

QSFP28 100G to 4x SFP28 25G Active Optical Cable

ESAOC001

Product Features

- Compliant to SFF-8636 & SFF-8472 Transceiver Specification
- Full duplex 4 channel 850nm parallel AOC
- High reliability 850nm VCSEL array transmitter
- Hot pluggable
- Single 3.3V power supply, Low power consumption
- Operating range -5 to 70°C case temperature
- RoHS-6 compliant (lead-free)
- Metal enclosure for low EMI
- Distance 1m/3m/5m/10m/15m/20m/30m/50m/100m

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	TSTG	-40	-	+85
Operating Temperature	Top	-5		70
Operating Relative Humidity	RH	5	-	85
3.3V Supply Voltage	VCC	-0.5	-	+3.6

QSFP28 Specification

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case temperature	Tc	-5	-	+70	°C	
3.3V Supply Voltage	VCC	3.135	3.3	3.465	V	
Total Data Rate			103.125		Gbps	
Data Rate per Lane			25.78125		Gbps	
Receiver Differential Data Output Load			100		ohms	
Logic Input Voltage High	Vih	2		Vcc+0.3	V	
Logic Input Voltage Low	Vil	-0.3		0.8	V	

Two wire Serial Interface Clock Rate			100	400	KHz	
Power Supply Noise				50	mVpp	
Standard Cable Lengths		1, 3, 5, 10, 15, 20, 30, 50, 100			m	

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transceiver Power Consumption				2.5	W	
Transceiver Power Supply Current				750	mA	
Transceiver Power On Initialization Time	Tinit			2000	ms	
Transmitter (per lane)						
Differential Data Input Voltage Peak to Peak Swing	Vin,pp			900	mV	
Differential Input Impedance	Zind	90	100	110	ohm	*
Common Mode Noise RMS				17.5	mV	
Differential input return loss	SDD22	Per OIF CEI-28G-VSR and CAUI-4 requirements			dB	
Common Mode to Differential conversion & Differential to Common Mode Conversion	SDC22, SCD22					
Common Mode Return Loss	SCC22					
Transition Time, 20 to 80%	Tr, Tf	10			ps	
Common Mode Voltage	Vcm	-0.3		2.8	V	
Eye Width at 1E-15 probability	EW15	0.46			UI	
Eye Height at 1E-15 probability	EH15	94			mv	
Receiver (per lane)						
Differential Data Output Voltage Peak to Peak Swing	Vopp	300		900	mV	
Differential output Impedance	Zos	90	100	110	Ohms	
Common Mode Voltage	Vcm	-0.35		2.85	V	
Common Mode Noise RMS				17.5	mv	
Differential output return loss	SDD22	Per OIF CEI-28G-VSR and CAUI-4 requirements			dB	
Common Mode to Differential conversion and Differential to Common Mode Conversion	SDC22, SCD22					
Common Mode Return Loss	SCC22					
Transition Time, 20 to 80%	Tr, Tf	10			ps	
Vertical Eye Closure	VEC			5.5	dB	
Eye Width at 1E-15 probability	EW15	0.57			UI	
Eye Height at 1E-15 probability	EH15	228			mv	

Note:
AC coupled inside module

SFP28 Specification

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case temperature	Tc	-5	-	+70	°C	
3.3V Supply Voltage	VCC	3.135	3.3	3.465	V	
Data Rate per Lane			25.78125		Gbps	
Receiver Differential Data Output Load			100		ohms	
Logic Input Voltage High	Vih	2		Vcc+0.3	V	
Logic Input Voltage Low	Vil	-0.3		0.8	V	
Two wire Serial Interface Clock Rate			100	400	KHz	
Power Supply Noise				50	mVpp	

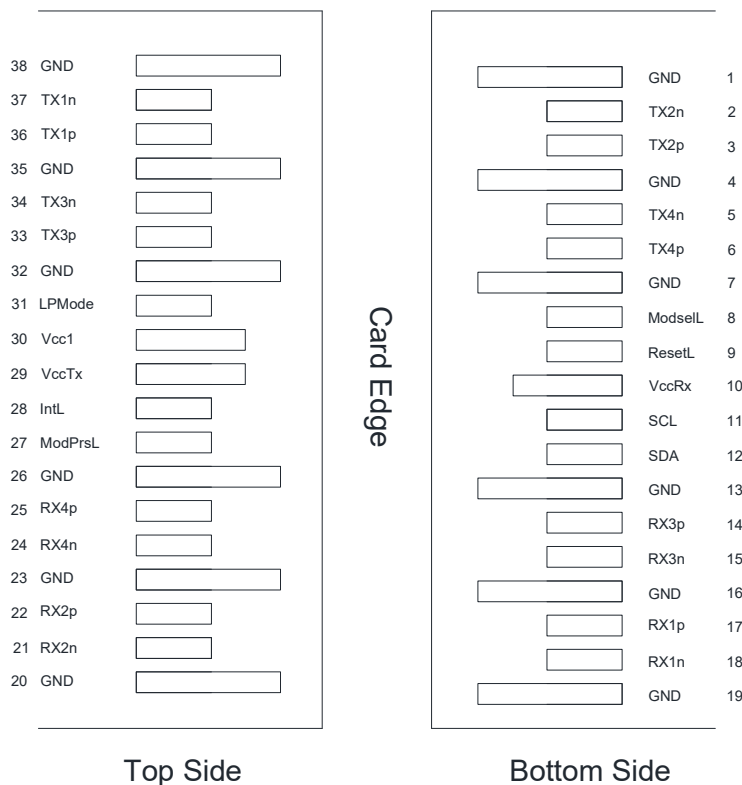
Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transceiver Power Consumption				1	W	
Transceiver Power Supply Current				300	mA	
Transceiver Power On Initialization Time	Tinit			2000	ms	
Transmitter (per lane)						
Differential Data Input Voltage Peak to Peak Swing	Vin,pp			900	mV	
Differential Input Impedance	Zind	90	100	110	ohm	*
Common Mode Noise RMS				17.5	mV	
Differential input return loss	SDD22	Per OIF CEI-28G-VSR and CAUI-4 requirements			dB	
Common Mode to Differential conversion & Differential to Common Mode Conversion	SDC22, SCD22					
Common Mode Return Loss	SCC22					
Transition Time, 20 to 80%	Tr, Tf	10			ps	
Common Mode Voltage	Vcm	-0.3		2.8	V	
Eye Width at 1E-15 probability	EW15	0.46			UI	
Eye Height at 1E-15 probability	EH15	94			mv	
Receiver (per lane)						
Differential Data Output Voltage Peak to Peak Swing	Vopp	300		900	mV	

Differential output Impedance	Zos	90	100	110	Ohms	
Common Mode Voltage	Vcm	-0.35		2.85	V	
Common Mode Noise RMS				17.5	mv	
Differential input return loss	SDD22	Per OIF CEI-28G-VSR and CAUI-4 requirements			dB	
Common Mode to Differential conversion & Differential to Common Mode Conversion	SDC22, SCD22					
Common Mode Return Loss	SCC22			-2	dB	
Transition Time, 20 to 80%	Tr, Tf	10			ps	
Vertical Eye Closure	VEC			5.5	dB	
Eye Width at 1E-15 probability	EW15	0.57			UI	
Eye Height at 1E-15 probability	EH15	228			mv	

Note:
AC coupled inside module

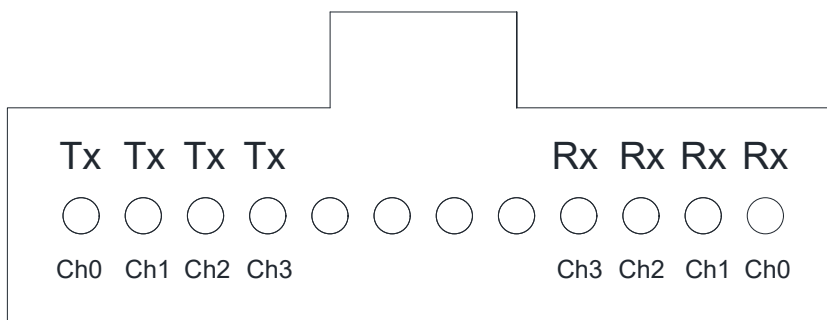
QSFP28 Pin Descriptions



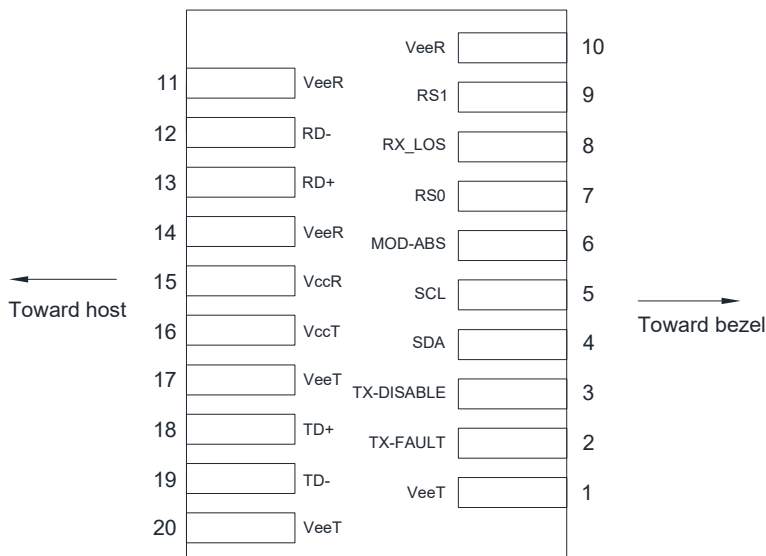
Pin	Symbol	Descriptions
1	GND	Transmitter Ground (common with receiver ground)
2	Tx2-	Transmitter inverted data input
3	Tx2+	Transmitter non-inverted data output
4	GND	Transmitter Ground (common with receiver ground)
5	Tx4-	Transmitter inverted data input
6	Tx4+	Transmitter non-inverted data output
7	GND	Transmitter Ground (common with receiver ground)
8	ModSe1L	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	Transmitter Ground (common with receiver ground)
14	Rx3+	Receiver non-inverted data output
15	Rx3-	Receiver inverted data output
16	GND	Transmitter Ground (common with receiver ground)
17	Rx1+	Receiver non-inverted data output
18	Rx1-	Receiver inverted data output
19	GND	Transmitter Ground (common with receiver ground)
20	GND	Transmitter Ground (common with receiver ground)
21	Rx2-	Receiver inverted data output
22	Rx2+	Receiver non-inverted data output
23	GND	Transmitter Ground (common with receiver ground)
24	Rx4-	Receiver inverted data output
25	Rx4+	Receiver non-inverted data output
26	GND	Transmitter Ground (common with receiver ground)
27	ModPrsL	Module present
28	IntL	Interrupt
29	VccTx	3.3V power supply transmitter
30	Vcc1	3.3V power supply
31	LPMoDe	Low power mode
32	GND	Transmitter Ground (common with receiver ground)

33	Tx3+	Transmitter non-inverted data input
34	Tx3-	Transmitter inverted data output
35	GND	Transmitter Ground (common with receiver ground)
36	Tx1+	Transmitter non-inverted data input
37	Tx1-	Transmitter inverted data output
38	GND	Transmitter Ground (common with receiver ground)

Optical Interface Lanes and Assignment



SFP28 Pin Descriptions



Pin	Symbol	Descriptions
1	VeeT	Transmitter ground
2	TX_fault	Transmitter fault (LVTTTL-O) – high indicates a fault condition
3	TX_disable	Transmitter disable (LVTTTL-I) – high or open disable the transmitter
4	SDA	2-wire serial interface data line (LVCMOS-I/O) (MOD-DEF2)
5	SCL	2-wire serial interface clock line (LVCMOS-I/O) (MOD-DEF1)
6	MOD_ABS	Module absent, (output), connected to VeeT or VeeR in the module
7	RS0	NA
8	RX_LOS	Receiver loss of signal LVTTTL-O)
9	RS1	NA
10	VccRx	Receiver ground
11	SCL	Receiver ground
12	RD-	Inverse received data out (CML-O)
13	RD+	Received data out (CML-O)
14	VeeR	Receiver ground
15	VccR	Receiver power +3.3V
16	VccT	Transmitter power +3.3V
17	VeeT	Transmitter ground
18	TD+	Transmitter data in (CML-I)
19	TD-	Reverse transmitter data in (CML-I)
20	VeeT	Transmitter ground