

## 400GbE to 4x100GbE (QSFP56-DD to 4xQSFP56) Direct attach Cable

P/N: GQD-4Q56P401-XXC

### Features

- ✓ Hot-plug QSFP56-DD and QSFP56 form factor
- ✓ Support 8x 50Gb/s PAM4 modulation
- ✓ Commercial case temperature range of 0°C to 70°C
- ✓ 26 AWG ~30 AWG support up to 3m length
- ✓ I<sup>2</sup>C management interface
- ✓ RoHS compliant

### Applications

- ✓ Data storage and communication industry
- ✓ Switch / router / HBA
- ✓ Enterprise network
- ✓ SAN
- ✓ Data Center Network



### STANDARDS COMPLIANCE

- ✓ IEEE802.3cd
- ✓ QSFP-DD MSA

### Description

Gigalight's GQD-4Q56P401-XXC cable assembly is used in 4 X 100 Gigabit Ethernet links over copper cable, which provides connectivity between system units with a 400GbE connector on one side and four separate 100GbE connectors on the other four sides. The cable connects data signals from each of the 16 pairs on the single QSFP56-DD end to the dual pairs of each of the QSFP56 multiport ends.

Gigalight's GQD-4Q56P401-XXC cable assemblies is compliant with the QSFP-DD-MSA and IEEE802.3cd ,it's high performance, cost effective I/O solutions for LAN, HPC and SAN. The high speed cable assemblies meet and exceed 400Gigabit Ethernet, InfiniBand EDR /HDR and temperature requirements for performance and reliability.

## Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Temperature	T <sub>s</sub>	-20	85	°C
Case Operating Temperature	T <sub>c</sub>	0	70	°C
Humidity (non-condensing)	Rh	5	95	%

## Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	T <sub>c</sub>	0		70	°C
Baud Rate per Lane (PAM4)	fd		26.5625		GBaud/s
Humidity	Rh	5		85	%

## Pin Description

Pin	Logic	Symbol	Name/Description
1		GND	Module Ground <sup>Note5</sup>
2	CML-I	Tx2-	Transmitter inverted data input
3	CML-I	Tx2+	Transmitter non-inverted data input
4		GND	Module Ground <sup>Note5</sup>
5	CML-I	Tx4-	Transmitter inverted data input
6	CML-I	Tx4+	Transmitter non-inverted data input
7		GND	Module Ground <sup>Note5</sup>
8	LVTTL-I	MODSEIL	Module Select <sup>Note6</sup>
9	LVTTL-I	ResetL	Module Reset <sup>Note6</sup>
10		VCCR <sub>x</sub>	+3.3V Power Supply
11	LVC MOS-I	SCL	2-wire Serial interface clock <sup>Note6</sup>
12	LVC MOS-I/O	SDA	2-wire Serial interface data <sup>Note6</sup>
13		GND	Module Ground <sup>Note5</sup>
14	CML-O	RX3+	Receiver non-inverted data output
15	CML-O	RX3-	Receiver inverted data output
16		GND	Module Ground <sup>Note5</sup>
17	CML-O	RX1+	Receiver non-inverted data output

18	CML-O	RX1-	Receiver inverted data output
19		GND	Module Ground <sup>Note5</sup>
20		GND	Module Ground <sup>Note5</sup>
21	CML-O	RX2-	Receiver inverted data output
22	CML-O	RX2+	Receiver non-inverted data output
23		GND	Module Ground <sup>Note5</sup>
24	CML-O	RX4-	Receiver inverted data output
25	CML-O	RX4+	Receiver non-inverted data output
26		GND	Module Ground <sup>Note5</sup>
27	LVTTL-O	ModPrsL	Module Present, internal pulled down to GND
28	LVTTL-O	IntL	Interrupt output, should be pulled up on host board <sup>2</sup>
29		VCCTx	+3.3V Transmitter Power Supply
30		VCC1	+3.3V Power Supply
31	LVTTL-I	LPMode	Low Power Mode <sup>Note6</sup>
32		GND	Module Ground <sup>Note5</sup>
33	CML-I	Tx3+	Transmitter non-inverted data input
34	CML-I	Tx3-	Transmitter inverted data input
35		GND	Module Ground <sup>Note5</sup>
36	CML-I	Tx1+	Transmitter non-inverted data input
37	CML-I	Tx1-	Transmitter inverted data input
38		GND	Module Ground <sup>Note5</sup>
39		GND	Module Ground <sup>Note5</sup>
40	CML-I	Tx6-	Transmitter inverted data input
41	CML-I	Tx6+	Transmitter non-inverted data input
42		GND	Module Ground <sup>Note5</sup>
43	CML-I	Tx8-	Transmitter inverted data input
44	CML-I	Tx8+	Transmitter non-inverted data input
45		GND	Module Ground <sup>Note5</sup>
46		Reserved	
47		TBD	For future use
48		VCC	+3.3V Receiver Power Supply
49		TBD	For future use
50		TBD	For future use

51		GND	Module Ground <sup>Note5</sup>
52	CML-O	RX7+	Receiver non-inverted data output
53	CML-O	RX7-	Receiver inverted data output
54		GND	Module Ground <sup>Note5</sup>
55	CML-O	RX5+	Receiver non-inverted data output
56	CML-O	RX5-	Receiver inverted data output
57		GND	Module Ground <sup>Note5</sup>
58		GND	Module Ground <sup>Note5</sup>
59	CML-O	RX6-	Receiver inverted data output
60	CML-O	RX6+	Receiver non-inverted data output
61		GND	Module Ground <sup>Note5</sup>
62	CML-O	RX8-	Receiver inverted data output
63	CML-O	RX8+	Receiver non-inverted data output
64		GND	Module Ground <sup>Note5</sup>
65		NC	No connect
66		TBD	For future use
67		VCC	+3.3V Power Supply
68		VCC	+3.3V Power Supply
69		TBD	For future use
70		GND	Module Ground <sup>Note5</sup>
71	CML-I	Tx7+	Transmitter non-inverted data input
72	CML-I	Tx7-	Transmitter inverted data input
73		GND	Module Ground <sup>Note5</sup>
74	CML-I	Tx5+	Transmitter non-inverted data input
75	CML-I	Tx5-	Transmitter inverted data input
76		GND	Module Ground <sup>Note5</sup>

Note:

1. Module circuit ground is isolated from module chassis ground within the module.
2. Open collector should be pulled up with 4.7K to 10K ohms on host board to a voltage between 3.15V and 3.6V.

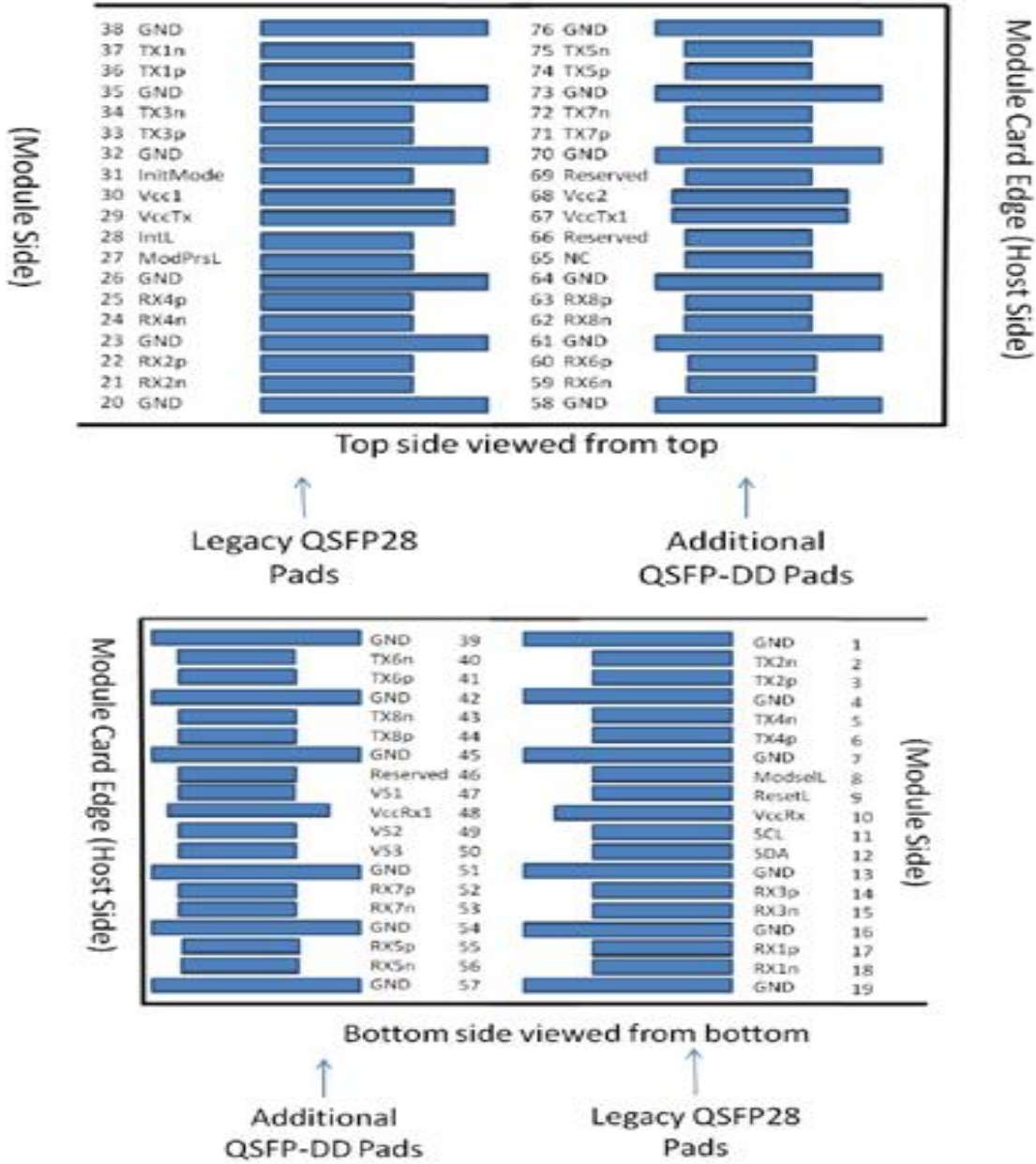


Figure 1. Electrical Pin-out Details

**SIGNAL INTEGRITY**

A	Time domain parameter	Test condition	SPEC	Equipment
1	Differential Impedance(bulk cable)	TDR Tr:25ps	100+10/-5 ohms	E5071C
2	Differential Impedance (Mated connector)		100+/-10 ohms	
3	Differential Impedance(cable termination)		100+10/-15 ohms	
4	Intra-skew		L*15+20	

B	Frequency domain parameter	Test condition	Test spec(dB)	f(GHz)	Equipment
1	SDD11/SDD22	Freq:50MHz ~20GHz Points:1601	-22+20/25.78*f*10 <sup>(-3)</sup>	0.05≤f<4.1	E5071C
			-10.66+14*log((f*10 <sup>(-3)</sup> )/5.5) ≤5.3dB@13.26GHz	4.1≤f≤19	
2	SCC11/SCC22	Freq:50MHz ~20GHz Points:1601	≤-2dB	0.2≤f≤19	
3	SDC11/SDC22	Freq:50MHz ~20GHz Points:1601	-16+2*f/3	0.05≤f≤2	
4	SCD21- SDD21	Freq:50MHz ~20GHz Points:1601	10 as 0.01≤f < 12.89; -27+29/22*f*0.001 as 12.89≤f < 15.7; 6.3 as 15.7≤f≤19	0.01≤f≤19	
5	MDNEXT	Freq:50MHz ~20GHz Points:1601	≤-26dB@12.89GHz	0.01≤f≤19	
6	SDD21	Freq:50MHz ~20GHz Points:1601 IF: 1KHz	0.7*(f*10 <sup>(-3)</sup> ) <sup>0.5</sup> -0.3*( f*10 <sup>(-3)</sup> ) -0.01*(f*10 <sup>(-3)</sup> ) <sup>2</sup> <17.16dB@13.26GHz	0.01≤f≤19	
7	COM	IEEE802.3cd	>3dB		

### Mechanical Dimensions

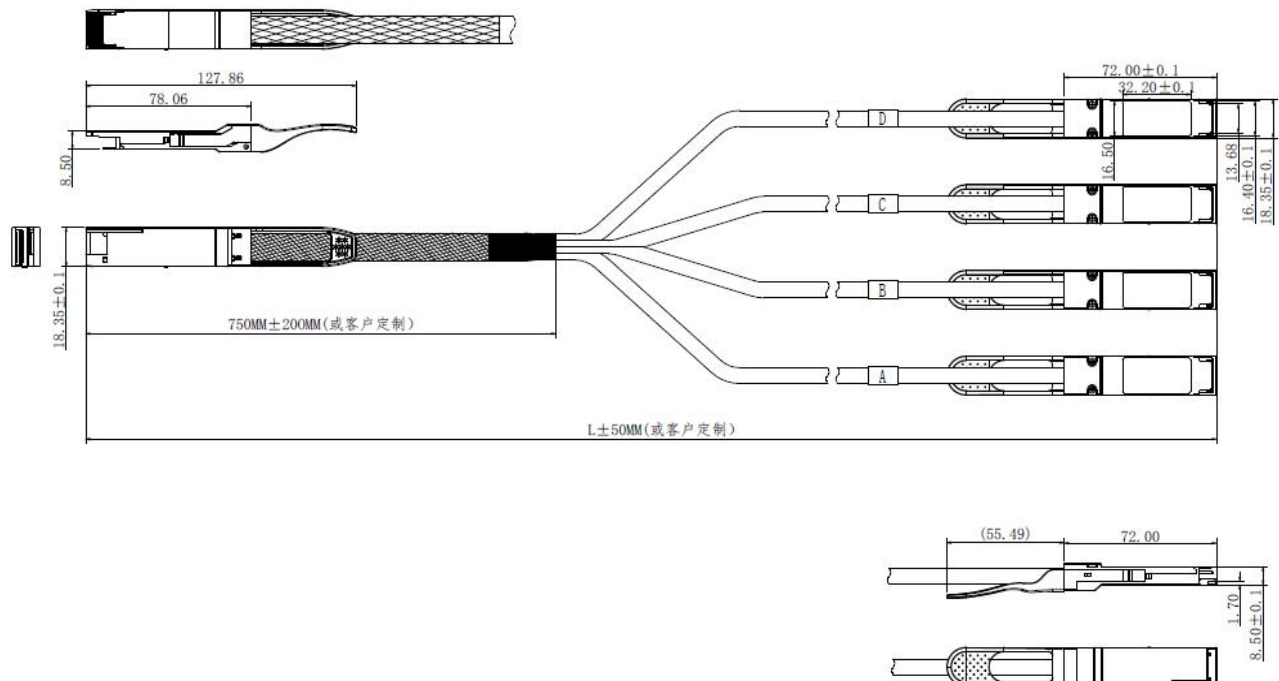


Figure 2. Mechanical Specifications

### Wiring Patterns

<b>P1, QSFP56-DD</b>		<b>P2, QSFP56</b>		<b>P1, QSFP56-DD</b>		<b>P4, QSFP56</b>	
GND		GND		GND		GND	
TX1+	36	17	RX1+	TX5+	74	17	RX1+
TX1-	37	18	RX1-	TX5-	75	18	RX1-
TX2+	3	22	RX2+	TX6+	41	22	RX2+
TX2-	2	21	RX2-	TX6-	40	21	RX2-
RX1+	17	36	TX1+	RX5+	55	36	TX1+
RX1-	18	37	TX1-	RX5-	56	37	TX1-
RX2+	22	3	TX2+	RX6+	60	3	TX2+
RX2-	21	2	TX2-	RX6-	59	2	TX2-
GND		GND		GND		GND	
<b>P1, QSFP56-DD</b>		<b>P3, QSFP56</b>		<b>P1, QSFP56-DD</b>		<b>P5, QSFP56</b>	
GND		GND		GND		GND	
TX3+	33	17	RX1+	TX7+	71	17	RX1+
TX3-	34	18	RX1-	TX7-	72	18	RX1-
TX4+	6	22	RX2+	TX8+	44	22	RX2+
TX4-	5	21	RX2-	TX8-	43	21	RX2-
RX3+	14	36	TX1+	RX7+	52	36	TX1+
RX3-	15	37	TX1-	RX7-	53	37	TX1-
RX4+	25	3	TX2+	RX8+	63	3	TX2+
RX4-	24	2	TX2-	RX8-	62	2	TX2-
GND		GND		GND		GND	

Figure 3. Wiring Patterns

### Wiring connection diagram

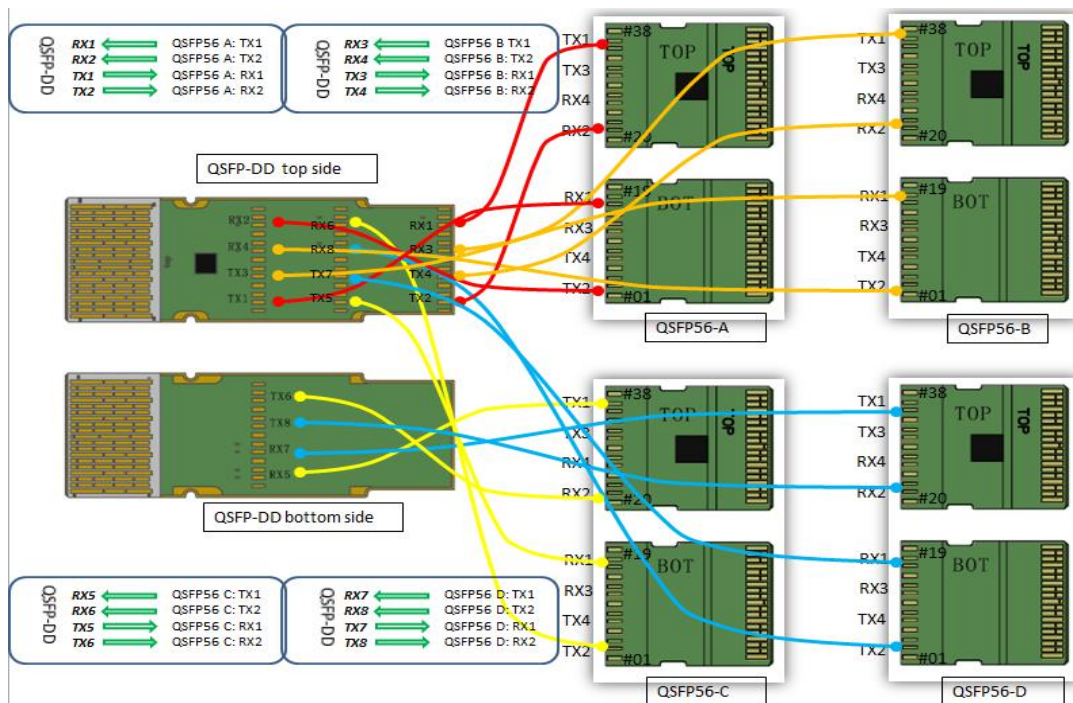


Figure 4. Wiring connection diagram

## Regulatory Compliance

Gigalight GQD-4Q56PC401-xxC passive cable assemblies meet the requirements of the following standards:

Feature	Standard
Electrical Safety	EN 62368-1: 2014 IEC 62368-1:2014 UL 62368-1:2014
Environmental protection	Directive 2011/65/EU with amendment(EU)2015/863
CE EMC	EN55032: 2015 EN55035: 2017 EN61000-3-2:2014 EN61000-3-3:2013
FCC	FCC Part 15, Subpart B; ANSI C63.4-2014

## Ordering information

Part Number	GQD-4Q56P401-XXC		
Length (meter)	1	2	3
Wire gauge (AWG)	30/26	30/26	26

Example:

GQD-4Q56P401-01C/30AWG

GQD-4Q56P401-01C/26AWG

## Important Notice

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## Revision History

Revision	Date	Description
V0	Nov. 11th, 2021	Advance Release.
V1	Apr. 2nd, 2022	Update wire gauge information. Update differential impedance information