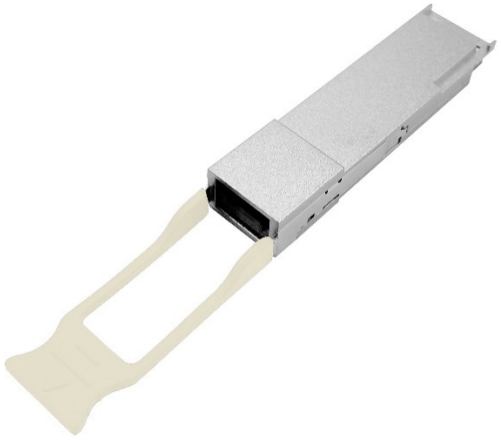
400Gb/s QSFP-DD DR4 Transceiver
QSFP-DD-400G-DR4

Features



- Compliant with IEEE Std 802.3bs
- Compliant with 400G-DR4 optical specifications
- Compliant with QSFP-DD MSA
- Compliant with CMIS4.0 Management interface specifications
- 8x53.125Gb/s electrical interface (400GAUI-8)
- Up to 0.5km transmission on single mode fiber (SMF) with FEC
- Single +3.3V power supply
- Case temperature range: 0 ~ +70℃
- Maximum power consumption 10W
- RoHS complaint

Applications

- 400G Ethernet
- Data Center Interconnect
- Infiniband Interconnect
- Enterprise Networking

Description

The 400G QSFP-DD DR4 EML transceiver is designed for 500m optical communication applications. It is compliant to QSFP-DD MSA, IEEE 802.3bs 400GBASE-DR4 protocol and 400GAUI-8 standard. The 425Gigabit signal is carried over four parallel lanes by one wavelength per lane. This module can convert 8 channels of 53.125 Gbit/s electrical data to 4 parallel channels of optical signals, each supporting 106.25 Gbit/s data transmission. Reversely, it can convert 4 channels of 106.25 Gbit/s optical signals to 8 channels of electrical output data on the receiver side. It is designed to meet the harshest external operating conditions including temperature, humidity and EMI interference. The module offers very high functionality and feature integration, accessible via a two-wire serial interface.

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.3	3.6	V
Input Voltage	Vin	-0.3	Vcc+0.3	V
Storage Temperature	Tst	-20	85	ºC
Case Operating Temperature	Top	0	70	ºC
Humidity(non-condensing)	Rh	5	95	%

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Supply Voltage	Vcc	3.13	3.3	3.47	V
Operating Case temperature	Tca	0		70	ºC
Data Rate Per Lane	fd		106.25		Gbit/s
Humidity	Rh	5		85	%
Power Dissipation	Pm			10	W

Electrical Specifications

Parameter	Symbol	Min	Typical	Max	Unit
Differential input impedance	Zin	90	100	110	ohm
Differential Output impedance	Zout	90	100	110	ohm
Differential input voltage amplitude aAmplitude	ΔVin			900	mVp-p
Differential output voltage amplitude	ΔVout			900	mVp-p
Skew	Sw			300	ps
Bit Error Rate	BER			2.4E-4	
Near-end Eye Width at 10^-6 probability(EW6)		0.265			UI
Near-end Eye Height at 10^-6 probability(EH6)		70			mV
Far-end Eye Width at 10^-6 probability(EW6)		0.20			UI
Far-end Eye Height at 10^-6 probability(EH6)		30			mV

Near-end Eye Linearity		0.85			

Note:
1.BER=2.4E-4; PRBS31Q@26.5625GBd. Pre-FEC
2.Differential input voltage amplitude is measured between TxnP and TxnN.
3.Differential output voltage amplitude is measured between RxnP and RxnN.

Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Centre Wavelength	λc	1304.5		1317.5	nm	
Side-mode suppression ratio	SMSR	30			dB	
Average launch power, each lane	Pout	-2.9		4.0	dBm	
Optical Modulation Amplitude (OMA outer), each lane	OMA	-0.8		4.2	dBm	
Transmitter and dispersion eye closure (TDEC),each lane	TDEC			3.4	dB	
Extinction Ratio	ER	3.5			dB	
Average launch power of OFF transmitter, each lane				-15	dB	
Receiver						
Centre Wavelength	λc	1304.5		1317.5	nm	
Receiver Sensitivity in OMA outer	RXsen			-4.4	dBm	1
Average power at receiver, each lane input, each lane	Pin	-5.9		4	dBm	
Receiver Reflectance				-26	dB	
LOS Assert		-15			dBm	
LOS De-Assert – OMA				-8.4	dBm	
LOS Hysteresis		0.5			dB	

Note:
1.Measured with conformance test signal at TP3 for BER = 2.4E-4 Pre-FEC

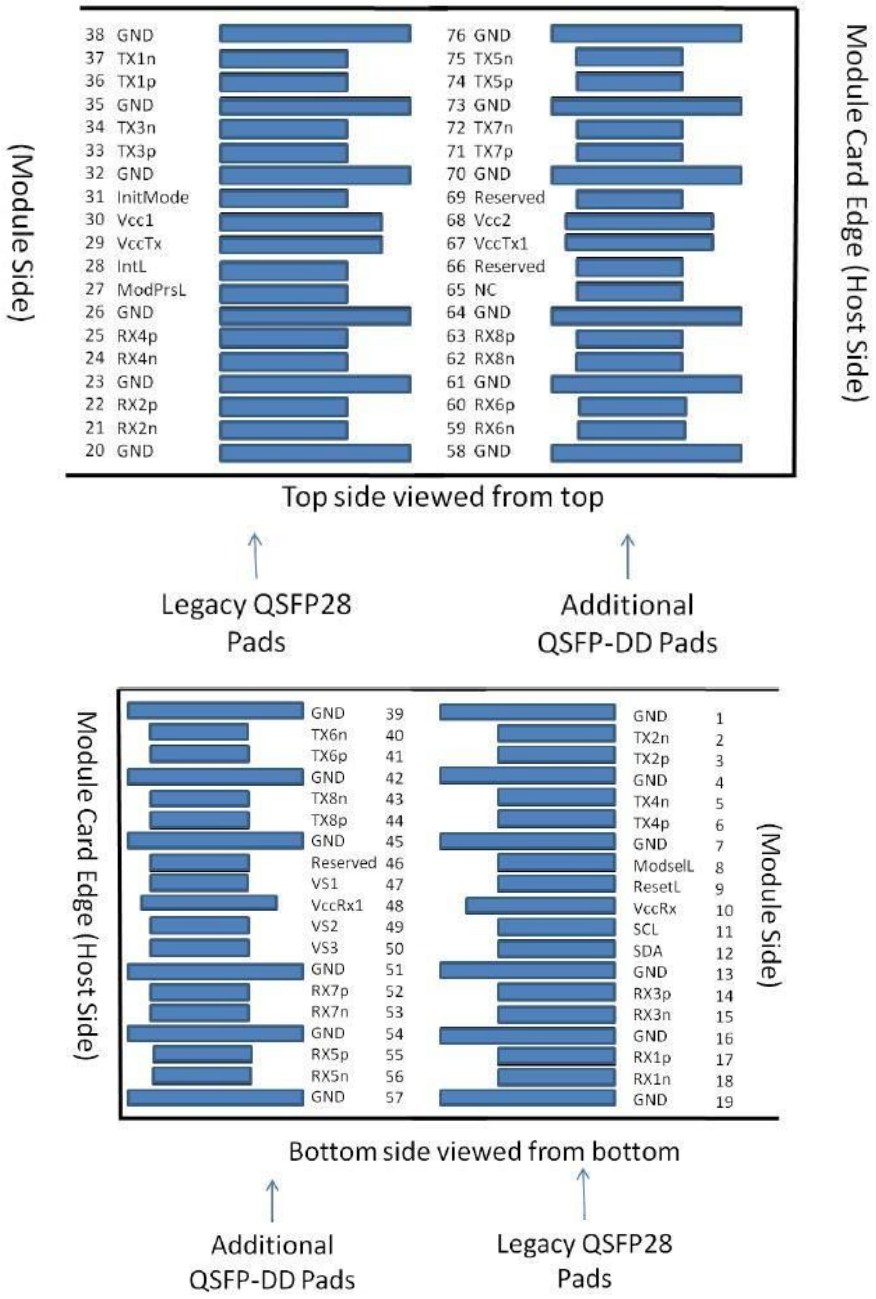
Pin Description

Pin #	Logic	Symbol	Definition
1		GND	Ground
2	CML-I	Tx2n	Transmitter Inverted Data Input
3	CML-I	Tx2p	Transmitter Non-inverted Data Input

4		GND	Ground
5	CML-I	Tx4n	Transmitter Inverted Data Input
6	CML-I	Tx4p	Transmitter Non-inverted Data Input
7		GND	Ground
8	LVTTL-I	ModSelL	Module Select
9	LVTTL-I	ResetL	Module Reset
10		VccRx	+3.3V Power Supply Receiver
11	LVCMOS-I/O	SCL	2-wire serial interface clock
12	LVCMOS-I/O	SDA	2-wire serial interface data
13		GND	Ground
14	CML-O	Rx3p	Receiver Non-inverted Data Output

15	CML-O	Rx3n	Receiver Inverted Data Output
16		GND	Ground
17	CML-O	Rx1p	Receiver Non-inverted Data Output
18	CML-O	Rx1n	Receiver Inverted Data Output
19		GND	Ground
20		GND	Ground
21	CML-O	Rx2n	Receiver Inverted Data Output
22	CML-O	Rx2p	Receiver Non-inverted Data Output
23		GND	Ground
24	CML-O	Rx4n	Receiver Inverted Data Output
25	CML-O	Rx4p	Receiver Non-inverted Data Output
26		GND	Ground
27	LVTTL-O	ModPrsL	Module Present
28	LVTTL-O	IntL	Interrupt
29		VccTx	+3.3V Power Supply Transmitter
30		Vcc1	+3.3V Power Supply
31	LVTTL-I	InitMode	Initialization mode
32		GND	Ground
33	CML-I	Tx3p	Transmitter Non-inverted Data Input
34	CML-I	Tx3n	Transmitter Inverted Data Input
35		GND	Ground
36	CML-I	Tx1p	Transmitter Non-inverted Data Input
37	CML-I	Tx1n	Transmitter Inverted Data Input
38		GND	Ground
39		GND	Ground
40	CML-I	Tx6n	Transmitter Inverted Data Input
41	CML-I	Tx6p	Transmitter Non-inverted Data Input

42		GND	Ground
43	CML-I	Tx8n	Transmitter Inverted Data Input
44	CML-I	Tx8p	Transmitter Non-inverted Data Input
45		GND	Ground
46		Reserved	
47		VS1	Module Vendor Specific 1
48		VccRx1	3.3V Power Supply
49		VS2	Module Vendor Specific 2
50		VS3	Module Vendor Specific 3
51		GND	Ground
52	CML-O	Rx7p	Receiver Non-inverted Data Output
53	CML-O	Rx7n	Receiver Inverted Data Output
54		GND	Ground
55	CML-O	Rx5p	Receiver Non-inverted Data Output
56	CML-O	Rx5n	Receiver Inverted Data Output
57		GND	Ground
58		GND	Ground
59	CML-O	Rx6n	Receiver Inverted Data Output
60	CML-O	Rx6p	Receiver Non-inverted Data Output
61		GND	Ground
62	CML-O	Rx8n	Receiver Inverted Data Output
63	CML-O	Rx8p	Receiver Non-inverted Data Output
64		GND	Ground
65		NC	Not connected
66		Reserved	
67		VccTx1	3.3V Power Supply
68		Vcc2	3.3V Power Supply
69		Reserved	
70		GND	Ground
71	CML-I	Tx7p	Transmitter Non-inverted Data Input
72	CML-I	Tx7n	Transmitter Inverted Data Input
73		GND	Ground
74	CML-I	Tx5p	Transmitter Non-inverted Data Input
75	CML-I	Tx5n	Transmitter Inverted Data Input
76		GND	Ground



Ordering Information

Part Number	Product Description
QSFP-DD-400G-DR4	400G QSFP56-DD, 500m on Single mode Fiber (SMF), MPO-12 connector

Important Notice

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Edition January, 2024
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