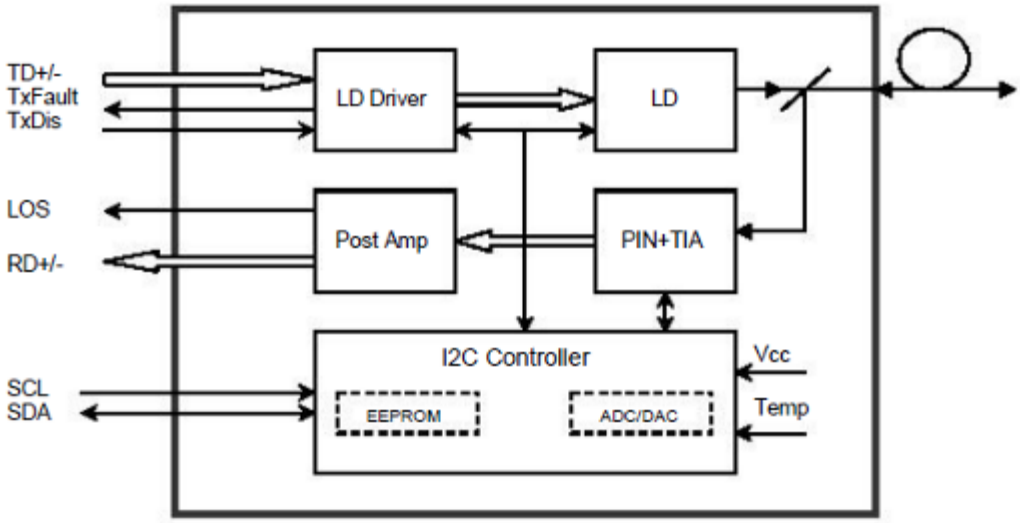
INDUSTRIAL GRADE SMALL FORM-FACTOR PLUGGABLE (SFP) TRANSCEIVERS
SFP Transceivers (155Mbps & 1.25Gbps)
Hot-Pluggable Transceivers

General Description

The industrial-grade small form-factor pluggable (SFP) transceivers are used in the optical network communications. They are compact in size and hot-pluggable, which allows them to be connected or removed without disrupting the operation of the network. They support the Digital Diagnostic Monitoring (DDM) function which allows users to monitor functions such as the temperature, supply voltage, input/output power and others. In addition, they can support a wide operating temperature range from -40 degrees Celsius to 85 degrees Celsius. Various types of SFP transceivers are available which can support different optical fiber types Singlemode or Multimode, different wavelengths 850nm or 1310nm, different transmission distance 550m, 2km, 40km or even 80km, different data transmission speed and transmission direction such as bi-directional. The SFP transceivers comply with both the SFP Multi-Source Agreement (MSA) and SFF-8472 standards with both single and duplex LC receptacles available.

Block Module Diagram



Absolute Maximum Ratings

Parameter	Min	Max
Supply Voltage (Vcc)	0V	4V
Storage Temperature (Ts)	-40°C	+85°C
Operating Humidity	5%	85%

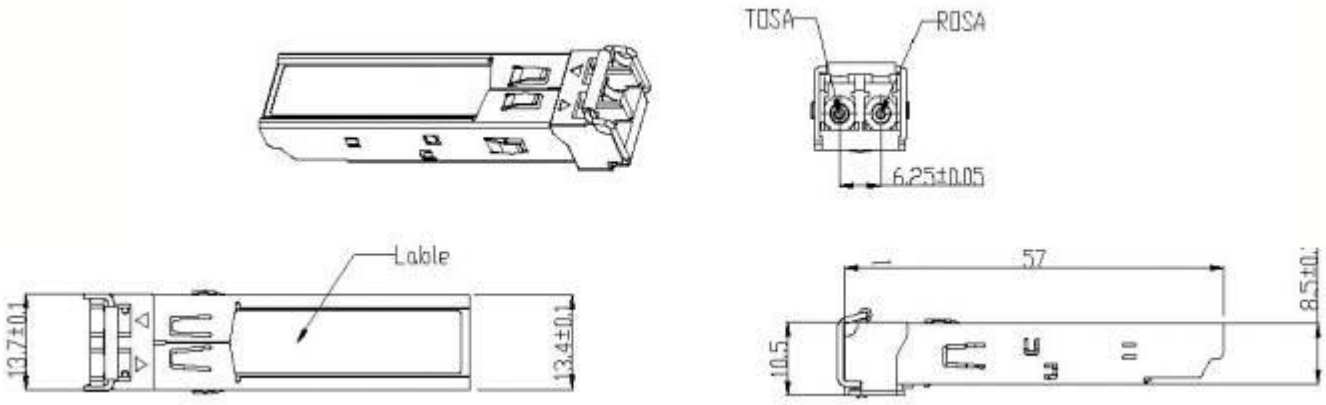
Recommended Operating Conditions

Parameter		Min	Typical	Max
Operating Case Temperature (TC)	Industrial	-40°C		+85°C
Power Supply Voltage (Vcc)		3.13V	3.3V	3.47V
Power Supply Current (Icc)		-	-	300mA[1]

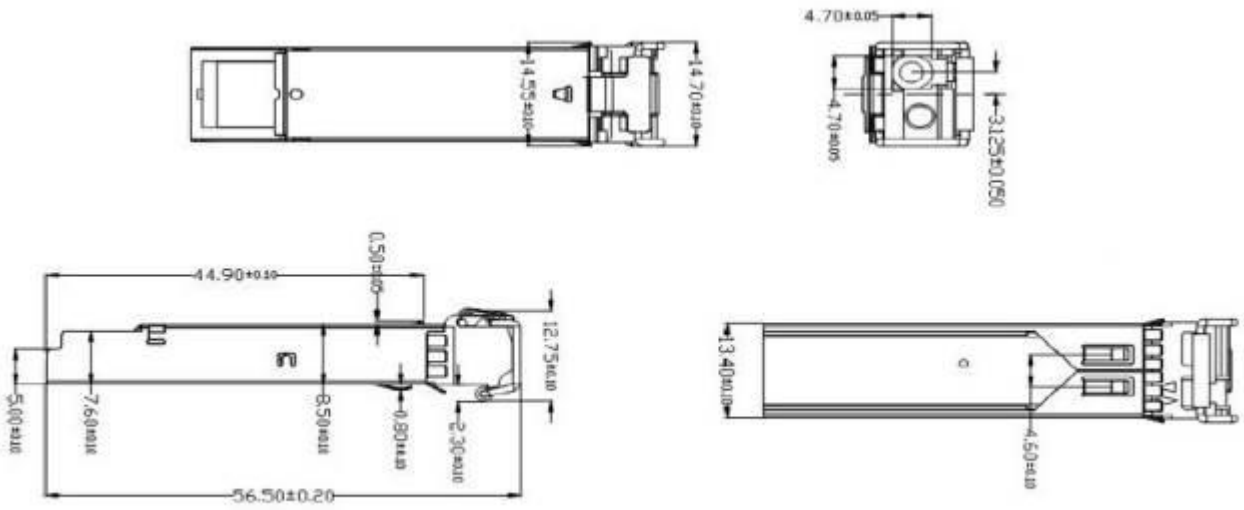
Note: For SFP-M1213L-02I, the power supply current required is 280mA.

Dimensions

Duplex LC Receptacles – Duplex Fibers



Single LC Receptacle – Simplex Fiber



Note: All dimensions are in millimeters.

Duplex LC Receptacles – Duplex Fibers

SFP Transceivers (155Mbps)

These transceivers support the data transmission speed up to 155Mbps.

Specifications

Optical and Electrical Characteristics

Type			Model Number								
			SFP-M1513L-02I			SFP-S1513L-20I			SFP-S1513L-40I		
			Min	Typical	Max	Min	Typical	Max	Min	Typical	Max
Transmitter	Centre Wavelength ((λc)		1290nm	1310nm	1330nm	1290nm	1310nm	1330nm	1290nm	1310nm	1330nm
	Spectral Width (RMS) (Δλ)				4nm			3nm			3nm
	Average Output Power (Pout) *refer to note 1*		-18dBm		-14dBm	-14dBm		-8dBm	-5dBm		0dBm
	Extinction Ratio (ER)		9dB			8dB			8dB		
	Optical Rise/Fall Time (20%~80%) (tr/tf)				16ns			0.16ns			0.16ns
	Data Input Swing Differential (V_{IN}) *refer to note 2*		400mV		1860mV	400mV		1800mV	400mV		1800mV
	Input Differential Impedance (Z_{IN})		90Ω	100Ω	110Ω	90Ω	100Ω	110Ω	90Ω	100Ω	110Ω
	TX Disable	Disable	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc
		Enable	0V		0.8V	0V		0.8V	0V		0.8V
	TX Fault	Fault	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc
		Normal	0V		0.8V	0V		0.8V	0V		0.8V
Receiver	Centre Wavelength ((λc)		1260nm		1580nm	1260nm		1620nm	1260nm		1620nm
	Receiver Sensitivity *refer to note 3*				-30dBm			-32dBm			-34dBm
	Receiver Overload *refer to note 3*		-3dBm			-3dBm			-3dBm		
	LOS De-Assert (LOS_D)				-24dBm			-24dBm			-24dBm
	LOS Assert (LOS_A)		-45dBm			-35dBm			-35dBm		
	LOS Hysteresis		1dB		4dB	1dB		4dB	1dB		4dB
	Data Output Swing Differential (Vout) *refer to note 4*		400mV		900mV	700mV		900mV	700mV		900mV
	LOS	High	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc
		Low			0.8V			0.8V			0.8V

Notes:

1. The optical power is launched into MMF for SFP-M1513L-02I, SMF for SFP-S1513L-20I & SFP-S1513L-40I
2. PECL input, internally AC-coupled and terminated.
3. For SFP-M1513L-02I - Measured with a PRBS 2^7-1 test pattern @1250Mbps, BER ≤1×10^{-10}.
   For SFP-S1513L-20I & SFP-S1513L-40I - Measured with a PRBS 2^7-1 test pattern @1250Mbps, BER ≤1×10^{-12}
4. Internally AC-coupled.

Duplex LC Receptacles – Duplex Fibers

SFP Transceivers (1.25Gbps)

These transceivers support the data transmission speed up to 1.25Gbps.

Specifications Part One

Optical and Electrical Characteristics

Type			Model Number: SFP-M1285L-05I Min	SFP-M1285L-05I Typical	SFP-M1285L-05I Max	SFP-M1213L-02I Min	SFP-M1213L-02I Typical	SFP-M1213L-02I Max	SFP-S1213L-20I Min	SFP-S1213L-20I Typical	SFP-S1213L-20I Max	SFP-S1213L-40I Min	SFP-S1213L-40I Typical	SFP-S1213L-40I Max
Transmitter	Centre Wavelength ((λc)		830 nm	850 nm	860 nm	1270 nm	1310 nm	1360 nm	1260 nm	1310 nm	1360 nm	1290 nm	1310 nm	1330 nm
	Spectral Width (RMS) (Δλ)				0.85 nm	3.5 nm					4 nm			3 nm
	Average Output Power (Pout) *refer to note 1*		-9.5 dBm		-3 dBm	-11 dBm		-3 dBm	-9 dBm		-3 dBm	-5 dBm		0 dBm
	Extinction Ratio (ER)		9dB			9dB			9dB			8dB		
	Optical Rise/Fall Time(20%~80%) (tr/tf)				0.26ns			100ps			0.26 ns			0.16ns
	Data Input Swing Differential (V_{IN}) *refer to note 2*		400 mV		1800 mV	200 mV		2400 mV	400 mV		1800 mV	400 mV		1800 mV
	Input Differential Impedance (Z_{IN})		90Ω	100Ω	110Ω	90Ω	100Ω	110Ω	90Ω	100Ω	110Ω	90Ω	100Ω	110Ω
	TX Disable	Disable	2.0V		Vcc	1.3V		Vcc	2.0V		Vcc	2.0V		Vcc
		Enable	0V		0.8V	0.3V		0.8V	0V		0.8V	0V		0.8V
	TX Fault	Fault	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc
		Normal	0V		0.8V	0V		0.8V	0V		0.8V	0V		0.8V
Receiver	Centre Wavelength ((λc)		1530 nm	1550 nm	1570 nm	1270 nm		1610 nm	1260 nm		1580 nm	1260 nm		1620 nm
	Receiver Sensitivity *refer to note 3				-32 dBm			-19 dBm			-23 dBm			-23 dBm
	Receiver Overload *refer to note 3*		-3 dBm			-3 dBm			-3 dBm			-3 dBm		
	LOS De-Assert (LOS_D)				-24 dBm			-20 dBm			-24 dBm			-24 dBm
	LOS Assert (LOS_A)		-35 dBm			-35 dBm			-35 dBm			-35 dBm		
	LOS Hysteresis		1dB		4dB	0dB		5dB	1dB		4dB	1dB		4dB
	Data Output Swing Differential (Vout) *refer to note 4*		700 mV		900 mV	500 mV		900 mV	700 mV		900 mV	700 mV		900 mV
	LOS	High	2.0V		Vcc	1.3V		Vcc	2.0V		Vcc	2.0V		Vcc
		Low			0.8V	0.3V		0.8V			0.8V			0.8V

Notes:

1. The optical power is launched into MMF for SFP-M1285L-05I, SFP-M1213L-02I SMF for SFP-S1213L-20I, SFP-S1213L-40I
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2^7-1 test pattern @1250Mbps, BER ≤1×10^{-12}.
4. Internally AC-coupled.

Specifications Part Two

Optical and Electrical Characteristics

Type			Model Number: SFP-S1215L-80I Min	Typical	Max			
Transmitter	Centre Wavelength ((λc)		1530 nm	1550 nm	1570 nm			
	Spectral Width (RMS) (Δλ)				3 nm			
	Average Output Power (Pout) *refer to note 1*		0 dBm		5 dBm			
	Extinction Ratio (ER)		8dB					
	Optical Rise/Fall Time(20%~80%) (tr/tf)				0.16ns			
	Data Input Swing Differential (V_{IN}) *refer to note 2*		400 mV		1800 mV			
	Input Differential Impedance (Z_{IN})		90Ω	100Ω	110Ω			
	TX Disable	Disable	2.0V		Vcc			
		Enable	0V		0.8V			
	TX Fault	Fault	2.0V		Vcc			
		Normal	0V		0.8V			
Receiver	Centre Wavelength ((λc)		1260 nm		1620 nm			
	Receiver Sensitivity *refer to note 3				-23 dBm			
	Receiver Overload *refer to note 3*		-3 dBm					
	LOS De-Assert (LOS_D)				-24 dBm			
	LOS Assert (LOS_A)		-35 dBm					
	LOS Hysteresis		1dB		4dB			
	Data Output Swing Differential (Vout) *refer to note 4*		700 mV		900 mV			
	LOS	High	2.0V		Vcc			
		Low			0.8V			

Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2^7-1 test pattern @1250Mbps, BER ≤1×10^{-12}.
4. Internally AC-coupled.

Single LC Receptacles – Simplex Fiber (Bi-directional)

SFP Transceivers (155Mbps)

These transceivers support the data transmission speed up to 155Mbps.

Specifications

Optical and Electrical Characteristics

Type			Model Number: SFP-B1535L-20I Min	SFP-B1535L-20I Typical	SFP-B1535L-20I Max	SFP-B1535L-40I Min	SFP-B1535L-40I Typical	SFP-B1535L-40I Max	SFP-B1553L-20I Min	SFP-B1553L-20I Typical	SFP-B1553L-20I Max	SFP-B1553L-40I Min	SFP-B1553L-40I Typical	SFP-B1553L-40I Max
Transmitter	Centre Wavelength ((λc)		1290 nm	1310 nm	1330 nm	1290nm	1310 nm	1330 nm	1530 nm	1550 nm	1570 nm	1530 nm	1550 nm	1570 nm
	Spectral Width (RMS) (Δλ)				3 nm			3 nm			1 nm			1 nm
	Average Output Power (Pout) *refer to note 1*		-14 dBm		-8 dBm	-5 dBm		0 dBm	-14 dBm		-8 dBm	-5 dBm		0 dBm
	Extinction Ratio (ER)		8dB			8dB			8dB			8dB		
	Optical Rise/Fall Time(20%~80%) (tr/tf)				0.16 ns			0.16 ns			0.16 ns			0.16ns
	Data Input Swing Differential (V_{IN}) *refer to note 2*		400 mV		1800 mV	400 mV		1800 mV	400 mV		1800 mV	400 mV		1800 mV
	Input Differential Impedance (Z_{IN})		90Ω	100Ω	110Ω	90Ω	100Ω	110Ω	90Ω	100Ω	110Ω	90Ω	100Ω	110Ω
	TX Disable	Disable	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc
		Enable	0V		0.8V	0V		0.8V	0V		0.8V	0V		0.8V
	TX Fault	Fault	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc
		Normal	0V		0.8V	0V		0.8V	0V		0.8V	0V		0.8V
Receiver	Centre Wavelength ((λc)		1530 nm	1550 nm	1570 nm	1530 nm	1550 nm	1570 nm	1290 nm	1310 nm	1330 nm	1290 nm	1310 nm	1330 nm
	Receiver Sensitivity *refer to note 3				-32 dBm			-31 dBm			-31 dBm			-31 dBm
	Receiver Overload *refer to note 3*		-3 dBm			-3 dBm			-3 dBm			-3 dBm		
	LOS De-Assert (LOS_D)				-24 dBm			-24 dBm			-24 dBm			-24 dBm
	LOS Assert (LOS_A)		-35 dBm			-35 dBm			-35 dBm			-35 dBm		
	LOS Hysteresis		1dB		4dB	1dB		4dB	1dB		4dB	1dB		4dB
	Data Output Swing Differential (Vout) *refer to note 4*		700 mV		900 mV	700 mV		900 mV	700 mV		900 mV	700 mV		900 mV
	LOS	High	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc
		Low			0.8V			0.8V			0.8V			0.8V

Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2^7-1 test pattern @1250Mbps, BER ≤1×10^{-12}
4. Internally AC-coupled.

Single LC Receptacles – Simplex Fiber (Bi-directional)

SFP Transceivers (1.25Gbps)

These transceivers support the data transmission speed up to 1.25Gbps.

Specifications Part One

Optical and Electrical Characteristics

Type			Model Number: SFP-B1235L-20I Min	SFP-B1235L-20I Typical	SFP-B1235L-20I Max	SFP-B1235L-40I Min	SFP-B1235L-40I Typical	SFP-B1235L-40I Max	SFP-B1253L-20I Min	SFP-B1253L-20I Typical	SFP-B1253L-20I Max	SFP-B1253L-40I Min	SFP-B1253L-40I Typical	SFP-B1253L-40I Max
Transmitter	Centre Wavelength ((λc)		1290 nm	1310 nm	1330 nm	1290nm	1310 nm	1330 nm	1530 nm	1550 nm	1570 nm	1530 nm	1550 nm	1570 nm
	Spectral Width (RMS) (Δλ)				1 nm			1 nm			1 nm			3 nm
	Average Output Power (Pout) *refer to note 1*		-9 dBm		-3 dBm	-5 dBm		0 dBm	-9 dBm		-3 dBm	-5 dBm		0 dBm
	Extinction Ratio (ER)		8dB			8dB			8dB			8dB		
	Optical Rise/Fall Time(20%~80%) (tr/tf)				0.16 ns			0.16 ns			0.16 ns			0.16ns
	Data Input Swing Differential (V_{IN}) *refer to note 2*		400 mV		1800 mV	400 mV		1800 mV	400 mV		1800 mV	400 mV		1800 mV
	Input Differential Impedance (Z_{IN})		90Ω	100Ω	110Ω	90Ω	100Ω	110Ω	90Ω	100Ω	110Ω	90Ω	100Ω	110Ω
	TX Disable	Disable	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc
		Enable	0V		0.8V	0V		0.8V	0V		0.8V	0V		0.8V
	TX Fault	Fault	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc
		Normal	0V		0.8V	0V		0.8V	0V		0.8V	0V		0.8V
Receiver	Centre Wavelength ((λc)		1530 nm	1550 nm	1570 nm	1530 nm	1550 nm	1570 nm	1290 nm	1310 nm	1330 nm	1290 nm	1310 nm	1330 nm
	Receiver Sensitivity *refer to note 3				-23 dBm			-23 dBm			-23 dBm			-23 dBm
	Receiver Overload *refer to note 3*		-3 dBm			-3 dBm			-3 dBm			-3 dBm		
	LOS De-Assert (LOS_D)				-24 dBm			-24 dBm			-24 dBm			-24 dBm
	LOS Assert (LOS_A)		-35 dBm			-35 dBm			-35 dBm			-35 dBm		
	LOS Hysteresis		1dB		4dB	1dB		4dB	1dB		4dB	1dB		4dB
	Data Output Swing Differential (Vout) *refer to note 4*		700 mV		900 mV	700 mV		900 mV	700 mV		900 mV	700 mV		900 mV
	LOS	High	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc	2.0V		Vcc
		Low			0.8V			0.8V			0.8V			0.8V

Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2^7-1 test pattern @1250Mbps, BER ≤1×10^{-12}
4. Internally AC-coupled.

Specifications Part Two

Optical and Electrical Characteristics

Type			Model Number							
			SFP-B1245L-80I			SFP-B1254L-80I				
			Min	Typical	Max	Min	Typical	Max		
Transmitter	Centre Wavelength ((λc)		1470 nm	1490 nm	1510 nm	1530 nm	1550 nm	1570 nm		
	Spectral Width (RMS) (Δλ)				1 nm			1 nm		
	Average Output Power (Pout) *refer to note1		0 dBm		+5 dBm	0 dBm		+5 dBm		
	Extinction Ratio (ER)		9.0 dB			9.0 dB				
	Data Input Swing Differential (V_{IN}) *refer to note 2		180 mV		1200 mV	180 mV		1200 mV		
	Input Differential Impedance (Z_{IN})		90Ω	100Ω	110Ω	90Ω	100Ω	110Ω		
	TX Disable	Disable	2.0V		Vcc	2.0V		Vcc		
		Enable	0V		0.8V	0V		0.8V		
	TX Fault	Fault	2.0V		Vcc	2.0V		Vcc		
		Normal	0V		0.8V	0V		0.8V		
Receiver	Centre Wavelength ((λc)		1530 nm	1550 nm	1570 nm	1470 nm	1490 nm	1510 nm		
	Receiver Sensitivity *refer to note 3				-26 dBm			-26 dBm		
	Receiver Overload *refer to note 3		-1 dBm			-1 dBm				
	LOS De-Assert (LOS_D)				-27 dBm			-27 dBm		
	LOS Assert (LOS_A)		-38 dBm			-38 dBm				
	LOS Hysteresis		0.5 dB		4 dB	0.5 dB		4 dB		
	Data Output Swing Differential (Vout) *refer to note 4		600 mV	800 mV	1000 mV	600 mV	800 mV	1000 mV		
	LOS	High	2.0V		Vcc	2.0V		Vcc		
		Low			0.8V			0.8V		

Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS $^{223-1}$ test pattern @1250Mbps, BER ≤1×10^{-12}.
4. Internally AC-coupled.

Ordering Information

155Mbps SFP

Duplex Fibers	
Model	**Description**
SFP-M1513L-02I	155Mbps SFP, Industrial Grade, Multimode, 1310nm, LC, 2km, DDM, Cisco Compatible
SFP-S1513L-20I	155Mbps SFP, Industrial Grade, Singlemode, 1310nm, LC, 20km, DDM, Cisco Compatible
SFP-S1513L-40I	155Mbps SFP, Industrial Grade, Singlemode, 1310nm, LC, 40km, DDM, Cisco Compatible
Simplex Fiber (Bi-directional)	
Model	**Description**
SFP-B1535L-20I	155Mbps SFP, Industrial Grade, TX1310/RX1550nm, LC, 20km, DDM, Cisco Compatible
SFP-B1553L-20I	155Mbps SFP, Industrial Grade, TX1550/RX1310nm, LC, 20km, DDM, Cisco Compatible
SFP-B1535L-40I	155Mbps SFP, Industrial Grade, TX1310/RX1550, LC, 40km, DDM, Cisco Compatible
SFP-B1553L-40I	155Mbps SFP, Industrial Grade, TX1550/RX1310, LC, 40km, DDM, Cisco Compatible

1.25Gbps SFP

Duplex Fibers	
Model	**Description**
SFP-M1285L-05I	1.25Gbps SFP, Industrial Grade, Multimode, 850nm, LC, 550m, DDM, Cisco Compatible
SFP-M1213L-02I	1.25Gbps SFP, Industrial Grade, Multimode, 1310nm, LC, 2km, DDM, Cisco Compatible
SFP-S1213L-20I	1.25Gbps SFP, Industrial Grade, Singlemode, 1310nm, LC, 20km, DDM, Cisco Compatible
SFP-S1213L-40I	1.25Gbps SFP, Industrial Grade, Singlemode, 1310nm, LC, 40km, DDM, Cisco Compatible
SFP-S1215L-80I	1.25Gbps SFP, Industrial Grade, Singlemode, 1550nm, LC, 80km, DDM, Cisco Compatible
Simplex Fiber (Bi-directional)	
Model	**Description**
SFP-B1253L-20I	1.25Gbps SFP, Industrial Grade, TX1550/RX1310, LC, 20km, DDM, Cisco Compatible
SFP-B1235L-20I	1.25Gbps SFP, Industrial Grade, TX1310/RX1550, LC, 20km, DDM, Cisco Compatible
SFP-B1235L-40I	1.25Gbps SFP, Industrial Grade, TX1310/RX1550, LC, 40km, DDM, Cisco Compatible
SFP-B1253L-40I	1.25Gbps SFP, Industrial Grade, TX1550/RX1310, LC, 40km, DDM, Cisco Compatible
SFP-B1245L-80I	1.25Gbps SFP, Industrial Grade, TX1490/RX1550, LC, 80km, DDM, Cisco Compatible
SFP-B1254L-80I	1.25Gbps SFP, Industrial Grade, TX1550/RX1490, LC, 80km, DDM, Cisco Compatible

* Certified to: Certificate of Compliance to RoHS Directive 2011/65/EU, CE Certificate of Compliance under EMC Directive, FCC Declaration of Conformity