

CSMQ28HGP3120

100 Gbps QSFP28 LR1 20 km Single-Lambda Transceiver

Description

The CSMQ28HGP3120 is a transceiver module designed for 20 km optical communication applications. It is intended for 100 Gbps high-speed data communication over single-mode fiber. The optical interface is provided through an industry-standard duplex LC connector.

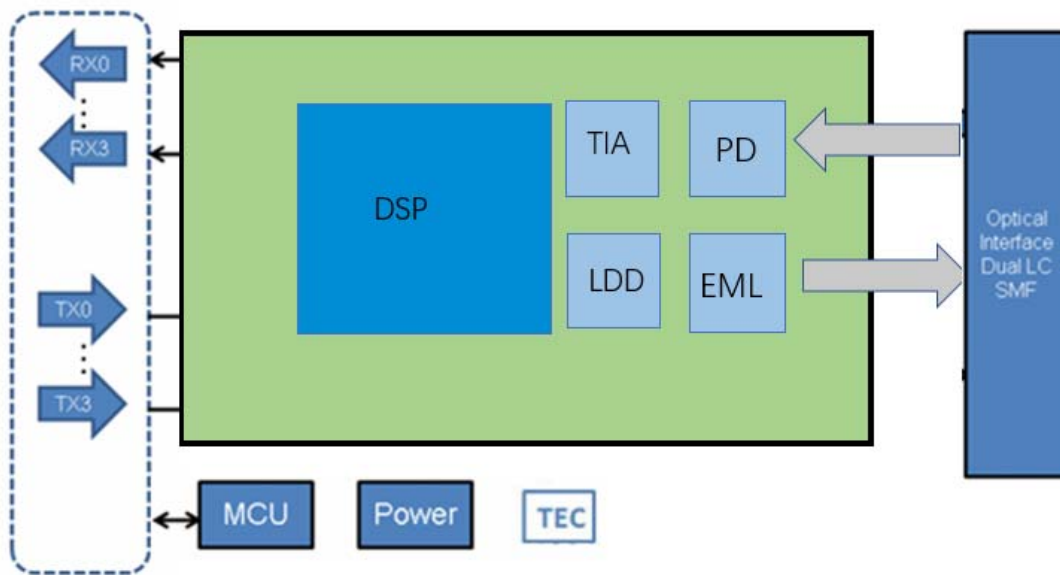
Features

- Lane signaling rate 106.25Gb/s with PAM4
- Up to 20km transmission on SMF
- EML Laser and PIN receiver
- 4x25.78Gb/s with NRZ electrical interface (CAUI-4)
- Support KP4 FEC inside the module
- High speed I/O electrical interface
- I²C interface with integrated Digital Diagnostic monitoring
- QSFP28 MSA package with duplex LC connector
- Single +3.3V power supply
- Power consumption <3.5 W
- Operating case temperature: 0 to +70 °C
- Compliant to 802.3cu, SFF-8636&SFF-8679 standard
- Compliant to 100G Lambda MSA 100G-LR1 Optical Specifications
- Complies with EU Directive 2015/863/EU

Applications

- Data Center
- 100 Gigabit Ethernet

Module Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
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
Operating Case Temperature	T _c	0		+70	°C
Power Supply Voltage	V _{CC}	3.13	3.3	3.47	V
Transmission Distance	TD			20	km

Electrical Specifications

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}			900	mVpp	
Differential Termination Mismatch (Max.)	D-mismatch			10	%	
DC Common-Mode Input Voltage		-0.3		2.8	V	
Transition Time (20% to 80%)	Tr/Tf	10			ps	
LPMODE, ResetL, and ModSelL / TxDis	V _{IL}	-0.3		0.8	V	
LPMODE, ResetL, and ModSelL / TxDis	V _{IH}	2.0		VCC + 0.3	V	
Receiver (Module Output)						
Output Differential Impedance	R _{out}		100		Ohm	
Differential Data Output Amplitude	V _{OUTP-P}			900	mVpp	
Differential Termination Mismatch (Max.)	D-mismatch			10	%	
Transition Time (20% to 80%)	Tr/Tf	12			ps	
ModPrsL and IntL / RxLOS	V _{OL}	0		0.4	V	
ModPrsL and IntL / RxLOS	V _{OH}	VCC - 0.5		VCC + 0.3	V	

Optical Specifications

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Center Wavelength	λ _c	1304.5	1311	1317.5	nm	
Signaling Rate	SR			53.125	GBd	
Frequency Offset	F _{offset}	-100		100	ppm	
Average Launch Power	PTX	-0.2		6.6	dBm	1
Transmitter and Dispersion Eye Closure for PAM4 (TDECQ) (Max.)	TDECQ			3.6	dBm	
Average Output Power (Laser Turn-Off)	P _{off}			-30	dBm	
Side Mode Suppression Ratio	SMSR	30			dB	
Extinction Ratio	ER	3.5			dB	
RIN_OMA	RIN			-136	dB/Hz	
Transmitter Reflectance	T _{ref}			-26	dB	
Optical Return Loss Tolerance	ORLT			15.6	dB	

Receiver						
Center Wavelength	CW		1311		nm	
Damage Threshold	Pdamage	5.5			dBm	2
Average Rx Power	PRx	-7.7		4.5	dBm	3
Receive Power, OMAouter	POMA			4.7	dBm	
Receiver Sensitivity, OMAouter for TDECQ < 1.4 dB for 1.4 dB ≤ TDECQ ≤ 3.4 dB	SEN _OMA			-7.6 -9 + TDECQ	dBm	4
Reflectance	Ref			-26	dB	
LOS Assert	LosA	-26			dBm	
LOS De-Assert	LosDA			-10	dBm	
LOS Hysteresis	LosH	0.5			dB	
Stressed Receiver Sensitivity, OMAouter	SRS			-5.4	dBm	5
Conditions of Stressed Receiver Sensitivity Test:						
Stressed Eye Closure for PAM4 (SECQ)				3.4	dB	6
SECQ - $10 \times \log_{10}(\text{Ceq})$				3.4	dB	6

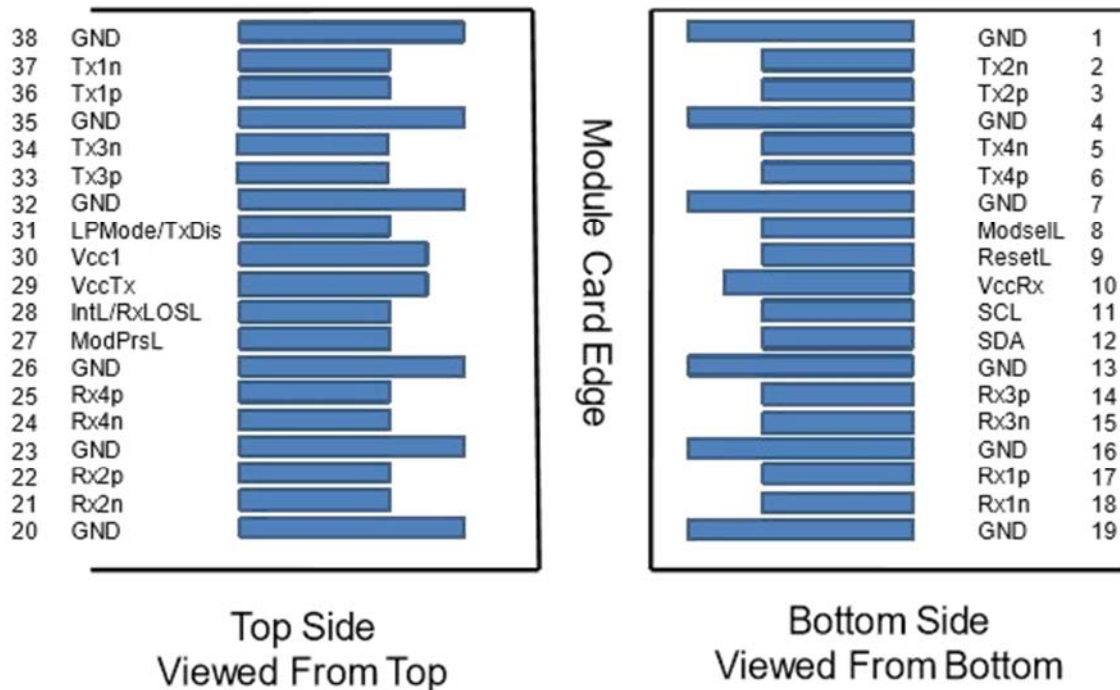
Notes:

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 a conformance test signal at TP3 using the test pattern PRBS31Q or scrambled idle for stressed receiver sensitivity at BER = 2.4×10^{-4} .
5. Measured with a conformance test signal at TP3 (see 3.11) for the BER specified in IEEE Std 802.3cu.
6. Ceq is a coefficient defined in IEEE Std 802.3-2022 Clause 121.8.5.3, which accounts for reference equalizer noise enhancement

Digital Diagnostic Specifications

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 °C to +70 °C	±3	°C	Commercial
Voltage	0 to Vcc	±3 %	V	Commercial
Tx Bias Current	0 to 100	±10 %	mA	Commercial
Tx Output Power	-0.2 to 6.8	±3 dB	dBm	Commercial
Rx Receive Power	-10 to 6.6	±3 dB	dBm	Commercial

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		Vcc Rx	+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	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	
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/RxLOSL	Interrupt. Optionally configurable as RxLOSL via the management interface (SFF-8636). Interrupt. Optionally configurable as RxLOSL via the management interface (SFF-8636).	3	
29		Vcc Tx	+3.3V Power supply transmitter	2	2
30		Vcc1	+3.3V Power supply	2	2
31	LVTTL-I	LPMODE/TxDis	Low Power Mode. Optionally configurable as TxDis via the management interface (SFF-8636).	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 symbol for signal and supply (power) common for the module. All are common within the 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. VccRx, Vcc1 and VccTx are applied concurrently and may be internally connected within the module in any combination. Vcc contacts in SFF-8662 and SFF-8672 each have a steady state current rating of 1 A.

Recommended Interface Circuit

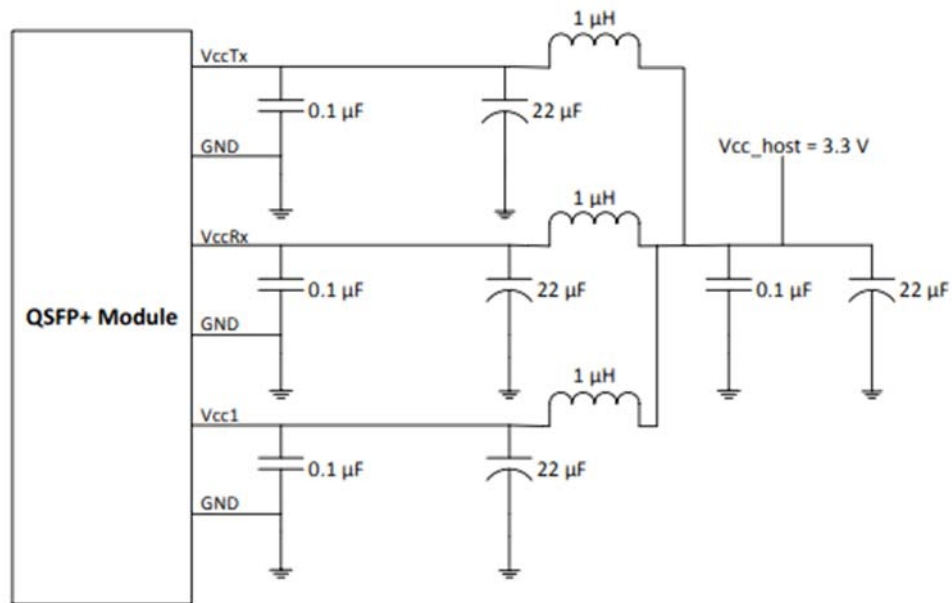
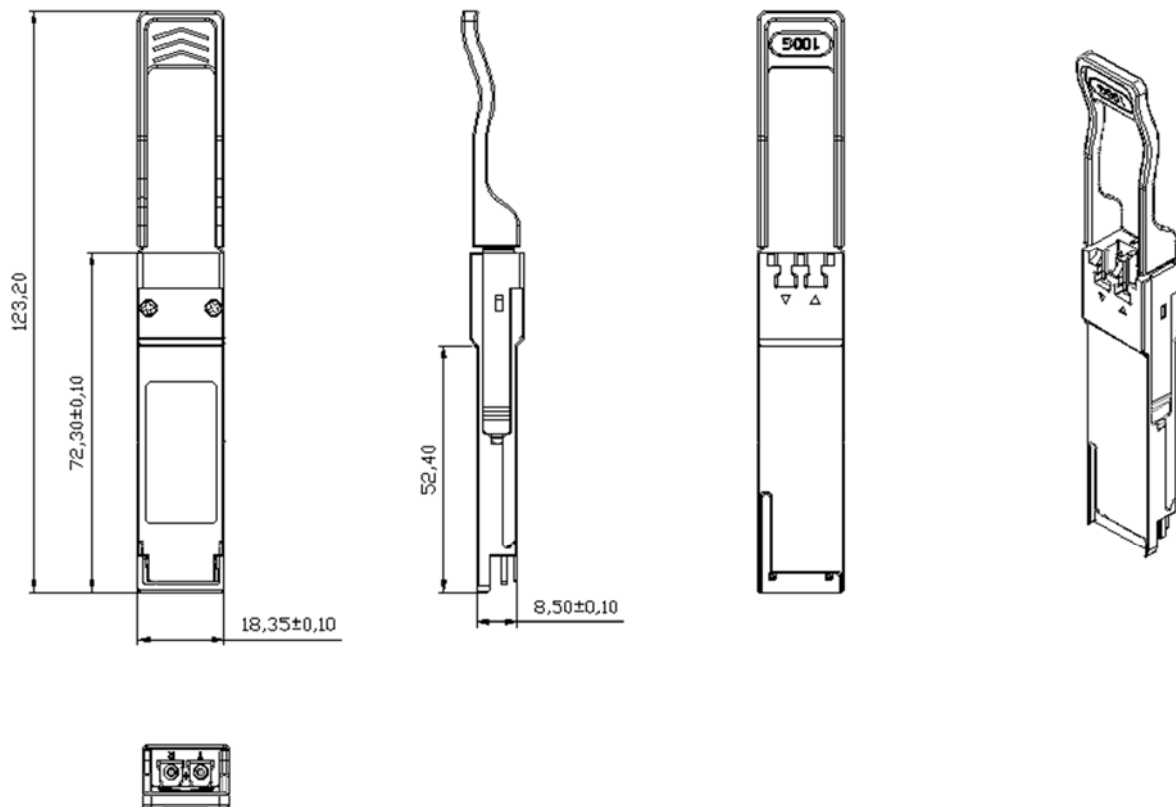


FIGURE 5-4 RECOMMENDED HOST BOARD POWER SUPPLY FILTERING

Mechanical Specifications



Unit: mm

Ordering Information

Part Number	Product Description
CSMQ28HGP3120	QSFP28 LR1, 106.25Gb/s, 20km, SMF, Dual LC, 0°C~+70°C

For More Information

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