
100G QSFP28 to 4x25G SFP28 Direct Attach Passive Copper Cables
PQ21H-DAMxx-4**Features**

- ✓ Connector A: 1 QSFP28 100Gbps Rated Connector
- ✓ Connector B: 4 SFP28 25Gbps Rated Connector
- ✓ Support data rates 25.78Gbps per channel
- ✓ Maximum aggregate data rate 100Gbps
- ✓ Copper link length up to 3m
- ✓ +3.3V single power supply
- ✓ Hot pluggable
- ✓ All-metal housing for superior EMI performance
- ✓ RoHS6 compliant (lead free)
- ✓ Operating case temperature:
Commercial: 0°C to +70°C

Applications

- ✓ 100GE/25 Gigabit Ethernet
- ✓ Switches, Routers, and HBAs
- ✓ Data Center Network

Standards

- ✓ Compliant with QSFP28 MSA and SFP28 MSA
- ✓ Compliant with SFF-8402, SFF-8432 and SFF-8665
- ✓ Compatible with IEEE802.3bj 100GEBASE-CR4 and P802.3by

Description

The PQ21H-DAMxx-4 passive copper cable is a high speed, cost-effective 100GbE to 4x25GbE Ethernet connectivity solution, designed for the growing need for higher bandwidth in data centers.

The PQ21H-DAMxx-4 cables are compliant with SFF-8402 SFP28 and SFF-8665QSFP28 standard specifications and provide connectivity between system units with QSFP28 port on one side and up to four different SFP28 ports on the other.

The cable connects data signals from each of the 4 copper pairs on the QSFP28 end to the single pair of each of the SFP28 ends. Each (Q) SFP port comprises an EEPROM providing product information which can be read by the host system.

The unique quality passive copper cable solutions provide power-efficient connectivity for short distance interconnects. It enables higher port bandwidth, density and configuration at a low cost and reduced power requirement in the data centers. Rigorous cable production testing ensures best out-of-the-box installation experience, performance and durability.

Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|----------------------|-----------------|------|---------|------|------|
| Power Supply Voltage | V _{CC} | 0 | | 3.6 | V |
| Storage Temperature | T _s | -40 | | +85 | °C |
| Relative Humidity | RH | 0 | | 85 | % |

Recommended Operating Environment

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|----------------------------|-----------------|------|---------|--------|------|
| Power Supply Voltage | V _{CC} | 3.13 | 3.3 | 3.46 | V |
| Power Dissipation | P _D | | | 0.02 | W |
| Operating Case Temperature | T _C | 0 | | +70 | °C |
| Aggregate Data Rate | - | | | 103.12 | Gbps |
| Bit Rate per Lane | BR | | | 25.78 | Gbps |

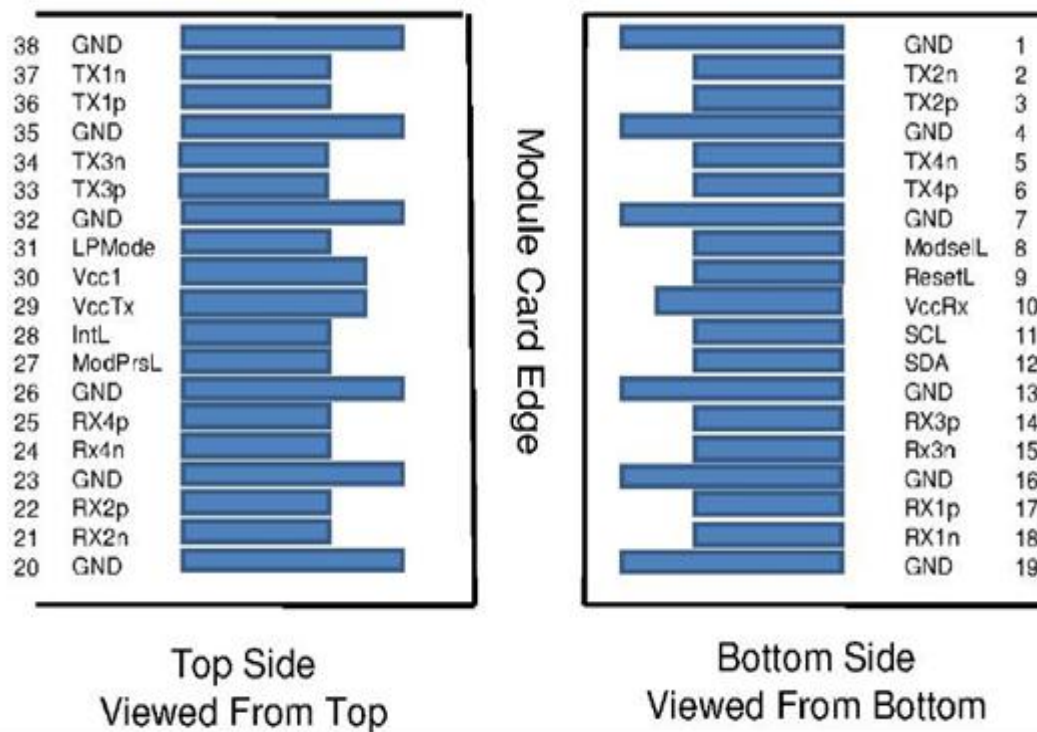
Electrical Characteristics

| Parameter | Symbol | Min. | Typical | Max. | Unit | Note |
|---|-----------------|-------|---------|-------|------|--------------------|
| Differential Impedance | R _{in} | 90 | 100 | 110 | Ω | |
| Insertion Loss | SDD21 | 8 | | 22.48 | dB | @12.8906GHz |
| Differential Return Loss | SDD11 | 12.45 | | Note1 | dB | @0.05 to 4.1GHz |
| | SDD22 | 3.12 | | Note2 | | @4.1 to 19GHz |
| Common-mode to common-mode output return loss | SCC11 | 2 | | | dB | @0.2 to 19GHz |
| | SCC22 | 2 | | | | |
| Differential to common-mode return loss | SCD11 | 12 | | Note3 | dB | @ 0.01 to 12.89GHz |
| | SCD22 | 10.58 | | Note4 | | @12.89 to 19GHz |
| Differential to common Mode Conversion Loss | SCD21-IL | 10 | | | dB | @0.01 to 12.89GHz |
| | | | | Note5 | | @12.89 to 15.7GHz |
| | | 6.3 | | | | @15.7 to 19GHz |
| Channel Operating Margin | COM | 3 | | | dB | |

Notes:

1. Reflection Coefficient given by equation $SDD11(dB) < 16.5 - 2 * \sqrt{f}$, with f in GHz.
2. Reflection Coefficient given by equation $SDD11(dB) < 10.66 - 14 * \log_{10}(f/5.5)$, with f in GHz
3. Reflection Coefficient given by equation $SDD11(dB) < 22 - (20/25.78) * f$, with f in GHz
4. Reflection Coefficient given by equation $SDD11(dB) < 15 - (6/25.78) * f$, with f in GHz
5. Reflection Coefficient given by equation $SDD21(dB) < 27 - (29/22) * f$, with f in GHz

QSFP28 Pin Definitions



QSFP28 Pin Descriptions

| Pin | Symbol | Description | Plug Seq. | Notes |
|-----|---------|-------------------------------------|-----------|-------|
| 1 | Ground | Ground | 1 | 1 |
| 2 | Tx2n | Transmitter Inverted Data Input | 3 | |
| 3 | Tx2p | Transmitter Non-Inverted Data Input | 3 | |
| 4 | Ground | Ground | 1 | 1 |
| 5 | Tx4n | Transmitter Inverted Data Input | 3 | |
| 6 | Tx4p | Transmitter Non-Inverted Data Input | 3 | |
| 7 | Ground | Ground | 1 | 1 |
| 8 | ModSelL | Module Select | 3 | |
| 9 | ResetL | Module Reset | 3 | |
| 10 | VccRx | +3.3 V Power supply receiver | 2 | 2 |
| 11 | SCL | 2-wire serial interface clock | 3 | |
| 12 | SDA | 2-wire serial interface data | 3 | |
| 13 | Ground | Ground | 1 | 1 |
| 14 | Rx3p | Transmitter Non-Inverted Data Input | 3 | |
| 15 | Rx3n | Transmitter Inverted Data Input | 3 | |
| 16 | Ground | Ground | 1 | 1 |
| 17 | Rx1p | Transmitter Non-Inverted Data Input | 3 | |
| 18 | Rx1n | Transmitter Inverted Data Input | 3 | |

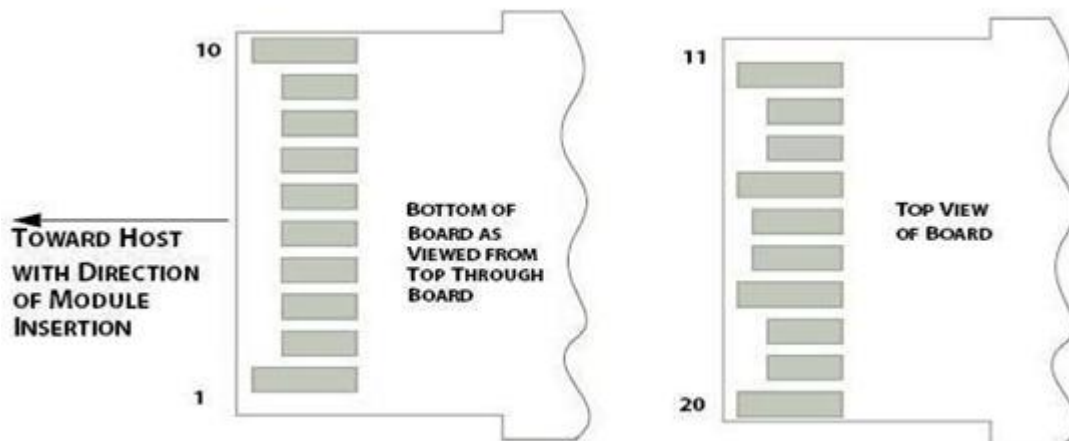
| | | | | |
|----|---------|-------------------------------------|---|---|
| 19 | Ground | Ground | 1 | 1 |
| 20 | Ground | Ground | 1 | 1 |
| 21 | Rx2n | Transmitter Inverted Data Input | 3 | |
| 22 | Rx2p | Transmitter Non-Inverted Data Input | 3 | |
| 23 | Ground | Ground | 1 | 1 |
| 24 | Rx4n | Transmitter Inverted Data Input | 3 | |
| 25 | Rx4p | Transmitter Non-Inverted Data Input | 3 | |
| 26 | Ground | Ground | 1 | 1 |
| 27 | ModPrsL | Module Present | 3 | |
| 28 | IntL | Interrupt | 3 | |
| 29 | VccTx | +3.3 V Power supply transmitter | 2 | 2 |
| 30 | Vcc1 | +3.3 V Power Supply | 2 | 2 |
| 31 | LPMoDe | Low Power Mode | 3 | |
| 32 | Ground | Ground | 1 | 1 |
| 33 | Tx3p | Transmitter Non-Inverted Data Input | 3 | |
| 34 | Tx3n | Transmitter Inverted Data Input | 3 | |
| 35 | Ground | Ground | 1 | 1 |
| 36 | Tx1p | Transmitter Non-Inverted Data Input | 3 | |
| 37 | Tx1n | Transmitter Inverted Data Input | 3 | |
| 38 | Ground | Ground | 1 | 1 |

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

1. Module ground pins GND are isolated from the module case.
2. VccRx, Vcc1 and VccTx are the receiver and transmitter power supplies and shall be applied concurrently.

SFP28 Pin Definitions



SFP28 Pin Descriptions

| Pin | Signal Name | Description | Plug Seq. | Notes |
|-----|-------------|---|-----------|-------|
| 1 | VeeT | Module Transmitter Ground | 1 | 1 |
| 2 | TX FAULT | Module Transmitter Fault, Not supported | 3 | |
| 3 | TX Disable | Transmitter Disable; Turns off transmitter laser output | 3 | |
| 4 | SDA | 2-Wire Serial Interface Data Line | 3 | 2 |
| 5 | SCL | 2-Wire Serial Interface Clock | 3 | 2 |
| 6 | Mod_ABS | Module Definition, Grounded in the module | 3 | |
| 7 | RS0 | Receiver Rate Select(not used) | 3 | |
| 8 | LOS | Receiver Loss of Signal Indication Active LOW | 3 | |
| 9 | RS1 | Transmitter Rate Select (not used) | 3 | |
| 10 | VeeR | Module Receiver Ground | 1 | 1 |
| 11 | VeeR | Module Receiver Ground | 1 | 1 |
| 12 | RD- | Receiver Inverted Data Output | 3 | |
| 13 | RD+ | Receiver Data Output | 3 | |
| 14 | VeeR | Module Receiver Ground | 1 | 1 |
| 15 | VccR | Module Receiver 3.3 V Supply | 2 | |
| 16 | VccT | Module Receiver 3.3 V Supply | 2 | |
| 17 | VeeT | Module Transmitter Ground | 1 | 1 |
| 18 | TD+ | Transmitter Non-Inverted Data Input | 3 | |
| 19 | TD- | Transmitter Inverted Data Input | 3 | |
| 20 | VeeT | Module Transmitter Ground | 1 | 1 |

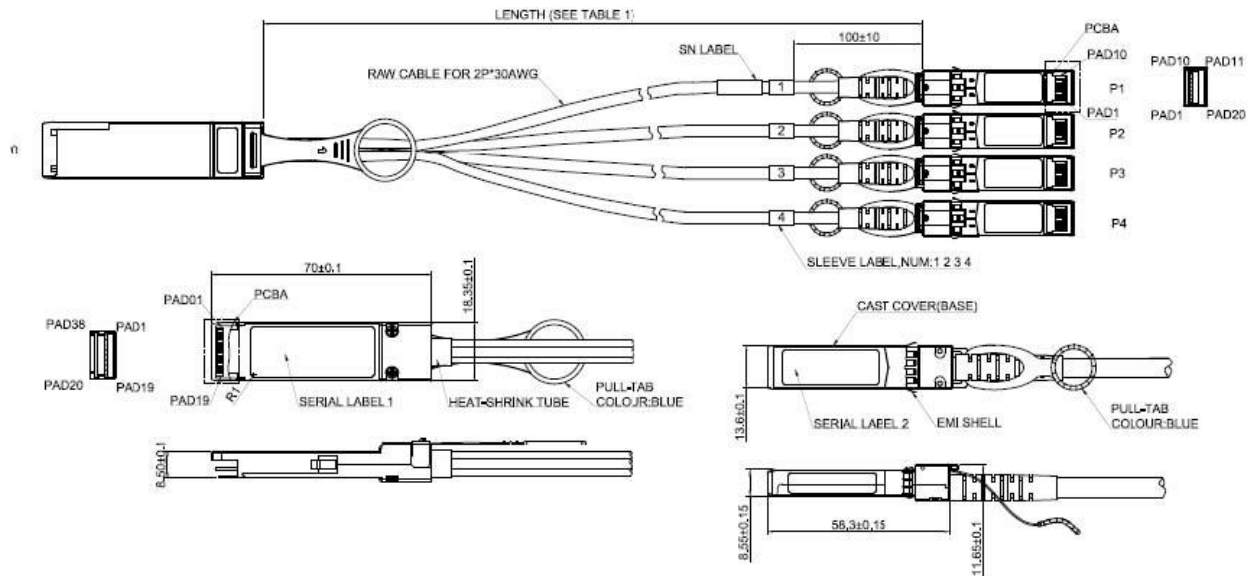
Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

1. Module ground pins GND are isolated from the module case.
2. Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.45V on the host board.

Mechanical Dimensions

| Parameter | Minimum | Typical | Maximum | Unit |
|-------------------------|---|---------|---------------------------|--------|
| Cable Diameter (28 AWG) | | 0.185 | | Inches |
| Bend Radius (28 AWG) | 0.925 | | | Inches |
| Cable Diameter (30 AWG) | | 0.181 | | Inches |
| Bend Radius (30 AWG) | 0.905 | | | Inches |
| Within Pair Skew | | | 60 | ps/5m |
| Cable Insertion Loss | | 24.06 | | dB/5m |
| Bulk Cable Time Delay | | | 5.2 | ns/m |
| Bulk Cable Impedance | 95 | 100 | 105 | Ohms |
| Insertion Force | / | | QSFP28: 40 SFP28: 18 | N |
| Withdrawal Force | / | | QSFP28: 30 SFP28: 12.5 | N |
| Retention Force | 90 | | / | N |
| Durability | QSFP28: 250 Cycles SFP28: 250 Cycles | | / | / |



Ordering information

| Part Number | Product Description |
|----------------|--|
| PQ21H-DAM01-4 | 100G, QSFP28 to 4xSFP28, 1m, Passive |
| PQ21H-DAM1.5-4 | 100G, QSFP28 to 4xSFP28, 1.5m, Passive |
| PQ21H-DAM02-4 | 100G, QSFP28 to 4xSFP28, 2m, Passive |
| PQ21H-DAM2.5-4 | 100G, QSFP28 to 4xSFP28, 2.5m, Passive |
| PQ21H-DAM03-4 | 100G, QSFP28 to 4xSFP28, 3m, Passive |

References

1. QSFP28 MSA and SFP28 MSA.
2. SFF-8402, SFF-8432 and SFF-8665.
3. IEEE802.3bj 100GEBASE-CR4 and P802.3by.

Important Notice

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