

# 25Gbps SFP28 Passive Direct Attach Copper Twinax Cable Specification

## 1 Description :

SFP28 direct attach cable is a low-cost, high-efficiency high-speed interconnection solution with a single channel maximum transmission rate of up to 25Gbps. It is suitable for stacking and connection of short-distance switch equipment.

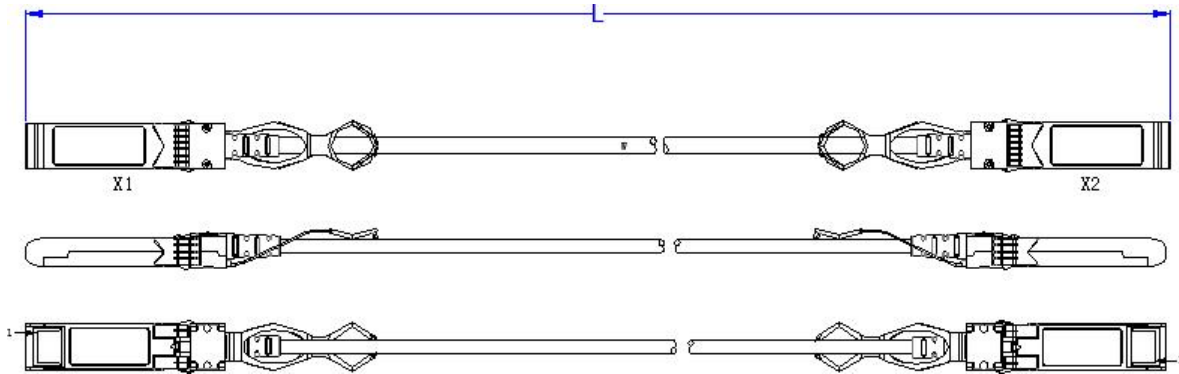
## 2 Features:

- Single channel data rate of 25Gbps
- Compliant with SFP + MSA and SFF-8432 compliant
- Compliant with IEEE 802.3 and FCoE
- Enhanced EMI / EMC performance
- Support serial ID function through EEPROM
- Supports cable customization up to 5 meters
- 30AWG to 26AWG cable available
- RoHS and halogen-free options

## 3 Applications :

- Switch / Router / HBA
- Servers and storage devices
- Data center network
- Base station / BBU / RRU
- Fiber Channel
- 25Gbps Ethernet

#### 4 Outline drawing :



#### 5 Wiring Diagram:

Starting	End	Remark
X1. 12	X2. 19	Pair
X1. 13	X2. 18	
X1. 18	X2. 13	Pair
X1. 19	X2. 12	
X1:1, 2, 6 8, 10, 11, 14, 17, 20	X2:1, 2, 6 8, 10, 11, 14, 17, 20	Drain wire
X1:1, 4, 5 15, 16	X1:1, 4, 5 15, 16	EEPROM point at both ends



## Electrical Performance:

### 5.1 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 $S_{DD11}/S_{DD22}$ ]		$Return\_loss(f) \geq \begin{cases} 16.5-2\sqrt{f} & 0.05 \leq f < 4.1 \\ 10.66-14\log_{10}(f/5.5) & 4.1 \leq f \leq 19 \end{cases}$ 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 $S_{CD11}/S_{CD22}$ ]		$Return\_loss(f) \geq \begin{cases} 22-(20/25.78)f & 0.01 \leq f < 12.89 \\ 15-(6/25.78)f & 12.89 \leq f \leq 19 \end{cases}$ 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 $S_{CC11}/S_{CC22}$ ]		$Return\_loss(f) \geq 2dB$ Where $f$ is the frequency in GHz $Return\_loss(f)$ is the common-mode to common-mode return loss at frequency $f$	10MHz ≤ $f$ ≤ 19GHz						
[Differential Insertion Loss ( $S_{DD21}$ Max.)]		(Differential Insertion Loss Max. For TP <sub>a</sub> to TP <sub>b</sub> Excluding Test fixture)					10MHz ≤ $f$ ≤ 19GHz		
		F	1.25GHz	2.5GHz	5.0GHz	7.0GHz		10Ghz	12.89Ghz
		AWG							
		30(1m)	4.5dB	5.4dB	6.3dB	7.5dB	8.5dB	10.5dB	

	Max.							
	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 <sub>CD21</sub> -S <sub>DD21</sub> )	$\text{Conversion\_loss}(f) - \text{IL}(f) \geq \begin{cases} 10 & 0.01 \leq f < 12.89 \\ 27-(29/22)f & 12.89 \leq f < 15.7 \\ 6.3 & 15.7 \leq f \leq 19 \end{cases}$							10MHz ≤ f ≤ 19GHz
[MDNEXT(multiple disturber near-end crosstalk)]	≥26dB @12.89GHz							10MHz ≤ f ≤ 19GHz
[Intra Skew]	15ps/m,							10MHz ≤ f ≤ 19GHz

## 5.2 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.

## 6 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.

## 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.
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 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	18N Max.(SFP28)	Per SFF-8432 Rev 5.0
Cable plug Extraction	12.5N Max. (SFP28)	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)