10Gbps 50GHz DWDM SFP+ Single-Mode 80km Optical Transceiver
DSFP-10GHXXX-80-xx

Features

- Available in all C-Band Wavelengths on the 50GHz DWDM ITU Grid
- Temperature-Stabilized DWDM EML Transmitter
- Duplex LC Connector
- Power Dissipation＜1.5W
- Dispersion tolerance from -500ps/nm to 1600ps/nm
- Hot-Pluggable SFP+ Footprint
- Compliant with SFF-8431 MSA
- Compliant with SFF-8432 MSA
- Operating case temperature
  Standard : 0°C to +70°C

Applications

- 10GBASE-ZR/ZW
- 10G FC
- Other optical links

Description

The DSFP-10GHXXX-80-xx series single mode transceiver is small form factor pluggable module for duplex optical data communications. 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.

It is with the SFP+ 20-pin connector to allow hot plug capability. 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 an APD detector and a limiting post-amplifier IC.

The DSFP-10GHXXX-80-xx series are designed to be compliant with SFP+ Multi-Source Agreement (MSA) Specification SFF-8431 and 8432.

Specifications

Table 1 - Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	3.6	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	-	95	%

Table 2 - Recommended Operating Conditions

Parameter		Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Standard	Tc	0		+70	°C
Power Supply Voltage		Vcc	3.15	3.3	3.45	V
Power Supply Current		Icc		300	430	mA
Data Rate					10.3	Gbps

Table3-C-band λc Wavelength Guide

*Note 1: Please contact with FiberStore for the channel availability.

λC 50 GHz Channel GuiSe			
Channel	Part No.	Frequency (THz)	Wavelength (nm)
HC17	DSFP-10GHC17-80-xx	191.70	1563.86
HH17	DSFP-10GHH17-80-xx	191.75	1563.46
HC18	DSFP-10GHC18-80-xx	191.80	1563.05
HH18	DSFP-10GHH18-80-xx	191.85	1562.64
HC19	DSFP-10GHC19-80-xx	191.90	1562.23
HH19	DSFP-10GHH19-80-xx	191.95	1561.83
HC20	DSFP-10GHC20-80-xx	192.00	1561.42
HH20	DSFP-10GHH20-80-xx	192.05	1561.01
HC21	DSFP-10GHC21-80-xx	192.10	1560.61
HH21	DSFP-10GHH21-80-xx	192.15	1560.20
HC22	DSFP-10GHC22-80-xx	192.20	1559.79
HH22	DSFP-10GHH22-80-xx	192.25	1559.39
HC23	DSFP-10GHC23-80-xx	192.30	1558.98
HH23	DSFP-10GHH23-80-xx	192.35	1558.58
HC24	DSFP-10GHC24-80-xx	192.40	1558.17
HH24	DSFP-10GHH24-80-xx	192.45	1557.77
HC25	DSFP-10GHC25-80-xx	192.50	1557.36
HH25	DSFP-10GHH25-80-xx	192.55	1556.96
HC26	DSFP-10GHC26-80-xx	192.60	1556.56
HH26	DSFP-10GHH26-80-xx	192.65	1556.15
HC27	DSFP-10GHC27-80-xx	192.70	1555.75
HH27	DSFP-10GHH27-80-xx	192.75	1555.34
HC28	DSFP-10GHC28-80-xx	192.80	1554.94
HH28	DSFP-10GHH28-80-xx	192.85	1554.54
HC29	DSFP-10GHC29-80-xx	192.90	1554.13
HH29	DSFP-10GHH29-80-xx	192.95	1553.73
HC30	DSFP-10GHC30-80-xx	193.00	1553.33
HH30	DSFP-10GHH30-80-xx	193.05	1552.93

HC31	DSFP-10GHC31-80-xx	193.10	1552.52
HH31	DSFP-10GHH31-80-xx	193.15	1552.12
HC32	DSFP-10GHC32-80-xx	193.20	1551.72
HH32	DSFP-10GHH32-80-xx	193.25	1551.32
HC33	DSFP-10GHC33-80-xx	193.30	1550.92
HH33	DSFP-10GHH33-80-xx	193.35	1550.52
HC34	DSFP-10GHC34-80-xx	193.40	1550.12
HH34	DSFP-10GHH34-80-xx	193.45	1549.72
HC35	DSFP-10GHC35-80-xx	193.50	1549.32
HH35	DSFP-10GHH35-80-xx	193.55	1548.92
HC36	DSFP-10GHC36-80-xx	193.60	1548.52
HH36	DSFP-10GHH36-80-xx	193.65	1548.12
HC37	DSFP-10GHC37-80-xx	193.70	1547.72
HH37	DSFP-10GHH37-80-xx	193.75	1547.32
HC38	DSFP-10GHC38-80-xx	193.80	1546.92
HH38	DSFP-10GHH38-80-xx	193.85	1546.52
HC39	DSFP-10GHC39-80-xx	193.90	1546.12
HH39	DSFP-10GHH39-80-xx	193.95	1545.72
HC40	DSFP-10GHC40-80-xx	194.00	1545.32
HH40	DSFP-10GHH40-80-xx	194.05	1544.92
HC41	DSFP-10GHC41-80-xx	194.10	1544.53
HH41	DSFP-10GHH41-80-xx	194.15	1544.13
HC42	DSFP-10GHC42-80-xx	194.20	1543.73
HH42	DSFP-10GHH42-80-xx	194.25	1543.33
HC43	DSFP-10GHC43-80-xx	194.30	1542.94
HH43	DSFP-10GHH43-80-xx	194.35	1542.54
HC44	DSFP-10GHC44-80-xx	194.40	1542.14
HH44	DSFP-10GHH44-80-xx	194.45	1541.75
HC45	DSFP-10GHC45-80-xx	194.50	1541.35
HH45	DSFP-10GHH45-80-xx	194.55	1540.95
HC46	DSFP-10GHC46-80-xx	194.60	1540.56
HH46	DSFP-10GHH46-80-xx	194.65	1540.16
HC47	DSFP-10GHC47-80-xx	194.70	1539.77
HH47	DSFP-10GHH47-80-xx	194.75	1539.37
HC48	DSFP-10GHC48-80-xx	194.80	1538.98
HH48	DSFP-10GHH48-80-xx	194.85	1538.58
HC49	DSFP-10GHC49-80-xx	194.90	1538.19
HH49	DSFP-10GHH49-80-xx	194.95	1537.79
HC50	DSFP-10GHC50-80-xx	195.00	1537.40
HH50	DSFP-10GHH50-80-xx	195.05	1537.00
HC51	DSFP-10GHC51-80-xx	195.10	1536.61
HH51	DSFP-10GHH51-80-xx	195.15	1536.22
HC52	DSFP-10GHC52-80-xx	195.20	1535.82

HH52	DSFP-10GHH52-80-xx	195.25	1535.43
HC53	DSFP-10GHC53-80-xx	195.30	1535.04
HH53	DSFP-10GHH53-80-xx	195.35	1534.64
HC54	DSFP-10GHC54-80-xx	195.40	1534.25
HH54	DSFP-10GHH54-80-xx	195.45	1533.86
HC55	DSFP-10GHC55-80-xx	195.50	1533.47
HH55	DSFP-10GHH55-80-xx	195.55	1533.07
HC56	DSFP-10GHC56-80-xx	195.60	1532.68
HH56	DSFP-10GHH56-80-xx	195.65	1532.29
HC57	DSFP-10GHH57-80-xx	195.70	1531.90
HH57	DSFP-10GHH57-80-xx	195.75	1531.51
HC58	DSFP-10GHC58-80-xx	195.80	1531.12
HH58	DSFP-10GHH58-80-xx	195.85	1530.73
HC59	DSFP-10GHC59-80-xx	195.90	1530.33
HH59	DSFP-10GHH59-80-xx	195.95	1529.94
HC60	DSFP-10GHC60-80-xx	196.00	1529.55
HH60	DSFP-10GHH60-80-xx	196.05	1529.16
HC61	DSFP-10GHC61-80-xx	196.10	1528.77
HH61	DSFP-10GHH61-80-xx	196.15	1528.38

Table 4 - Performance Specifications - Electrical

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
CML Inputs(Differential)	Vin	150		1200	mVpp	AC coupled inputs
Input Impedance (Differential)	Zin	85	100	115	ohms	Rin > 100 kohms@ DC
Tx_DISABLE Input Voltage - High		2		Vcc+0.3	V	
Tx_DISABLE Input Voltage - Low		0		0.8	V	
Tx_FAULT Output Voltage - High		2		Vcc+0.3	V	Io = 800 μ A; Host Vcc
Tx_FAULT Output Voltage - Low		0		0.5	V	Io = -4.0mA
Receiver						
CML Outputs (Differential)	Vout	350		700	mVpp	AC coupled outputs
Output Impedance	Zout	85	100	115	ohms	

(Differential)						
Rx_LOS Output Voltage - High		2		Vcc+0.3	V	Io = 800 μ A; Host Vcc
Rx_LOS Output Voltage - Low		0		0.8	V	Io = -4.0mA
MOD_DEF (2:0)	VoH	2.5			V	With Serial ID
	VoL	0		0.5	V	

Table 5- Optical Performance Specifications

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Data Rate				10.3	Gpbs	
Transmitter						
Centre Wavelength Spacing			50		Ghz	
			0.4		nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Output Power	Pout	0		5	dBm	2
Average Launch Power (Tx: OFF)	Poff			-30	dBm	
Transmitter Dispersion Penalty @1600ps/nm	TDP			3.5	dB	
Extinction Ratio	ER	3.5			dB	
P_{out}@TX Disable Asserted	Pout			-45	dBm	
Relative Intensity Noise	RIN			-128	dB/Hz	
TX Jitter	TXj	Per 802.3ae requirements				
Receiver						
Receiver Sensitivity	Pmin			-23	dBm	3
Receiver Overload	Pmax	-8			dBm	
LOS De-Assert	LOS_D			-24	dBm	
LOS Assert	LOS_A	-37			dBm	
LOS Hysteresis		1			dB	

Notes:

2. Output is coupled into a 9/125μm single-mode fiber.

3. Minimum average optical power measured at the BER less than 1E-12. The measure pattern is PRBS 2^{31}-1.

SFP+ Transceiver Electrical Pad Layout

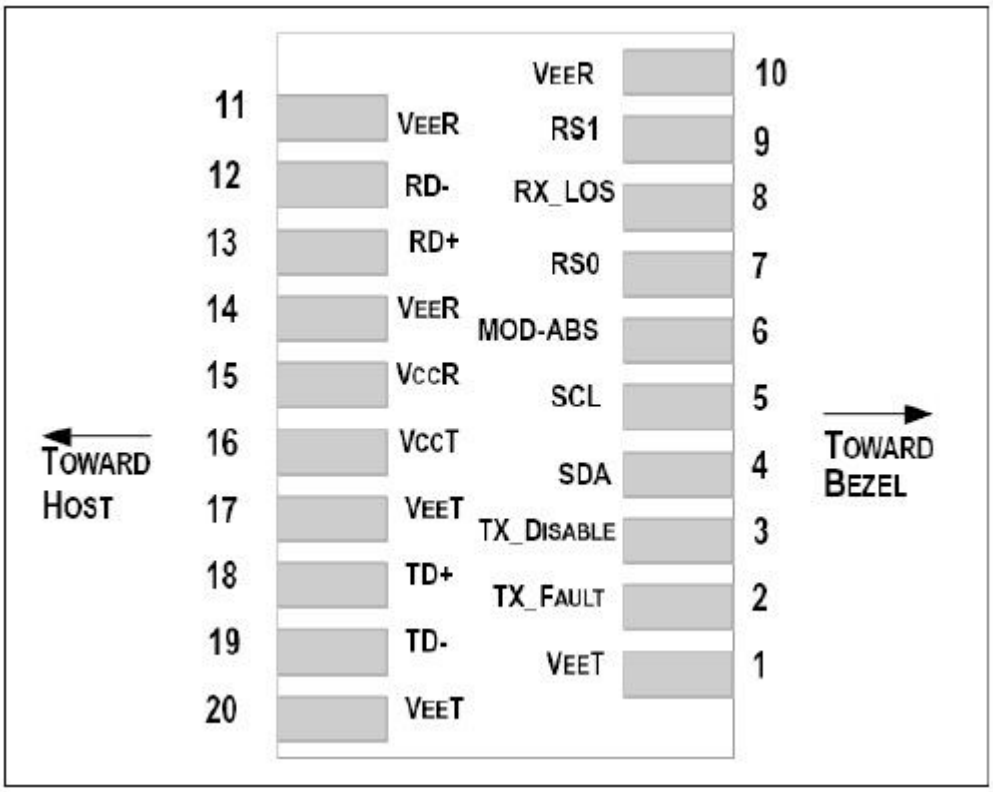


Table 6– Diagnostics Specification

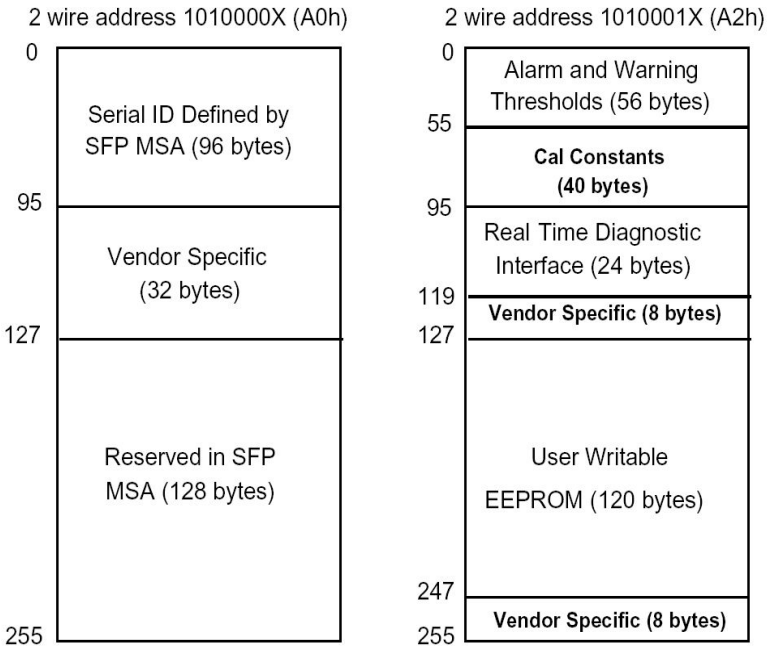
Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal / External
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	0 to 100	mA	±10%	Internal / External
TX Power	0 to +5	dBm	±3dB	Internal / External
RX Power	-23 to -3	dBm	±3dB	Internal / External

Digital Diagnostic Memory Map

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

The digital diagnostic memory map specific data field defines as following.



Pin Function Definition

Pin	Signal Name	Description	Plug Seq.	Notes
1	Veet	Transmitter Ground	1	Note5
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX DISABLE	Transmitter Disable	3	Note 2, Module disables on high or open
4	MOD_DEF(2)	Serial Data Signal	3	Note 3, Data line for Serial ID.
5	MOD_DEF(1)	SCL Serial Clock Signal	3	Note 3, Clock line for Serial ID.
6	MOD_DEF(0)	TTL Low	3	Note 3
7	RS0	RX Rate Select (LVTTL).	3	Rate Select 0, optionally controls SFP+ module receiver. This pin is pulled low to VeeT with a >30K resistor
8	LOS	Loss of Signal	3	Note 4
9	RS1	TX Rate Select(LVTTL).	1	Rate Select 1, optionally controls SFP+ module transmitter. This pin is pulled low to VeeT with a >30K resistor
10	VeeR	Receiver ground	1	Note 5
11	VeeR	Receiver ground	1	Note 5
12	RD-	Inv. Received Data Out	3	Note 6
13	RD+	Received Data Out	3	Note 7
14	VeeR	Receiver ground	1	Note 5
15	VccR	Receiver Power Supply	2	3.3 ± 5%, Note 7

16	VccT	Transmitter Power Supply	2	3.3 ± 5%, Note 7
17	VeeT	Transmitter Ground	1	Note 5
18	TD+	Transmit Data In	3	Note 8
19	TD-	Inv. Transmit Data In	3	Note 8
20	VeeT	Transmitter Ground	1	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 – 10kΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R+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 < 0.8V.

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 4.7k~10kΩ resistor. Its states are:

Low (0 to 0.8V): Transmitter on

(>0.8V, < 2.0V): Undefined

High (2.0 to 3.465V): Transmitter Disabled

Open: Transmitter Disabled

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 VccT or VccR.

Mod-Def 0 is 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

4) LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K –10kΩ resistor. Pull up voltage between 2.0V and VccT, R+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 <0.8V.

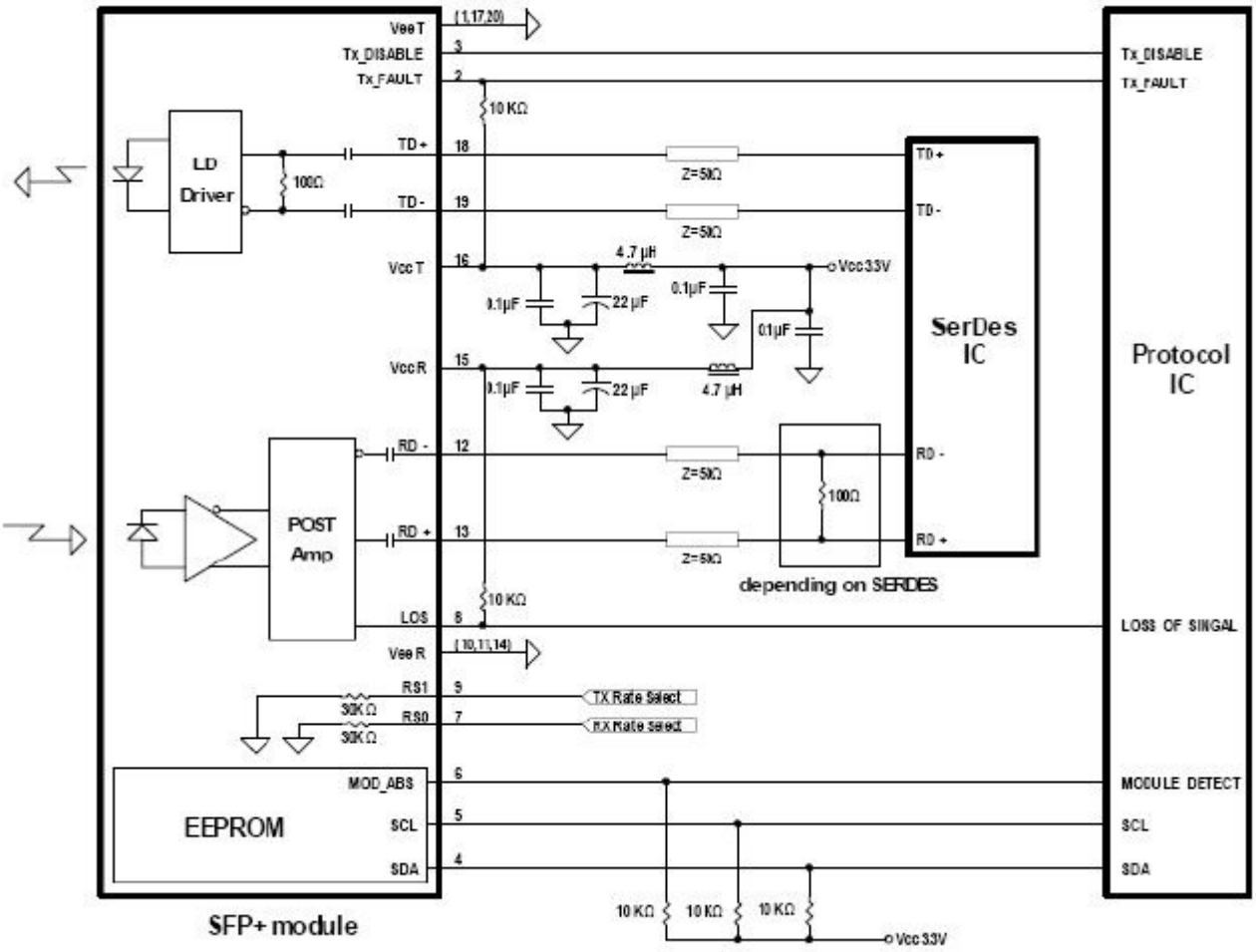
5) VeeR and VeeT may be internally connected within the SFP+ module.

6) 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.

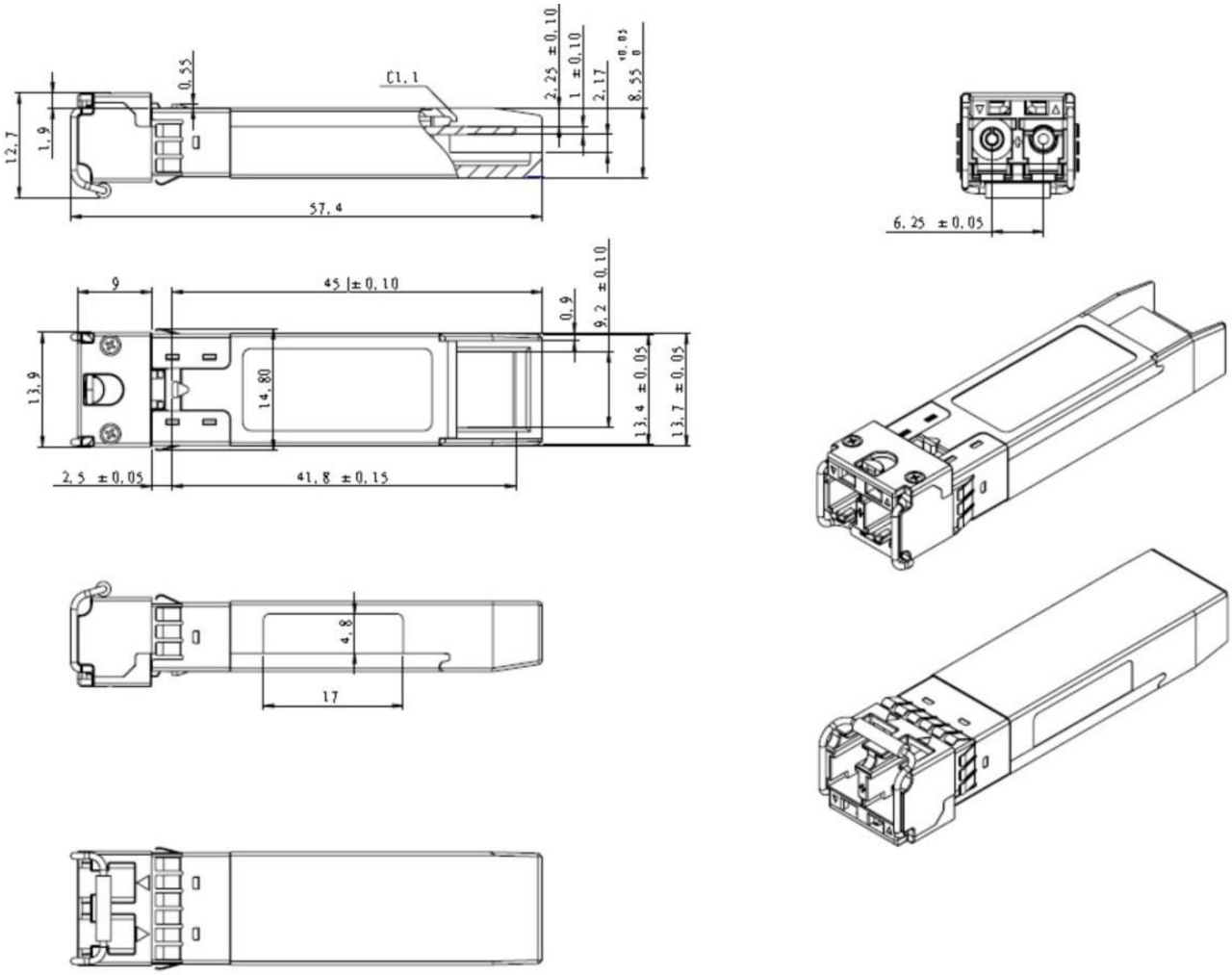
7) VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V±5% at the SFP+ connector pin. Maximum supply current is 300mA. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP+ input pin with 3.3V supply voltage. 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 30mA 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 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

Recommend Circuit Schematic



Mechanical Dimensions



Laser Emission

Ordering Information

Part No.	Data Rate (Gbps)	Frequency (GHz)	ITU Channel/ Wavelength (nm)	Connector Type	Transmission Distance (km)	Operating case temperature (° C)	Digital Diagnostics
DSFP-10GHXXX -80-xx	10	50GHz	CH17~CH61 (1563.46~1528.38)	LC	80	0 to +70	Yes

Notes:

XXX means DWDM ITU Channel (HC17=1563.86nm, HC18=1563.05nm, HC19=1562.23nm, etc)
(HH17=1563.46nm, HH18=1562.64nm, HH19=1561.83nm, etc)

xx means compatible brand. (For example: CO= Cisco, JU=Juniper, FD=Foundry, EX=Extreme, NE=Netgear,etc.)

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