

# 50GBASE-SR SFP56 850nm 100m DOM Transceiver

SFP56-SR-50G



## Application

- 25G&50G BASE-SR

## Standards

- SFF-8402
- SFF-8419
- SFF-8472
- OIF-CEI-04.0
- IEEE802.3cd

## Features

- Supports 25.78Gb/s NRZ and 53.125Gb/s PAM4
- Hot-pluggable SFP56 Footprint
- 850nm VCSEL Laser and Pin Photo-Detector
- Internal CDR on Transmitter and Receiver Channel
- Duplex LC Connector
- Low Power Consumption < 1.5W
- Link Lengths at 25.78G NRZ and 53.125G PAM4 100m over OM4 MMF
- Single +3.3V  $\pm$  5% Power Supply
- Operating Temperature Range: 0°C to 70°C
- Digital Monitoring SFF-8472 Compliant

## Description

The 50G SR short-wavelength transceiver is designed for use in 25.78G NRZ and 53.125Gb/s PAM4 data rate over multimode fiber. The transceiver is compliant with SFF-8402, and the mechanical SFP+ plug is compatible with SFF-8432. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

## Product Specifications

### I. Absolute Maximum Ratings

Parameter	Symbol	Unit	Min.	Max.
<b>Storage Temperature Range</b>	T <sub>s</sub>	°C	-40	85
<b>Relative Humidity</b>	RH	%	0	85
<b>Supply Voltage</b>	V <sub>CC</sub>	V	-0.3	4.0

### II. Recommended Operating Conditions

Parameter	Symbol	Unit	Min.	Typ.	Max.
<b>Operating Case Temperature Range</b>	T <sub>c</sub>	°C	0		70
<b>Power Supply Voltage</b>	V <sub>CC</sub>	V	3.1	3.3	3.465
<b>Bit Rate</b>	BR	Gb/s		25.78/53.125	
<b>Bit Error Ratio</b>	BER				5*1E-5
<b>Max. Supported Link Length</b>	L	m			100

### III. Electric Characteristics

Parameter	Symbol	Unit	Min.	Typ.	Max.	Note
<b>Supply Voltage</b>	$V_{CC}$	V	3.1	3.3	3.465	
<b>Supply Current</b>	$I_{CC}$	mA			450	
<b>Transmitter</b>						
<b>Input Differential Impedance</b>	$R_{IN}$	$\Omega$	80	100	120	1
<b>Single Ended Data Input Swing</b>	$V_{IN}$	mVp-p	90		500	
<b>Transmit Disable Voltage</b>	$V_{DIS}$	V	2		$V_{CCHOST}$	
<b>Transmit Enable Voltage</b>	$V_{EN}$	V	$V_{EE}$		$V_{EE}+0.8$	
<b>Transmit Fault Assert Voltage</b>	$V_{FA}$	V	2		$V_{CCHOST}$	
<b>Transmit Fault De-Assert Voltage</b>	$V_{FDA}$	V	$V_{EE}$		$V_{EE}+0.8$	
<b>Receiver</b>						
<b>Single Ended Data Output Swing</b>	$V_{OD}$	mVp-p	200		500	
<b>LOS Fault</b>	$V_{LOSFT}$	V	2		$V_{CCHOST}$	
<b>LOS Normal</b>	$V_{LOSNR}$	V	$V_{EE}$		$V_{EE}+0.8$	

**NOTE 1:** Differential between TD+ / TD-

## IV. Optical Characteristics

(Tested under recommended operating conditions, unless otherwise noted)

Parameter	Symbol	Unit	25.78Gb/s			53.125Gb/s			Note
			Min.	Typ.	Max.	Min.	Typ.	Max.	

### Transmitter

<b>Modulation Format</b>			NRZ			PAM4			
<b>Nominal Wavelength</b>	$\lambda$	nm	840		860	840		860	
<b>RMS Spectral Width</b>	$\Delta\lambda$	nm			0.6			0.6	
<b>Tx OMA per Lane</b>	TxOMA	dBm	-6.4		3	-4.5		3	
<b>Optical Output Power</b>	P <sub>av</sub>	dBm	-8.4		2.4	-6.5		4	
<b>Extinction Ratio</b>	ER	dB	2			3			
<b>Launch Power in OMA Outer Minus TDECQ (Min)</b>		dBm				-5.9			
<b>Optical Return Loss Tolerance</b>	ORL	dB			12			12	
<b>Encircled Flux</b>	FLX	dBm				>86% at 19um			
						<30% at 4.5um			
<b>TDECQ</b>		dB						4.5	
<b>Average Launch Power of OFF Transmitter</b>	P <sub>OFF</sub>	dBm			-30			-30	

### Receiver

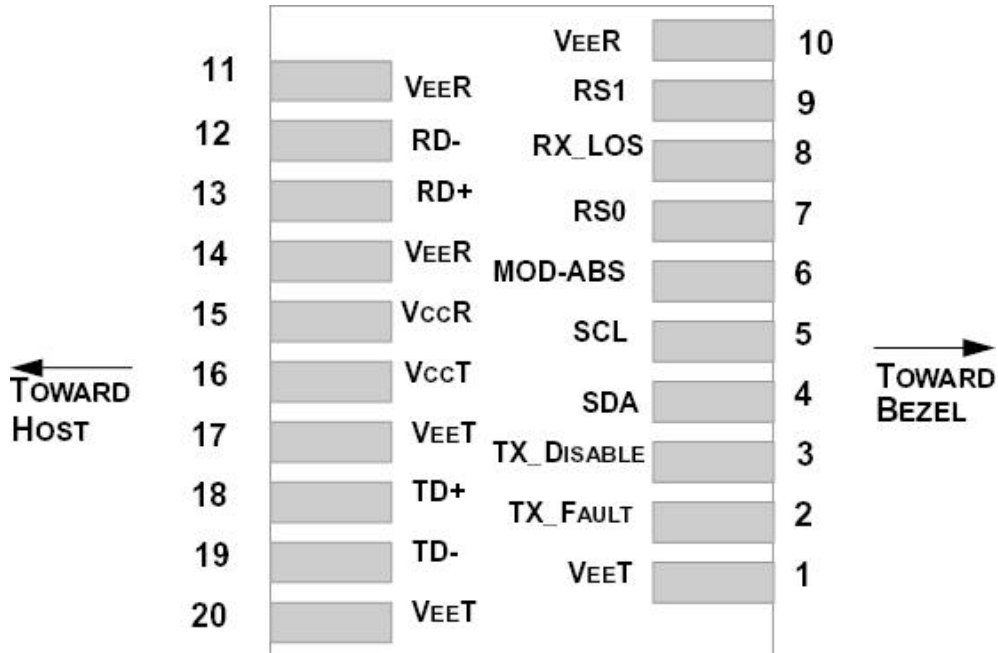
<b>Modulation Format</b>			NRZ			PAM4			
<b>Center Wavelength</b>	$\lambda$	nm	840		860	840		860	
<b>Damage Threshold</b>	DT	dBm	3.4			5			

Parameter	Symbol	Unit	25.78Gb/s			53.125Gb/s			Note
			Min.	Typ.	Max.	Min.	Typ.	Max.	

**Receiver**

<b>Max. Average Receiver Power (Overload)</b>	$P_{AVG}$	dBm			2.4			4	
<b>Receive Power (OMAOuter) (Overload)</b>		dBm			3			3	
<b>Stressed Receiver Sensitivity (OMA)</b>	$R_{SENSE1}$	dBm			-5.2			-3.4	
<b>Receiver Reflectance</b>	$R_{REFL}$	dB			-12			-12	
<b>Max. Receiver Sensitivity (OMAouter)</b>	$R_{SENSE2}$	dBm			-10.3			-6.5	

**V. Pin Function Definitions**



## VI. Transceiver Pin Descriptions

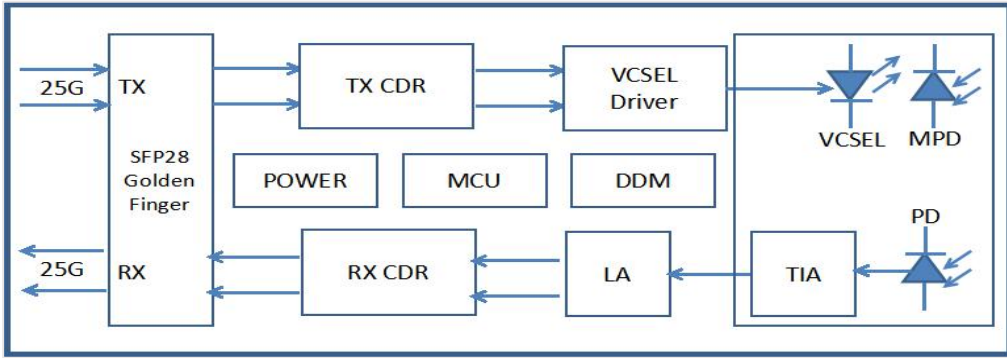
Pin Number	Symbol	Name	Description
<b>1,17,20</b>	VeeT	Transmitter Signal Ground	These Pins Should Be Connected to Signal Ground on the Host Board.
<b>2</b>	TX Fault	Transmitter Fault Out (OC)	Logic "1" Output = Transmitter Fault Logic "0" Output = Normal Operation This Pin is Open Collector Compatible, and Should Be Pulled up to Host Vcc with A 10kΩ Resistor.
<b>3</b>	TX Disable	Transmitter Disable In (LVTTTL)	Logic"1"Input (or No Connection) = Laser off Logic"0" Input = Laser on This Pin is Internally Pulled Up to Vcct with A 10kΩ Resistor.
<b>4</b>	SDA	Module Definition Identifiers	Serial ID with SFF 8472 Diagnostics Module Definition Pins Should Be Pulled up to Host Vcc with 10kΩ Resistors.
<b>5</b>	SCL		
<b>6</b>	MOD-ABS		
<b>7</b>	RS0	Receiver Rate Select (LVTTTL) Transmitter Rate Select (LVTTTL)	NA
<b>9</b>	RS1		NA
<b>8</b>	LOS	Loss of Signal Out (OC)	This Pin is Open Collector Compatible, and Should Be Pulled Up to Host Vcc with A 10kΩ Resistor.
<b>10,11,14</b>	VeeR	Receiver Signal Ground	These Pins Should Be Connected to Signal Ground on the Host Board.
<b>12</b>	RD-	Receiver Negative DATA Out (CML)	Light on = Logic "0" Output Receiver DATA Output is Internally AC Coupled And series terminated with a5 0Ω resistor.
<b>13</b>	RD+	Receiver Positive DATA Out (CML)	Light on = Logic "1" Output Receiver Data Output is Internally Ac Coupled and Series Terminated with A 50Ω Resistor.
<b>15</b>	VccR	Receiver Power Supply	This Pin Should Be Connected to a Filtered +3.3V Power Supply on the Host Board.see Figure3. Recommended Power Supply Filter

Pin Number	Symbol	Name	Description
16	VccT	Transmitter Power Supply	<b>This Pin Should Be Connected to a Filtered +3.3V Power Supply on the Host Board. See Figure3. Recommended Power Supply Filter</b>
18	TD+	Transmitter Positive DATA In (CML)	Logic"1"Input=Light On Transmitter Data Inputs are Internally AC Coupled and Terminated with a Differential 100Ω Resistor.
19	TD-	Transmitter Negative DATA In (CML)	Logic"0"Input=Light on Transmitter Data Inputs Are Internally AC Coupled and Terminated with a Differential 100Ω Resistor.

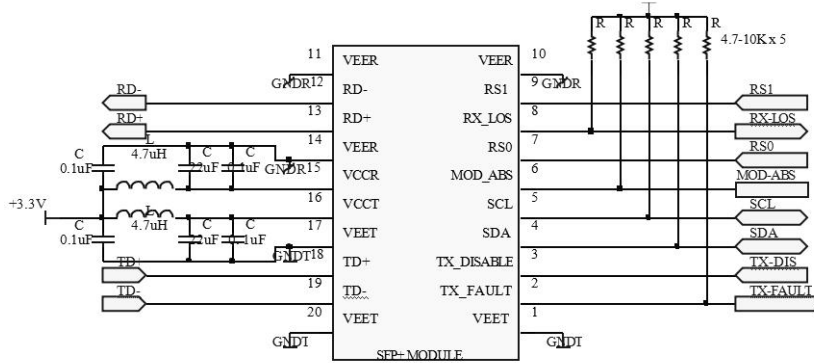
## VII. Regulatory Compliance

Feature	Test Method	Performance
<b>Electrostatic Discharge (ESD) to the Electrical Pins</b>	MIL-STD-883C Method 3015.7	Class1 (>1500 Volts)
<b>Electrostatic Discharge (ESD) Immunity</b>	Variation of IEC 61000-4-2	LV 4 (Air discharge: 15 KV; Contact discharge : 8 KV)
<b>Electromagnetic Interference (EMI)</b>	CISPR22 ITE Class B EN55022 Class B FCC Class B	Compliant with Standards
<b>Immunity</b>	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.

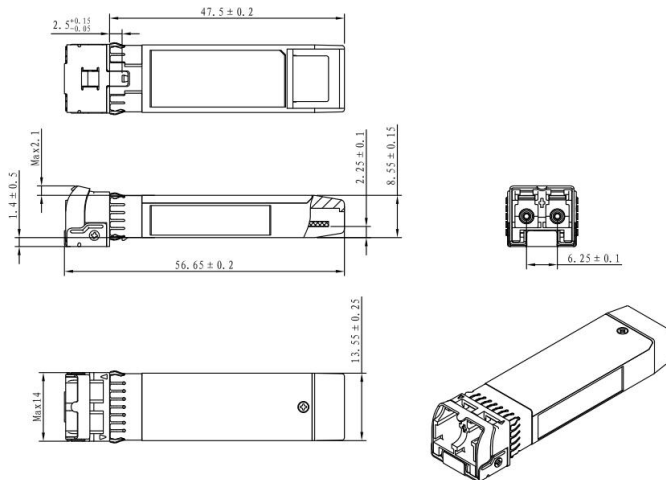
### VIII. Principle diagram



### IX. Typical Application Circuit



### X. Package Outline



Unit: mm

Unspecified Tolerance: ±0.2mm



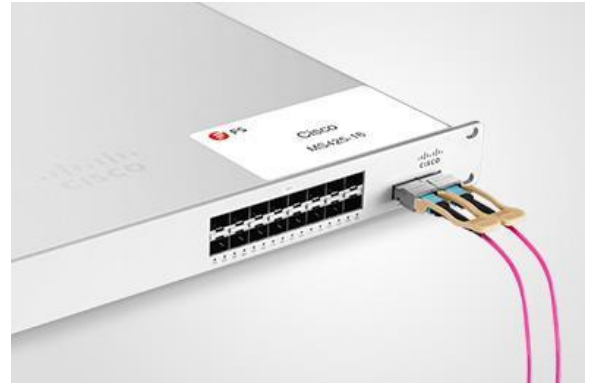
## Test Center

### I. Compatibility Testing

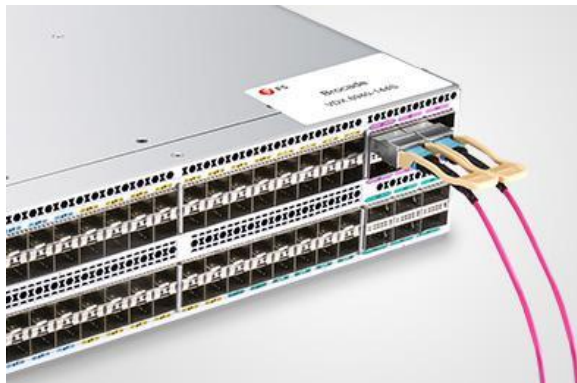
Each fiber optical transceiver has been tested in host device on site in FS Assured Program to ensure full compatibility with over 200 vendors.



Cisco Catalyst C9500-24Y4C



Cisco MS425-16



Brocade VDX 6940-144S



Dell EMC Networking Z9100-ON



Force@tm S60-44T

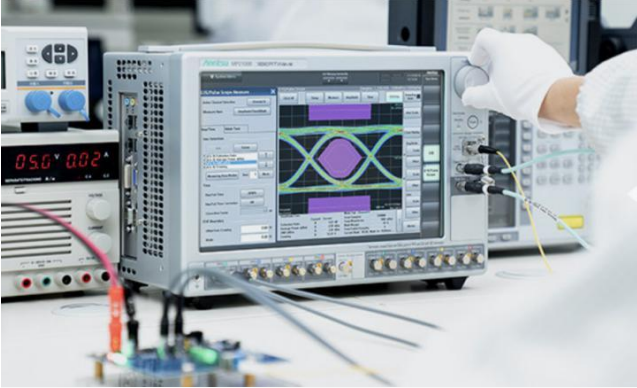


HUAWEI S6720-30L-HI-24S

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
SFP56-SR-50G	SFP56 50GBASE-SR 850nm 100m Transceiver
QSFP28-50G-BX	QSFP28 50GBASE-BX 1271nmTX/1331nmRX 10km Transceiver
QSFP28-50G-BX	QSFP28 50GBASE-BX 1331nmTX/1271nmRX 10km Transceiver
QSFP28-50G-BX40	QSFP28 50GBASE-BX40 1295nmTX/1309nmRX 40km Transceiver
QSFP28-50G-BX40	QSFP28 50GBASE-BX40 1309nmTX/1295nmRX 40km Transceiver



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