100G QSFP28 ZR4 BiDi 80km Optical Transceiver

Variants

100G ZR4 80km LC

Details

D-TECH 100G QSFP28 ZR4 BiDi 80km Optical Transceiver

Single fiber · LAN-WDM EML + SOA · Simplex LC · SMF · DDM · 0 to 70°C

Important: BiDi modules work in pairs. Use **Side A** at one end and **Side B** at the other end of the fiber. RS-FEC (KR4-FEC) must be enabled on the host switch/router for 80km.

Product Features

Supports line rate of 103.125 Gb/s

Lane bit rate 25.78 Gb/s (100GE)

Up to 80km transmission with KR4-FEC

LAN-WDM EML laser and PIN receiver with SOA

Supports multi-pin function with IntL/RxLOSL and LPMode/TxDIS

High-speed I/O electrical interface (CAUI-4)

I2C interface with integrated Digital Diagnostic Monitoring (DDM)

QSFP28 MSA package with simplex LC connector

Single +3.3V power supply

Power dissipation: 5.5W (Commercial)

Complies with EU Directive 2015/863/EU (RoHS)

Operating case temperature: 0 to 70°C

Applications

100GBASE-ZR4 Ethernet

100G Datacom & Telecom connections

Long-distance links where fiber is limited (single-fiber 100G)

Description

The 100G QSFP28 ZR4 BiDi optical transceiver is designed for 80km optical communication over a single strand of single-mode fiber. It integrates the transmit and receive paths in one module.

On the transmit side, four lanes of serial data are recovered, retimed and passed to four laser drivers, which control four electro-absorption modulated lasers (EML) on the LAN-WDM grid. The four optical signals are multiplexed into a single-mode fiber through an industry-standard simplex LC connector.

On the receive side, the incoming optical signal is first amplified by an SOA (semiconductor optical amplifier), then an integrated optical demultiplexer separates it into four channels. Each channel is detected by a PIN photodetector and trans-impedance amplifier (TIA), retimed and passed to an output driver.

Side A transmits on 1273 / 1278 / 1282 / 1287 nm and receives on 1296 / 1300 / 1305 / 1309 nm; Side B is the reverse. The module features a hot-pluggable electrical interface, low power consumption and a 2-wire serial interface.

Wavelength Plan (Side A / Side B)

Variant	TX Wavelengths (nm)	RX Wavelengths (nm)	Connector
Side A	1273.55 / 1277.89 / 1282.26 / 1286.66	1295.56 / 1300.05 / 1304.58 / 1309.14	Simplex LC
Side B	1295.56 / 1300.05 / 1304.58 / 1309.14	1273.55 / 1277.89 / 1282.26 / 1286.66	Simplex LC

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit
Storage Temperature	TS	-40		85	°C
Operating Case Temperature	TOP	0		70	°C
Power Supply Voltage	VCC	-0.5		3.6	V
Damage Threshold, each Lane	THd	5.5			dBm
Relative Humidity (non-condensing)	RH	0 to 85%			%

Exceeding any of these values may immediately damage the device.

Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Operating Case Temperature	Top	0		+70	°C
Power Supply Voltage	VCC	3.14	3.3	3.47	V
Maximum Power Dissipation	PD			5.5	W

Lane Bit Rate	–		25.78125		Gb/s
Transmission Distance	TD			80	km
Coupled Fiber	Single-mode fiber (9/125μm SMF)				1

Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Transmitter					
Signaling Speed per Lane			25.78125		Gbps
Center Wavelength Lane 0 (Side A)	?0	1272.55	1273.55	1274.54	nm
Center Wavelength Lane 1 (Side A)	?1	1276.89	1277.89	1278.89	nm
Center Wavelength Lane 2 (Side A)	?2	1281.25	1282.26	1283.27	nm
Center Wavelength Lane 3 (Side A)	?3	1285.65	1286.66	1287.68	nm
Center Wavelength Lane 4 (Side B)	?4	1294.53	1295.56	1296.59	nm
Center Wavelength Lane 5 (Side B)	?5	1299.02	1300.05	1301.09	nm
Center Wavelength Lane 6 (Side B)	?6	1303.54	1304.58	1305.63	nm
Center Wavelength Lane 7 (Side B)	?7	1308.09	1309.14	1310.19	nm
Total Launch Power, 100GE	PT	8		12.5	dBm

Average Launch Power per Lane	Pavg	2		6.5	dBm
OMA, each Lane	POMA	2		6.5	dBm
Launch Power Difference between any Two Lanes (Avg & OMA)	Ptx,diff			3	dB
Average Output Power (Laser Off)	Poff			-30	dBm
Side Mode Suppression Ratio	SMSR	30			dB
Extinction Ratio, 100GE	ER	8.2			dB
RIN20OMA	RIN			-130	dB/Hz
Optical Return Loss Tolerance	TOL			20	dB
Transmitter Reflectance	RT			-12	dB
Optical Eye Mask	{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}				%
Receiver					
Signaling Rate, each Lane			25.78125		Gbps
RX Wavelength Range (Side A)	?0–?3	1294.53	1295.56 – 1309.14	1310.19	nm
RX Wavelength Range (Side B)	?4–?7	1272.55	1273.55 – 1286.66	1287.68	nm
Damage Threshold, each Lane	Pdamage	5.5			dBm
Receiver Sensitivity (Average), each Lane	SEN			-26	dBm
LOS Assert	LosA	-40			dBm
LOS De-assert	LosDA			-28	dBm

Optical power launched into SMF. Measured with PRBS 2^{31}-1 at 25.78125 Gb/s, BER ? 5E-5.

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Transmitter (Module Input)					
Data Rate, each Lane			25.78125		Gbps
Differential Voltage pk-pk	Vpp			900	mV
Common Mode Voltage	Vcm	-350		2850	mV
Receiver (Module Output)					
Data Rate, each Lane			25.78125		Gbps
Common Mode Noise, RMS	Vrms			17.5	mV
Differential Output Voltage Swing	Vout, pp			900	mV
Eye Width	EW15	0.57			UI
Eye Height	EH15	228			mV
Differential Termination Resistance Mismatch				10	%
Transition Time (20%–80%)	Trise/Tfall	12			ps

Digital Diagnostics (DDM)

Parameter	Unit	Accuracy
Temperature Monitor Absolute Error	°C	± 3.0

Supply Voltage Monitor Absolute Error	%	± 5
Bias Current Monitor Absolute Error	%	± 10
Received Power (Rx) Monitor Absolute Error	dB	± 3.0
Transmit Power (Tx) Monitor Absolute Error	dB	± 3.0

Pin Definition

Pin	Logic	Symbol	Description	Pin	Logic	Symbol	Description
1		GND	Ground	20		GND	Ground
2	CML-I	Tx2n	Transmitter Inverted Data Input	21	CML-O	Rx2n	Receiver Inverted Data Output
3	CML-I	Tx2p	Transmitter Non-Inverted Data Input	22	CML-O	Rx2p	Receiver Non-Inverted Data Output
4		GND	Ground	23		GND	Ground
5	CML-I	Tx4n	Transmitter Inverted Data Input	24	CML-O	Rx4n	Receiver Inverted Data Output
6	CML-I	Tx4p	Transmitter Non-Inverted Data Input	25	CML-O	Rx4p	Receiver Non-Inverted Data Output
7		GND	Ground	26		GND	Ground
8	LVTTL-I	ModSelL	Module Select	27	LVTTL-O	ModPrsL	Module Present

9	LVTTL-I	ResetL	Module Reset	28	LVTTL-O	IntL/Rx_LOS	Interrupt / Rx_LOS
10		VccRx	+3.3V Power Supply Receiver	29		VccTx	+3.3V Power Supply Transmitter
11	LVCMOS-I/O	SCL	2-Wire Serial Interface Clock	30		Vcc1	+3.3V Power Supply
12	LVCMOS-I/O	SDA	2-Wire Serial Interface Data	31	LVTTL-I	LPMode/TxDIS	Low Power Mode / Tx Disable
13		GND	Ground	32		GND	Ground
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	33	CML-I	Tx3p	Transmitter Non-Inverted Data Input
15	CML-O	Rx3n	Receiver Inverted Data Output	34	CML-I	Tx3n	Transmitter Inverted Data Input
16		GND	Ground	35		GND	Ground
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	36	CML-I	Tx1p	Transmitter Non-Inverted Data Input
18	CML-O	Rx1n	Receiver Inverted Data Output	37	CML-I	Tx1n	Transmitter Inverted Data Input

19		GND	Ground	38		GND	Ground

GND is common for signal and power within the module; connect directly to the host board ground plane. VccRx, Vcc1 and VccTx must be applied together; each connector pin is rated for a maximum of 1000 mA.

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