

Cisco Compatible SFP-50G-LR-S-FL Quick Spec:

Part Number:	SFP-50G-LR-S-FL SFP-50G-LR-S-EXT-FL SFP-50G-LR-S-IND-FL SFP-50G-LR-S-FLT SFP-50G-LR-S-EXT-FLT SFP-50G-LR-S-IND-FLT
Form Factor:	SFP56
TX Wavelength:	1310nm
Reach:	10km
Cable Type:	SMF
Rate Category:	10G/25/50GBase
Interface Type:	LR
DDM:	Yes
Connector Type:	Dual-LC



Cisco Compatible SFP-50G-LR-S-FL Features

- Support eCPRI wireless and 50GBASE-LR application
- Comply with IEEE 802.3cd 50GBASE-LR
- Comply with IEEE 802.3 50GAUI-1 C2M electrical interface.
- Management Interface comply with SFF-8472
- Comply with SFF-8432 with duplex LC connector
- Up to 10km transmission on SMF
- 2-wire interface with integrated Digital Diagnostic monitoring
- DFB laser and PIN receiver
- Support 10Gbps/25Gbps/26.5625GBd rate selection
- Single +3.3V power supply
- Power consumption lower than 2W
- Operating temperature range:
 - Standard: 0°C to +70 °C
 - Extended -5°C to +85 °C
 - Industrial -40°C to +85 °C

Cisco Compatible SFP-50G-LR-S-FL Applications

- 25GBASE-LR

Product Description

The [Cisco Compatible SFP-50G-LR-S-FL](#) optical transceiver supports high-speed serial links over single-mode optical fiber at signaling rates up to 57.8 Gb/s PAM4 (the serial line rate of 64GFC). The product is compliant with Small Form Pluggable SFP+ industry agreements for mechanical and low-speed electrical specifications. High-speed electrical and optical specifications are compliant with ANSI Fibre Channel FC-PI-7.

The SFP-50G-LR-S-FL is a multirate 1310-nm transceiver that ensures compliance with FC-PI-7 64GFC, 32GFC, and 16GFC specifications. Per the requirements of 64GFC, internal clock and data recovery circuits (CDRs) are present on both electrical input and electrical output of this transceiver. These CDRs lock at 57.8-Gb/s PAM4, 28.05-Gb/s NRZ, and 14.025-Gb/s NRZ (64GFC, 32GFC, and 16GFC) accomplished by using two Rate Select inputs and I2C to configure

transmit and receive sides.

Digital diagnostic monitoring information (DMI) is present in the SFP56-10/25/50GBase-LR per the requirements of SFF-8472, providing real-time monitoring information of transceiver laser, receiver, and environment conditions over an SFF-8431 I2C interface.

Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000V for SFI pins, >2000V for other pins.)
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	IEC 61000-4-3	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)

Cisco Compatible SFP-50G-LR-S-FL Absolute Maximum Ratings

The operation in excess of any absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Max	Unit	Notes
Storage Temperature	TS	-40	+85	°C	
Operating Relative Humidity	RH	10	+85	%	

Cisco Compatible SFP-50G-LR-S-FL Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	TOP	-40		+85	°C	I-temp
		0		+70	°C	C-temp
Power Supply Voltage	V _{CC}	3.135	3.3	3.465	V	
Power Dissipation	P	-	-	2	W	
Data Rate	DR		26.5625	-	GBd	
Transmission Distance	TD	-	-	10	km	1

Note:

1. Measured with SMF.

Cisco Compatible SFP-50G-LR-S-FL Optical Characteristics

All parameters are specified under the recommended operating conditions unless otherwise specified.

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Center Wavelength	λC	1304.5		1317.5	nm	1
		1300		1320		2
Modulation Format		PAM4				
Average Output Power	P0UT	-4.5	-	4.2	dBm	
Outer Optical Modulation Amplitude	OMA	-1.5	-	4	dBm	
TDECQ	TDECQ			3.2	dB	
Average Output Power (Laser Off)	P0UT-OFF	-	-	-30	dBm	
Extinction Ratio	ER	3.5	-	-	dB	
RIN15.6OMA	-	-	-	-132	dB/Hz	
Optical return loss tolerance	-	-	-	15.6	dB	
Transmitter reflectance	-	-	-	-26	dB	
Receiver						
Center Wavelength Range	λC	1295	1311	1325	nm	
Damage threshold	-	-	-	5.2	dBm	3
Average receive power		-10.8		4.2	dBm	
Receiver Power (OMAouter)	-	-	-	4	dBm	4
Receiver sensitivity (OMAouter)		Max(-8.4, SECQ - 9.8)			dBm	
LOS Assert	LOSA	-30	-		dBm	
LOS De-assert	LOSD	-	-	-11	dBm	
LOS Hysteresis	LOSH	0.5	-	-	dB	

Notes:

1. For C temp 0~70°C
2. For I temp -40~85°C
3. 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
4. Measured with a PRBS31Q test pattern @26.5625 GBd, BER≤2.4X10⁻⁴.

Cisco Compatible SFP-50G-LR-S-FL Electrical Specifications

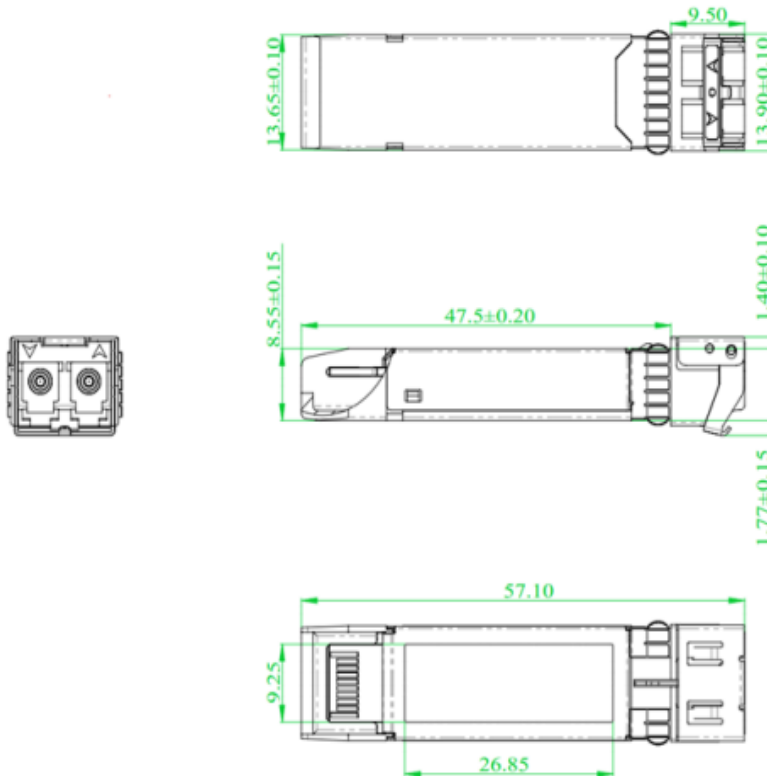
Parameter	Symbol	Min	Typical	Max	Unit	Notes	
Transmitter (Module Input)							
Differential Data Input Amplitude	VIN,P-P	180	-	900	mVpp		
Input Differential Impedance	ZIN	90	100	110	Ω		
Tx Fault	Normal Operation	VOL	-0.3	-	0.4	V	
	Transmitter Fault	VOH	2.4	-	VCC	V	
Tx Disable	Normal Operation	VIL	-0.3	-	0.8	V	
	Laser Disable	VIH	2.0	-	VCC+0.3	V	
Receiver (Module Output)							
Differential Data Output Amplitude	VOUT,P-P	300	-	1000	mVpp		
Output Differential Impedance	ZO	90	100	110	Ω		
Rx LOS	Normal Operation	VOL	-0.3	-	0.4	V	
	Lose Signal	VOH	2.4	-	VCC	V	

Cisco Compatible SFP-50G-LR-S-FL Digital Diagnostic Functions

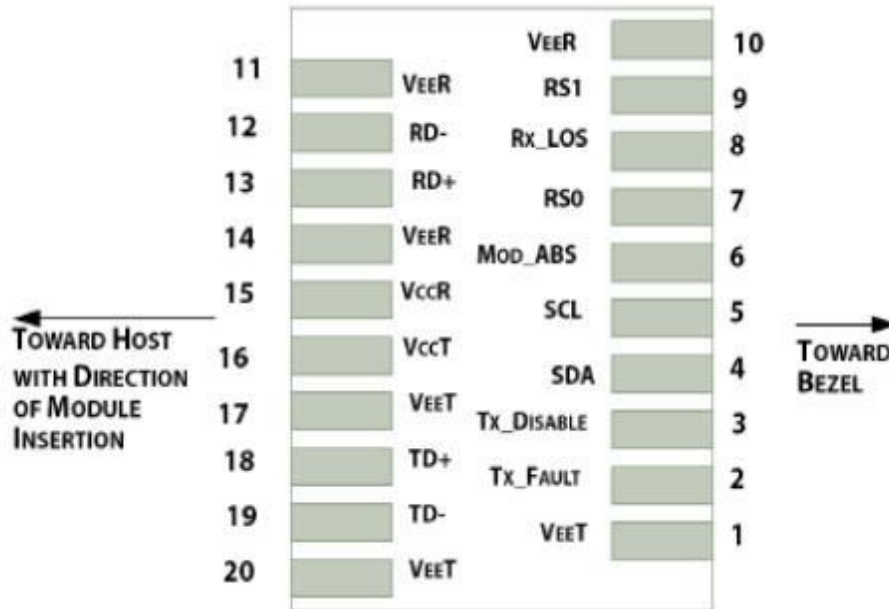
Digital diagnostics monitoring function is available on FluxLight product. A 2-wire serial interface provides user to contact with module. It is compliant to SFF-8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales stuff.

Parameter	Symbol	Min	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	+3	°C	
Supply voltage monitor absolute error	DMI_VCC	-3%	+3%	V	
TX power monitor absolute error	DMI_RX	-3	+3	dB	
RX power monitor absolute error	DMI_RX	-3	+3	dB	
Bias current monitor	DMI_Ibias	-10%	+10%	mA	

Mechanical Dimensions



Cisco Compatible SFP-50G-LR-S-FL Pin Assignment and Description



Pin Definitions

Contacts	Logic	Symbol	Description	Notes
case		case	Module case	2
1		VEET	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 VEET or VEE 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
9	LVTTL-I	RS1	Tx Rate Select	

10		VEE R	Module Receiver Ground	3
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11		VEE R	Module Receiver Ground	3
12	CML-O	RD-	Receiver Inverted Data Output	
13	CML-O	RD+	Receiver Non-Inverted Data Output	
14		VEE R	Module Receiver Ground	3
15		VCC R	Module Receiver 3.3 V Supply	
16		VCCT	Module Transmitter 3.3 V Supply	
17		VEET	Module Transmitter Ground	3
18	CML-I	TD+	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	Transmitter Inverted Data Input	
20		VEET	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, VeeR and VeeT, 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 VccT/R + 0.5 V.
5. Tx_Disable is an input contact with a 4.7 kOhms to 10 kOhms pullup to VccT 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

Cisco Compatible SFP-50G-LR-S-FL Rate Selection

Notes:

A2.73.bit 4 is default to 1b, RS0 and RS1 hardware pins state are ignored, module allows RS0(1) bits for 10G/25G rate selection

50G PMA4 Enable (A2.119.Bit2)	Soft RS0 select (A2.110.bit3)	Soft RS1 select (A2.118.bit3)	Rate (both Tx&Rx)
0	0	x	10Gbps
0	1	x	25Gbps
1	x	x	50Gbps

Pin Assignment

PIN #	Symbol	Description	Notes
1	VeeT	Transmitter Ground	
2	TX Fault	Transmitter Fault Indication	Note 1
3	TX Disable	Transmitter Disable	Note 2, Module disables on high or open
4	SDA	2-wire Serial Interface Data Line(Same as MOD-DEF2 in INF-8074i)	
5	SCL	2 Wire Serial Interface Data Line (Same as MOD-DEF1 as defined in the INF-8074i)	
6	MOD-ABS	Module Absent,Connected to VeeT or VeeR in the module.	Note 3
7	RS0	SFP+ RX Rate Select, optional	Rate Select0,Not used.Note 9
8	LOS	Loss of Signal	Note 4
9	RS1	SFP+ TX Rate Select, optional	Rate Select 1, Not used.Note 9
10	VeeR	Receiver Ground	Note 5
11	VeeR	Receiver Ground	Note 5
12	RD-	Inv. Received Data Out	Note 6
13	RD+	Received Data Out	Note 6
14	VeeR	Receiver Ground	Note 5
15	VccR	Receiver Power	Note 7, 3.3V □ 5%
16	VccT	Transmitter Power	Note 7, 3.3V □ 5%
17	VeeT	Transmitter Ground	Note 5
18	TD+	Transmit Data In	Note 8
19	TD-	Inv. Transmit Data In	Note 8
20	VeeT	Transmitter Ground	Note 5

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

- TX Fault is an open collector/drain output, which should be pulled up with a 4.7K–10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT +0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.4V.
- TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7–10 KΩ resistor. Its states are:
Low (-0.3–0.8V):Transmitter on (>0.8, < 2.0V):Undefined
High (2.0–VccT+0.3V):Transmitter Disabled Open:Transmitter Disabled
- Mod-ABS shall be pulled up with a 4. 7K–10KΩ resistor on the host board. The pull -up voltage shall VccT or VccR.
- LOS (Loss of Signal) is an open collector/ drain output, which should be pulled up with a 4.7K–10KΩ resistor. Pull up voltage between 2.0V and VccR+0.3V. When high, this output indicates the received

- optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.4V.
5. VeeR and VeeT may be internally connected within the SFP module.
 6. RD-/+: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.
 7. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V 5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage.
When the recommended supply filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.
 8. TD-/+: These are the differential transmitter inputs. They are AC -coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.
 9. Internally pulled down per SFF-8431 Rev 4.1.

Licensing

The following U.S. patents are licensed by Finisar to FluxLight, Inc.:
U.S. Patent Nos: 7,184,668, 7,079,775, 6,957,021, 7,058,310, 6,952,531, 7,162,160, 7,050,720