

### **SFP-25GB-DW24-10-FT-C**

Fortinet® Compatible TAA 25GBase-DWDM SFP28 Transceiver C-Band 100GHz (SMF, 1558.17nm, 10km, LC, DOM)

#### **Features:**

- SFF-8432 and SFF-8472 Compliance
- Duplex LC Connector
- Single-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free



#### **Applications:**

- 25x Gigabit Ethernet over DWDM
- Access and Enterprise

#### **Product Description**

This Fortinet® compatible SFP28 transceiver provides 25GBase-DWDM throughput up to 10km over single-mode fiber (SMF) using a wavelength of 1558.17nm via an LC connector. It can operate at temperatures between 0 and 70C. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Fortinet®. It has been programmed, uniquely serialized, and tested for data-traffic and application to ensure that it will initialize and perform identically. All of our transceivers comply with Multi-Source Agreement (MSA) standards to provide seamless network integration. Additional product features include Digital Optical Monitoring (DOM) support which allows access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S.-made or designated country end products.")



### Wavelength Guide (100GHz ITU Channels)

Channel	Wavelength (nm)	Frequency (THZ)	Channel	Wavelength (nm)	Frequency (THZ)
15	1565.50	191.5	39	1546.12	193.9
16	1564.68	191.6	40	1545.32	194.0
17	1563.86	191.7	41	1544.53	194.1
18	1563.05	191.8	42	1543.73	194.2
19	1562.23	191.9	43	1542.94	194.3
20	1561.42	192.0	44	1542.14	194.4
21	1560.61	192.1	45	1541.35	194.5
22	1559.79	192.2	46	1540.56	194.6
23	1558.98	192.3	47	1539.77	194.7
24	1558.17	192.4	48	1538.98	194.8
25	1557.36	192.5	49	1538.19	194.9
26	1556.55	192.6	50	1537.40	195.0
27	1555.75	192.7	51	1536.61	195.1
28	1554.94	192.8	52	1535.82	195.2
29	1554.13	192.9	53	1535.04	195.3
30	1553.33	193.0	54	1534.25	195.4
31	1552.52	193.1	55	1533.47	195.5
32	1551.72	193.2	56	1532.68	195.6
33	1550.92	193.3	57	1531.90	195.7
34	1550.12	193.4	58	1531.12	195.8
35	1549.32	193.5	59	1530.33	195.9
36	1548.51	193.6	60	1529.55	196.0
37	1547.72	193.7	61	1528.77	196.1
38	1546.92	193.8			

### Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Maximum Supply Voltage	Vcc	-0.5		3.6	V	
Storage Temperature	Tstg	-40		85	°C	
Operating Case Temperature	Tc	0		70	°C	
Relative Humidity	RH	5		85	%	
Data Rate	BR		25.78		Gbps	

## Electrical Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Notes
Power Supply Voltage		V <sub>cc</sub>	3.15	3.3	3.45	V	
Power Supply Current		I <sub>cc</sub>			606	mA	
Transmitter							
Differential CML Inputs		V <sub>in</sub>	40		1000	mVp-p	1
Differential Input Impedance		Z <sub>in</sub>		100		Ω	2
Tx_Dis	Disable		2		V <sub>cc</sub> +0.3	V	
	Enable		0		0.8		
Tx-Fault	Fault		2		V <sub>cc</sub> +0.3	V	
	Normal		0		0.8		
Receiver							
Differential CML Outputs		V <sub>out</sub>	450		1050	mVp-p	3
Differential Output Impedance		Z <sub>out</sub>	85	100	115	Ω	
RXD_LOS	LOS		2		V <sub>cc</sub> +0.3	V	
	Normal		0		0.8		

### Notes:

1. AC coupled input. CML logic. Internally AC coupled.
2. R<sub>IN</sub>>100kΩ @ DC.
3. AC coupled output. CML logic. Internally AC coupled.

## Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Wavelength	$\lambda$	1528.77		1565.50	nm	
Center Wavelength Spacing			100		GHz	
			0.8		nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Output Power	P <sub>out</sub>	-3		2	dBm	1
Extinction Ratio	ER	3			dB	
<b>Receiver</b>						
Receiver Sensitivity @25.78Gbps	P <sub>min</sub>			-10	dBm	2
Receiver Overload	P <sub>max</sub>	2			dBm	
LOS De-Assert	LOSD			-17	dBm	
LOS Assert	LOSA	-30			dBm	
LOS Hysteresis	H <sub>y</sub>	0.5			dB	
Optical Signal to Noise Ratio Tolerance	OSNR	33			dB	

### Notes:

1. Output is coupled into a 9/125μm single-mode fiber.
2. Minimum average optical power measured at the BER less than  $5E^{-5}$ . The measure pattern is PRBS  $2^{31}-1$ .

## Pin Descriptions

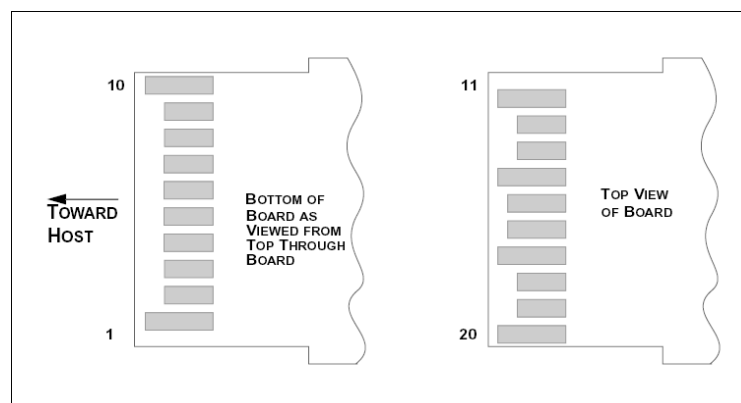
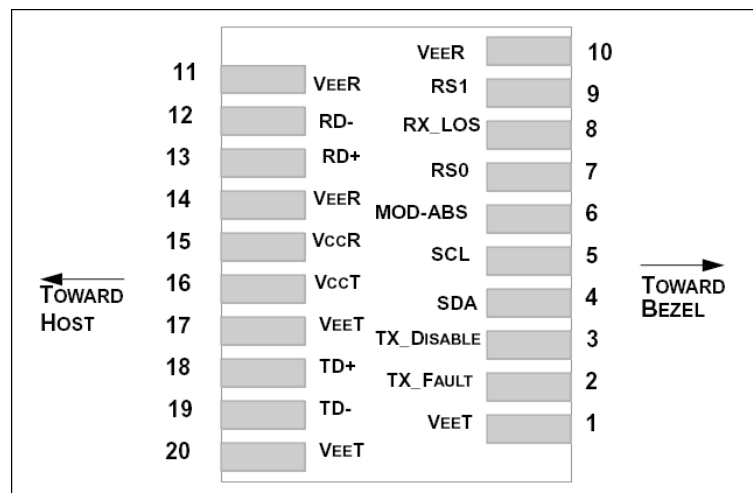
Pin	Symbol	Name/Descriptions	Plug Sequence	Ref.
1	VeeT	Transmitter Ground.	1	5
2	TX_Fault	Transmitter Fault Indication.	3	1
3	TX Disable	Transmitter Disable. Module disables on "high" or "open."	3	2
4	SDA	Module Definition 2. 2-Wire Serial Interface Data.	3	3
5	SCL	Module Definition 1. 2-Wire Serial Interface Clock.	3	3
6	MOD-ABS	Module Definition 0.	3	3
7	RS0	RX Rate Select (LVTTTL).	3	9
8	RX_LOS	Loss of Signal.	3	4
9	RS1	TX Rate Select (LVTTTL).	1	9
10	VeeR	Receiver Ground.	1	5
11	VeeR	Receiver Ground.	1	5
12	RD-	Inverted Received Data Out.	3	6
13	RD+	Received Data Out.	3	7
14	VeeR	Receiver Ground.	1	5
15	VccR	Receiver Power. $3.3 \pm 5\%$ .	2	7
16	VccT	Transmitter Power. $3.3 \pm 5\%$ .	2	7
17	VeeT	Transmitter Ground.	1	5
18	TD+	Transmit Data In.	3	8
19	TD-	Inverted Transmit Data In.	3	8
20	VeeT	Transmitter Ground.	1	5

### Notes:

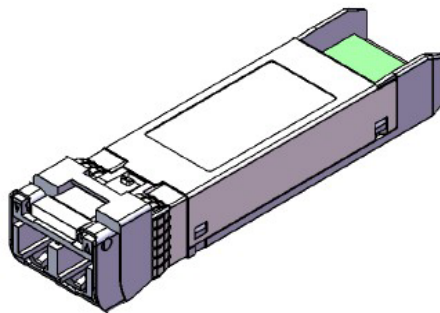
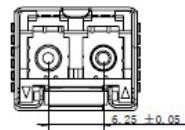
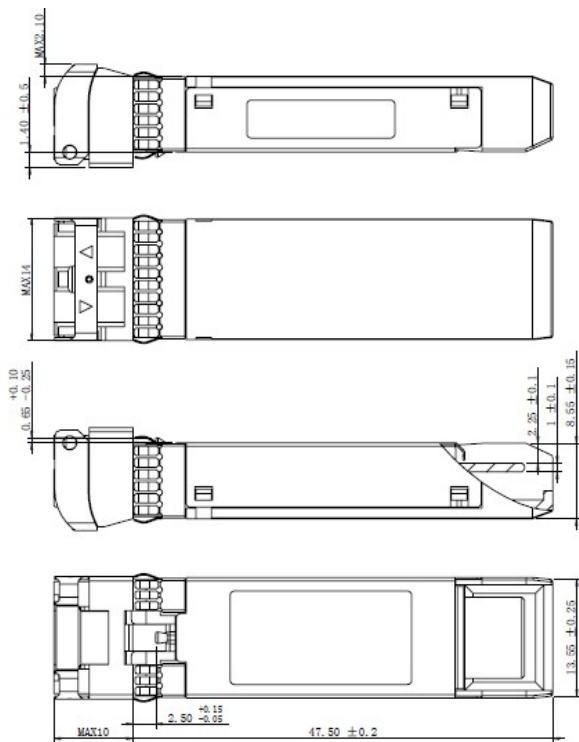
1. Tx\_Fault is an open collector/drain output which should be pulled up with a 4.7k $\Omega$  to 10k $\Omega$  resistor on the host board. Pull-up voltage is between 2.4V and  $V_{ccT}/R+0.3V$ . When "high," the output indicates a laser fault of some kind. "Low" indicates normal operation. In the "low" 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 4.7k $\Omega$ –10k $\Omega$  resistor. Its states are:
  - Low (-0.3 – 0.8V): Transmitter On.
  - (>0.8, < 2.0V): Undefined.
  - High (2.0 –  $V_{ccT}/R+0.3V$ ): Transmitter Disabled.
  - Open: Transmitter Disabled.
3. Module Absent. Connected to the VeeT or VeeR in the module.
4. LOS (Loss of Signal) is an open collector/drain output which should be pulled up with a 4.7k $\Omega$  to 10k $\Omega$  resistor. Pull-up is voltage between 2.4V and  $V_{ccT}/R+0.3V$ . 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 <0.4V.

5. VeeR and VeeT may be internally connected within the SFP28 module.
6. RD-/+: these are the differential receiver outputs. They are AC coupled 100 (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. The voltage swing on these lines will be between 225mV-525mV single-ended when properly terminated.
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 606mA. Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at the SFP28 input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot-plugging of the SFP28 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 100 differential terminations inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 20mV-500mV single-ended, though it is recommended the values between 90mV-900mV single-ended be used for best EMI performance.
9. This pin has an internal 30k pull down to ground. This pin will not affect module performance.

### Transceiver Pad layout



## Mechanical Specifications



Unremarked tolerances  $\pm 0.2\text{mm}$

## About ProLabs

Our extensive experience comes as standard. For over 20 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with more than 100 optical switching and transport platforms.

## A Complete Portfolio of Network Solutions

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 1.6T while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

## The Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure compatible products, and immediate answers to your questions. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.



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