

10Gb/s SFP+ DWDM 10km Industrial Type

PRODUCT FEATURES

- Hot pluggable
- 10.3125Gb/s serial optical interface
- Up to 10km on 9/125um SMF
- Compliant with SFP MSA
- SFP MSA package with duplex LC connector
- Digital Diagnostic Monitor Interface
- Very low EMI and excellent ESD protection
- High transmission margin
- +3.3V single power supply
- Below <1.8W power consumption
- SFP mechanical interface
- Wide data-rate range

APPLICATIONS

- Switch/Router
- SAN/Server
- Fiber Channel
- Other optical transmission systems

STANDARD

- SFP+ MSA Compliant
- SFF-8472 reversion 9.5 compliant
- IEEE802.3-2005 compliant
- Telcordia GR-468-CORE compliant
- FCC 47 CFR Part 15, Class B compliant
- FDA 21 CFR 1040.10 and 1040.11, class1 compliant
- RoHS compliant

ORDERING INFORMATION

Product Part Number	Data Rate	Media	Wavelength	Transmission Distance	Temperature Range (Tcase)
ZSDWXX1X-LD10	10.3125	SMF	xxxx	10Km	0~70℃
ZSDWXX1X-ILD10	10.3125	SMF	xxxx	10Km	-40~+85℃

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min.	Max	Unit	Notes
Supply Voltage	Vcc	-0.5	4.0	V	
Storage Temperature		-40	85	℃	
Relative Humidity			85	%	

Note: Stress in excess of the maximum absolute ratings can cause permanent damage to the module.

PRODUCT SELECTION

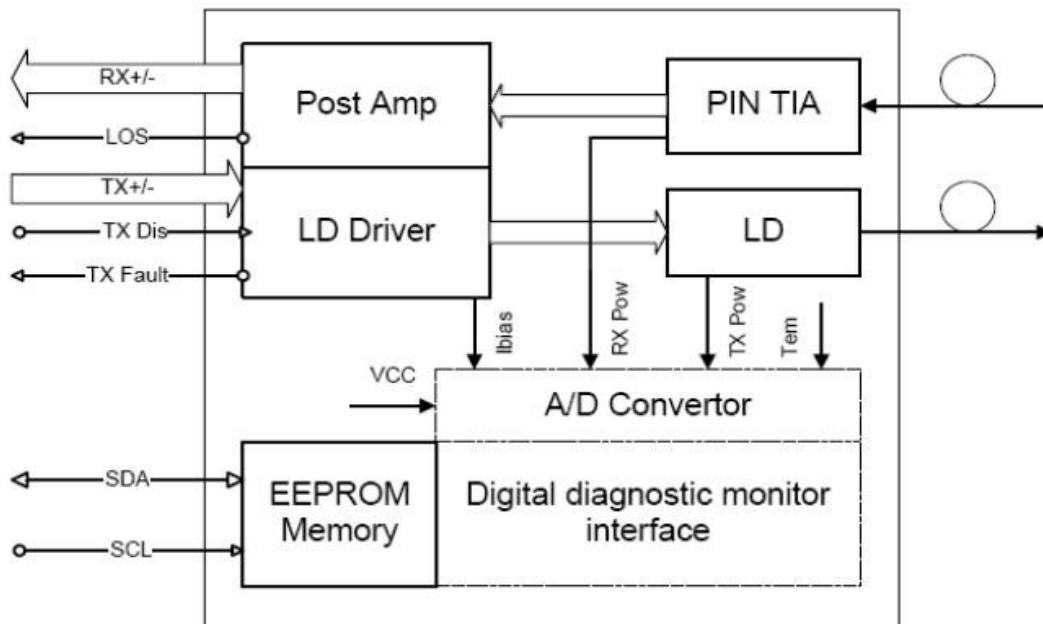
 C-band λ_c Wavelength Guide Pin Descriptions

Channl#	Product Code	Frequency (THz)	Cent Wavelength (nm)
17	ZSDW171X-LD10	191.7	1563.86
18	ZSDW181X-LD10	191.8	1563.05
19	ZSDW191X-LD10	191.9	1562.23
20	ZSDW201X-LD10	192.0	1561.42
21	ZSDW211X-LD10	192.1	1560.61
22	ZSDW221X-LD10	192.2	1559.79
23	ZSDW231X-LD10	192.3	1558.98
24	ZSDW241X-LD10	192.4	1558.17
25	ZSDW251X-LD10	192.5	1557.36
26	ZSDW261X-LD10	192.6	1556.55
27	ZSDW271X-LD10	192.7	1555.75
28	ZSDW281X-LD10	192.8	1554.94
29	ZSDW291X-LD10	192.9	1554.13
30	ZSDW301X-LD10	193.0	1553.33
31	ZSDW311X-LD10	193.1	1552.52
32	ZSDW321X-LD10	193.2	1551.72
33	ZSDW331X-LD10	193.3	1550.92
34	ZSDW341X-LD10	193.4	1550.12
35	ZSDW351X-LD10	193.5	1549.32
36	ZSDW361X-LD10	193.6	1548.51
37	ZSDW371X-LD10	193.7	1547.72

38	ZSDW381X-LD10	193.8	1546.92
39	ZSDW391X-LD10	193.9	1546.12
40	ZSDW401X-LD10	194.0	1545.32
41	ZSDW411X-LD10	194.1	1544.53
42	ZSDW421X-LD10	194.2	1543.73
43	ZSDW431X-LD10	194.3	1542.94
44	ZSDW441X-LD10	194.4	1542.14
45	ZSDW451X-LD10	194.5	1541.35
46	ZSDW461X-LD10	194.6	1540.56
47	ZSDW471X-LD10	194.7	1539.77
48	ZSDW481X-LD10	194.8	1538.98
49	ZSDW491X-LD10	194.9	1538.19
50	ZSDW501X-LD10	195.0	1537.40
51	ZSDW511X-LD10	195.1	1536.61
52	ZSDW521X-LD10	195.2	1535.82
53	ZSDW531X-LD10	195.3	1535.04
54	ZSDW541X-LD10	195.4	1534.25
55	ZSDW551X-LD10	195.5	1533.47
56	ZSDW561X-LD10	195.6	1532.68
57	ZSDW571X-LD10	195.7	1531.90
58	ZSDW581X-LD10	195.8	1531.12
59	ZSDW591X-LD10	195.9	1530.33
60	ZSDW601X-LD10	196.0	1529.55
61	ZSDW611X-LD10	196.1	1528.77

GENERAL OPERATING CHARACTERISTICS

Parameter		Symbol	Min.	Typ	Max.	Unit	Note
Data Rate	Ethernet			10.3125		Gb/s	
Supply Voltage		V _{cc}	3.13	3.3	3.47	V	
		V _{cc}				V	
Supply Current		I _{cc5}				mA	
		I _{cc3}			500	mA	
Operating Case Temp.		T _c	0		70	°C	

FUNCTIONAL DIAGRAM

ELECTRICAL INPUT/OUTPUT CHARACTERISTICS

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Transmitter						
Diff. input voltage swing		120		820	mV _{pp}	1
Tx Disable input	H	V _{IH}	2.0	V _{cc} +0.3	V	
	L	V _{IL}	0	0.8		
Tx Fault output	H	V _{OH}	2.0	V _{cc} +0.3	V	2
	L	V _{OL}	0	0.8		
Input Diff. Impedance	Z _{in}		100		Ω	
Receiver						
Diff. output voltage swing		340	650	800	mV _{pp}	3
Rx LOS Output	H	V _{OH}	2.0	V _{cc} +0.3	V	2
	L	V _{OL}	0	0.8		

Note 1) TD+/- are internally AC coupled with 100Ω differential termination inside the module.

Note 2) Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10kΩ resistors on the host board. Pull up voltage between 2.0V and Vcc+0.3V.

Note 3) RD+/- outputs are internally AC coupled, and should be terminated with 100Ω (differential) at the user SERDES.

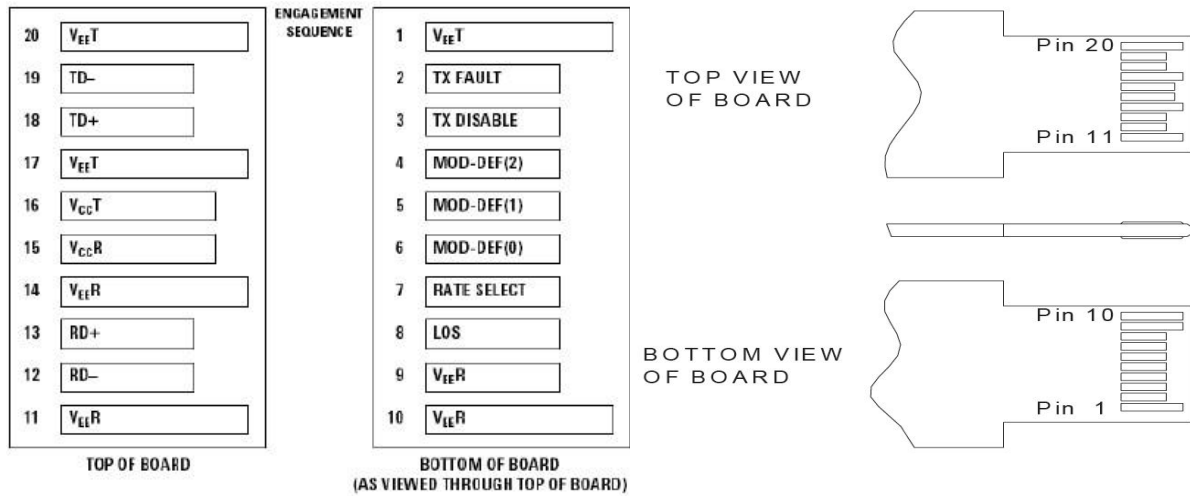
OPTICAL CHARACTERISTICS

Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Transmitter (0~70°C@10.3125Gb/s)						
Operating Wavelength			xx		nm	
Ave. output power (Enabled)	Po	-3		+3	dBm	1
Extinction Ratio	ER	9			dB	1
RMS spectral width	$\Delta\lambda$			1	nm	
Rise/Fall time (20%~80%)	Tr/Tf			60	ps	2
Optical modulation amplitude	OMA	2			dBm	
Dispersion penalty				2	dB	
Output Optical Eye	IEEE 802.3-2005 Compliant					
Receiver (0~70°C@10.3125Gb/s)						
Parameter	Symbol	Min.	Typ	Max.	Unit	Note
Operating Wavelength		1480	xx	1580	nm	
Sensitivity	Psen			-14.4	dBm	3
Min. overload	Pimax	0			dBm	
LOS Assert	Pa	-30			dBm	
LOS De-assert	Pd			-14.4	dBm	
LOS Hysteresis	Pd-Pa	0.5		4	dB	

Note 1) Measured at 10.3125b/s with PRBS 2³¹ - 1 NRZ test pattern.

Note 2) 20%~80%

Note 3) Under the ER worst case, measured at 10.3125 Gb/s with PRBS 2³¹ - 1 NRZ test pattern for BER < 1x10⁻¹²

PIN DEFINITIONS AND FUNCTIONS


PIN #	Name	Function	Notes
1	VeeT	Tx ground	
2	Tx Fault	Tx fault indication, Open Collector Output, active "H"	Note 1
3	Tx Disable	LVTTL Input, internal pull-up, Tx disabled on "H"	Note 2
4	MOD-DEF2	2 wire serial interface data input/output (SDA)	Note 3
5	MOD-DEF1	2 wire serial interface clock input (SCL)	Note 3
6	MOD-DEF0	Model present indication	Note 3
7	Rate select	No connection	
8	LOS	Rx loss of signal, Open Collector Output, active "H"	Note 4
9	VeeR	Rx ground	
10	VeeR	Rx ground	
11	VeeR	Rx ground	
12	RD-	Inverse received data out	Note 5
13	RD+	Received data out	Note 5
14	VeeR	Rx ground	
15	VccR	Rx power supply	
16	VccT	Tx power supply	
17	VeeT	Tx ground	
18	TD+	Transmit data in	Note 6
19	TD-	Inverse transmit data in	Note 6
20	VeeT	Tx ground	

Note 1) When high, this output indicates a laser fault of some kind. Low indicates normal operation. And should be pulled up with a 4.7 – 10KΩ resistor on the host board.

Note 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 4.7 – 10KΩ resistor. Its states are:

Low (0 – 0.8V): Transmitter on (>0.8, < 2.0V): Undefined
 High (2.0V~Vcc+0.3V): Transmitter Disabled Open: Transmitter Disabled

Note 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 between 2.0V~Vcc+0.3V.

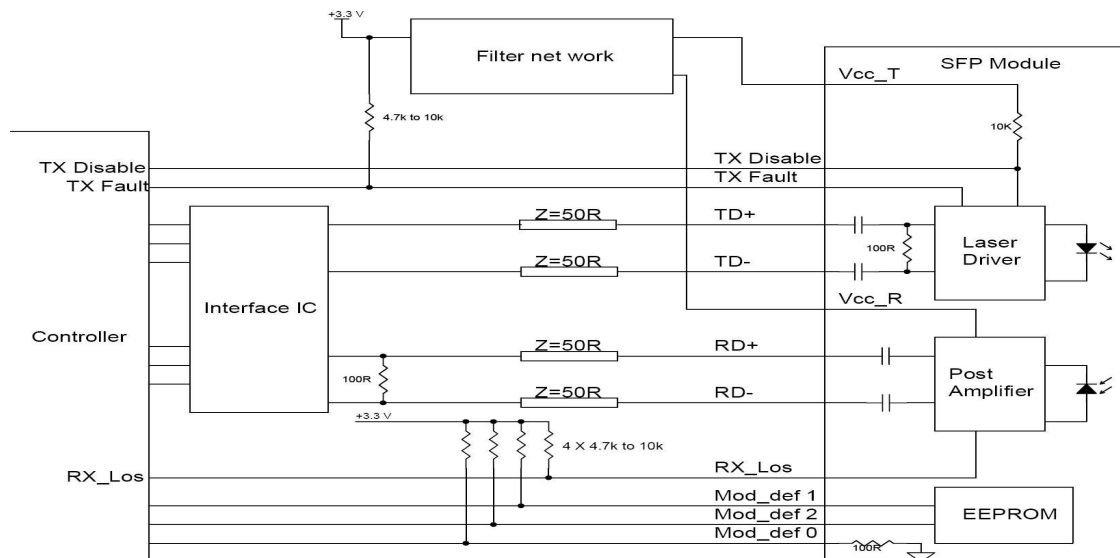
Mod-Def 0 has been grounded by the module to indicate that the module is present
 Mod-Def 1 is the clock line of two wire serial interface for serial ID
 Mod-Def 2 is the data line of two wire serial interface for serial ID

Note 4) When high, this output indicates loss of signal (LOS). Low indicates normal operation.

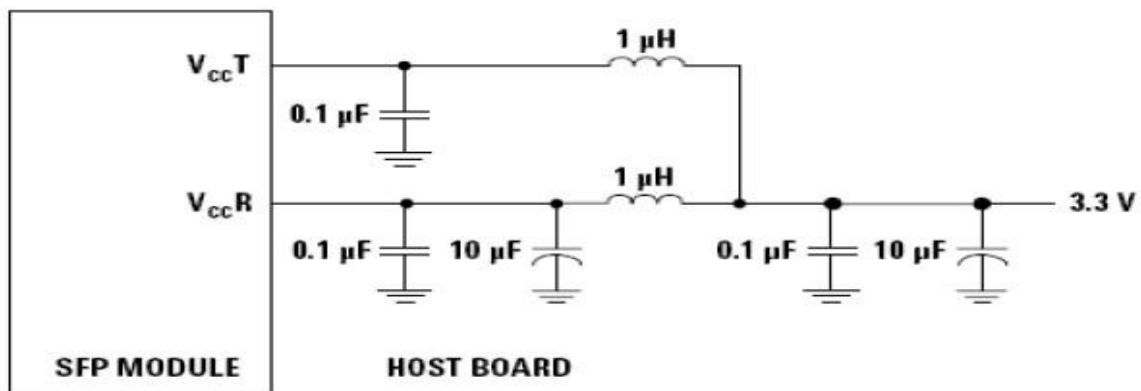
Note 5) RD+/-: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.

Note 6) TD+/-: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

TYPICAL INTERFACE CIRCUIT

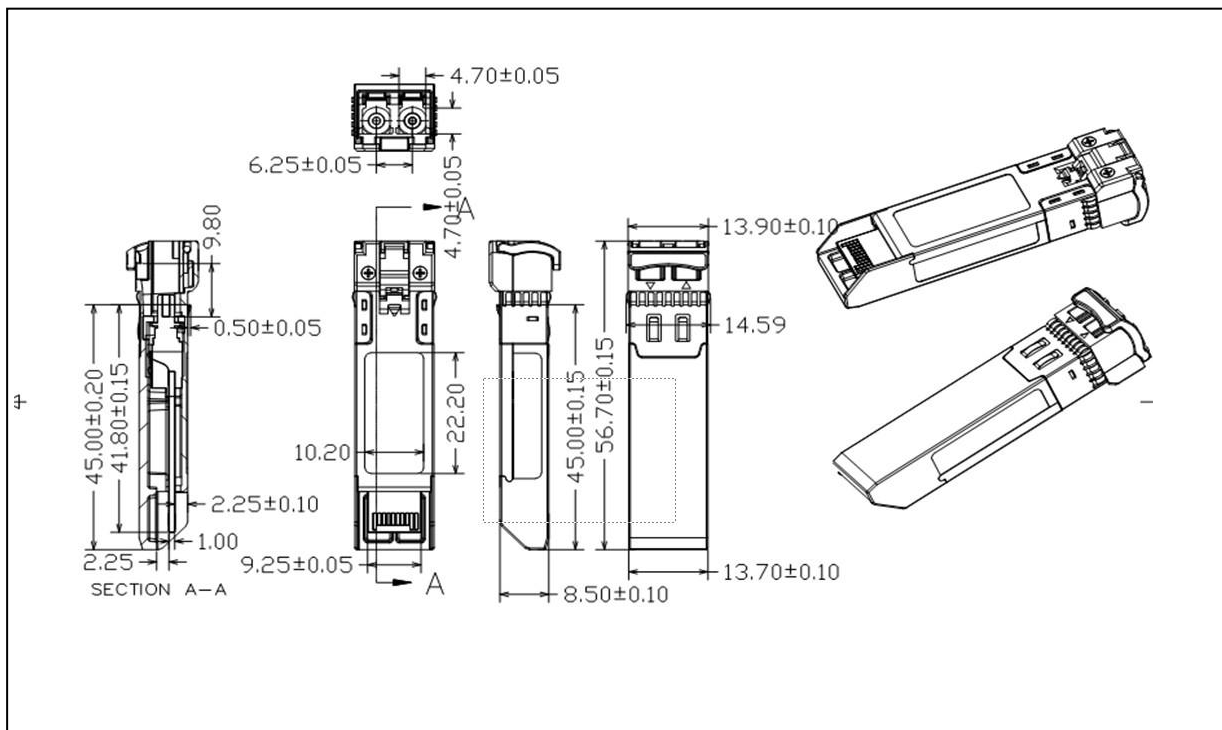


RECOMMENDED POWER SUPPLY FILTER



Note: Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value.

PACKAGE DIMENSIONS



SERIAL INTERFACE FOR ID AND DDM

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP MSA. The serial ID information of the SFP modules and Digital Diagnostic Monitor parameters can be accessed through the I2C interface at address A0h and A2h. The memory is mapped in Table 1. Detailed ID information(A0h) is listed in Table 2. And the DDM specification(A2h) is described in Table 3. For more details of the memory map and byte definitions, please refer to the SFF-8472 (Rev 9.3, Aug. 2002), “Digital Diagnostic Monitoring Interface for Optical Transceivers”. The DDM parameters have been internally calibrated.

Table 1. Digital Diagnostic Memory Map (Specific Data Field Descriptions)

2 wire address 1010000X (A0h)		2 wire address 1010001X (A2h)	
Address	Information	Address	Information
0~95	Serial ID Defined by SFP MSA (96 bytes)	0~55	Alarm and Warning Thresholds (56 bytes)
96~127	Vendor Specific (32 bytes)	56~95	Calibration Constants (40 bytes)
128~255	Reserved,SFF8079 (128 bytes)	96~119	Real Time Diagnostic Interface (24 bytes)
		120~127	Vender Specific (8 bytes)
		128~247	User Writable EEPROM (120 bytes)
		248~255	Vender Specific (8 bytes)

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	FDA 21CFR 1040.10, 1040.11 IEC/EN 60825-1, 2	Class 1 laser product
Component Recognition	IEC/EN 60950, UL	Compatible with standards
ROHS	2002/95/EC	Compatible with standards
EMC	EN61000-3	Compatible with standards

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