Datasheet

407-BBVN-FL

100G, QSFP28, Duplex LC, 100G-SWDM4, MMF, 100m, COM

Quick Spec

Rate Category:	100G
Form Factor:	QSFP28
Interface Type:	100G-SWDM4
Standard / Protocol:	100G-SWDM4 MSA, QSFP28 MSA (SFF-8665)
TX Wavelength:	850/880/910/940nm
RX Wavelength:	850/880/910/940nm
Cable Type:	MMF
Reach:	75m (OM3), 100m (OM4)
DDM:	Supported
Connector Type:	Duplex LC (UPC)
Power Consumption:	3.5W max
Operating Temperature:	0°C to +70°C (COM)

Overview

The FluxLight 407-BBVN-FL is a 100Gb/s QSFP28 transceiver that carries 100 Gigabit Ethernet over a single pair of duplex multimode fiber using shortwave wavelength division multiplexing (SWDM). Four 25.78125 Gb/s NRZ lanes are transmitted on four VCSEL wavelengths of 850, 880, 910 and 940 nm, multiplexed onto one fiber and demultiplexed at the receiver. This lets 100G run over existing duplex LC cabling instead of 8-fiber MPO trunks. The module reaches up to 75 m on OM3 and 100 m on OM4, compliant with the 100G-SWDM4 MSA, with RS-FEC enabled on the host.

The hot-pluggable module operates from a single +3.3V supply at 3.5 W maximum and provides real-time digital diagnostic monitoring of temperature, supply voltage, laser bias current and transmit/receive optical power per SFF-8636. Every FluxLight optic is programmed and tested for 100% compatibility with the target OEM platform and is backed by a lifetime warranty.

Features

- Compliant with the 100G-SWDM4 MSA
- QSFP28 MSA compliant (SFF-8665), hot-pluggable
- 4 × 25.78125 Gb/s NRZ lanes on four SWDM wavelengths (850/880/910/940nm)
- 4-wavelength VCSEL transmitter, photodiode array receiver with linear amplifier
- 100G over duplex multimode fiber, so no MPO trunks are needed
- Up to 75m on OM3 and 100m on OM4 (RS-FEC required on host)
- Duplex LC (UPC) connector
- OMA launch power −5.5 to +3 dBm per lane; unstressed receiver sensitivity −8.2 dBm OMA per lane
- Digital Diagnostics Monitoring (DDM/DOM) per SFF-8636
- Single +3.3V power supply, 3.5W max power dissipation
- Operating case temperature: 0°C to +70°C (COM)
- Class 1 laser product (IEC 60825-1)
- RoHS 6 compliant
- 100% compatible with OEM equipment
- Backed by a lifetime warranty

Applications

- 100G Ethernet over duplex multimode fiber (OM3/OM4)
- Data center migration from 10G/40G to 100G on the installed duplex LC cable plant
- Leaf-spine and ToR/EoR switch interconnects
- High-performance computing 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
Storage Temperature	TS	-40	85	°C
Power Supply Voltage	VCC	0	3.6	V
Relative Humidity	RH	15	85	%

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	TOP	0		70	°C	
Supply Voltage	VCC	3.135	3.3	3.465	V	
Data Rate (Each Lane)	DR		25.78125		Gb/s	
Power Consumption	PC			3.5	W	
50 / 125 um MMF OM3	D			75	m	RS-FEC required
50 / 125 um MMF OM4	D			100	m	RS-FEC required

Electrical Characteristics

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

Parameter	Min	Typical	Max	Unit
Transmitter				
Signaling rate per lane (range)		25.78125 ± 100 ppm		GBd
Differential input return loss	Equation (83E-5)			dB
Differential to common mode input return loss	Equation (83E-6)			dB
Differential pk-pk input voltage tolerance	900			mV
DC common mode voltage	-350		2850	mV
Single ended voltage tolerance range	-0.4		3.3	V
Receiver				
Signaling rate per lane (range)		25.78125 ± 100 ppm		GBd
AC common-mode output voltage (RMS)			17.5	mV
Differential output voltage			900	mV
Eye width	0.57			UI
Eye height, differential	228			mV
Vertical eye closure			5.5	dB
Differential output return loss	Equation (83E-2)			dB
Common to differential mode conversion return loss	Equation (83E-3)			dB
Transition time (20% to 80%)	12			ps

Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Lane Wavelength Range	Lane0 Lane1 Lane2 Lane3	844 874 904 934		858 888 918 948	nm	
Optical Modulation Amplitude (OMA), each lane	OMA	-5.5		3	dBm	
Extinction ratio	ER	2			dB	
Average Output Power (Laser Off)	POFF			-30	dBm	
RMS Spectral Width	Δλ			0.6	nm	
Optical Return Loss Tolerance	ORLT			12	dB	

Optical Characteristics (Continued)

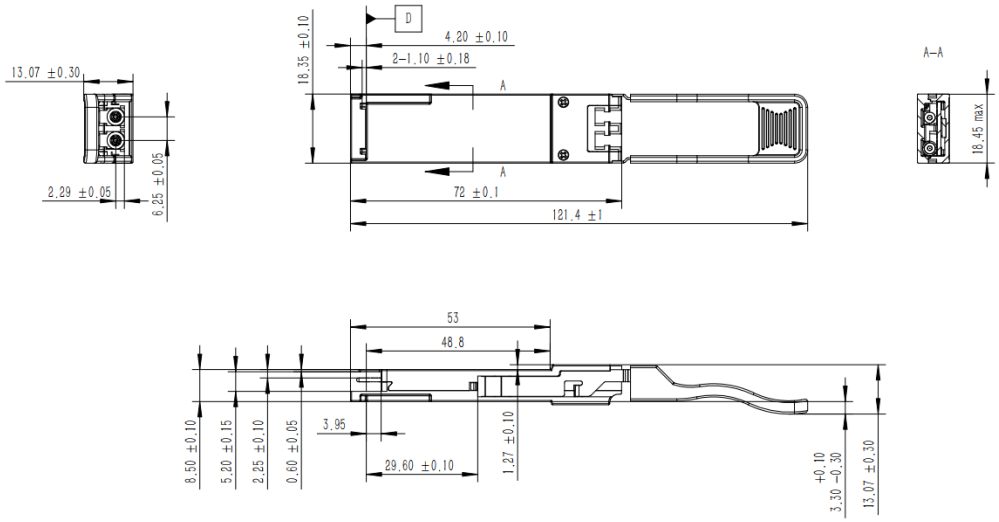
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter eye mask definition {X1,X2,X3,Y1,Y2,Y3}, Hit ratio 1.5×10^{-3} hits/sample		{0.3, 0.38, 0.45, 0.35, 0.41, 0.5}				
Receiver						
Lane Wavelength Range	Lane0 Lane1 Lane2 Lane3	844 874 904 934		858 888 918 948	nm	
Average receive power, each lane		-9.5		3.4	dBm	
Unstressed Receiver Sensitivity (OMA), each lane				-8.2	dBm	BER = 5E-5, measured with PRBS $2^{31}-1$ at 25.78Gb/s
Receiver Damage Threshold, per Lane	PRdmg	4.4			dBm	
Receiver Reflectance	RFL			-12	dB	
LOS Assert	LOSA			-30	dBm	
LOS De-Assert	LOSD			-12	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	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

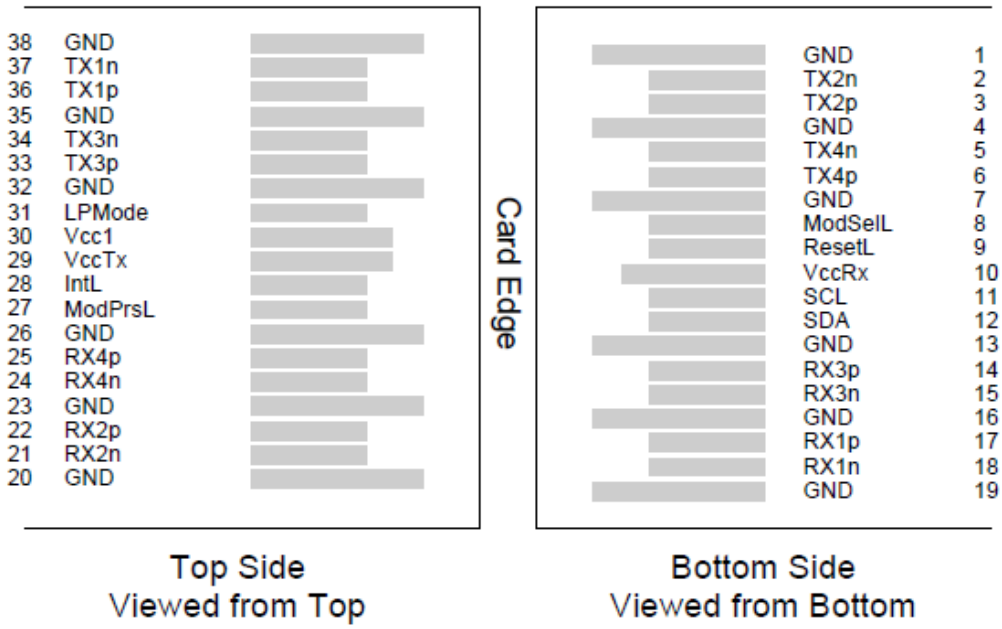


Figure 1. QSFP28 Pin Assignment

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
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

Pin Assignment and Description (Continued)

Pin	Logic	Symbol	Description	Plug Sequence
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 ESD threshold 1kV for high-speed data pins and 2kV for all other electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). 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).