

# SO-XFP-ER-50G-Dxxxx

XFP, 10GBase-ER, Multirate 9.95-11.1 Gbps, DWDM, 50GHz, SM, DDM, 14dB, 40km

## OVERVIEW

The SO-XFP-50G-ER-Dxxxx series single mode transceiver is small form factor pluggable module for duplex optical data communications up to 10G. It is with the SFP+ 20-pin connector to allow hot plug capability. This module is designed for single mode fiber and operates at a nominal wavelength of 1550 nm. The transmitter section uses a DWDM DFB-EML, which is class 1 laser compliant according to International Safety Standard IEC-60825. The DWDM modules operate at nominal Dense Wavelength Division Multiplexing (DWDM) wavelengths on the 50GHz grid as defined in the ITU-T 694.1 standard. The receiver section uses an integrated InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

## PRODUCT FEATURES

- Supports 9.95Gb/s to 11.1Gb/s bit rates
- Hot-Pluggable XFP footprint
- 14dB power budget
- 50GHz ITU Grid, C-band
- Duplex LC connector
- Built-in digital diagnostic functions
- Support line side loopback
- Support XFI loopback
- Auxiliary 1 monitoring laser temperature
- Auxiliary 2 monitoring 5V supply
- Operating case temperature
  - Standard: 0°C + 70°C
  - Extended: -20°C to 85°C

## ORDERING INFORMATION

Part Number	Description
SO-XFP-ER-50G-Dxxxx*	XFP, 10GBase-ER, Multirate 9.95-11.1 Gbps, DWDM, 50GHz, SM, DDM, 14dB, 40km
SO-XFP-ER-50G-Dxxxx-E*	XFP, 10GBase-ER, Multirate 9.95-11.1 Gbps, DWDM, 50GHz, SM, DDM, 14dB, 40km ext. temp

\*xxxx = Refers to notation for frequency data. Please see extended order information on last pages for additional information.

## APPLICATIONS

- 10GBASE-ER/EW Ethernet
- 1200-SM-LL-L 10G Fiber Channel
- SONET OC-192 IR-2

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- SDH STM S-64.2b
- SONET OC-192 IR-3
- SDH STM S-64.3b
- ITU-T G.709

## ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min.	Max.	Unit
Maximum Supply Voltage 1	Vcc3	-0.5	4.0	V
Maximum Supply Voltage 2	Vcc5	-0.3	6.0	V
Storage Temperature	TS	-40	85	°C

## RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min.	Typ	Max.	Unit
Supply Voltage 1	Vcc3	3.13	3.3	3.45	V
Supply Voltage 2	Vcc5	4.75	5	5.25	V
Case Operating Temperature	Tc	SO-XFP-ER-Dxxxx	0	70	°C
		SO-XFP-ER-Dxxxx-E	-20	85	°C

## GENERAL SPECIFICATIONS

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Main Supply Voltage	Vcc5	4.75		5.25	V	
Supply Voltage #2	Vcc3	3.13		3.45	V	
Supply Current – Vcc5 supply	Icc5			500	mA	
Supply Current – Vcc3 supply	Icc3			750	mA	

## PERFORMANCE SPECIFICATIONS – ELECTRICAL TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Input Impedance (Differential)	Rin		100		Ω	Internal AC coupling
Differential Data Input Swing	Vin, pp	120		820	mV	
Transmit Disable Voltage	VD	2.0		Vcc	V	
Transmit Enable Voltage	VEN	GND		GND+0.8	V	
Transmit Disable Assert Time				10	μs	

## PERFORMANCE SPECIFICATIONS – ELECTRICAL RECEIVER

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Differential Data Output Swing	Vout,pp	340	650	850	mV	
Data Output Rise Time	Tr			38	ps	
Data Output Fall Time	Tf			38	ps	20% – 80%
LOS Fault	VLOS Fault	Vcc – 0.5		VccHOST	V	20% – 80%
LOS Normal	VLOS Normal	GND		GND+0.5	V	

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Power Supply Noise Rejection

PSNR

Compliant to Section 2.7.1 of XFP MSA

## PERFORMANCE SPECIFICATIONS – OPTICAL TRANSMITTER

Parameter	Symbol	Min.	Typ	Max.	Unit
Output Opt. Pwr: 9/125 SMF	$P_{out}$	-1	1550	+4	dBm
Center Wavelength Spacing			50		GHz
			0.8		nm
Optical Wavelength-EOL	$\lambda C$	X-80	X	X+80	pm
Transmitter Center Wavelength –BOL	$\lambda C$	X-40	X	X+40	pm
Optical Extinction Ratio	$ER$	8.2			dB
Transmitter and Dispersion Penalty	$TDP$			2	dB
Side Mode Suppression Ratio	$SMSR$	30			dB
TX Jitter Generation (peak-to-peak)	$TXj$			0.1	UI
TX Jitter Generation (RMS)	$TXj_{RMS}$			0.01	UI

## PERFORMANCE SPECIFICATIONS – OPTICAL RECEIVER

Parameter	Symbol	Min.	Typ	Max.	Unit
Receiver Sensitivity @ 9.95Gb/s	$P_{min}$			-15	dBm
Maximum Input Power	$P_{max}$	0.5			dBm
Optical Wavelength	$\lambda$	1270		1600	nm
Path Penalty				2	dB
Receiver Reflectance	$R_{rx}$			-27	dB
LOS De-Assert	$LOSD$			-17	dBm
LOS Assert	$LOSA$	-29			dBm
LOS Hysteresis		1			dB

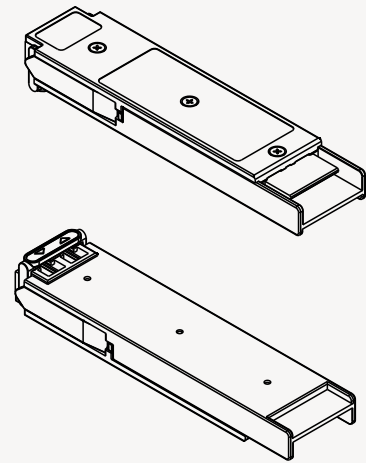
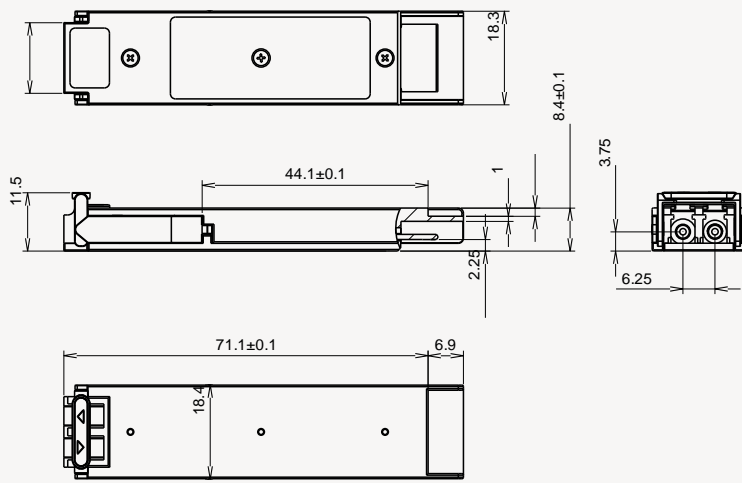
## PIN FUNCTION DEFINITIONS

PIN	Signal Name	Description	PIN	Signal Name	Description
1	$V_{EE}T$	Transmitter Ground	11	$V_{EE}R$	Receiver Ground
2	TX_Fault	Transmitter Fault Indication	12	RD-	Inv. Received Data Out
3	TX_Disable	Transmitter Disable	13	RD+	Received Data Out
4	SDA	Module Definition 2	14	$V_{EE}R$	Receiver Ground
5	SCL	Module Definition 1	15	$V_{CC}R$	Receiver Power
6	MOD_ABS	Module Definition 0	16	$V_{CC}T$	Transmitter Power
7	RS0	RX Rate Select (LVTTTL).	17	$V_{EE}T$	Transmitter Ground
8	LOS	Loss of Signal	18	TD+	Transmit Data In
9	RS1	TX Rate Select (LVTTTL).	19	TD-	Inv. Transmit Data In
10	$V_{EE}R$	Receiver Ground	20	$V_{EE}T$	Transmitter Ground

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# MECHANICAL SPECIFICATIONS



## EXTENDED ORDERING INFORMATION, STANDARD

Part Number	ITU channel no.	Frequency [THz]	Center Wavelength (nm)
SO-XFP-ER-50G-D9180	18.0	191.80	1563.05
SO-XFP-ER-50G-D9185	18.5	191.85	1562.64
SO-XFP-ER-50G-D9190	19.0	191.90	1562.23
SO-XFP-ER-50G-D9195	19.5	191.95	1561.83
SO-XFP-ER-50G-D9200	20.0	192.00	1561.42
SO-XFP-ER-50G-D9205	20.5	192.05	1561.01
SO-XFP-ER-50G-D9210	21.0	192.10	1560.61
SO-XFP-ER-50G-D9215	21.5	192.15	1560.20
SO-XFP-ER-50G-D9220	22.0	192.20	1559.79
SO-XFP-ER-50G-D9225	22.5	192.25	1559.39
SO-XFP-ER-50G-D9230	23.0	192.30	1558.98
SO-XFP-ER-50G-D9235	23.5	192.35	1558.58
SO-XFP-ER-50G-D9240	24.0	192.40	1558.17
SO-XFP-ER-50G-D9245	24.5	192.45	1557.77
SO-XFP-ER-50G-D9250	25.0	192.50	1557.36
SO-XFP-ER-50G-D9255	25.5	192.55	1556.96
SO-XFP-ER-50G-D9260	26.0	192.60	1556.55
SO-XFP-ER-50G-D9265	26.5	192.65	1556.15
SO-XFP-ER-50G-D9270	27.0	192.70	1555.75
SO-XFP-ER-50G-D9275	27.5	192.75	1555.34
SO-XFP-ER-50G-D9280	28.0	192.80	1554.94
SO-XFP-ER-50G-D9285	28.5	192.85	1554.54
SO-XFP-ER-50G-D9290	29.0	192.90	1554.13
SO-XFP-ER-50G-D9295	29.5	192.95	1553.73
SO-XFP-ER-50G-D9300	30.0	193.00	1553.33
SO-XFP-ER-50G-D9305	30.5	193.05	1552.93
SO-XFP-ER-50G-D9310	31.0	193.10	1552.52
SO-XFP-ER-50G-D9315	31.5	193.15	1552.12
SO-XFP-ER-50G-D9320	32.0	193.20	1551.72
SO-XFP-ER-50G-D9325	32.5	193.25	1551.32
SO-XFP-ER-50G-D9330	33.0	193.30	1550.92
SO-XFP-ER-50G-D9335	33.5	193.35	1550.52
SO-XFP-ER-50G-D9340	34.0	193.40	1550.12
SO-XFP-ER-50G-D9345	34.5	193.45	1549.72
SO-XFP-ER-50G-D9350	35.0	193.50	1549.32
SO-XFP-ER-50G-D9355	35.5	193.55	1548.91
SO-XFP-ER-50G-D9360	36.0	193.60	1548.51
SO-XFP-ER-50G-D9365	36.5	193.65	1548.11
SO-XFP-ER-50G-D9370	37.0	193.70	1547.72
SO-XFP-ER-50G-D9375	37.5	193.75	1547.32
SO-XFP-ER-50G-D9380	38.0	193.80	1546.92
SO-XFP-ER-50G-D9385	38.5	193.85	1546.52
SO-XFP-ER-50G-D9390	39.0	193.90	1546.12
SO-XFP-ER-50G-D9395	39.5	193.95	1545.72
SO-XFP-ER-50G-D9400	40.0	194.00	1545.32
SO-XFP-ER-50G-D9405	40.5	194.05	1544.92
SO-XFP-ER-50G-D9410	41.0	194.10	1544.53
SO-XFP-ER-50G-D9415	41.5	194.15	1544.13

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SO-XFP-ER-50G-D9420	42.0	194.20	1543.73
SO-XFP-ER-50G-D9425	42.5	194.25	1543.33
SO-XFP-ER-50G-D9430	43.0	194.30	1542.94
SO-XFP-ER-50G-D9435	43.5	194.35	1542.54
SO-XFP-ER-50G-D9440	44.0	194.40	1542.14
SO-XFP-ER-50G-D9445	44.5	194.45	1541.75
SO-XFP-ER-50G-D9450	45.0	194.50	1541.35
SO-XFP-ER-50G-D9455	45.5	194.55	1540.95
SO-XFP-ER-50G-D9460	46.0	194.60	1540.56
SO-XFP-ER-50G-D9465	46.5	194.65	1540.16
SO-XFP-ER-50G-D9470	47.0	194.70	1539.77
SO-XFP-ER-50G-D9475	47.5	194.75	1539.37
SO-XFP-ER-50G-D9480	48.0	194.80	1538.98
SO-XFP-ER-50G-D9485	48.5	194.85	1538.58
SO-XFP-ER-50G-D9490	49.0	194.90	1538.18
SO-XFP-ER-50G-D9495	49.5	194.95	1537.79
SO-XFP-ER-50G-D9500	50.0	195.00	1537.40
SO-XFP-ER-50G-D9505	50.5	195.05	1537.00
SO-XFP-ER-50G-D9510	51.0	195.10	1536.61
SO-XFP-ER-50G-D9515	51.5	195.15	1536.22
SO-XFP-ER-50G-D9520	52.0	195.20	1535.82
SO-XFP-ER-50G-D9525	52.5	195.25	1535.43
SO-XFP-ER-50G-D9530	53.0	195.30	1535.04
SO-XFP-ER-50G-D9535	53.5	195.35	1534.64
SO-XFP-ER-50G-D9540	54.0	195.40	1534.25
SO-XFP-ER-50G-D9545	54.5	195.45	1533.86
SO-XFP-ER-50G-D9550	55.0	195.50	1533.47
SO-XFP-ER-50G-D9555	55.5	195.55	1533.07
SO-XFP-ER-50G-D9560	56.0	195.60	1532.68
SO-XFP-ER-50G-D9565	56.5	195.65	1532.29
SO-XFP-ER-50G-D9570	57.0	195.70	1531.90
SO-XFP-ER-50G-D9575	57.5	195.75	1531.51
SO-XFP-ER-50G-D9580	58.0	195.80	1531.12
SO-XFP-ER-50G-D9585	58.5	195.85	1530.72
SO-XFP-ER-50G-D9590	59.0	195.90	1530.33
SO-XFP-ER-50G-D9595	59.5	195.95	1529.94
SO-XFP-ER-50G-D9600	60.0	196.00	1529.55
SO-XFP-ER-50G-D9605	60.5	196.05	1529.16
SO-XFP-ER-50G-D9610	61.0	196.10	1528.77
SO-XFP-ER-50G-D9615	61.5	196.15	1528.38

## EXTENDED ORDERING INFORMATION, EXTENDED

Part Number	ITU channel no.	Frequency [THz]	Center Wavelength (nm)
SO-XFP-ER-50G-D9180-E	18.0	191.80	1563.05
SO-XFP-ER-50G-D9185-E	18.5	191.85	1562.64
SO-XFP-ER-50G-D9190-E	19.0	191.90	1562.23
SO-XFP-ER-50G-D9195-E	19.5	191.95	1561.83
SO-XFP-ER-50G-D9200-E	20.0	192.00	1561.42
SO-XFP-ER-50G-D9205-E	20.5	192.05	1561.01
SO-XFP-ER-50G-D9210-E	21.0	192.10	1560.61
SO-XFP-ER-50G-D9215-E	21.5	192.15	1560.20
SO-XFP-ER-50G-D9220-E	22.0	192.20	1559.79
SO-XFP-ER-50G-D9225-E	22.5	192.25	1559.39
SO-XFP-ER-50G-D9230-E	23.0	192.30	1558.98
SO-XFP-ER-50G-D9235-E	23.5	192.35	1558.58
SO-XFP-ER-50G-D9240-E	24.0	192.40	1558.17
SO-XFP-ER-50G-D9245-E	24.5	192.45	1557.77
SO-XFP-ER-50G-D9250-E	25.0	192.50	1557.36
SO-XFP-ER-50G-D9255-E	25.5	192.55	1556.96
SO-XFP-ER-50G-D9260-E	26.0	192.60	1556.55
SO-XFP-ER-50G-D9265-E	26.5	192.65	1556.15
SO-XFP-ER-50G-D9270-E	27.0	192.70	1555.75
SO-XFP-ER-50G-D9275-E	27.5	192.75	1555.34
SO-XFP-ER-50G-D9280-E	28.0	192.80	1554.94
SO-XFP-ER-50G-D9285-E	28.5	192.85	1554.54
SO-XFP-ER-50G-D9290-E	29.0	192.90	1554.13
SO-XFP-ER-50G-D9295-E	29.5	192.95	1553.73
SO-XFP-ER-50G-D9300-E	30.0	193.00	1553.33
SO-XFP-ER-50G-D9305-E	30.5	193.05	1552.93
SO-XFP-ER-50G-D9310-E	31.0	193.10	1552.52
SO-XFP-ER-50G-D9315-E	31.5	193.15	1552.12
SO-XFP-ER-50G-D9320-E	32.0	193.20	1551.72
SO-XFP-ER-50G-D9325-E	32.5	193.25	1551.32
SO-XFP-ER-50G-D9330-E	33.0	193.30	1550.92
SO-XFP-ER-50G-D9335-E	33.5	193.35	1550.52
SO-XFP-ER-50G-D9340-E	34.0	193.40	1550.12
SO-XFP-ER-50G-D9345-E	34.5	193.45	1549.72
SO-XFP-ER-50G-D9350-E	35.0	193.50	1549.32
SO-XFP-ER-50G-D9355-E	35.5	193.55	1548.91
SO-XFP-ER-50G-D9360-E	36.0	193.60	1548.51
SO-XFP-ER-50G-D9365-E	36.5	193.65	1548.11
SO-XFP-ER-50G-D9370-E	37.0	193.70	1547.72
SO-XFP-ER-50G-D9375-E	37.5	193.75	1547.32
SO-XFP-ER-50G-D9380-E	38.0	193.80	1546.92
SO-XFP-ER-50G-D9385-E	38.5	193.85	1546.52
SO-XFP-ER-50G-D9390-E	39.0	193.90	1546.12
SO-XFP-ER-50G-D9395-E	39.5	193.95	1545.72
SO-XFP-ER-50G-D9400-E	40.0	194.00	1545.32
SO-XFP-ER-50G-D9405-E	40.5	194.05	1544.92
SO-XFP-ER-50G-D9410-E	41.0	194.10	1544.53
SO-XFP-ER-50G-D9415-E	41.5	194.15	1544.13

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SO-XFP-ER-50G-D9420-E	42.0	194.20	1543.73
SO-XFP-ER-50G-D9425-E	42.5	194.25	1543.33
SO-XFP-ER-50G-D9430-E	43.0	194.30	1542.94
SO-XFP-ER-50G-D9435-E	43.5	194.35	1542.54
SO-XFP-ER-50G-D9440-E	44.0	194.40	1542.14
SO-XFP-ER-50G-D9445-E	44.5	194.45	1541.75
SO-XFP-ER-50G-D9450-E	45.0	194.50	1541.35
SO-XFP-ER-50G-D9455-E	45.5	194.55	1540.95
SO-XFP-ER-50G-D9460-E	46.0	194.60	1540.56
SO-XFP-ER-50G-D9465-E	46.5	194.65	1540.16
SO-XFP-ER-50G-D9470-E	47.0	194.70	1539.77
SO-XFP-ER-50G-D9475-E	47.5	194.75	1539.37
SO-XFP-ER-50G-D9480-E	48.0	194.80	1538.98
SO-XFP-ER-50G-D9485-E	48.5	194.85	1538.58
SO-XFP-ER-50G-D9490-E	49.0	194.90	1538.18
SO-XFP-ER-50G-D9495-E	49.5	194.95	1537.79
SO-XFP-ER-50G-D9500-E	50.0	195.00	1537.40
SO-XFP-ER-50G-D9505-E	50.5	195.05	1537.00
SO-XFP-ER-50G-D9510-E	51.0	195.10	1536.61
SO-XFP-ER-50G-D9515-E	51.5	195.15	1536.22
SO-XFP-ER-50G-D9520-E	52.0	195.20	1535.82
SO-XFP-ER-50G-D9525-E	52.5	195.25	1535.43
SO-XFP-ER-50G-D9530-E	53.0	195.30	1535.04
SO-XFP-ER-50G-D9535-E	53.5	195.35	1534.64
SO-XFP-ER-50G-D9540-E	54.0	195.40	1534.25
SO-XFP-ER-50G-D9545-E	54.5	195.45	1533.86
SO-XFP-ER-50G-D9550-E	55.0	195.50	1533.47
SO-XFP-ER-50G-D9555-E	55.5	195.55	1533.07
SO-XFP-ER-50G-D9560-E	56.0	195.60	1532.68
SO-XFP-ER-50G-D9565-E	56.5	195.65	1532.29
SO-XFP-ER-50G-D9570-E	57.0	195.70	1531.90
SO-XFP-ER-50G-D9575-E	57.5	195.75	1531.51
SO-XFP-ER-50G-D9580-E	58.0	195.80	1531.12
SO-XFP-ER-50G-D9585-E	58.5	195.85	1530.72
SO-XFP-ER-50G-D9590-E	59.0	195.90	1530.33
SO-XFP-ER-50G-D9595-E	59.5	195.95	1529.94
SO-XFP-ER-50G-D9600-E	60.0	196.00	1529.55
SO-XFP-ER-50G-D9605-E	60.5	196.05	1529.16
SO-XFP-ER-50G-D9610-E	61.0	196.10	1528.77
SO-XFP-ER-50G-D9615-E	61.5	196.15	1528.38