

EQP31Y-2D-M

QSFP28 100Gb/s PSM4 MPO 2km DDM Optical Transceiver

PRODUCT FEATURES

- **Four-channel full-duplex transceiver modules**
- **Transmission data rate up to 26Gbit/s per channel**
- **Up to 2km transmission of single mode fiber**
- **Low power consumption <3.5W**
- **Operating case temperature 0°C to 70°C**
- **3.3V power supply voltage**
- **RoHS compliant**
- **Hot Pluggable QSFP28 form factor**
- **Single MPO connector receptacle**
- **Built-in digital diagnostic function**

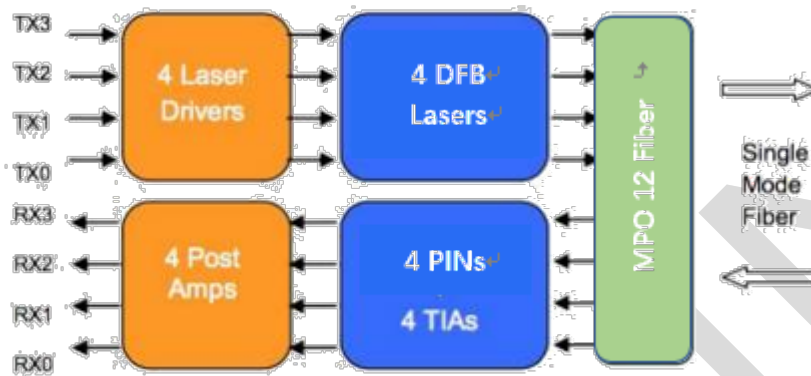
APPLICATIONS

- **100G Ethernet**
- **Proprietary High Speed Interconnections**
- **Data center**

DESCRIPTIONS

The ETU-LINK EQP31Y-2D is a Four-Channel, Pluggable, Parallel, Fiber-Optic QSFP28 Transceiver for 100G Ethernet Applications. The QSFP28 full-duplex optical module offers 4 independent transmit and receive channels, each capable of 26Gbps operation for an aggregate data rate of 104Gbps 2km using single mode fiber. These modules are designed to operate over single mode fiber systems using DFB laser . An optical fiber ribbon cable with an MPO/MTPTM connector can be plugged into the QSFP28 module receptacle. QSFP28 PSM4 is one kind of parallel transceiver which provides increased port density and total system cost savings.

Module Block Diagram



Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI	Latch Color
EQP31Y-02D-M	103.125	DFB	SMF	10km	MPO	0~70	Yes	Blue

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	TS	-40	+85	°C
Maximum Supply Voltage	VCC	-0.5	3.6	V
Operating Relative Humidity	RH	0	85	%

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	Top	0		+70	°C	
Power Supply Voltage	VCC	3.13	3.3	3.47	V	
Power Supply Current	ICC			1.21	A	
Maximum Power	PD			3.5	W	

Dissipation						
Aggregate Bit Rate	BR _{AVE}		103.125		Gb/s	
Lane Bit Rate	BR _{LANE}		25.78125 5		Gb/s	
Transmission Distance	TD			2	km	
Coupled fiber	Single mode fiber					9/125um SMF

Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter (Module Input)						
Data Rate, each lane			25.78125		Gbps	
Differential Voltage pk-pk	V _{pp}			900	mV	1
Common Mode Voltage	V _{cm}	-350		2850	mV	
Transition time	Trise/Tf all	10			ps	2
Receiver (Module Output)						
Data Rate, each lane			25.78125		Gbps	
Common Mode Noise, RMS	V _{rms}			17.5	mV	
Differential output voltage swing	V _{out, pp}			900	mV	
Eye width	EW15	0.57			UI	
Eye height	EH15	228			mV	
Differential Termination Resistance Mismatch				10	%	1
Transition time	Trise/Tf all	12			ps	

Optical and Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter						
Signaling Speed per Lane			25.78125		Gbps	
Center Wavelength	λ_C	1295		1325	nm	1
Average Launch Power, each lane	PAVG	-6	-0.5	+2.0	dBm	
Optical Modulation Amplitude (OMA)	POMA	-5	-0.5	+2.2	dBm	1
Difference in Launch Power between any two lanes	P _{tx,diff}			5.0	dB	
Transmitter and dispersion penalty (TDP), each lane (max)	TDP			2.9	dBm	1

Rise/Fall Time	Tr/Tf			30	ps	
Extinction Ratio	ER	3.5			dB	
Relative Intensity Noise	Rin			-128	dB/Hz	
Optical Return Loss Tolerance	TOL			20	dB	
Average Launch Power OFF Transmitter each Lane	Poff			-30	dBm	
Transmitter Reflectance	RT			-12	dB	
Optical Eye Mask	{0.25,0.4, 0.45, 0.25, 0.28, 0.4}				%	2
Receiver						
Center Wavelength	λ C	1295		1325	nm	
Damage Threshold	THd	+3			dBm	
Overload, each lane	OVL	+2.5			dBm	
Receiver Sensitivity in OMA, each Lane	SEN			- 11.35	dBm	3
Signal Loss Assert Threshold	LOSA	-30			dBm	
Signal Loss Deassert Threshold	LOSD			- 12	dBm	
LOS Hysteresis	LOSH	0.5			dB	
Optical Return Loss	ORL			- 12	dBm	

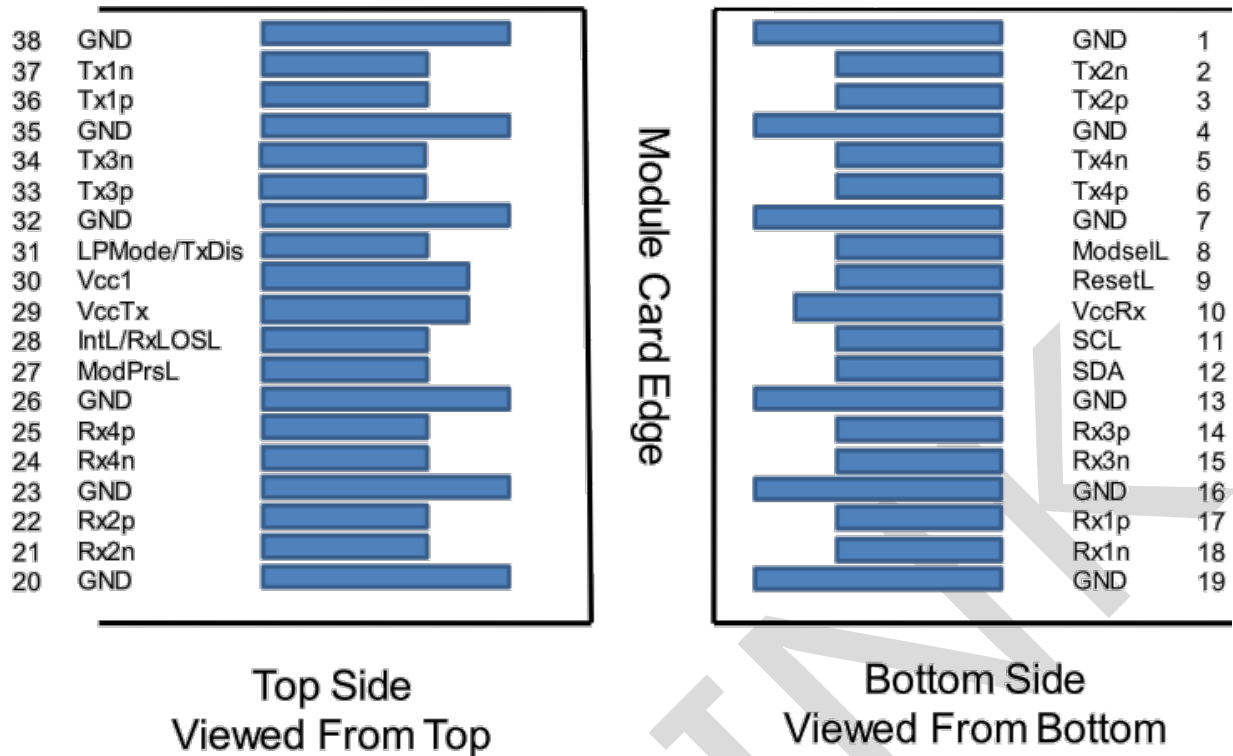
Note:

1. Transmitter wavelength and power need to meet the OMA minus TDP specs to guarantee link performance.
2. The eye diagram is tested with 1000 waveform.
3. Measured with a PRBS 231 -1 test pattern, @25.78Gb/s, BER<5*10⁻⁵

Digital Diagnostics

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	°C	±3°C	Internal / External
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	10 to 100	mA	±10%	Internal / External
TX Power	-6 to 0.5	dBm	±3dB	Internal / External
RX Power	-11.5 to 2.5	dBm	±3dB	Internal / External

Pin Diagram



Pin Definitions

PIN	Logic	Symbol	Description	Plug Seq.	Notes
1		GND	Ground	1	1
2	CML-I	Tx2n	Transmitter Inverted Data Input	3	
3	CML-I	Tx2p	Transmitter Non-Inverted Data output	3	
4		GND	Ground	1	1
5	CML-I	Tx4n	Transmitter Inverted Data Input	3	
6	CML-I	Tx4p	Transmitter Non-Inverted Data output	3	
7		GND	Ground	1	1
8	LVTLL-I	ModSelL	Module Select	3	
9	LVTLL-I	ResetL	Module Reset	3	
10		VccRx	+ 3.3V Power Supply Receiver	2	2
11	LVC MOS-I/O	SCL	2-Wire Serial Interface Clock	3	
12	LVC MOS-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	1
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	

19		GND	Ground	1	1
20		GND	Ground	1	1
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	1
24	CML-O	Rx4n	Receiver Inverted Data Output	3	1
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3	
26		GND	Ground	1	1
27	LVTTL-O	ModPrsL	Module Present	3	
28	LVTTL-O	IntL/Rx_LOS	Interrupt/Rx_LOS	3	
29		VccTx	+3.3 V Power Supply transmitter	2	2
30		Vcc1	+3.3 V Power Supply	2	2
31	LVTTL-I	LPMoDe/TxDI S	Low Power Mode/Tx_Disable	3	
32		GND	Ground	1	1
33	CML-I	Tx3p	Transmitter Non-Inverted Data Input	3	
34	CML-I	Tx3n	Transmitter Inverted Data Output	3	
35		GND	Ground	1	1
36	CML-I	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-I	Tx1n	Transmitter Inverted Data Output	3	
38		GND	Ground	1	1

Notes:

1. GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
2. Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in MSA. The connector pins are each rated for a maximum current of 1000 mA.

Recommended Interface Circuit

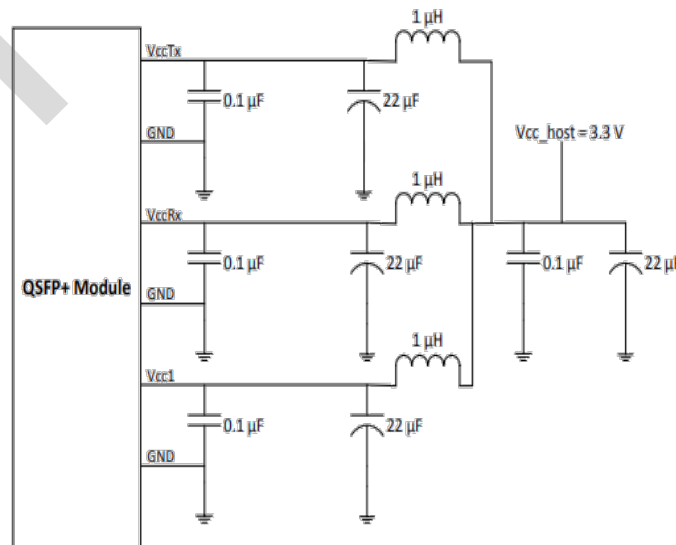


FIGURE 5-4 RECOMMENDED HOST BOARD POWER SUPPLY FILTERING

Optical Interface Lanes and Assignment

The optical interface port is a male MPO connector. The four fiber positions on the left as shown in Figure 2, with the key up, are used for the optical transmit signals (Channel 1 through 4). The fiber positions on the right are used for the optical receive signals (Channel 4 through 1). The central four fibers are physically present.

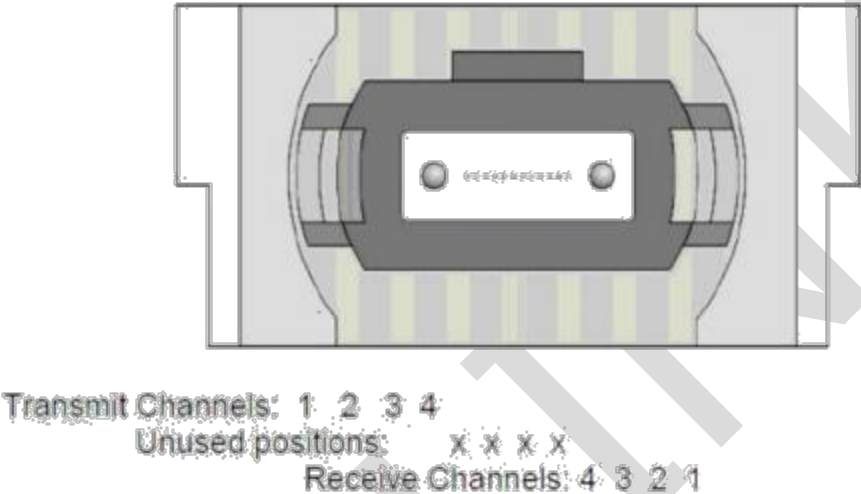
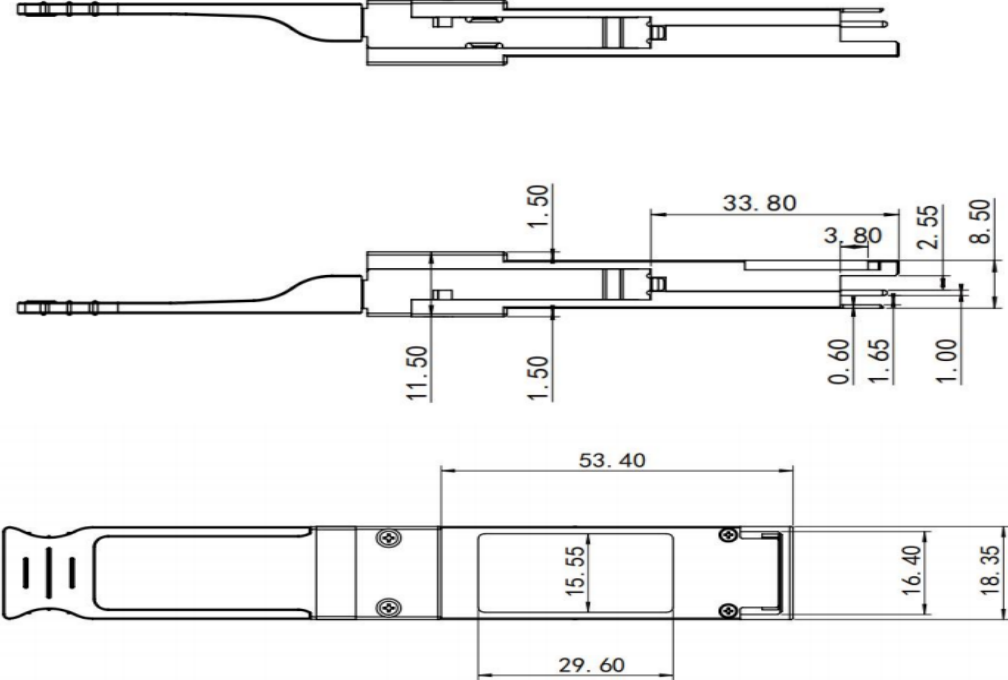
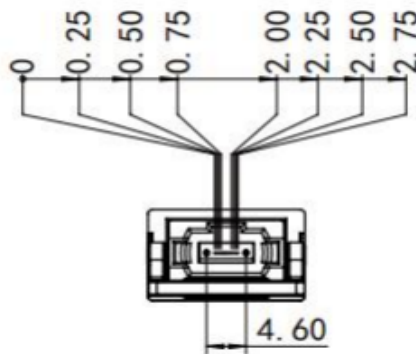
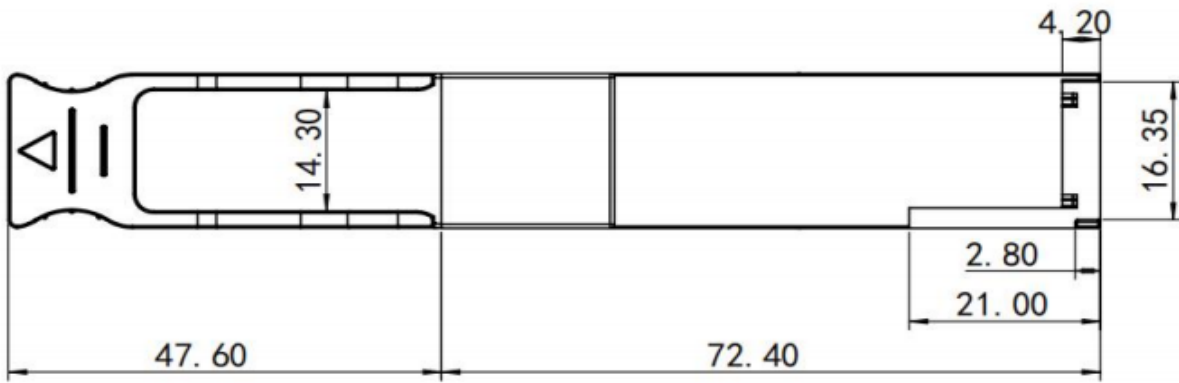


Figure 2. Optical Receptacle and Channel Orientation

Mechanical Diagram





Revision History

Version No.	Date	Description
1.0	July 15, 2019	Preliminary datasheet
1.1	July 20, 2024	Format change

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