

25Gb/s SFP28 BIDI 40km Transceiver

Features

Up to 25.78Gb/s data rate

1270nm DFB laser and APD receiver for HXSX-FL6843x

1330nm DFB laser and APD receiver for HXSX-FL8643x

Support Digital Monitoring interface

Up to 40km transmission on SMF

BIDI LC optical connector

Single +3.3V power supply

RoHS-10 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 ~ +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

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	T _s	-40	85	°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	Notes
Operating Case Temperature	T _{OP}	0		70	°C	commercial
		-10		80		Extended
		-40		85		Industrial
Power Supply Voltage	V _{CC}	3.135	3.3	3.465	V	
Data Rate			25.78		Gb/s	
Control Input Voltage High		2		V _{CC}	V	
Control Input Voltage Low		0		0.8	V	
Link Distance (SMF)	D			40	km	9/125um

General Description

HC-FL6843x/HC-FL8643x 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 V_{CC}_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.

Pin Assignment and Pin Description

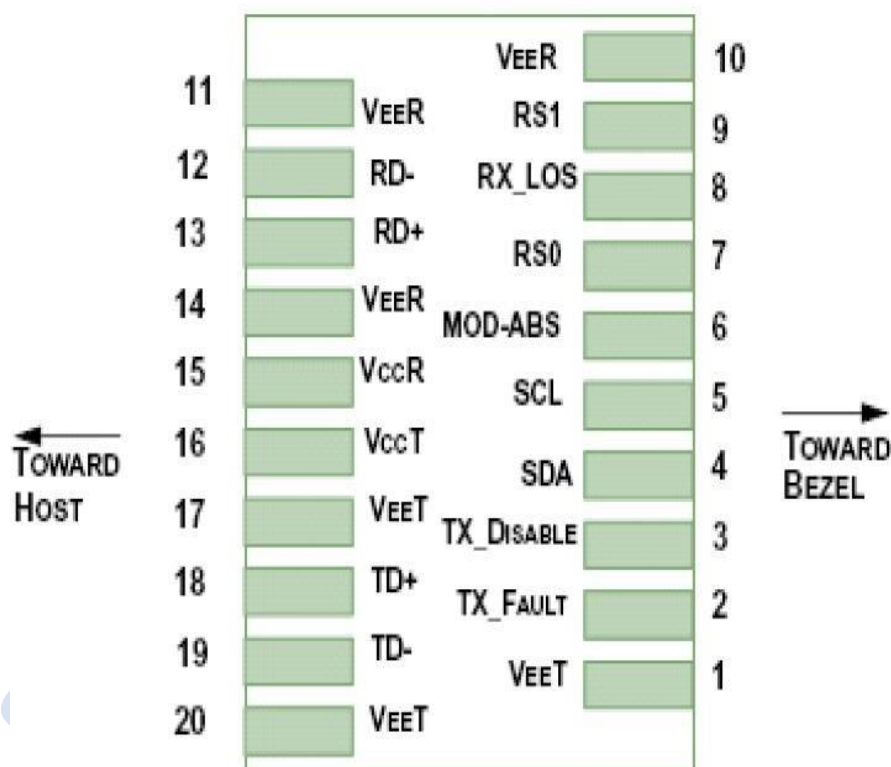


Figure1. Diagram of host board connector block pin numbers and names

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.

Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.47V on the host board

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	Icc			520	mA	
Transmitter						
Single-ended Input Voltage	Vcc	-0.3		4.0	V	
Tolerance						
Common mode voltage tolerance		15			mV	
Differential Input Voltage Swing	Vin,pp	180		700	mVpp	
Differential Input Impedance	Zin	90	100	110	Ohm	1
Transmit Disable Assert Time				10	us	
Transmit Disable Voltage	Vdis	Vcc-1.3		Vcc	V	
Transmit Enable Voltage	Ven	Vee		Vee +0.8	V	2
Receiver						
Single-ended Input Voltage Tolerance	Vcc	-0.3		4.0	V	
Differential Output Voltage Swing	Vout,pp	300		900	mVpp	
Differential Output Impedance	Zout	90	100	110	Ohm	3
Data output rise/fall time	Tr/Tf	9.5			ps	4
LOS Assert Voltage	VlosH	Vcc-1.3		Vcc	V	5
LOS De-assert Voltage	VlosL	Vee		Vee +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.

Loss of Signal is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

Optical Characteristics

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Transmitter						
Center Wavelength	λ_c	1260	1270	1280	nm	FL6843x
		1320	1330	1340	nm	FL8643x
Optical Spectral Width	$\Delta\lambda$			1	nm	
Average Optical Power	P_{AVG}	-3		6	dBm	1
Side Mode Suppression Ratio	SMSR	20			dB	
Optical Extinction Ratio	ER	3.5			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					
Receiver						
Center Wavelength	λ_c	1320	1330	1340	nm	FL8643x
		1260	1270	1280	nm	FL6843x
Receiver Sensitivity (OMA)	Sen.			-14	dBm	2
Stressed Receiver Sensitivity (OMA)				-11.5	dBm	2
Average Receive Power		-20		-4	dBm	
Input Saturation Power (overload)	P_{sat}	-8			dBm	
LOS Assert	LOSA	-30			dBm	
LOS De-assert	LOSD			-21	dBm	

Damage Threshold	TH _d	-3			dBm	
LOS Hysteresis	LOSH	0.5			dB	

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

Notes:

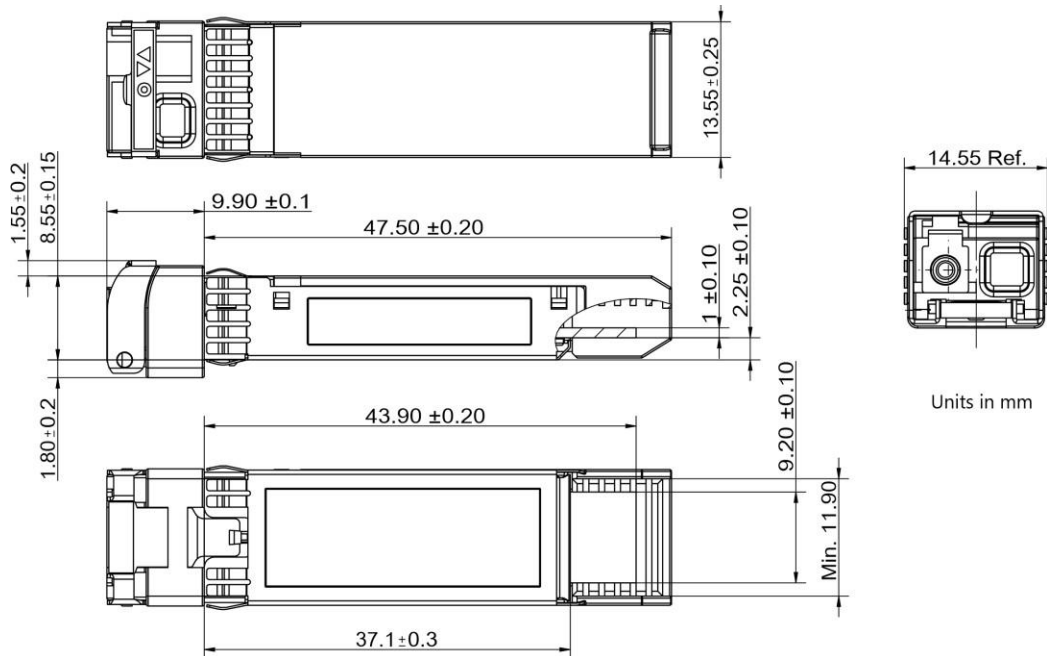
1. Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
2. Measured with Light source 1270@1330nm, ER=3.5dB; BER≤1E-12 @10.3125Gbps, PRBS=2³¹-1NRZ.

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	°C	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	

Mechanical Dimensions



Ordering Information

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Transmission Distance(km)	Temperature (°C) (Operating Case)
HC-FL68/8643C	25.78	1270Tx/1330Rx	40	0~70 commercial
HC-FL68/8643E	25.78	1330Tx/1270Rx	40	-10~80 Extended
HC-FL68/8643I	25.78		40	-40~85 Industrial