FluxLight
OPTICAL TRANSCEIVERS

Datasheet

QSFP-100G-FR-FL

100G, QSFP28, Duplex LC, 1311nm, SMF, 2km, COM

Quick Spec

Rate Category:	100G
Form Factor:	QSFP28
Interface Type:	100GBASE-FR1
Standard/Protocol:	IEEE 802.3cu 100GBASE-FR1; 100G Lambda MSA 100G-FR; QSFP28 MSA
TX Wavelength:	1311nm
RX Wavelength:	1311nm
Cable Type:	SMF
Reach:	2km (SMF)
DDM:	Supported
Connector Type:	Duplex LC (UPC)
Power Consumption:	4W max
Operating Temperature:	0°C to +70°C (COM)



Overview

The FluxLight QSFP-100G-FR-FL is a 100G QSFP28 single-wavelength optical transceiver for 100 Gigabit Ethernet links up to 2 km over duplex single-mode fiber. An internal DSP gearbox converts the four 25 Gb/s NRZ host lanes into a single 53.125 GBd PAM4 optical signal at 1311 nm, with an integrated retimer and FEC block. The transmitter uses a cooled EML laser and the receiver a PIN photodiode, behind a duplex LC connector. The optical interface is compliant with IEEE 802.3cu 100GBASE-FR1 and the 100G Lambda MSA 100G-FR specification, and the module follows the QSFP28 MSA for form factor and digital diagnostic monitoring, with 4 W maximum power dissipation.

Features

- Hot-pluggable QSFP28 footprint with duplex LC receptacle
- Compliant with IEEE 802.3cu 100GBASE-FR1 and the 100G Lambda MSA 100G-FR specification
- Single 1311 nm wavelength at 53.125 GBd PAM4
- 4 × 25G electrical interface (OIF CEI-28G-VSR) with internal DSP gearbox, retimer and FEC
- Cooled EML transmitter and PIN receiver
- Up to 2 km over single-mode fiber with FEC
- Average launch power −2.4 to +4 dBm; receiver sensitivity max(−4.5, SECQ−5.9) dBm (OMAouter)
- Real-time Digital Diagnostic Monitoring (DDM/DOM)
- Single +3.3V power supply, power dissipation ≤ 4 W
- Operating case temperature: 0°C to +70°C (COM)
- QSFP28 MSA compliant, RoHS compliant, and Class 1 laser eye safety certified (IEC 60825-1)
- 100% compatible with and programmed for the target OEM platform
- Backed by a FluxLight lifetime warranty

Applications

- 100 Gigabit Ethernet over duplex single-mode fiber up to 2 km
- Data center interconnect
- Enterprise networking

Absolute Maximum Rating

The operation in excess of any absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Max	Unit
Storage Temperature	TS	-40	85	°C
Operating Case Temperature	TOP	0	70	°C
Power Supply Voltage	VCC	-0.5	3.6	V
Relative Humidity	RH	0	85	%

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	TC	0		70	°C	
Power Supply Voltage	VCC	3.135	3.3	3.465	V	
Instantaneous Peak Current at Hot Plug	ICC_IP			1600	mA	
Sustained Peak Current at Hot Plug	ICC_SP			1320	mA	
Maximum Power Dissipation	PD			4	W	
Maximum Power Dissipation, Low Power Mode	PDLP			1.5	W	

Recommended Operating Conditions (Continued)

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Signaling Rate	SR		53.125		GBd	PAM4
Control Input Voltage High	VIH	VCC×0.7		VCC+0.3	V	
Control Input Voltage Low	VIL	-0.3		VCC×0.3	V	
Two-Wire Serial Interface Clock Rate				400	kHz	
Power Supply Noise				66	mVpp	10 Hz – 10 MHz
Rx Differential Data Output Load			100		Ω	
Operating Distance (SMF)		2		2000	m	

Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit
Transmitter					
Center Wavelength	λC	1304.5	1311	1317.5	nm
Side Mode Suppression Ratio	SMSR	30			dB
Average Optical Launch Power	POUT	-2.4		4	dBm
Average Launch Power, Transmitter Off	POUT_OFF			-15	dBm
Extinction Ratio	ER	3.5			dB
Outer Optical Modulation Amplitude	OMAouter	-0.2		4.2	dBm
Launch Power in OMAouter minus TDECQ, for ER ≥ 4.5 dB	OMAouter–TDECQ	-1.6			dBm
Launch Power in OMAouter minus TDECQ, for ER < 4.5 dB	OMAouter–TDECQ	-1.5			dBm
Transmitter and Dispersion Eye Closure for PAM4	TDECQ			3.4	dB
TDECQ – 10·log10(Ceq)				3.4	dB
Transmitter Transition Time				17	ps
RIN17.1OMA	RIN			-136	dB/Hz
Optical Return Loss Tolerance	ORLT			17.1	dB
Transmitter Reflectance	TR			-26	dB
Receiver					
Center Wavelength	λC	1304.5	1311	1317.5	nm
Damage Threshold		5.5			dBm
Average Receive Power		-6.4		4.5	dBm
Receive Power (OMAouter)	RP			4.7	dBm

Optical Characteristics (Continued)

Parameter	Symbol	Min	Typical	Max	Unit
Receiver Reflectance	RR			-26	dB
Receiver Sensitivity (OMAouter)	RS			max(-4.5, SECQ-5.9)	dBm
Stressed Receiver Sensitivity (OMAouter)	SRS			-2.5	dBm
Stressed Eye Closure for PAM4	SECQ			3.4	dB
SECQ – 10·log10(Ceq)				3.4	dB

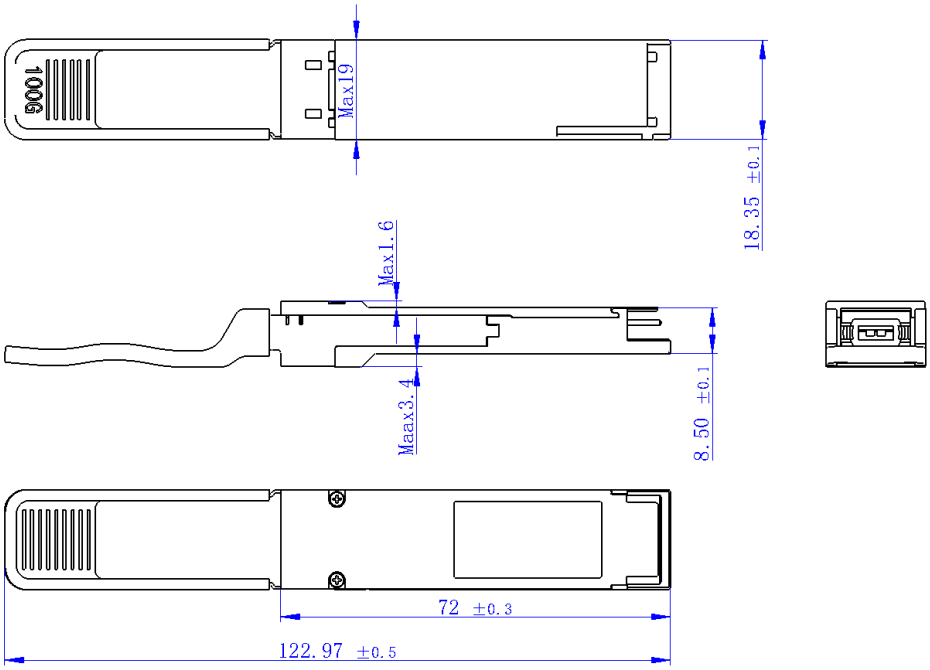
Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified.

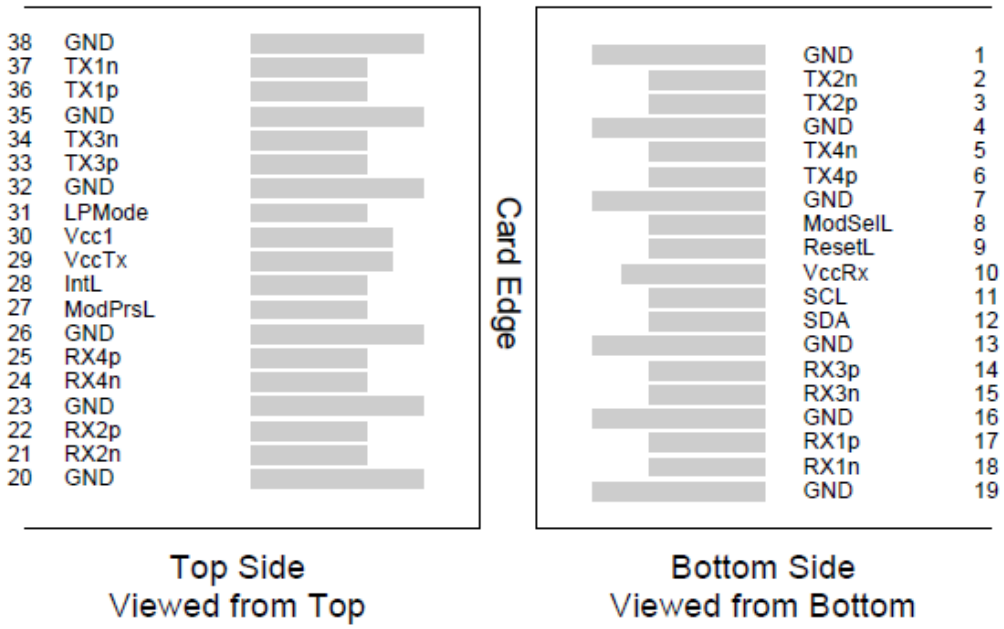
Parameter	Symbol	Min	Max	Unit
Temperature monitor absolute error	DMI_Temp	-5	5	°C
Supply voltage monitor absolute error	DMI_VCC	-0.1	0.1	V
Channel RX power monitor absolute error	DMI_RX_Ch	-3	3	dB
Channel bias current monitor absolute error	DMI_Ibias_Ch	-10%	10%	mA
Channel TX power monitor absolute error	DMI_TX_Ch	-3	3	dB

Mechanical Dimensions

Units: mm



Pin Assignment and Description



Pin	Logic	Symbol	Description	Plug Sequence
1		GND	Ground	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	3
4		GND	Ground	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	3
7		GND	Ground	1
8	LVTTL-I	ModSelL	Module Select	3
9	LVTTL-I	ResetL	Module Reset	3
10		VccRx	+3.3V Power Supply Receiver	2
11	LVCMOS-I/O	SCL	2-Wire Serial Interface Clock	3
12	LVCMOS-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
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3
18	CML-O	Rx1n	Receiver Inverted Data Output	3
19		GND	Ground	1

Pin Assignment and Description (Continued)

Pin	Logic	Symbol	Description	Plug Sequence
20		GND	Ground	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3
23		GND	Ground	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3
26		GND	Ground	1
27	LVTTL-O	ModPrsL	Module Present	3
28	LVTTL-O	IntL	Interrupt	3
29		VccTx	+3.3V Power Supply Transmitter	2
30		Vcc1	+3.3V Power Supply	2
31	LVTTL-I	LPMode	Low Power Mode	3
32		GND	Ground	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3
34	CML-I	Tx3n	Transmitter Inverted Data Input	3
35		GND	Ground	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3
37	CML-I	Tx1n	Transmitter Inverted Data Input	3
38		GND	Ground	1

ESD

This transceiver is specified as an ESD threshold of 1kV for the high-speed data pins and 2kV for all other electrical input pins, tested per MIL-STD-883, Method 3015.4 / JESD22-A114-A (Human Body Model). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD-protective packaging. It should be removed from the packaging and handled only in an ESD-protected environment.

Laser Safety

This is a Class 1 Laser Product according to IEC 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).