

# SFP28-DW25Gxx-40C

25.78Gbps SFP28 DWDM Transceiver, Single Mode, 40km Reach



## Product Features

- ❖ Up to 25.78Gb/s data links
- ❖ DWDM EML transmitter and APD receiver
- ❖ 100 GHz ITU channel spacing with integrated wavelength locker
- ❖ Up to 40km on 9/125um SMF
- ❖ Hot-pluggable SFP28 footprint
- ❖ Support Digital Monitoring interface
- ❖ Duplex LC/UPC type pluggable optical interface

- ❖ RoHS-10 compliant and lead-free
- ❖ With CDR function
- ❖ Single +3.3V power supply
- ❖ Compliant with SFF+MSA and SFF-8472
- ❖ Metal enclosure, for lower EMI
- ❖ Meet ESD requirements, resist 8KV direct contact voltage
- ❖ Case operating temperature
- ❖ Commercial: 0 ~ +70° C
- ❖ Extended: -10 ~ +80° C
- ❖ Industrial: -40 ~ +85° C

## Applications

- ❖ High-speed storage area networks
- ❖ Computer cluster cross-connect
- ❖ Custom high-speed data pipes
- ❖ Inter Rack Connection
- ❖ Other Optical Links

## Description

SFP28-DW25Gxx-40C transceiver is designed for use in 25-Gigabit Ethernet links up to 40km over single mode fiber. The module consists of DWDM EML Laser, APD and Pre-amplifier in a high-integrated optical sub-assembly. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472. This module is designed for single mode fiber and operates at a nominal wavelength of 100GHz ITU Grid, C Band DWDM wavelength.

The module optical connection is duplex LC and shall be compatible with SFP+ 28Gbps and backward compatible with legacy 10G SFP+ pluggable. The SFP28 DWDM LR module is a dual directional device with a transmitter and receiver plus a control management interface (2-wire interface) in the same physical package. 2-wire interface is used for serial ID, digital diagnostics and module control function.

The transmitter converts 25Gbit/s serial PECL or CML electrical data into serial optical

data compliant with the 25GBASE-LR standard. An open collector compatible Transmit Disable (Tx\_Dis) is provided. Logic “1” or no connection on this pin will disable the laser from transmitting. Logic “0” on this pin provides normal operation. The transmitter has an internal automatic power control loop (APC) to ensure constant optical power output across supply voltage and temperature variations. An open collector compatible Transmit Fault (Tx\_Fault) is provided. TX\_Fault is module output contact that when high, indicates that the module transmitter has detected a fault condition related to laser operation or safety. The TX\_Fault output contact is an open drain/collector and shall be pulled up to the Vcc\_Host in the host with a resistor in the range 4.7-10 kΩ. TX\_Disable is a module input contact. When TX\_Disable is asserted high or left open, the SFP28 module transmitter output shall be turned off. This contact shall be pulled up to VccT with a 4.7 kΩ to 10 kΩ resistor.

The receiver converts 25Gbit/s serial optical data into serial PECL/CML electrical data. An open collector compatible Loss of Signal is provided. Rx\_LOS when high indicates an optical signal level below that specified in the relevant standard. The Rx\_LOS contact is an open drain/collector output and shall be pulled up to Vcc\_Host in the host with a resistor in the range 4.7-10 kΩ, or with an active termination. Power supply filtering is recommended for both the transmitter and receiver. The Rx\_LOS signal is intended as a preliminary indication to the system in which the SFP28 is installed that the received signal strength is below the specified range. Such an indication typically points to non-installed cables, broken cables, or a disabled, failing or a powered off transmitter at the far end of the cable.

## Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Max	Unit	Note
Supply Voltage	$T_s$	-40	8.5	° C	
Power Supply Voltage	$V_{CC}$	-0.5	3.6	V	
Relative Humidity(non-condensation)	RH	5	95	%	
Damage Threshold	$TH_d$	-3		dBm	

## Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Note
Operating Case Temperature	$T_{OP}$	0		70	°C	commer cial
Power Supply Voltage		-10		80		extended
Data Rate		-40		85		Industria 1
Control Input Voltage High	$V_{CC}$	3.135	3.3	3.465	V	
Control Input Voltage Low			25.78		Gb/s	
Link Distance (SMF)		2		$V_{CC}$	V	

## Optical Characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min	Typical	Max	Unit	Notes
<b>Transmitter</b>						
Optical Wavelength	$\lambda_c$	$\lambda_c - 0.1$		$\lambda_c + 0.1$	nm	1
Center Wavelength Spacing			100		GHz	

Optical Spectral Width	$\Delta\lambda$			1	nm	
Average Optical Power	PAVG	0		5	dBm	2
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Extinction Ratio	ER	6			dB	
Transmitter OFF Output Power	$P_{off}$			-30	dBm	
Transmitter and Dispersion Penalty	TDP			2.7	dB	
Optical Return Loss Tolerance	ORLT			20	dB	
Transmitter Eye Mask	Compliant with IEEE802.3ae					
<b>Receiver</b>						
Center Wavelength	$\lambda_c$	1270		1610	nm	
Receiver Sensitivity	Sen.			-14	dBm	3
Average Receive Power		-20		-5	dBm	
Input Saturation Power (overload)	$P_{sat}$	-8			dBm	
LOS Assert	$LOS_A$	-30			dBm	
LOS De-assert	$LOS_D$			-21	dBm	
LOS Hysteresis	$LOS_H$	0.5			dB	
Damage Threshold	$TH_d$	3			dBm	
Center Wavelength	$\lambda_c$	1270		1610	nm	

**Notes:**

1.  $\lambda_c$  refer to wavelength selection, and corresponds to approximately 0.8 nm.
2. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
3. Measured with Light source 1528.77~1563.86nm, ER=6dB; BER =<math>10^{-12}</math> @ PRBS=2<sup>31</sup>-1 NRZ.
4. Internally AC-coupled.

## Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Power Consumption	p			1.75	W	
Supply Current	I <sub>cc</sub>			520	mA	
<b>Transmitter</b>						
Single-ended Input Voltage Tolerance	V <sub>cc</sub>	-0.3		4.0	V	
Common mode voltage tolerance		15			mV	
Differential Input Voltage Swing	V <sub>in,pp</sub>	180		700	mVpp	
Differential Input Impedance	Z <sub>in</sub>	90	100	110	Ohm	1
Transmit Disable Assert Time				10	us	
Transmit Disable Voltage	V <sub>dis</sub>	V <sub>cc</sub> -1.3		V <sub>cc</sub>	V	
Transmit Enable Voltage	V <sub>en</sub>	V <sub>ee</sub>		V <sub>ee</sub> +0.8	V	2
<b>Receiver</b>						
Single-ended Input Voltage Tolerance	V <sub>cc</sub>	-0.3		4.0	V	
Differential Output Voltage Swing	V <sub>out,pp</sub>	300		900	mVpp	
Differential Output Impedance	Z <sub>out</sub>	90	100	110	Ohm	3
Data output rise/fall time	Tr/Tf	9.5			ps	4
LOS Assert Voltage	V <sub>losH</sub>	V <sub>cc</sub> -1.3		V <sub>cc</sub>	V	5
LOS De-assert Voltage	V <sub>losL</sub>	V <sub>ee</sub>		V <sub>ee</sub> +0.8	V	5

**Notes:**

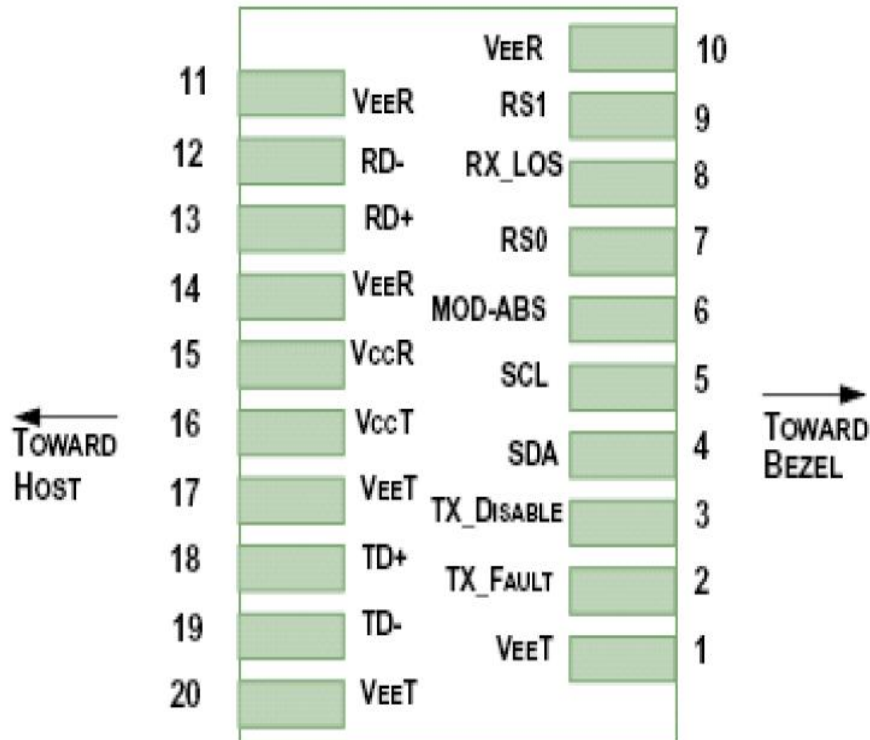
1. Connected directly to TX data input pins. AC coupled thereafter.
2. Or open circuit.
3. Input 100 ohms differential termination.
4. These are unfiltered 20-80% values.
5. Loss of Signal is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected

## Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff

Parameter	Symbol	Min	Max	Unit	Notes
Temperature monitor absolute error	DMI_T <sub>emp</sub>	-3	3	°C	Over operating temp
Supply voltage monitor absolute error	DMI_V <sub>CC</sub>	-0.15	0.15	V	Full operating range
RX power monitor absolute error	DMI_R <sub>x</sub>	-3	3	dB	
Bias current monitor	DMI_bias	-10%	10%	mA	
TX power monitor absolute error	DMI_T <sub>x</sub>	-3	3	dB	

## Pin Descriptions



**Figure1. Diagram of host board connector block pin numbers and names**

Pin	Signal Name	Description	Notes
1	VeeT	Transmitter Ground	1
2	TX_Fault	Transmitter Fault	
3	TX_Disable	Transmitter Disable; Turns off transmitter laser output	
4	SDA	Two wire serial interface Data Line (LVCMOS-I/O) (MOD-DEF2)	2
5	SCL	Two wire serial interface Clock Line (LVCMOS-I/O) (MOD-DEF1)	2
6	MOD_ABS	Module Definition, Grounded in the module	
7	RS0	Rx Rate Select:	
8	RX_LOS	Receiver Loss of Signal Indication Active LOW	
9	RS1	Transmitter Rate Select (not used)	
10	VeeR	Receiver Ground	1
11	VeeR	Receiver Ground	1
12	RD-	Receiver Inverted Data Output	
13	RD+	Receiver Data Output	
14	VeeR	Receiver Ground	1
15	VccR	Receiver Power - +3.3V	
16	VccT	Transmitter Power - +3.3 V	
17	VeeT	Transmitter Ground	1
18	TD+	Transmitter Non-Inverted Data Input	
19	TD-	Transmitter Inverted Data Input	
20	VeeT	Transmitter Ground	1

**Notes:**

1. Module ground pins GND are isolated from the module case.
2. Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.47V on the host board.



## Mechanical Dimensions

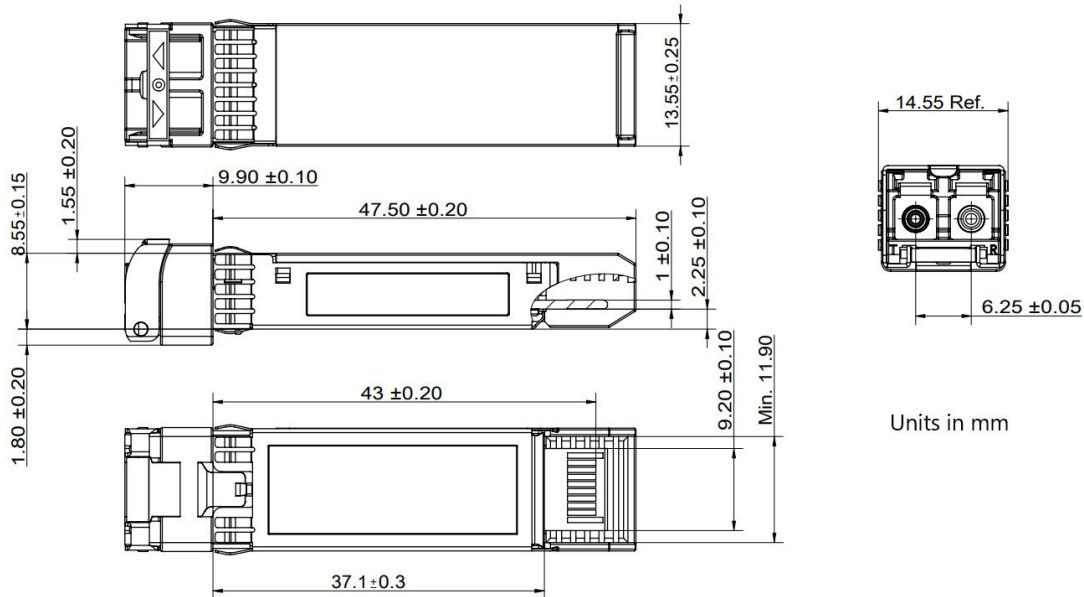


Figure2. Mechanical Outline

## Ordering Information

Part Number	Product Description
SFP28-DW25Gxx-40C	25G DWDM SFP28,100Ghz ITU channel xx (1528.77~1563.86nm) , LC, 40km, 0°C~+70°C, with DDM
SFP28-DW25Gxx-40E	25G DWDM SFP28,100Ghz ITU channel xx (1528.77~1563.86nm) , LC, 40km,-10°C~ +80°C, with DDM
SFP28-DW25Gxx-40I	25G DWDM SFP28,100Ghz ITU channel xx (1528.77~1563.86nm) , LC, 40km, -40°C~ +85°C, with DDM

<b>λC Wavelength Guide</b>					
<b>ITU Channel</b>	<b>Frequency (THz)</b>	<b>Wavelength</b>	<b>ITU Channel</b>	<b>Frequency (THz)</b>	<b>Wavelength</b>
<b>Product Code</b>			<b>Product Code</b>		
C17	191.70	1563.86	C39	193.90	1546.12
C18	191.80	1563.05	C40	194.00	1545.32
C19	191.90	1562.23	C41	194.10	1544.53
C20	192.00	1561.42	C42	194.20	1543.73
C21	192.10	1560.61	C43	194.30	1542.94
C22	192.20	1559.79	C44	194.40	1542.14
C23	192.30	1558.98	C45	194.50	1541.35
C24	192.40	1558.17	C46	194.60	1540.56
C25	192.50	1557.36	C47	194.70	1539.77
C26	192.60	1556.55	C48	194.80	1538.98
C27	192.70	1555.75	C49	194.90	1538.19
C28	192.80	1554.94	C50	195.00	1537.40
C29	192.90	1554.13	C51	195.10	1536.61
C30	193.00	1553.33	C52	195.20	1535.82
C31	193.10	1552.52	C53	195.30	1535.04
C32	193.20	1551.72	C54	195.40	1534.25
C33	193.30	1550.92	C55	195.50	1533.47
C34	193.40	1550.12	C56	195.60	1532.68
C35	193.50	1549.32	C57	195.70	1531.90
C36	193.60	1548.51	C58	195.80	1531.12
C37	193.70	1547.72	C59	195.90	1530.33
C38	193.80	1546.92	C60	196.00	1529.55
Non-ITU	Peak wavelength between 1528.77nm-1563.86		C61	196.10	1528.77