

100BASE-LX SFP 1310nm 10km DOM Duplex LC SMF Transceiver

SFP-100LX-31-I



Features

- Data rate 155Mbps
- 1310nm FP laser and PIN photodetector for 15km transmission
- Digital diagnostic monitor interface compliant with SFF-8472
- SFP MSA package with duplex LC connector
- +3.3V single power supply
- Power consumption less than 1W
- Operating case temperature Standard temp:-5~+70° C Industrial temp:-40~+85° C
- RoHS compliant

I. Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature Range	T _s	-40	-	+85	°C	
Supply Voltage	V _{CC}	-0.5	-	+3.6	V	
Operating Relative Humidity	RH	+5	-	95	%	

II. Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge(ESD) to the Electrical Pins	MIL-STD-883E Method3015.7	Class1
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC61000-4-2	Compliant with standard
Electromagnetic Interference(EMI)	FCC Part15 Class B	Compliant with standard
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN(IEC)60825-1,2	Compliant with Class I laser product
RoHS	2011/65/EU	Compliant with RoHS

III. Recommended Operating Conditions

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Operating Case Temperature	Standard	TC	-5	-	+70	°C	
	Industrial		-40	-	+85	°C	
Power Supply Voltage		V _{CC}	3.13	3.3	3.47	V	
Power Supply Current		I _{CC}	-	-	300	mA	
Power Dissipation		P _D	-	-	1	W	
Data Rate				155		Mbps	

IV. Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Centre Wavelength	λC	1261		1360	nm	
Average Output Power	P _{OUT}	-15		-8	dBm	1
Spectral Width(RMS)	Δλ			7.7	nm	
Extinction Ratio	EX	8.2			dB	
Jitter Generation(RMS)				0.01	UI	
Jitter Generation(pk-pk)				0.1	UI	
Optical Eye Mask	Compliant with Telcordia GR-253-CORE and ITU-T G.957					2

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Receiver						
Centre Wavelength	λ_C	1260		1580	nm	
Receiver Sensitivity	P_{IN}			-28	dBm	3
Receiver Overload	P_{IN}	-8			dBm	3
Optical Path Penalty		8.2		1	dB	4
LOS Assert	LOS_A	-45			dBm	
LOS Deassert	LOS_D			-31	dBm	
LOS Hysteresis		0.5		4	dB	

- Note:
- 1.The optical power is launched into SMF.
 - 2.Measured with a PRBS 2²³-1 test pattern @155Mbps.
 - 3.Measured with a PRBS 2²³-1 test pattern @155Mbps, BER ≤1 × 10⁻¹².
 - 4.Measured with a PRBS 2²³-1 test pattern @155Mbps, over 15km G.652 SMF, BER ≤1 × 10⁻¹².

V. Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
DataInputSwingDifferential	VIN	500		2400	mV	1
InputDifferentialImpedance	ZIN	90	100	110	Ω	

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Tx_DIS Disable	V_D	2.0		V_{CC}	V	
Tx_DIS Enable	V_{EN}	GND		GND+0.8	V	
TX_Fault (Fault)		2.0		$V_{CC} + 0.3$	V	
TX_Fault (Normal)		0		0.8	V	
Receiver						
Data Output Swing Differential	V_{out}	370		2000	mv	1
Rx_LOS Fault	$V_{los\ fault}$	2.0		$V_{CC} + 0.3$	V	
Rx_LOS Normal	$V_{los\ norm}$	GND		GND+0.8	V	

Note:
1.Internally AC coupled

VI. Recommended Host Board Power Supply Circuit

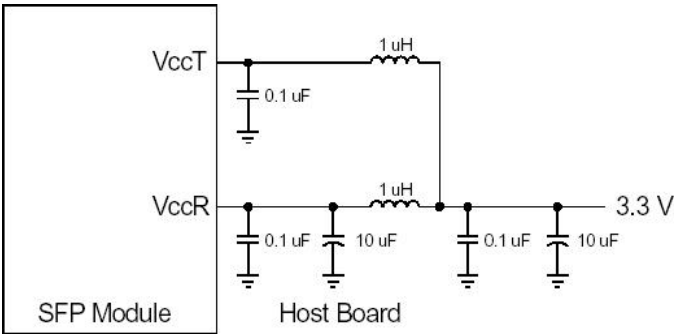


Figure 1, Recommended Host Board Power Supply Circuit

VII. Recommended Interface Circuit

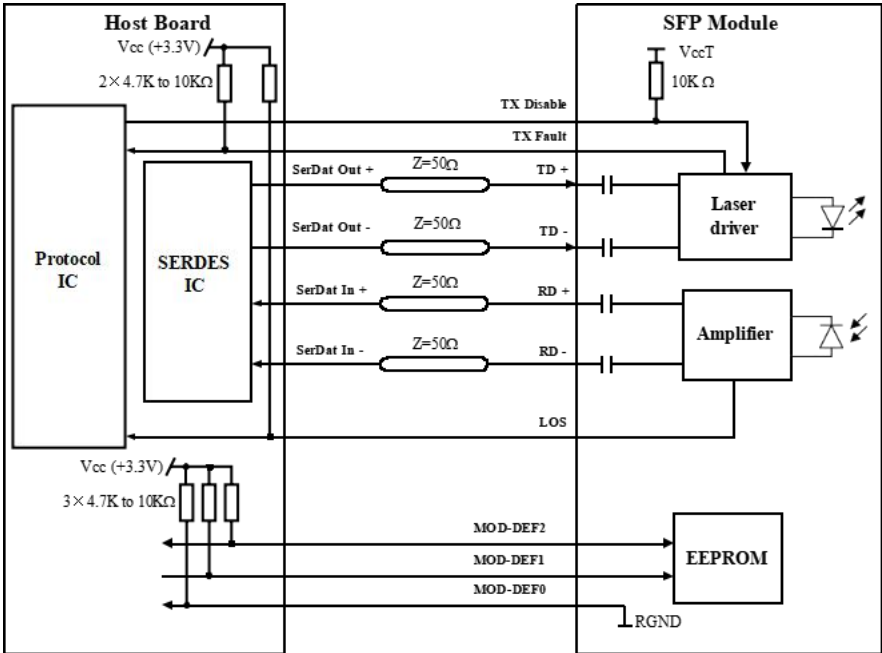


Figure 2, Recommended Interface Circuit

VIII. Pin Definitions

Figure 3 below shows the pin numbering of SFP electrical interface. The pin functions are described in Table 6 with some accompanying notes.

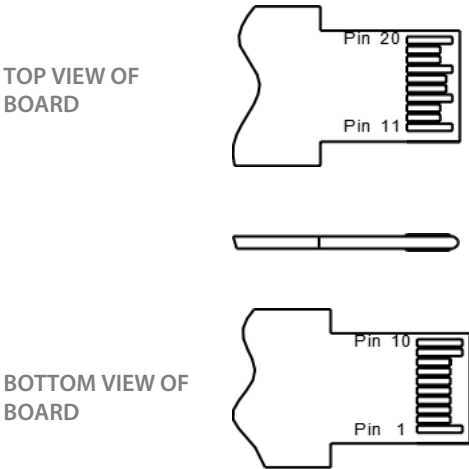


Figure 3, Pin View

Pin No.	Name	Function	Plug Seq.	Notes
1	VeeT	SFP, 100BASE-T, 100m, RJ-45, 0 to70°C(COM), SG	1	
2	TX Fault	Transmitter Fault Indication	3	Note1
3	TX Disable	Transmitter Disable	3	Note2
4	MOD-DEF2	Module Definition 2	3	Note3
5	MOD-DEF1	Module Definition 1	3	Note3
6	MOD-DEF0	Module Definition 0	3	Note3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note4
9	VeeR	Receiver Ground	1	
10	VeeR	Receiver Ground	1	
11	VeeR	Receiver Ground	1	
12	RD-	Inv.Received Data Out	3	Note5
13	RD+	Received Data Out	3	Note5
14	VeeR	Receiver Ground	1	

Pin No.	Name	Function	Plug Seq.	Notes
15	VeeR	Receiver Power	2	
16	VccT	Transmitter Power	2	
17	VccT	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	VccT	Transmitter Ground	1	

Note:

- 1. TX Fault is an open collector output, which should be pulled up with a 4.7k~10k resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
- 2. TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7k~10k resistor. Its states are:
Low (0~0.8V): Transmitter on
(>0.8V, <2.0V): Undefined
High (2.0~3.465V): Transmitter Disabled Open: Transmitter Disabled
- 3. MOD-DEF 0,1,2 are the module definition pins. They should be pulled up with a 4.7k~10k resistor on the host board. The pull-up voltage shall be VccT or VccR.
MOD-DEF 0 is grounded by the module to indicate that the module is present
MOD-DEF 1 is the clock line of two wires serial interface for serial ID
MOD-DEF 2 is the data line of two wires serial interface for serial ID
- 4. LOS is an open collector output, which should be pulled up with a 4.7k~10k resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; logic 1 indicates loss of signal. In the low state, the output will be pulled to less than 0.8V.
- 5. These are the differential receiver output. They are internally AC-coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES.
- 6. These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module

IX. Monitoring Specification

Follow SFF-8472 Rev 9.5.

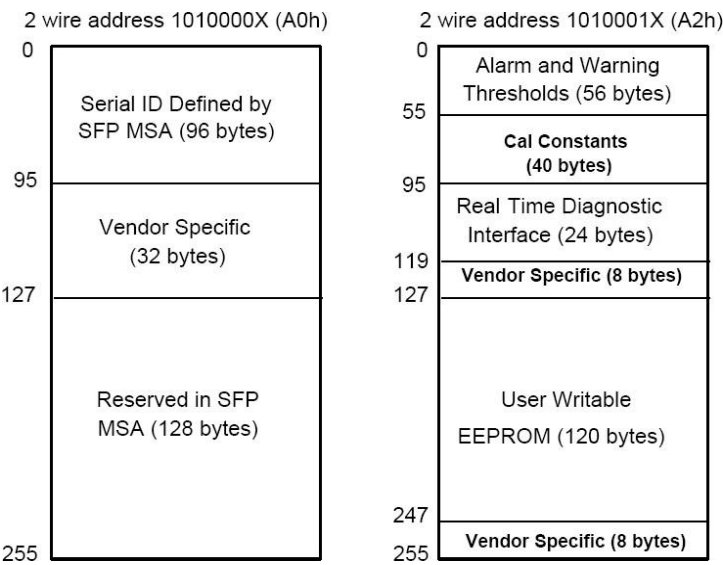


Figure 4, EEPROM Memory Map Specific Data Field Descriptions

Monitoring Specification

Parameter		Range	Accuracy	Calibration
Temperature	Standard	-5 to 70° C	± 3%	External
	Industrial	-40 to 85° C	± 3%	External
Voltage		3.0 to 3.6V	± 3%	External
Bias Current		0 to 80mA	± 10	External
Tx Power		-16 to -7dBm	± 3dB	External
Rx Power		-30 to -7dBm	± 3dB	External

X. Mechanical Diagram

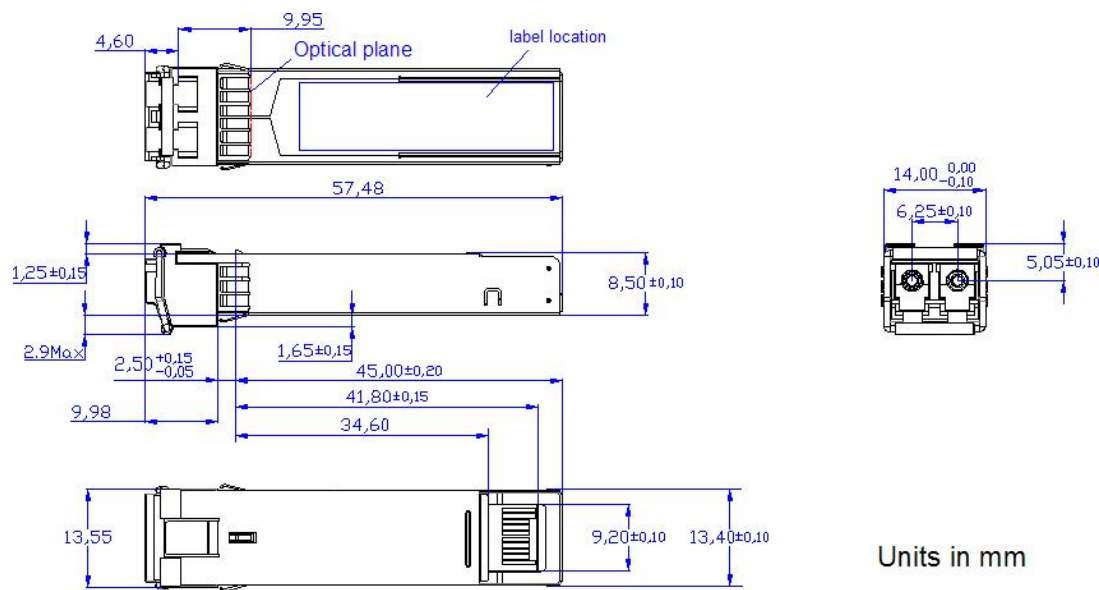


Figure 5, Mechanical Design Diagram of the SFP

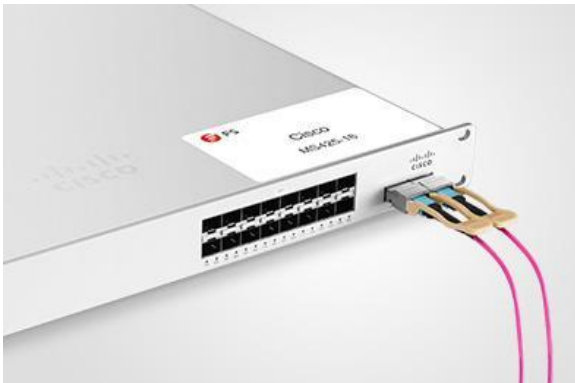
Test Center

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



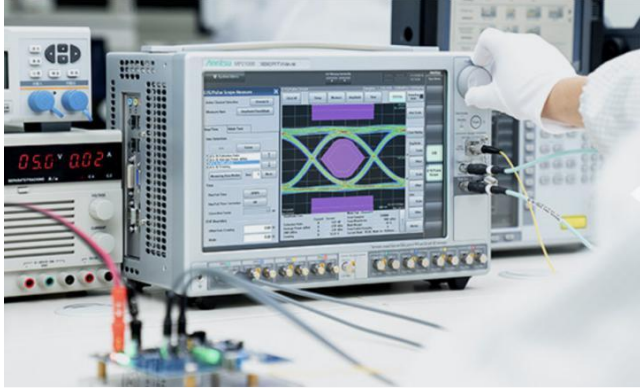
Force@tm S60-44T



HUAWEI S6720-30L-HI-24S

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.

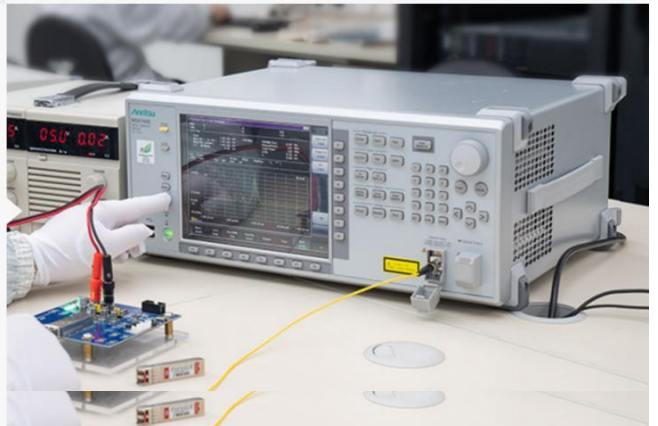
- Ethernet
- Fibre Channel
- SDH/SONET
- CPRI



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-FB-GE-T	SFP, 100BASE-T, 100m, RJ-45, 0 to70°C(COM)
SFP-100FX-31	SFP, 100BASE-FX,1310nm, MMF, 2km, LC, 0 to70°C(COM), DOM
SFP-GE-100FX	SFP, 100BASE-FX,1310nm, MMF, 2km, LC, 0 to70°C(COM), DOM, SGMII
SFP-100LX-31	SFP, 100BASE-LX,1310nm, SMF, 10km, LC, 0 to70°C(COM), DOM
SFP-FE-BX	SFP, 100BASE-BX, 1310nm-TX/1550nm-RX, SMF, 10km, LC, 0 to70°C(COM), DOM
SFP-FE-BX	SFP, 100BASE-BX, 1550nm-TX/1310nm-RX, SMF, 10km, LC, 0 to70°C(COM), DOM
SFP-100ZX-55	SFP, 100BASE-ZX, 1550nm, SMF, 80km, LC, 0 to70°C(COM), DOM
SFP-FE-BX	SFP, 100BASE-BX, 1310nm-TX/1550nm-RX, SMF, 20km, LC, 0 to70°C(COM), DOM
SFP-FE-BX	SFP, 100BASE-BX, 1550nm-TX/1310nm-RX, SMF, 20km, LC, 0 to70°C(COM), DOM
SFP-100EX-31	SFP, 100BASE-EX, 1310nm, SMF, 40km, LC, 0 to70°C(COM), DOM
SFP-100LX-31-1	SFP, 100BASE-LX,1310nm, SMF, 10km, LC, 0 to70°C(COM), DOM

Note:
Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.
Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.