DATA SHEET

UNIVISO –UGS10B0D
10G SFP+ (Small Form Pluggable) 100km Single Mode Transceiver

SFP+ 10G-ZR-100KM Overview

UNIVISO's SFP+ 10G-ZR-100KM SFP+ transceivers are Enhanced Small Form Factor Pluggable SFP+ transceivers designed for use in 10-Gigabit multi-rate links up to 100km 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)
- 100km 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

Part Number	Description
UGS10B0D	10G, SFP+, Duplex LC Connector, 1550nm, 100km

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^{-12}		
Operating Temperature	T_{OP}	0		70	℃	1
Storage Temperature	T_{STO}	-40		85	℃	2
Supply Current	I_S		195	450	mA	3
Input Voltage	V_{CC}	3.14	3.3	3.46	V	
Maximum Voltage	V_{MAX}	-0.5		4	V	3

Notes:

1. Case temperature

2. Ambient temperature

3. For electrical power interface

Optical Characteristics – Transmitter

V_{CC}=3.14V to 3.46V, T_C=0℃ to 70℃

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Output Optical Power	P_{TX}	0		5	dBm	1
Optical Center Wavelength	λ_C	1530		1565	nm	
Extinction Ratio	ER	8			dB	
Spectral Width (RMS)	$\Delta\lambda$			0.3	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Laser Off Power	Poff			-30	dBm	
Transmitter Dispersion Penalty	TDP			3.0	dBm	2
Optical Rise/Fall Time (20% - 80%)	T_{RF_IN}			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$_{CC}$=3.14V to 3.46V, T$_C$=0℃ to 70℃

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Center Wavelength	λ$_C$	1260		1620	nm	
Receiver Sensitivity	R$_{X\_SEN}$			− 23	dBm	1,2
Receiver Overload	Pol	-7			dBm	
LOS Assert	P$_{LOS\_A}$	− 36			dBm	
LOS De-Assert	P$_{LOS\_D}$			− 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$_{CC}$=3.14V to 3.46V, T$_C$=0℃ to 70℃

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Input differential impedance	R$_{IN}$		100		Ω	1
Single ended data input swing	V$_{IN\_PP}$	180		700	mV	2
Transmit disable voltage	V$_D$	2		V$_{CC}$	V	3
Transmit enable voltage	V$_{EN}$	V$_{EE}$		V$_{EE}$+0.8	V	
Transmit disable assert time				10	us	

Electrical Characteristics – Receiver

V$_{CC}$=3.14V to 3.46V, T$_C$=0℃ to 70℃

| Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Rx Output Diff Voltage	V$_{OUT\_PP}$	300		850	mV	3
Data output rise time	t$_r$	30			ps	4
Data output fall time	t$_f$	30			ps	4
LOS Fault	V$_{LOS\_Fault}$	V$_{CC}$ − 0.5		V$_{CC\_HOST}$	V	5
LOS Normal	V$_{LOS\_Normal}$	V$_{EE}$		V$_{EE}$ +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 − 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1. Maximum pull-up voltage is 5.5V.

Recommended Circuit
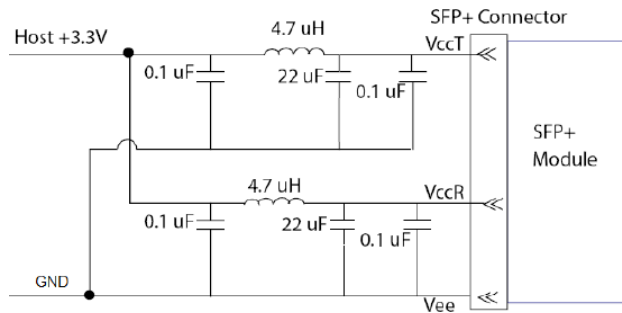
Block Diagram of Transceiver
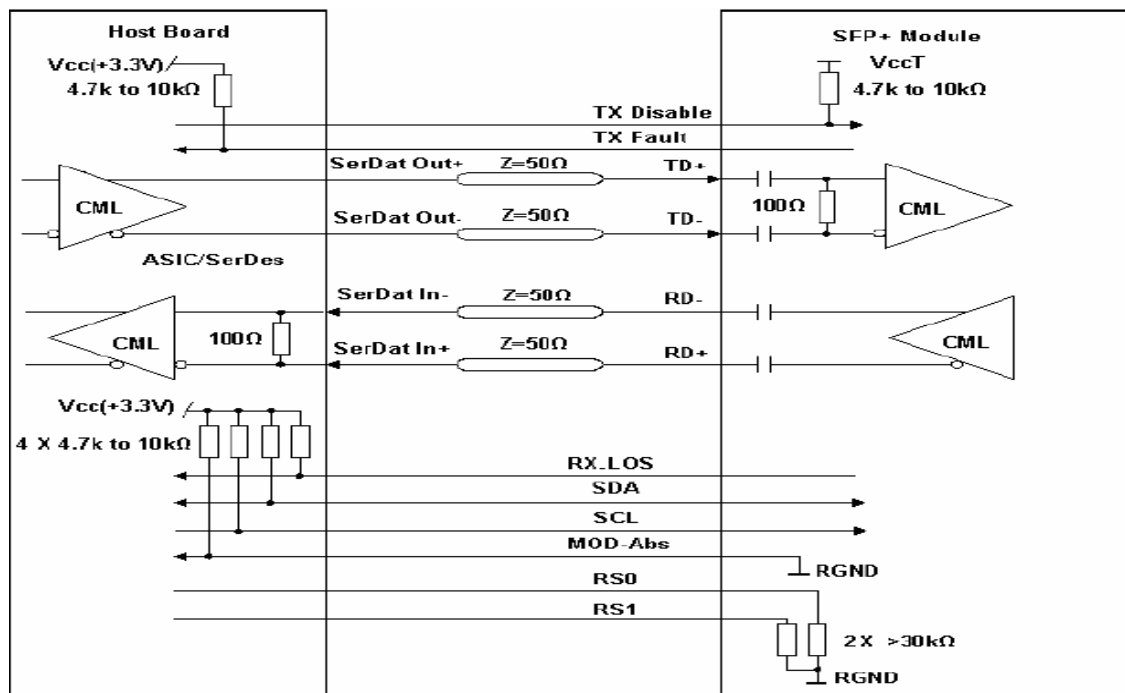
Transmitter Section

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.
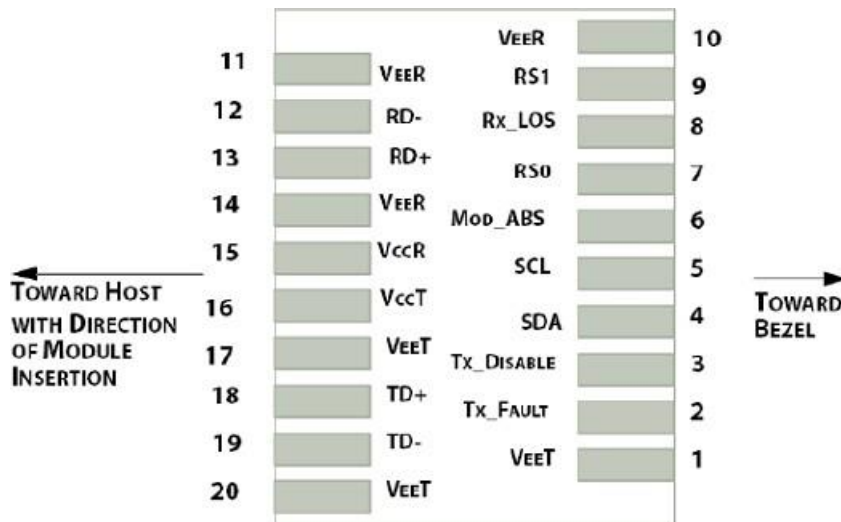
Timing Parameters

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_{MAX}			100	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
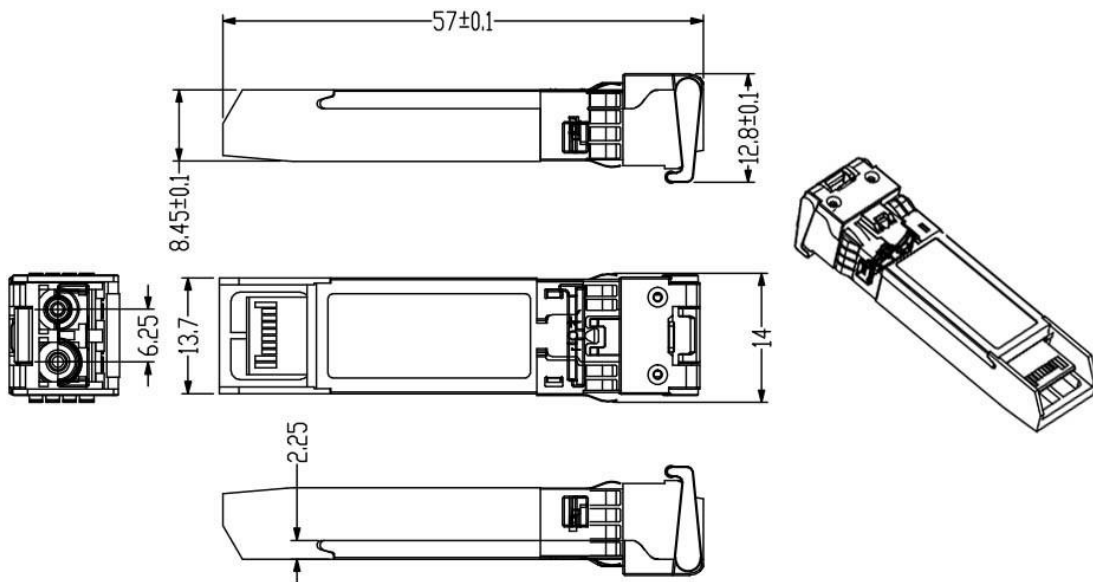
ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED
UNIT: mm

References

1. IEEE standard 802.3. IEEE Standard Department, 2005.

2. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 2000.