

## **100Gbps QSFP28 To 4x 25G SFP28**

### **Passive High Speed Cable Specification**

#### **1 Description :**

100G QSFP28 is based on a 4X25G or 4X28G structure, meeting the needs of next-generation 100G switches, servers, routers and other product applications. The QSFP28 cable assembly uses an optimized design to reduce crosstalk and insertion loss, has excellent signal integrity, and fully complies with the next-generation 100G Ethernet and InfiniBand EDR standards.

SFP28 is based on SFP+ equivalent form factor, supports 25G Ethernet standard, can provide 25Gb/s error-free transmission, and is used in high-density 25G Ethernet switches and network interfaces. 100G QSFP28 To 4x25G SFP28 supports two interface device interconnection, single channel The transmission rate is 25Gbps.

#### **2 Features**

- Enhanced EMI / EMC performance
- Compliant with the IEEE 802.3bj Infiniband EDR specifications
- Meets SFF-8636、SFF-8402
- Support serial ID function through EEPROM
- 30AWG to 26AWG cable available
- RoHS

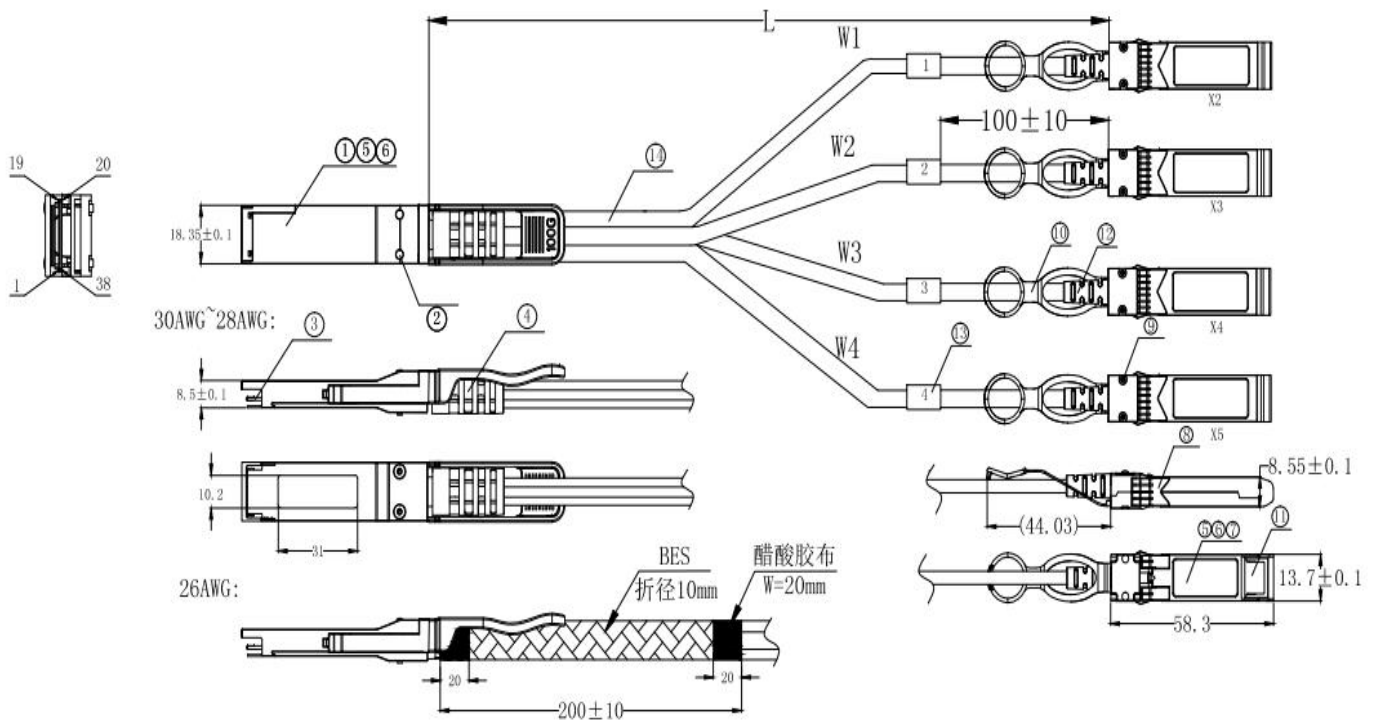
### 3 Applications :

10G/25G/40G /100g Ethernet

Infiniband SDR, DDR, QDR, FDR, EDR

Switches, routers, data centers, cloud servers

### 4 Outline drawing :



## 5 Wiring Diagram:

wire	Starting signal	Starting	End	End signal	wire	Starting signal	Starting	End	End signal
W1	RX1+	X1. 17	X2. 18	TX1+	W3	RX3+	X1. 14	X4. 18	TX3+
	RX1-	X1. 18	X2. 19	TX1-		RX3-	X1. 15	X4. 19	TX3-
	GND	X1. 19	X2. 20	GND		GND	X1. 16	X4. 20	GND
	TX1+	X1. 36	X2. 13	RX1+		TX3+	X1. 33	X4. 13	RX3+
	TX1-	X1. 37	X2. 12	RX1-		TX3-	X1. 34	X4. 12	RX3-
	GND	X1. 38	X2. 14	GND		GND	X1. 35	X4. 14	GND
W2	GND	X1. 20	X3. 20	GND	W4	GND	X1. 23	X5. 20	GND
	RX2-	X1. 21	X3. 19	TX2-		RX4-	X1. 24	X5. 19	TX4-
	RX2+	X1. 22	X3. 18	TX2+		RX4+	X1. 25	X5. 18	TX4+
	GND	X1. 1	X3. 14	GND		GND	X1. 4	X5. 14	GND
	TX2-	X1. 2	X3. 12	RX2-		TX4-	X1. 5	X5. 12	RX4-
	TX2+	X1. 3	X3. 13	RX2+		TX4+	X1. 6	X5. 13	RX4+

## 6 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 $S_{DD11}/S_{DD22}$ ]	$\text{Return\_loss}(f) \geq \begin{cases} 16.5-2\sqrt{f} & 0.05 \leq f < 4.1 \\ 10.66-14\log_{10}(f/5.5) & 4.1 \leq f \leq 19 \end{cases}$ Where $f$ is the frequency in GHz Return loss(f) is the return loss at frequency $f$	10MHz≤f≤19GHz	
[Differential to common-mode (Input/Output)Return loss $S_{CD11}/S_{CD22}$ ]	$\text{Return\_loss}(f) \geq \begin{cases} 22-(20/25.78)f & 0.01 \leq f < 12.89 \\ 15-(6/25.78)f & 12.89 \leq f \leq 19 \end{cases}$ Where $f$ is the frequency in GHz Return_loss(f) is the Differential to common-mode return loss at frequency $f$	10MHz≤f≤19GHz	

[Common-mode to Common-mode (Input/Output)Return loss $S_{CC11}/S_{CC22}$ ]	$Return\_loss(f) \geq 2\text{dB} \quad 0.2 \leq f \leq 19$ Where $f$ is the frequency in GHz $Return\_loss(f)$ is the common-mode to common-mode return loss at frequency $f$	$10\text{MHz} \leq f \leq 19\text{GHz}$																																			
[Differential Insertion Loss ( $S_{DD21}$ Max.)]	(Differential Insertion Loss Max. For TPa to TPb Excluding Test fixture ) <table border="1" data-bbox="475 555 1273 1097"> <thead> <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> </thead> <tbody> <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> </tbody> </table>	F / AWG	1.25GHz	2.5GHz	5.0GHz	7.0GHz	10GHz	12.89GHz	30(1m) Max.	4.5dB	5.4dB	6.3dB	7.5dB	8.5dB	10.5dB	30/28(3m)Max.	7.5dB	9.5dB	12.2dB	14.8dB	18.0dB	21.5dB	26(3m) Max.	5.7dB	7.2dB	9.9 dB	11.9dB	14.1dB	16.5dB	26/25(5m)Max.	7.8dB	10.0dB	13.5dB	16.0dB	19.0dB	22.0dB	$10\text{MHz} \leq f \leq 19\text{GHz}$
F / AWG	1.25GHz	2.5GHz	5.0GHz	7.0GHz	10GHz	12.89GHz																															
30(1m) Max.	4.5dB	5.4dB	6.3dB	7.5dB	8.5dB	10.5dB																															
30/28(3m)Max.	7.5dB	9.5dB	12.2dB	14.8dB	18.0dB	21.5dB																															
26(3m) Max.	5.7dB	7.2dB	9.9 dB	11.9dB	14.1dB	16.5dB																															
26/25(5m)Max.	7.8dB	10.0dB	13.5dB	16.0dB	19.0dB	22.0dB																															
Differential to common-mode Conversion Loss-Differential Insertion Loss ( $S_{CD21}-S_{DD21}$ )	$Conversion\_loss(f) - IL(f) \geq \begin{cases} 10 & 0.01 \leq f < 12.89 \\ 27-(29/22)f & 12.89 \leq f < \end{cases}$ 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	$10\text{MHz} \leq f \leq 19\text{GHz}$																																			
[MDNEXT(multiple disturber near-end crosstalk)]	$\geq 26\text{dB} @ 12.89\text{GHz}$	$10\text{MHz} \leq f \leq 19\text{GHz}$																																			

## 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.

## 7 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°C at 85% RH for 500 hours then return to ambient
Cable Cold Bend	4H,No evidence of physical damage	Condition: -20°C±2°C, mandrel diameter is 6 times the cable diameter.

## 8 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° ( $\pm 90^\circ$ 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 ( $\pm 90^\circ$ from nominal position) at 12 cycles per minute with a 1.0kg load applied to the cable jacket. Flex in the boot area 90° 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)