

# 25G SFP28 1330nm-TX/1270nm-RX 20km DOM LC SMF Transceiver

SFP28-25G-BX20



## Application

- 25GBASE-LR
- CPRI option 10 / eCPRI

## Features

- Up to 20 km Transmission Distance
- LC Single Connector
- Low Power Consumption <1.2W
- -40°C to 85°C Operating Case Temperature Range
- Single 3.3V ± 5% Power Supply
- Compliant with SFF-8472

## Standards

- SFF-8472
- SFF-8402
- SFF-8432
- SFF-8431
- CEI-28G-VSR

## Description

The SFP28-25G-BX20 is designed to transmit and receiver optical data up to 20km over single mode fiber. The transceiver is compliant with SFF-8472, SFF-8402, SFF- 8432 and applicable portions of SFF-8431. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

## Product Specifications

### I. Ordering Information

Form Factor	Data Rate (Gb/s)	Laser	Average Power (dBm)	Detector	OMA Sensitivity 5E-5 (dBm)	Top (°C)	Reach (km)
SFP28	25.78125	1330nm DFB	0~6	PIN	<-14	-40~85	20

### II. 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	3.6

### III. Recommended Operating Conditions

Parameter	Symbol	Unit	Min.	Typ.	Max.
<b>Operating Case Temperature Range</b>	T <sub>c</sub>	°C	-40		85
<b>Power Supply Voltage</b>	V <sub>CC</sub>	V	3.135	3.3	3.465
<b>Bit Rate</b>	BR	Gb/s	24.33024	25.78125	
<b>Max. Supported Link Length</b>	L	km	10	20	

## IV. Electrical Characteristics

Parameter	Symbol	Unit	Min.	Typ.	Max.	Note
<b>Supply Voltage</b>	$V_{CC}$	V	3.14	3.3	3.46	
<b>Supply Current</b>	$I_{CC}$	mA			360	@3.3V
<b>Transmitter</b>						
<b>Input Differential Impedance</b>	$R_{IN}$	$\Omega$		100		
<b>Single Ended Data Input Swing</b>	$V_{IN}$	mVp-p	90		450	
<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	2.2		$V_{CCHOST}$	
<b>Transmit Fault De-Assert Voltage</b>	$V_{FDA}$	V	$V_{EE}$		$V_{EE}+0.4$	
<b>Receiver</b>						
<b>Single Ended Data Output Swing</b>	$V_{OD}$	mVp-p	200		450	
<b>LOS Fault</b>	$V_{LOSFT}$	V	2.2		$V_{CCHOST}$	
<b>LOS Normal</b>	$V_{LOSNR}$	V	$V_{EE}$		$V_{EE}+0.4$	

## V. Optical Characteristics

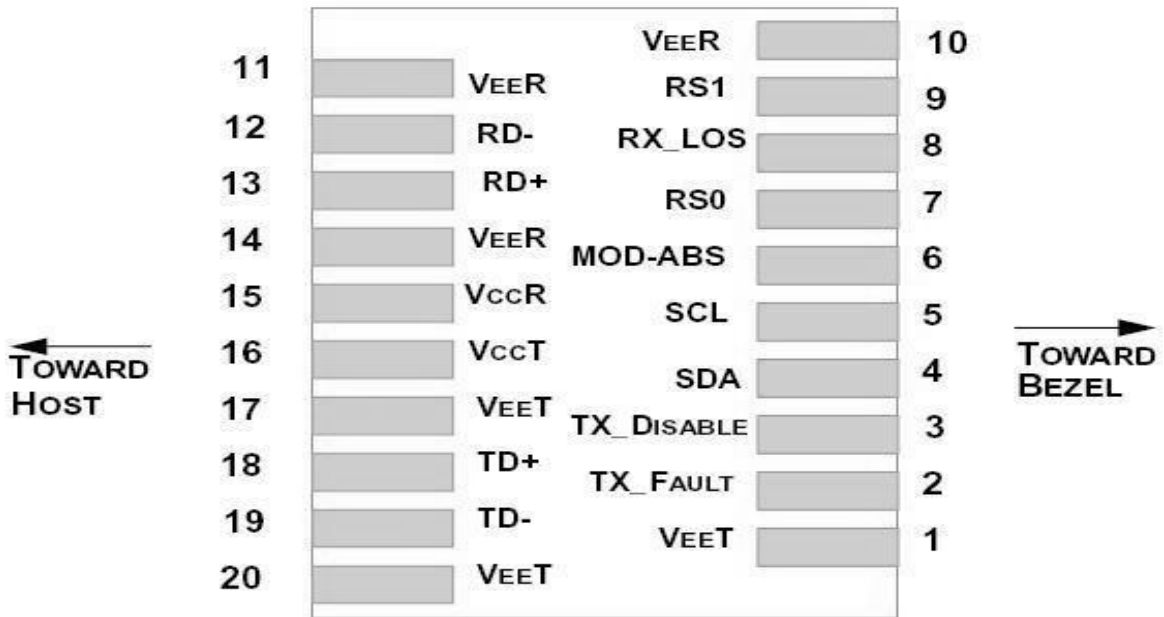
(tested under recommended operating conditions, unless otherwise noted)

Parameter	Symbol	Unit	Min.	Typ.	Max.	Note
<b>Transmitter</b>						
<b>Center Wavelength Range</b>	$\lambda$	nm	1320		1340	Downstream
<b>Spectral Width   -20dB</b>		nm			1	
<b>Side Mode Suppression Ratio</b>	SMSR	dB	30			
<b>Average Launch Power</b>	$P_{AVG}$	dBm	0		6	
<b>OMA Launch Power</b>	$P_{OMA}$	dBm	-2			
<b>Transmitter and Dispersion Penalty 25G   BER=5E-5</b>	TDP	dB			4	
<b>Average launch power of OFF transmitter</b>	$P_{OFF}$	dBm			-30	
<b>Extinction Ratio</b>	ER	dB	3.5			
<b>RIN20OMA</b>	$R_{IN}$	dB/Hz			-130	
<b>Optical Return Loss Tolerance</b>		dB			20	
<b>Mask Margin</b>		%	5			1

**Note 1:** Template: {0.31, 0.40, 0.45, 0.34, 0.38, 0.40}, Hit Ratio: 5E-5

Parameter	Symbol	Unit	Min.	Typ.	Max.	Note
<b>Receiver</b>						
<b>Center Wavelength</b>	$\lambda$	nm	1260	1270	1280	Downstream
<b>Overload</b>		dBm	2.5			
<b>OMA Receiver Sensitivity Up to 25G 5E-5</b>	$P_{OMA}$	dBm			-14	
<b>Assert LOS</b>	$LOS_A$	dBm	-30			
<b>De-Assert LOS</b>	$LOS_D$	dBm			-17	
<b>LOS Hysteresis</b>		dB	0.5			

## VI. Pin Function Definitions



## VII. Transceiver Pin Descriptions

Pin No.	Symbol	Logic	Description
1,17,20	VeeT		Connected to signal ground on the host board.
2	TX Fault	LVTTL Output	Module transmitter fault output
3	TX Disable	LVTTL Input	Module transmitter disable control
4	SDA	LVTTL Input/Output	2-wire serial interface data
5	SCL	LVTTL Input/Output	2-wire serial interface clock
6	MOD-ABS		Module absent (connected to Module ground)
7	RS0	LVTTL Input	Rate select 0 (Rx): Low=CDR Bypass; High=CDR Select

Pin No.	Symbol	Logic	Description
8	LOS	LVTTTL Output	Receiver loss of signal
9	RS1	LVTTTL Input	Rate select 1 (Tx): Low=CDR Bypass; High=CDR Select
10,11,14	VeeR		Connected to signal ground on the host board.
12	RD-	CML Output	Receiver inverted data output, internally AC coupled and terminated.
13	RD+	CML Output	Receiver non-inverted data output, internally AC coupled and terminated.
15	VccR		Receiver Power 3.3V Supply
16	VccT		Transmitter Power 3.3V Supply
18	TD+	CML Input	Transmitter non-inverted data input, internally AC coupled and terminated.
19	TD-	CML Input	Transmitter inverted data Input, internally AC coupled and terminated.

## VIII. Software Control

1. CDR control (Volatile parameter. Reset to default value on boot)

	Hard:Pin#7	Soft:A2h, Byte 110d bit 3	Mode of Operation	Rate	Note
<b>RS0</b>	0	0	Rx CDR Bypass	Rx: 9.8304Gb/s, 10.1376Gb/s or 10.3125Gb/s	
	0	1	Rx CDR Select	Rx: 24.33024Gb/s or 25.78125Gb/s. Module auto detect data rate and CDR lock accordingly.	Default
	1	0	Rx CDR Select		
	1	1	Rx CDR Select		

	Hard: Pin#9	Soft:A2h, Byte 118d bit 3	Mode of Operation	Rate	Note
<b>RS1</b>	0	0	Tx CDR Bypass	Tx: 9.8304Gb/s, 10.1376Gb/s or 10.3125Gb/s	
	0	1	Tx CDR Select	Tx: 24.33024Gb/s or 25.78125Gb/s. Module auto detect data rate and CDR lock accordingly.	Default
	1	0	Tx CDR Select		
	1	1	Tx CDR Select		

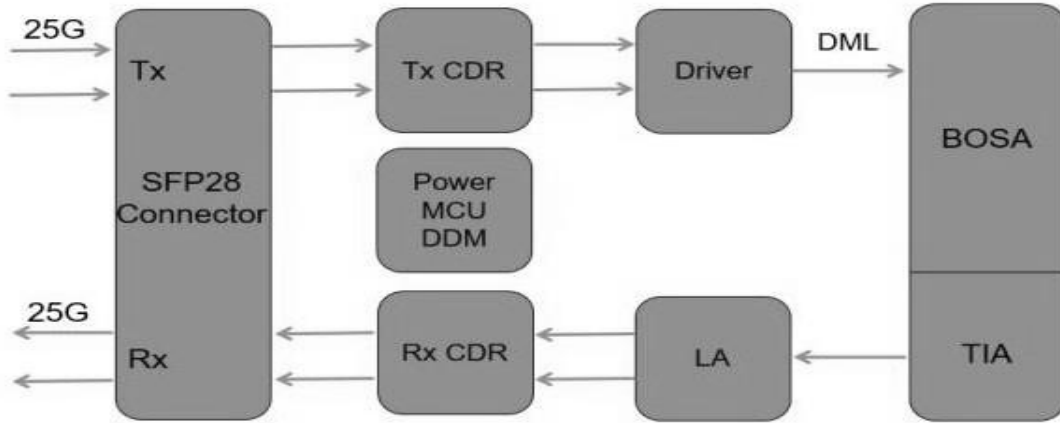
## 2. Input EQ and Output Emphasis (Volatile parameter. Reset to default value onboot)

A2H,114d	7-4	Tx Input Equalization@Tx CDR Select	Input Equalization Level Control
	3-0	Tx Input Equalization@Tx CDR Bypass	Input Equalization Level Control
A2H,115d	7-4	RX Output Emphasis@Rx CDR Select	Output Emphasis Level Control
	3-0	RX Output Emphasis@Rx CDR Bypass	Output Emphasis Level Control

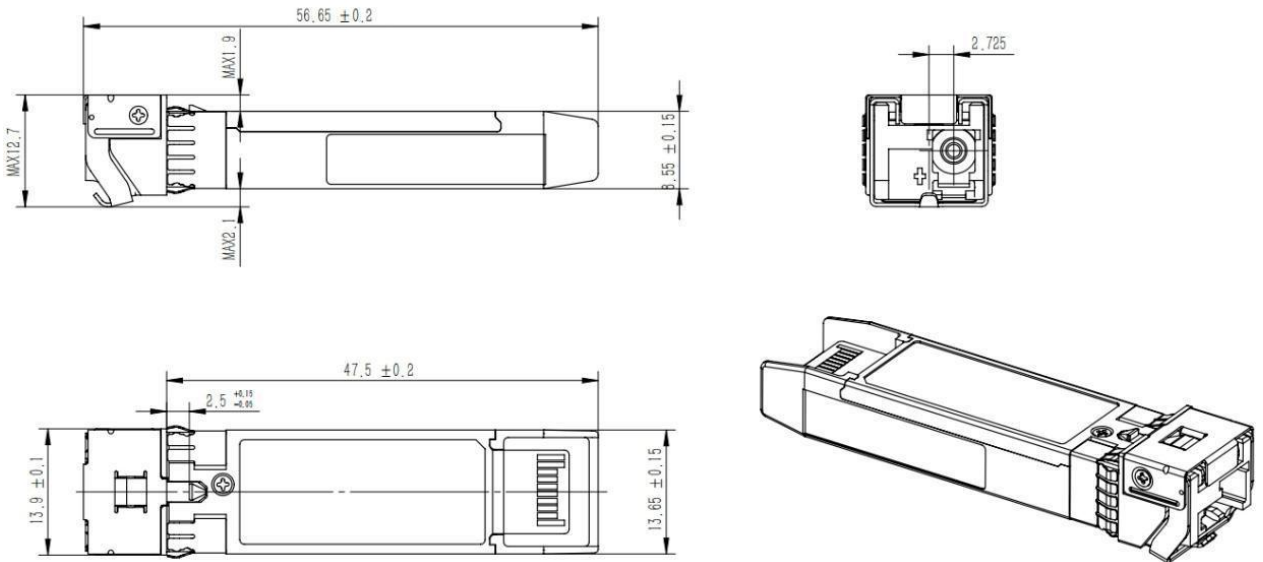


ADDRESS A2H BYTE 114d				ADDRESS A2H BYTE 115d			
Code	Transmitter Input Equalization			Code	Receiver Output Emphasis		
	Nominal	Units	Note		Nominal	Units	Note
11xx	Reserved	dB					
1011	Reserved	dB		1xxx	Vendor Specific		
1010	10	dB		0111	7	dB	
1001	9	dB		0110	6	dB	
1000	8	dB		0101	5	dB	
0111	7	dB		0100	4	dB	
0110	6	dB		0011	3	dB	
0101	5	dB		0010	2	dB	
0100	4	dB		0001	1	dB	Default
0011	3	dB		0000	0	No Emphasis	
0010	2	dB	Default				
0001	1	dB					
0000	0	NO EQ					

### IX. Principle Diagram



### X. Package Outline



Unit: mm  
 Unspecified Tolerance:  $\pm 0.1$ mm

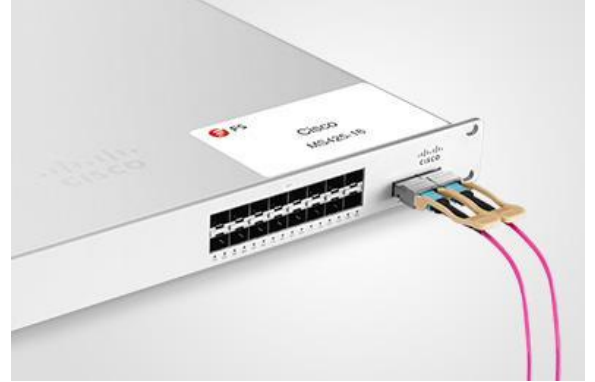
## Test Center

### 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

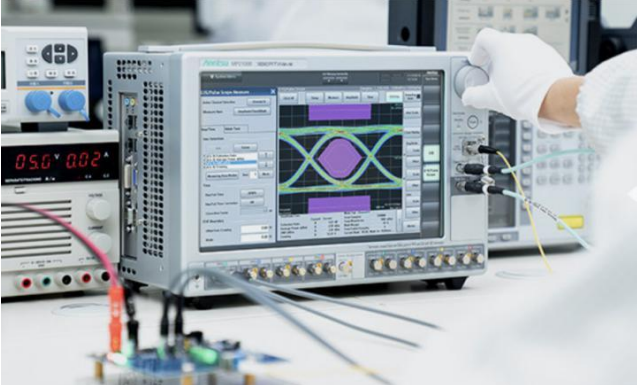


HUAWEI S6720-30L-HI-24S

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.

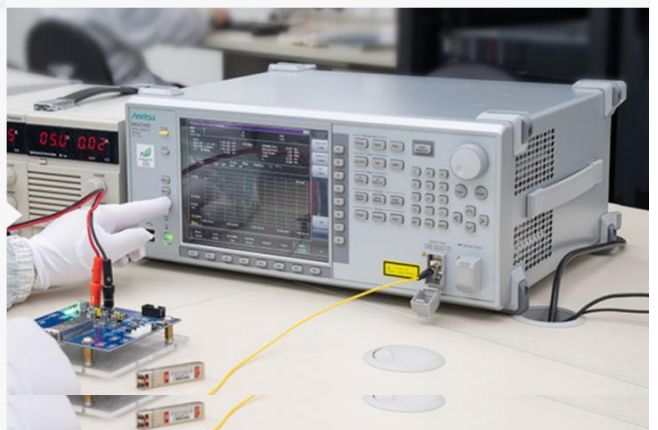
- Ethernet
- Fibre Channel
- SDH/SONET
- CPRI



### 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
SFP28-25G-BX	25G SFP28 1270nm-TX/1330nm-RX 10km DOM Transceiver
SFP28-25G-BX	25G SFP28 1330nm-TX/1270nm-RX 10km DOM Transceiver
SFP28-25G-BX-I	25G SFP28 1270nm-TX/1330nm-RX 10km Industrial DOM Transceiver
SFP28-25G-BX-I	25G SFP28 1330nm-TX/1270nm-RX 10km Industrial DOM Transceiver
SFP28-25G-BX20	25G SFP28 1270nm-TX/1330nm-RX 20km DOM Transceiver
SFP28-25G-BX20	25G SFP28 1330nm-TX/1270nm-RX 20km DOM Transceiver
SFP28-25G-BX20-I	25G SFP28 1270nm-TX/1330nm-RX 20km Industrial DOM Transceiver
SFP28-25G-BX20-I	25G SFP28 1330nm-TX/1270nm-RX 20km Industrial DOM Transceiver
SFP28-25G-BX40	25G SFP28 1270nm-TX/1310nm-RX 40km DOM Transceiver
SFP28-25G-BX40	25G SFP28 1270nm-TX/1310nm-RX 40km DOM Transceiver
SFP28-25G-BX40-I	25G SFP28 1270nm-TX/1310nm-RX 40km Industrial DOM Transceiver
SFP28-25G-BX40-I	25G SFP28 1310nm-TX/1270nm-RX 40km Industrial DOM Transceiver

**Note:**  
25G SFP28 transceiver module is individually tested on corresponding equipment such as Cisco, Arista, Juniper, Dell, Brocade and other brands, and passes the monitoring of FS.COM intelligent quality control system.



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