

VC-SFP28-BD32-40

25Gb/s SFP28 BIDI 40km Optical Transceiver Module

Features

- ✓ Up to 25.78Gb/s data rate
- ✓ 1330nm DFB laser and APD receiver for VC-SFP28-BD32-40x
- ✓ 2-wire interface with integrated Digital Diagnostic monitoring
- ✓ Up to 40km transmission on SMF
- ✓ BIDI LC optical connector
- ✓ Single +3.3V power supply
- ✓ RoHS-6 compliant and lead-free
- ✓ Compliant with SFF+MSA and SFF-8472
- ✓ Maximum power consumption 1.5W
- ✓ Metal enclosure, for lower EMI
- ✓ Meet ESD requirements, resist 8KV direct contact voltage
- ✓ Operating case temperature

Commercial: 0 ~ +70oC

Extended: -10 ~ +80oC

Industrial: -40 ~ +85oC



Applications

- ✓ High-speed storage area networks
- ✓ Computer cluster cross-connect
- ✓ Custom high-speed data pipes
- ✓ Inter Rack Connection

General Description

AscentOptics' VC-SFP28-BD32-40 SFP28 transceiver is designed for use in 25-Gigabit Ethernet links up to 40km over single mode fiber. The module consists of CWDM DFB Laser, APD and Preamplifier in a high-integrated optical sub-assembly. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

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

Table 1- 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	Notes
Storage Temperature	TS	-40	85	oC	
Power Supply Voltage	VCC	-0.5	3.6	V	
Relative Humidity (non-condensation)	RH	5	95	%	
Damage Threshold	THd	-3		dBm	

Recommended Operating Conditions

Table 2- Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	TOP	0		70	oC	commercial
		-10		80		Extended
		-40		85		Industrial
Power Supply Voltage	VCC	3.135	3.3	3.465	V	
Data Rate			25.78		Gb/s	
Control Input Voltage High		2		Vcc	V	
Control Input Voltage Low		0		0.8	V	
Link Distance (SMF)	D			40	km	9/125um

Electrical Characteristics

Table 3- Electrical Characteristics

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

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

Optical Characteristics

Table 4- Optical Characteristics

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Transmitter						
Center Wavelength	λ_C	1320	1330	1340	nm	FL8643 x
Optical Spectral Width	$\Delta\lambda$			1	nm	
Average Optical Power	PAVG	-3		6	dBm	1
Side Mode Suppression Ratio	SMSR	20			dB	
Optical Extinction Ratio	ER	3.5			dB	
Transmitter OFF Output Power	Poff			-30	dBm	
Transmitter and Dispersion Penalty	TDP			2.7	dB	
Optical Return Loss Tolerance	ORLT			20	dB	
Transmitter Eye Mask	Compliant with IEEE802.3ae					
Receiver						
Center Wavelength	λ_C	1260	1270	1280	nm	FL6843 x
Receiver Sensitivity (OMA)	Sen.			-14	dBm	2
Stressed Receiver Sensitivity (OMA)				-11.5	dBm	2
Average Receive Power		-18		-4	dBm	
Input Saturation Power (overload)	Psat	-8			dBm	
LOS Assert	LOSA	-30			dBm	
LOS De-assert	LOSD			-21	dBm	
Damage Threshold	THd	-3			dBm	
LOS Hysteresis	LOSH	0.5			dB	

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

Notes:

1. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
2. Measured with Light source 1310nm, ER=3.5dB; BER = $<10^{-12}$ @ PRBS=2³¹-1 NRZ.

Digital Diagnostic Functions

Table 5- 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_Temp	-3	3	degC	Over operating temp
Supply voltage monitor absolute error	DMI_VCC	-0.15	0.15	V	Full operating range
RX power monitor absolute error	DMI_RX	-3	3	dB	
Bias current monitor	DMI_bias	-10%	10%	mA	
TX power monitor absolute error	DMI_TX	-3	3	dB	

Pin Assignment

Pin Diagram

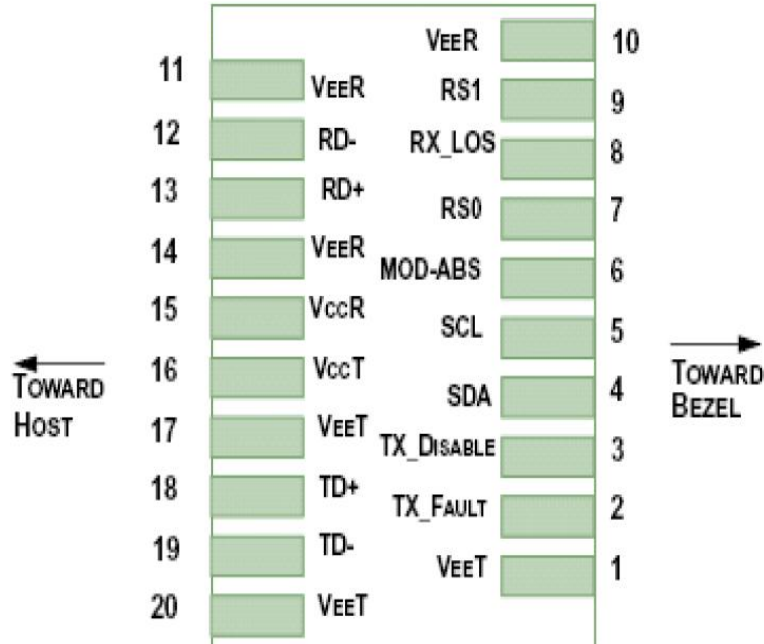


Figure1. Diagram of host board connector block pin numbers and names

Pin Descriptions

Table 6- Pin Descriptions

PIN	Name	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

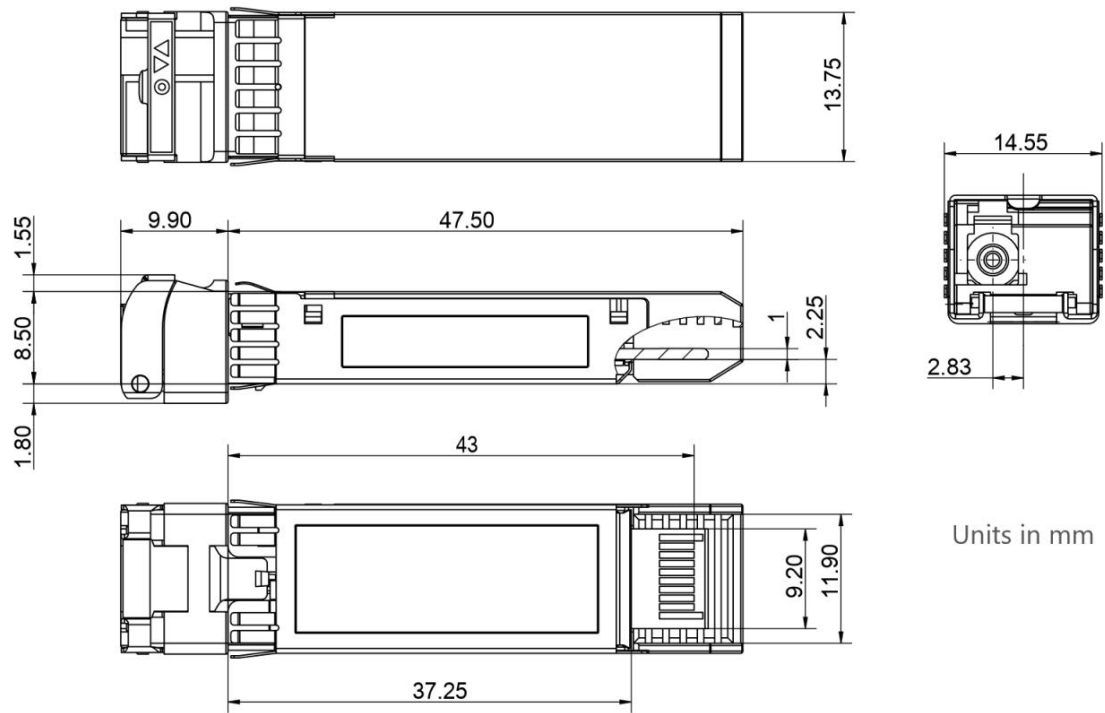


Figure2. Mechanical Outline

Ordering information

Table 7- Ordering information

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Transmission Distance(km)	Temperature (oC) (Operating Case)
VC-SFP28-BD32-40C	25.78	1330Tx/1270Rx	40km SMF	0~70 commercial
VC-SFP28-BD32-40E	25.78	1330Tx/1270Rx	40km SMF	-10~80 Extended
VC-SFP28-BD32-40I	25.78	1330Tx/1270Rx	40km SMF	-40~85 Industrial