

CSMQ28HGL31A0

100Gbps QSFP28 Transceiver, Single Mode, 100 km Reach

Description

The CSMQ28HGL31A0 is designed for 100 km optical communication applications. This module contains a 4-lane optical transmitter, a 4-lane optical receiver, and a module management block with a 2-wire serial interface. The optical signals are multiplexed into a single-mode fiber through an industry-standard LC connector. A block diagram is shown in Figure 1.

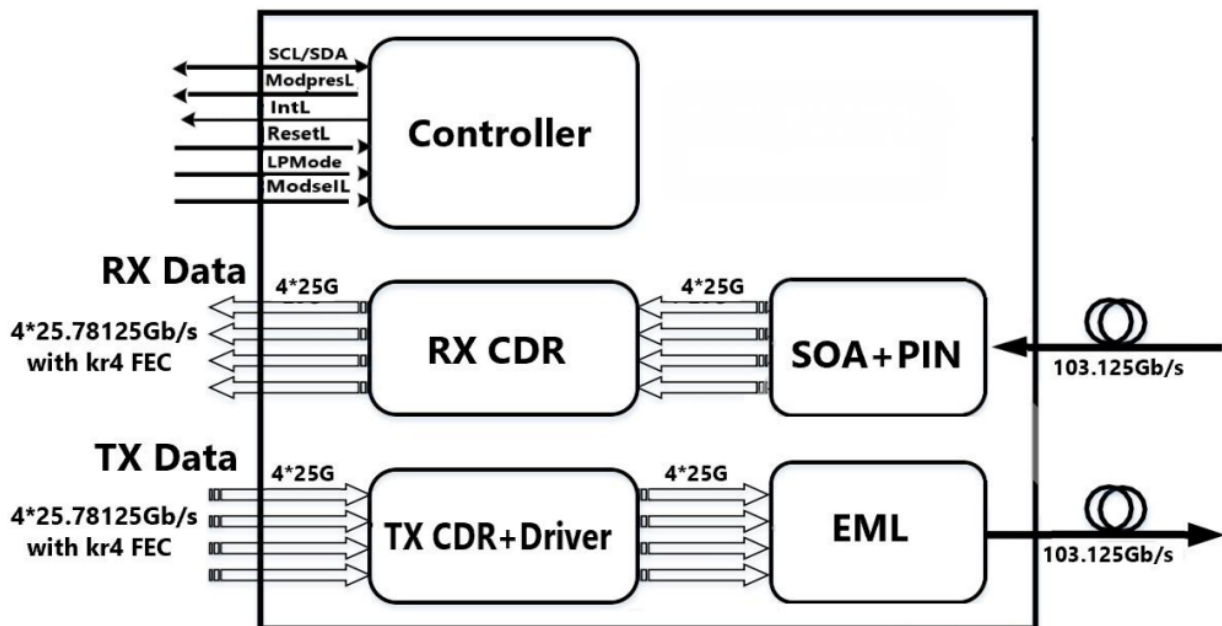
Features

- Supports line rates up to 103.125 Gb/s
- Lane bit rate: 25.78125 Gb/s for 100GE
- Up to 100 km transmission with KR4-FEC
- LAN-WDM EML laser and PIN receiver with SOA
- Support multi-Pin function with IntL/RxLOSL and LPMode/TxDIS
- High-speed I/O electrical interface (CAUI-4)
- I²C interface with integrated Digital diagnostic monitoring
- QSFP28 MSA package with a duplex LC connector
- Single +3.3 V power supply
- Maximum power consumption 6 W
- Complies with EU Directive 2015/863/EU
- Operating case temperature: 0 °C to +70 °C

Applications

- 100GBASE-ZR4 Ethernet
- 100G Datacom & Telecom Connections

Transceiver Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Temperature	TS	-40	+85	°C
Maximum Supply Voltage	VCC	-0.5	3.6	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}			1.82	A	
Maximum Power Dissipation	P _D			6	W	
Aggregate Bit Rate	BR _{AVE}		103.125		Gb/s	
Lane Bit Rate	BR _{LANE}		25.78125		Gb/s	
Transmission Distance	TD			100	km	
Coupled Fiber	Single-Mode Fiber					9/125 μm SMF

Electrical Specifications

X' High-Speed Signal: Compliant with CAUI-4 (IEEE 802.3bm)

Low-Speed Signal: Compliant with SFF-8679.

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter (Module Input)						
Data Rate, Each Lane			25.78125		Gbps	
Differential Voltage, pk-pk	V _{pp}			900	mV	1
Common-Mode Voltage	V _{cm}	-350		2850	mV	
Transition Time	Trise/Tfall	10			ps	2
Receiver (Module Output)						
Data Rate, Each Lane			25.78125		Gbps	
Common-Mode Noise, RMS	V _{rms}			17.5	mV	
Differential Output Voltage Swing	V _{out} , pp			900	mV	
Eye width	EW ₁₅	0.57			UI	
Eye height	EH ₁₅	228			mV	
Differential Termination Resistance Mismatch				10	%	1
Transition Time	Trise/Tfall	12			ps	

Notes:

1. At 1 MHz
2. 20%~80%.

Optical Specifications

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Signaling Speed per Lane			25.78125		Gbps	
Lane Wavelength	L0	1294.53	1295.56	1296.59	nm	
	L1	1299.02	1300.05	1301.09	nm	
	L2	1303.54	1304.58	1305.63	nm	
	L3	1308.09	1309.14	1310.19	nm	
Total Launch Power, 100GE	P _T	7		12.5	dBm	1
Average Launch Power per Lane	P _{avg}	2		7	dBm	1
OMA, Each Lane	P _{OMA}	3		8	dBm	1
Difference in Launch Power Between Any Two Lanes (Average and OMA)	P _{tx,diff}			3	dB	
Average Output Power (Laser Turn-off)	P _{off}			-30	dBm	
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio, 100GE	ER	8.2			dB	
RIN20OMA	RIN			-130	dB/Hz	

Optical Return Loss Tolerance	TOL			20	dB	
Transmitter Reflectance	R _T			-12	dB	
Optical Eye Mask	{0.25,0.4, 0.45, 0.25, 0.28, 0.4}				%	2
Receiver						
Signaling Rate, Each Lane			25.78125		Gbps	
Center Wavelength Lane 0	λ0	1294.53	1295.56	1296.59	nm	
Center Wavelength Lane 1	λ1	1299.02	1300.05	1301.09	nm	
Center Wavelength Lane 2	λ2	1303.54	1304.58	1305.63	nm	
Center Wavelength Lane 3	λ3	1308.09	1309.14	1310.19	nm	
Damage Threshold, Each Lane	Pdamage	5.5			dBm	
Average Receive Power, Each Lane		-30		-6	dBm	3
Receiver Sensitivity, Average, Each Lane	SEN			-29	dBm	3
LOS Assert	LosA	-40			dBm	
LOS De-Assert	LosDA			-30	dBm	
LOS Hysteresis	LosH	0.5		5	dB	

Notes:

1. The optical power is launched into SMF.
2. Measured with a PRBS 2³¹-1 test pattern @25.78125 Gb/s, Hit ratio≤5E-5.
3. Measured with a PRBS 2³¹-1 test pattern @25.78125 Gb/s, BER≤5E-5.

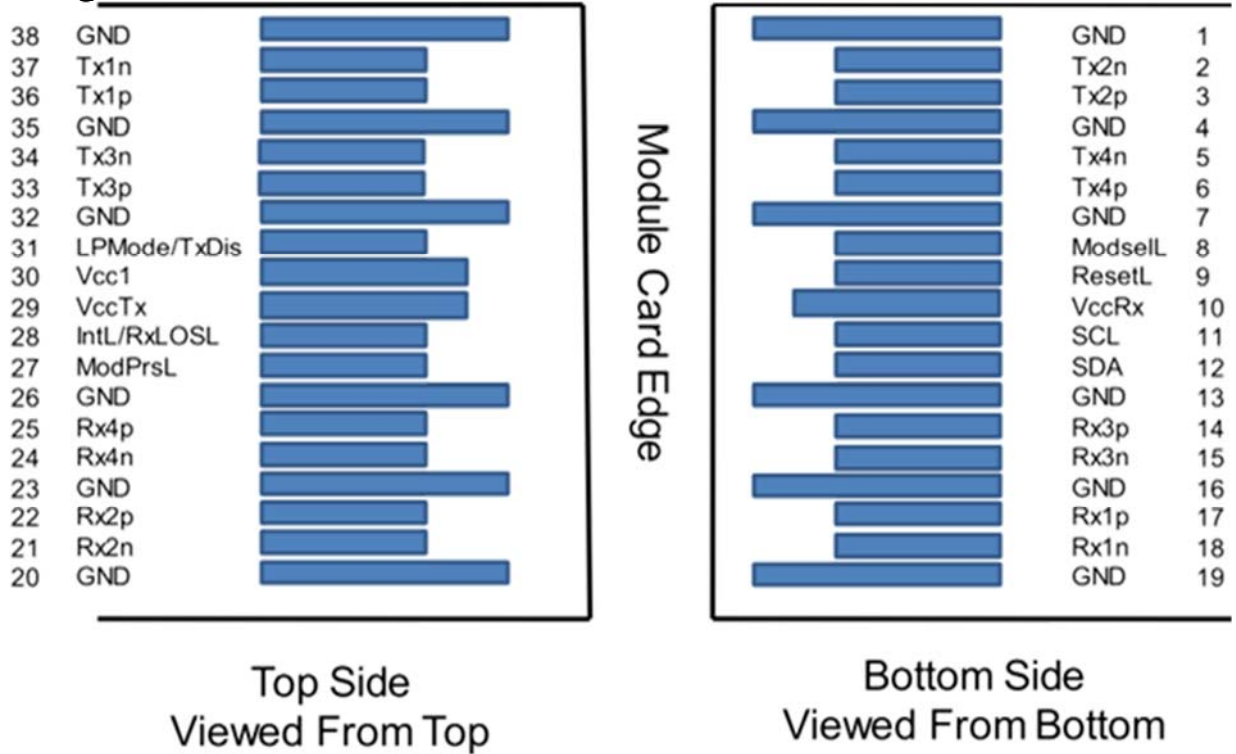
Digital Diagnostic Specifications

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 °C to +70 °C	±3	°C	Internal / External
Voltage	3.0 to 3.6	±3 %	V	Internal / External
Tx Bias Current	30 to 100	±10 %	mA	Internal / External
Tx Output Power	1 to 6.5	±3 dB	dBm	Internal / External
Rx Input Power	-29 to 4.5	±3 dB	dBm	Internal / External

Notes:

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions via the 2-wire serial interface (SCL, SDA). Both internal and external calibration are supported for diagnostic monitoring, including received power, transmitted power, bias current, supply voltage, and temperature.

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 Input	3	
4		GND	Ground	1	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3	
7		GND	Ground	1	1
8	LVTTL-I	ModSelL	Module Select	3	
9	LVTTL-I	ResetL	Module Reset	3	
10		VccRx	+3.3 V 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	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
15	CML-O	Rx3n	Receiver Inverted Data Output	3	
16		GND	Ground	1	1

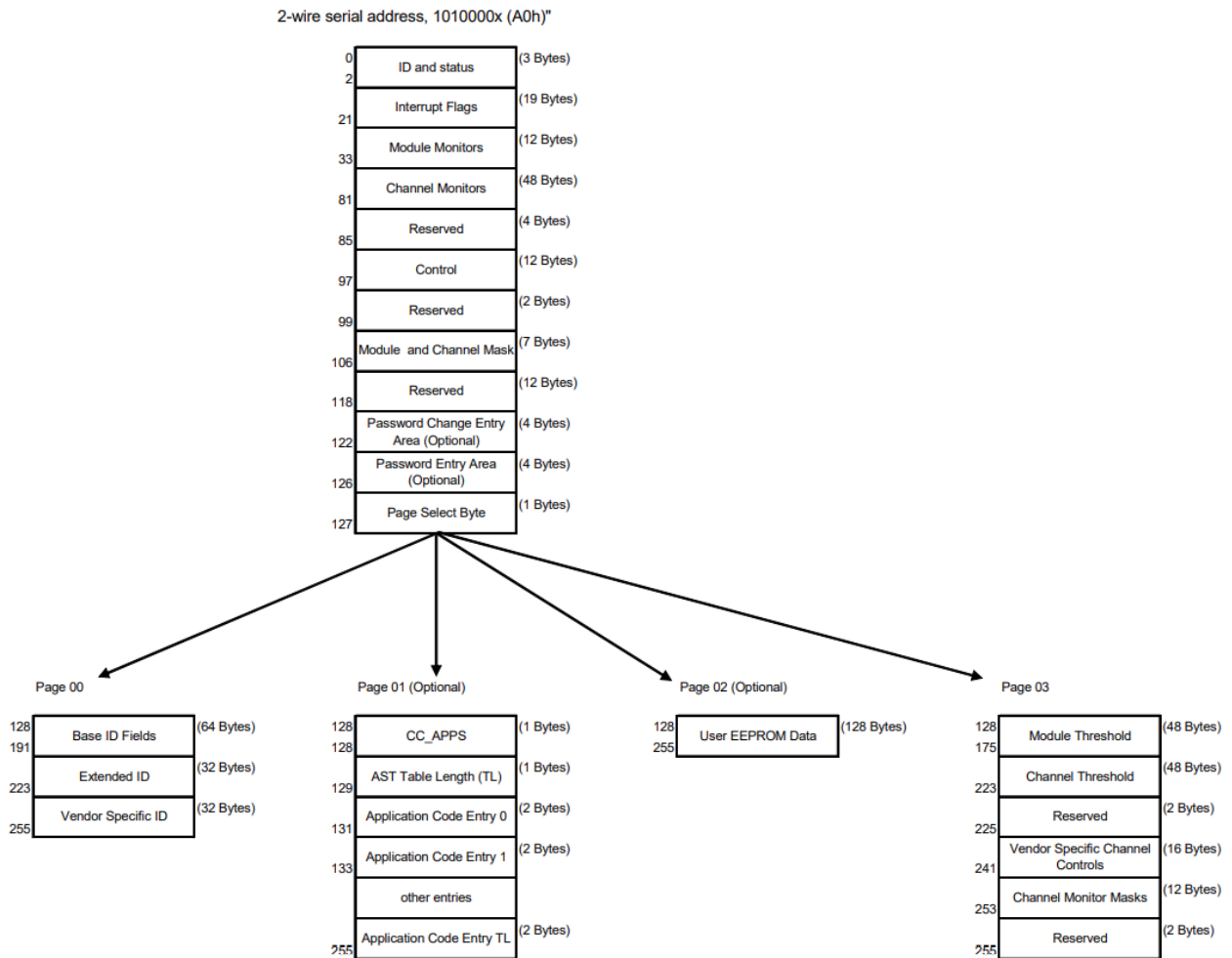
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	1
20		GND	Ground	1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3	1
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3	
26		GND	Ground	1	1
27	LVTTL-O	ModPrsL	Module Present	3	
28	LVTTL-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	LVTTL-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 Input	3	
35		GND	Ground	1	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Input	3	
38		GND	Ground	1	1

Notes:

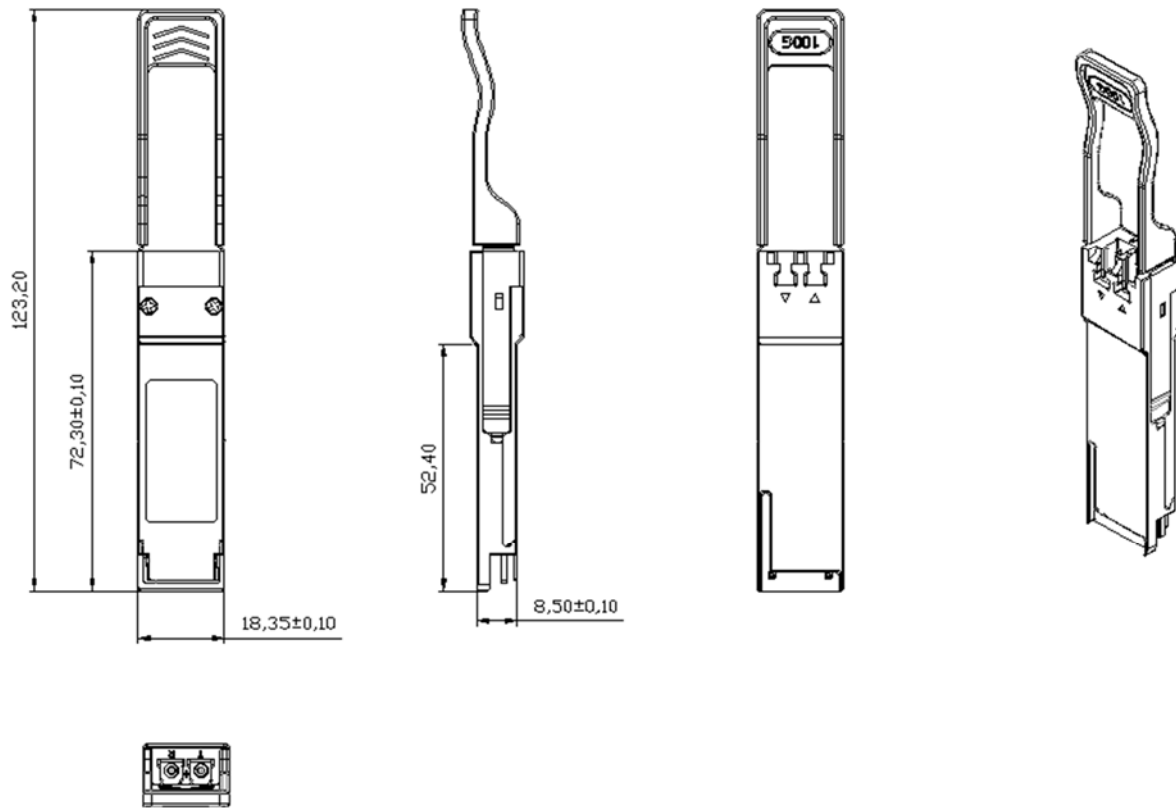
1. GND is the common reference for signal and supply power in the QSFP28 module.
All GND pins are common within the QSFP28 module, and all module voltages are referenced to this potential unless otherwise noted. Connect these pins directly to the host board signal-common ground plane.
2. VccRx, Vcc1, and VccTx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements for the host side of the host edge card connector are defined in the MSA. Each connector pin is rated for a maximum current of 500 mA.

EEPROM Information

The detailed data field descriptions for the EEPROM memory map are shown below.



Mechanical Specifications



Unit: mm

Ordering Information

Part Number	Product Description
CSMQ28HGL31A0	100 Gbps QSFP28 ZR4, LC, 100 km, 0 °C to +70 °C, with DDM

For More Information

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