ATGBICS® by APPROVED TECHNOLOGY

Technical Datasheet

DAC-QSFP28-4SFP25G-xM

100GBase QSFP28 to 4x 25GBase SFP28 Direct Attach Cable

Copper, Passive, 0.5m to 5m Lengths, Commercial Temperature

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
- Commercial Operating Temperature Range: 0°C to 70°C
- RoHS compliant

APPLICATIONS

- 10G/25G/40G/100G Ethernet
- InfiniBand SDR, DDR, QDR, FDR, EDR
- Switches, routers, data centres, cloud servers

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 optimised design to reduce crosstalk and insertion loss with 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 and can provide 25Gbps error-free transmission. It is used in high-density 25G Ethernet switches and network interfaces. 100G QSFP28 to 4x25G SFP28 supports two interface device interconnection, single channel with a transmission rate of 25Gbps.

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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 CHARACTERISTICS

<table>
<tr><th colspan="2">ITEM</th><th colspan="7">REQUIREMENT</th><th>TEST CONDITION</th></tr>
<tr><td rowspan="3">Differential Impedance</td><td>Cable Impedance</td><td colspan="7">105+5/-10Ω</td><td rowspan="3">Rise time of 25ps (20% - 80%).</td></tr>
<tr><td>Paddle Card Impedance</td><td colspan="7">100±10Ω</td></tr>
<tr><td>Cable Termination Impedance</td><td colspan="7">100±15Ω</td></tr>
<tr><td colspan="2">Differential (Input/Output) Return loss S_{DD11}/S_{DD22}</td><td colspan="7">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 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 colspan="7">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 colspan="2">Common-mode to Common-mode (Input/Output) Return loss S_{CC11}/S_{CC22}</td><td colspan="7">$Return\_loss(f)\ge 2dB$ $0.2\le f\le 19$
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" rowspan="6">Differential Insertion Loss (S_{DD21} Max.)</td><td colspan="7">(Differential InsertionLoss Max. For TPa to TPb Excluding Test fixture)</td><td rowspan="6">10MHz≤f ≤19GHz</td></tr>
<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) 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>9.9dB</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>

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Differential to common-mode Conversion Loss-Differential Insertion Loss (S_{CD21}-S_{DD21})	Conversion _loss(f) – IL(f)≥ $\begin{cases} 10 & 0.01 \le f < 12.89 \\ 27-(29/22)f & 12.89 \leqslant f < 15.7 \\ 6.3 & 15.7 \leqslant f \leqslant 19 \end{cases}$ 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	10MHz≤f ≤19GHz
MDNEXT (multiple disturber near-end crosstalk)	≥26dB @12.89GHz	10MHz≤f ≤19GHz
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 1 minute
Dielectric Withstanding Voltage	NO disruptive discharge.	EIA-364-20: Apply a voltage of 300 VDC for 1 minute between adjacent terminals and between adjacent terminals and ground.

ENVIRONMENTAL CHARACTERISTICS

ITEM	REQUIREMENT	TEST CONDITON
Operating Temperature Range	0°C to +70°C	Cable operating temperature range.
Storage Temperature 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.
Temperature 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.

MECHANICAL & 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)

MECHANICAL DIMENSIONS (UNITS: mm)