

200G QSFP56 Active Optical Cable

Key Features

- ❑ Low latency DSP-free electronics-based CDR
- ❑ Multi-data rate up to 56.15 Gb/s per lane
- ❑ PAM4 modulation
- ❑ HPC-grade BER $\leq 5 \times 10^{-8}$
- ❑ Single 3.3 V power supply
- ❑ Low power consumption : 3.6 W per cable end with all CDRs enabled
- ❑ Up to 100 m length
- ❑ SFF-8665 compliant QSFP56 port
- ❑ SFF-8636 compliant I2C management interface
- ❑ Commercial operating case temperature range: 0 to 70°C
- ❑ Hot pluggable
- ❑ RoHS/REACH compliant
- ❑ TUV-certified
- ❑ LSZH, LSZH/OFNR or OFNP-rated cable



Applications

- ❑ IEEE 802.3cd 200GBASE SR4
- ❑ IBTA InfiniBand HDR
- ❑ Datacenter: servers, switches, storages and NIC adapters
- ❑ Proprietary HPC interconnections

1. Absolute Maximum Ratings

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V_{IN}	0	-	4.0	V	
Input Swing	V_{IN-MAX}			1500	mVpp	
Storage Temperature	T_{STG}	-40	-	85	°C	Ambient
Relative Humidity	RH	5	-	85	%	

2. Operating Specifications

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Case Temperature	T_{OP}	0	-	70	°C	
Power Supply Voltage	V_{CC}	3.15	3.30	3.47	V	
Power Supply Current	I_{CC}	-	1100	1250	mA	1
Power Consumption		-	3.6	4.0	W	1

3. Electrical Characteristics

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Data Rate (Per Channel)	BR	-	26.5625	-	GBd	2
Transmitter						
Input Differential Impedance	R_{IN}	90	100	110	Ω	
Differential Data Input Voltage	V_{INP-P}	900			mV	
Receiver						
Output Differential Impedance	R_{OUT}	90	100	110	Ω	
Differential Data Output Voltage	V_{OUTP-P}	-	800	-	mV	
Bit Error Ratio (at 26.5625 GBd)	-	-	-	2.4×10^{-4}	-	3
Digital Logic						
Input High Voltage	V_{IH}	$0.7 \times V_{CC}$			V	
Input Low Voltage	V_{IL}			$0.3 \times V_{CC}$	V	
Output High Voltage	V_{OH}	$V_{CC} - 0.7$			V	
Output Low Voltage	V_{OL}			0.6	V	

Note:

- Per end, all channel CDRs are enabled.
- Dual data rate of 25.78125 and 28.07618 Gbaud are available upon request.
- Pre-FEC Bit Error Ratio with a PRBS $2^{31} - 1$ test pattern over a normal operating temperature range.

4. Pin Description

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

Note:

- 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.
- 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.

4. Pin Description

38	GND	
37	Tx1n	
36	Tx1p	
35	GND	
34	Tx3n	
33	Tx3p	
32	GND	
31	LPMode/TxDis	
30	Vcc1	
29	VccTx	
28	IntL/RxLOSL	
27	ModPrsL	
26	GND	
25	Rx4p	
24	Rx4n	
23	GND	
22	Rx2p	
21	Rx2n	
20	GND	

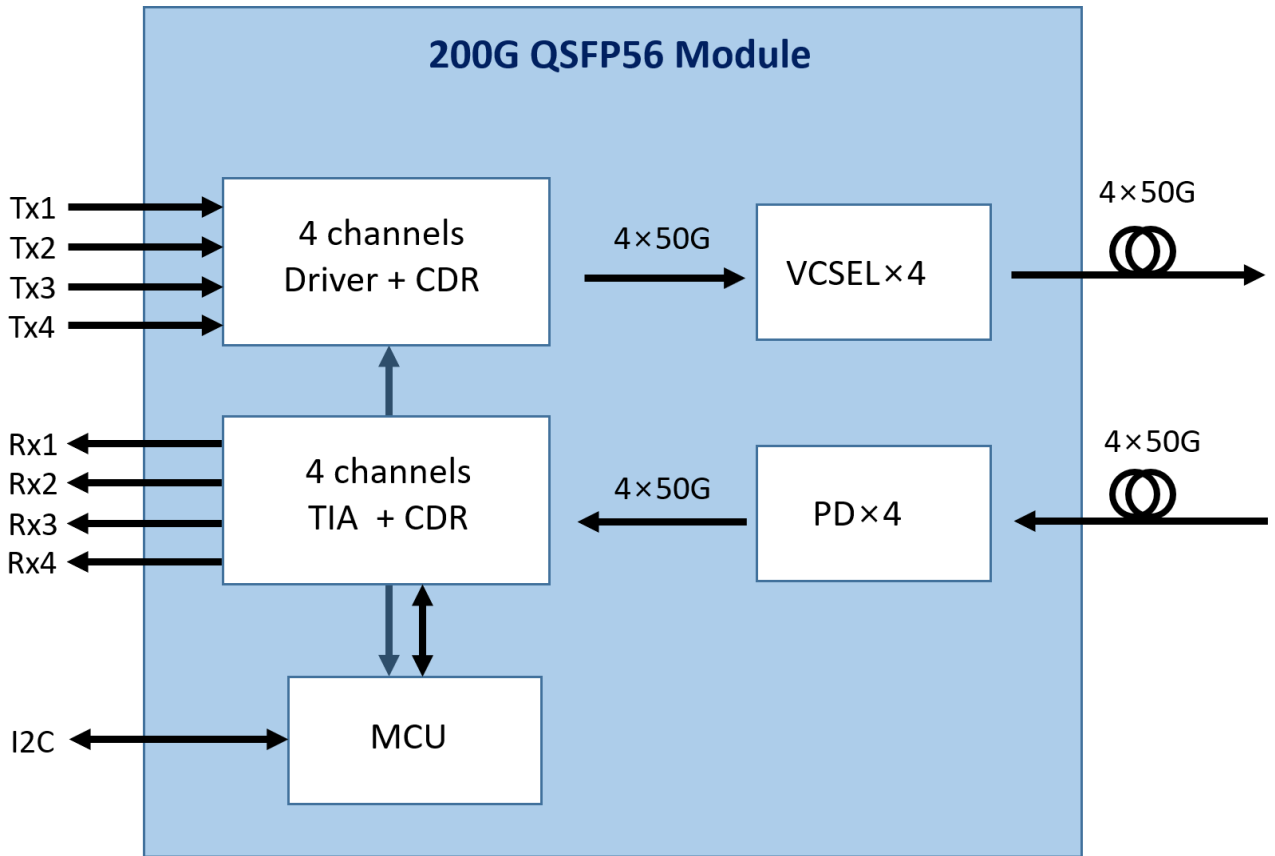
Top Side
Viewed From Top

Module Card Edge

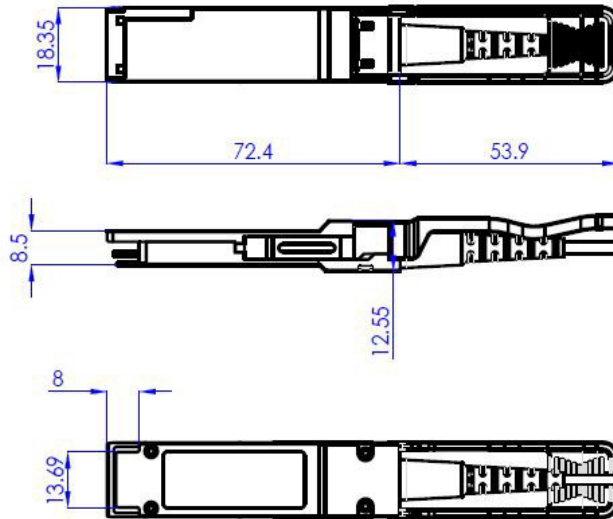
	GND	1
	Tx2n	2
	Tx2p	3
	GND	4
	Tx4n	5
	Tx4p	6
	GND	7
	ModselL	8
	ResetL	9
	VccRx	10
	SCL	11
	SDA	12
	GND	13
	Rx3p	14
	Rx3n	15
	GND	16
	Rx1p	17
	Rx1n	18
	GND	19

Bottom Side
Viewed From Bottom

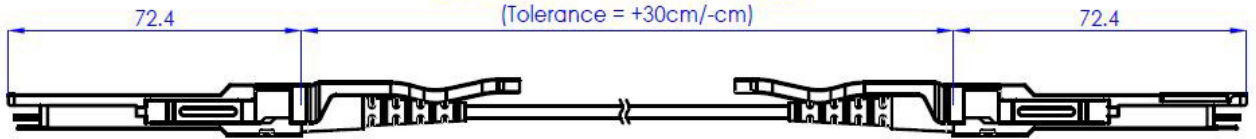
5. Block Diagram



6. Mechanical Specifications



Cable Length = xx meters + Tolerance
(Tolerance = +30cm/-cm)



7. Active Optical Cable

Parameters	Value	Unit	Note
Cable Diameter	<ul style="list-style-type: none"> LSZH, LSZH/OFNR: $\varnothing 3.0 \pm 0.15$ OFNP: $\varnothing 3.0 \pm 0.20$ 	mm	
Minimum Bend Radius	30	mm	Without tension
	60	mm	Under Maximum tension
Length Tolerance	+300 / -0	mm	
Cable Jacket	LSZH, LSZH/OFNR or OFNP-rated, Aqua		

8. Ordering Information

Part Number	Description	Note
MD56EXXyyyZZ	AOC, QSFP56, Ethernet, yyy m, three-digit number yyy for length in meter	
MD56IXXyyyZZ	AOC, QSFP56, InfiniBand, yyy m, three-digit number yyy for length in meter	

Note:

- Length (yyy)
 - The maximum cable length is 70 m with OM3 or 100 m with OM4.
 - The first digit A, B or C of the three-digit number denotes 0.25 m, 0.50 m and 0.75 m, respectively.
 - The first digit A, B or C of the three-digit number can be used for the cable length no greater than 10 m.
- Cable jacket type (XX): GA (LSZH), GB (LSZH/OFNR), GC (OFNP)
- Customer ID (ZZ): To be assigned upon request.

Examples

Part Number	Description
MD56EGAB <u>00</u> ZZ	AOC, QSFP56, LSZH, Ethernet, <u>0.5</u> m
MD56IGBA <u>09</u> ZZ	AOC, QSFP56, LSZH/OFNR, InfiniBand, <u>9.25</u> m
MD56EGCC <u>01</u> ZZ	AOC, QSFP56, OFNP, Ethernet, <u>1.75</u> m

9. Revision History

Version	Date	Description
1.0	Jan. 4, 2021	Initial release
1.01	Mar. 12, 2021	Added TUV-certified in key features Added dual rate feature in Sec. 3 Added a note on minimum bend radius in Sec. 7 Added detailed ordering information in Sec. 8
1.02	Jun. 15, 2021	Modified differential data input/output voltage values in Sec. 3
1.10	Oct. 19, 2021	Added detailed input/output differential impedance values in Sec. 3 Added a detailed minimum bend radius in Sec. 7