



HydraX QSFP28 100G BIDI Transceiver 100GBASE-LR 10KM LC Simplex

Design Reference

802.3cu
SFF-8636
SFF-8679
2015/863/EU

Application

Business users/ 5G-MFH/
Data centers

Working Condition

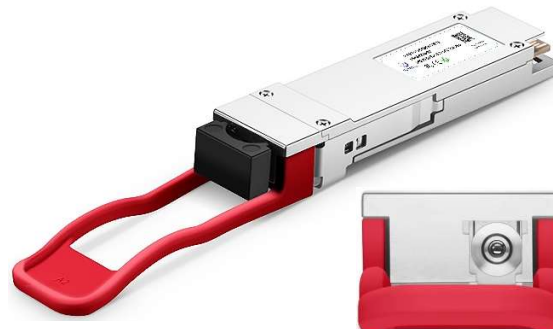
Operation Temperature
0°C ~ +70°C

Storage Temperature
-40°C ~ +85°C

Relative humidity
5% ~ 85%

Safety and EMI

Protection of over voltage



Lane signaling rate
103.125Gbps/106.25Gb/s with PAM4.

Up to 30km transmission on SMF

EML laser and APD receiver

4x25.78Gb/s with NRZ electrical
interface (CAUI-4)

High speed I/O electrical interface

Maximum power consumption 4.5 W

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T _s	-40	-	+85	°C	
Supply Voltage	V _{CC}	-0.5	-	+4.0	V	
Operating Relative Humidity	RH	-	-	+85	%	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T _c	0	-	+70	°C	
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V	
Power Supply Current	I _{CC}	-	-	1.3	A	
Maximum Power Dissipation	P _D	-	-	4.5	W	
Data Rate(optical)	DRo	103.125	106.25	111.8	Gb/s	
Transmission Distance	TD	-	-	10	km	Over SMF



Optical and Characteristics

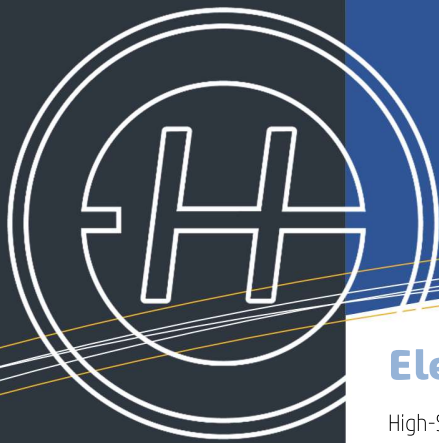
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Center Wavelength	CW	1264.5	1271	1277.5	nm	
		1324.5	1331	1337.5	nm	
Average Launch Power	P _{TX}	-1.4	-	4.5	dBm	1
Outer Optical Modulation Amplitude	OMA	0.7	-	4.7	dBm	1
Launch power in OMA minus TDECQ(min)	OMA TDECQ	-0.7	-		dBm	ER $\geq$ 4.5 dB
		-0.6	-			ER<4.5dB
Transmitter and dispersion eye closure for PAM4 (TDECQ) (max)	TDECQ	-	-	3.4	dBm	
Average Output Power (Laser Turn off)	P _{OUT-OFF}	-	-	-30	dBm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio	ER	3.5	-	-	dB	
RIN_OMA	RIN	-	-	-136	dB/Hz	
Transmitter reflectance	Tref	-	-	-26	dB	
Optical Return Loss Tolerance	ORLT	-	-	15.6	dB	
Receiver						
Center Wavelength	CW	1324.5	1331	1337.5	nm	
		1264.5	1271	1277.5	nm	
Damage threshold	P _{damage}	5.5	-	-	dBm	2
Average Rx Power	P _{Rx}	-7.7	-	4.5	dBm	3
Receive power _OMAouter	P _{OMA}	-	-	4.7	dBm	
Receiver sensitivity _OMAouter	SEN _{OMA}	-	-	-6.1	dBm	4
Reflectance	Ref	-	-	-26	dB	
Stressed receiver sensitivity _OMAouter	SRS	-	-	-4.1	dBm	5
Los Assert	LosA	-26	-	-12	dBm	
Los De-Assert	LosDA	-	-	-10	dBm	
Los Hysteresis	LosH	0.5	-	-	dB	

Notes:

1. The optical power is launched into SMF.
2. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level. The receiver does not have to operate correctly at this input power.
3. Average receive power, each lane (min) is informative and not the principal indicator of signal strength.
4. Measured with conformance test signal at TP3 using the test pattern PRBS31Q or scrambled idle for stressed receiver sensitivity for the BER= 2.4x10⁻⁴.
5. Measured with conformance test signal at TP3 (see3.11) for the BER specified in IEEE Std 802.3cd clause 140.1.1

Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70	±3	°C	Internal
Voltage	0 to V _{cc}	±3%	V	Internal
Tx Bias Current	0 to 100	±10%	mA	Internal
Tx Output Power	-1.4 to 4.5	±3	dB	Internal
Rx Input Power	-7.7 to 4.5	±3	dB	Internal



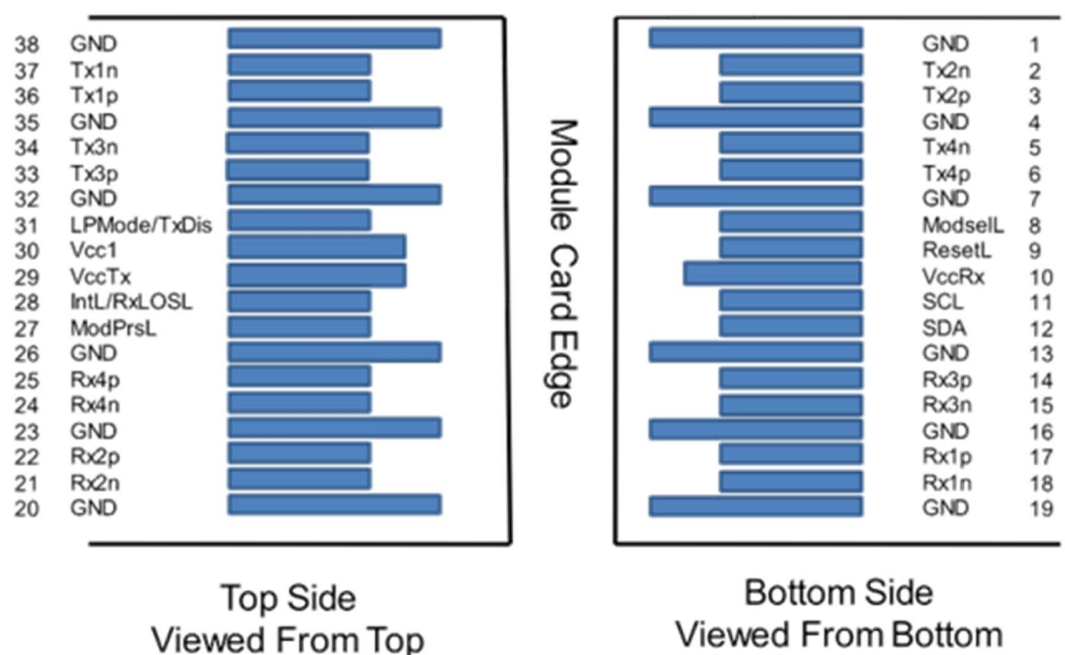
Electrical Characteristics

High-Speed Signal: Compliant to CAUI-4 (IEEE 802.3cu)

Low-Speed Signal: Compliant to SFF-8679.

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter (Module Input)						
Input Differential Impedance	R_{in}	-	100	-	Ohm	
Differential Data Input Amplitude	$V_{IN,P-P}$	80	-	900	mVpp	
Differential termination mismatch (max)	D-mismatch	-	-	10	%	
DC common-mode input voltage		-0.3	-	2.8	V	
Transition time(20%~80%)	$T_r T_f$	10	-	-	ps	
LPMODE, Reset and ModSelL / Tx dis	V_{IL}	-0.3	-	0.8	V	
LPMODE, Reset and ModSelL / Tx dis	V_{IH}	2.0	-	VCC+0.3	V	
Receiver (Module Output)						
Output Differential Impedance	R_{out}	-	100	-	Ohm	
Differential Data Output Amplitude	$V_{OUT,P-P}$	-	-	900	mVpp	
Differential termination mismatch (max)	D-mismatch	-	-	10	%	
Transition time, 20% to 80%	$T_r T_f$	12	-	-	ps	
ModPrsL and IntL/ Rx los	V_{OL}	0	-	0.4	V	
ModPrsL and IntL/ Rx los	V_{OH}	VCC-0.5	-	VCC+0.3	V	

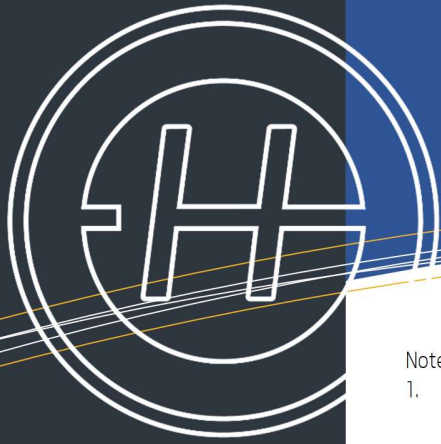
Pin Diagram





Pin Definitions

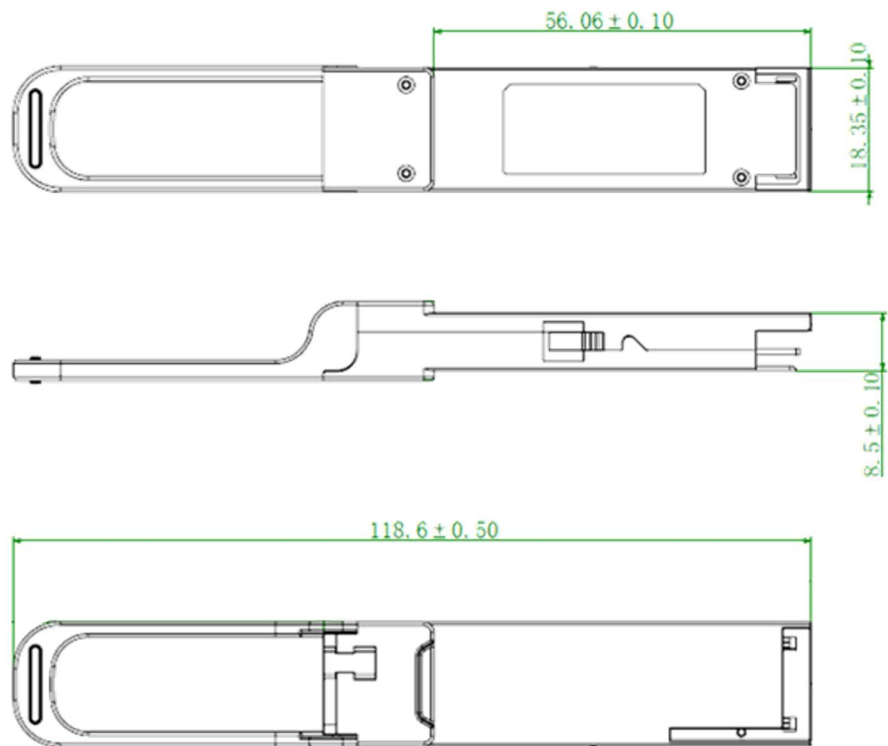
PIN	Logic	Symbol	Description	Plug Seq.	Notes
1		GND	Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	3	
4		GND	Ground	1	1
5		NC		3	
6		NC		3	
7		GND	Ground	1	1
8	LVTLL-I	ModSelL	Module Select	3	
9	LVTLL-I	ResetL	Module Reset	3	
10		VccRx	+ 3.3V Power Supply Receiver	2	2
11	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock	3	
12	LVC MOS-I/O	SDA	2-Wire Serial Interface Data	3	
13		GND	Ground	1	
14		NC		3	
15		NC		3	
16		GND	Ground	1	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	1
20		GND	Ground	1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	1
24		NC		3	
25		NC		3	
26		GND	Ground	1	1
27	LVTTL-O	ModPrsL	Module Present	3	
28	LVTTL-O	IntL	Interrupt	3	
29		VccTx	+3.3 V Power Supply transmitter	2	2
30		Vcc1	+3.3 V Power Supply	2	2
31	LVTTL-I	LPMODE	Low Power Mode	3	
32		GND	Ground	1	1
33		NC		3	
34		NC		3	
35		GND	Ground	1	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Output	3	
38		GND	Ground	1	1



Notes:

1. GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
2. V_{cc} Rx, V_{cc1} and V_{cc} Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in MSA. The connector pins are each rated for a maximum current of 1000 mA.

Dimension



Ordering Information

Part No.	Laser	Fiber Type	Distance	Optical Interface	DDMI
SFP-21100100AFH1SWR-12	Tx1271/Rx1331	SMF	10km	LC	Y
SFP-21100100AFH1SWR-13	Tx1331/Rx1271	SMF	10km	LC	Y