

## 400G QSFP-DD to QSFP-DD Active Electrical Cable

---

### QSFP-DD Series

- **QSFP-DD to QSFP-DD 400G Application**
- **Hot Pluggable**
- **Host and line interface**
- **Performance monitor in features**
- **Comprehensive test and debug capabilities**
- **RoHS Compliance**



Ascent's 400G QSFP-DD to QSFP-DD Active Electrical Cable (AEC) is a high-performance, low-power interconnect solution designed to deliver reliable 400Gb/s connectivity for next-generation AI infrastructure, hyperscale data centers, cloud computing, and high-speed Ethernet networks. The active cable integrates advanced signal conditioning technology to extend copper transmission distances while maintaining excellent signal integrity, making it an ideal alternative to passive DAC cables for medium-reach server and switch interconnections.

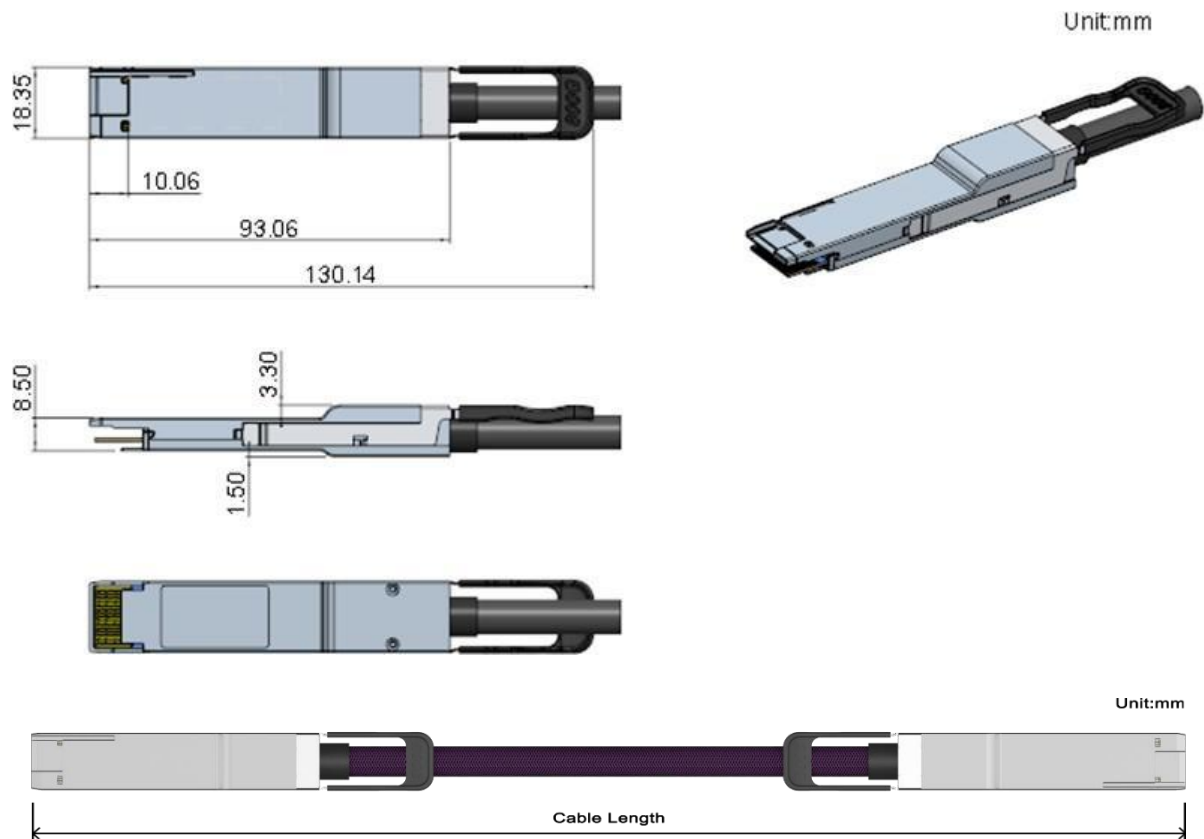
The cable assembly features QSFP-DD connectors at both ends and supports an aggregate data rate of 400Gb/s over a single cable assembly. Integrated active equalization circuitry compensates for channel loss and minimizes signal degradation, enabling longer reach, lower bit error rates, and improved system reliability. Operating from a single 3.3V power supply, the module supports hot-pluggable operation and provides comprehensive diagnostic capabilities, including PRBS generation and checking, loopback testing, signal-to-noise ratio (SNR) monitoring, eye histogram analysis, and advanced performance monitoring for simplified deployment and maintenance.

Designed in accordance with the QSFP-DD MSA specification and fully compliant with RoHS requirements, the Ascent 400G QSFP-DD AEC offers a compact, energy-efficient, and cost-effective solution for high-density networking environments. Its low latency, enhanced electrical performance, and broad platform compatibility make it an ideal choice for Ethernet switches, AI GPU clusters, storage networks, and high-performance computing (HPC) applications requiring reliable short- to medium-reach 400G interconnects.

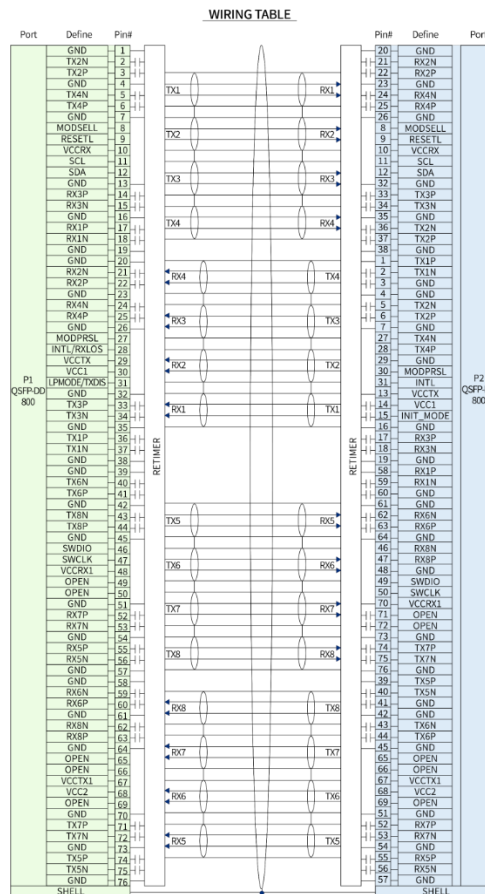
## Key Features

- QSFP-DD to QSFP-DD 400G Application
- 3.3V Power Supply
- Hot Pluggable
- Host and line interface support loopbacks and PRBS generator/checker for diagnostic operations
- Performance monitor in features including SNR, eye histogram and more
- Comprehensive test and debug capabilities
- RoHS Compliance

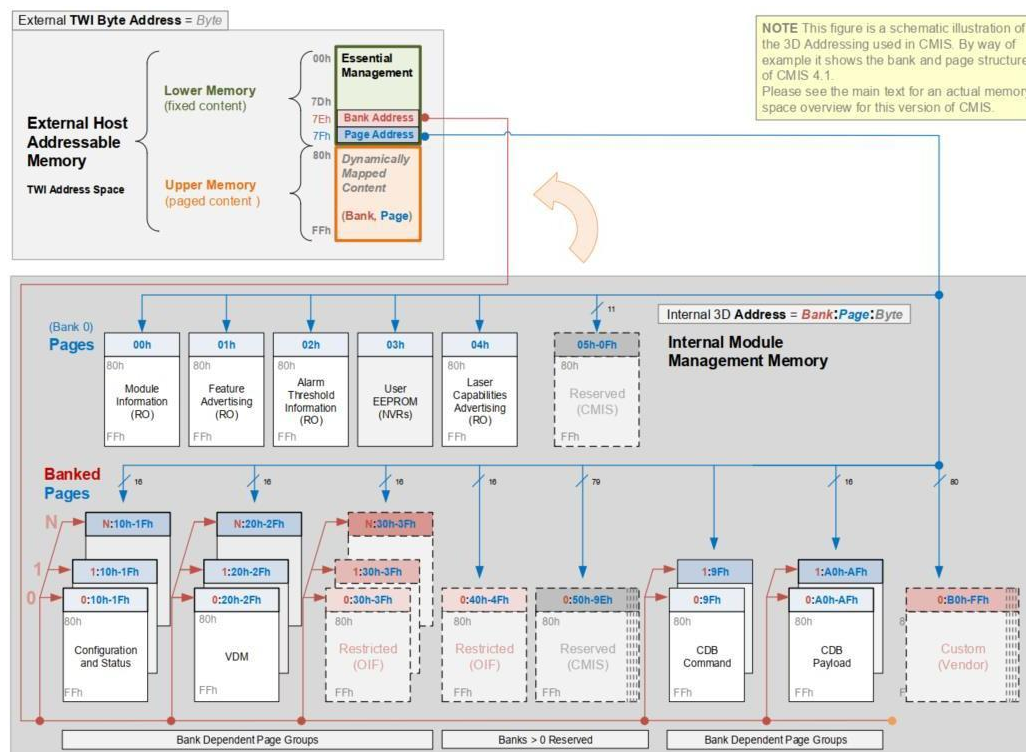
## Outline Dimension



## Cable Wiring



## Memory Map and Control Register (Compatible CMIS 5.0)



## Specifications

### Absolute Maximum Ratings

| Parameter           | Symbol           | Min. | Typ. | Max. | Unit | Note           |
|---------------------|------------------|------|------|------|------|----------------|
| Storage Temperature | T <sub>stg</sub> | -40  | -    | +85  | °C   |                |
| Supply Voltage      | V <sub>cc</sub>  | -0.3 | -    | 3.6  | V    |                |
| Relative Humidity   | RH               | 10%  | -    | 85%  | %    | Non-Condensing |

### Recommended Operating Conditions

| Parameter                   | Symbol            | Min. | Typ. | Max.  | Unit | Note |
|-----------------------------|-------------------|------|------|-------|------|------|
| Operating Case Temperature  | T <sub>CASE</sub> | 0    | -    | +70   | °C   |      |
| Power Supply Voltage        | V <sub>CC</sub>   | 3.13 | 3.3  | 3.465 | V    |      |
| Power Consumption           | P <sub>DISS</sub> |      | -    |       | W    |      |
| Operating Relative Humidity |                   | 0    |      | 85    | %    |      |

### General Product Characteristics

| Parameter                                      | Description                                                                            | P1 End                                    | P2 End     |
|------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------|------------|
| Module Form Factor                             | QSFP-DD400                                                                             |                                           | QSFP-DD400 |
| Full/Half Active Full                          | Full Active                                                                            |                                           |            |
| Default Data Rate                              | 400G(8*56G-PAM4) to 400G(8*56G-PAM4)                                                   |                                           |            |
| Number of Data Lanes /Data Rate                | 8Lane(16Pair)/56G PAM4                                                                 |                                           |            |
| Cable Construction                             | Expando over discrete twinax and metal braid                                           |                                           |            |
| Nominal Data Rate per Lane                     | 53.125Gbps(PAM4), KP4 FEC must be enabled                                              | 53.125Gbps(PAM4), KP4 FEC must be enabled |            |
| Pre-FEC Bit Ratio<br>(Test with PRBS31 Patent) | <1e-8                                                                                  | <1e-8                                     |            |
| Post-FEC Bit Ratio                             | <1e-15                                                                                 | <1e-15                                    |            |
| Power Consumption per End(Typical)             | 4.5W                                                                                   | 4.5W                                      |            |
| Host Max I2C Interface                         | 400kbps                                                                                |                                           |            |
| Time to CMIS Ready                             | 100milliseconds                                                                        |                                           |            |
| Time to Link                                   | 15seconds                                                                              |                                           |            |
| Hot Swappable/Pluggable                        | Yes                                                                                    |                                           |            |
| Data Rate Capabilities                         | 400G: 56G PAM4<br>(data rate=53.125Gbps)<br>200G: 25G PAM4<br>(data rate=25.78125Gbps) |                                           |            |

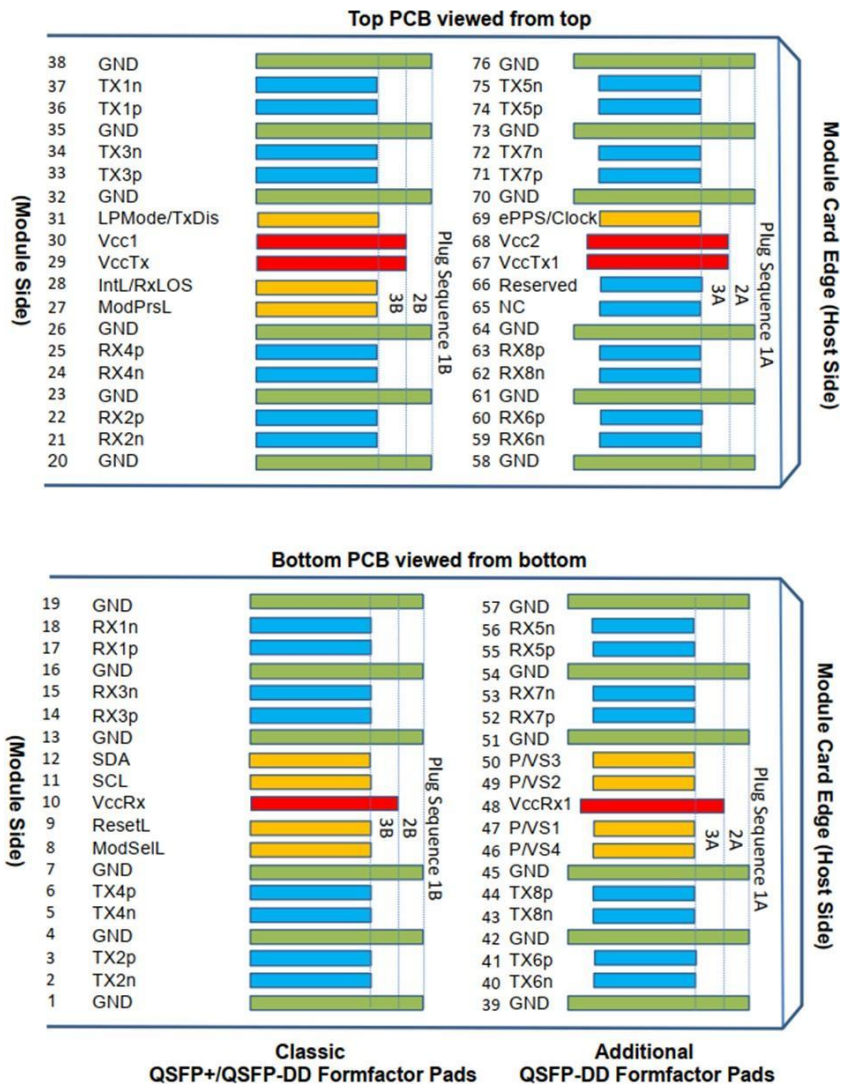
### Electrical Characteristics

| Parameter                            | Min. | Typ. | Max. | Unit | Note |
|--------------------------------------|------|------|------|------|------|
| Characteristic Impedance             | 90   | 100  | 110  | ohm  |      |
| Time Propagation Delay (Informative) |      |      | 4.9  | ns   |      |

## Digital Diagnostics

| Parameter                       | Symbol  | Unit | Accuracy | Notes                |
|---------------------------------|---------|------|----------|----------------------|
| Temperature Monitor Absolute    | DMI_TEM | °C   | ±3       | Over Operating Temp  |
| Supply Voltage Monitor Absolute | DMI_VCC | V    | ±5       | Full Operating Range |

## Pin Assignment



| Pin | Logic       | Symbol  | Description                          | PlugSeq. | Notes |
|-----|-------------|---------|--------------------------------------|----------|-------|
| 1   |             | GND     | Ground                               | 1B       | 1     |
| 2   | CML-I       | Tx2n    | Transmitter Inverted Data Input      | 3B       |       |
| 3   | CML-I       | Tx2p    | Transmitter Non-Inverted Data output | 3B       |       |
| 4   |             | GND     | Ground                               | 1B       | 1     |
| 5   | CML-I       | Tx4n    | Transmitter Inverted Data Input      | 3B       |       |
| 6   | CML-I       | Tx4p    | Transmitter Non-Inverted Data output | 3B       |       |
| 7   |             | GND     | Ground                               | 1B       | 1     |
| 8   | LVTLL-I     | ModSelL |                                      | 3B       |       |
| 9   | LVTLL-I     | ResetL  |                                      | 3B       |       |
| 10  |             | VccRx   | + 3.3V Power Supply Receiver         | 2B       | 2     |
| 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     | Ground                               | 1B       | 1     |

| Pin | Logic         | Symbol        | Description                           | PlugSeq. | Notes |
|-----|---------------|---------------|---------------------------------------|----------|-------|
| 14  | CML-O         | Rx1p          | Receiver Non-Inverted Data Output     | 3B       |       |
| 15  | CML-O         | Rx1n          | Receiver Inverted Data Output         | 3B       |       |
| 16  |               | GND           | Ground                                | 1B       | 1     |
| 17  | CML-O         | Rx1p          | Receiver Non-Inverted Data Output     | 3B       |       |
| 18  | CML-O         | Rx1n          | Receiver Inverted Data Output         | 3B       |       |
| 19  |               | GND           | Ground                                | 1B       | 1     |
| 20  |               | GND           | Ground                                | 1B       | 1     |
| 21  | CML-O         | Rx2n          | Receiver Inverted Data Output         | 3B       |       |
| 22  | CML-O         | Rx2p          | Receiver Non-Inverted Data Output     | 3B       |       |
| 23  |               | GND           | Ground                                | 1B       |       |
| 24  | CML-O         | Rx4n          | Receiver Inverted Data Output         | 3B       |       |
| 25  | CML-O         | Rx4p          | Receiver Non-Inverted Data Output     | 3B       |       |
| 26  |               | GND           | Ground                                | 1B       | 1     |
| 27  | LVTTL-O       | ModPrsL       | Present                               | 3B       |       |
| 28  | LVTTL-O       | IntL/RX_LOS   | Interrupt/Optional Rx LOS             | 3B       |       |
| 29  |               | VccTx         | +3.3 V Power Supply Transmitter       | 2B       | 2     |
| 30  |               | Vcc1          | +3.3 V Power Supply                   | 2B       | 2     |
| 31  | LVTTL-I       | LPMODE/Tx_DIS | Low Power Mode/Optional Tx Disable    | 3B       |       |
| 32  |               | GND           | Ground                                | 1B       | 1     |
| 33  | CML-I         | Tx3p          | Transmitter Non-Inverted Data Input   | 3B       |       |
| 34  | CML-I         | Tx3n          | Transmitter Inverted Data Input       | 3B       |       |
| 35  |               | GND           | Ground                                | 1B       | 1     |
| 36  | CML-I         | Tx1p          | Transmitter Non-Inverted Data Input   | 3B       |       |
| 37  | CML-I         | Tx1n          | Transmitter Inverted Data Input       | 3B       |       |
| 38  |               | GND           | Ground                                | 1B       | 1     |
| 39  |               | GND           | Ground                                | 1A       | 1     |
| 40  | CML-I         | Tx6n          | Transmitter Inverted Data Input       | 3A       |       |
| 41  | CML-I         | Tx6p          | Transmitter Non-Inverted Data Input   | 3A       |       |
| 42  |               | GND           | Ground                                | 1A       | 1     |
| 43  | CML-I         | Tx8n          | Transmitter Inverted Data Input       | 3A       |       |
| 44  | CML-I         | Tx8p          | Transmitter Non-Inverted Data Input   | 3A       |       |
| 45  |               | GND           | Ground                                | 1A       | 1     |
| 46  | LVC MOS/CML-I | P/VS4         | Programmable/Module Vendor Specific 4 | 3A       | 5     |
| 47  | LVC MOS/CML-I | P/VS1         | Programmable/Module Vendor Specific 1 | 3A       | 5     |
| 48  |               | VccRx1        | 3.3V Power Supply                     | 2A       | 2     |
| 49  | LVC MOS/CML-O | P/VS2         | Programmable/Module Vendor Specific 2 | 3A       | 5     |
| 50  | LVC MOS/CML-O | P/VS3         | Programmable/Module Vendor Specific 3 | 3A       | 5     |
| 51  |               | GND           | Ground                                | 1A       | 1     |
| 52  | CML-O         | Rx7p          | Receiver Non-Inverted Data Output     | 3A       |       |
| 53  | CML-O         | Rx7n          | Receiver Inverted Data Output         | 3A       |       |
| 54  |               | GND           | Ground                                | 1A       | 1     |
| 55  | CML-O         | Rx5p          | Receiver Non-Inverted Data Output     | 3A       |       |
| 56  | CML-O         | Rx5n          | Receiver Inverted Data Output         | 3A       |       |



| Pin | Logic     | Symbol     | Description                             | PlugSeq. | Notes |
|-----|-----------|------------|-----------------------------------------|----------|-------|
| 57  |           | GND        | Ground                                  | 1A       | 1     |
| 58  |           | GND        | Ground                                  | 1A       | 1     |
| 59  | CML-O     | Rx6n       | Receiver Inverted Data Output           | 3A       |       |
| 60  | CML-O     | Rx6p       | Receiver Non-Inverted Data Output       | 3A       |       |
| 61  |           | GND        | Ground                                  | 1A       | 1     |
| 62  | CML-O     | Rx8n       | Receiver Inverted Data Output           | 3A       |       |
| 63  | CML-O     | Rx8p       | Receiver Non-Inverted Data Output       | 3A       |       |
| 64  |           | GND        | Ground                                  | 1A       | 1     |
| 65  |           | NC         | No Connect                              | 3A       | 3     |
| 66  |           | Reserved   | For future use                          | 3A       | 3     |
| 67  |           | VccTx1     | 3.3V Power Supply                       | 2A       | 2     |
| 68  |           | Vcc2       | 3.3V Power Supply                       | 2A       | 2     |
| 69  | LVC MOS-I | ePPS/Clock | 1PPS PTP Clock or Reference Clock Input | 3A       | 6     |
| 70  |           | GND        | Ground                                  | 1A       | 1     |
| 71  | CML-I     | Tx7p       | Transmitter Non-Inverted Data Input     | 3A       |       |
| 72  | CML-I     | Tx7n       | Transmitter Inverted Data Input         | 3A       |       |
| 73  |           | GND        | Ground                                  | 1A       | 1     |
| 74  | CML-I     | Tx5p       | Transmitter Non-Inverted Data Input     | 3A       |       |
| 75  | CML-I     | Tx5n       | Transmitter Inverted Data Input         | 3A       |       |
| 76  |           | GND        | Ground                                  | 1A       | 1     |

- Note 1:** QSFP-DD uses common ground (GND) for all signals and supply (power). All are common within the QSFP- DD module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane. Each connector GND contact is rated for a steady state current of 500 mA.
- Note 2:** VccRx, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 shall be applied concurrently. Supply requirements defined for the host side of the Host Card Edge Connector(see MSA specification). For power classes 4 and above the module differential loading of input voltage pads must not result in exceeding contact current limits. Each connector Vcc contact is rated for a steady state current of 2000mA.
- Note 3:** Reserved pad recommended to be terminated with 10kΩ to ground on the host. Pad 65 (No Connect) Shall be left unconnected within the module, optionally pad 65 may get terminated with 10kΩ to ground on the host.
- Note 4:** Plug Sequence specifies the mating sequence of the host connector and module. The sequence is 1A, 2A, 3A, 1B, 2B, 3B. Contact sequence A will make, then break contact with additional QSFP- DD pads. Sequence 1A and 1B will then occur simultaneously, followed by 2A and 2B, followed by 3A and 3B.
- Note 5:** Full definitions of the P/VSx signals currently under development. For module designs using programmable/vendor specific inputs P/VS1 and P/VS4 signals it is recommended each to be terminated in the module with 10 kΩ. For host designs using programmable/vendor specific outputs P/VS2 and P/VS3 signals it is recommended each to be terminated on the host with 10kΩ.
- Note 6:** For host not implementing ePPS/Clock, it is not necessary to parallel terminate the ePPS/Clock signal to ground on the host. ePPS/Clock already has parallel termination in the module.

**Handling Precautions**

This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

**Laser Safety**

Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.

**Ordering Information**

---

**Product Name**

Q56-DD-AEC-001  
Q56-DD-AEC-003  
Q56-DD-AEC-005  
Q56-DD-AEC-007

**Product Description**

QSFP-DD to QSFP-DD 400G AEC, 32AWG, 1.0M  
QSFP-DD to QSFP-DD 400G AEC, 30AWG, 3.0M  
QSFP-DD to QSFP-DD 400G AEC, 28AWG, 5.0M  
QSFP-DD to QSFP-DD 400G AEC, 28AWG, 7.0M



## Contact Information



### Ascent Communication Technology Ltd

#### AUSTRALIA

140 William Street, Melbourne  
Victoria 3000, AUSTRALIA  
Phone: +61-3-8691 2902

#### Hong Kong SAR

Room 1210, 12th Floor, Wing Tuck Commercial Centre  
181 Wing Lok Street, Sheung Wan , Hong Kong SAR  
Phone: +852-2851 4722

#### CHINA

Unit 1933, 600 Luban Road  
200023, Shanghai, CHINA  
Phone: +86-21-60232616

#### USA

2710 Thomes Ave  
Cheyenne, WY 82001, USA  
Phone: +1 203 350 9822

#### EUROPE

Pfarrer-Bensheimer-Strasse 7a  
55129 Mainz, GERMANY  
Phone: +49 (0) 6136 926 3246

#### VIETNAM

11th Floor, Hoa Binh Office Tower  
106 Hoang Quoc Viet Street, Nghia Do Ward  
Cau Giay District, Hanoi 10649, VIETNAM  
Phone: +84-24-37955917

**WEB:** [www.ascentcomtec.com](http://www.ascentcomtec.com)

**EMAIL:** [sales@ascentcomtec.com](mailto:sales@ascentcomtec.com)

Specifications and product availability are subject to change without notice.  
Copyright © 2026 Ascent Communication Technology Limited. All rights reserved.  
Ver. ACT\_Q56-DD-AEC-XXX\_Datasheet\_V1b\_Jul\_2025