

# SO-SFP-10GE-ZR-50G-Dxxxx

SFP+, 10GBase-ZR, DWDM 50GHz, SM, DDM, 23dB, 80km

## OVERVIEW

The SO-SFP-10GE-ZR-50G-Dxxxx fiber optical SFP+ (small form pluggable) transceivers include an APD diode and temperature stabilized DFB-EML transmitter. The modules operate at data-rates from 0.6 Gbps up to 11.1 Gbps. 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 module has a duplex LC optical interface and all mechanical characteristics are compliant with the current SFP+ specification (SFF-8431 and SFF-8432). Wavelengths stated in the specification are measured in vacuum. All requirements in this specification are valid throughout the specified lifetime and operational environmental temperature range unless otherwise stated. The transceiver modules are compliant to RoHS-6/6

## PRODUCT FEATURES

- Duplex LC connector
- Compliant with SFP+ MSA
- Hot-pluggable SFP footprint
- Built-in digital diagnostic functions
- Up to 80km on 9/125um SMF (G.652)
- Dispersion tolerance from -500ps/nm to 1450ps/nm
- Single power supply 3.3V
- RoHS6/6 Compliant
- Class 1 laser product complies with EN 60825-1
- Operating temperature range:  
Normal: 0°C to 70°C.
- Power consumption <1.5W

## APPLICATIONS

- 10GBASE-ER/EW
- 10G FC
- OBSAI rates 6.144 Gbps, 3.072 Gbps, 1.536 Gbps, 0.768 Gbps
- CPRI rates 9.830 Gbps, 7.373 Gbps, 6.144 Gbps, 4.915 Gbps, 2.458 Gbps, 1.229 Gbps, 0.614 Gbps

## ORDERING INFORMATION

Part Number	Description
SO-SFP-10GE-ZR-50G-Dxxxx	SFP+, 10GBase-ZR, DWDM 50GHz, SM, DDM, 23dB, 80km

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

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## GENERAL SPECIFICATIONS

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate	DR	0.6		11.3	Gbps	
Bit Error Rate	BER			10 <sup>-12</sup>		
Operating temperature	T <sub>OP</sub>	0		70	°C	Standard temperature - case
		-40		85	°C	Industrial temperature - case
Operating relative humidity				95	%	
Storage Temperature	T <sub>STO</sub>	-40		85	°C	Ambient temperature
Supply current	I <sub>S</sub>		350	430	mA	For electrical power interface
Input Voltage	V <sub>CC</sub>	3.15	3.3	3.45	V	
Maximum Voltage	V <sub>MAX</sub>	-0.5		3.6	V	For electrical power interface

## ELECTRICAL CHARACTERISTICS – HIGH-SPEED SIGNAL INTERFACE (CML)

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Differential input impedance	R <sub>IN</sub>	85	100	115	Ω	
Differential data input swing	V <sub>IN_PP</sub>	250		1000	mVpp	Internally AC coupled
Differential output impedance	R <sub>OUT</sub>	85	100	115	Ω	
Differential data output swing	V <sub>OUT_PP</sub>	350		700	mVpp	Internally AC coupled

## ELECTRICAL CHARACTERISTICS – LOW-SPEED SIGNAL INTERFACE (LVTTTL)

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Input high voltage		2.0		V <sub>CC</sub> +0.3	V	TX-DIS, TX-FAULT
Input low voltage		GND		0.8	V	
Output high voltage		2.4		V <sub>CC</sub>	V	RX-LOS
Output low voltage		GND		0.5	V	

## OPTICAL CHARACTERISTICS – TRANSMITTER

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Output optical power	P <sub>TX</sub>	0		+5	dBm	Average, coupled into 9/125um SMF
Extinction ratio	E <sub>r</sub>	8.2			dB	
Optical center wavelength	λ <sub>c</sub>	According to ITU-T 694.1				nm
Spectral width (-20dB)	Δλ			1		nm
Side Mode Suppression Ratio	SMSR	30				dB
Transmitter and dispersion penalty				3		dB -500 to 1450ps/nm@ 10.3Gb/s
TX jitter	TXj	Per 802.3 ae requirements				
Relative intensity noise	RIN			-128		dB/Hz Peak-to-Peak
Launch power OFF	P <sub>off</sub>			-30		dBm Average

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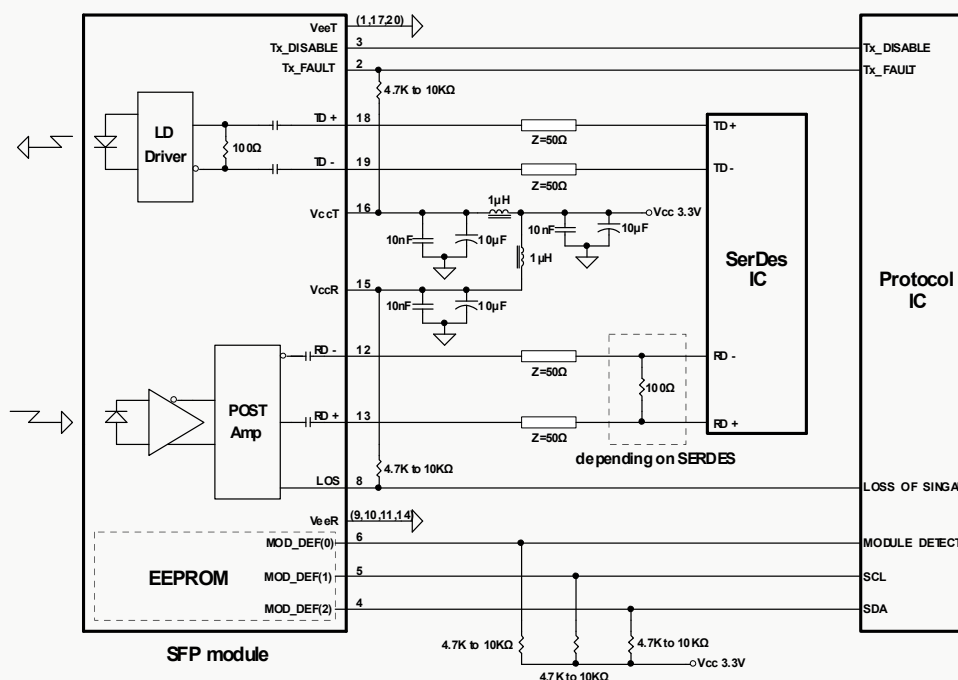
### OPTICAL CHARACTERISTICS – RECEIVER

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical receiver power	$P_{RX}$			-6	dBm	Average
Optical center wavelength	$\lambda_c$	1480		1580	nm	
Receiver sensitivity @ 10.3Gbps	$R_{X\_SENS}$			-23	dBm	BER<10 <sup>-12</sup> , PRBS 2 <sup>31</sup> -1
Loss of signal-asserted	$P_{LOS\_A}$	-40			dBm	
Loss of signal-deasserted	$P_{LOS\_D}$			-24	dBm	
Optical Return Loss	ORL			-27	dB	

### OSNR– RECEIVER

SFP+	BER	RX input power (dBm)	Min OSNR back-to-back (dB)	Min OSNR w/ dispersion -500 to +1450 ps/nm (dB)
10G ZR	1E-12	-8 to -18	24	28
	1E-3	-8 to -18	15	19

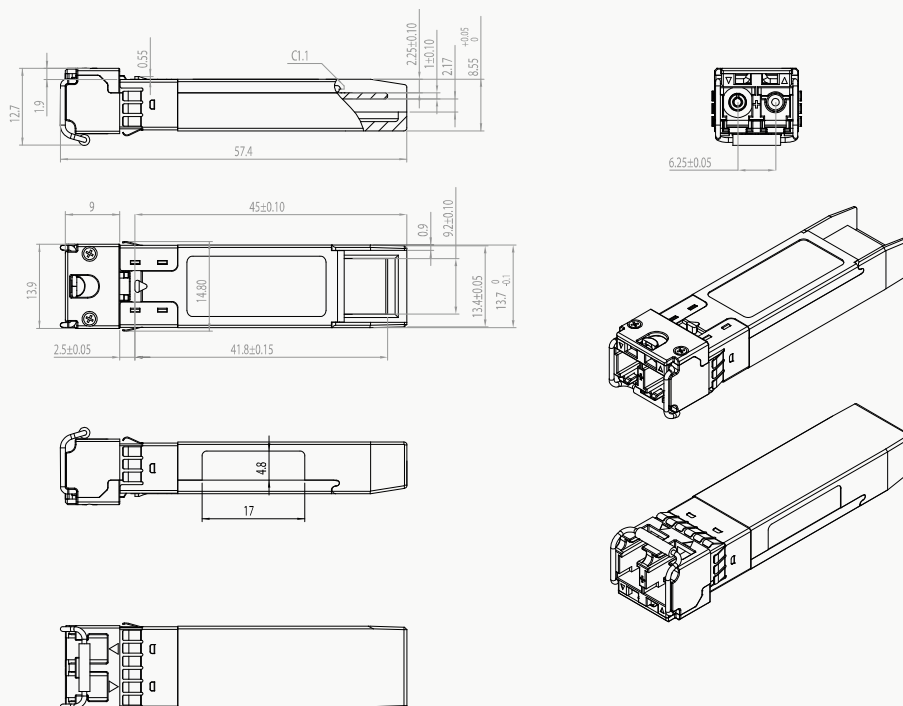
### FUNCTIONAL DIAGRAM OF TRANSCEIVER



## PIN ASSIGNMENT ACCORDING TO MSA

PIN	Signal Name	Description	PIN	Signal Name	Description
1	V <sub>EE</sub> T	Transmitter signal ground	11	V <sub>EE</sub> R	Receiver signal ground
2	TX_Fault	Transmitter Fault indication. Logic "1" output = laser fault. Logic "0" output = normal operation	12	RD-	Inverse Receiver Data out
3	TX_Disable	Logic "1" input (or no connection) = laser off, Logic "0" = laser on.	13	RD+	Receiver Data out
4	SDA	Modulation definition 2 – Two wires serial ID interface	14	V <sub>EE</sub> R	Receiver signal ground
5	SDL	Modulation definition 1 – Two wires serial ID interface	15	V <sub>CC</sub> R	Receiver power – 3.3V±5%
6	MOD-ABS	Modulation definition 0 – Ground in module	16	V <sub>CC</sub> T	Transmitter power – 3.3V±5%
7	RS0	RX Rate Select (LVTTL). This pin has an internal 30k pulldown to ground. A signal on this pin will not affect module performance.	17	V <sub>EE</sub> T	Transmitter signal ground
8	RX_LOS	Loss of signal out (OC).	18	TD+	Transmitter Data in
9	RS1	TX Rate Select (LVTTL). This pin has an internal 30k pulldown to ground. A signal on this pin will not affect module performance.	19	TD-	Inverse Transmitter Data in
10	V <sub>EE</sub> R	Receiver signal ground	20	V <sub>EE</sub> T	Transmitter signal ground

## MECHANICAL DIMENSIONS



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## EXTENDED ORDERING INFORMATION

Part Number	ITU channel no.	Frequency [THz]	Center Wavelength (nm)
SO-SFP-10GE-ZR-50G-D9200	20.0	192.00	1561.42
SO-SFP-10GE-ZR-50G-D9205	20.5	192.05	1561.01
SO-SFP-10GE-ZR-50G-D9210	21.0	192.10	1560.61
SO-SFP-10GE-ZR-50G-D9215	21.5	192.15	1560.20
SO-SFP-10GE-ZR-50G-D9220	22.0	192.20	1559.79
SO-SFP-10GE-ZR-50G-D9225	22.5	192.25	1559.39
SO-SFP-10GE-ZR-50G-D9230	23.0	192.30	1558.98
SO-SFP-10GE-ZR-50G-D9235	23.5	192.35	1558.58
SO-SFP-10GE-ZR-50G-D9240	24.0	192.40	1558.17
SO-SFP-10GE-ZR-50G-D9245	24.5	192.45	1557.77
SO-SFP-10GE-ZR-50G-D9250	25.0	192.50	1557.36
SO-SFP-10GE-ZR-50G-D9255	25.5	192.55	1556.96
SO-SFP-10GE-ZR-50G-D9260	26.0	192.60	1556.55
SO-SFP-10GE-ZR-50G-D9265	26.5	192.65	1556.15
SO-SFP-10GE-ZR-50G-D9270	27.0	192.70	1555.75
SO-SFP-10GE-ZR-50G-D9275	27.5	192.75	1555.34
SO-SFP-10GE-ZR-50G-D9280	28.0	192.80	1554.94
SO-SFP-10GE-ZR-50G-D9285	28.5	192.85	1554.54
SO-SFP-10GE-ZR-50G-D9290	29.0	192.90	1554.13
SO-SFP-10GE-ZR-50G-D9295	29.5	192.95	1553.73
SO-SFP-10GE-ZR-50G-D9300	30.0	193.00	1553.33
SO-SFP-10GE-ZR-50G-D9305	30.5	193.05	1552.93
SO-SFP-10GE-ZR-50G-D9310	31.0	193.10	1552.52
SO-SFP-10GE-ZR-50G-D9315	31.5	193.15	1552.12
SO-SFP-10GE-ZR-50G-D9320	32.0	193.20	1551.72
SO-SFP-10GE-ZR-50G-D9325	32.5	193.25	1551.32
SO-SFP-10GE-ZR-50G-D9330	33.0	193.30	1550.92
SO-SFP-10GE-ZR-50G-D9335	33.5	193.35	1550.52
SO-SFP-10GE-ZR-50G-D9340	34.0	193.40	1550.12
SO-SFP-10GE-ZR-50G-D9345	34.5	193.45	1549.72
SO-SFP-10GE-ZR-50G-D9350	35.0	193.50	1549.32
SO-SFP-10GE-ZR-50G-D9355	35.5	193.55	1548.91
SO-SFP-10GE-ZR-50G-D9360	36.0	193.60	1548.51
SO-SFP-10GE-ZR-50G-D9365	36.5	193.65	1548.11
SO-SFP-10GE-ZR-50G-D9370	37.0	193.70	1547.72
SO-SFP-10GE-ZR-50G-D9375	37.5	193.75	1547.32
SO-SFP-10GE-ZR-50G-D9380	38.0	193.80	1546.92
SO-SFP-10GE-ZR-50G-D9385	38.5	193.85	1546.52
SO-SFP-10GE-ZR-50G-D9390	39.0	193.90	1546.12
SO-SFP-10GE-ZR-50G-D9395	39.5	193.95	1545.72
SO-SFP-10GE-ZR-50G-D9400	40.0	194.00	1545.32
SO-SFP-10GE-ZR-50G-D9405	40.5	194.05	1544.92
SO-SFP-10GE-ZR-50G-D9410	41.0	194.10	1544.53
SO-SFP-10GE-ZR-50G-D9415	41.5	194.15	1544.13
SO-SFP-10GE-ZR-50G-D9420	42.0	194.20	1543.73
SO-SFP-10GE-ZR-50G-D9425	42.5	194.25	1543.33
SO-SFP-10GE-ZR-50G-D9430	43.0	194.30	1542.94
SO-SFP-10GE-ZR-50G-D9435	43.5	194.35	1542.54

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SO-SFP-10GE-ZR-50G-D9440	44.0	194.40	1542.14
SO-SFP-10GE-ZR-50G-D9445	44.5	194.45	1541.75
SO-SFP-10GE-ZR-50G-D9450	45.0	194.50	1541.35
SO-SFP-10GE-ZR-50G-D9455	45.5	194.55	1540.95
SO-SFP-10GE-ZR-50G-D9460	46.0	194.60	1540.56
SO-SFP-10GE-ZR-50G-D9465	46.5	194.65	1540.16
SO-SFP-10GE-ZR-50G-D9470	47.0	194.70	1539.77
SO-SFP-10GE-ZR-50G-D9475	47.5	194.75	1539.37
SO-SFP-10GE-ZR-50G-D9480	48.0	194.80	1538.98
SO-SFP-10GE-ZR-50G-D9485	48.5	194.85	1538.58
SO-SFP-10GE-ZR-50G-D9490	49.0	194.90	1538.18
SO-SFP-10GE-ZR-50G-D9495	49.5	194.95	1537.79
SO-SFP-10GE-ZR-50G-D9500	50.0	195.00	1537.40
SO-SFP-10GE-ZR-50G-D9505	50.5	195.05	1537.00
SO-SFP-10GE-ZR-50G-D9510	51.0	195.10	1536.61
SO-SFP-10GE-ZR-50G-D9515	51.5	195.15	1536.22
SO-SFP-10GE-ZR-50G-D9520	52.0	195.20	1535.82
SO-SFP-10GE-ZR-50G-D9525	52.5	195.25	1535.43
SO-SFP-10GE-ZR-50G-D9530	53.0	195.30	1535.04
SO-SFP-10GE-ZR-50G-D9535	53.5	195.35	1534.64
SO-SFP-10GE-ZR-50G-D9540	54.0	195.40	1534.25
SO-SFP-10GE-ZR-50G-D9545	54.5	195.45	1533.86
SO-SFP-10GE-ZR-50G-D9550	55.0	195.50	1533.47
SO-SFP-10GE-ZR-50G-D9555	55.5	195.55	1533.07
SO-SFP-10GE-ZR-50G-D9560	56.0	195.60	1532.68
SO-SFP-10GE-ZR-50G-D9565	56.5	195.65	1532.29
SO-SFP-10GE-ZR-50G-D9570	57.0	195.70	1531.90
SO-SFP-10GE-ZR-50G-D9575	57.5	195.75	1531.51
SO-SFP-10GE-ZR-50G-D9580	58.0	195.80	1531.12
SO-SFP-10GE-ZR-50G-D9585	58.5	195.85	1530.72
SO-SFP-10GE-ZR-50G-D9590	59.0	195.90	1530.33
SO-SFP-10GE-ZR-50G-D9595	59.5	195.95	1529.94

SO-SFP-10GE-ZR-50G-Dxxxx-I for industrial parts.