

# SFP56 50GBASE-LR 1310nm 10km SMF LC Optical Transceiver Module

## FST-50G-LR

### Features

- Hot-pluggable SFP28 form factor
- Maximum link length of 10km
- Full-duplex transceiver module
- Up to 53.125Gbps (26.5625GBd PAM4)
- 53.125Gbps PAM4 based on a cooled EML TOSA transmitter
- 53.125Gbps PAM4 PIN Receiver
- Duplex LC receptacle
- Single 3.3V power supply
- Power dissipation < 3W
- RoHS compliant (lead free)
- Operating case temperature range: 0°C to 70°C



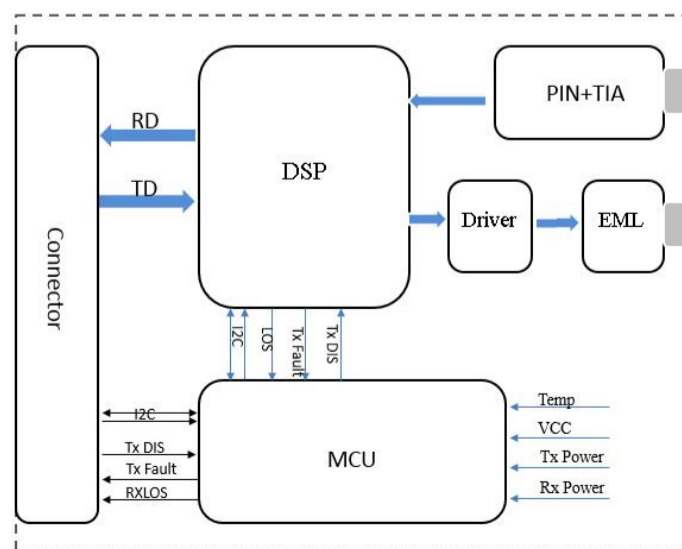
### Applications

- IEEE 802.3cd 50GBASE-LR
- Other Optical Link

### Description

The FIBERSTAMP Technologies FST-50G-LR is a single-Channel, Pluggable, Fiber-Optic SFP56 for 26.5625GBd PAM4 Ethernet Applications. It is a high performance module for short-range data communication and interconnect applications which operate at 53.125 Gbps up to 10km. This module is designed to operate over single mode fiber systems using a nominal wavelength of 1311nm. The electrical interface uses a 20 contact edge type connector. The optical interface uses duplex LC receptacle. This module incorporates FIBERSTAMP Technologies proven circuit and technology to provide reliable long life, high performance, and consistent service.

### Block Diagram



**Absolute Maximum Ratings**

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	0	3.6	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

**Recommended Operating Conditions**

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0		+70	°C
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Power Dissipation	Pm			3	W

**Electrical Specifications**

Parameter	Symbol	Min	Typical	Max	Unit
Differential Input Impedance	Zin	90	100	110	ohm
Differential Output Impedance	Zout	90	100	110	ohm
Differential Input Voltage Amplitude1	$\Delta V_{in}$			900	mVp-p
Differential Output Voltage Amplitude2	$\Delta V_{out}$			900	mVp-p
Input Logic Level High	V <sub>IH</sub>	2.0		Vcc	V
Input Logic Level Low	V <sub>IL</sub>	0		0.8	V
Output Logic Level High	V <sub>OH</sub>	Vcc-0.5		Vcc	V
Output Logic Level Low	V <sub>OL</sub>	0		0.4	V

**Notes:**

1. Differential input voltage amplitude is measured between TxnP and TxnN.
2. Differential output voltage amplitude is measured between RxnP and RxnN.

**Optical Characteristics**

Parameter	Symbol	Min	Typical	Max	Unit	Notes
<b>Transmitter</b>						
Centre Wavelength	$\lambda_c$	1304.5	-	1317.5	nm	-
Side-mode suppression ratio	SMSR	30	-	-	dB	-
Average launch power	P <sub>out</sub>	-4.5	-	4.2	dBm	-
Optical Modulation Amplitude (OMA outer)	OMA	-1.5	-	4	dBm	-
Transmitter and dispersion eye closure(TDEC)	TDEC	-	-	3.2	dB	
Extinction Ratio	ER	3.5	-	-	dB	-
Average launch power of OFF transmitter		-	-	-30	dB	-
<b>Receiver</b>						
Centre Wavelength	$\lambda_c$	1304.5	-	1317.5	nm	-



Parameter	Symbol	Min	Typical	Max	Unit	Notes
Receiver Sensitivity in OMA outer	RXsen	-	-11	-8.4	dBm	1
Average receive power	Pin	-10.8	-	4.2	dBm	-
Receiver Reflectance		-	-	-26	dB	-
LOS Assert		-	-16	-	dBm	-
LOS De-Assert		-	-14	-	dBm	-
LOS Hysteresis		0.5	-	-	dB	-

**Note:**

- 1、 Measured with conformance test signal at TP3 for BER = 2.4E-4 Pre-FECs

**DIAGNOSTIC MONITORING INTERFACE (OPTIONAL)**

The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified.

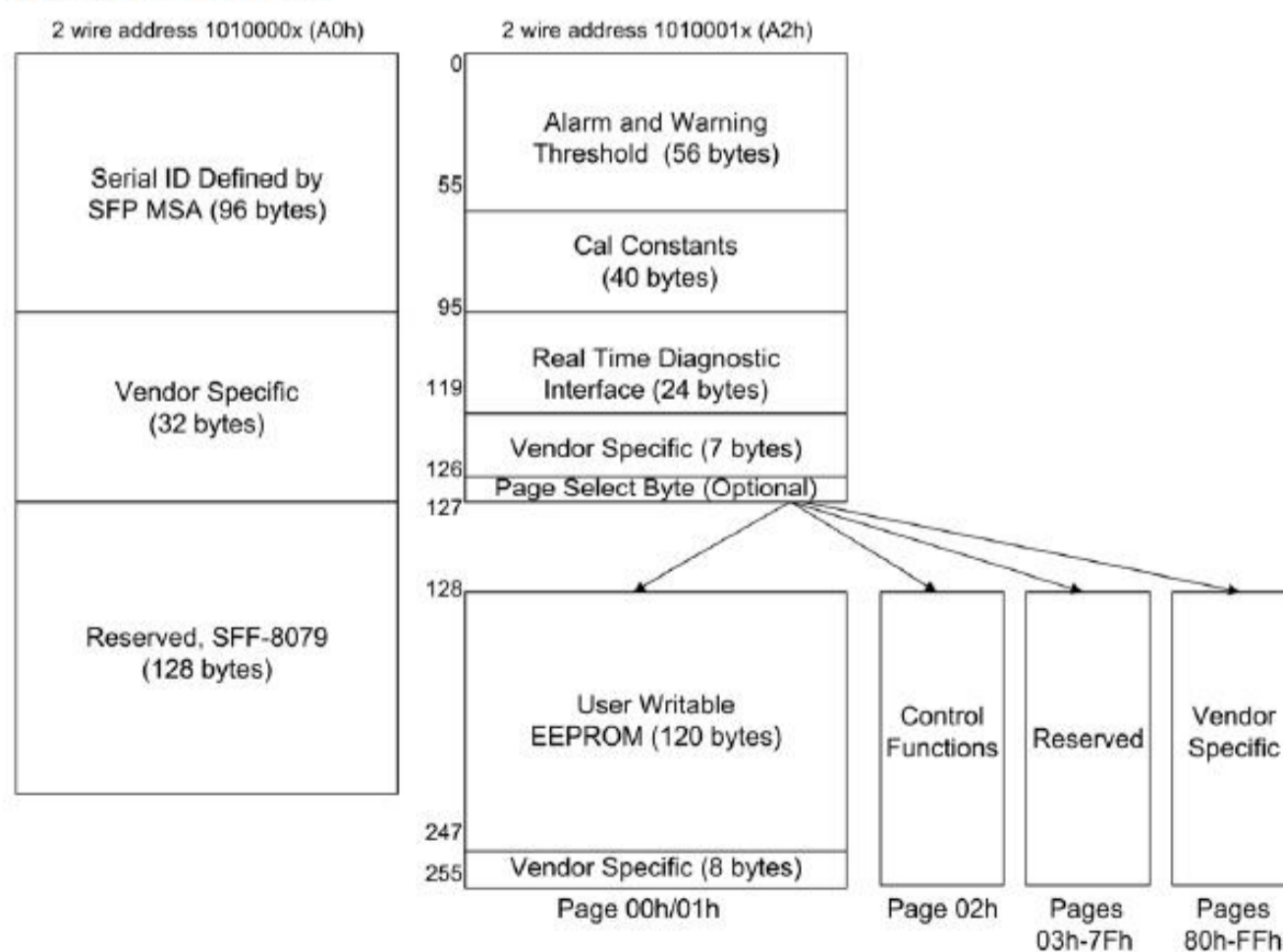
Parameter	Symbol	Min	Max	Units	Notes
Temperature monitor absolute error	DMI_Temp	-3	+3	degC	Over operating temperature range
Supply voltage monitor absolute error	DMI_VCC	-0.1	0.1	V	Over full operating range
Channel RX power monitor absolute error	DMI_RX_Ch	-2	2	dB	1
Channel Bias current monitor	DMI_Ibias_Ch	-10%	10%	mA	
Channel TX power monitor absolute error	DMI_TX_Ch	-2	2	dB	1

**Notes:**

- 1、 Due to measurement accuracy of different single mode fibers, there could be an additional +/- 1 dB fluctuation, or a +/- 3 dB total accuracy.

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA). The memory map specific data field defines as following.

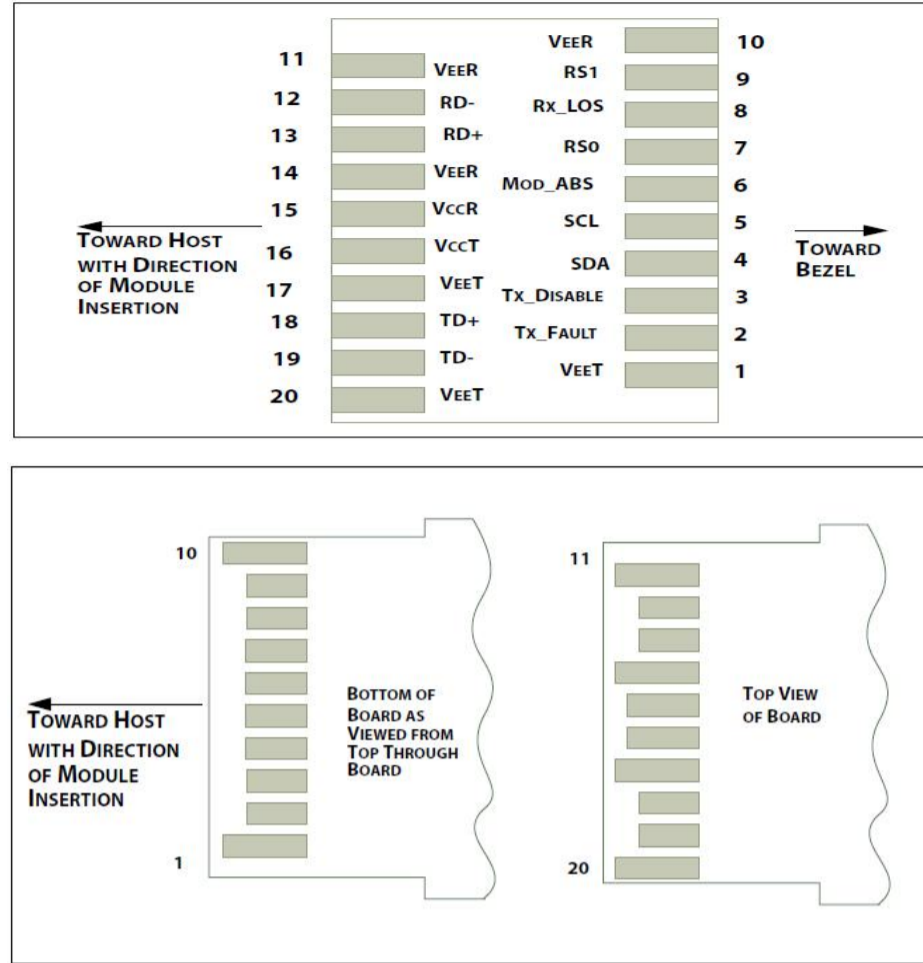
**Two-wire Interface Fields**



**TWO-WIRE INTERFACE FIELDS**



Pin Definitions



Pin Descriptions

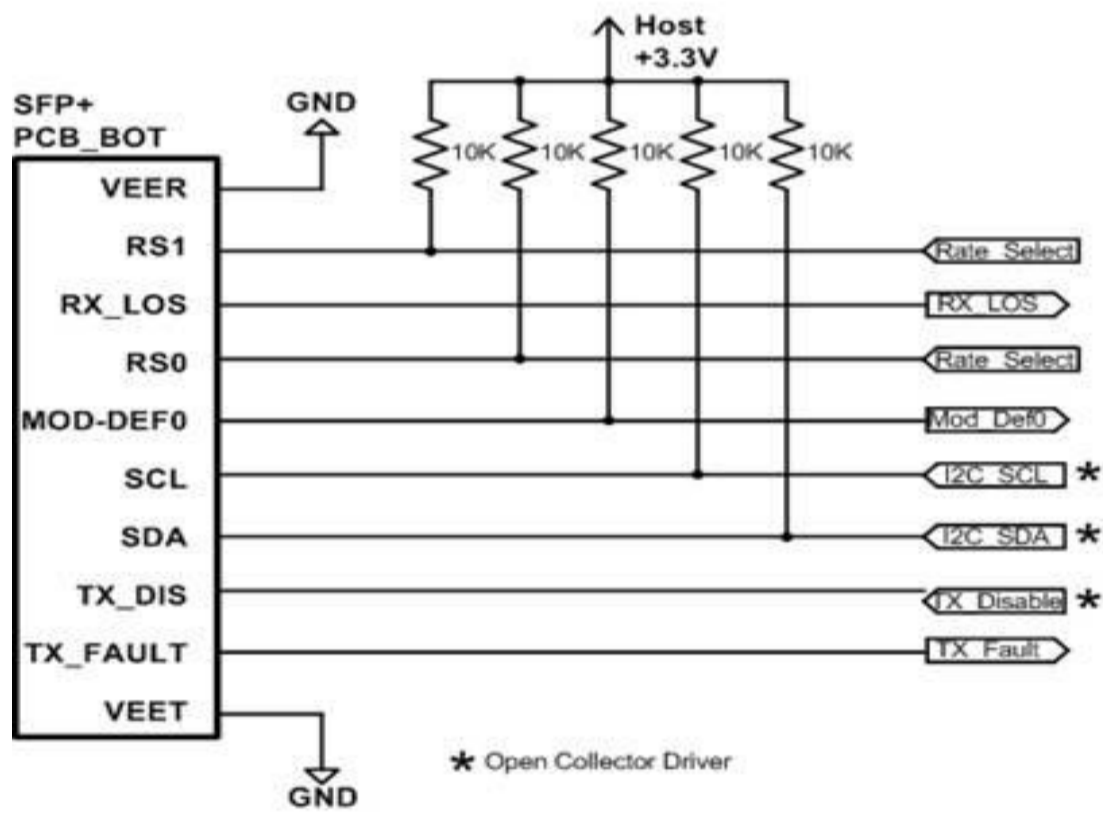
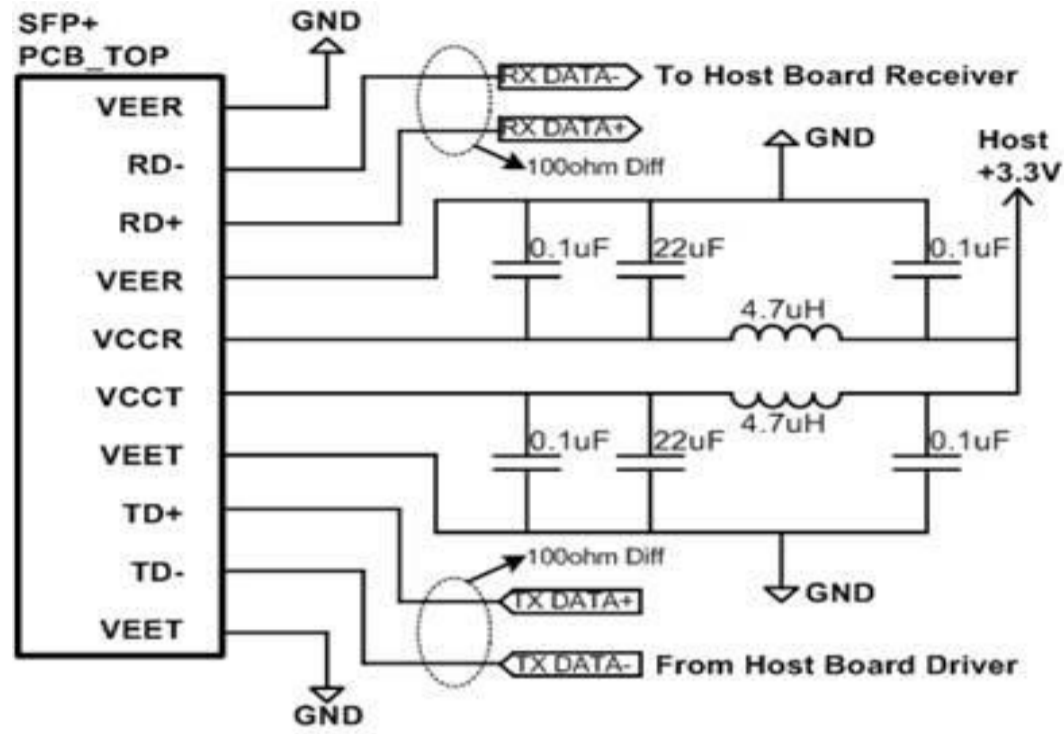
PIN	Logic	Symbol	Name / Description	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	2
3	LVTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
5	LVTTL-I	SCL	2-Wire Serial Interface Clock	2
6		MOD_ABS	Module Definition, Grounded in the module	
7	LVTTL-I	RS0	Receiver Rate Select	
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication Active LOW	
9	LVTTL-I	RS1	Transmitter Rate Select (not used)	
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 Data Output	
14		VeeR	Module Receiver Ground	1
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Receiver 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



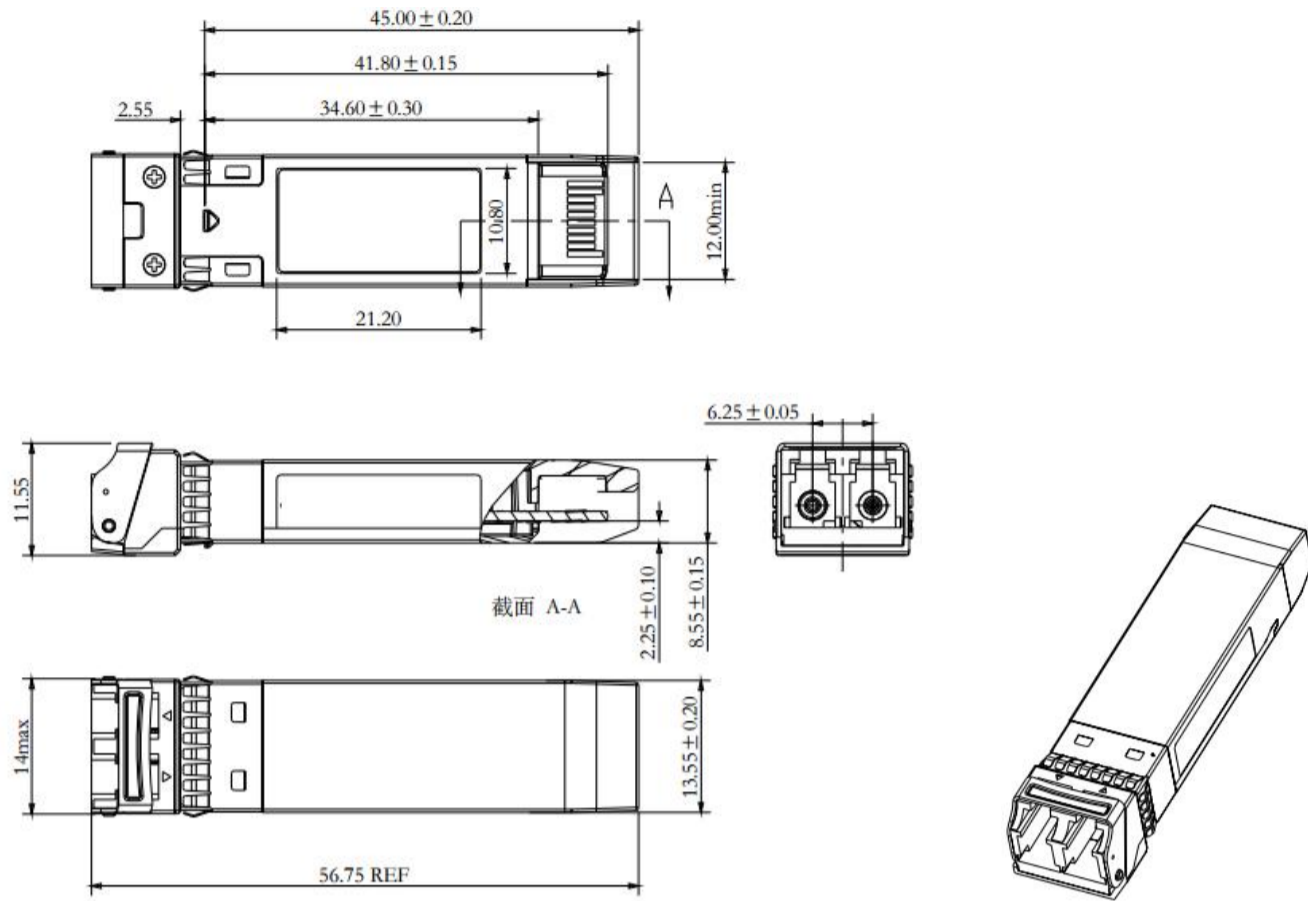
Notes:

- 1、 Module ground pins GND are isolated from the module case.
- 2、 Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.45V on the host board.

Recommended Interface Circuit



Mechanical Dimensions



Regulatory Compliance

FIBERSTAMP FST-50G-LR transceivers are Class 1 Laser Products. They meet the requirements of the following standards:

Feature	Standard
Laser Safety	IEC 60825-1:2014 (3rd Edition) IEC 60825-2:2004/AMD2:2010 EN 60825-1-2014 EN 60825-2:2004+A1+A2
Electrical Safety	EN 62368-1: 2014 IEC 62368-1:2014 UL 62368-1:2014
Environmental protection	Directive 2011/65/EU with amendment(EU)2015/863
CE EMC	EN55032: 2015 EN55035: 2017 EN61000-3-2:2014 EN61000-3-3:2013
FCC	FCC Part 15, Subpart B; ANSI C63.4-2014

References

1. SFP-8472 V12.3
2. SFP-8431
3. IEEE 802.3cd 50GBASE-LR
4. OIF CEI-56G-VSR-PAM4

**⚠ CAUTION:**

Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Ordering information

Part Number	Product Description
FST-50G-LR	53Gbps, 1311nm, SMF, 10km, 0°C ~ +70°C



**Important Notice**

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