ETU-LINK®
Optical Communication System

QSFP28 Series

QSFP28

EQ2DP10X-34S2CNxx

100Gbps QSFP28 To 4x 25G SFP28 Passive High Speed Cable

- Compliant SFF-8636、SFF-8402
- Compliant Sonet IEEE802.3bj
- Operating case temperature: -40 to 85° C
- All-metal housing for superior EMI performance
- Precision process control for minimization of pair-to-pair skew
- AC coupling of PECL signals
- EEPROM for cable signature & system communications
- 30 AWG to 26 AWG cable sizes available
- RoHS compliant

Applications

- 10G/40G /100G Sonet
- Infiniband SDR, DDR, QDR,FDR,EDR
- Routers and Switches
- DATA Center & Clouds

Description

100G QSFP28 passive copper direct-attach cables are suitable for very short distances and offer a highly cost-effective way to establish a 100-Gigabit link between QSFP28 ports of QSFP28 switches within racks and across adjacent racks. These cables are used for 100GbE and Infniband standards, to maximize performance. 100G QSFP28 are designed to meet emerging data center and high performance computing application needs for a high density cabling interconnect system capable of delivering an aggregate data bandwidth of 40Gb/s. This interconnect system is fully compliant with existing industry standard specifications such as the QSFP MSA and IBTA (InfiniBand Trade Association). The 100G QSFP28 cables support the bandwidth transmission requirements as defined by IEEE 802.3ba (100Gb/s) and Infiniband QDR (4x125 Gb/s per channel) specifications.

Wiring Diagram

wire	Starting signal	Starting	End	End signal
W1	RX1+	X1.17	X2.18	TX1+
	RX1-	X1.18	X2.19	TX1-
	GND	X1.19	X2.20	GND
	TX1+	X1.36	X2.13	RX1+
	TX1-	X1.37	X2.12	RX1-
	GND	X1.38	X2.14	GND
W2	GND	X1.20	X3.20	GND
	RX2-	X1.21	X3.19	TX2-
	RX2+	X1.22	X3.18	TX2+
	GND	X1.1	X3.14	GND
	TX2-	X1.2	X3.12	RX2-
	TX2+	X1.3	X3.13	RX2+

wire	Starting signal	Starting	End	End signal
W3	RX3+	X1.14	X4.18	TX3+
	RX3-	X1.15	X4.19	TX3-
	GND	X1.16	X4.20	GND
	TX3+	X1.33	X4.13	RX3+
	TX3-	X1.34	X4.12	RX3-
	GND	X1.35	X4.14	GND
W4	GND	X1.23	X5.20	GND
	RX4-	X1.24	X5.19	TX4-
	RX4+	X1.25	X5.18	TX4+
	GND	X1.4	X5.14	GND
	TX4-	X1.5	X5.12	RX4-
	TX4+	X1.6	X5.13	RX4+

Electrical Performance

6.1 Signal Integrity：

ITEM		REQUIREMENT	TEST CONDITION
Differential Impedance	Cable Impedance	105+5/-10Ω	Rise time of 25ps (20 % - 80 %).
	Paddle Card Impedance	100±10Ω	
	Cable Termination Impedance	100±15Ω	
[Differential (Input/Output)Return loss S_{DD11}/S_{DD22}]		Return_loss(f)≥ $16.5-2\sqrt{f}$ $0.05\le f < 4.1$; $10.66-14\log_{10}(f/5.5)$ $4.1\le f\le 19$ Where	10MHz≤f≤19GHz

<table>
<tr><td></td><td>f is the frequency in GHz
Return loss(f) is the return loss at frequency f</td><td></td></tr>
<tr><td>Differential to common-mode (Input/Output)Return loss S_{CD11}/S_{CD22}</td><td>Return_loss(f)≥
$22-(20/25.78)f$ $0.01\le f < 12.89$
$15-(6/25.78)f$ $12.89\le f\le 19$
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>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>Differential Insertion Loss (S_{DD21} Max.)</td><td>(Differential InsertionLoss Max. For TPa to TPb Excluding Test fixture)
<table>
<tr><td>F
AWG</td><td>1.25GHz</td><td>2.5GHz</td><td>5.0GHz</td><td>7.0GHz</td><td>10Ghz</td><td>12.89Ghz</td></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)Ma
x.</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)Ma
x.</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></td><td></td><td></td></tr>
<tr><td>Differential to common-mode Conversion Loss-Differential Insertion Loss(S_{CD21}-S_{DD21})</td><td>Conversion _loss(f) – IL(f)≥
10 $0.01\le f < 12.89$
$27-(29/22)f$ $12.89\le f < 15.7$
6.3 $15.7\le f\le 19$
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>MDNEXT(multiple disturber near-end crosstalk)</td><td>≥35dB @12.89GHz</td><td>10MHz≤f ≤19GHz</td></tr>
<tr><td>[Intra Skew</td><td>15ps/m,</td><td>10MHz≤f ≤19GHz</td></tr>
</table>

6.2 Other Electrical Performance:

ITEM	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.

Environment Performance

ITEM	REQUIREMENT	TEST CONDITON
Operating Temp. Range	-20°C to +75°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.

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.
Twist	No evidence of physical damage	Twist cable 180° (±90° from nominal position) for 100 cycles at 30 cycles per minute with a 0.5kg load applied to the cable jacket. Clamp position: 300mm
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.(QSFP28) 18N Max.(SFP28)	Per SFF8661 Rev 2.1 Per SFF-8432 Rev 5.0
Cable plug Extraction	30N Max. (QSFP28) 12.5N Max. (SFP28)	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 QSFP28/SFP28 module (CONNECTOR TO PCB)

Package Diagram

The connectors at both ends are protected by protective sleeves, and each PCS is separately packed in an antistatic bag.

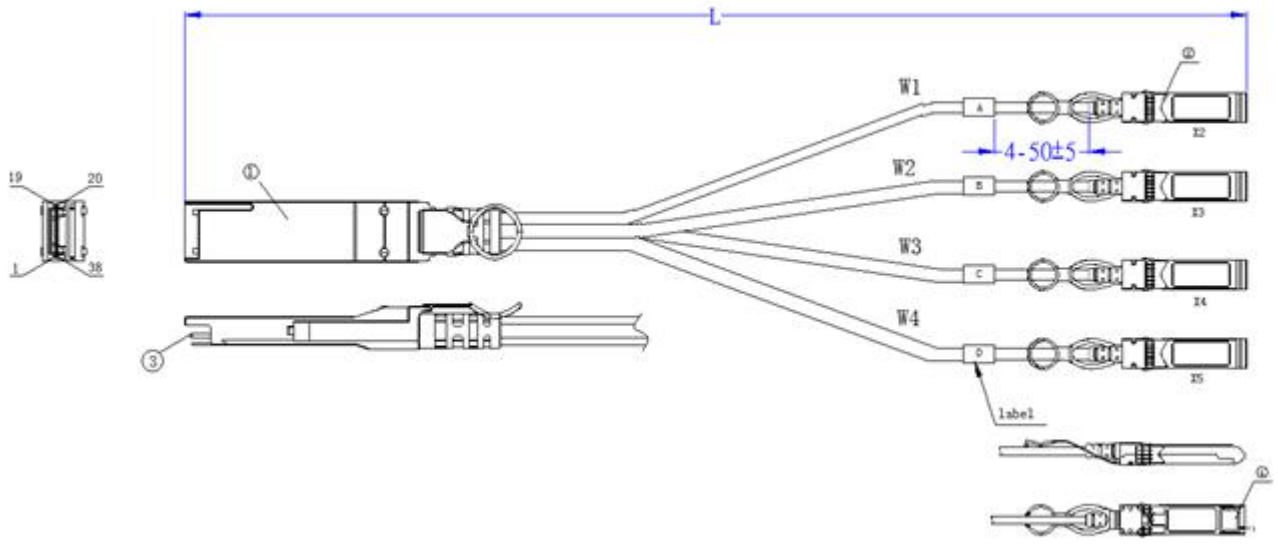
<=2m : 200mm*300mm

>2m: 300mm*400mm

Revision Record

Date	version	change Description	Author
2017-07-21	V1.0	First release	LEON
2018-11-27	V2.0		Wanbin

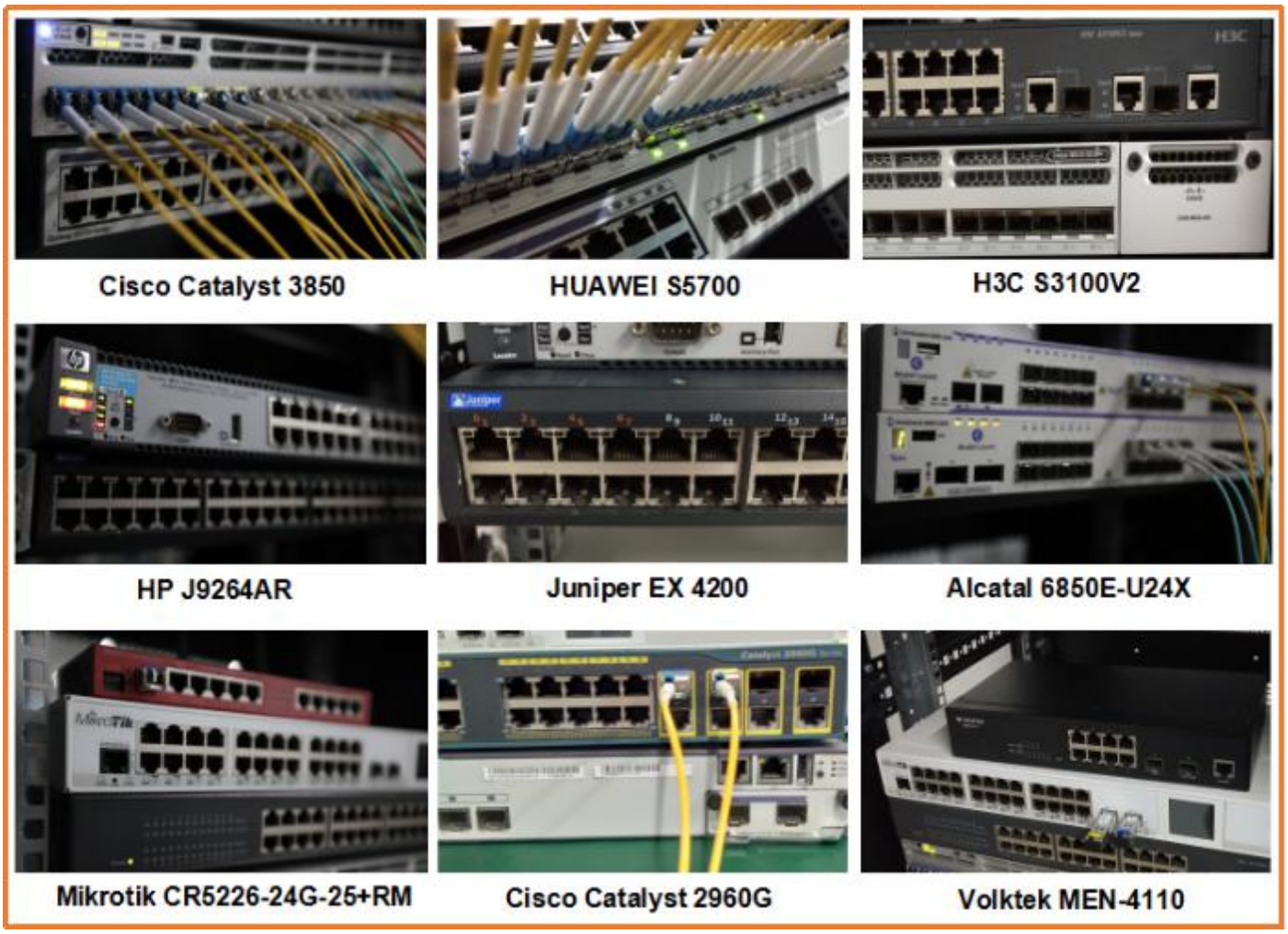
Outline Drawing



Compatibility Test

In order to ensure the product compatibility, our products will be tested on the switch before shipment. Our modules can compatible with many mainstream brand switches, such as Cisco, Juniper, Extreme, Brocade, IBM, H3C, HP, Huawei, D-Link, Mikrotik, ZTE, TP-Link...

Our test equipment: VOLKTEK MEN-4110, HP 2530-8G, CRS226-24G-25+RM, Catalyst 2960G Series, Catalyst 3850 XS 10G SFP+, Catalyst 3750-E Series, HUAWEI S5700Series, H3C S3100V2 Series, Juniper-EX4200, etc.



Product Production Process

Quality Assurance

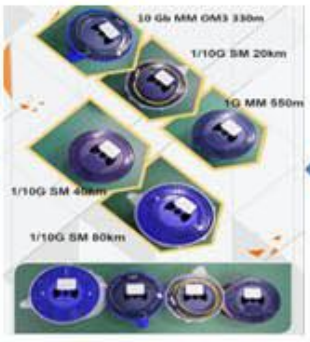
Continuous introduction of new equipment, produced by strict standards, strict quality inspection, to guarantee the high quality standard of each product.

Standardized Production Line

Professional Welding

Assembling

Cleaning end face



Distance Testing

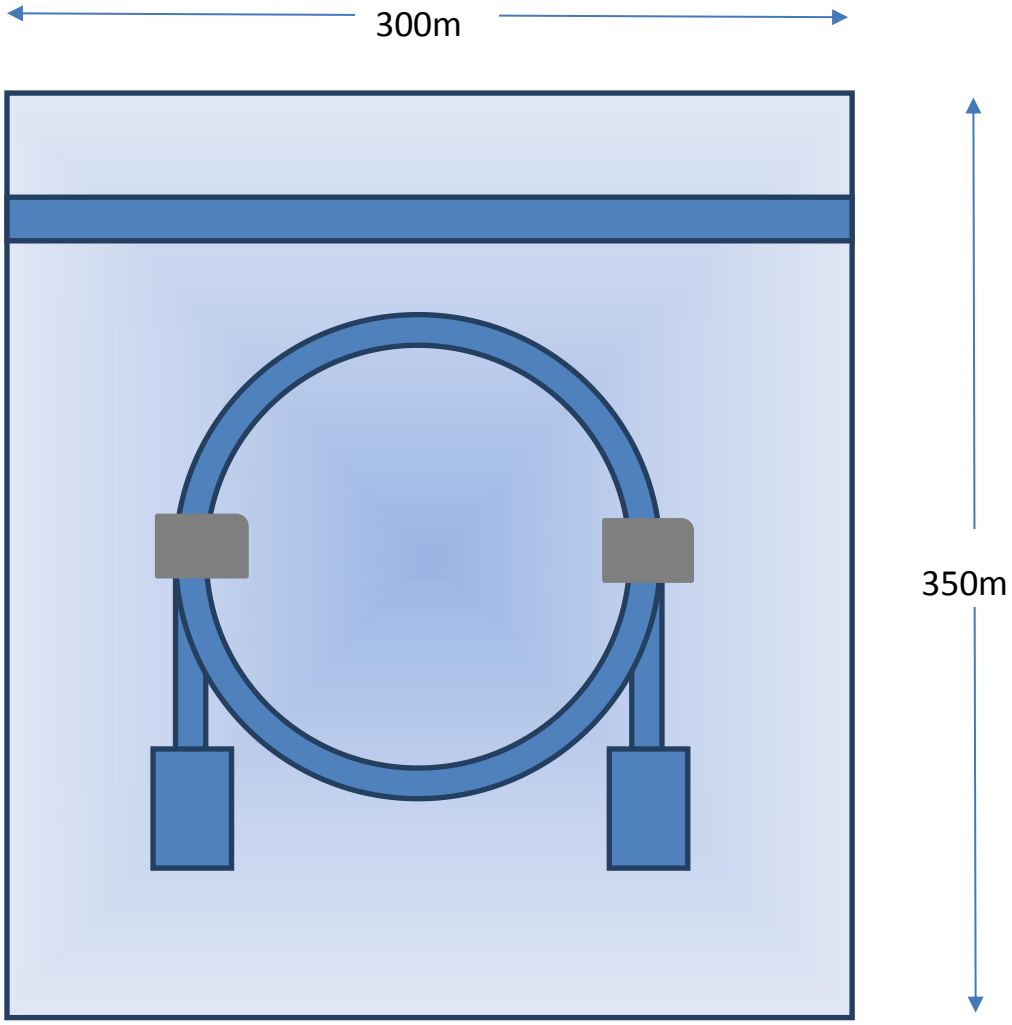
Aging Testing

Product Initial Test

Switch Testing

Product Final Test

Packaging



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