200G QSFP56 to QSFP-56 Direct Attach Cable Specification
HTDC-Q56O5-xx01MB

Features

- Configurable & flexible
- EEPROM in cable assembly
- I/O system has 10-12 watt single port dissipative heat capacity
- Assembled with industry leading twin-axial SKEWCLEAR® 8-pair or 16-pair wire
- Hot-pluggable QSFP56 form factor
- Optimized PCB interface board with auto soldering process
- Passive copper length to 3 meter
- Operating temperature range: 0℃ ~ +70 ℃
- Compliant with RoHS2

Applications

- Switch & Router Connections
- 10G/40G /100G/200G Ethernet
- Infiniband SDR, DDR, QDR,FDR,EDR,HDR

Standards

- IEEE 802.3cd
- OIF-CEI-04.0
- IEEE 802.3bj
- QSFP56 MSA

Description

Hirundo’s 200G QSFP56 passive cable assembly products, based on 4X25G/4X 28G or 4*50G/4*56G(pam-4) structure, this product can well meet the next generati on of 200G switches, servers, routers and other products application needs. The QSF P56 cable assembly is optimally designed to reduce crosstalk and plug loss, providing excellent signal integrity and fully compliant with next generation Ethernet and Infin iBand standards.

1. Ordering Information

Table 1.1 Ordering Information

Part No.	Specifications	Application

	Package	Data rate	Laser	Optical Power	Detector	Sensitivity	Temp	Reach	Others	
HTDC-Q56O5-xx01MB	QSFP56	200G	NA	NA	NA	NA	0~70 ℃	3m	RoHS	Servers
PN	HTDC-Q56O5-xx01MB									
Description	200Gbps,DAC,3m,0-70℃									
SAP No	-									
Customer PN	-									

2. Revision History

Table 2.1 Revision History

Version	Initiated	Reviewed	Approved	Date
V1.0	Hu.Cheng	Wei.Chen	Bruce.Zou	2020.12.30

3. Absolute Maximum Ratings and Recommended Operating Conditions

Table 3.1 Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Storage Temperature Range	Ts	℃	-40	+85
Relative Humidity	RH	%	5	95
Power Supply Voltage	Vcc	V	-0.5	+4.0

Table 3.1 Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Typ	Max
Operating Case Temperature Range	Tc	℃	0		70
Power Supply Voltage	Vcc	V	3.135	3.3	3.465
Bit Rate(Per channel)	BR	GBd		26.5625	

4. Electrical Performance

<table>
<tr><th colspan="2">ITEM</th><th>REQUIREMENT</th><th>TEST CONDITION</th></tr>
<tr><td rowspan="3">Differential Impedance</td><td>Cable Impedance</td><td>105+5/-10Ω</td><td rowspan="3">Rise time of 25ps (20 % - 80 %).</td></tr>
<tr><td>Paddle Card Impedance</td><td>100±10Ω</td></tr>
<tr><td>Cable Termination Impedance</td><td>100±15Ω</td></tr>
<tr><td colspan="2">Differential (Input/Output)Return loss S_{DD11}/S_{DD22}</td><td>Return_loss(f)≥ $\begin{cases} 16.5-2\sqrt{f} & 0.05 \leqslant f < 4.1 \\ 10.66-14\log_{10}(f/5.5) & 4.1 \leqslant f \leqslant 19 \end{cases}$
Where
f is the frequency in GHz
Return loss(f) is the return loss at frequency f</td><td>10MHz≤f ≤19GHz</td></tr>
<tr><td colspan="2">Differential to common-mode (Input/Output)Return loss S_{CD11}/S_{CD22}</td><td>Return_loss(f)≥ $\begin{cases} 22-(20/25.78)f & 0.01 \leqslant f < 12.89 \\ 15-(6/25.78)f & 12.89 \leqslant f \leqslant 19 \end{cases}$
Where
f is the frequency in GHz
Return_loss(f) is the Differential to common-mode return loss at frequency f</td><td>10MHz≤f ≤19GHz</td></tr>
<tr><td colspan="2">Common-mode to Common-mode (Input/Output)Return loss S_{CC11}/S_{CC22}</td><td>Return_loss(f)≥2dB 0.2≤f≤19
Where f is the frequency in GHz
Return_loss(f) is the common-mode to common-mode return loss at frequency f</td><td>10MHz≤f ≤19GHz</td></tr>
<tr><td colspan="2">Differential Insertion Loss (S_{DD21} Max.)</td><td>(Differential InsertionLoss Max. For TPa to TPb Excluding Test fixture)
<table>
<tr><th>F
AWG</th><th>1.25GHz</th><th>2.5GHz</th><th>5.0GHz</th><th>7.0GHz</th><th>10Ghz</th><th>12.89Ghz</th></tr>
<tr><td>30(1m) Max.</td><td>4.5dB</td><td>5.4dB</td><td>6.3dB</td><td>7.5dB</td><td>8.5dB</td><td>10.5dB</td></tr>
<tr><td>30/28(3m)Max.</td><td>7.5dB</td><td>9.5dB</td><td>12.2dB</td><td>14.8dB</td><td>18.0dB</td><td>21.5dB</td></tr>
<tr><td>26(3m) Max.</td><td>5.7dB</td><td>7.2dB</td><td>9.9 dB</td><td>11.9dB</td><td>14.1dB</td><td>16.5dB</td></tr>
<tr><td>26/25(5m)Max.</td><td>7.8dB</td><td>10.0dB</td><td>13.5dB</td><td>16.0dB</td><td>19.0dB</td><td>22.0dB</td></tr>
</table></td><td>10MHz≤f ≤19GHz</td></tr>
<tr><td colspan="2">Differential to common-mode Conversion Loss-Differential Insertion Loss(S_{CD21}-S_{DD21})</td><td>Conversion _loss(f) – IL(f)≥ $\begin{cases} 10 & 0.01 \leqslant f < 12.89 \\ 27-(29/22)f & 12.89 \leqslant f < 15.7 \\ 6.3 & 15.7 \leqslant f \leqslant 19 \end{cases}$
Where
f is the frequency in GHz
Conversion_loss(f) is the cable assembly differential to common-mode conversion loss
IL(f) is the cable assembly insertion loss</td><td>10MHz≤f ≤19GHz</td></tr>
<tr><td colspan="2">[MDNEXT(multiple disturber near-end crosstalk)]</td><td>≥26dB @12.89GHz</td><td>10MHz≤f ≤19GHz</td></tr>
</table>

5. Electrical Specification

TEM	REQUIREMENT	TEST CONDITON
Low Level Contact Resistance	70milliohms Max. From initial.	EIA-364-23:Apply a maximum voltage of 20mV And a current of 100 mA.
Insulation Resistance	10Mohm(Min.)	EIA364-21:AC 300V 1minute
Dielectric Withstanding Voltage	NO disruptive discharge.	EIA-364-20:Apply a voltage of 300 VDC for 1minute between adjacent terminals And between adjacent terminals and ground.

6. Environment Performance:

ITEM	REQUIREMENT	EST CONDITON
Operating Temp. Range	0°C to +70°C	Cable operating temperature range.
Storage Temp. Range (in packed condition)]	-40°C to +80°C	Cable storage temperature range in packed condition.
Thermal Cycling Non-Powered	No evidence of physical damage	EIA-364-32D, Method A, -25 to 90C, 100 cycles, 15 min. dwells
Salt Spraying	48 hours salt spraying after shell corrosive area less than 5%.	EIA-364-26
Mixed Flowing Gas	Pass electrical tests per 3.1 after stressing. (For connector only)	EIA-364-35 Class II,14 days.
Temp. Life	No evidence of physical damage	EIA-364-17C w/ RH, Damp heat 90℃ at 85% RH for 500 hours then return to ambient
Cable Cold Bend	4H,No evidence of physical damage	Condition: -20℃±2℃, mandrel diameter is 6 times the cable diameter.

7. Mechanical and Physical Characteristics:

ITEM	REQUIREMENT	TEST CONDITON
Vibration	Pass electrical tests per 3.1 after stressing.	Clamp & vibrate per EIA-364-28E, TC-VII, test condition letter – D, 15 minutes in X, Y & Z axis.
Cable Flex	No evidence of physical damage	Flex cable 180° for 20 cycles (±90° from nominal position) at 12 cycles per minute with a 1.0kg load applied to the cable jacket. Flex in the boot area 90º in each direction from vertical. Per EIA-364-41C
Cable Plug Retention in Cage	90N Min. No evidence of physical damage	Force to be applied axially with no damage to cage. Per SFF 8661 Rev 2.1 Pull on cable jacket approximately 1 ft behind cable plug. No functional damage to cable plug below 90N. Per SFF-8432 Rev 5.0
Cable Retention in Plug	90N Min. No evidence of physical damage	Cable plug is fixtured with the bulk cable hanging vertically. A 90N axial load is applied (gradually) to the cable jacket and held for 1 minute. Per EIA-364-38B
Mechanical Shock	Pass electrical tests Per 3.1 after stressing.	Clamp and shock per EIA-364-27B, TC-G,3 times in 6 directions, 100g, 6ms.

Cable Plug Insertion	40N Max.(QSFP56)	Per SFF8661 Rev 2.1 Per SFF-8432 Rev 5.0
Cable plug Extraction	30N Max. (QSFP56)	Place axial load on de-latch to de-latch plug.Per SFF8661 Rev 2.1 Measure without the aid of any cage kick-out springs. Place axial load on de-latch to de-latch plug. Per SFF-8432 Rev 5.0
Durability	50 cycles,No evidence of physical damage	EIA-364-09, perform plug &unplug cycles:Plug and receptacle mate rate: 250times/hour. 50times for QSFP /SFP28 module (CONNECTOR TO PCB)

8. Module Memory Map

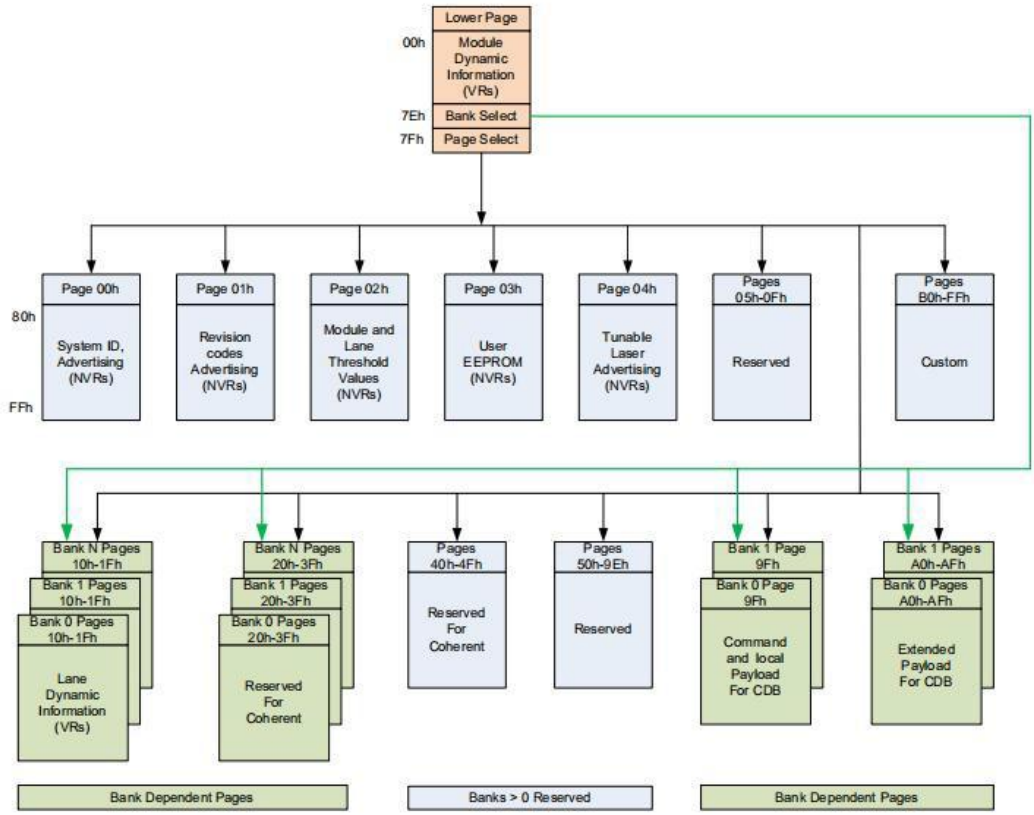

Figure 1 Digital Diagnostic Memory Map

9. Pin Assignment and Pin Description

9.1 Pin Assignment

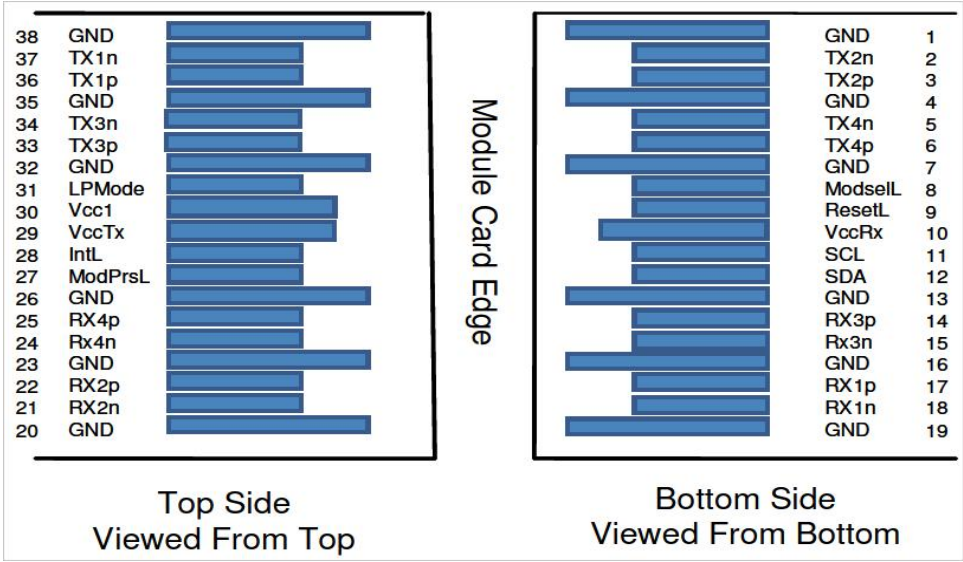

Figure 2. Electrical Pin-out Details

9.2 Pin Description

Pin	Symbol	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	ModSe1L	Module Select	
9	ResetL	Module Reset	
10	Vcc Rx	+3.3V Power supply receiver	
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	VccTx	+3.3V Power supply transmitter	
30	Vcc1	+3.3V Power Supply	
31	LPMode	Low Power Mode	
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

Notes:

1. QSFP56 uses common ground (GND) for all signals and supply (power). All the common within the QSFP56 module and all module voltages are referenced to this potential unless otherwise noted. Connected theses directly to the host board signal common ground plane.

2. VccRx, VccRx1, Vcc1, Vcc2, VccTx, and VccTx1 shall be applied concurrently. Requirements defined for the host side of the Host Card Edge Connector are listed in Table 4. VccRx, VccRx1, Vcc1, Vcc2, VccTx, and VccTx1 may be internally connected within the module in any combination. The connector Vcc pins are each rated for a maximum current of 1000mA.

All Vendor Specific, Reserved and No Connect pins may be terminated with 50 ohms to ground on the host. Pad 65 (No Connect) shall be left unconnected within the module. Vendor Specific and Reserved pads shall have an impedance to GND that is greater than 10 kOhms and less than 100pF.

10. Package Outline

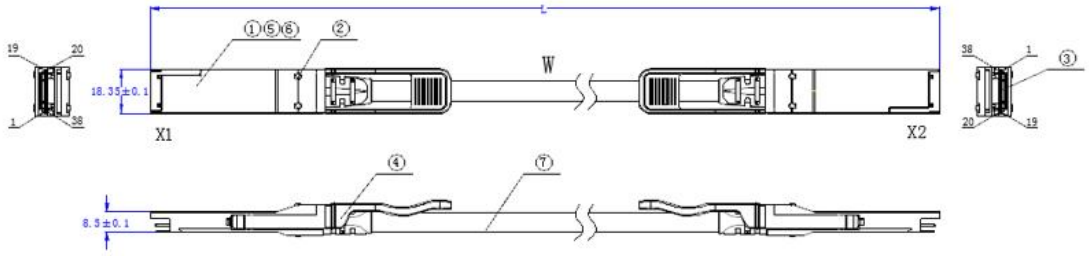

Figure 4 Package Outline

11. Product Selction

Length	Product Number	AWG	Length Tolerance (mm)
0.5m	QSD-DAAG2-005C	30	±15
1m	QSD-DAAG2-010C	30	±25
1.5m	QSD-DAAG2-015C	30	±30
2m	QSD-DABG2-020C	28	±30
2.5m	QSD-DABG2-025C	28	±45
3m	QSD-DAEG2-030C	27	±45

12. For More Information

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