

**DATA SHEET****UNIVISO – UGS10Z8D****10G SFP+ (Small Form Pluggable) 80km Single Mode Transceiver****SFP+ 10G-ZR-80KM Overview**

UNIVISO's SFP+ 10G-ZR-80KM 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 are compliant with SFF-8431, SFF-8432 and support 10G Ethernet ZR and 10G Fibre Channel..

Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472. The optical transceiver is compliant per the RoHS Directive 2011/65/EU.

**Product Features**

- Up to 10Gb/s data links
- Duplex LC connector
- Compliant with SFP MSA
- Hot-pluggable SFP footprint
- Cooled 1550nm EML laser
- Single power supply 3.3V
- RoHS-6 compliant (lead-free)
- 80km link length
- APD Receiver
- 0/70°C case temperature range

**Applications**

- 10G Ethernet ZR and 10G Fibre Channel
- SONET OC-192/SDH STM-64

**Ordering Information**

<b>Part Number</b>	<b>Description</b>
UGS10Z8D	10G, SFP+, Duplex LC Connector, 1550nm, 80km

**For More Information:**

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**General Specifications**

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate	DR	8		10.31	Gb/s	
Bit Error Rate	BER			10 <sup>-12</sup>		
Operating Temperature	T <sub>OP</sub>	0		70	°C	1
Storage Temperature	T <sub>STO</sub>	- 40		85	°C	2
Supply Current	I <sub>S</sub>		195	450	mA	3
Input Voltage	V <sub>CC</sub>	3.14	3.3	3.46	V	
Maximum Voltage	V <sub>MAX</sub>	- 0.5		4	V	3

**Notes:**

1. Case temperature
2. Ambient temperature
3. For electrical power interface

**Optical Characteristics – Transmitter**
**V<sub>CC</sub>=3.14V to 3.46V, T<sub>C</sub>=0°C to 70°C**

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Output Optical Power	P <sub>TX</sub>	-1		5	dBm	1
Optical Center Wavelength	λ <sub>C</sub>	1530		1565	nm	
Extinction Ratio	ER	8			dB	
Spectral Width (RMS)	Δλ			0.3	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Laser Off Power	P <sub>off</sub>			-30	dBm	
Transmitter Dispersion Penalty	TDP			3.0	dBm	2
Optical Rise/Fall Time (20% - 80%)	T <sub>RF_IN</sub>			260	ps	
Relative Intensity Noise	RIN			- 128	dB/Hz	3
Output Eye	Compliant with IEEE802.3 z (class 1 laser safety)					

**Notes:**

1. Average power figures are informative only, per IEEE802.3ae.
2. TWDP figure requires the host board to be SFF-8431compliant. TWDP is calculated using the Matlab code provided in clause 68.6.6.2 of IEEE802.3ae.
3. 12dB reflection.

**Optical Characteristics – Receiver**
**V<sub>CC</sub>=3.14V to 3.46V, T<sub>C</sub>=0°C to 70°C**

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Center Wavelength	$\lambda_C$	1260		1620	nm	
Receiver Sensitivity	R <sub>X_SEN</sub>			- 22	dBm	1,2
Receiver Overload	Pol	-7			dBm	
LOS Assert	P <sub>LOS_A</sub>	- 36			dBm	
LOS De-Assert	P <sub>LOS_D</sub>			- 25	dBm	
LOS Hysteresis	LOS H	0.5			dB	

**Notes:**

1. Conditions of stressed receiver tests per IEEE802.3ae. CSRS testing requires the host board to be SFF-8431 compliant.
2. The receiver sensitivity over fiber may vary depending on the host's clock and data recovery model.

**Electrical Characteristics – Transmitter**
**V<sub>CC</sub>=3.14V to 3.46V, T<sub>C</sub>=0°C to 70°C**

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Input differential impedance	R <sub>IN</sub>		100		$\Omega$	1
Single ended data input swing	V <sub>IN_PP</sub>	180		700	mV	2
Transmit disable voltage	V <sub>D</sub>	2		V <sub>CC</sub>	V	3
Transmit enable voltage	V <sub>EN</sub>	V <sub>EE</sub>		V <sub>EE</sub> +0.8	V	
Transmit disable assert time				10	us	

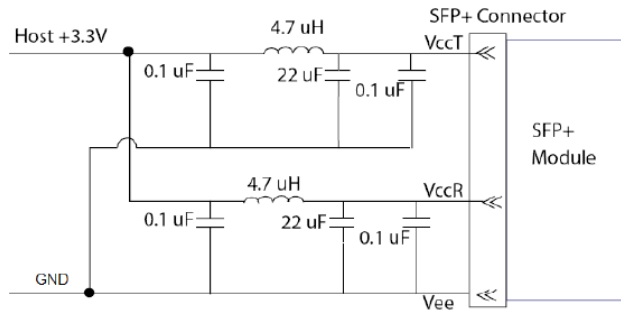
**Electrical Characteristics – Receiver**
**V<sub>CC</sub>=3.14V to 3.46V, T<sub>C</sub>=0°C to 70°C**

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Rx Output Diff Voltage	V <sub>OUT_PP</sub>	300		850	mV	3
Data output rise time	t <sub>r</sub>	30			ps	4
Data output fall time	t <sub>f</sub>	30			ps	4
LOS Fault	V <sub>LOS_Fault</sub>	V <sub>CC</sub> - 0.5		V <sub>CC_HOST</sub>	V	5
LOS Normal	V <sub>LOS_Normal</sub>	V <sub>EE</sub>		V <sub>EE</sub> +0.8	V	5

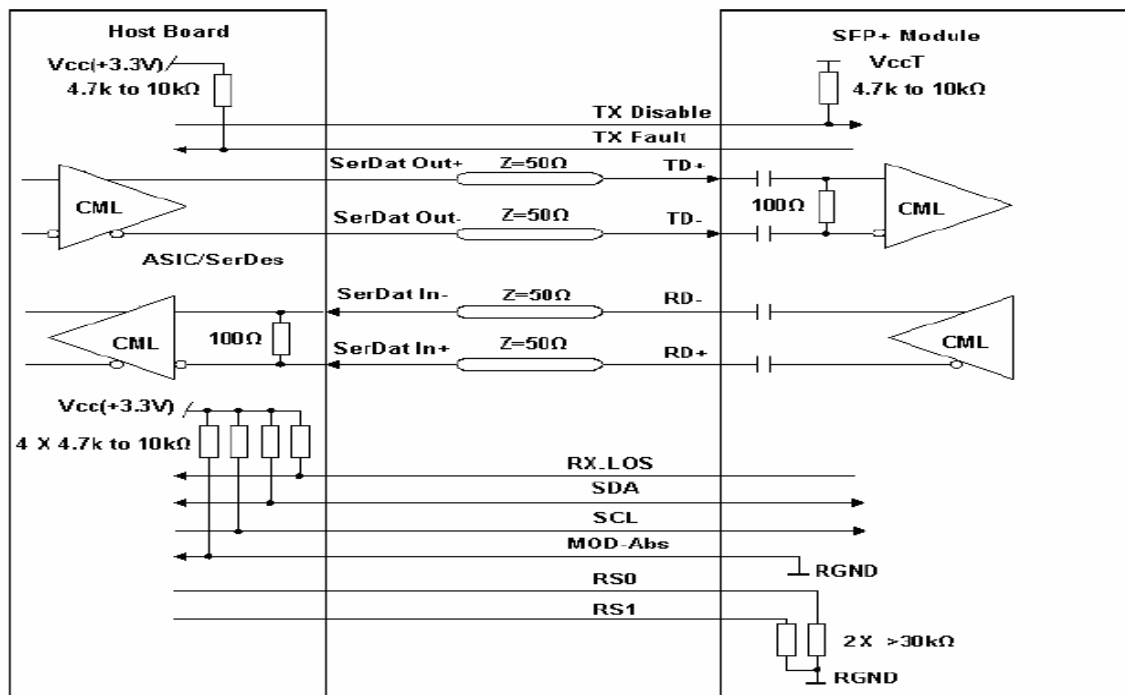
**Note:**

1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2. Per SFF-8431 Rev 3.0
3. Into 100 ohms differential termination.
4. 20% ~ 80%
5. LOS is an open collector output. Should be pulled up with 4.7k – 10k $\Omega$  on the host board. Normal operation is logic 0; loss of signal is logic 1. Maximum pull-up voltage is 5.5V.

**Recommended Circuit**



**Block Diagram of Transceiver**



**Transmitter Section**

The EML driver accepts differential input data and provide bias and modulation currents for driving a laser. An automatic power-control (APC) feedback loop is incorporated to maintain a constant average optical power. 1550nm EML in an eye safe optical subassembly (OSA) mates to the fiber cable.

**TX\_DISABLE**

The TX\_DISABLE signal is high (TTL logic "1") to turn off the laser output. The laser will turn on within 1ms when TX\_DISABLE is low (TTL logic "0").

**TX\_FAULT**

When the TX\_FAULT signal is high, output indicates a laser fault of some kind. Low indicates normal operation.

**Receiver Section**

The receiver utilizes a APD detector integrated with a trans-impedance preamplifier in an OSA. This OSA is connected to a Limiting Amplifier which providing post-amplification quantization, and optical signal detection. The limiting Amplifier is AC-coupled to the transimpedance amplifier, with internal 100Ω differential termination.

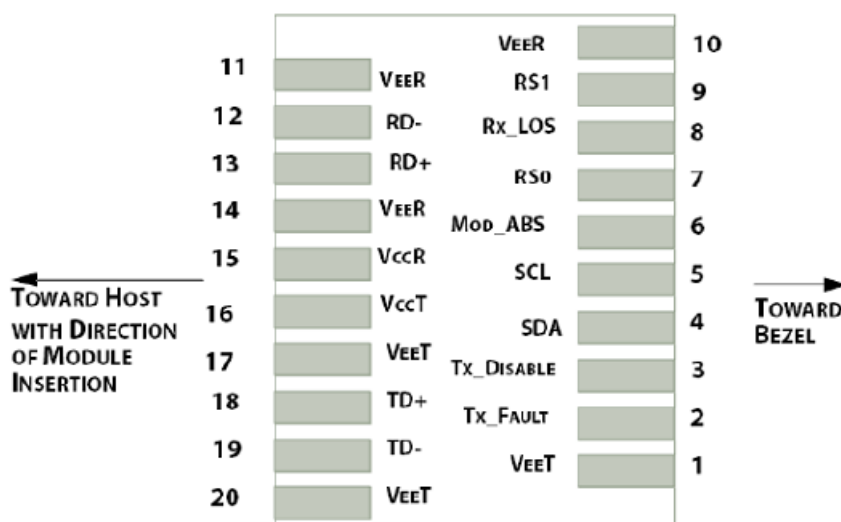
**Timing Parameters**

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Time to initialize	t_start_up			10	S	

**General Specifications**

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Bit Rate	BR	8		10.31	Gb/s	
Max. Supported Link Length	L <sub>MAX</sub>			80	KM	1

**Notes:** 1. Over G.652 single mode fiber.

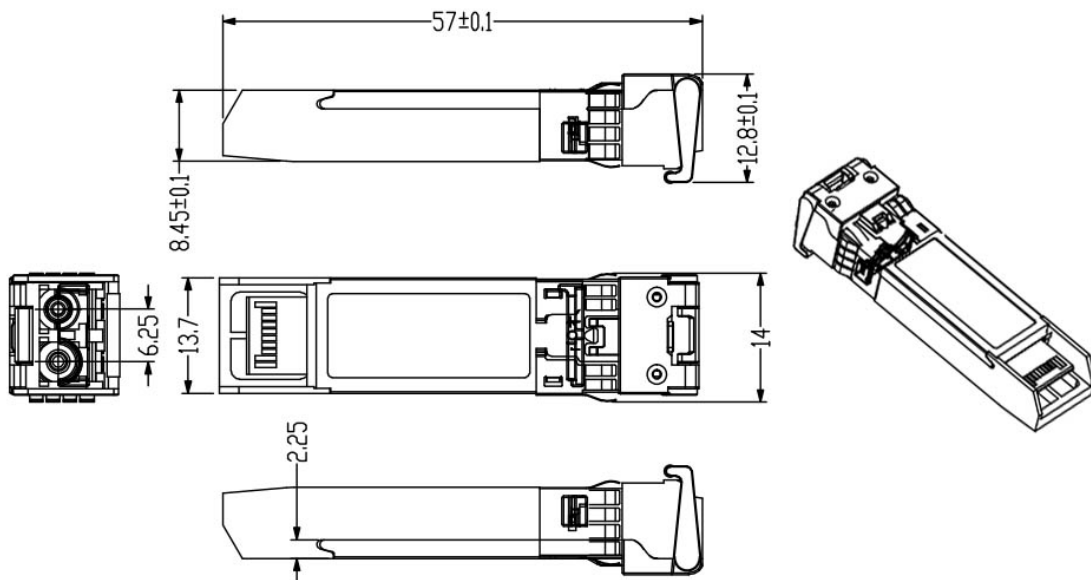
**Electrical Pad Layout**

**Pin Assignment**

PIN #	Symbol	Description	Remarks
1	VeeT	Transmitter Ground	1
2	TX Fault	Transmitter Fault Indication	2
3	TX Disable	Transmitter Disable	3
4	SDL	2 wire serial interface data input/output (SDA)	
5	SCL	2 wire serial interface clock input (SCL)	
6	MOD-ABS	Module Absent, connect to VeeR or VeeT in the module	2
7	RS0	Rate select0, optionally control SFP+ receiver. When high, input data rate >4.5Gb/s; when low, input data rate <=4.5Gb/s	
8	LOS	Loss of Signal	4
9	RS1	Rate select0, optionally control SFP+ transmitter. When high, input data rate >4.5Gb/s; when low, input data rate <=4.5Gb/s	
10	VeeR	Receiver Ground	1

11	VeeR	Receiver Ground	1
12	RD-	Inv. Received Data Out	
13	RD+	Received Data Out	
14	VeeR	Receiver Ground	1
15	VccR	Receiver Power	
16	VccT	Transmitter Power	
17	VeeT	Transmitter Ground	1
18	TD+	Transmit Data In	
19	TD-	Inv. Transmit In	
20	VeeT	Transmitter Ground	1

**Notes:**

1. The module ground pins shall be isolated from the module case.
2. This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host\_Vcc on the host board.
3. This pin shall be pulled up with 4.7K-10Kohms to VccT in the module.
4. This pin is an open collector/drain output pin and shall be pulled up with 4.7K-10Kohms to Host\_Vcc on the host board.

**Dimensions**


**ALL DIMENSIONS ARE  $\pm 0.2$ mm UNLESS OTHERWISE SPECIFIED**

**UNIT: mm**

**References**

1. IEEE standard 802.3. IEEE Standard Department, 2005.
2. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 2000.