

# SP10-DWxxZR80x

## SFP+ 10Gb/s DWDM 80km Transceiver

### PRODUCT FEATURES

- Supports up to 11.3Gbps bit rates
- Hot-pluggable SFP+ footprint
- Up to 80km for SMF
- DWDM EML laser and APD photodiode,
- Compliant with SFP+ MSA and SFF-8472
- Single +3.3V power supply
- Real Time Digital Diagnostic Monitoring
- RoHS compliant
- Operating case temperature:  
Commercial: 0 to +70°C  
Industrial : -40to +85°C



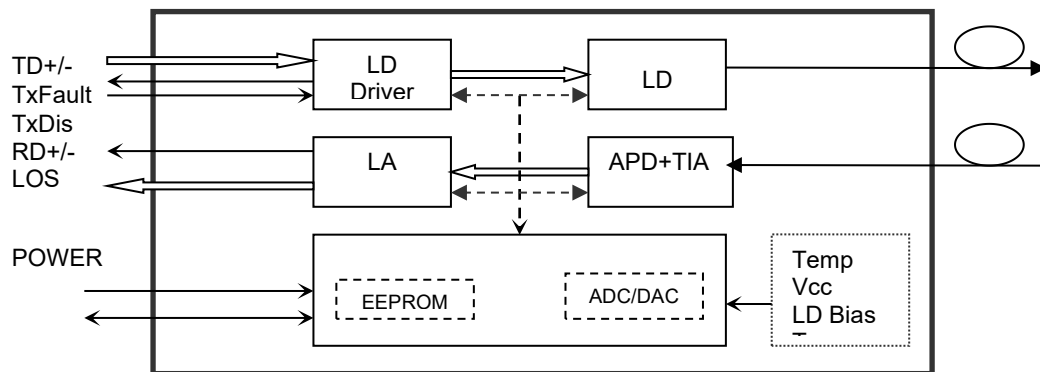
### APPLICATIONS

- 10Gbps DWDM Optical systems
- 10GBASE-ZR at 10.3125Gbps
- 10GBASE-ZW at 9.953Gbps
- LTE systems

### PRODUCT DESCRIPTION

The SP10-DWxxZR80x SFP+ transceivers are high performance, cost effective modules supporting data rate of 11.3Gbps and 80km transmission distance with SMF. The transceiver consists of three sections: a cooled EML DFB laser transmitter, a APD photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

**Transceiver functional diagram**



## Ordering information

Product part Number	Data Rate (Gbps)	Media	Wavelength (nm)	Transmission Distance(km)	Temperature Range / °C	T <sub>case</sub>
SP10-DWxxZR80C	10.3	SMF	1528.77~1563.05	40	0~70	Commercial
SP10-DWxxZR80I	10.3	SMF	1528.77~1563.05	40	-40~85	Industrial

## Wavelength Guide for “xx” value (100GHz ITU-T channel)

Channel #	Product Part Number	Frequency (THz)	Center Wavelength (nm)
18	SP10-DW18ZR80x	191.8	1563.05
19	SP10-DW19ZR80x	191.9	1562.23

20	SP10-DW20ZR80x	192.0	1561.42
21	SP10-DW21ZR80x	192.1	1560.61
22	SP10-DW22ZR80x	192.2	1559.79
23	SP10-DW23ZR80x	192.3	1558.98
24	SP10-DW24ZR80x	192.4	1558.17
25	SP10-DW25ZR80x	192.5	1557.36
26	SP10-DW26ZR80x	192.6	1556.55
27	SP10-DW27ZR80x	192.7	1555.75
28	SP10-DW28ZR80x	192.8	1554.94
29	SP10-DW29ZR80x	192.9	1554.13
30	SP10-DW30ZR80x	193.0	1553.33
31	SP10-DW31ZR80x	193.1	1552.52
32	SP10-DW32ZR80x	193.2	1551.72
33	SP10-DW33ZR80x	193.3	1550.92
34	SP10-DW34ZR80x	193.4	1550.12
35	SP10-DW35ZR80x	193.5	1549.32
36	SP10-DW36ZR80x	193.6	1548.51
37	SP10-DW37ZR80x	193.7	1547.72
38	SP10-DW38ZR80x	193.8	1546.92
39	SP10-DW39ZR80x	193.9	1546.12
40	SP10-DW40ZR80x	194.0	1545.32
41	SP10-DW41ZR80x	194.1	1544.53
42	SP10-DW42ZR80x	194.2	1543.73
43	SP10-DW43ZR80x	194.3	1542.94
44	SP10-DW44ZR80x	194.4	1542.14
45	SP10-DW45ZR80x	194.5	1541.35
46	SP10-DW46ZR80x	194.6	1540.56
47	SP10-DW47ZR80x	194.7	1539.77
48	SP10-DW48ZR80x	194.8	1538.98
49	SP10-DW49ZR80x	194.9	1538.19
50	SP10-DW50ZR80x	195.0	1537.40
51	SP10-DW51ZR80x	195.1	1536.61
52	SP10-DW52ZR80x	195.2	1535.82
53	SP10-DW53ZR80x	195.3	1535.04
54	SP10-DW54ZR80x	195.4	1534.25
55	SP10-DW55ZR80x	195.5	1533.47

56	SP10-DW56ZR80x	195.6	1532.68
57	SP10-DW57ZR80x	195.7	1531.90
58	SP10-DW58ZR80x	195.8	1531.12
59	SP10-DW59ZR80x	195.9	1530.33
60	SP10-DW60ZR80x	196.0	1529.55
61	SP10-DW61ZR80x	196.1	1528.77

## Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V <sub>cc</sub>	-0.5	4.5	V
Storage Temperature	T <sub>s</sub>	-40	+85	°C
Operating Humidity	-	5	85	%

## Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Case Operating Temperature Range	T <sub>c</sub>	0	-	70	°C
		-40	-	85	
Power Supply Voltage	V <sub>cc</sub>	3.135	3.30	3.465	V
Power Supply Current	I <sub>cc</sub>			550	mA
Data Rate			10.3125	11.3	Gbps

## Optical and Electrical Characteristics

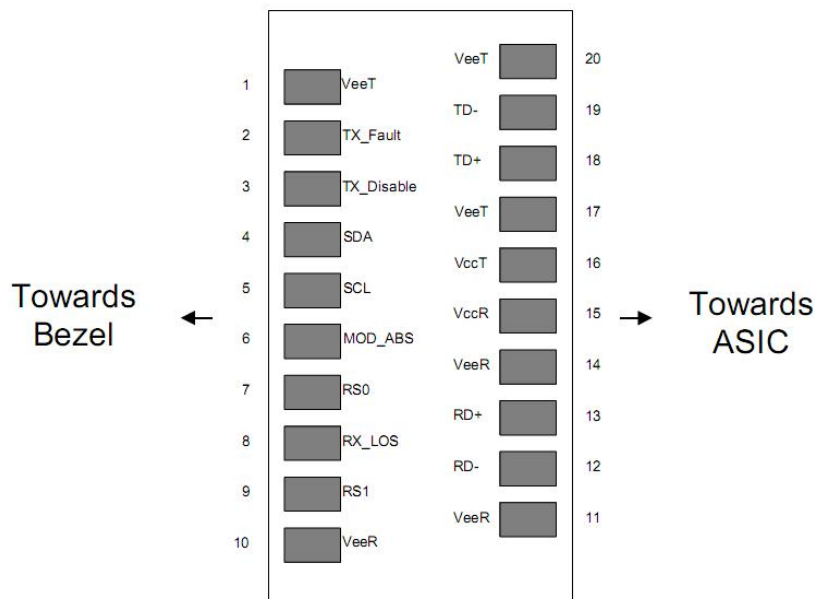
Parameter	Symbol	Min	Typical	Max	Unit	Notes
<b>Transmitter</b>						
Centre Wavelength	$\lambda_c$	1528.77	-	1563.05	nm	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side-Mode Suppression Ratio	SMSR	30	-		dB	
Average Output Power	P <sub>out</sub>	0		+4.0	dBm	1
Extinction Ratio	ER	9.0			dB	
Data Input Swing Differential	V <sub>IN</sub>	180		850	mV	2
Input Differential Impedance	Z <sub>IN</sub>	90	100	110	$\Omega$	
TX Disable	Disable		2.0	V <sub>cc</sub>	V	

	Enable		0		0.8	V	
TX Fault	Fault		2.0		Vcc	V	
	Normal		0		0.8	V	
<b>Receiver</b>							
Centre Wavelength	$\lambda_c$	1260		1620	nm		
Receiver Sensitivity				-24	dBm		3
Receiver Overload		-7.0			dBm		3
LOS De-Assert	LOS <sub>D</sub>			-26	dBm		
LOS Assert	LOS <sub>A</sub>	-35			dBm		
LOS Hysteresis		0.5			dB		
Data Output Swing Differential	V <sub>out</sub>	300		900	mV		4
LOS	High	2.0		Vcc	V		
	Low			0.8	V		

**Notes:**

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS 2<sup>31</sup>-1 test pattern @10312Mbps, BER ≤1×10<sup>-12</sup>.
4. Internally AC-coupled.

**Pin Description**



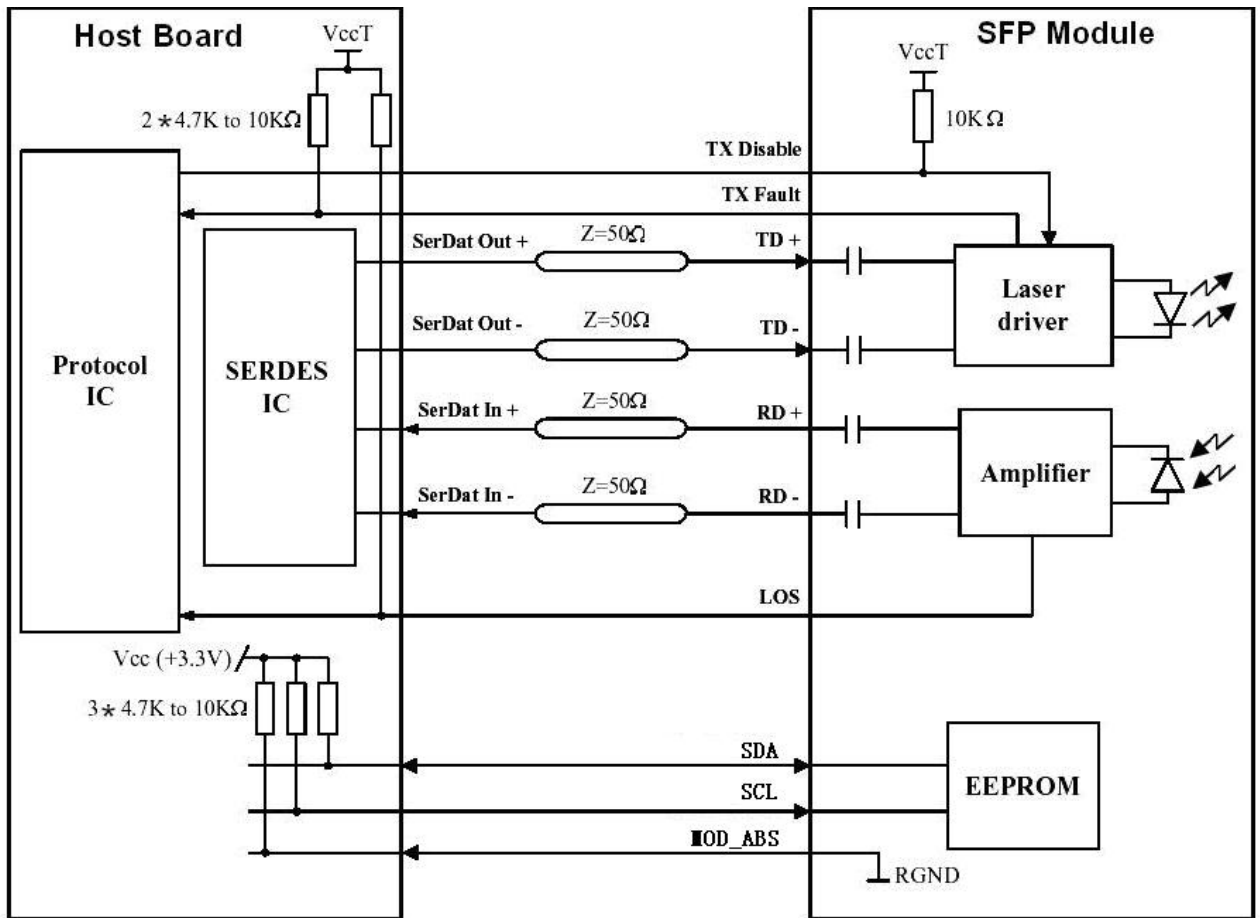
Pin	Signal Name	Description	Plug Seq.	Notes
1	V <sub>EET</sub>	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2
4	SDA	SDA Serial Data Signal	3	
5	SCL	SCL Serial Clock Signal	3	
6	MOD_ABS	Module Absent. Grounded within the module	3	
7	RS0	Not Connected	3	
8	LOS	Loss of Signal	3	Note 3
9	RS1	Not Connected	3	
10	V <sub>EER</sub>	Receiver ground	1	
11	V <sub>EER</sub>	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 4
13	RD+	Received Data Out	3	Note 4
14	V <sub>EER</sub>	Receiver ground	1	
15	V <sub>CCR</sub>	Receiver Power Supply	2	
16	V <sub>CCT</sub>	Transmitter Power Supply	2	
17	V <sub>EET</sub>	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 5
19	TD-	Inv. Transmit Data In	3	Note 5
20	V <sub>EET</sub>	Transmitter Ground	1	

Notes:

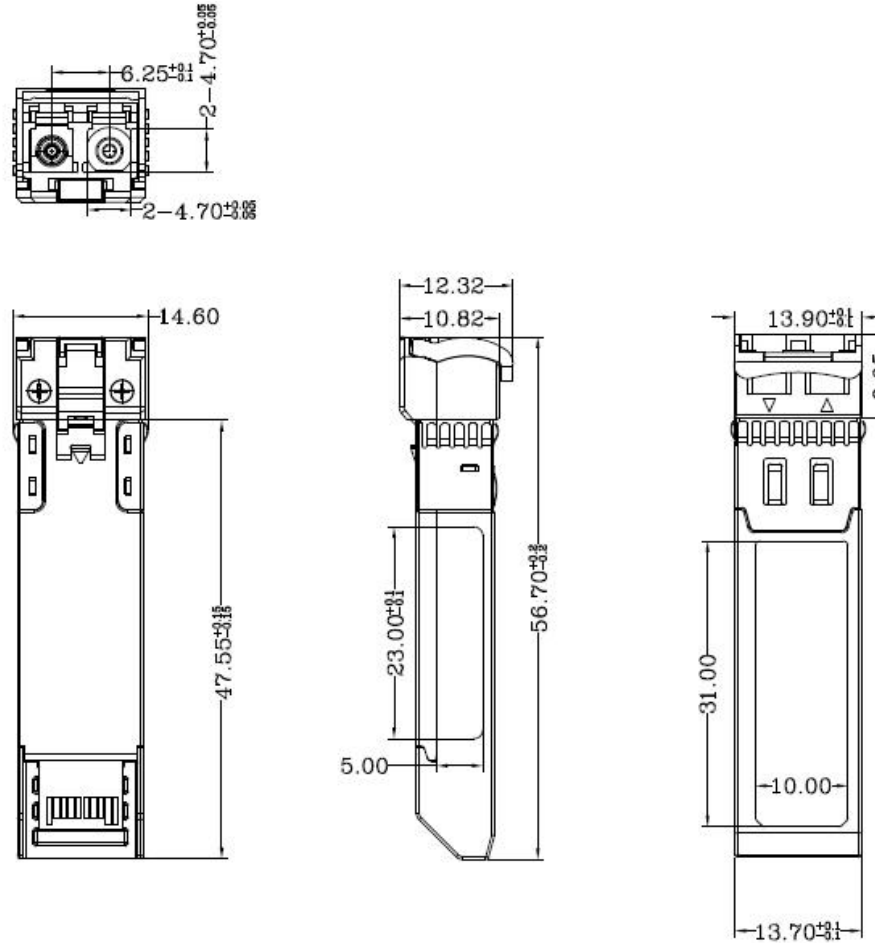
Plug Seq.: Pin engagement sequence during hot plugging.

- 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<sub>cc</sub>+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) Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
- 3) LOS is open collector output. Should be pulled up with 4.7k~10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
- 4) 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.
- 5) TD-/+ : These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

### Recommended Interface Circuit



## Mechanical Dimensions



## Regulatory Compliance

Feature	Reference	Performance
Electrostatic discharge (ESD)	IEC/EN 61000-4-2	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022 Class B (CISPR 22A)	Compatible with standards
Laser Eye Safety	IEC/EN 60825-1, 2	Class 1 laser product
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards