Whandar Shenzhen Handar Optical Technology Co.,Ltd

10G SFP+ Bi-Directional Transceiver 40Km

Features

- ✓ Optical interface compliant to IEEE 802.3ae 10GBASE-ER
- ✓ Electrical interface compliant to SFF-8431
- ✓ Hot Pluggable
- ✓ Maximum link length of 40Km on SMF
- ✓ Low power consumption
- ✓ All-metal housing for superior EMI performance
- ✓ Advanced firmware allow customer system encryption
- ✓ information to be stored in transceiver
- ✓ Cost effective SFP+ solution, enables higher port densities and greater bandwidth
- ✓ RoHS6 compliant (lead free)
- ✓ Operating case temperature:

  Commercial : 0 to +70℃

  Extended: -20 to +80℃

  Industrial : -40 to +85°C

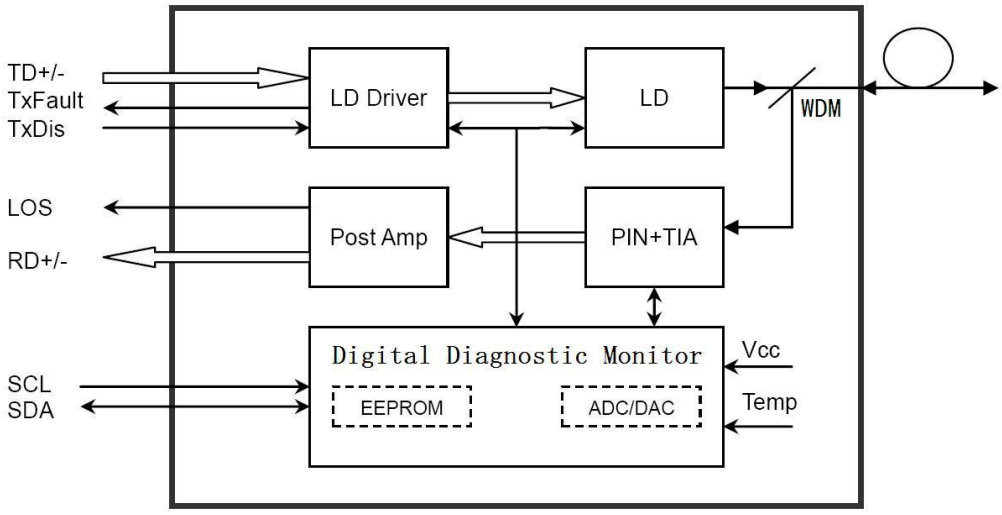
Applications

- ✓ 10GBASE-LR/LW 10G Ethernet
- ✓ 1200-SM-LL-L 10G Fiber Channel
- ✓ 10G SONET
- ✓ Other optical links

Description

HD-SFP+/10G-BIDI-40U& HD-SFP+/10G-BIDI-40D 10Gbps SFP+ Bi-Directional Transceiver are designed for use in 10-Gigabit Ethernet links up to 40km over Single Mode fiber.

Module Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Power Supply Voltage	V_{CC}	0		3.6	V
Storage Temperature	Ts	-40		+85	°C
Operating Case Temperature	Tc	--40		+85	°C
Relative Humidity	RH	0		85	%
RX Input Average Power	Pmax	-		0	dBm

Recommended Operating Environment:

Parameter		Symbol	Min.	Typical	Max.	Unit
Power Supply Voltage		V_{CC}	3.135	3.3	3.465	V
Power Supply Current		Icc			300	mA
Operating Case Temperature	Commercial	T_C	0		70	°C
	Extended		-20		80	°C
	Industrial		-40		+85	
Bit Rate		BR	9.953	10GBASE-LW		Gb/s
			10.3125	10GBASE-LR		
			8.5	800-SM-LC-L		
			10.51875	1200-SM-LL-L		

Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Input differential impedance	R_{in}	90	100	110		
Single ended data input swing	$V_{in\ PP}$	180		700	mVp-p	
Transmit Disable Voltage	V_D	Vcc – 1.3		Vcc	V	
Transmit Enable Voltage	V_{EN}	Vee		Vee+ 0.8	V	
Receiver Section:						
Single ended data output swing	Vout,pp	300		850	mv	2,6
Data output rise time	t_r				ps	3
Data output fall time	t_f				ps	3
LOS Fault	$V_{losfault}$	Vcc – 0.5		V_{CC_host}	V	4
LOS Normal	$V_{los\ norm}$	V_{ee}		V_{ee}+0.5	V	4

Notes:

1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2. Into 100Ω differential termination.
3. 20 – 80%. Measured with Module Compliance Test Board and OMA test pattern. Use of four 1's and four 0's

sequence in the PRBS 9 is an acceptable alternative. SFF-8431 Rev 4.1.
4. LOS is an open collector output. Should be pulled up with 4.7kΩ – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1.
5. See Section 2.8.3 of SFF-8431 Rev 4.1

Optical Parameters

HD-SFP+/10G-BIDI-40U:(1270nm TX/1330nm RX)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Center Wavelength	λt	1260	1270	1280	nm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Average Optical Power	Pavg	0	0	+5	dBm	
Laser Off Power	Poff	-	-	-30	dBm	
Extinction Ratio	ER	3.5	-	-	dB	
Transmitter Dispersion Penalty	TDP	-	-	3.2	dB	
Relative Intensity Noise	Rin	-	-	-128	dB/Hz	12dB reflection
Optical Return Loss Tolerance		-	-	12	dB	
Receiver Section:						
Center Wavelength	λr	1320		1340	nm	
Receiver Sensitivity in Average Power	Sen			-15.0	dBm	1
Vertical eye closure penalty		2.2	-	-	dB	3
Los Assert	LosA	-30	-	-	dBm	
Los Dessert	LosD	-	-	-16.0	dBm	
Los Hysteresis	LosH	0.5	-	-	dB	
Overload	Pin	-	-	0.5	dBm	1
Receiver Reflectance		-	-	-12	dB	
Stressed eye jitter		0.3	-	-	Ulp-p	2
Receive electrical 3dB upper cutoff frequency		-	-	12.3	GHz	
Receiver power (damage)		-	-	1.5	dBm	

Optical Parameters

HD-SFP+/10G-BIDI-40D:(1330 TX/1270 nm RX)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Center Wavelength	λt	1320	1330	1340	nm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Average Optical Power	Pavg	0	0	+5	dBm	

Laser Off Power	Poff	-	-	-30	dBm	
Extinction Ratio	ER	3.5	-	-	dB	
Transmitter Dispersion Penalty	TDP	-	-	3.2	dB	
Relative Intensity Noise	Rin	-	-	-128	dB/Hz	12dB reflection
Optical Return Loss Tolerance		-	-	12	dB	
Receiver Section:						
Center Wavelength	λr	1260		1280	nm	
Receiver Sensitivity in Average Power	Sen			-15.0	dBm	1
Vertical eye closure penalty		2.2	-	-	dB	3
Los Assert	LosA	-30	-	-	dBm	
Los Dessert	LosD	-	-	-12	dBm	
Los Hysteresis	LosH	0.5	-	-	dB	
Overload	Pin	-	-	0.5	dBm	1
Receiver Reflectance		-	-	-12	dB	
Stressed eye jitter		0.3	-	-	UIp-p	2
Receive electrical 3dB upper cutoff frequency		-	-	12.3	GHz	
Receiver power (damage)		-	-	1.5	dBm	

Notes:

1. Average optical power shall be measured using the methods specified in TIA/EIA-455-95.
2. Receiver sensitivity is informative. Stressed receiver sensitivity shall be measured with conformance test signal for BER =1x 10^{-12} .
3. Vertical eye closure penalty and stressed eye jitter are the test conditions for measuring stressed receiver sensitivity. They are not the required characteristic of the receiver.
4. Power budget is defined as the different between the Rx sensitivity and the Tx output power of the interface.
5. Path penalty is intended as the power penalty of the interface between back-to-back and the maximum applied dispersion.

Timing Characteristics:

Parameter	Symbol	Min.	Typical	Max.	Unit
TX_Disable Assert Time	t_off			10	us
TX_Disable Negate Time	t_on			1	ms
Time to Initialize Include Reset of TX_FAULT	t_int			300	ms
TX_FAULT from Fault to Assertion	t_fault			100	us
TX_Disable Time to Start Reset	t_reset	10			us
Receiver Loss of Signal Assert Time	T_A,RX_LOS			100	us
Receiver Loss of Signal Deassert Time	T_d,RX_LOS			100	us

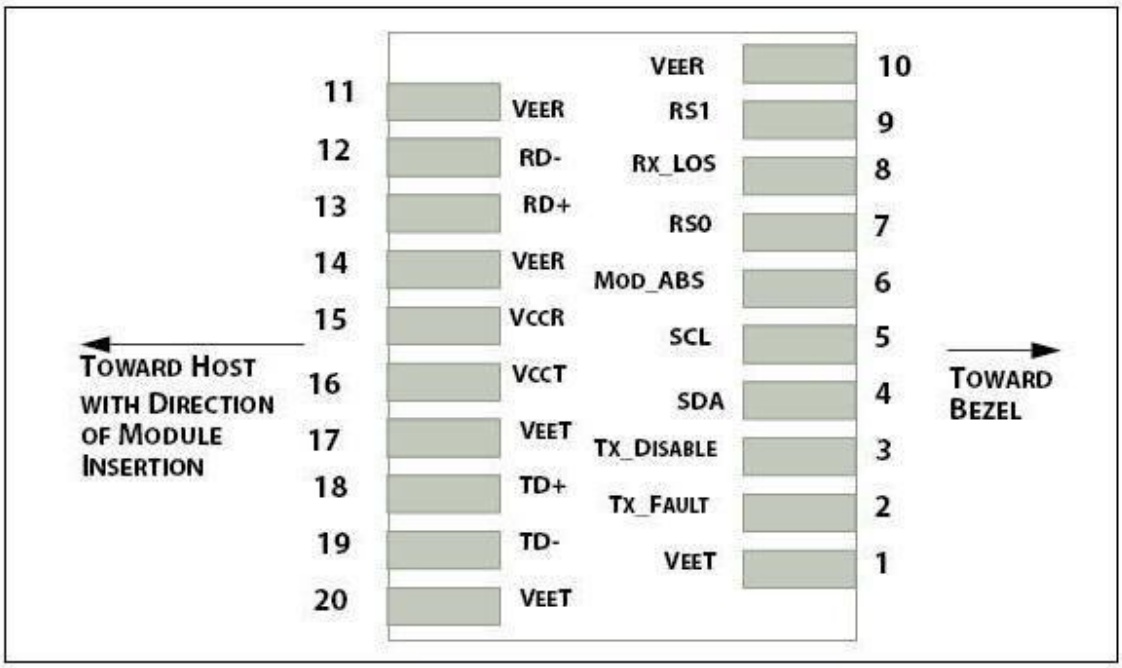
Rate-Select Change Time	t_ratesel			10	us
Serial ID Clock Time	t_serial-clock			100	kHz

Digital Diagnostic Monitor Characteristics

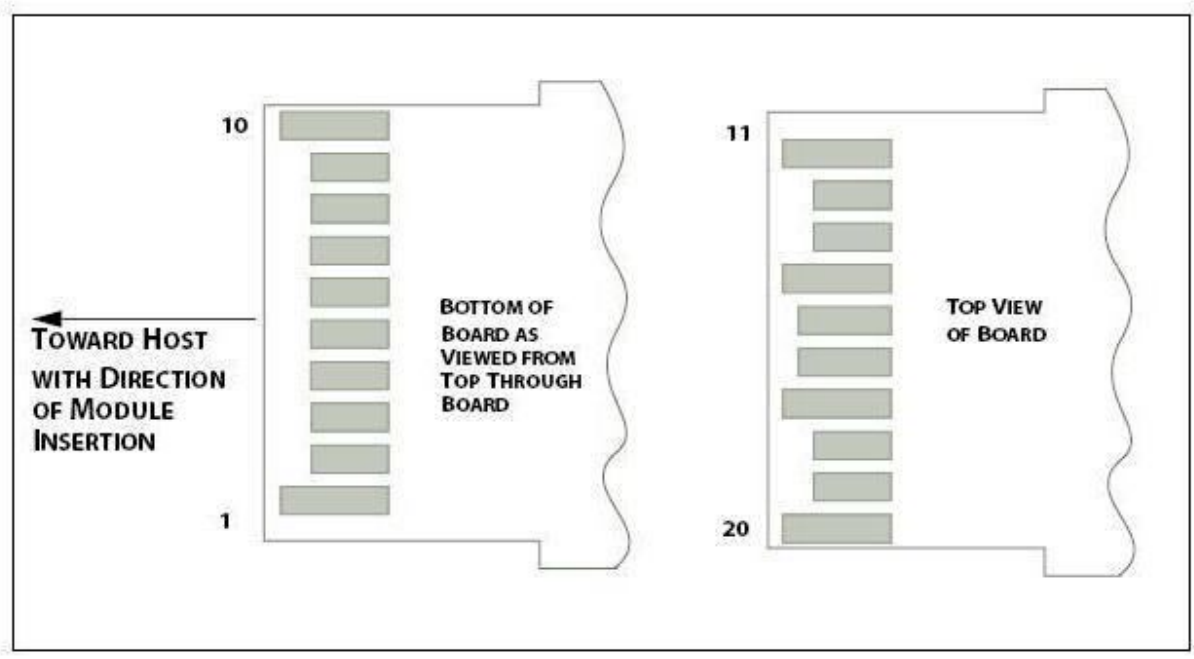
The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales stuff.

Parameter	Symbol	Min.	Max.	Unit
Temperature monitor absolute error	DMI_Temp	-3	3	degC
Laser power monitor absolute error	DMI_TX	-3	3	dB
RX power monitor absolute error	DMI_RX	-3	3	dB
Supply voltage monitor absolute error	DMI_VCC	-0.08	0.08	V
Bias current monitor absolute error	DMI_Ibias	-10%	10%	mA

Pin Assignment:



Host PCB SFP+ pad assignment top view



SFP+ module contact assignment

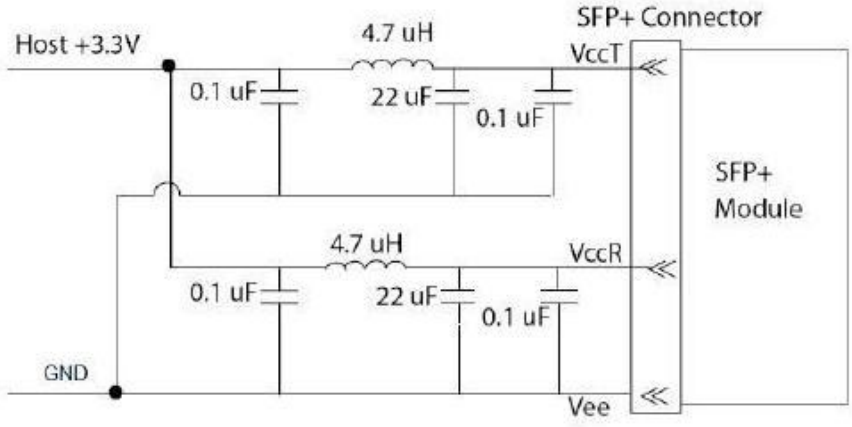
Pin Descriptions

PIN	Logic	Symbol	Name / Description	Note
1		VeeT	Module Transmitter Ground	1
2	LVTTL-O	TX_Fault	Module Transmitter Fault	
3	LVTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	
4	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
5	LVTTL-I	SCL	2-Wire Serial Interface Clock	2
6		MOD_DEF0	Module Definition, Grounded in the module	
7	LVTTL-I	RS0	Receiver Rate Select	
8	LVTTL-O	RX_LOS	Receiver Loss of Signal Indication Active LOW	
9	LVTTL-I	RS1	Transmitter Rate Select (not used)	
10		VeeR	Module Receiver Ground	1
11		VeeR	Module Receiver Ground	1
12	CML-O	RD-	Receiver Inverted Data Output	
13	CML-O	RD+	Receiver Data Output (not used)	
14		VeeR	Module Receiver Ground	1
15		VccR	Module Receiver 3.3 V Supply	
16		VccT	Module Receiver 3.3 V Supply	
17		VeeT	Module Transmitter Ground	1
18	CML-I	TD+	Transmitter Non-Inverted Data Input	
19	CML-I	TD-	Transmitter Inverted Data Input	
20		VeeT	Module Transmitter Ground	1

SFP+ Module PIN Definition

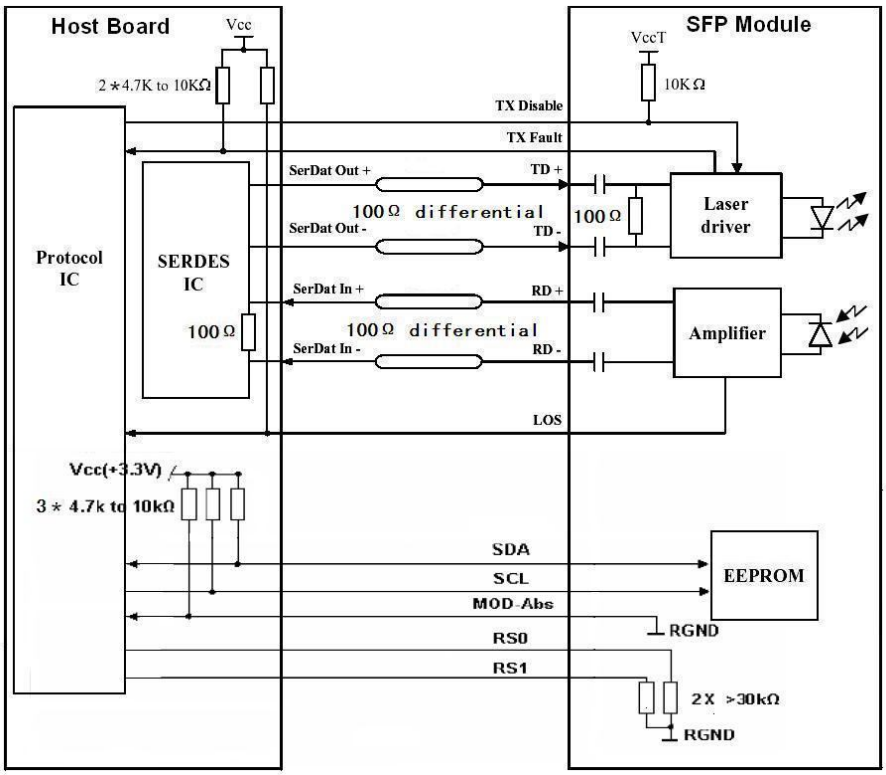
Notes:
1. Module ground pins GND are isolated from the module case.
2. Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.45V on the host board.

Recommended Power Interface Circuit

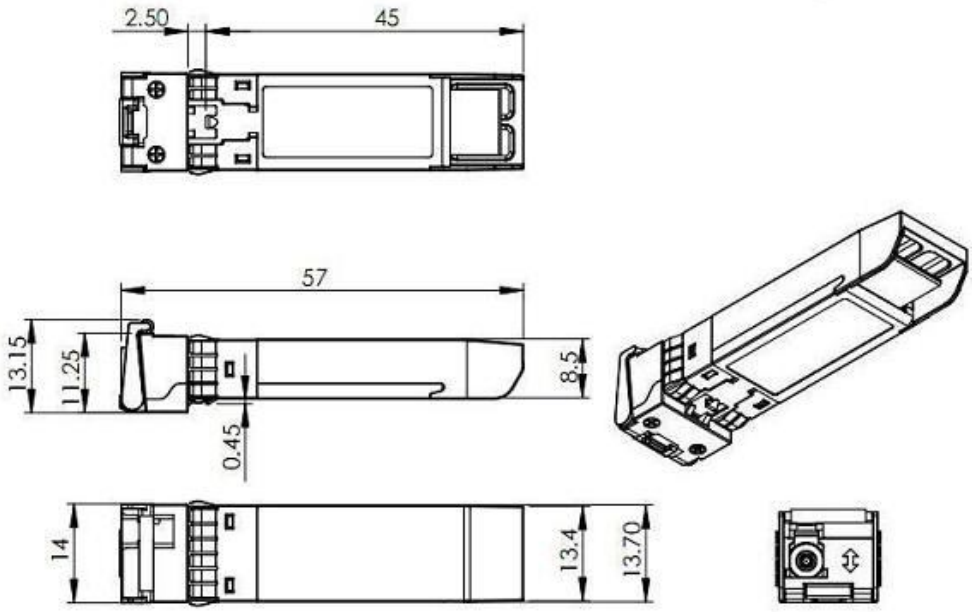


Host Board Power Supply Filters Circuit

Host - Transceiver Interface Block Diagram



Mechanical Dimensions



Ordering information

Part Number	Product Description
HD-SFP+/10G-BIDI-40U	1270nm TX/1330nm RX, 10Gbps, 40Km, 10Gbps SFP+ Bi-Directional Transceiver with Single LC Receptacle, 0ºC ~ +70ºC .
HD-SFP+/10G-BIDI-40D	1330nm TX/1270nm RX, 10Gbps, 40Km, 10Gbps SFP+ Bi-Directional Transceiver with Single LC Receptacle, 0ºC ~ +70ºC .
HD-SFP+/10G-BIDI-40UI	1270nm TX/1330nm RX, 10Gbps, 40Km, 10Gbps SFP+ Bi-Directional Transceiver with Single LC Receptacle, -40ºC ~ +85ºC .
HD-SFP+/10G-BIDI-40DI	1330nm TX/1330nm RX, 10Gbps, 40Km, 10Gbps SFP+ Bi-Directional Transceiver with Single LC Receptacle, -40ºC ~ +85ºC .

References

1. “Specifications for Enhanced Small Form Factor Pluggable Module SFP+”,SFF-8431, Rev 4.1, July 6, 2009.
2. “Improved Pluggable Formfactor”,SFF-8432, Rev 4.2,Apr 18,2007
3. IEEE802.3ae – 2002
4. “Diagnostic Monitoring Interface for Optical Transceivers” SFF-8472, Rev 10.2, June 1, 2007

Important Notice

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