Product Specification

OC-48/STM-16 LX SFP 1310nm 15km
SONET/SDH Optical Transceiver

P/N: OC48-SFP-LX

Features

- Hot Pluggable SFP form factor
- Up to 2.5Gb/s Data
- Single +3.3V power supply
- Duplex LC connector
- Max power dissipation <1.0W
- Up to 15km on 9/125μm SMF
- 1310nm DFB Laser Transmitter
- PIN receivers
- Built-in digital diagnostic function
- Commercial temperature range 0°C to 70°C

Compliance

- SFP MSA
- Compliant to SFP+ Electrical MSA SFF-8431
- Compliant to SFP+ Mechanical MSA SFF-8432
- SFF-8472
- IEEE 802.3ae
- RoHS

Applications

- Other Optical Links
- SDH STM-16
- SONETOC48
- 1X/2X Fiber Channel

Description

The OC48-SFP-LX Transceiver is a high-performance, cost-effective optical module designed for medium-range communication applications. It features a Duplex LC optics interface and supports standard AC-coupled CML for high-speed signal transmission, along with LVTTL control and monitor signals. This module is engineered to deliver reliable and efficient performance in high-speed network environments.

The OC48-SFP-LX incorporates a PIN receiver in its receiver section and a 1310 nm FP laser in its transmitter section. With a link budget of up to 16dB, it is optimized for SONET OC-48/STM-16 applications, ensuring seamless data transmission over distances of up to 15 kilometers. Its robust design and advanced components make it ideal for high-speed, medium-reach communication networks.

This transceiver module is specifically designed for OC-48/STM-16 networks, providing a reliable solution for telecommunications and enterprise environments requiring high-speed connectivity over single-mode fiber. Its combination of performance, cost-effectiveness, and ease of integration makes the OC48-SFP-LX a versatile choice for applications demanding high data integrity and extended reach within medium-distance network segments.

Product performance Specifications

1. Basic Product Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit	Note
Storage Temperature	TS	-40	-	+85	°C	
Supply Voltage	VCC	-0.5	-	4	V	
Relative Humidity	RH	0	-	85	%	
Operating Case Temperature	Top	0	-	70	°C	
Power Supply Voltage	VCC	3.0	3.30	3.60	V	
Supply Current	Icc		160	280	mA	

2. Product Optical and Electrical Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit	Note
Transmitter						
Differential Input Impedance	Rin	90	100	110	Ohm	1
Single ended data input swing	VinPP	200		1200	mVp-p	
Transmit Disable Voltage	Vdis	V_{CC} -1.3		V_{CC}	V	2
Transmit Enable Voltage	Ven	V_{CC} - 0.3		0.8	V	
Transmit Disable Assert Time	Tdessert			10	us	
Center Wavelength	λc	1260	1310	1360	nm	3
Spectral Width	σ			0.85	nm	
Optical Output Power	Pout	-5		0	dBm	4
Extinction Ratio	ER	8.2			dB	5
Total Generated Transmitter Jitter (peak to peak)	JTXp-p			0.07	UI	
Total Generated Transmitter Jitter (rms)	JTXrms			0.007	UI	
Transmitter Eye Mask	λc	830	850	860	nm	3
Receiver						
Single ended data output swing	Vout,pp	300		1000	mVpp	6
Power Supply Rejection	PSR	100			mVpp	7
Data output rise/fall time	Tr/Tf		260		ps	8
LOS Fault	Vlosfault	V_{CC}-0.5		V_{CC}_host	V	9
LOS Normal	Vlosnorm	V_{EE}		V_{EE}+0.5	V	9
Total Generated Receiver Jitter (peak to peak)	JRXp-p			0.07	UI	
Total Generated Receiver Jitter(rms)	JRXrms			0.007	UI	
Optical Input Wavelength		1260		1660	nm	
RX Sensitivity	Sen			-18	dBm	10
Receiver Overload	Pol			-3	dBm	10
LOS Assert	LOSA	-36			dB	
LOS De-assert	LOSD			-18	dBm	
LOS Hysteresis	LOSH	0.5		4	dBm	

General Specifications						
Data Rate	BR	2125		2500	Mb/s	
Bit Error Rate	BER			10^{-12}		
Max. Supported Link Length on 50/125μm MMF@155Mb/s	L_{MAX}			15	km	11
Total System Budget	LB	7			dB	12

Note1: AC coupled.

Note2: Or open circuit.

Note3: Also specified to meet curves in FC-PI 13.0 Figures 18 and 19, which allow trade-off between wavelength spectral width.

Note4: Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 regulations.

Note5: Unfiltered, 20-80%. Complies with IEEE 802.3 (Gig. E), FC 1x and 2x eye masks when filtered.

Note6: Into 100 ohm differential termination.

Note7: All transceiver specifications are compliant with a power supply sinusoidal modulation of 20 Hz to 1.5MHz up to specified value applied through the power supply filtering network shown on page 23 of the Small Form-factor Pluggable (SFP) Transceiver Multi-SourceAgreement (MSA), September 14, 2000.

Note8: 20 – 80 %.

Note9: LOS is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

Note10: Measured with conformance signals defined in FC-PI 13.0 specifications. Measured with PRBS 27 -1at 10^{-12} BER

Note11: Dispersion limited per FC-PI Rev. 13

Note12: Attenuation of 3.5 dB/km is used for the link length calculations. Distances are indicative only. Please refer to the Optical Specifications in Table IV to calculate a more accurate link budget based on specific conditions in your application.

Recommended Host Board Power Supply Circuit

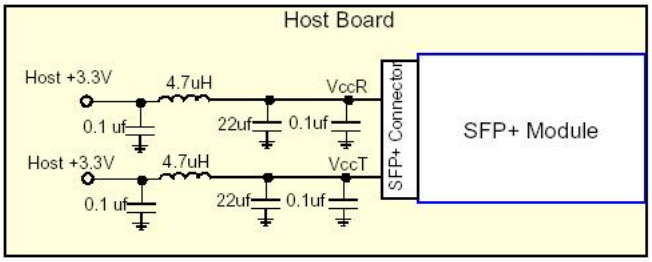


Figure 1: Recommended Host Board Power Supply Circuit

Recommended Interface Circuit

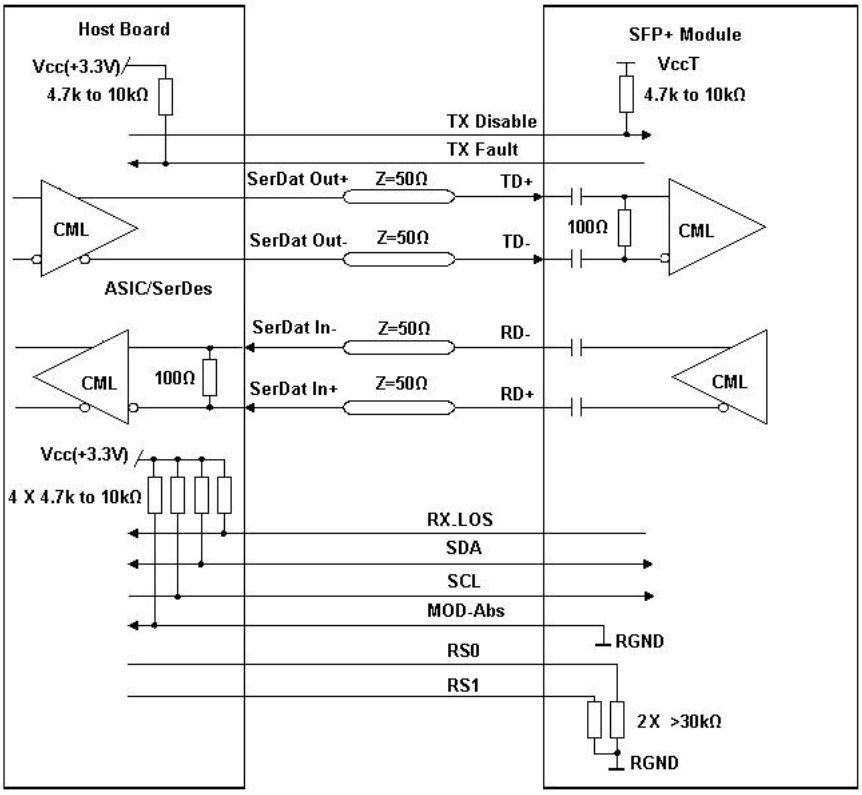


Figure2: Recommended Interface Circuit

Pin-out Definition

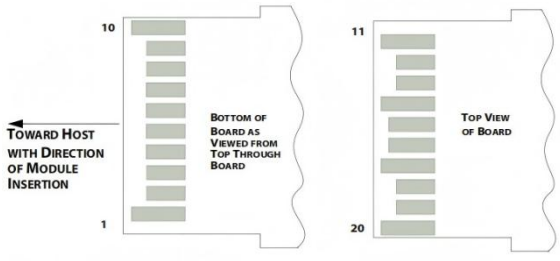


Figure3: Pin view

Pin Function Definitions

Pin	Logic	Symbol	Description	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	2
3	LVTTL-I	TX_Disable	Transmitter Disable; Turns off transmitter laser output	3
4	LVTTL-I/O	SDA	2-wire Serial Interface Data Line (Same as MOD-DEF2 as defined in the INF-8074i)	4
5	LVTTL-I/O	SCL	2-wire Serial Interface Clock (Same as MOD-DEF1 as defined in the INF-8074i)	4
6		MOD_ABS	Module Absent, connected to VeeT or VeeR in the module	5
7	LVTTL-I	RS0	Adaptive multi-rate operation	6
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication (In FC designated as RX_LOS, in SONET designated as LOS, and in Ethernet designated at Signal Detect)	2
9	LVTTL-I	RS1	Adaptive multi-rate operation	6
10		VeeR	Module Receiver Ground	1
11		VeeR	Module Receiver Ground	1
12	CML-O	RD-	Receiver Inverted Data Output	
13	CML-O	RD+	Receiver Non-Inverted Data Output	
14		VeeR	Module Receiver Ground	1
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Transmitter 3.3 V Supply	
17		VeeT	Module Transmitter Ground	1
18	CML-I	TD+	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	Transmitter Inverted Data Input	
20		VeeT	Module Transmitter Ground	1

Note1: The module signal ground pins, VeeR and VeeT, shall be isolated from the module case.

Note2: This pin is an open collector/drain output pin and shall be pulled up with 4.7kΩ-10kΩ to Host_Vcc on the host board. Pull ups can be connected to multiple power supplies, however the host board design shall ensure that no module pin has voltage exceeding module VccT/R + 0.5V.

Note3: This pin is an open collector/drain input pin and shall be pulled up with 4.7kΩ-10kΩ to VccT in the module.

Note4: See SFF-8431 4.2 2-wire Electrical Specifications.

Note5: This pin shall be pulled up with 4.7kΩ-10kΩ to Host_Vcc on the host board.

Note6: Connect with 30kΩ load pulled down to GND in the module.

Monitoring Specification

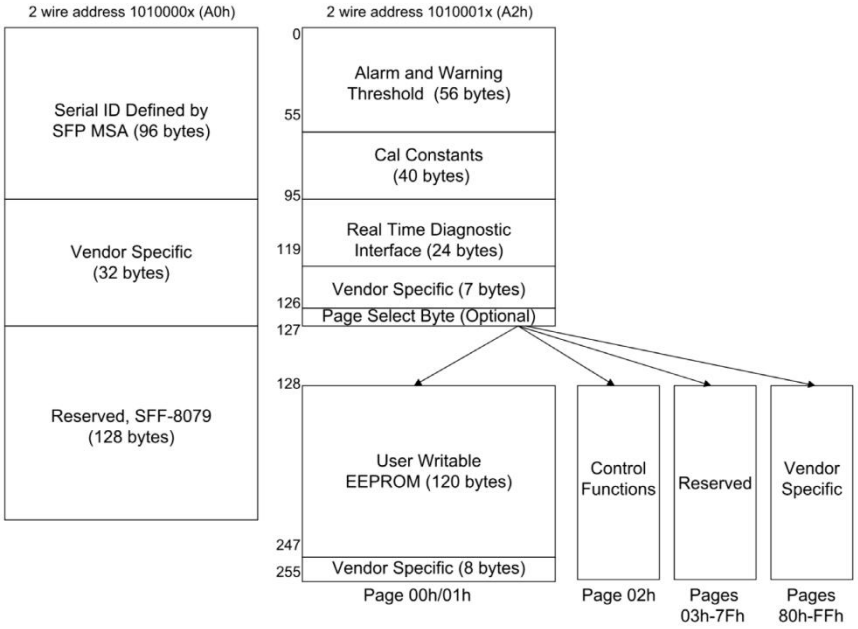


Figure4: Memory map

Memory map Table

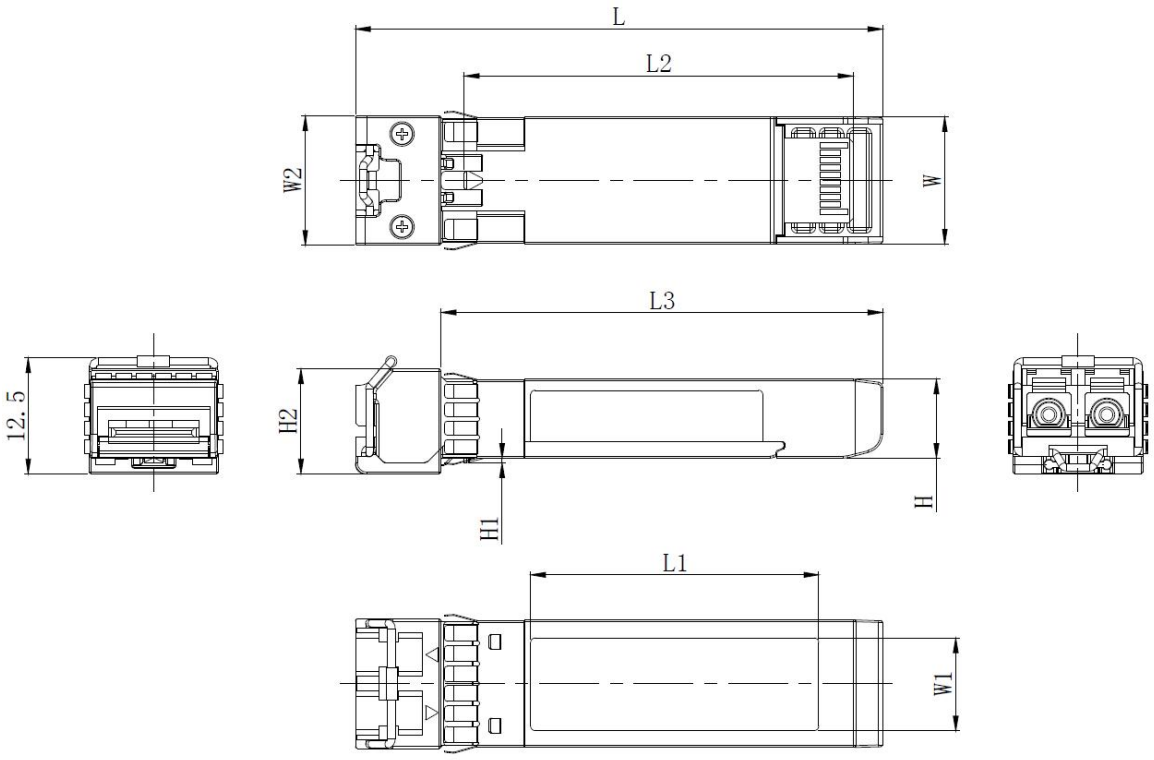
A0h	Bytes	Name	Description
A0h ID Fields			
0	1	Identifier	Type of transceiver
1	1	Ext. Identifier	Extended identifier of type of transceiver
2	1	Connector	Code for connector type
3-10	8	Transceiver	Code for electronic or optical compatibility
11	1	Encoding	Code for high speed serial encoding algorithm
12	1	Signaling Rate, Nominal	Nominal signaling rate, units of 100 MBd.
13	1	Rate Identifier	Type of rate select functionality
14	1	Length (SMF,km) or Copper Cable	Link length supported for single-mode fiber, units of km, or copper

		Attenuation	cable attenuation in dB at 12.9 GHz
15	1	Length (SMF) or Copper Cable Attenuation	Link length supported for single-mode fiber, units of 100 m, or copper cable attenuation in dB at 25.78 GHz
16	1	Length (50 um, OM2)	Link length supported for 50 um OM2 fiber, units of 10 m
17	1	Length (62.5 um, OM1)	Link length supported for 62.5 um OM1 fiber, units of 10 m
18	1	Length (OM4 or copper cable)	Link length supported for 50um OM4 fiber, units of 10 m. Alternatively, copper or direct attach cable, units of m
19	1	Length (OM3) or Cable length, additional	Link length supported for 50 um OM3 fiber, units of 10 m. Alternatively, copper or direct attach cable multiplier and base value
20-35	16	Vendor name	SFP vendor name (ASCII)
36	1	Transceiver	Code for electronic or optical compatibility
37-39	3	Vendor OUI	SFP vendor IEEE company ID
40-55	16	Vendor PN	Part number provided by SFP vendor (ASCII)
56-59	4	Vendor rev	Revision level for part number provided by vendor (ASCII)
60-61	2	Wavelength	Laser wavelength (Passive/Active Cable Specification Compliance)
62	1	Fibre Channel Speed 2	Transceiver's Fibre Channel speed capabilities
63	1	CC_BASE	Check code for Base ID Fields (addresses 0 to 62)
64-65	2	Options	Indicates which optional transceiver signals are implemented
66	1	Signaling Rate, max	Upper signaling rate margin, units of %
67	1	Signaling Rate, min	Lower signaling rate margin, units of %
68-83	16	Vendor SN	Serial number provided by vendor (ASCII)
84-91	8	Date code	Vendor's manufacturing date code
92	1	Diagnostic Monitoring Type	Indicates which type of diagnostic monitoring is implemented (if any) in the transceiver
93	1	Enhanced Options	Indicates which optional enhanced features are implemented (if any) in the transceiver
94	1	SFF-8472 Compliance	Indicates which revision of SFF-8472 the transceiver complies with.
95	1	CC_EXT	Check code for the Extended ID Fields (addresses 64 to 94)
96-127	32	Vendor Specific	Vendor Specific EEPROM
128-255	128	Reserved	Reserved (was assigned to SFF-8079)
A2h ID Fields			
00-01	2	Temp High Alarm	MSB at low address
02-03	2	Temp Low Alarm	MSB at low address
04-05	2	Temp High Warning	MSB at low address
06-07	2	Temp Low Warning	MSB at low address
08-09	2	Voltage High Alarm	MSB at low address
10-11	2	Voltage Low Alarm	MSB at low address
12-13	2	Voltage High Warning	MSB at low address
14-15	2	Voltage Low Warning	MSB at low address

16-17	2	Bias High Alarm	MSB at low address
18-19	2	Bias Low Alarm	MSB at low address
20-21	2	Bias High Warning	MSB at low address
22-23	2	Bias Low Warning	MSB at low address
24-25	2	TX Power High Alarm	MSB at low address
26-27	2	TX Power Low Alarm	MSB at low address
28-29	2	TX Power High Warning	MSB at low address
30-31	2	TX Power Low Warning	MSB at low address
32-33	2	RX Power High Alarm	MSB at low address
34-35	2	RX Power Low Alarm	MSB at low address
36-37	2	RX Power High Warning	MSB at low address
38-39	2	RX Power Low Warning	MSB at low address
40-41	2	Optional Laser Temp High Alarm	MSB at low address
42-43	2	Optional Laser Temp Low Alarm	MSB at low address
44-45	2	Optional Laser Temp High Warning	MSB at low address
46-47	2	Optional Laser Temp Low Warning	MSB at low address
48-49	2	Optional TEC Current High Alarm	MSB at low address
50-51	2	Optional TEC Current Low Alarm	MSB at low address
52-53	2	Optional TEC Current High Warning	MSB at low address
54-55	2	Optional TEC Current Low Warning	MSB at low address
56-91	36	Ext Cal Constants or Additional Enhanced Features	Diagnostic calibration constants for optional External Calibration if External Calibration bit, A0h, byte 92, bit 4 is 1 Additional Enhanced Features advertisement, control and status if External Calibration bit, A0h, byte 92, bit 4 is 0
92-94	3	Reserved	
95	1	CC_DMI	Check code for Base Diagnostic Fields (addresses 0 to 94)
96-105	10	Diagnostics	Diagnostic Monitor Data (internally or externally calibrated)
106-109	4	Optional Diagnostics	Monitor Data for Optional Laser temperature and TEC current
110	1	Status/Control	Optional Status and Control Bits
111	1	Reserved	Reserved (was assigned to SFF-8079)
112-113	2	Alarm Flags	Diagnostic Alarm Flag Status Bits
114	1	Tx Input EQ control	Tx Input equalization level control
115	1	Rx Out Emphasis control	Rx Output emphasis level control
116-117	2	Warning Flags	Diagnostic Warning Flag Status Bits
118-119	2	Ext Status/Control	Extended module control and status bytes
120-126	7	Vendor Specific	Vendor specific memory addresses
127	1	Table Select	Optional Page Select
A2h Page 00-01h			

128-247	120	User EEPROM	User writable non-volatile memory
248-255	8	Vendor Control	Vendor specific control addresses
A2h Page 02h			
128-129	2	Reserved	Reserved for SFF-8690 (Tunable Transmitter)
130	1	Reserved	Reserved for future receiver controls
131	1	Rx Decision Threshold	RDT value setting
132-172	41	Reserved	Reserved for SFF-8690
173-255	83	Reserved	Reserved

Mechanical Dimension



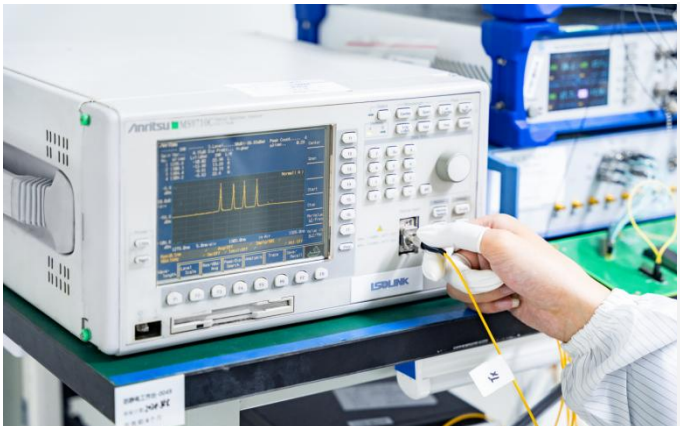
Unit: mm

	L	L1	L2	L3	W	W1	W2	H	H1	H2
MAX	56.9	31.2	41.95	47.7	13.8	10.2	14.0	8.6	0.6	11.5
Typical	56.7	31.0	41.80	47.5	13.7	10.0	-	8.5	0.5	11.3
MIN	56.5	30.8	41.65	47.3	13.5	9.8	-	8.4	0.4	11.1

Test Center

1. Performance Testing

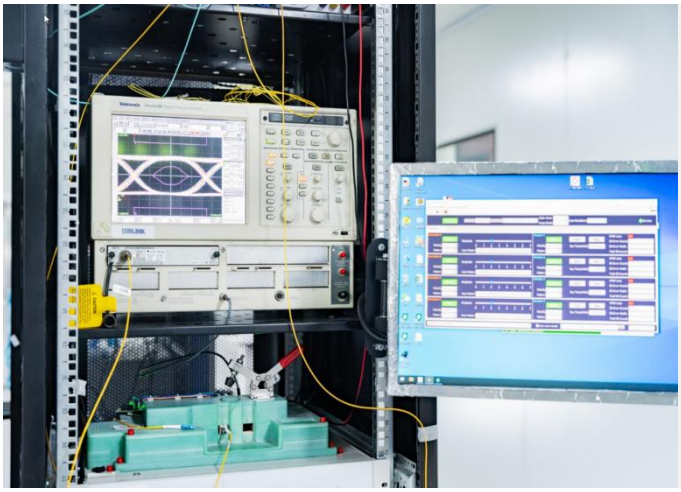
Every fiber optic transceiver is thoroughly tested by the LSOLINK Assurance Program, which is equipped with the world's most advanced analytical equipment to ensure that our transceivers meet the industry's international public protocol standards while still functioning flawlessly in your facility.



Optical Spectrum Inspection

Using the industry's leading optical spectrum analyser to check in real time that the parameters of the optical transceiver's laser comply with industry standards.

- **Peak:** Peak wavelength and peak level
- **2nd Peak:** Side-mode wavelength and level
- **Mean WI:** Center wavelength
- **Total Power:** Total power of spectrum
- **SMSR:** Side-Mode Suppression Ratio



Optical Signal Quality Inspection

Using highly efficient sampling oscilloscopes and BERT testers, equipped with an automated test platform to accurately test the signal quality of the transceiver, test records are kept for up to 5 years to ensure the traceability of each transceiver.

- **Eye Mask Margin(NRZ)**
- **TDECQ(PAM4):**transmitter dispersion eye closure
- **OMA:** Optical modulation amplitude
- **BER:** Bit error rate
- **ER:** Extinction Ratio

Flow Pressure Test

Using multi-protocol network traffic analyser with various brands of switches to test the transceiver's ability to transmit at full speed.

- **Bandwidth:** Actual transceiver bandwidth on the port
- **Packet Loss**
- **Packet Errors:**CRC Errors/PCS Errors/Symbol Errors
- **LinkDown Counts**
- **latency**

Aboveis part of our test bed network equipment. For more information, Please click download for optical transceiver performance test report.

2. Quality Control

We adopt advanced quality management solutions. Each transceiver is self-inspected, including:20x microscope inspection, 200x microscope inspection, and QC process inspection.

visual inspection

Microscopic inspection: 20X

Microscopic inspection: 200X

Reliability Verification

Optical endface inspection

OQC Inspection

Order Information

Part Number	Description
OC3-SFP-SX	155BASE-SX SFP OC-3/STM-1 SONET/SDH 1310nm 2km DOM LC MMF SONET/SDH Transceiver Module
OC3-SFP-LX	155BASE-LX SFP OC-3/STM-1 SONET/SDH 1310nm 20km DOM LC SMF SONET/SDH Transceiver Module
OC3-SFP-EX	155BASE-EX SFP OC-3/STM-1 SONET/SDH 1550nm 40km DOM LC SMF SONET/SDH Transceiver Module
OC3-SFP-ZX	155BASE-ZX SFP OC-3/STM-1 SONET/SDH 1550nm 80km DOM LC SMF SONET/SDH Transceiver Module
OC12-SFP-SX	622BASE-SX SFP OC-12/STM-4 SONET/SDH 850nm 500m DOM LC MMF SONET/SDH Transceiver Module
OC12-SFP-LX	622BASE-LX SFP OC-12/STM-4 SONET/SDH 1310nm 15km DOM LC SMF SONET/SDH Transceiver Module
OC12-SFP-EX	622BASE-EX SFP OC-12/STM-4 SONET/SDH 1550nm 40km DOM LC SMF SONET/SDH Transceiver Module
OC12-SFP-ZX	622BASE-ZX SFP OC-12/STM-4 SONET/SDH 1550nm 80km DOM LC SMF SONET/SDH Transceiver Module
OC48-SFP-SX	2.5GBASE-SX SFP OC-48/STM-16 SONET/SDH 850nm 500m DOM LC MMF SONET/SDH Transceiver Module
OC48-SFP-LX	2.5GBASE-LX SFP OC-48/STM-16 SONET/SDH 1310nm 15km DOM LC SMF SONET/SDH Transceiver Module
OC48-SFP-EX	2.5GBASE-EX SFP OC-48/STM-16 SONET/SDH 1550nm 40km DOM LC SMF SONET/SDH Transceiver Module
OC48-SFP-ZX	2.5GBASE-ZX SFP OC-48/STM-16 SONET/SDH 1550nm 80km DOM LC SMF SONET/SDH Transceiver Module

Further Information

LSOLINK | Lighting the Path to Global Links

Web | www.lsolink.com

Email | For Sales@lsolink.com

Disclaimer

1. We are committed to continuous product improvement and feature upgrades, and the contents con t ained in this manual are subject to change without notice.
2. Nothing herein should be construed as constituting an additional warranty.
3. LSOLINK assumes no responsibility for the use or reliability of equipment or software not provided by LSOLINK.