

### **QDD-400GB-ADAC6-5M-AR-C**

Arista Networks® Compatible TAA 400GBase-CU QSFP-DD to QSFP-DD Direct Attach Cable (Active Twinax, 6.5m)

#### **Features:**

- Module Compliant to QSFP-DD MSA
- Transmission Data Rate up to PAM4 53.125Gbps Per Channel
- Low Power Consumption, Meeting 1.5W Module LP Mode
- Enables a Transparent ACC Solution Meeting all IEEE 200GBASE-CR4 Auto-Negotiation and Link Training
- Low Latency
- Supports Device Programming by MCU with I2C
- Operates from a Single 3.3V Power Supply with an Integrated Power On Reset (POR)
- Operating Temperature: 0 to 70 Celsius
- RoHS Compliant and Lead-Free



#### **Applications:**

- 400GBase Ethernet

#### **Product Description**

This is a Arista Networks® Compatible 400GBase-CU QSFP-DD to QSFP-DD direct attach cable that operates over active copper with a maximum reach of 6.5m. It has been programmed, uniquely serialized, and data-traffic and application tested to ensure it is 100% compliant and functional. We stand behind the quality of our products and proudly offer a limited lifetime warranty. This cable is TAA (Trade Agreements Act) compliant and is built to comply with MSA (Multi-Source Agreement) standards.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S. – made or designated country end products."



## Absolute Maximum Ratings

| Parameter                  | Symbol           | Min. | Typ. | Max. | Unit | Notes |
|----------------------------|------------------|------|------|------|------|-------|
| Supply Voltage             | V <sub>cc</sub>  | -0.3 | 3.3  | 3.6  | V    |       |
| Storage Temperature        | T <sub>stg</sub> | -40  |      | 85   | °C   |       |
| Operating Case Temperature | T <sub>c</sub>   | 0    |      | 70   | °C   |       |
| Humidity                   | RH               | 5    |      | 85   | %    |       |
| Data Rate                  |                  |      | 400  |      | Gbps |       |

## Physical Characteristics

| Parameter       | Symbol | Min.                         | Typ. | Max. | Unit | Notes |
|-----------------|--------|------------------------------|------|------|------|-------|
| Length          | L      |                              |      | 6.5  | M    |       |
| AWG             |        |                              | 26   |      | AWG  |       |
| Jacket Material |        | Plastic Braided Mesh, Orange |      |      |      |       |

## Electrical Characteristics

| Parameter                        | Symbol          | Min.                  | Typ. | Max.                  | Unit  | Notes |
|----------------------------------|-----------------|-----------------------|------|-----------------------|-------|-------|
| Input Amplitude                  |                 | 800                   |      | 1200                  | mVp-p |       |
| Control Logic Input Low Voltage  | V <sub>IL</sub> | -0.3                  |      | 0.35*V <sub>cc</sub>  | V     |       |
| Control Logic Input High Voltage | V <sub>IH</sub> | 0.65* V <sub>cc</sub> |      | V <sub>cc</sub> +0.3  | V     |       |
| Control Logic Input Low Current  | I <sub>IL</sub> | -100                  |      | +100                  | uA    |       |
| Control Logic Input High Current | I <sub>IH</sub> | -100                  |      | +100                  | uA    |       |
| Output Logic Low                 | V <sub>OL</sub> |                       |      | 0.25* V <sub>cc</sub> | V     |       |
| I2C Master Mode Output Frequency |                 |                       |      | 400                   | kHz   |       |

## High-Speed Specifications

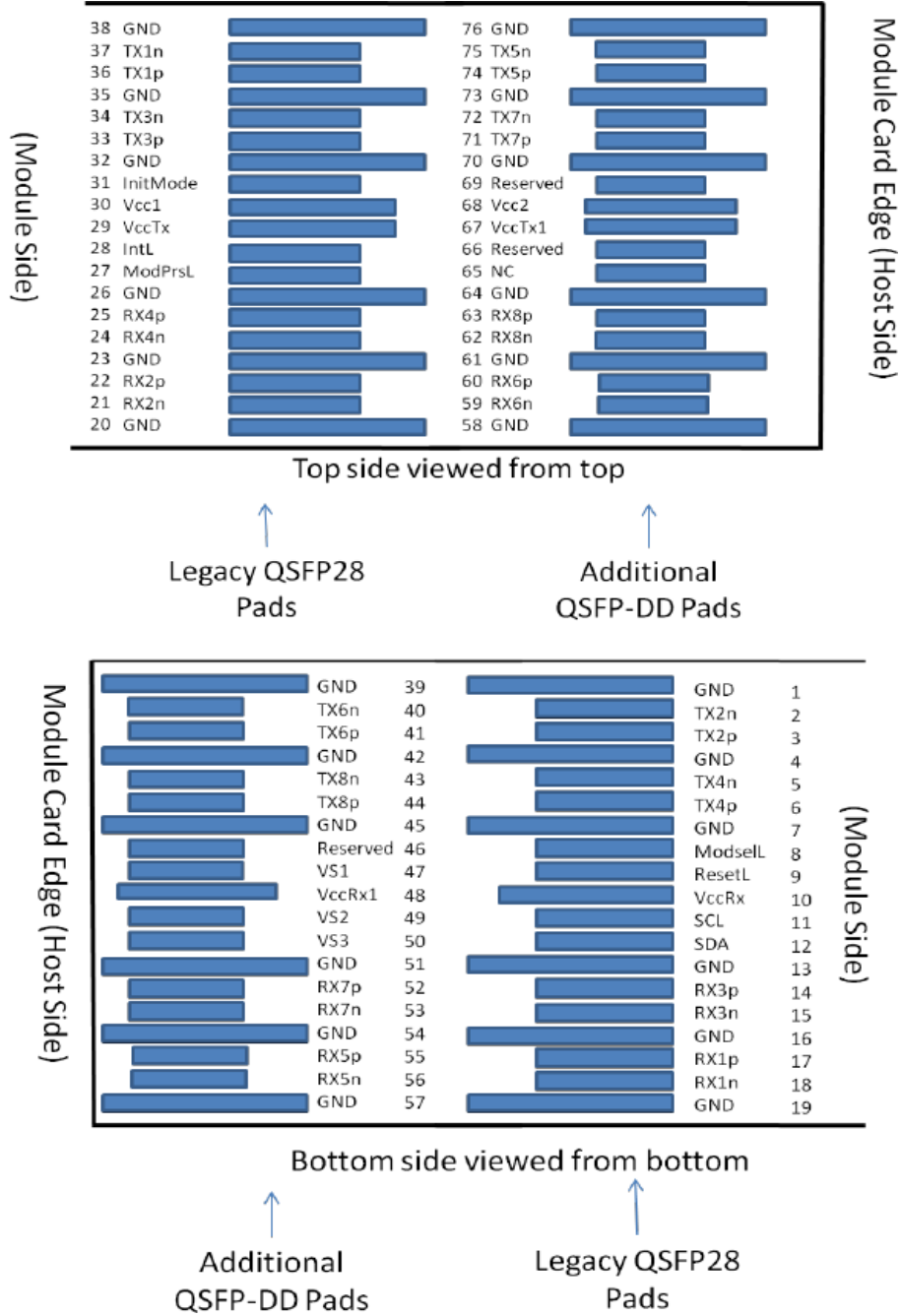
| Parameter                          | Symbol            | Min.                          | Typ. | Max.                 | Unit | Notes |
|------------------------------------|-------------------|-------------------------------|------|----------------------|------|-------|
| Raw Cable Differential Impedance   | Z <sub>ca</sub>   | 90                            |      | 110                  | Ω    |       |
| PCBA Differential Impedance        | Z <sub>pcba</sub> | 85                            |      | 115                  | Ω    |       |
| Maximum Insertion Loss at 13.28GHz | SDD21             | 8                             |      | 17.16                | dB   |       |
| Other SI Performance               |                   | Compliant with IEEE802.3cd&bj |      |                      |      |       |
| Minimum COM                        | COM               | 3                             |      |                      | dB   |       |
| BER with FEC                       |                   |                               |      | 2.4x10 <sup>-4</sup> |      |       |

## Pin Descriptions

| Pin | Logic       | Symbol   | Name/Description                                                                     | Plug Sequence |
|-----|-------------|----------|--------------------------------------------------------------------------------------|---------------|
| 1   |             | GND      | Module Ground.                                                                       | 1B            |
| 2   | CML-I       | Tx2-     | Transmitter Inverted Data Input.                                                     | 3B            |
| 3   | CML-I       | Tx2+     | Transmitter Non-Inverted Data Input.                                                 | 3B            |
| 4   |             | GND      | Module Ground.                                                                       | 1B            |
| 5   | CML-I       | Tx4-     | Transmitter Inverted Data Input.                                                     | 3B            |
| 6   | CML-I       | Tx4+     | Transmitter Non-Inverted Data Input.                                                 | 3B            |
| 7   |             | GND      | Module Ground.                                                                       | 1B            |
| 8   | LVTTL-I     | ModSelL  | Module Select.                                                                       | 3B            |
| 9   | LVTTL-I     | ResetL   | Module Reset.                                                                        | 3B            |
| 10  |             | VccRx    | +3.3V Receiver Power Supply.                                                         | 2B            |
| 11  | LVC MOS-I/O | SCL      | 2-Wire Serial Interface Clock.                                                       | 3B            |
| 12  | LVC MOS-I/O | SDA      | 2-Wire Serial Interface Data.                                                        | 3B            |
| 13  |             | GND      | Module Ground.                                                                       | 1B            |
| 14  | CML-O       | Rx3+     | Receiver Non-Inverted Data Output.                                                   | 3B            |
| 15  | CML-O       | Rx3-     | Receiver Inverted Data Output.                                                       | 3B            |
| 16  |             | GND      | Module Ground.                                                                       | 1B            |
| 17  | CML-O       | Rx1+     | Receiver Non-Inverted Data Output.                                                   | 3B            |
| 18  | CML-O       | Rx1-     | Receiver Inverted Data Output.                                                       | 3B            |
| 19  |             | GND      | Module Ground.                                                                       | 1B            |
| 20  |             | GND      | Module Ground.                                                                       | 1B            |
| 21  | CML-O       | Rx2-     | Receiver Inverted Data Output.                                                       | 3B            |
| 22  | CML-O       | Rx2+     | Receiver Non-Inverted Data Output.                                                   | 3B            |
| 23  |             | GND      | Module Ground.                                                                       | 1B            |
| 24  | CML-O       | Rx4-     | Receiver Inverted Data Output.                                                       | 3B            |
| 25  | CML-O       | Rx4+     | Receiver Non-Inverted Data Output.                                                   | 3B            |
| 26  |             | GND      | Module Ground.                                                                       | 1B            |
| 27  | LVTTL-O     | ModPrsL  | Module Present.                                                                      | 3B            |
| 28  | LVTTL-O     | IntL     | Interrupt.                                                                           | 3B            |
| 29  |             | VccTx    | +3.3V Transmitter Power Supply.                                                      | 2B            |
| 30  |             | Vcc1     | +3.3V Power Supply.                                                                  | 2B            |
| 31  | LVTTL-I     | InitMode | Initialization Mode. In legacy QSFP applications, the InitMode pad is called LPMODE. | 3B            |
| 32  |             | GND      | Module Ground.                                                                       | 1B            |
| 33  | CML-I       | Tx3+     | Transmitter Non-Inverted Data Input.                                                 | 3B            |
| 34  | CML-I       | Tx3-     | Transmitter Inverted Data Input.                                                     | 3B            |
| 35  |             | GND      | Module Ground.                                                                       | 1B            |
| 36  | CML-I       | Tx1+     | Transmitter Non-Inverted Data Input.                                                 | 3B            |
| 37  | CML-I       | Tx1-     | Transmitter Inverted Data Input.                                                     | 3B            |
| 38  |             | GND      | Module Ground.                                                                       | 1B            |

|    |       |          |                                      |    |
|----|-------|----------|--------------------------------------|----|
| 39 |       | GND      | Module Ground.                       | 1A |
| 40 | CML-I | Tx6-     | Transmitter Inverted Data Input.     | 3A |
| 41 | CML-I | Tx6+     | Transmitter Non-Inverted Data Input. | 3A |
| 42 |       | GND      | Module Ground.                       | 1A |
| 43 | CML-I | Tx8-     | Transmitter Inverted Data Input.     | 3A |
| 44 | CML-I | Tx8+     | Transmitter Non-Inverted Data Input. | 3A |
| 45 |       | GND      | Module Ground.                       | 1A |
| 46 |       | Reserved | For Future Use.                      | 3A |
| 47 |       | VS1      | Module Vendor-Specific 1.            | 3A |
| 48 |       | VccRx1   | +3.3V Receiver Power Supply.         | 2A |
| 49 |       | VS2      | Module Vendor-Specific 2.            | 3A |
| 50 |       | VS3      | Module Vendor-Specific 3.            | 3A |
| 51 |       | GND      | Module Ground.                       | 1A |
| 52 | CML-O | Rx7+     | Receiver Non-Inverted Data Output.   | 3A |
| 53 | CML-O | Rx7-     | Receiver Inverted Data Output.       | 3A |
| 54 |       | GND      | Module Ground.                       | 1A |
| 55 | CML-O | Rx5+     | Receiver Non-Inverted Data Output.   | 3A |
| 56 | CML-O | Rx5-     | Receiver Inverted Data Output.       | 3A |
| 57 |       | GND      | Module Ground.                       | 1A |
| 58 |       | GND      | Module Ground.                       | 1A |
| 59 | CML-O | Rx6-     | Receiver Inverted Data Output.       | 3A |
| 60 | CML-O | Rx6+     | Receiver Non-Inverted Data Output.   | 3A |
| 61 |       | GND      | Module Ground.                       | 1A |
| 62 | CML-O | Rx8-     | Receiver Inverted Data Output.       | 3A |
| 63 | CML-O | Rx8+     | Receiver Non-Inverted Data Output.   | 3A |
| 64 |       | GND      | Module Ground.                       | 1A |
| 64 |       | NC       | Not Connected.                       | 3A |
| 66 |       | Reserved | For Future Use.                      | 3A |
| 67 |       | VccTx1   | +3.3V Transmitter Power Supply.      | 2A |
| 68 |       | Vcc2     | +3.3V Power Supply.                  | 2A |
| 69 |       | Reserved | For Future Use.                      | 3A |
| 70 |       | GND      | Module Ground.                       | 1A |
| 71 | CML-I | Tx7+     | Transmitter Non-Inverted Data Input. | 3A |
| 72 | CML-I | Tx7-     | Transmitter Inverted Data Input.     | 3A |
| 73 |       | GND      | Module Ground.                       | 1A |
| 74 | CML-I | Tx5+     | Transmitter Non-Inverted Data Input. | 3A |
| 75 | CML-I | Tx5-     | Transmitter Inverted Data Input.     | 3A |
| 76 |       | GND      | Module Ground.                       | 1A |

Electrical Pin-Out Details



Bending Radius

| Wire Gauge | OD (Ref) | Minimum Bend Radius | Bend Space |
|------------|----------|---------------------|------------|
| 26AWG      | 12.1mm   | 24.2mm              | 68mm       |

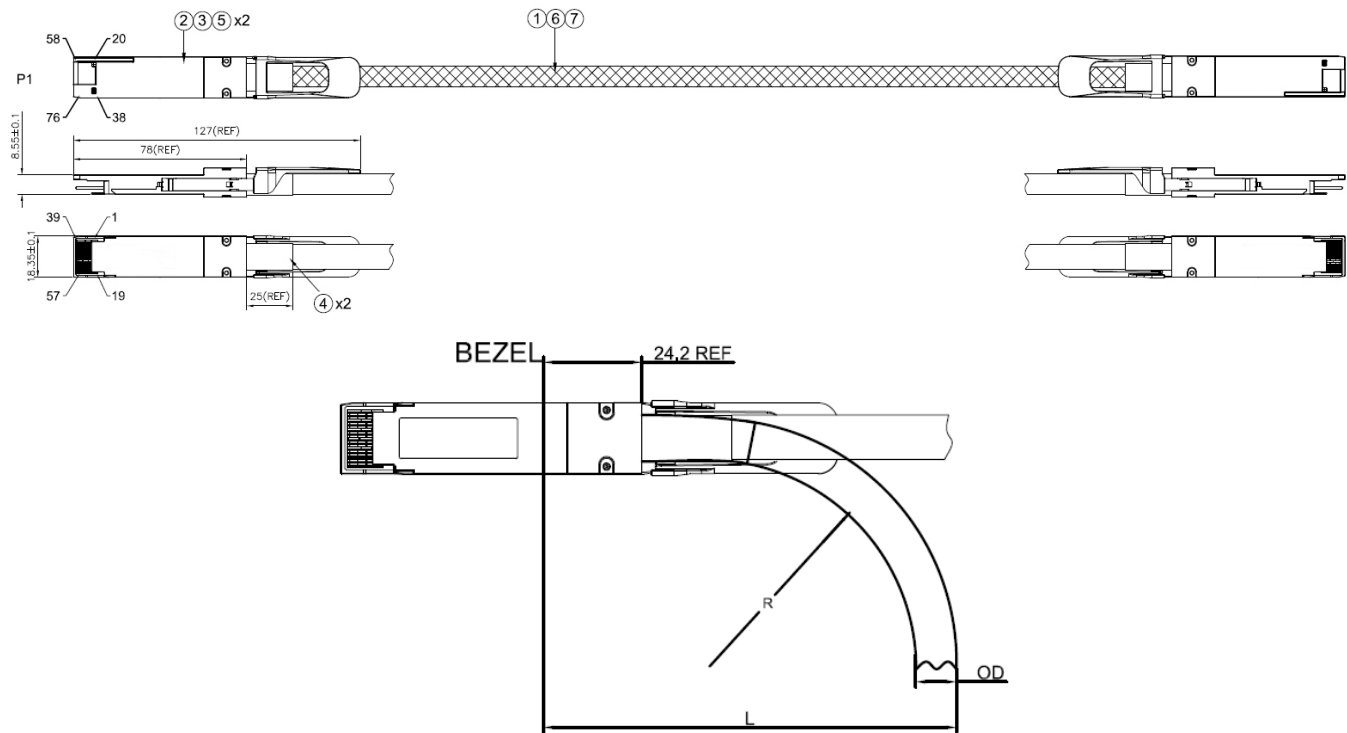
Block Diagram



Wiring Table



**Mechanical Specifications**



| Item | Name                   | Description                                                              | Quantity |
|------|------------------------|--------------------------------------------------------------------------|----------|
| 1    | Raw Cable              | SAS Cable, 56G, RoHS 2.0                                                 | A/R      |
| 2    | PCBA                   | QSFP-DD PCBA with Signal Chip, 76 P, Gold 30u" Minimum                   | 2        |
| 3    | QSFP-DD Conn. Assembly | Zinc Alloy, Plated Nickel Over Copper + Stainless Steel Latch + Pull Tab | 2        |
| 4    | Heat Shrink Tube       | Black                                                                    | A/R      |
| 5    | Back Shell Label       | Black Shell Label, 29.5*10mm                                             | 2        |
| 6    | Plastic Braided Mesh   | Pet, Orange                                                              | A/R      |
| 7    | Braid Shield           | Copper, Braid                                                            | A/R      |

**Notes:**

1. Raw cable impedance: 100±10Ω.  
Mated connector impedance: 100±15Ω.  
Rise time: 25ps (20-80%).
2. High-frequency test according to IEEE802.3cd standard.
3. All material must comply with RoHS 2.0.

## About ProLabs

Our experience comes as standard; for over 15 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with over 90 optical switching and transport platforms.

## Complete Portfolio of Network Solutions

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 400G while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

## Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure that you get immediate answers to your questions and compatible product when needed. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.



## Contact Information

ProLabs US

Email: [sales@prolabs.com](mailto:sales@prolabs.com)

Telephone: 952-852-0252

ProLabs UK

Email: [salesupport@prolabs.com](mailto:salesupport@prolabs.com)

Telephone: +44 1285 719 600