FluxLight
OPTICAL TRANSCEIVERS

Datasheet

PAN-QSFP28-100GBASE-LR4-FL

100G, QSFP28, Duplex LC, 1310nm LAN-WDM, SMF, 10km, COM

Quick Spec

Rate Category:	100G
Form Factor:	QSFP28
Interface Type:	100GBASE-LR4
Standard/Protocol:	IEEE 802.3ba 100GBASE-LR4, QSFP28 MSA (SFF-8636)
TX Wavelength:	1295.56/1300.05/1304.58/1309.14nm (LAN-WDM)
RX Wavelength:	1295.56/1300.05/1304.58/1309.14nm (LAN-WDM)
Cable Type:	SMF
Reach:	10km (SMF)
DDM:	Supported
Connector Type:	Duplex LC (UPC)
Power Consumption:	4W max
Operating Temperature:	0°C to +70°C (COM)



Overview

The FluxLight PAN-QSFP28-100GBASE-LR4-FL is a 100G QSFP28 optical transceiver for 100 Gigabit Ethernet links up to 10 km over duplex single-mode fiber, compliant with IEEE 802.3ba 100GBASE-LR4. It converts four 25 Gb/s electrical lanes into four LAN-WDM optical signals at 1295.56, 1300.05, 1304.58 and 1309.14 nm, multiplexes them onto a single fiber for 103.1 Gb/s transmission, and demultiplexes them on the receive side. Cooled LAN-WDM DFB transmitters and high-sensitivity PIN receivers sit behind a duplex LC connector, with a 4 × 25G CEI-28G-VSR electrical interface and SFF-8636 digital diagnostic monitoring (DDM/DOM). The module operates from a single +3.3V supply at 4 W maximum.

Features

- Hot-pluggable QSFP28 MSA form factor with duplex LC receptacle
- Compliant with IEEE 802.3ba 100GBASE-LR4
- 103.1 Gb/s aggregate bit rate; 4 × 25G electrical interface (OIF CEI-28G-VSR)
- Four LAN-WDM lanes at 1295.56 / 1300.05 / 1304.58 / 1309.14 nm
- Cooled 4 × 25 Gb/s LAN-WDM DFB transmitter and 4 × 25 Gb/s PIN receiver
- Up to 10 km over G.652 single-mode fiber
- Average launch power −4.3 to +4.5 dBm per lane; receiver sensitivity −8.6 dBm (OMA) per lane
- Real-time Digital Diagnostic Monitoring (DDM/DOM) per SFF-8636
- Single +3.3V power supply, maximum power consumption 4.0 W
- Operating case temperature: 0°C to +70°C (COM)
- RoHS-6 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 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	-0.5	3.6	V	
Relative Humidity	RH	0	85	%	Non-condensing
Damage Threshold, each lane	THd	5.5		dBm	

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	TC	0		70	°C
Data Rate Accuracy		-100		100	ppm
Control Input Voltage High	VIH	2		Vcc	V
Control Input Voltage Low	VIL			0.8	V
Link Distance with G.652 SMF	D			10	km

Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min	Typical	Max	Unit
Supply Voltage	Vcc	3.135		3.465	V
Supply Current	Icc			1.15	A
Module Total Power	P			4	W

Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit
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
Transmitter					
Side Mode Suppression Ratio	SMSR	30			dB
Total Average Launch Power	PT			10.5	dBm
Average Launch Power, each lane	PAVG	-4.3		4.5	dBm
Extinction Ratio	ER	4			dB
Average Launch Power OFF Transmitter, each lane	POFF			-30	dBm
Receiver					
Damage Threshold, each lane	THd	5.5			dBm
Average Receive Power, each lane	Pin	-10.6		4.5	dBm
Receiver Sensitivity (OMA), each lane	SEN			-8.6	dBm
Receiver Reflectance	RR			-26	dB
LOS Assert	LOSA	-24			dBm

Optical Characteristics (Continued)

Parameter	Symbol	Min	Typical	Max	Unit
LOS De-Assert	LOSD			-11.6	dBm
LOS Hysteresis	LOSH	0.5			dB

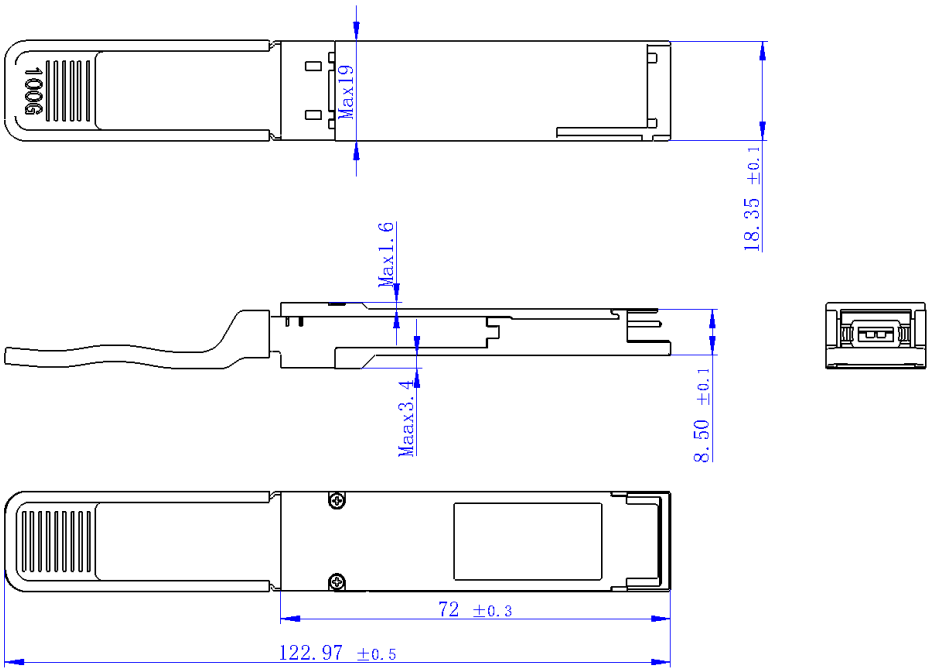
Digital Diagnostic Functions

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

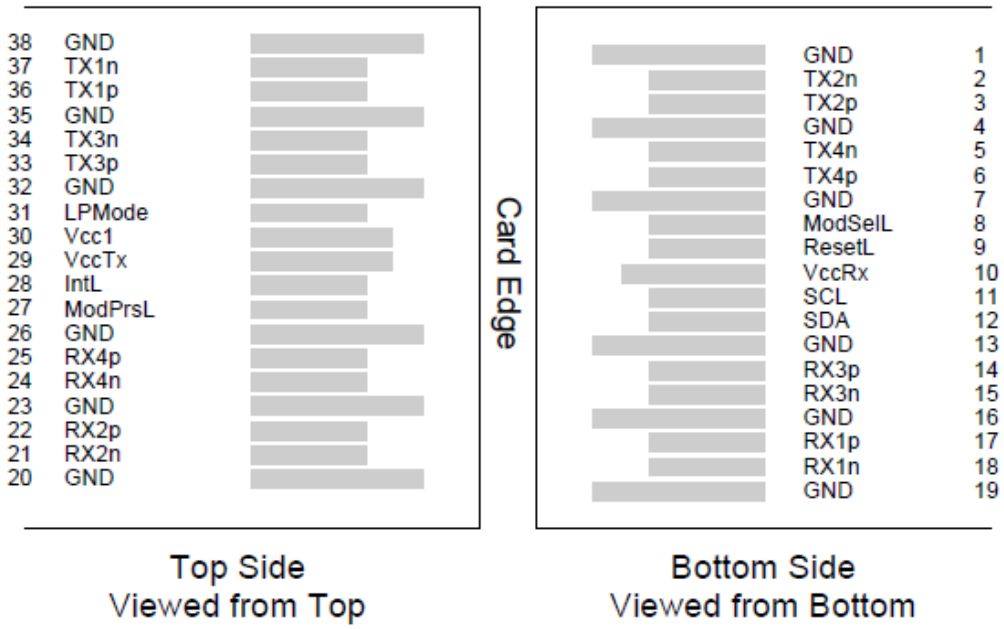
Parameter	Symbol	Min	Max	Unit
Temperature monitor absolute error	DMI_Temp	-5	5	°C
Supply voltage monitor absolute error	DMI_VCC	-0.1	0.1	V
Channel RX power monitor absolute error	DMI_RX_Ch	-3	3	dB
Channel bias current monitor absolute error	DMI_Ibias_Ch	-10%	10%	mA
Channel TX power monitor absolute error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