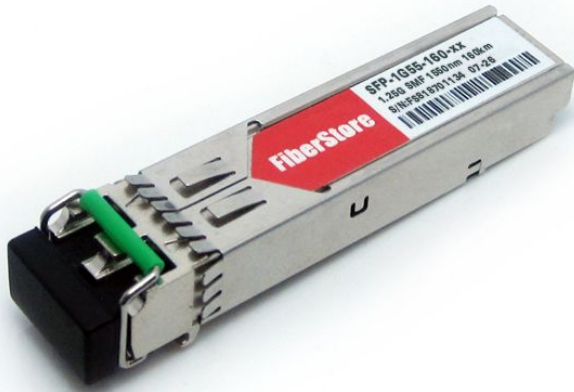


1.25Gbps SFP 1550nm 160km Single-Mode Optical Transceiver SFP-1G55-160-xx



Features

- Data-rate of 1.25Gbps operation
- 1550nm DFB laser and PIN photodetector for 160km transmission
- 160km with 9/125 μm SMF
- Hot-pluggable SFP footprint duplex LC connector Interface
- Class 1 FDA and IEC60825-1 Laser Safety Compliant
- Digital Diagnostic Monitoring
- Compatible with SFP MSA
- Compatible with SFF-8472
- +3.3V single power supply
- Operating case temperature
 - Standard : 0°C to +70°C
 - Extended: -20°C to +85°C
 - Industrial: -40°C to +85°C

Applications

- Gigabit Ethernet
- Fiber Channel
- Switch to Switch interface
- Switched backplane applications
- Router/Server interface
- Other optical transmission systems

Description

The SFP transceivers are high performance, cost effective modules supporting dual data-rate of 1.25Gbps and 160km transmission distance with SMF.

The transceiver consists of three sections: a FP laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements. The transceivers are compatible with SFP Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA.

Specifications

Table 1 - Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	3.6	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-		95	%

Table 2 - Recommended Operating Conditions

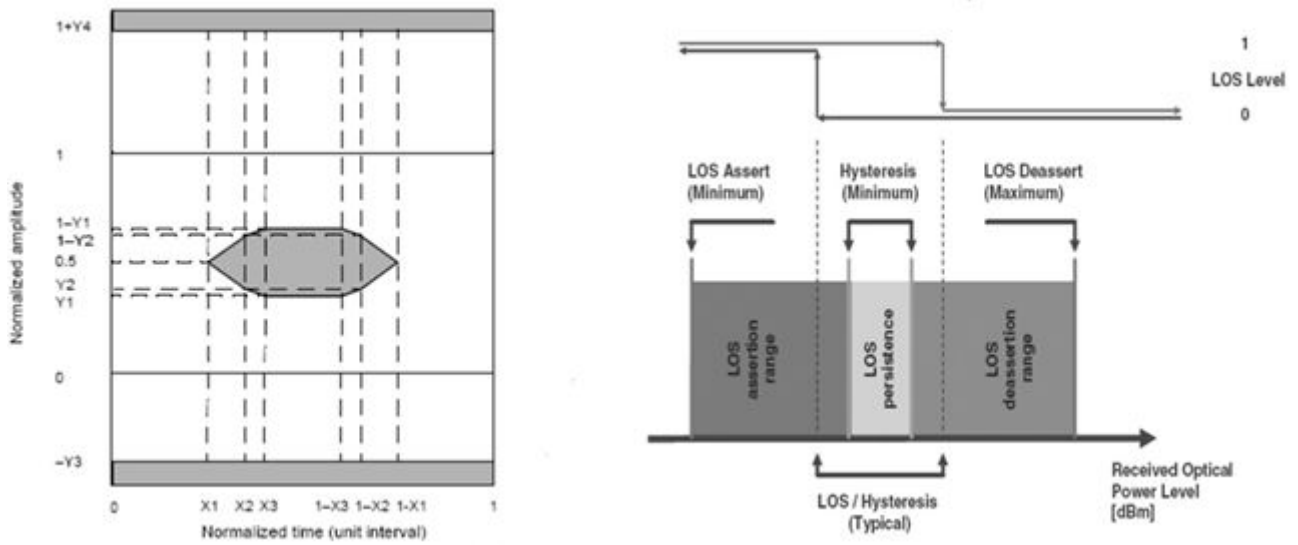
Parameter		Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Standard	T _c	0		+70	°C
	Industrial		-40		+85	°C
Power Supply Voltage		V _{cc}	3.15	3.3	3.45	V
Power Supply Current		I _{cc}			300	mA
Data Rate	Gigabit Ethernet			1.25		Gbps
	Fiber Channel			1.063		

Table 3- Optical and Electrical Characteristics

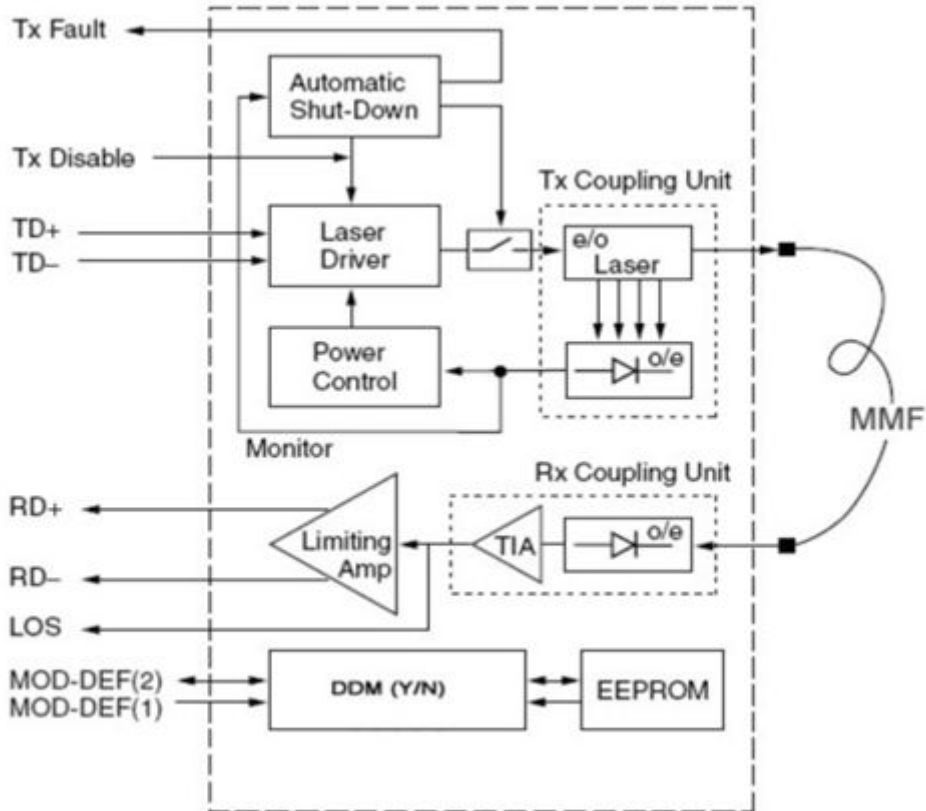
Parameter	Symbol	Min	Typical	Max	Unit	Notes
9µm Core Diameter SMF	L		160		km	
Data Rate		-5	1.063/1.25		Gbps	
Transmitter						
Centre Wavelength	λ _c	1500	1550	1580	nm	
Spectral Width (RMS)	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Output Power	P _{out}	3		7	dBm	1
Extinction Ratio	ER	9			dB	2
Optical Rise/Fall Time (20%~80%)	tr/tf			0.26	ns	
Output Optical Eye	Compliant with IEEE 802.3ah-2004					2,6
Total Jitter	TJ		100	0.43	UI	
TX Disable Assert Time	t _{off}			10	us	
Pout@TX Disable Asserted	P _{out}			-45	dBm	
Receiver						
Centre Wavelength	λ _c	1260		1600	nm	
Receiver Sensitivity	P _{min}			-37	dBm	3
Receiver Overload	P _{max}	-10			dBm	
LOS De-Assert	LOS _D			-39	dBm	
LOS Assert	LOS _A	-48			dBm	
LOS Hysteresis		0.5			dB	5,6
Optical Path Penalty				1	dB	4
Return Loss		12			dB	

Notes:

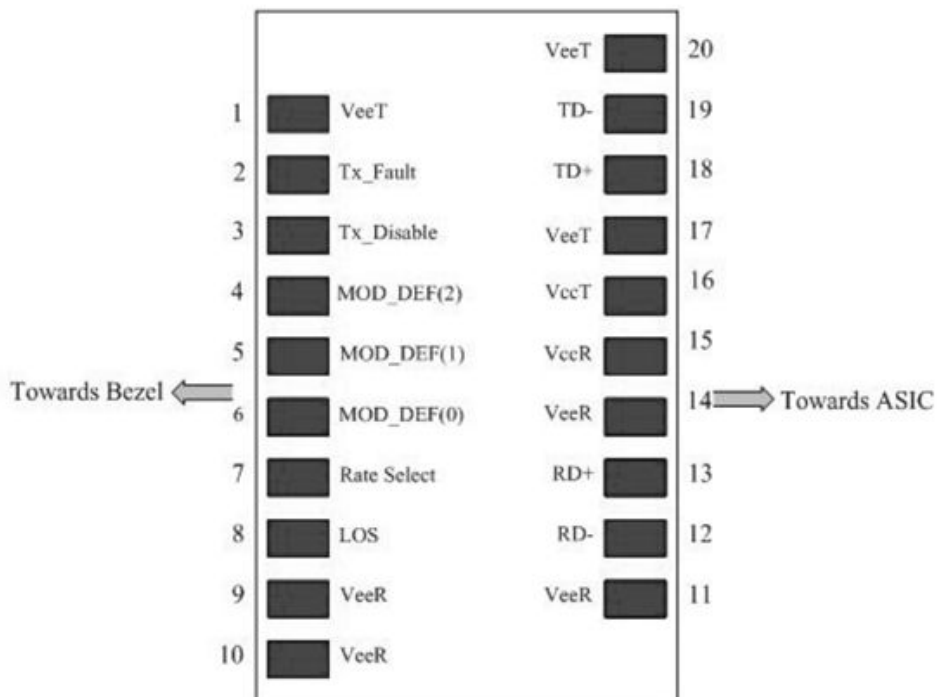
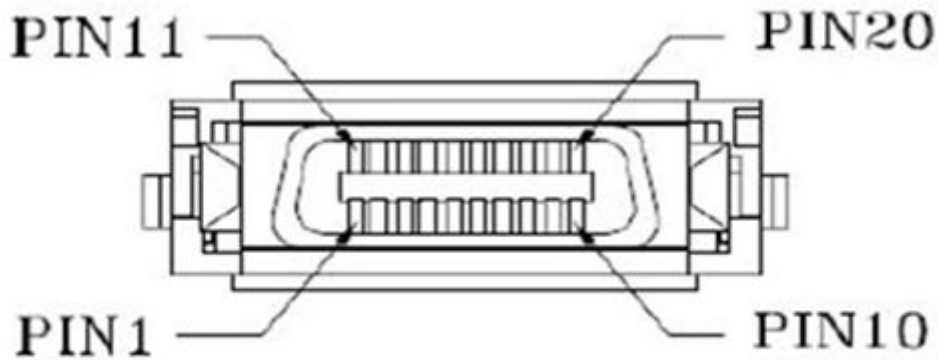
- 1: Output is coupled into a 9/125µm single-mode fiber.
- 2: Filtered, measured with a PRBS 2⁷-1 test pattern @1.25Gbps
- 3: Minimum average optical power measured at BER less than 1E-12, with a 2⁷-1 NRZ PRBS and ER=9dB.
- 4: Measured with a PRBS 2⁷-1 test pattern @1.25Gbps, G.652 SMF, BER ≤1×10⁻¹⁰
- 5: LOS Hysteresis
- 6: Eye Pattern Mask



Functional Description of Transceiver



SFP Transceiver Electrical Pad Layout



Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
1	V _{EET}	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	MOD_DEF(2)	SDA Serial Data Signal	3	Note 3

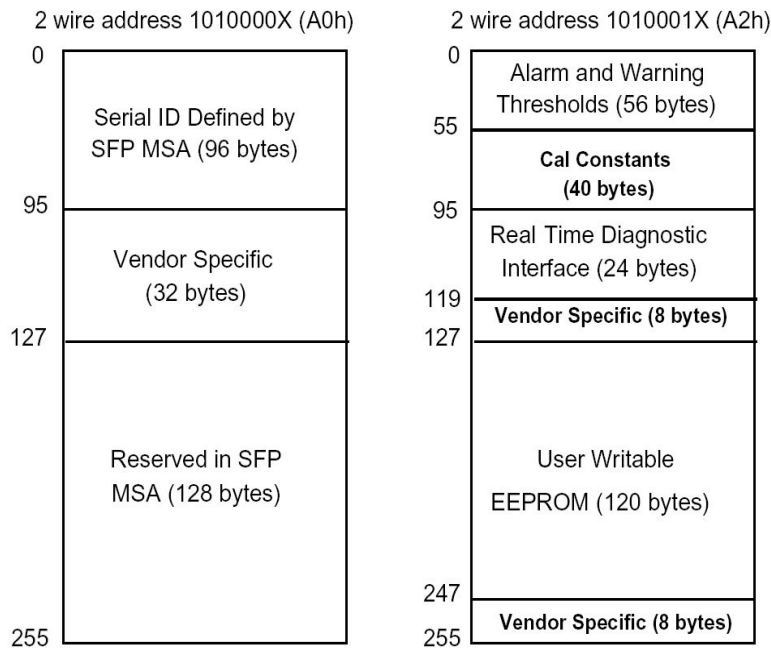
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3
6	MOD_DEF(0)	TTL Low	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	V _{EER}	Receiver ground	1	
10	V _{EER}	Receiver ground	1	
11	V _{EER}	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	V _{EER}	Receiver ground	1	
15	V _{CCR}	Receiver Power Supply	2	
16	V _{CCT}	Transmitter Power Supply	2	
17	V _{EET}	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	V _{EET}	Transmitter Ground	1	

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

- 1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and V_{cc}+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~10kΩ resistor. Its states are:

Low (0 to 0.8V):	Transmitter on
(>0.8V, < 2.0V):	Undefined
High (2.0 to 3.465V):	Transmitter Disabled
Open:	Transmitter Disabled
- 3) Mod-Def 0, 1, 2. These are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board. The pull-up voltage shall be V_{ccT} or V_{ccR}.
 - Mod-Def 0 is grounded by the module to indicate that the module is present
 - Mod-Def 1 is the clock line of two wire serial interface for serial ID
 - Mod-Def 2 is the data line of two wire serial interface for serial ID
- 4) LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and V_{cc}+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.
- 5) RD-/+ : These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
- 6) TD-/+ : These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.



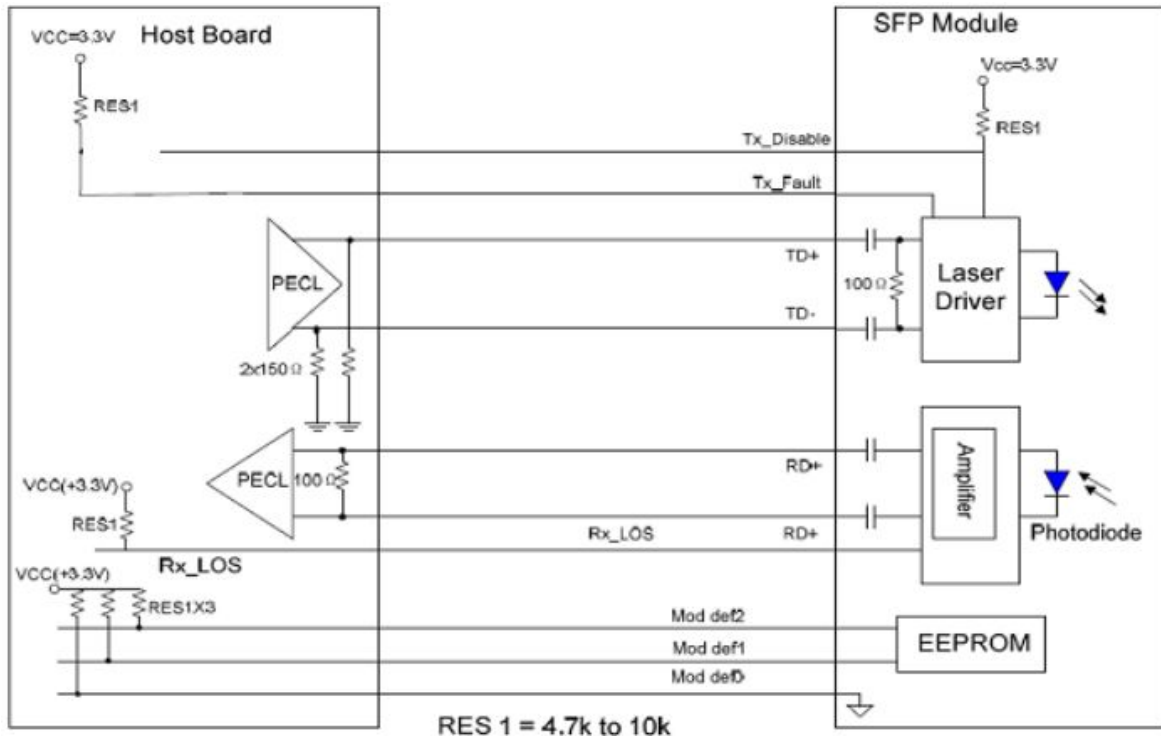
EEPROM Serial ID Memory Contents

Addr.	Size (Bytes)	Name of Field	Hex	Description
BASE ID FIELDS				
0	1	Identifier	3	SFP
1	1	Ext. Identifier	4	SFP function is defined by serial ID only
2	1	Connector	7	LC Connector
3-10	8	Transceiver	XX ^(note)	Transmitter Code
11	1	Encoding	01	8B10B
12	1	BR, Nominal	0D	1.25Gbps
13	1	Reserved	00	Transceiver Transmit Distance
14	1	Length (9μm) km	0A/0F/14/1E/28	
15	1	Length(9μm) 100m	64/96/C8/FF/FF	
16	1	Length (50μm) 10m	00	
17	1	Length(62.5μm)10m	00	
18	1	Length (Copper)	00	Not Compliant
19	1	Reserved	00	
20-35	16	Vendor name	XX XX XX XX XX XX XX XX ^(note) 20 20 20 20 20 20 20 20	Vendor name (ASCII)
36	1	Reserved	00	
37-39	3	Vendor OUI	00 00 00	

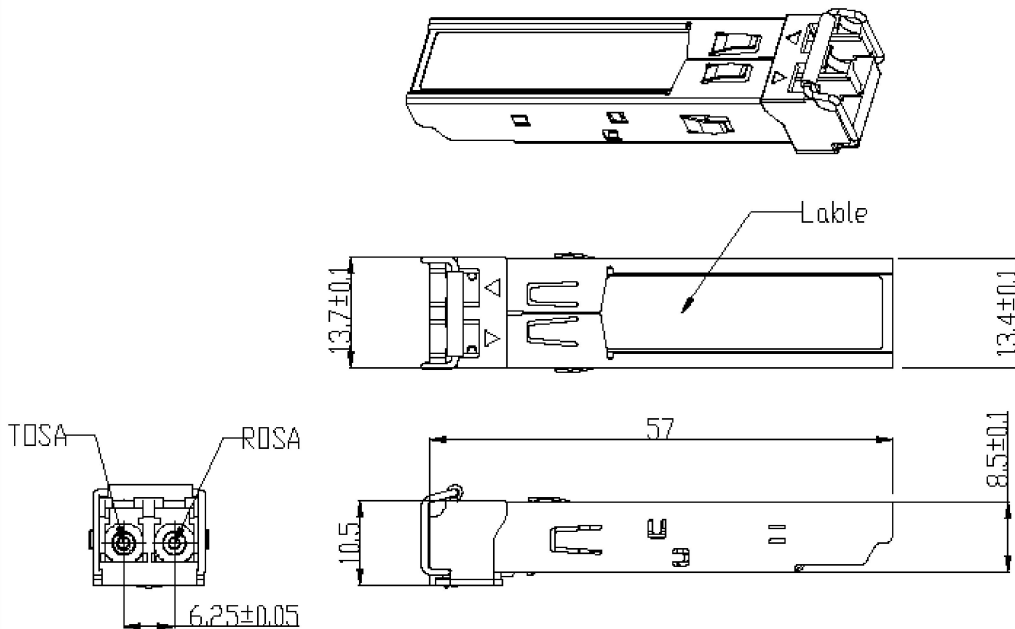
40-35	16	Vendor PN	XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX	Transceiver part number
56-59	4	Vendor rev	XX XX XX XX ^(note)	ASCII (31 30 20 20 means 1.0 revision)
60-61	2	Wavelength	05 1E	1550nm
62	1	Reserved	00	
63	1	CC_BASE	Check Sum (Variable)	Check Code for Base ID Fields
EXTENDED ID FIELDS				
64-65	2	Options	00 1A	TX_DISABLE, TX_FAULT and Loss of Signal implemented.
66	1	BR, max	00	
67	1	BR, min	00	
68-83	16	Vendor SN	XX XX XX XX XX XX XX XX ^(note) 20 20 20 20 20 20 20 20	Serial Number of transceiver (ASCII). For example "B000822".
84-91	8	Date Code	XX XX XX XX XX XX XX XX ^(note9)	Manufactory Date Code. For example "080405"
92	1	Diagnostic Monitoring Type	XX ^(note9)	Digital Diagnostic Monitoring Implemented
93	1	Enhanced Options	XX ^(note)	Optional Flags
94	1	SFF_8472 Compliance	XX ^(note)	01 for Rev9.3 SFF-8472
95	1	CC_EXT	Check Sum (Variable)	Check Sum for Extended ID Field
VENDOR SPECIFIC ID FIELDS				
96-127	32	Vendor Specific	Read Only	Depends on Customer Information
128-255	128	Reserved	Read Only	

Note: The "XX" byte should be filled in according to practical case. For more information, please refer to the related document of SFP Multi-Source Agreement (MSA).

Recommended Interface Circuit



Mechanical Dimensions



Ordering Information

Part No.	Data Rate (Gbps)	Wavelength (nm)	Connector Type	Transmission Distance (km)	Operating case temperature (°C)	Digital Diagnostics
SFP-1G55-160-xx	1.25	1550	LC	160	0 to +70	No
SFP-1G55-160D-xx	1.25	1550	LC	160	0 to +70	Yes
SFP-1G55-160E-xx	1.25	1550	LC	160	-20 to +85	No
SFP-1G55-160ED-xx	1.25	1550	LC	160	-20 to +85	Yes
SFP-1G55-160I-xx	1.25	1550	LC	160	-40 to +85	No
SFP-1G55-160ID-xx	1.25	1550	LC	160	-40 to +85	Yes

Notes:

xx means compatible brand. (For example: CO= Cisco, JU=Juniper, FD=Foundry, EX=Extreme, NE=Netgear,etc.)

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