

QSFP56-DD-ER4L

400G, QSFP56-DD, ER4L, SMF TRANSCEIVER

1295~1310nm, 30km (with FEC) REACH, DUPLEX LC CONNECTOR

Product Features

- QSFP-DD MSA compliant
- 4 LWDM lanes MUX/DEMUX design
- Up to 30km transmission on single mode
- fiber (SMF) with built-in PFEC
- 8x53.125Gb/s electrical interface
- (400GAUI-8)
- Data Rate 106.25Gbps (PAM4) per channel.
- Maximum power consumption 12W
- Duplex LC connector
- RoHS compliant
- Case operating temperature:
 - Commercial: 0 ~ 70°C



Product Applications

- 400G Ethernet
- Data Center
- Infiniband interconnects
- Enterprise networking

I. Maximum Ratings

Exceeding the limits below may damage the transceiver module permanently.

Parameter	Symbol	Min.	Typ.	Max.	Units
Storage Temperature	Ts	-40		+85	°C
Damage Threshold, each lane	THd	5			dBm
Power Supply Voltage	Vcc	-0.5		3.6	V
Relative Humidity (non-condensation)	RH	0		85	%

II. Operating Specifications

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Case Operating Temperature	TC	0		+70	°C	Commercial
Power Supply Voltage	Vcc	3.135	3.3	3.465	V	
Data Rate, each lane			26.5625		GBd	PAM4
Data Rate Accuracy		-100		100	ppm	
Pre-FEC Bit Error Ratio				2.4×10^{-4}		
Post-FEC Bit Error Ratio				1×10^{-12}		1
Link Distance	D	0.002		25	km	2
				30		3

Notes:

1. FEC provided by host system.
2. FEC required on host system to support maximum distance.
3. Built-in PFEC is required to support up to 30km

III. Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Wavelength Assignment	L0	1294.53	1295.56	1296.59	nm	
	L1	1299.02	1300.05	1301.09		
	L2	1303.54	1304.58	1305.63		
	L3	1308.09	1309.14	1310.19		
Receiver						
Data Rate, each Lane		53.125 ± 100 ppm				
Modulation format		PAM4				
Damage Receive Power, each lane		-2.4				
Receiver Saturation, each lane	overload	-3.4				
Sensitivity, each lane	Sen1	Max(-10.1, SECQ-13.5)			dBm	25km
	Sen2	Max(-12.1, SECQ-13.5)				30km

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Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						
Data Rate, each Lane		53.125 ± 100 ppm			GBd	
Modulation format		PAM4				
Side-mode Suppression Ratio	SMSR	30			dB	
Total Average Launch Power	P _T			14.7	dBm	
Average launch power, each lane	P _{AVG}	-0.4		6.5	dBm	
Outer Optical Modulation Amplitude (OMA _{outer}), each Lane	P _{OMA}	3.4		9	dBm	
Launch Power in OMA _{outer} minus TDECQ, each Lane		2			dB	
Transmitter and Dispersion Eye Closure for PAM4, each Lane	TDECQ			3.9	dB	
Extinction Ratio	ER	6			dB	
Difference in Launch Power between any Two Lanes(OMA _{outer})				4	dB	
RIN _{15.1OMA}	RIN	-132			dB/Hz	
Optical Return Loss Tolerance	TOL			15.6	dB	
Transmitter Reflectance	R _T			-26	dB	
Average Launch Power of OFF Transmitter, each Lane	P _{Off}			-30	dBm	
Stressed Conditions for Stress Receiver Sensitivity						
Stressed Eye Closure for PAM4 (SECQ), Lane under Test			3.4		dB	
SECQ – 10*log ₁₀ (Ceq), Lane under Test					dB	
OMA _{outer} of each Aggressor Lane			-8		dBm	

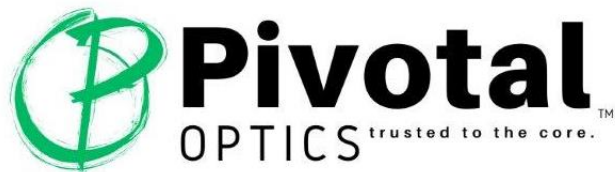
IV. Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Power Consumption				12	W	
Supply Current	I _{cc}			3.64	A	
Transmitter (each lane)						
Signaling Rate, each Lane	TP1	26.5625 ± 100 ppm			GBd	
Differential pk-pk Input Voltage Tolerance	TP1a	900			mVpp	1
Differential Termination Mismatch	TP1			10	%	
Differential Input Return Loss	TP1	IEEE 802.3-2015 Equation (83E-5)			dB	
Differential to Common Mode Input Return Loss	TP1	IEEE 802.3-2015 Equation (83E-6)			dB	
Module Stressed Input Test	TP1a	See IEEE 802.3bs 120E.3.4.1				2
Single-ended Voltage Tolerance Range (Min)	TP1a	-0.4 to 3.3			V	
DC Common Mode Input Voltage	TP1	-350		2850	mV	3
Receiver (each lane)						
Signaling Rate, each Lane	TP4	26.5625 ± 100 ppm			GBd	
Differential pk-pk Output Voltage	TP4			900	mVpp	
AC Common Mode Output Voltage, RMS	TP4			17.5	mV	
Differential Termination Mismatch	TP4			10	%	
Differential Output Return Loss	TP4	IEEE 802.3-2015 Equation (83E-2)				
Common to Differential Mode Conversion Return Loss	TP4	IEEE 802.3-2015 Equation (83E-3)				
Transition Time, 20% to 80%	TP4	9.5			ps	
Near-end Eye Symmetry Mask Width (ESMW)	TP4		0.265		UI	
Near-end Eye Symmetry Mask Width (ESMW)	TP4	70			mV	
Far-end Eye Symmetry Mask Width (ESMW)	TP4		0.2		UI	
Far-end Eye Height, Differential	TP4	30			mV	
Far-end Eye Height, Differential	TP4	-4.5		2.5	%	
Common Mode Output Voltage	TP4	-350		2850	mV	

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Notes:

1. With the exception to IEEE 802.3bs 120E.3.1.2 that the pattern is PRBS31Q or scrambled idle.
2. Meets BER specified in IEEE 802.3bs 120E.1.1.
3. DC common mode voltage generated by the host. Specification includes effects of ground offset voltage.

V. Ordering Information

Pivotal Part Number	Description
QSFP56-DD-ER4L	QSFP56-DD, CMIS 4.0, 1310nm, ER4L SMF 30km with FEC, 400G DDM, C-Temp

Notes:

1. Please contact sales for specific OEM Platform part numbers to fit your network.

Warranty

<https://pivotaloptics.com/warranty/>

Disclaimer

External physical characteristics are subject to variation. This may include, but is not limited to, external case designs, pull tab colors and/or shapes, removal latch styles or colors, and label sizes and placement. These variations do not affect the function or characteristics of the transceivers.