

10G SFP+ 80 km DWDM Optical Transceiver Datasheet

Overview

The T1-SFP-10G-DWDM80-Cxx is a high performance, cost effective module supporting data rate of 10Gbps and 80km transmission distance with SMF. This module is designed for single mode fiber and operates at a nominal DWDM wavelength from 1528nm to 1566nm as specified by the ITU-T. It is designed to deploy in the DWDM networking equipment in metropolitan access and core networks.

The transmitter section uses a DWDM EML laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses a PIN detector and a limiting post-amplifier IC. The T1-SFP-10G-DWDM80-Cxx is designed to be compliant with SFP+ Multi-Source Agreement (MSA) Specification SFF-8431.

Product Features

- Available in all C-Band Wavelengths on the 100GHz DWDM ITU Grid Cooled EML transmitter with TEC APD photodiode receiver
- Support up to 11.3Gb/s bit rates
- Compliant with SFP+ Electrical MSA SFF-8431
- Compliant with SFP+ Mechanical MSA SFF-8432
- Metal enclosure for lower EMI
- Power dissipation <2W
- Laser Class 1 IEC/CDRH compliant
- Links of 80 km with 9/125 μ m single mode fiber (SMF)

Applications

- 10GBASE-ZR/ZW

Regulatory Compliance

Feature	Standard	Performance
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN 55022:2010, Class B	Compatible with standards
Electromagnetic susceptibility (EMS)	EN 55024:2010	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class I laser product

Ordering Information

Part Number	Description
T1-SFP-10G-DWDM80-Cxx	SFP 80 km CDDM optical transceiver with SMF

For more information:

T1Nexus
 Address: 4701 Patrick Henry Drive, Bldg. 16, Santa Clara, CA 95054
 Toll-free phone number: 1-877-T1Nexus (1-877-816-3987)
 Email: sales@t1nexus.com

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Remarks
Storage Temperature	TS	-40	85	°C	
Relative Humidity (non-condensation)	RH	-	95	%	
Power Supply Voltage	V _{CC}	-0.5	4.0	V	

Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Power Supply Voltage	V _{CC}	+3.13	+3.3	+3.46	V	
Power Supply Current @ 3.3V	I _{CC}			600	mA	
Case Temperature (Operating)	TC	0	-	70	°C	
Data Rate	-	-	10.3125	11.3	Gb/s	

Optical Characteristics – Transmitter

Parameter	Symbol	Min	Typ	Max	Unit	Remarks	
Center Wavelength	λ	$\lambda-0.1$	-	$\lambda+0.1$	nm	1	
Spectral Width (-20dB)	R _{in}	-	-	0.3	nm		
Side Mode Suppression Ratio	SMSR	30	-	-	dB		
Average Optical Output Power	P _o	0	-	+5	dBm		
Output Power with Transmitter Disabled	P _{off}	-	-	-30	dBm		
Extinction Ratio	E _r	8.2	-	-	dB		
Transmitter Enable Voltage	V _{EN}	0	-	0.8	V		
Transmitter Disable Voltage	V _D	2.0	-	V _{CC}	V		
Differential Data Input Swing	V _{inpp}	120	-	850	mV _{pp}		
Output Optical Eye Mask		Compliant with IEEE802.3-2008					2

Optical Characteristics – Receiver

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Operate Wavelength	-	1260	-	1620	nm	-
Sensitivity (BER of 1E-12) up to 10.3Gb/s		-	-	-24	dBm	3
Saturation (BER of 1E-12)	P _{sat}	-7	-	-	dBm	3
LOS Asserted	T _{loss_on}	-35			dBm	

LOS De-Asserted	T_loss_off			-24.5	dBm	
LOS Hysteresis	T_loss_Hs	0.5	-	5.0	dB	
Differential Data Output Swing	VoutPP	350	-	910	mVpp	-
LOS Low Voltage	VLout	-	-	0.8	V	-
LOS High Voltage	VHout	2.0	-	-	V	-

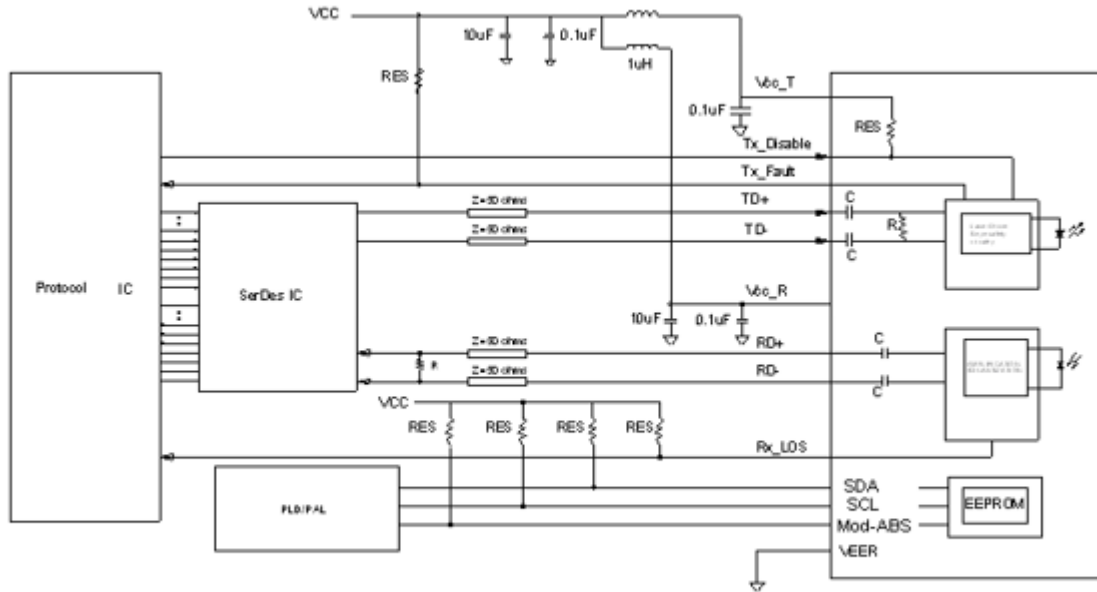
Notes:

1. See C-band λ_c Wavelength Guide
2. At least 1000 waveforms acquired, with minimum 5% margin against 802.3 mask
3. PRBS 2³¹-1, NRZ and including back to back

C-band λ_c Wavelength Guide

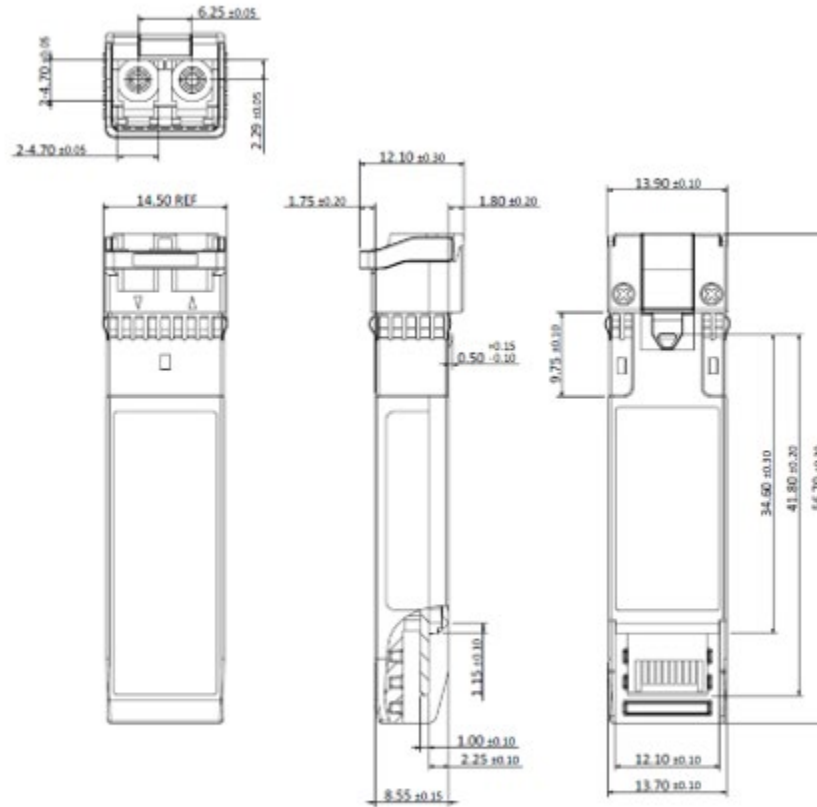
Code	f (THz)	λ_c (nm)	Code	f(THz)	λ_c (nm)	Code	f(THz)	λ_c (nm)
17	191.7	1563.86	32	193.2	1551.72	47	194.7	1539.77
18	191.8	1563.05	33	193.3	1550.92	48	194.8	1538.98
19	191.9	1562.23	34	193.4	1550.12	49	194.9	1538.19
20	192	1561.42	35	193.5	1549.32	50	195.0	1537.40
21	192.1	1560.61	36	193.6	1548.51	51	195.1	1536.61
22	192.2	1559.79	37	193.7	1547.72	52	195.2	1535.82
23	192.3	1558.98	38	193.8	1546.92	53	195.3	1535.04
24	192.4	1558.17	39	193.9	1546.12	54	195.4	1534.25
25	192.5	1557.36	40	194.0	1545.32	55	195.5	1533.47
26	192.6	1556.55	41	194.1	1544.53	56	195.6	1532.68
27	192.7	1555.75	42	194.2	1543.73	57	195.7	1531.90
28	192.8	1554.94	43	194.3	1542.94	58	195.8	1531.12
29	192.9	1554.13	44	194.4	1542.14	59	195.9	1530.33
30	193.0	1553.33	45	194.5	1541.35	60	196.0	1529.55
31	193.1	1552.52	46	194.6	1540.56	61	196.1	1528.77

Recommended Circuit



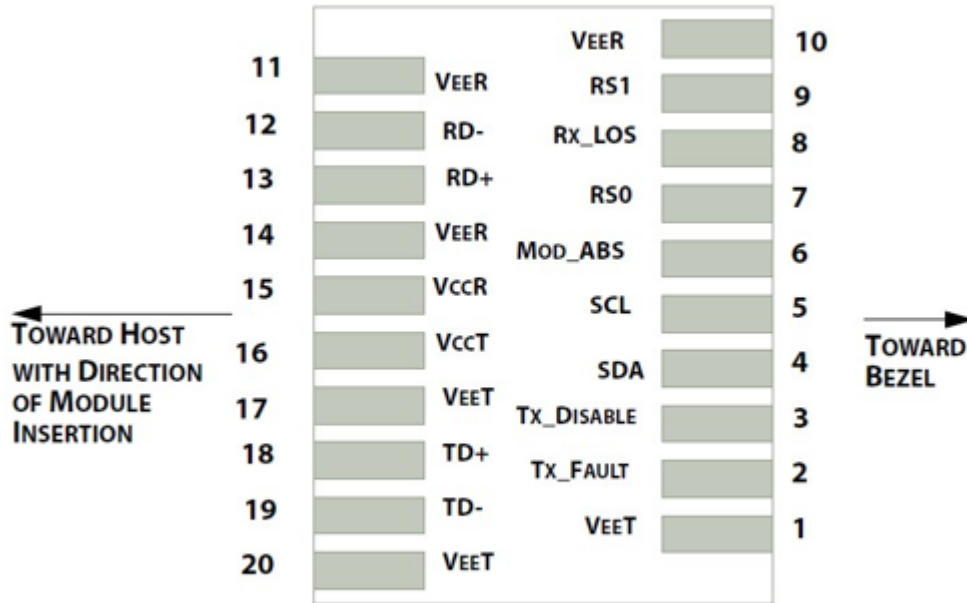
NOTE: 4.7K ohms < RES < 10K ohms

Dimensions



Unit:mm

Electrical Pad Layout



Pin Assignment

PIN #	Symbol	Description	Notes
1	VeeT	Transmitter Ground	-
2	TX Fault	Transmitter Fault Indication	Note 1
3	TX Disable	Transmitter Disable	Note 2, Module disables on high or open
4	SDA	2-wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i)	
5	SCL	2 Wire Serial Interface Data Line (Same as MOD-DEF1 as defined in the INF-8074i)	
6	MOD-ABS	Module Absent, Connected to VeeT or VeeR in the module.	Note 3
7	RS0	SFP+ RX Rate Select, optional	Rate Select 0, Not used. Note 9
8	LOS	Loss of Signal	Note 4
9	RS1	SFP+ TX Rate Select, optional	Rate Select 0, Not used. Note 9
10	VeeR	Receiver Ground	Note 5
11	VeeR	Receiver Ground	Note 5

12	RD-	Inv. Received Data Out	Note 6
13	RD+	Received Data Out	Note 6
14	VeeR	Receiver Ground	Note 5
15	VccR	Receiver Power	Note 7, 3.3V +/- 5%
16	VccT	Transmitter Power	Note 7, 3.3V +/- 5%
17	VeeT	Transmitter Ground	Note 5
18	TD+	Transmit Data In	Note 8
19	TD-	Inv. Transmit Data In	Note 8
20	VeeT	Transmitter Ground	Note 5

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

1. TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10K Ω resistor on the host board. Pull up voltage between 2.0V and VccT +0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.4V.

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 – 10 K Ω resistor. Its states are:

Low (-0.3 – 0.8V): Transmitter on (>0.8, < 2.0V): Undefined
 High (2.0 – VccT+0.3V): Transmitter Disabled Open: Transmitter Disabled

3. Mod-ABS shall be pulled up with a 4.7K – 10K Ω resistor on the host board. The pull-up voltage shall be VccT or VccR.

4. LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10K Ω resistor. Pull up voltage between 2.0V and VccR+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.4V.

5. VeeR and VeeT may be internally connected within the SFP module.

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

7. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V

5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 Ω 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. VccR and VccT may be internally connected within the SFP transceiver module.

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

9. Internally pulled down per SFF-8431 Rev 4.1.