

DATA SHEET

UNIVISO: SFP28-SR

25Gb/s SFP28 SR Transceiver

SFP28-SR Overview

UNIVISO's SFP28-SR optical transceivers are based on 25G Ethernet IEEE 802.3by standard. They are compliant with SFF-8402, SFF-8432, SFF-8431 and SFF-8472, providing a fast and reliable interface for 25G Ethernet applications. The product implements the digital diagnostics required by the SFF-8472 via a 2-wire serial bus.

Product Features

- 25.78Gbps bidirectional data transmission capability
- Compliant with IEEE 802.3by
- Compliant with SFF-8402
- Compliant with SFF-8432
- Compliant with SFF-8431
- Compliant with SFF-8472
- Clock data recovery on transmit and receive channels CDR
- Hot-pluggable SFP+ footprint
- 850nm VCSEL laser transmitter
- Duplex LC connector
- Built-in digital diagnostic functions
- Up to 70m on OM3 MMF and 100m on OM4 MMF
- Single power supply 3.3V
- RoHS-6 Compliant
- Operating temperature range: 0°C to 70°C(Case temperature)

Applications

- 25GBASE-SR Ethernet

Ordering Information

Part Number	Description	Color on Clasp
UMS25SR	25GBASE-SR SFP28 850nm LC Connectors, up to 70m(OM3) or 100m(OM4) on MMF, with DOM function	Black

General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Operating Temperature	T_C	0		70	$^{\circ}\text{C}$	1
Storage Temperature	T_{STO}	-40		85	$^{\circ}\text{C}$	2
Supply Current	I_{CC}			290	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

Link Distances

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data rate	DR		25.78		Gbps	1
Bit error rate	BER			5E[-5]		1
OM3 multimode fiber (bandwidth 2000MHz*km)	L			70	M	1
OM4 multimode fiber (bandwidth 4700MHz*km)	L			100	M	1

Notes:

1. At 25.78Gbps Ethernet data rate (IEEE802.3by)

Optical – Characteristics – Transmitter

$V_{CC}=3.14V$ to $3.46V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Output Optical Power	P_{TX}	-8.4		2.4	dBm	1
Optical Center Wavelength	λ_C	840	850	860	nm	
Optical Modulation Amplitude	OMA	-6.4		3	dBm	
Extinction Ratio	ER	2			dB	
Spectral Width (RMS)	$\Delta\lambda$			0.6	nm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Transmitter Dispersion Penalty	TDP			4.3	dB	

Notes:

1. Average

Optical – Characteristics – Receiver

$V_{CC}=3.14V$ to $3.46V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Center Wavelength	λ_C	840	850	860	nm	
Optical Input Power@25.78Gbps	P_{RX}	-5.2		3	dBm	
Optical Return Loss	ORL	12			dB	
LOS Assert	LOS_A	-30			dBm	
LOS De-Assert	LOS_D			-13	dBm	
LOS Hysteresis	LOS_H	0.5			dB	

Electrical – Characteristics – Transmitter

$V_{CC}=3.14V$ to $3.46V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Input differential impedance	R_{IN}		100		Ω	
Differential data input swing	V_{IN_PP}	250		1600	mV	
Transmit Disable Voltage	V_D	2		V_{CC}	V	
Transmit Enable Voltage	V_{EN}	V_{EE}		$V_{EE}+0.8$	V	

Electrical – Characteristics – Receiver

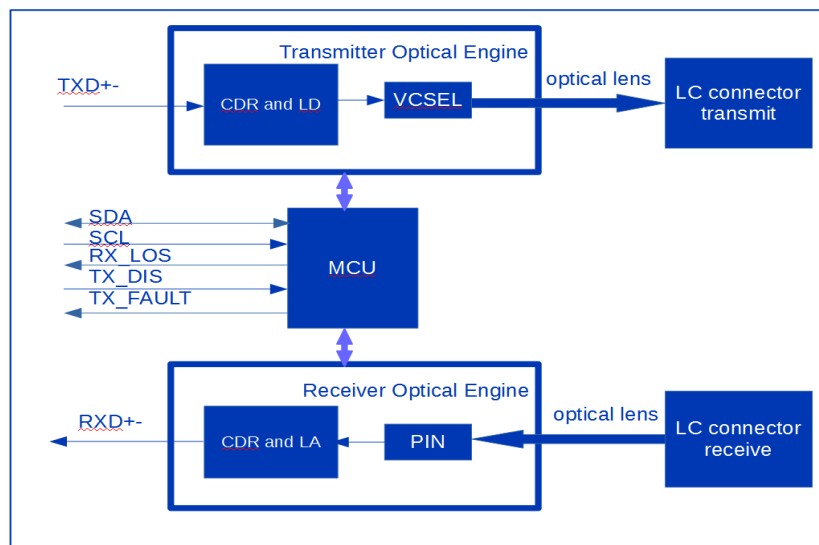
$V_{CC}=3.14V$ to $3.46V$, $T_C=0^{\circ}C$ to $70^{\circ}C$

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Differential output swing	V_{OUT_PP}	370		850	mV	
LOS Assert	LOS_A	2		V_{CC_HOST}	V	
LOS De-Assert	LOS_D	V_{EE}		$V_{EE}+0.5$	V	

Digital Diagnostic Functions

The SFP28-SR supports the 2-wire serial communication protocol defined in SFF-8472, which accesses digital diagnostic information via a 2-wire interface at address 0xA2. Digital diagnostics default to internal calibration, and the internal micro-control unit accesses device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power, and transceiver supply voltage in real time. The module implements the alarm function of the SFF-8472.

Block-Diagram-of-Transceiver



Functions Description

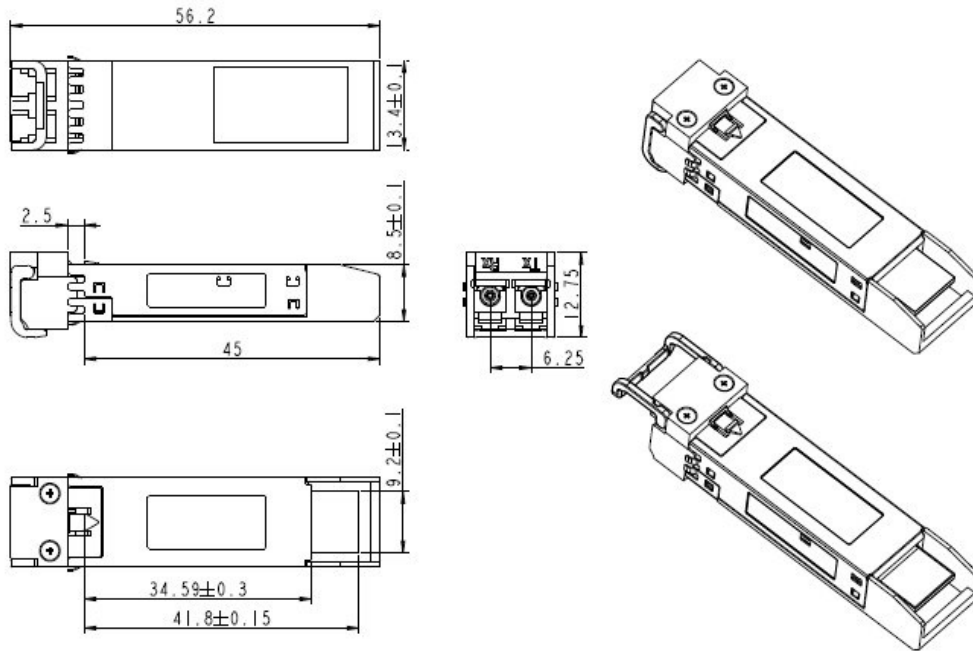
UNIVISO's SFP28-SR module is manufactured using the advanced COB (Chip on Board) process. It consists of a microcontroller, a transmitter optical engine and a receiver optical engine. The module has built-in clock and data recovery functions. The default fixed operation is in the 25.2Gbps- 28.1Gbps rate range. If you need other speed range versions or dual rate range versions, you can contact us for special customization.

The transmitter optical engine includes a transmitter clock recovery circuit (CDR) and a laser driver circuit (LD), a VCSEL laser, and a detection photodiode (MPD). The high-speed differential electrical signal output by the host is recovered by the CDR, sent to the laser driver for amplification, and the VCSEL laser is driven to generate an optical signal, which is coupled to the optical fiber through the optical lens. The light engine integrates a photodiode for detection for output optical power detection, and the laser driver uses an automatic optical power control loop to ensure the stability of the transmitted optical power.

The receiving end light engine includes a photodiode (PIN), a signal amplifier (TIA/LA) and a receiving end clock data recovery circuit (CDR). The optical signal in the optical fiber is coupled to the receiving photodiode (PIN) through the optical lens to be converted into The photo-generated current, the photo-generated current signal is amplified by the amplifier, sent to the CDR circuit and recovered from the clock and data signals, and finally output to the host as a high-speed differential signal. The microcontroller communicates with the host through a 2-wire serial communication interface, providing module control functions, status reporting functions, and monitoring functions (DOM). This product complies with the SFF-8472 standard.

This product meets the requirements of the IEEE 802.3by standard. With the support of RS-FEC, it can reach a transmission distance of 100 meters in OM4 fiber.

Dimensions

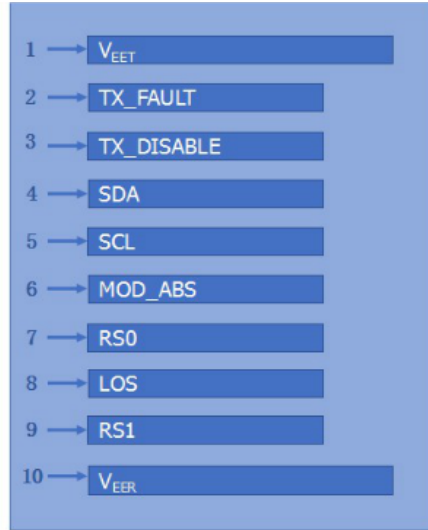


ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED
UNIT: mm

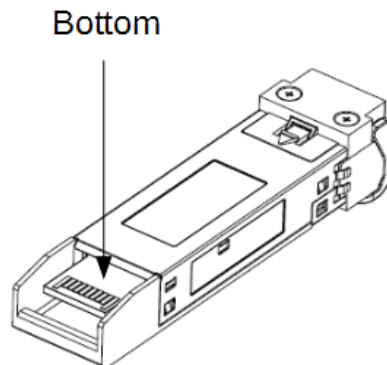
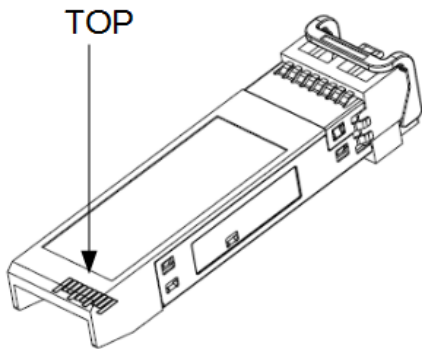
Electrical Pad Layout



Top of Board



bottom of Board



Pin Assignment

PIN #	Symbol	Description	Remarks
1	V _{EET}	Transmitter ground (common with receiver ground)	1
2	TX_FAULT	Transmitter Fault	
3	TX DISABLE	Transmitter Disable. Laser output disabled on high or open	2
4	SDA	2-wire Serial Interface Data Line	3
5	SCL	2-wire Serial Interface Clock Line	3
6	MOD ABS	Module Absent. Grounded within the module	3
7	RS0	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation	4
9	RS1	No connection required	1
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 isolated from chassis ground
2. Disabled: T_{DIS}>2V or open, Enabled: T_{DIS}<0.8V
3. Should Be pulled up with 4.7k -10k ohm on host board to a voltage between 2V and 3.6V
4. LOS is open collector output

References

1. IEEE standard 802.3by. IEEE Standard Department, 2016.
2. [SFF-8402_SFP-1X28-Gbs-Pluggable-Transceiver-Solution\(SFP28\).Rev1.1 September 13 2014](#)
3. [SFF-8432_SFP-Module-and-Cage.Rev5.1.1 October 30 2018](#)
4. [SFF-8431_SFP-10-Gbs-and-Low-Speed-Electrical-Interface.Rev4.1 September 15 2013](#)
5. [SFF-8472_Management-Interface-for-SFP.Rev12.3. July 29,2018](#)
6. [FIBRE-CHANNEL-Physical-Interface-6\(FC-PI-6\).Rev3.10 October 25,2013](#)