

1/10GBASE-LR SFP+ 1310nm 20km Industrial Module

SFP-1/10GLR20-I



Application

- 10GBASE-LR/LW Ethernet
- 10GFC
- 8GFC

Features

- Link Lengths at 10G 20km with DFB 1310nm
- Duplex LC Connector
- Maximum Power Consumption 1.3W
- -40 to 85°C Operating Temperature Range
- Single +3.3V ± 5% Power Supply
- Digital Monitoring SFF-8472 Compliant

Product Specifications

I. Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Notes
Supply Voltage	V _{CC}	-0.3	4.0	V	
Storage Temperature Range	T _s	-40	85	°C	
Relative Humidity	RH	0	95	%	

II. Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T _c	-40		85	°C	
Power Supply Voltage	V _{CC}	3.14	3.3	3.46	V	
Bit Rate	BR	1.25		10.52	Gb/s	
Bit Error Ratio	BER			10 ⁻¹²		
Max Supported Link Length	L			30	km	

III. Ordering Information

Package	Data Rate (Gb/s)	Laser	Optical Power (OMA) dBm	Detector	Sensitivity (OMA) dBm	Temp	Reach	Other	Application
SFP+	1.25~10.52	1310nm DFB	>-1	PIN	<-15	-40~85 °C	20km	DDM	10GBASE-LR/LW 8G/10GFC

IV. Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Nominal Wavelength	λ	1260	1310	1355	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Spectral Width	$\Delta\lambda$			1	nm	
Optical Output Power	P_{AV}	-2		4	dBm	20km
Extinction Ratio	ER	3.5			dB	
Average Launch Power of OFF Transmitter	P_{OFF}			-35	dBm	
Relative Intensity Noise	R_{IN}			-128	dB/Hz	
Optical Return Loss Tolerance	ORLT	-15			dB	
Receiver						
Center Wavelength	λ	1260		1610	nm	
Average Receiver Power	P_{AVG}			+1	dBm	
Receiver Sensitivity ² (OMA)	R_{SENSE1}			-15	dBm	
Receiver Reflectance	RREFL			-15	dB	
Assert LOS	LOS_A	-30			dBm	
De-Assert LOS	LOS_D			-17	dBm	
LOS Hysteresis		0.5			dB	

Notes :

- OMA = OMAmin - TDP, sum of all penalties incorporated, incl. aging and interoperability margin.
- Achieved with worst case jitter stress at δt , and maximum reflection at γt , Jitter total @ δt , BER < 10⁻¹² = 0.28UI (informative).

V. Principle Diagram

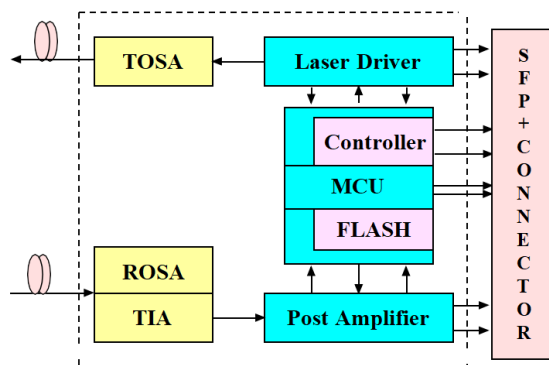


Figure 1. Principle Diagram

VI. Electric Ports Definition

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Supply Voltage	V _{CC}	3.14	3.3	3.46	V	
Supply Current	I _{CC}			390	mA	
Transmitter						
Input Differential Impedance	R _{IN}	80	100	120	Ω	1
Differential Data Input Swing	V _{IN}	180		700	mVp-p	
Transmit Disable Voltage	V _{DIS}	2		V _{CCHOST}	V	
Transmit Enable Voltage	V _{EN}	V _{EE}		V _{EE} +0.8	V	
Transmit Fault Assert Voltage	V _{FA}	2.2		V _{CCHOST}	V	
Transmit Fault De-Assert Voltage	V _{FDA}	V _{EE}		V _{EE} +0.4	V	
Receiver						
Differential Data Output Swing	V _{OD}	450	600	850	mVp-p	
Output Rise Time	t _{RISE}	25			ps	
Output Fall Time	t _{FALL}	25			ps	
LOS Fault	V _{LOSFT}	2		V _{CCHOST}	V	
LOS Normal	V _{LOSNR}	V _{EE}		V _{EE} +0.8	V	

VII. Pin Function Definitions

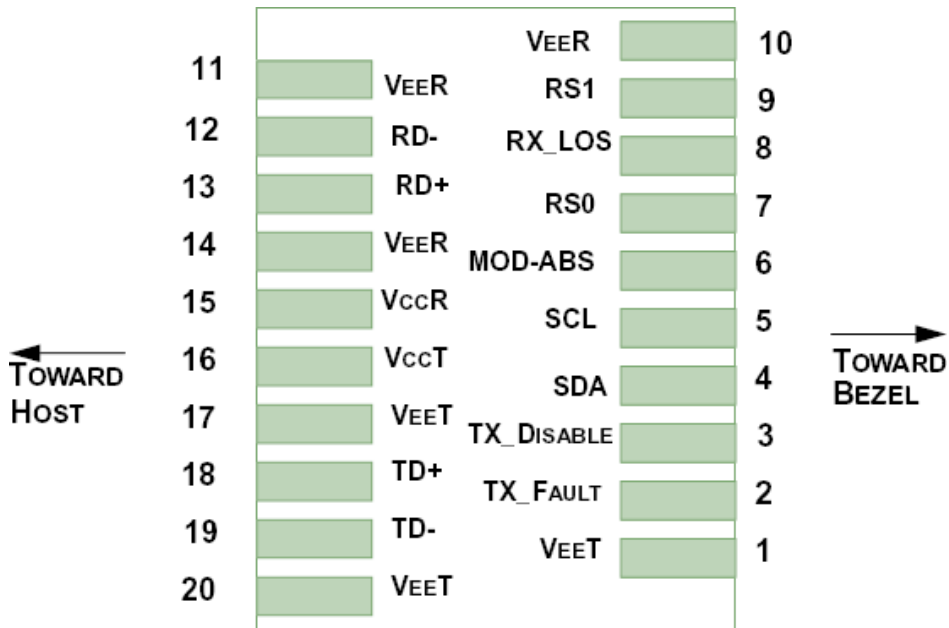


Figure 2. Pin Function Definitions

VIII. Typical Application Circuit

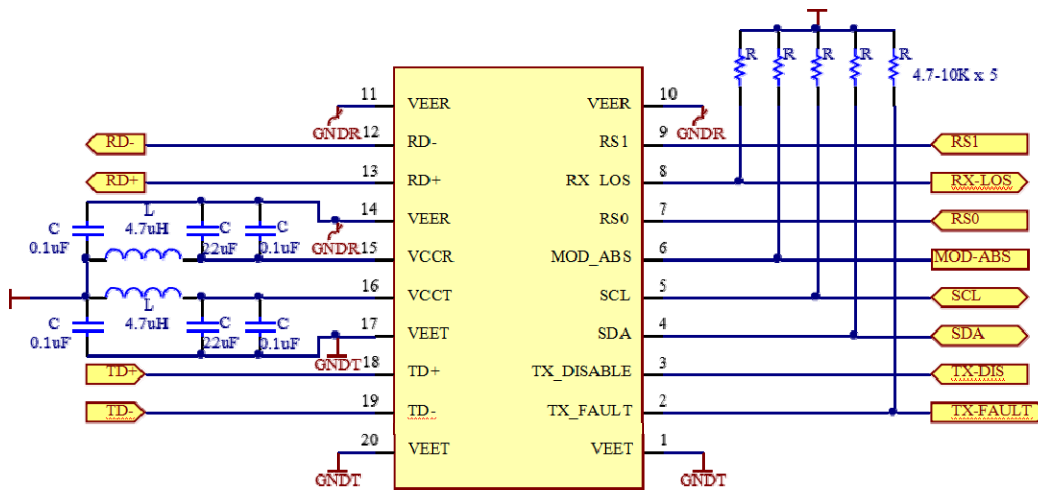


Figure 3. Typical Application Circuit

IX. Package Outline

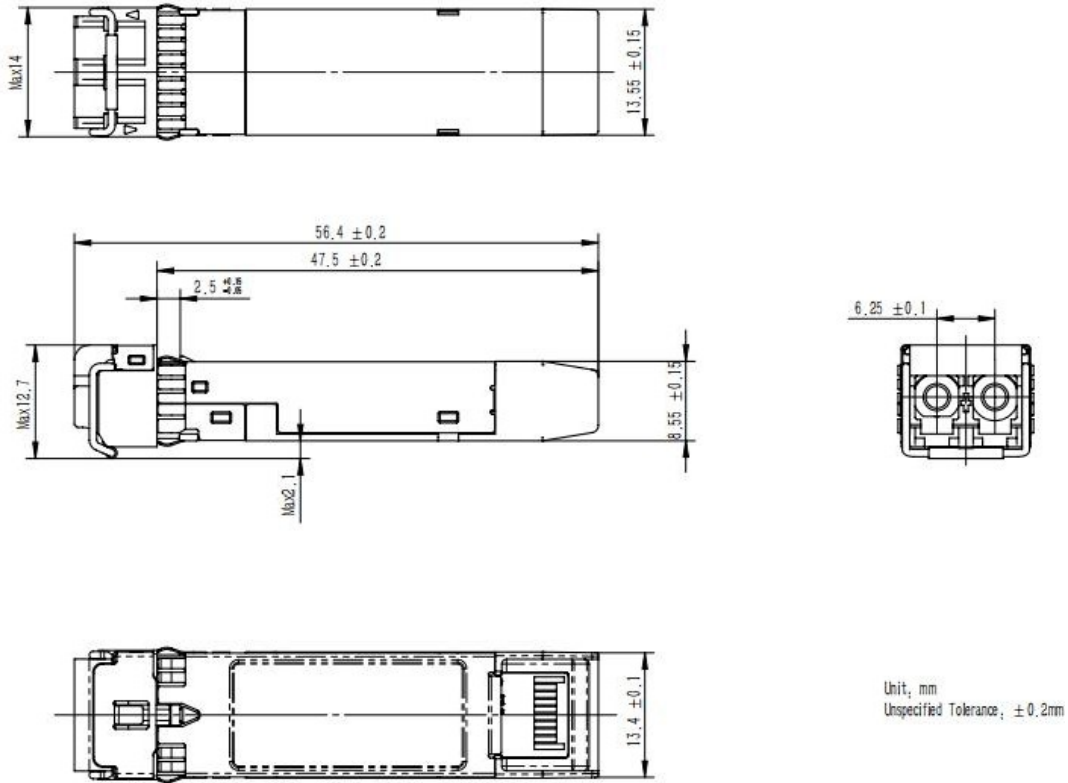


Figure 4. Package Outline

X. Module Pin Definitions

Feature	Test Method	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883C Method 3015.7	Class 1 (> 1500 Volts)
Electrostatic Discharge (ESD) Immunity	Variation of IEC 61000-4-2	LV 4 (Air discharge :15KV; Contact Discharge: 8 KV) Performance Criterion: B
Electromagnetic Interference (EMI)	CISPR22 ITE Class B EN55022 Class B FCC Class B	Compliant with Standards
Immunity	IEC61000-4-3 Class 2 EN55024	Typically show no measurable effect from a 3v/m field swept from 80 to 1000MHz applied to the transceiver without a chassis enclosure.

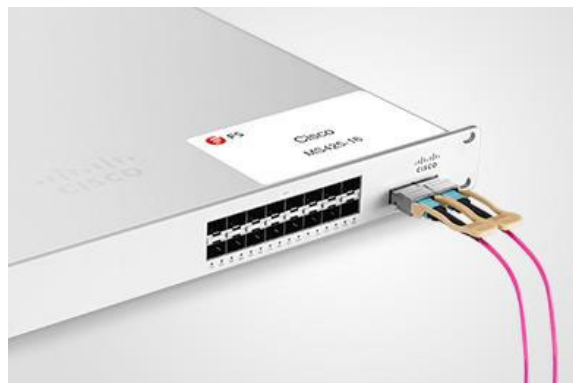
Test Center

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



Force@ S60-44T

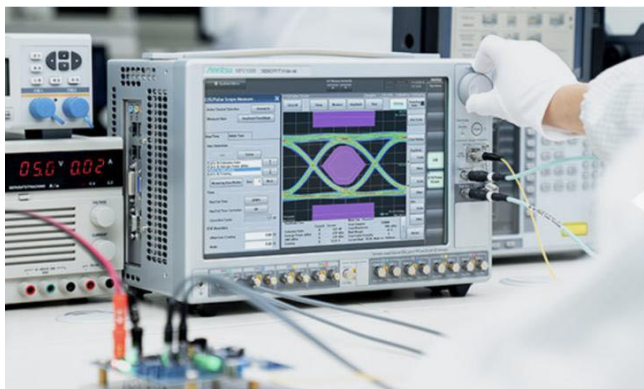


HUAWEI S6720-30L-HI-24S

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

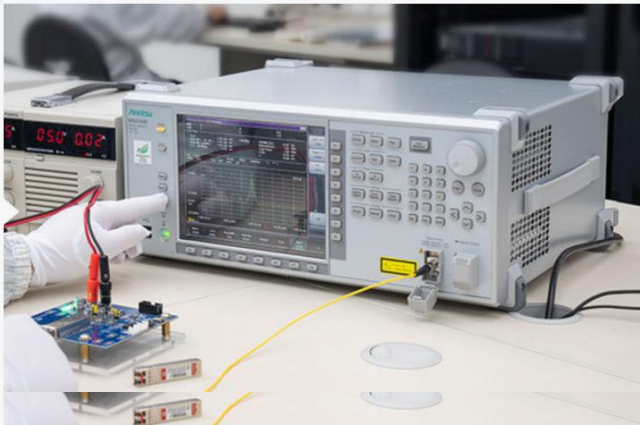
Test the actual transfer data rate and the transmission ability under different protocols with Network Master Pro.

- 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-1/10GLR20-I	1/10GBASE-LR SFP+ 1310nm 20km Industrial Module
SFP-10GER-31-I	10GBASE-ER SFP+ 1310nm 40km Industrial Module
SFP-10GLR-31-I	10GBASE-LR SFP+ 1310nm 10km Industrial Module
SFP-10GLRM-31-I	10GBASE-LRM SFP+ 1310nm 220m Industrial Module
SFP-10GSR-85-I	10GBASE-SR SFP+ 850nm 300m Industrial Module
SFP-10GZR-55-I	10GBASE-ZR SFP+ 1550nm 80km Industrial Module
SFP-10GZRC-55-I	10GBASE-ZR SFP+ 1550nm 100km Industrial Module
SFP-10G-T-I	10GBASE-T SFP+ Copper RJ-45 30m Industrial Module
SFP-10GER-31	10GBASE-ER SFP+ 1310nm 40km Module
SFP-10GER-55	10GBASE-ER SFP+ 1550nm 40km Module
SFP-10GLR-31	10GBASE-LR SFP+ 1310nm 20km Module
SFP-10GLRM-31	10GBASE-LRM SFP+ 1310nm 220m Module
SFP-10G-T	10GBASE-T SFP+ Copper RJ-45 30m Module
SFP-10G-T100	10GBASE-T SFP+ Copper RJ-45 100m Module
SFP-10GM-T	10M/100M/1G/2.5G/5G/10Gbps SFP+ SGMII Copper RJ-45 30m Module
SFP-10GSR-85	10GBASE-SR SFP+ 850nm 300m Module
SFP-10GZR-55	10GBASE-ZR SFP+ 1550nm 80km Module
SFP-10GZRC-120	10GBASE-ZR SFP+ 1550nm 120km Module
SFP-10GZRC-55	10GBASE-ZR SFP+ 1550nm 100km Module
SFP-2.5/5G-T	1/2.5/5/10G NBASE-T SFP+ Copper RJ-45 30m Module