10GBASE-ZR SFP+ 1550nm 100km Industrial DOM Duplex LC Transceiver

SFP-10GZR100-55-I

Application

- 10GBASE-ZR/ZW & 10G Ethernet

Standards

- SFF 8472
- SFP+ MSA
- IEEE 802.3ae

Features

- Up to 11.3Gb/s Data Links
- 1550nm EML Transmitter and APD Receiver
- Up to 100km on 9/125μm SMF
- Hot-pluggable SFP+ Footprint
- Duplex LC/UPC Type Pluggable Optical Interface
- Single 3.3V Power Supply
- Power Dissipation< 2W
- Support Digital Diagnostic Monitoring Interface
- Metal Enclosure, for Lower EMI
- Meet ESD Requirements, Resist 8KV Direct Contact Voltage
- Industrial Temperature Range: -40~85℃

Description

The 10G ZR SFP+ Optical Transceiver Module supports up to 100km link lengths over SMF fiber. This transceiver is compliant with SFP+ MSA and IEEE802.3ae standards. Digital diagnostics monitoring is available via a 2-wire serial interface, as specified in SFF-8472. Featuring an operating temperature range of -40℃ to 85℃, this industrial fiber optic transceiver can work in harsh industrial environments, such as telecommunication, data processing & management, the application of industrial and factory automation, outdoor applications, rail and intelligent transportation systems (ITSs), marine, oil and gas, mining, etc.

Product Specifications

I. Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_S	-40	85	℃
Power Supply Voltage	V_{CC}	-0.5	3.6	V
Relative Humidity (Non-condensation)	RH	5	95	%
Damage Threshold	TH_d	0		dBm

II. Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Case Temperature	T_{OP}	-40		85	℃	Industrial
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V	
Data Rate			10.3125		Gb/s	
Control Input Voltage High		2		V_{CC}	V	
Control Input Voltage Low		0		0.8	V	

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Link Distance (SMF)	D			100	km	9/125um

III. Optical Characteristics

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Center Wavelength	λ	1530	1550	1565	nm	1
Optical Spectral Width	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	P_{AVG}	1		5	dBm	2
Optical Extinction Ratio	ER	8.2			dB	
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Transmitter off Output Power	P_{Off}			-30	dBm	
Transmitter Eye Mask	Compliant with IEEE802.3ae					
Receiver						
Center Wavelength	λ	1270		1610	nm	
Receiver Sensitivity (Average Power)	Sen.			-25	dBm	3
Input Saturation Power (Overload)	P_{sat}	-8			dBm	
LOS Assert	LOS_A	-35			dBm	

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
LOS De-assert	LOS_D			-27	dBm	
LOS Hysteresis	LOS_H	0.5			dB	

Notes

1. Class 1 laser safety per FDA/CDRH and IEC-825-1 regulations.
2. Launched power (avg.) is power coupled into a single mode fiber with master connector (before of life).
3. Measured with light source 1550nm, ER=8.2dB; BER =<10^-12@10.3125Gbps, PRBS=2^31-1 NRZ.

IV. Electrical Characteristics

The following electrical characteristics are defined over the recommended operating environment unless otherwise specified.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Power Consumption	p			2	W	
Supply Current	I_{CC}			480	mA	
Transmitter						
Single-ended Input Voltage Tolerance	V_{CC}	-0.3		4.0	V	
AC Common Mode Input Voltage Tolerance (RMS)		15			mV	
Differential Input Voltage Swing	$V_{in, pp}$	120		820	mVpp	
Differential Input Impedance	Z_{in}	90	100	110	Ohm	1
Transmit Disable Assert Time				10	us	
Transmit Disable Voltage	V_{dis}	V_{CC}-1.3		V_{CC}	V	
Transmit Enable Voltage	V_{en}	V_{ee}		V_{ee}+0.8	V	2

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Receiver						
Differential Output Voltage Swing	$V_{out, pp}$	350		850	mVpp	
Differential Output Impedance	Z_{out}	90	100	110	Ohm	3
Data Output Rise/Fall Time	T_r / T_f	28			ps	4
LOS Assert Voltage	$V_{los}H$	V_{CC}-1.3		V_{CC}	V	5
LOS De-assert Voltage	$V_{los}L$	V_{ee}		V_{ee}+0.8	V	5
Power Supply Rejection	PSR	100			mVpp	6

Notes:

1. Connected directly to Tx data input pins. AC coupled thereafter.
2. Or open circuit.
3. Input 100 ohms differential termination.
4. These are unfiltered 20%-80% values.
5. Loss of Signal is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
6. Receiver sensitivity is compliant with power supply sinusoidal modulation of 20Hz to 1.5MHz up to specified value applied through the recommended power supply filtering network.

V. Pin Definitions

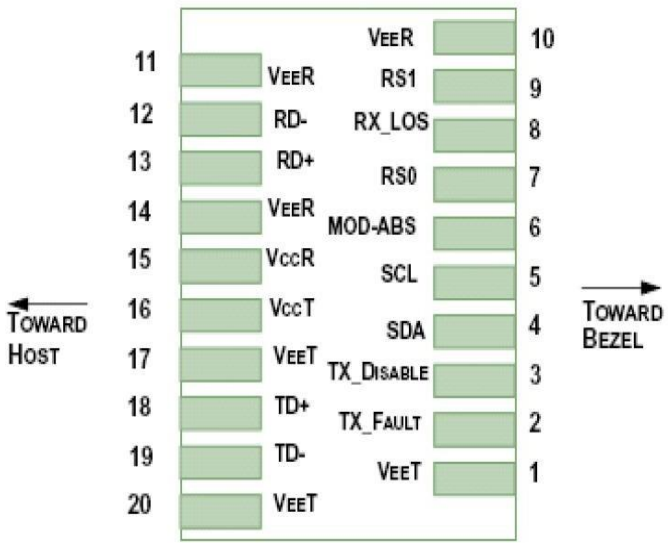


Figure 1. Diagram of host board connector block pin numbers and names

Pin	Symbol	Name/Description	Notes
1	$V_{EE}T$	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	4
5	SCL	2-Wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the Module	4
7	RS0	Rate Select 0	5
8	LOS	Loss of Signal Indication. Logic 0 Indicates Normal Operation.	6
9	RS1	No Connection Required	
10	$V_{EE}R$	Receiver Ground (Common with Transmitter Ground)	1
11	$V_{EE}R$	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	$V_{EE}R$	Receiver Ground (Common with Transmitter Ground)	1
15	$V_{CC}R$	Receiver Power Supply	
16	$V_{CC}T$	Transmitter Power Supply	
17	$V_{EE}T$	Transmitter Ground (Common with Receiver Ground)	1

Pin	Symbol	Name/Description	Notes
18	TD+	Transmitter Non-Inverted Data in. AC Coupled	
19	TD-	Transmitter Inverted Data in. AC Coupled	
20	$V_{EE}T$	Transmitter Ground (Common with Receiver Ground)	1

Notes

1. Circuit ground is internally isolated from chassis ground.
2. TFAULT is an open collector/drain output, which should be pulled up with a 4.7kΩ-10kΩ resistor on the host board if intended for use. Pull up voltage should be between 2.0V to V_{CC} + 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 TDIS>2.0V or open, enabled on TDIS<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. Internally pulled down per SFF-8431 Rev 4.1.
6. LOS is open collector output. It 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.

VI. Digital Diagnostic Specifications

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff.

Parameter	Symbol	Min.	Max.	Unit	Notes
Temperature Monitor Absolute Error	DMI_Temp.	-3	3	℃	Over Operating Temp
Supply Voltage Monitor Absolute Error	DMI_V_{CC}	-0.15	0.15	V	Full Operating Range
RX Power Monitor Absolute Error	DMI_Rx	-3	3	dB	
Bias Current Monitor	DMI_Bias	-10%	10%	mA	
TX Power Monitor Absolute Error	DMI_Tx	-3	3	dB	

VII. Mechanical Specifications

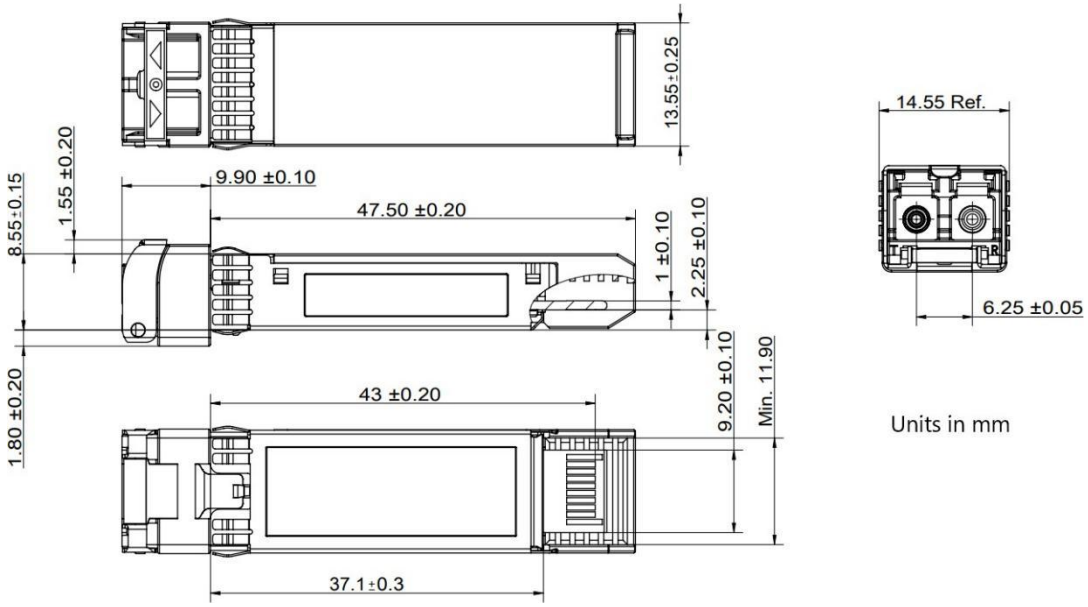


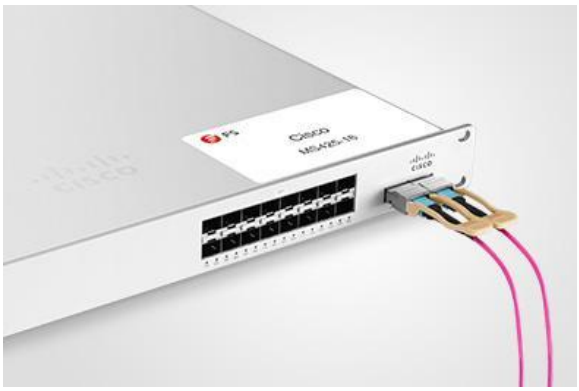
Figure 2. Mechanical Outline

Test Center

I. Compatibility Testing

Each fiber optical transceiver has been tested in host device on site in FS Assured Program to ensure full compatibility with over 200 vendors.

Cisco Catalyst C9500-24Y4C



Cisco MS425-16

Brocade VDX 6940-144S

Dell EMC Networking Z9100-ON

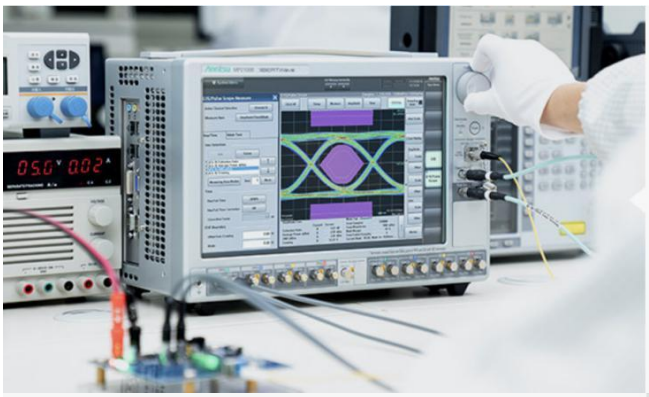
Force⑩tm S60-44T

HUAWEI S6720-30L-HI-24S

Above is part of our test bed network equipment. For more information, please click the Test Bed PDF. It will be updated in real time as we expand our portfolio.

II. Performance Testing

Each fiber optical transceiver has been fully tested in FS Assured Program equipped with world's most advanced analytical equipment to ensure that our transceivers work perfectly on your device.



1. TX/RX Signal Quality Testing

Equipped with the all-in-one tester integrated 4ch BERT & sampling oscilloscope, and variable optical attenuator to ensure the input and output signal quality.

- Eye Pattern Measurements: Jitter, Mask Margin, etc
- Average Output Power
- OMA
- Extinction Ratio
- Receiver Sensitivity
- BER Curve

2. Reliability and Stability Testing

Subject the transceivers to dramatic changes in temperature on the thermal shock chamber to ensure reliability and stability of the transceivers.

- Commercial: 0 °C to 70 °C
- Extended: -5 °C to 85 °C
- Industrial: -40 °C to 85 °C

3. Transfer Rate and Protocol Testing

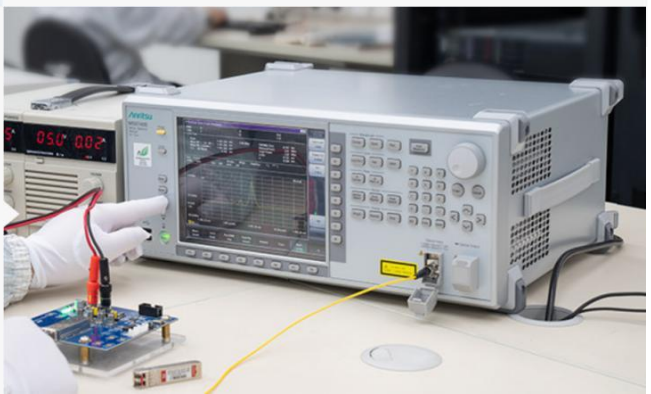
Test the actual transfer data rate and the transmission ability under different protocols with Network Master Pro.

- Ethernet
- Fibre Channel
- SDH/SONET
- CPRI

4. Optical Spectrum Evaluation

Evaluate various important parameters with the Optical Spectrum Analyzer to meet the industry standards.

- Center Wavelength, Level
- OSNR
- SMSR
- Spectrum Width



Order Information

Part Number	Description
SFP-10G-T-30	10GBASE-T SFP+ Copper RJ-45 30m Transceiver
SFP-10GLRM-31	10GBASE-LRM SFP+ 1310nm 220m DOM Duplex LC Transceiver
XFP-10GLRM-31	10GBASE-ER SFP+ 1550NM 40KM INDUSTRIAL DOM Duplex LC Transceiver
SFP-10GSR-85	10GBASE-SR SFP+ 850nm 300m DOM Duplex LC Transceiver
SFP-10GLR-31	10GBASE-LR SFP+ 1310nm 10km DOM Duplex LC Transceiver
SFP-10GER-55	10GBASE-ER SFP+ 1550nm 40km DOM Duplex LC Transceiver
SFP-10GZR-55	10GBASE-ZR SFP+ 1550nm 80km DOM Duplex LC Transceiver
XFP-10GZR-55	10GBASE-ZR XFP 1550nm 80km DOM Duplex LC Transceiver
SFP-10GZR100-55	10GBASE-ZR SFP+ 1550nm 100km DOM Duplex LC Transceiver
SFP-10GMSR-85	Dual-Rate 1000BASE-SX and 10GBASE-SR SFP+ 850nm 300m DOM Transceiver
SFP-10GMLR-31	Dual-Rate 1000BASE-LX and 10GBASE-LR SFP+ 1310nm 10km DOM Transceiver
SFP-10G-T-30I	10GBASE-T SFP+ Copper RJ-45 30m Industrial Transceiver
SFP-10GSR-85-I	10GBASE-SR SFP+ 850nm 300m Industrial DOM Duplex LC Transceiver
SFP-10GLR-31-I	10GBASE-LR SFP+ 1310nm 10km Industrial DOM Duplex LC Transceiver
SFP-10GER-31-I	10GBASE-ER SFP+ 1550nm 40km Industrial DOM Duplex LC Transceiver
SFP-10GZR-55-I	10GBASE-ZR SFP+ 1550nm 80km Industrial DOM Duplex LC Transceiver
SFP-10GZR100-55I	10GBASE-ZR SFP+ 1550nm 100km Industrial DOM Duplex LC Transceiver