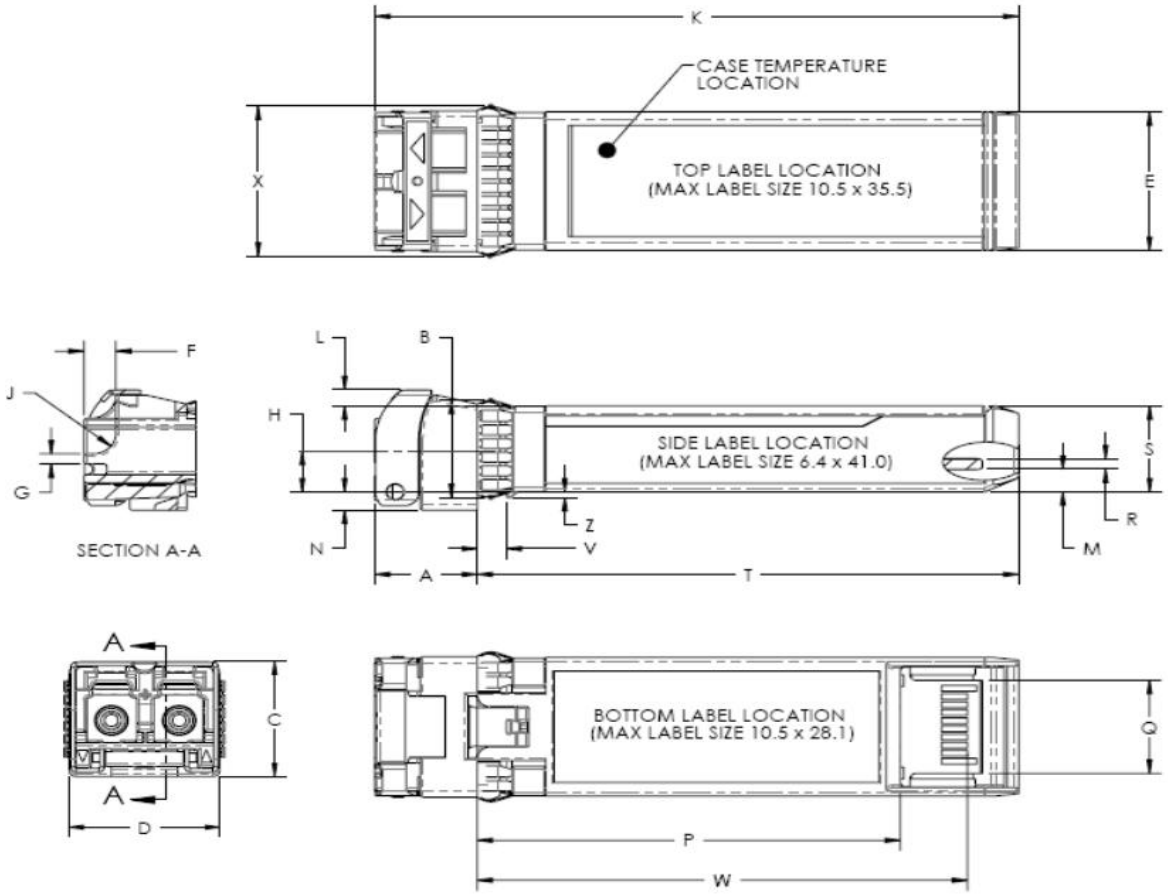
VI. Pin Description

Pin	Symbol	Name/Description	Ref.
1	V_{EET}	Transmitter Ground(Common with Receiver Ground)	1
2	T_{FAULT}	Transmitter Fault	2
3	T_{DIS}	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	2
7	RS0	No connection required	4
8	RX_LOS	Loss of Signal indication. Logic 0 indicates normal operation.	5
9	RS1	No connection required	4
10	V_{EER}	Receiver Ground(Common with Transmitter Ground)	1
11	V_{EER}	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	V_{EER}	Receiver Ground(Common with Transmitter Ground)	1
15	V_{CCR}	Receiver Power Supply	
16	V_{CCT}	Transmitter Power Supply	
17	V_{EET}	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	V_{EET}	Transmitter Ground(Common with Receiver Ground)	1

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. T FAULT 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 T DIS >2.0V or open, enabled on T DIS <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. LOS is open collector output. 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.

VII. Mechanical Specifications



Note:

1.The option of the label on the top side of the transceiver is not recommended.