

QSFP28-to-4×SFP28 Breakout Active Optical Cable

Key Features

- ❑ Up to 25.78 Gbps per channel
- ❑ 4 independent full-duplex
- ❑ Single 3.3 V power supply
- ❑ Low power consumption: < 1.9 W on QSFP end, < 0.8 W on SFP end
- ❑ Up to 150 m with OM3 fibers
- ❑ Hot pluggable
- ❑ RoHS compliant
- ❑ Commercial operating case temperature range: 0 to 70°C
- ❑ LSZH, LSZH/OFNR, OFNP-rated cables
- ❑ TUV/UL-certified



Applications

- ❑ 10/25G Ethernet
- ❑ Data center: Servers, switches, storages and NIC adapters

Description

QSFP28-to-4×SFP28 Breakout AOC fully takes advantage of the high transmission bandwidth, low power consumption, and long reach.

1. Absolute Maximum Ratings

Parameters	Symbol	Min.	Typ.	Max.	Units	Note
Supply Voltage	V_{IN}	0	-	4.0	V	
Storage Temperature	T_{STG}	-40	-	85	°C	Ambient
Relative Humidity	RH	0		85	%	

2. Operating Specifications

Parameters	Symbol	Min.	Typ.	Max.	Units	Note
Operating Case Temperature	T_{OP}	0	-	70	°C	
Power Supply Voltage	V_{CC}	3.13	3.30	3.47	V	
Power Supply Current	SFP28	I_{CC}	-	220	mA	Per End
	QSFP28		-	510		Per End
Power Consumption	SFP28	-	-	0.8	W	Per End
	QSFP28		-	1.9		Per End

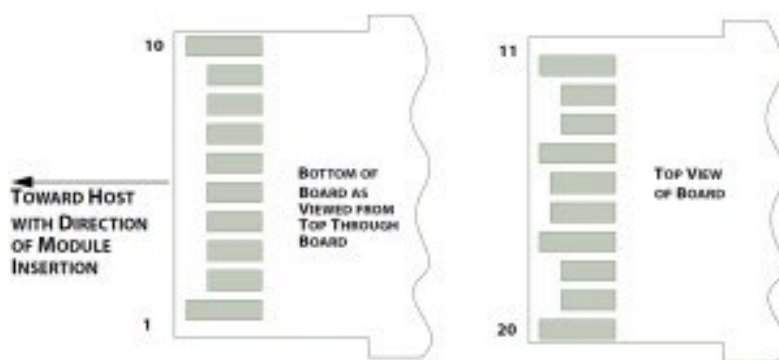
3. Electrical Characteristics

Parameters	Symbol	Min.	Typ.	Max.	Units	Note
Data Rate (Per Channel)	BR	10.00	25.78	-	Gbps	
Transmitter						
Input Differential Impedance	R_{IN}	-	100	-	Ω	
Differential Data Input Swing	V_{INP-P}	200	-	900	mV	
Receiver						
Output Differential Impedance	R_{OUT}	-	100	-	Ω	
Differential Data Output Swing	V_{OUTP-P}	-	-	800	mV	
Raw Bit Error Ratio (at 25.78 Gbps)	-	-	-	10^{-8}	-	PRBS 2 ³¹ -1

4. Pin Description (SFP28 Terminal)

Pin	Name	Description	Note
1	VeeT	Module Transmitter Ground	1
2	Tx_Fault	Module Transmitter Fault	2
3	Tx_Disable	Transmitter Disable; Turns off transmitter laser output	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock	4
6	Mod_ABS	Module Absent, grounded within the module	
7	RS0	Rate Select 0, optionally controls SFP+ module receiver	5
8	Rx_LOS	Receiver Loss of Signal Indication	2
9	RS1	Rate Select 1, optionally controls SFP+ module transmitter	5
10	VeeR	Module Receiver Ground	1
11	VeeR	Module Receiver Ground	1
12	RD-	Receiver Inverted Data Output	
13	RD+	Receiver Non-Inverted Data Output	
14	VeeR	Module Receiver Ground	1
15	VccR	Module Receiver 3.3V Supply	
16	VccT	Module Transmitter 3.3V Supply	
17	VeeT	Module Transmitter Ground	1
18	TD+	Transmitter Non-Inverted Data Input	
19	TD-	Transmitter Inverted Data Input	
20	VeeT	Module Transmitter Ground	1

1. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
2. The TTL level TXFault is an open collector/drain output, which should be pulled up with a 4.7 – 10 k Ω resistor on the host board to VccT. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V. When sensing an improper power level in the laser driver, the SFP sets this signal high and turns off the laser. TX-FAULT can be reset with the TX-DISABLE line.
3. TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 – 10 k Ω resistor. The states are: Low (0 – 0.8V): Transmitter on / (>0.8, < 2.0V): Undefined / High (>2.0): Transmitter Disabled / Open: Transmitter Disabled. Make TX-DISABLE high (TTL logic "1") to turn off the laser output. The laser will turn on when TX-DISABLE is low (TTL logic "0").
4. These are the module definition pins. They should be pulled up with a 4.7 – 10 k Ω resistor on the host board to supply less than VccT+0.3V or VccR+0.3V.
5. Not used.



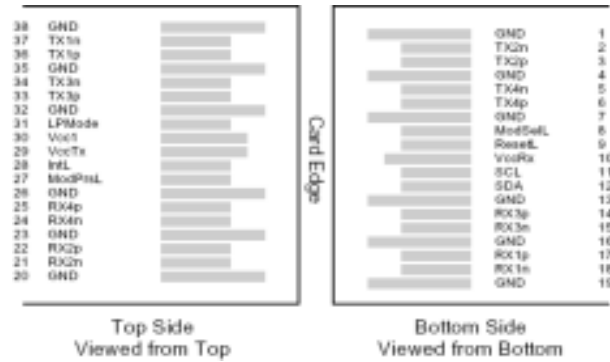
Pad Layout

4. Pin Description (QSFP28 Terminal)

Pin	Name	Description	Note
1	GND	Ground	1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	1
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	Vcc Rx	3.3V Power supply receiver	2
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	1
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	Vcc Tx	3.3V Power supply transmitter	2
30	Vcc 1	3.3V Power Supply	2
31	LPMODE	Low Power Mode	3
32	GND	Ground	1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	1
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	1

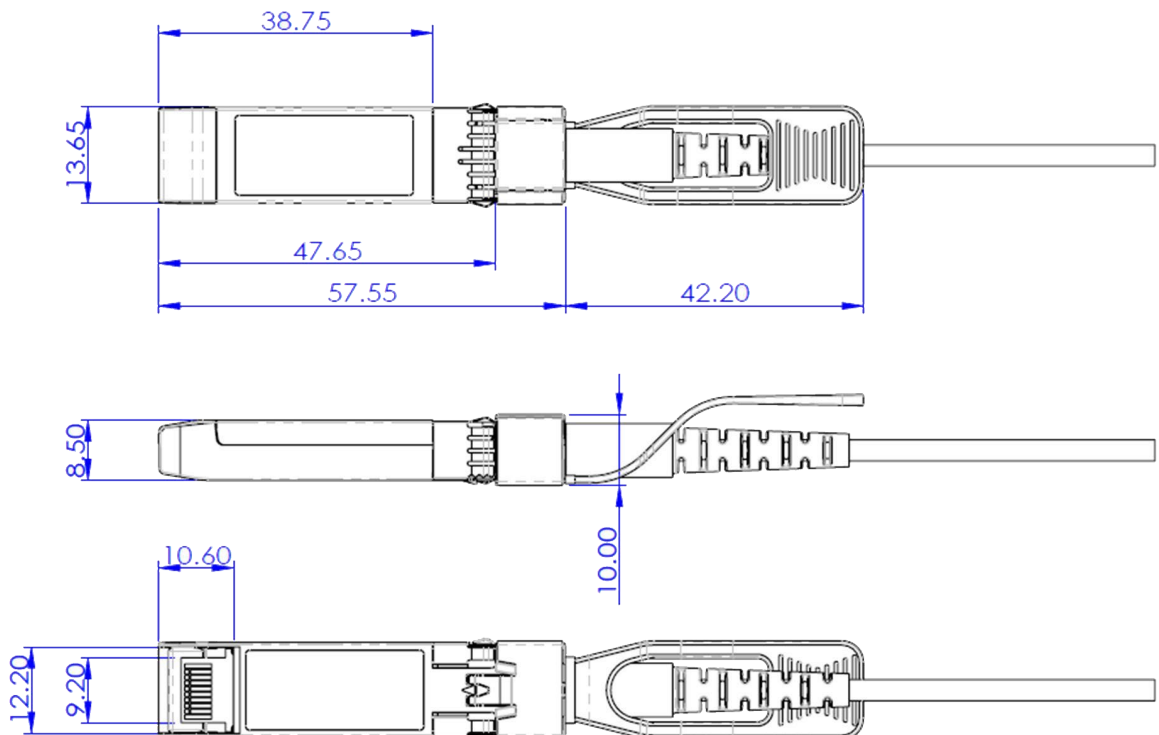
1. GND is the symbol for signal and supply (power) common for the QSFP module. All are common within the QSFP module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
2. Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP transceiver module in any combination. The connector pins are each rated for a maximum current of 500 mA.
3. Not used.

4. Pin Description (QSFP28 Terminal)

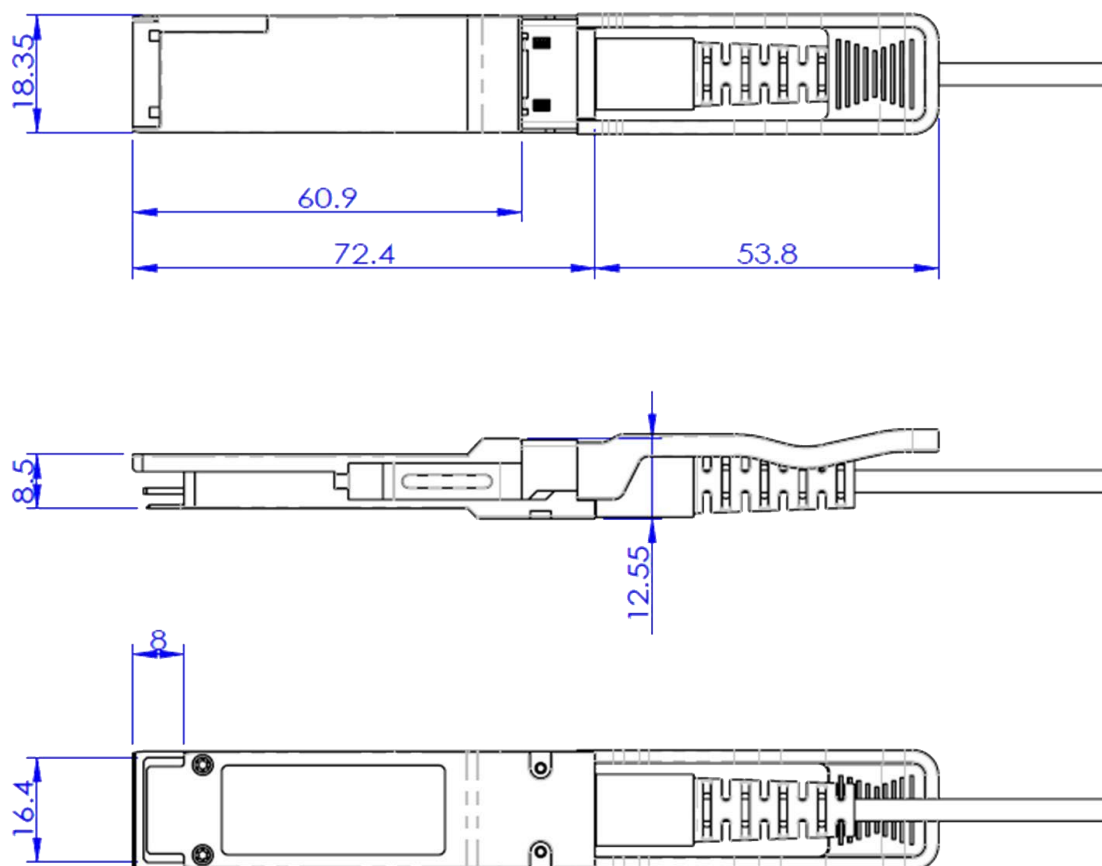


Pad Layout

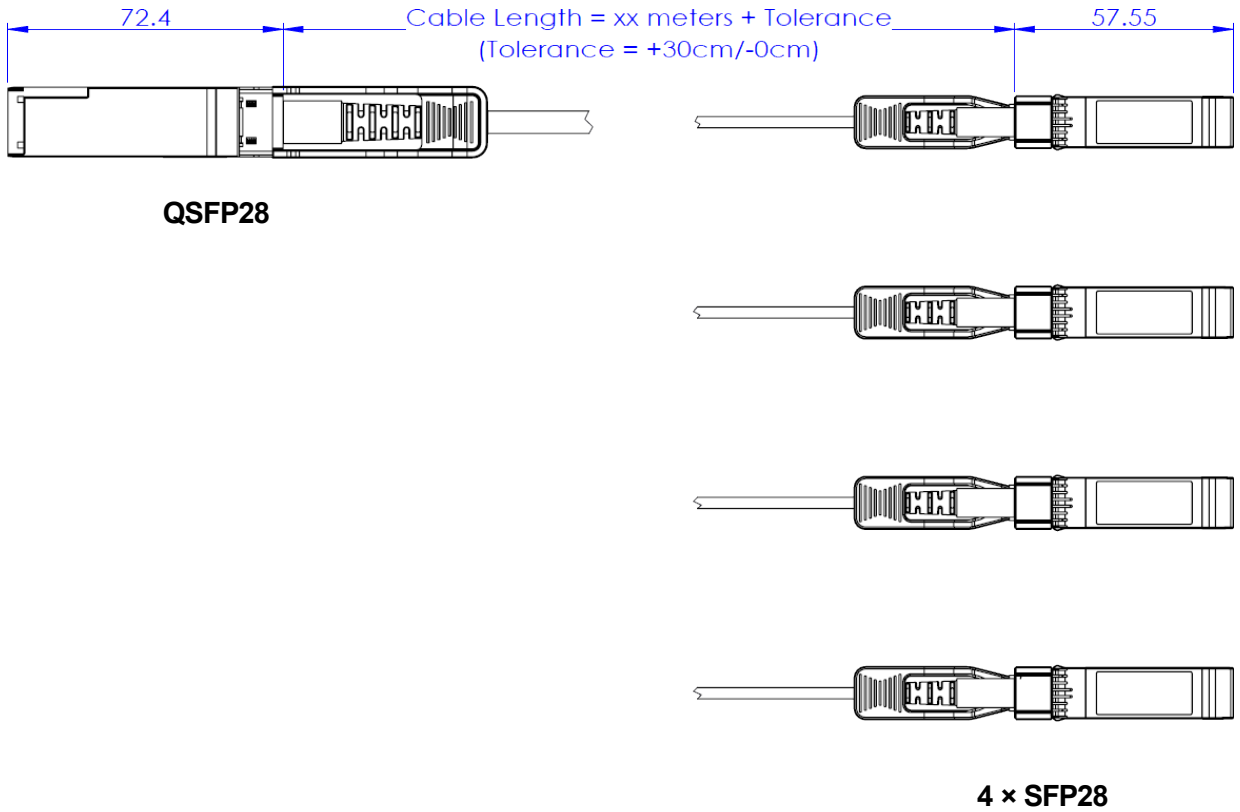
5. Mechanical Specifications (SFP28 Terminal)



5. Mechanical Specifications (QSFP28 Terminal)



5. Mechanical Specifications (Breakout)



6. Active Optical Cable

Parameter	Value	Unit	Note
Cable Diameter	- LSZH: $\varnothing 2.2 \pm 0.15$ - LSZH/OFNR, OFNP: $\varnothing 3.0 \pm 0.2$	mm	
Minimum Bend Radius	30	mm	
Length Tolerance	+300 / -0	mm	
Cable Jacket	LSZH, LSZH/OFNR, OFNP-rated, Aqua		

7. Ordering Information

Part Number	Description	Note
MD100FOXXyyzz	QSFP28-to-4×SFP28, AOC, LSZH, yyy m, three-digit number yyy for length in meter	

Note 1) The maximum cable length is 150 m.

Note 2) The first digit A, B or C of the three-digit number denotes 0.25 m, 0.50 m and 0.75 m, respectively.

Note 3) The first digit A, B or C of the three-digit number can be used for the cable length no greater than 10 m.

Note 4) Cable jacket XX– GA (LSZH), GB (LSZH/OFNR), GC (OFNP)

Part Number	Description
MD100FOGAB00ZZ	QSFP28 to 4×SFP28, LSZH, AOC, 0.5m
MD100FOGBA09ZZ	QSFP28 to 4×SFP28, LSZH/OFNR, AOC, 9.25m
MD100FOGCA01ZZ	QSFP28 to 4×SFP28, OFNP, AOC, 1.75m