FluxLight
OPTICAL TRANSCEIVERS

Datasheet

QSFP-40G-LR4-S-FL

40G, QSFP+, Duplex LC, 40GBASE-LR4, CWDM, SMF, 10km, COM

Quick Spec

Rate Category:	40G
Form Factor:	QSFP+
Interface Type:	40GBASE-LR4
Standard/Protocol:	IEEE 802.3ba 40GBASE-LR4
TX Wavelength:	1271/1291/1311/1331nm (CWDM)
RX Wavelength:	1271/1291/1311/1331nm (CWDM)
Cable Type:	SMF
Reach:	10km (SMF)
DDM:	Supported
Connector Type:	Duplex LC (UPC)
Power Consumption:	3.5W max
Operating Temperature:	0°C to +70°C (COM)



Overview

The FluxLight QSFP-40G-LR4-S-FL is a 40G QSFP+ optical transceiver for 40 Gigabit Ethernet links up to 10 km over duplex single-mode fiber. It converts four 10.3125 Gb/s electrical lanes into four CWDM optical signals at 1271, 1291, 1311 and 1331 nm (ITU-T G.694.2), multiplexes them onto a single fiber for transmission, and demultiplexes the four wavelengths on the receive side. The module uses a four-lane DFB laser transmitter and a four-lane PIN photodiode receiver behind a duplex LC connector. Compliant with the QSFP+ MSA, SFF-8436 digital diagnostic monitoring (DDM/DOM), IEEE 802.3ba 40GBASE-LR4 and Class 1 laser safety standards.

Features

- Hot-pluggable QSFP+ footprint with duplex LC receptacle
- Compliant with IEEE 802.3ba 40GBASE-LR4
- 4 × 10.3125 Gb/s electrical interface; 41.25 Gb/s aggregate
- Four CWDM lanes at 1271, 1291, 1311 and 1331 nm; 4-lane DFB transmitter and 4-lane PIN receiver
- Up to 10 km over G.652 single-mode fiber
- Average launch power −7 to +2.3 dBm per lane; receiver sensitivity −11.5 dBm (OMA) per lane
- Real-time Digital Diagnostic Monitoring (DDM/DOM) per SFF-8436
- Single +3.3V power supply, power dissipation ≤ 3.5 W
- Operating case temperature: 0°C to +70°C (COM)
- QSFP+ MSA compliant, RoHS-6 compliant, and Class 1 laser eye safety certified (IEC/EN 60825-1)
- 100% compatible with and programmed for the target OEM platform
- Backed by a FluxLight lifetime warranty

Applications

- 40 Gigabit Ethernet over duplex single-mode fiber up to 10 km
- Switch/router uplinks, campus and inter-building links
- Data center interconnect

Absolute Maximum Rating

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

Parameter	Symbol	Min	Max	Unit	Notes
Storage Temperature	TS	-40	85	°C	
Operating Case Temperature	TOP	0	70	°C	
Power Supply Voltage	VCC	0	3.6	V	
Relative Humidity	RH	5	85	%	Non-condensing

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	TOP	0		70	°C
Supply Voltage	VCC	3.15	3.3	3.45	V
Data Rate (Each Lane)	DR		10.3125		Gb/s
Power Consumption	PC			3.5	W
Supply Current	ICC			1.1	A
Link Distance with G.652 SMF	D			10	km

Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Average Output Power, each lane	POUT	-7		2.3	dBm	
Launch Power in OMA minus TDP, each lane		-4.8			dBm	
Extinction Ratio	ER	3.5			dB	
Total Average Launch Power	PT			8.3	dBm	
Center Wavelength, Lane 0	λ0	1264.5	1271	1277.5	nm	
Center Wavelength, Lane 1	λ1	1284.5	1291	1297.5	nm	
Center Wavelength, Lane 2	λ2	1304.5	1311	1317.5	nm	
Center Wavelength, Lane 3	λ3	1324.5	1331	1337.5	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Transmitter and Dispersion Penalty, each lane	TDP			2.6	dB	
Difference in Launch Power between any two lanes (OMA)				6.5	dB	
Optical Return Loss Tolerance	ORLT			20	dB	Per IEEE 802.3ba 40GBASE-LR4
Transmitter Reflectance				-12	dB	
Receiver						
Average Receive Power, each lane	Pin	-13.7		2.3	dBm	
Receiver Sensitivity (OMA), each lane	Sen			-11.5	dBm	
Receive Power, each lane (OMA)				3.5	dBm	
Receiver Damage Threshold, per Lane	PRdmg	3.3			dBm	
Center Wavelength (Lanes 0–3)	λ	1264.5		1337.5	nm	
Receiver Reflectance	RFL			-26	dB	
LOS Assert	LOSA	-30			dBm	
LOS De-Assert	LOSD			-12.5	dBm	
LOS Hysteresis	LOSH	0.5		6	dB	

Digital Diagnostic Functions

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

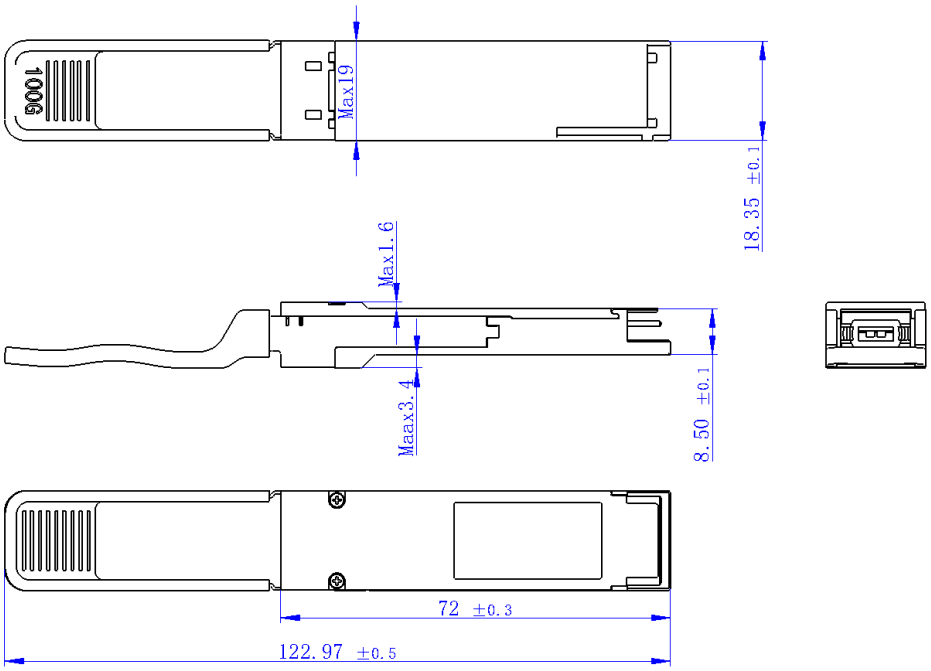
Parameter	Symbol	Min	Max	Unit
Temperature monitor absolute error	DMI_Temp	-3	3	°C
Supply voltage monitor absolute error	DMI_VCC	-0.1	0.1	V
Channel RX power monitor absolute error	DMI_RX_Ch	-3	3	dB

Digital Diagnostic Functions (Continued)

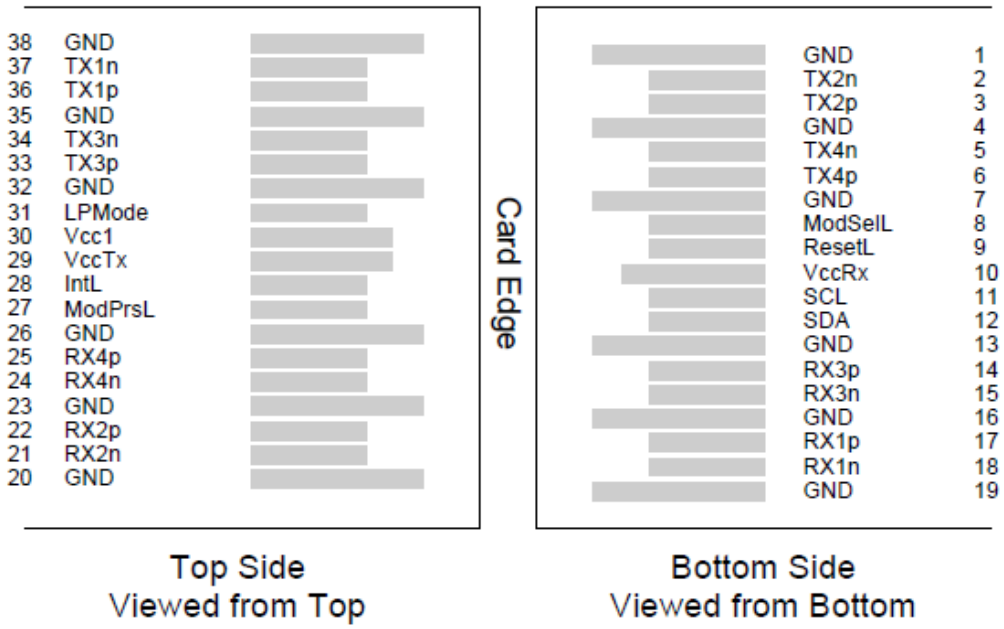
Parameter	Symbol	Min	Max	Unit
Channel bias current monitor absolute error	DMI_Ibias_Ch	-10%	10%	mA
Channel TX power monitor absolute error	DMI_TX_Ch	-3	3	dB

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).