

## HX4S-CL4943C/HX4S-CL9443C 100G QSFP28 ER1-40BIDI

### Features

- Supports 100GBASE-ER1-40 BIDI
- Lane signaling rate 106.25Gb/s with PAM4
- Up to 40km transmission on SMF
- EML laser and APD receiver
- 4x25.78Gb/s with NRZ electrical interface (CAUI-4)
- High speed I/O electrical interface
- I2C interface with integrated Digital Diagnostic monitoring
- QSFP28 MSA package with simplex LC connector
- Single +3.3V power supply
- Maximum power consumption 4.5W
- Operating case temperature: 0 to +70°C
- Compliant to IEEE 802.3bm,100G Lambda MSA
- Compliant to SFF-8636&SFF-8679 standard
- Complies with EU Directive 2015/863/EU



### Application

- 100GBASE-ER1-40BIDI;

### I. Order Information

Table1-order information

Part No.	Data Rate	Laser	Fiber Type	Distance	Optical Interface	temp	DDMI	Latch Color
HX4S-CL4943C	106.25Gbps	Tx1304/ Rx1309	SMF	40km	LC	0~70C	Y	Blue
HX4S-CL9443C	106.25Gbps	Tx1309/ Rx1304	SMF	40km	LC	0~70C	Y	Green

## II. Absolute Maximum Ratings

Table 2-Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	Ts	-40	-	+85	°C	
Supply Voltage	Vcc	-0.5	-	+4.0	V	
Operating Relative Humidity	RH	-	-	+85	%	

## III. Recommended Operating Conditions

Table3-Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	Tc	0	-	+70	°C	
Power Supply Voltage	Vcc	3.13	3.3	3.47	V	
Power Supply Current	Icc	-	-	1.3	A	
Maximum Power Dissipation	Pd	-	-	4.5	W	
Data Rate(optical)	DRo	-	106.25	-	Gb/s	
Transmission Distance	TD	-	-	40	km	Over SMF

## IV. Optical Characteristics

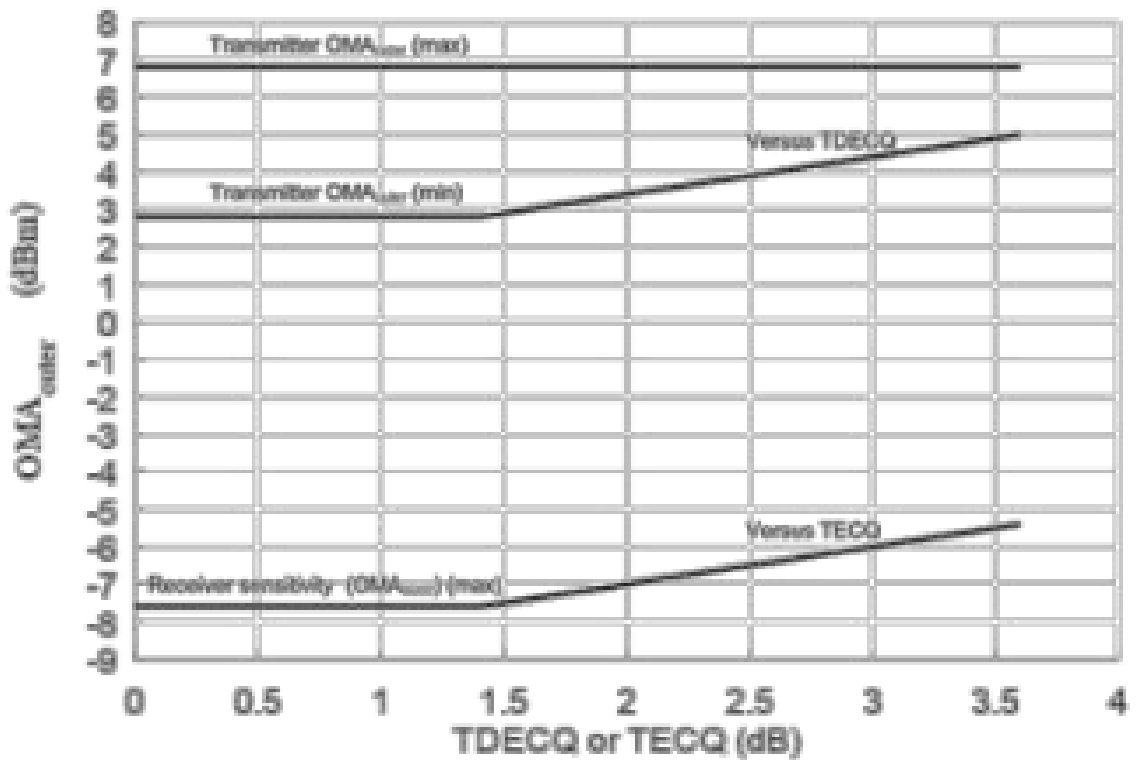
Table4-Optical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Center Wavelength	CW	1303.54	1309.14	1305.63	nm	
		1308.09	-	1310.19	nm	
Average Launch Power	PTX	1.7	-	7.1	dBm	1

Outer Optical Modulation Amplitude	OMA	4.7	-	7.9	dBm	TDECQ < 1.4
		3.3+TDECQ	-			TDECQ > 1.4
Transmitter and dispersion eye closure for PAM4 (TDECQ) (max)	TDECQ	-	-	3.9	dBm	
TDECQ-TECQ		-	-	2.7	dB	
Average Output Power (Laser Turn off)	P <sub>OUT-OFF</sub>	-	-	-15	dBm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio	ER	5	-	-	dB	
Receiver						
Center Wavelength	CW	1308.09	1309.14	1310.19	nm	
		1303.54	1304.58	1305.63	nm	
Damage threshold	P <sub>damage</sub>	-2.4	-	-	dBm	2
Average Rx Power	P <sub>RX</sub>	-16	-	-3.4	dBm	3
Receive power_OMAouter	P <sub>OMA</sub>	-	-	-2.6	dBm	
Receiver sensitivity_OMAouter	SEN_OMA	-	-	-13.8	dBm	TECQ≤1.4
		-	-	-15.2+TECQ	dBm	1.4≤TECQ≤3.9
Los Asser	LosA	-26	-	-	dBm	
Los De-Asser	LosDA	-	-	-17	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.



## V. Electrical Characteristics

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

Low-Speed Signal: Compliant to SFF-8679.

Table5-Electrical Characteristics

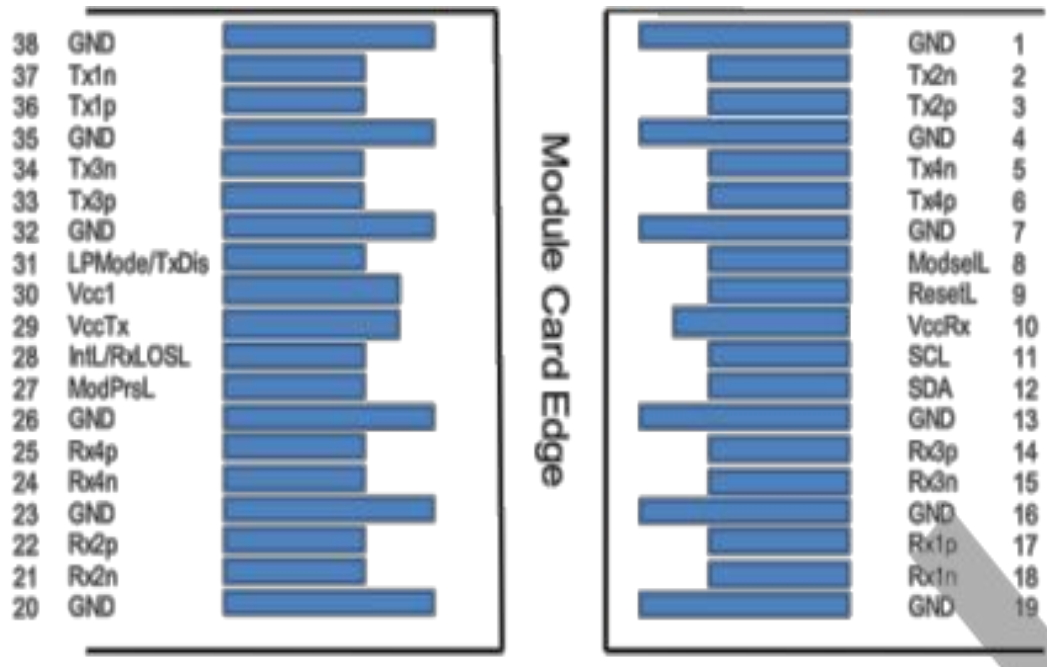
Transmitter (Module Input)						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Input Differential Impedance	R <sub>in</sub>	-	100	-	Ohm	
Differential Data Input Amplitude	V <sub>IN,P-P</sub>	80	-	900	mVpp	
Differential termination mismatch (max)	D-mismatch	-	-	10	%	
DC common-mode input voltage		-0.3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

## VI. Digital Diagnostics

Table6-Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70	±3	°C	Internal
Voltage	0 to Vcc	±3%	V	Internal
Tx Bias Current	0 to 120	±10%	mA	Internal
Tx Output Power	1.7 to 7.1	±3	dBm	Internal
Rx Power	-16 to -3.4	±3	dBm	Internal

## VII. Pin Definitions



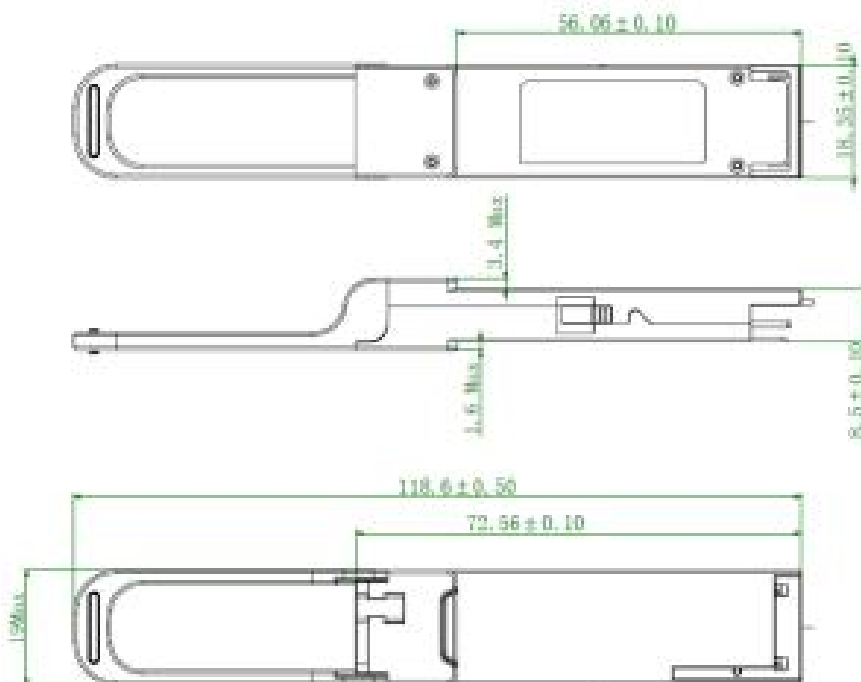
PIN	Logic	Symbol	Description	Plug Seq.	Notes
1		GND	Ground	1	1
2	CML-I	Tx2n		3	
3	CML-I	Tx2p	Transmitter Inverted Data Input	3	
4		GND	Transmitter Non-Inverted Data output	1	
5		Tx4n	Ground	3	1
6	CML-I	Tx4p	Transmitter Inverted Data Input	3	
7	CML-I	GND	Transmitter Non-Inverted Data output	1	

8		ModSelL	Ground	3	1
9	LVTTTL-I	ResetL	Module Reset	3	
10	LVTTTL-I	VccRx	Module Reset	2	
11		SCL	+ 3.3V Power Supply Receiver	3	2
12	LVC MOS-I/O	SDA	2-Wire Serial Interface Clock	3	
13	LVC MOS-I/O	GND	2-Wire Serial Interface Data	1	
14		Rx3p	Ground	3	
15	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
16	CML-O	GND	Receiver Inverted Data Output	1	
17		Rx1p	Ground	3	1
18	CML-O	Rx1n	Receiver Non-Inverted Data Output	3	
19	CML-O	GND	Receiver Inverted Data Output	1	
20		GND	Ground	1	1
21		Rx2n	Ground	3	1
22	CML-O	Rx2p	Receiver Inverted Data Output	3	
23	CML-O	GND	Receiver Non-Inverted Data Output	1	
24		Rx4n	Ground	3	1
25	CML-O	Rx4p	Receiver Inverted Data Output	3	
26	CML-O	GND	Receiver Non-Inverted Data Output	1	
27	LVTTTL-O	ModPrsL	Module Present	3	1
28	LVTTTL-O	IntL/Rx_LOS	Interrupt/Rx_LOS	3	
29		VccTx	+3.3 V Power Supply transmitter	2	2
30		Vcc1	+3.3 V Power Supply	2	2
31	LVTTTL-I	LPMODE/TxDIS	Low Power Mode/Tx_Disable	3	
32		GND	Ground	1	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3	
34	CML-I	Tx3n	Transmitter Inverted Data Output	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

Note 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.

Note 2: Vcc Rx, Vcc1 and Vcc 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.

## VIII. Mechanical Dimension



## IX. Warnings

**Handling Precautions:** This device is susceptible to damage as a result of electrostatic discharge (ESD). Astatic free environment is highly recommended. Follow guidelines according to proper ESD procedures.

**Laser Safety:** Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

## X. Contact

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