

100 Gb/s 2km QSFP28 LX4 Transceiver

QSFP Series



- **QSFP28 MSA compliant**
- **4x25Gb/s electrical interface**
- **Up to 2km on SMF and 100m on MMF(OM3)**
- **Hot-pluggable QSFP28 footprint**
- **Single 3.3V power supply**
- **RoHS compliant**

The 100GBASE-LX4 module is a versatile and high-performance optical transceiver designed to support link lengths of up to 2 km over single-mode fiber (SMF) and up to 100 meters on OM3 multimode fiber (MMF) using a Duplex LC connector. It is designed for a wide range of applications, including data centers and enterprise networking environments where reliable high-speed data transmission is essential. Its ability to operate across both SMF and MMF provides flexibility for network architects, enabling seamless integration into existing infrastructure while meeting the demands of 100G Ethernet applications.

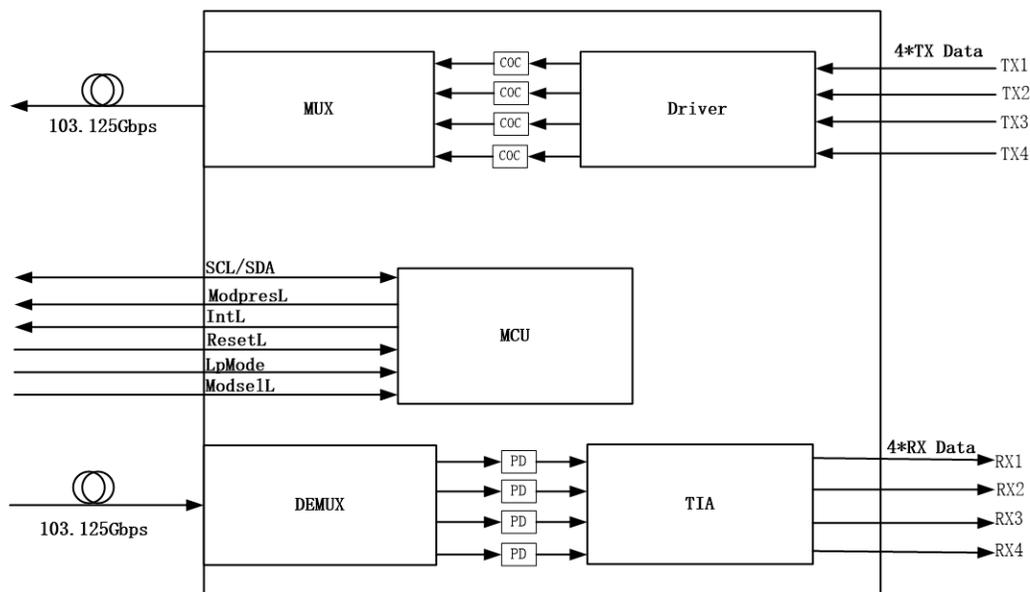
This transceiver is a fully integrated 4 x 25.78 Gbps optical module, utilizing advanced optical components to ensure exceptional performance. It incorporates cooled distributed feedback laser diodes (DFB LDs) operating at wavelengths of 1270 nm, 1290 nm, 1310 nm, and 1330 nm. These are paired with high-performance driver integrated circuits (ICs), PIN photodiodes, and clock and data recovery (CDR) ICs that support 25 Gbps electrical interfaces. This combination ensures precise and efficient optical signal transmission, making it well-suited for high-density network environments and demanding data rates.

Additionally, the 100GBASE-LX4 module features built-in digital diagnostics monitoring (DDM), which provides access to real-time operating parameters such as temperature, laser bias current, and transmitted/received optical power. This monitoring capability enhances network reliability by enabling proactive maintenance and reducing downtime.

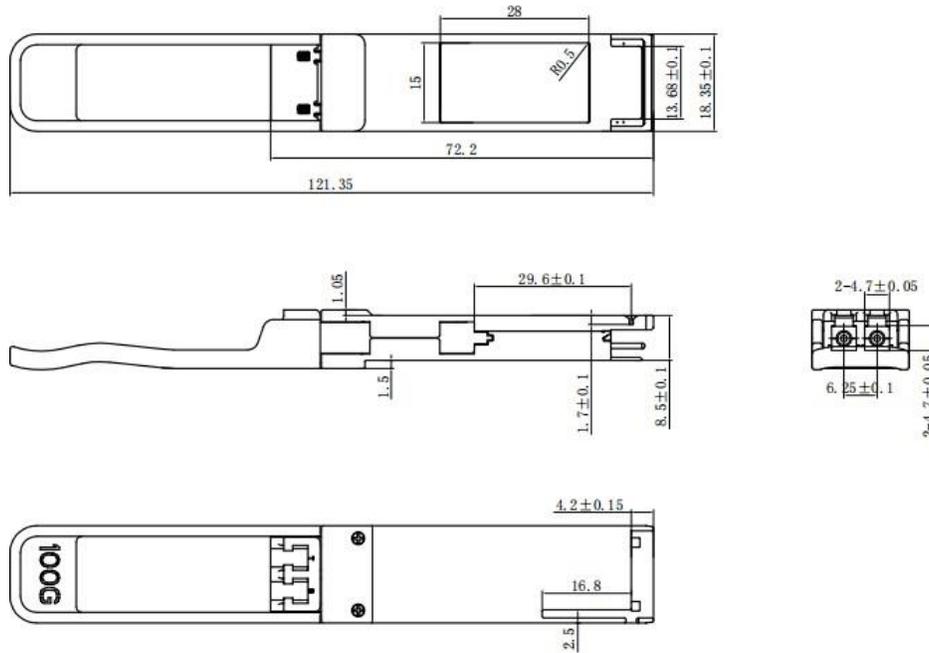
Key Features

- QSFP28 MSA compliant
- Supports 103.1 Gb/s aggregate bit rate
- 4x25Gb/s electrical interface
- Up to 2km on SMF and 100m on MMF(OM3)
- Hot-pluggable QSFP28 footprint
- LC duplex connector
- Maximum power consumption 3.5 Watts
- Single 3.3V power supply
- Support Digital Diagnostic Monitor interface
- Case operating temperature: 0°C to +70°C
- RoHS compliant

Block Diagram



Outline Diagram

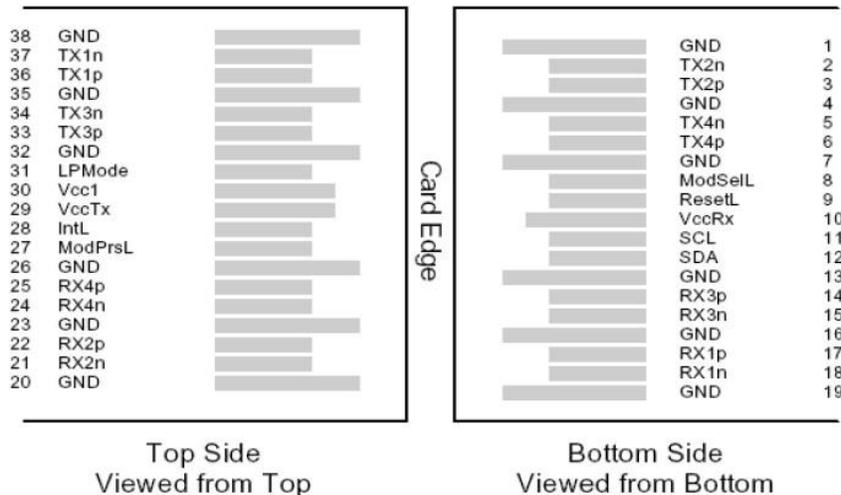


Digital Diagnostic Functions

QSFP28-100G-LX02 support the I2C-based Diagnostic Monitoring Interface (DMI) defined in document SFF-8636. The host can access real-time performance of transmitter and receiver optical power, temperature, supply voltage and bias current.

Parameter	Accuracy	Unit
Case Temperature	±3	°C
Supply Voltage	±3%	V
Tx Bias Current	±10%	mA
Tx Optical Power	±3	dB
Rx Optical Power	±3	dB

Pin Assignment



Pin	Symbol	Description	Notes
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	VccRx	+ 3.3V Power Supply Receiver	
11	SCL	2-Wire Serial Interface Clock	
12	SDA	2-Wire Serial Interface Data	
13	GND	Ground	
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	VccTx	+3.3 V Power Supply transmitter	
30	Vcc1	+3.3 V Power Supply	
31	LPMode	Low Power Mode	
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Output	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

Note1: Circuit ground is internally isolated from chassis ground.

Specifications

Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min.	Max.	Unit	Note
Maximum Supply Voltage	V _{cc}	0	3.6	V	
Storage Temperature	T _s	-40	85	°C	
Operating Case Temperature	T _{case}	-5	75	°C	
Relative Humidity	R _H	5	85	%	
Damage Threshold, per Lane	P _{dam}	3.6		dBm	

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Case Temperature	T _{case}	0		70	°C	
Supply Voltage	V _{cc}	3.135	3.3	3.465	V	
Relative Humidity	R _H	5		85	%	
Power Consumption	P _D			3.5	W	
Data Rate (Optical)	DR _O		4*25.78125		Gbps	
Data Rate (Electrical)	DR _E		4*25.78125		Gbps	
Operating Link Distance	L _D		SMF:2 MMF:0.1@OM3		km	

Optical Characteristics

100GBASE-LX4 Operation (EOL, TOP = 0 to 70 °C, V_{cc} = 3.135 to 3.465 V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Signaling Speed per Lane	BR	25.78125 ± 100 ppm			Gbps	
Lane Wavelength	λ ₀	1264.5	1271	1277.5	nm	
	λ ₁	1284.5	1291	1297.5	nm	
	λ ₂	1304.5	1311	1317.5	nm	
	λ ₃	1324.5	1331	1337.5	nm	
Side-Mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power for SMF	P _{total}			8.5	dBm	
Total Average Launch Power for MMF		-2.5		9.5	dBm	
Average Launch Power per Lane for SMF	P _{out}	-6.5		2.5	dBm	
Average Launch Power per Lane for MMF		-5.0		3.5	dBm	
Transmit OMA per Lane for SMF	TxOMA	-4.0		2.5	dBm	
Transmit OMA per Lane for MMF		-4.0		3.5	dBm	
Launch Power OFF per Lane	POff			-30	dBm	
Transmitter and Dispersion Penalty (TDP), each Lane	TDP			3	dB	
Extinction Ratio (ER)	ER	3.5			dB	
RIN20 OMA	R _{IN}			-128	dB/Hz	
Transmitter Eye Mask Definition {X1,X2, X3,Y1, Y2, Y3}		{0.31, 0.40, 0.45, 0.34, 0.38, 0.4}				1
Mask margin		15			%	1

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Receiver						
Signaling Rate, Each Lane	BR	10.3125 ± 100 ppm			Gb/s	
Receive Wavelength	λ_0	1264.5	1271	1277.5	nm	
	λ_1	1284.5	1291	1297.5	nm	
	λ_2	1304.5	1311	1317.5	nm	
	λ_3	1324.5	1331	1337.5	nm	
Damage Threshold, each Lane	P_{max}			3.5	dBm	
Average Receive Power per Lane for SMF		-11.5		2.5	dBm	
Average Receive Power per Lane for MMF		-8.6		3.5	dBm	
Rx Sensitivity (OMA) per Lane for SMF	R_{SEN}			-8.6	dBm	
Rx Sensitivity (OMA) per Lane for MMF				-8.6	dBm	
Receiver Reflectance	Rfl			-26	dB	
LOS Assert	LOSA	-30			dBm	
LOS De-Assert	LOSD			-12.5	dBm	
LOS Hysteresis		0.5		6	dB	

Note: Hit ratio 5×10^{-5} .

Electrical Interface Characteristics

100GBASE-LX4 Operation (EOL, TOP = 0 to 70 °C, $V_{cc} = 3.135$ to 3.465 V)

Parameter	Symbol	Min	Typ	Max	Unit	Note
Power Consumption				3.5	W	
Power Supply Current	I_{cc}			1	A	
Transmitter						
Data Rate, each Lane			25.78125		Gbps	
Differential Voltage Pk-Pk	V_{pp}	300		850	mV	
Input Differential Impedance	R_{in}		100		Ohm	1
Differential Termination Resistance Mismatch				10	%	
Receiver						
Data Rate, each Lane			25.78125		Gbps	
Output Differential Impedance	R_{out}		100		Ohm	1
Parameter						
Differential Termination Resistance Mismatch				10	%	
Differential Output Voltage	$V_{out, pp}$	260		850	mV	2

Notes:

1. Connected directly to TX data input pins. AC coupled there after.
2. Into 100Ω differential termination.

Ordering Information

Product Name

QSFP28-100G-LX02

Product Description

QSFP28 Plug-in, 100GBASE-LX4, CWDM wavelength 2km SMF/100m MMF, Optical Transceiver, LC, DOM

Contact Information



Ascent Communication Technology Ltd

AUSTRALIA

140 William Street, Melbourne
Victoria 3000, AUSTRALIA
Phone: +61-3-8691 2902

Hong Kong SAR

Room 1210, 12th Floor, Wing Tuck Commercial Centre
181 Wing Lok Street, Sheung Wan, Hong Kong SAR
Phone: +852-2851 4722

CHINA

Unit 1933, 600 Luban Road
200023, Shanghai, CHINA
Phone: +86-21-60232616

USA

2710 Thomes Ave
Cheyenne, WY 82001, USA
Phone: +1 203 350 9822

EUROPE

Pfarrer-Bensheimer-Strasse 7a
55129 Mainz, GERMANY
Phone: +49 (0) 6136 926 3246

VIETNAM

11th Floor, Hoa Binh Office Tower
106 Hoang Quoc Viet Street, Nghia Do Ward
Cau Giay District, Hanoi 10649, VIETNAM
Phone: +84-24-37955917

WEB: www.ascentcomtec.com

EMAIL: sales@ascentcomtec.com

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