

50GBASE-LR SFP56 1310nm 10km Industrial DOM Transceiver

SFP-50GLR-31-I



Application

- 50GBASE-LR
- eCPRI

Standards

- IEEE 802.3cd
- IEEE 802.3 50GAUI-1 C2M
- SFF-8472
- SFF-8432

Features

- Support eCPRI Wireless and 50GBASE-LR Application
- 2-Wire Interface with Integrated Digital Diagnostic Monitoring
- DFB Laser and PIN Receiver
- Single +3.3V Power Supply
- With Duplex LC Connector Up to 10km Transmission on SMF
- Power Consumption Lower than 2W
- Industrial Temperature Range: -40~85°C
- Class 1 Laser Safety

Description

The SFP56-LR-50G-I transceiver supports up to 10km link lengths over OS2 SMF via duplex LC connectors and is suitable for 50G Ethernet and Data Center applications. It is compliant with IEEE 802.3cd, SFP56 MSA, SFF-8472 and SFF-8432 standards. The built-in digital diagnostics monitoring (DDM) allows access to real-time operating parameters.

It is for industrial operating temperature range and 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.

Products Specifications

I. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Storage Temperature Range	T _S	-40		85	°C
Operating Relative Humidity	RH	10		85	%

II. Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature Range	T _{OPR}	-40		85	°C	
Power Supply Voltage	V _{CC}	3.135	3.3	3.465	V	
Power Supply Current	I _{CC}			600	mA	1
Power Dissipation	P			2	W	
Data Rate	DR		26.5625		GBd	
Transmission Distance	TD			10	km	2

Notes

- 1. Max. current at 3.3V.
- 2. Measured with SMF.

III. Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Center Wavelength Range	λ_c	1295	1311	1325	nm	
Modulation Fomart			PAM4			
Average Output Power	P_{OUT}	-4.5		4.2	dBm	
Outer Optical Modulation Amplitude	OMA	-1.5		4	dBm	
TDECQ	TDECQ			3.2	dB	
Average Output Power (Laser Off)	$P_{OUT-OFF}$			-30	dBm	
Extinction Ratio	ER	3.5			dB	
RIN15.6 OMA				-132	dB/Hz	
Optical Return Loss Tolerance				15.6	dB	
Transmitter Reflectance				-26	dB	
Receiver						
Center Wavelength Range	λ_c	1295	1311	1325	nm	
Damage Threshold				5.2	dBm	1
Average Receive Power		-10.8		4.2	dBm	
Receiver Power (OMA_{outer})				4	dBm	2
Receiver Sensitivity (OMA_{outer})			Max (-8.4, SECQ-9.8)		dBm	

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
LOS Assert	LOS _A	-30			dBm	
LOS De-assert	LOS _D			-11	dBm	
LOS Hysteresis	LOS _H	0.5			dB	

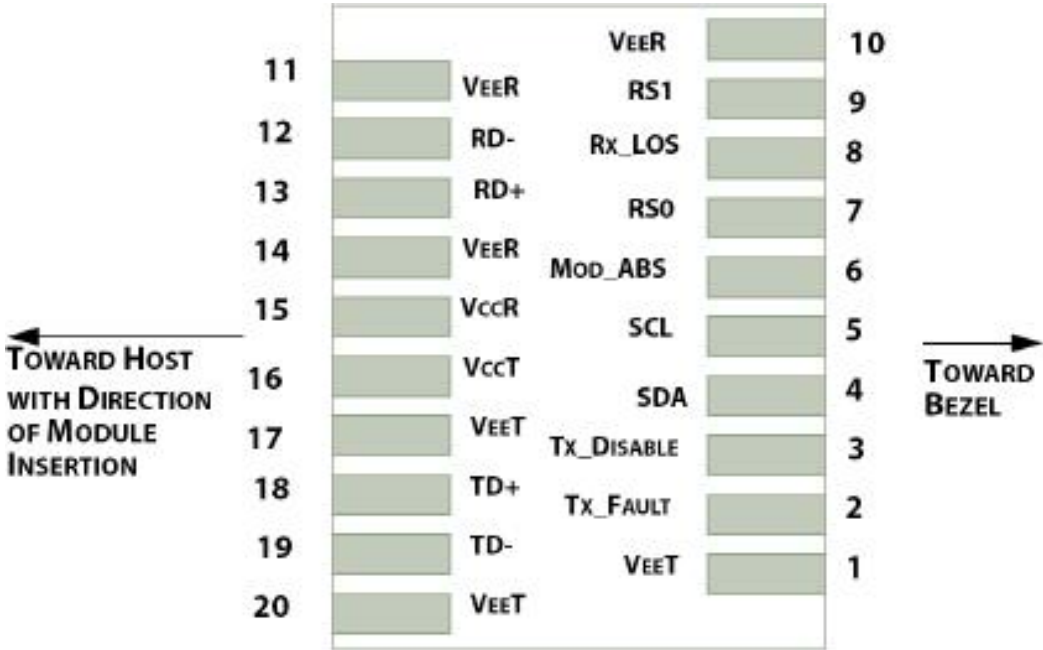
Notes

1. The receiver shall be able to tolerate, without damage, continuous exposure to an optical signal having this average power level.
The receiver does not have to operate correctly at this input power.
2. Measured with a PRBS31Q test pattern @26.5625 GBd, BER≤2.4X10⁻⁴.

IV. Electrical Characteristics

Parameter		Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter							
Differential Data Input Amplitude		V _{IN,P-P}	180		900	mVpp	
Input Differential Impedance		Z _{IN}	90	100	110	Ω	
Tx_Fault	Normal Operation	V _{OL}	-0.3		0.4	V	
	Transmitter Fault	V _{OH}	2.4		V _{CC}	V	
Tx_Disable	Normal Operation	V _{IL}	-0.3		0.8	V	
	Laser Disable	V _{IH}	2.0		V _{CC} +0.3	V	
Receiver							
Differential Data Output Amplitude		V _{OUT,P-P}	300		1000	mVpp	
Output Differential Impedance		Z _O	90	100	110	Ω	
Rx_LOS	Normal Operation	V _{OL}	-0.3		0.4	V	
	Lose Signal	V _{OH}	2.4		V _{CC}	V	

V. Pin Definition



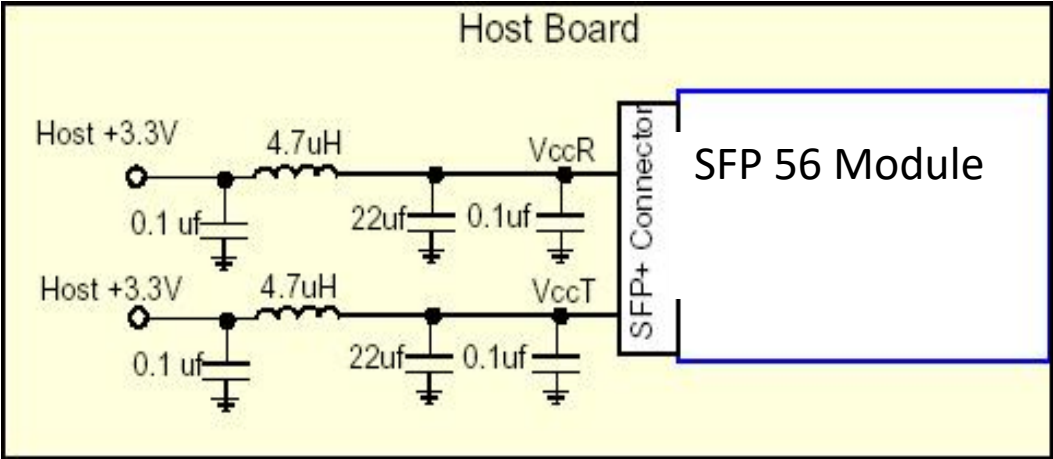
Contacts	Logic	Symbol	Description	Notes
Case		Case	Module Case	2
1		V _{EE} T	Module Transmitter Ground	3
2	LVTTL-O	TX_FAULT	Module Transmitter Fault	4
3	LVTTL-I	TX_DISABLE	Transmitter Disable Turns off Transmitter Laser Output	5
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i)	6
5	LVTTL-I/O	SCL	2-Wire Serial Interface Clock (Same as MOD-DEF1 in INF-8074i)	6
6		MOD_ABS	Module Absent, Connected to V _{EE} T or V _{EE} R in the Module	7
7	LVTTL-I	RS0	Rx Rate Select	
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication (In FC Designated as Rx_LOS and in Ethernet Designated as Signal Detect)	4

Contacts	Logic	Symbol	Description	Notes
9	LVTTL-I	RS1	Tx Rate Select	
10		V _{EE} R	Module Receiver Ground	3
11		V _{EE} R	Module Receiver Ground	3
12	CML-O	RD-	Receiver Inverted Data Output	
13	CML-O	RD+	Receiver Non-Inverted Data Output	
14		V _{EE} R	Module Receiver Ground	3
15		V _{CC} R	Module Receiver 3.3V Supply	
16		V _{CC} T	Module Transmitter 3.3V Supply	
17		V _{EE} T	Module Transmitter Ground	3
18	CML-I	TD+	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	Transmitter Inverted Data Input	
20		V _{EE} T	Module Transmitter Ground	3

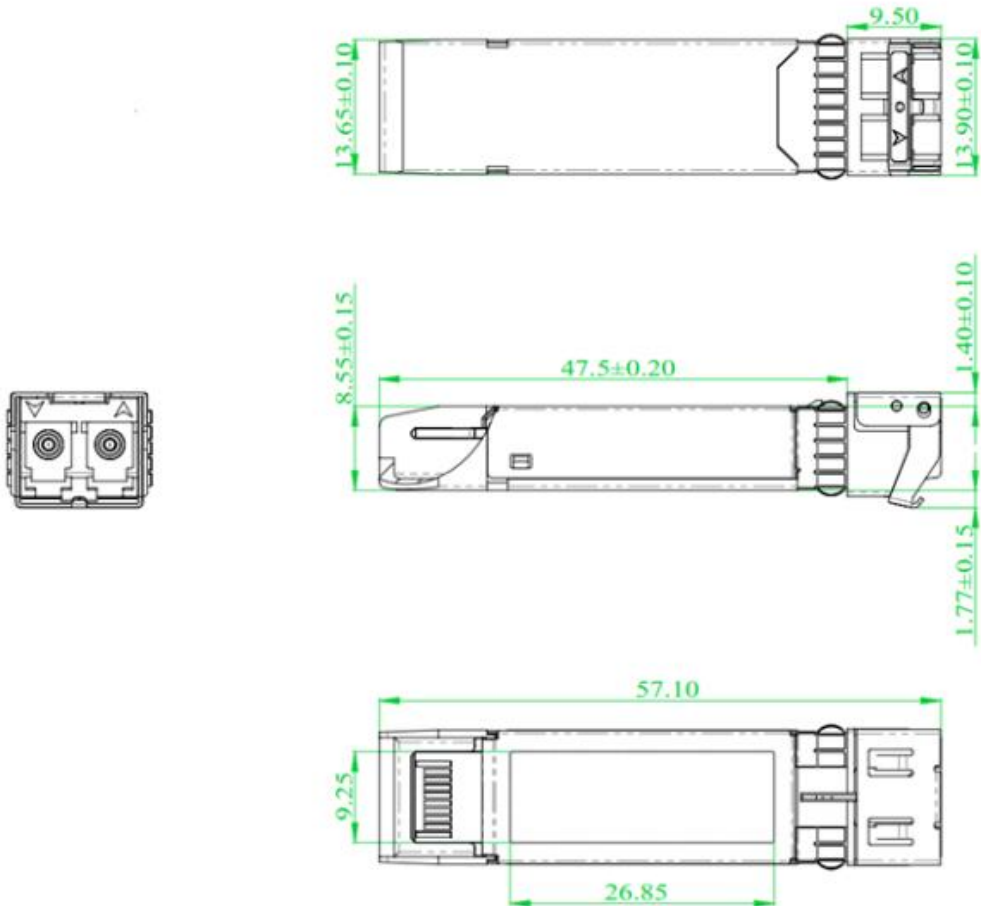
Notes

- 1. Labeling as inputs (I) and outputs (O) are from the perspective of the module.
- 2. The case makes electrical contact to the cage before any of the board edge contacts are made.
- 3. The module signal ground contacts, V_{EE}R and V_{EE}T, should be isolated from the module case.
- 4. This contact is an open collector/drain output contact and shall be pulled up on the host. Pull ups can be connected to one of several power supplies, however the host board design shall ensure that no module contact has voltage exceeding module V_{cc}T/R + 0.5 V.
- 5. Tx_Disable is an input contact with a 4.7 kOhms to 10 kOhms pullup to V_{cc}T inside the module.
- 6. 2-wire interface.
- 7. The pins shall be pulled up with 4.7K-10Kohms to a voltage between 3.14V and 3.46V on host board.

VI. Typical Application Circuit



VII. Diagram Mechanical Drawing



VIII. Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method3015.7	Class 1 (>1000V for SFIpins, >2000V for otherpins.)
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B)	Compatible with standards
Immunity	IEC61000-4-3	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950,EN (IEC) 60825-1,2	Compatible with Class I laser product.
RoHS	EU 2015/863	Compliant with exemption 7C(I)

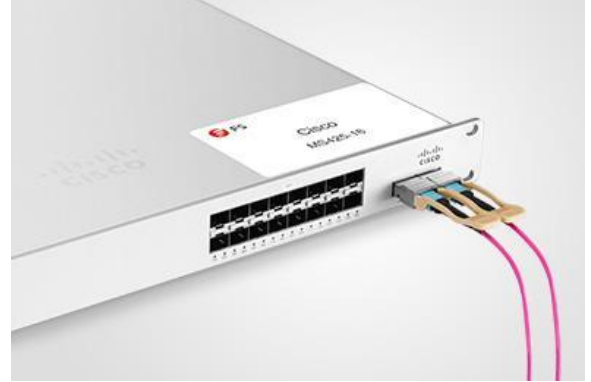
Test Center

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@tm S60-44T

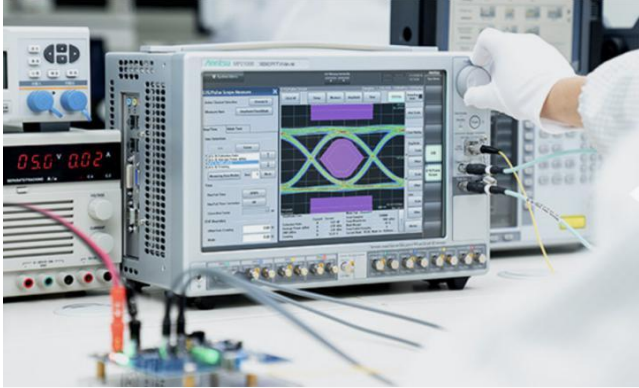


HUAWEI S6720-30L-HI-24S

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

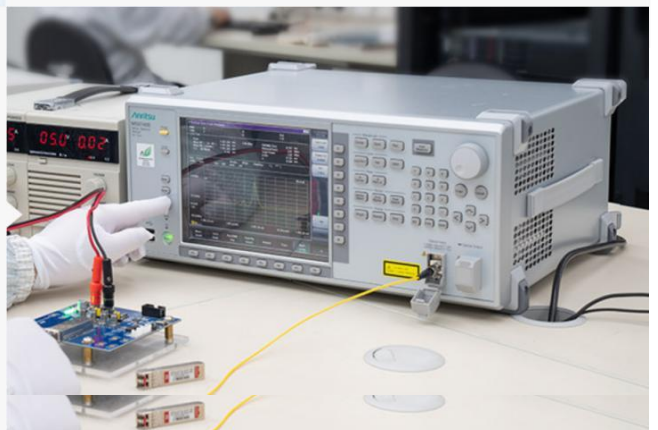
Test the actual transfer data rate and the transmission ability under different protocols with Network Master Pro.

- 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-50GSR-85	50GBASE-SR SFP56 850nm 100m DOM Transceiver
QSFP-LR-50G	50GBASE-LR QSFP28 1310nm 10km Transceiver
SFP-50GLR-31-I	50GBASE-LR QSFP28 1310nm 10km Industrial Transceiver
QSFP-ER-50G	50GBASE-ER QSFP28 1310nm 40km Transceiver
QSFP28-50G-BX	50GBASE-BX QSFP28 1271nm-TX/1331nm-RX 10km Transceiver
QSFP28-50G-BX	50GBASE-BX QSFP28 1331nm-TX/1271nm-RX 10km Transceiver
QSFP28-50G-BX40	50GBASE-BX QSFP28 1295nm-TX/1309nm-RX 40km Transceiver
QSFP28-50G-BX40	50GBASE-BX QSFP28 1309nm-TX/1295nm-RX 40km Transceiver