

## Application

- Data center & Networking Equipment
- Servers/Storage Devices
- High Performance Computing (HPC)
- Switches/Routers
- Telecom Central Offices (CO)
- Test and Measurement Equipment

## Standards Compliance

- Compliant with QSFP56 MSA
- Compliant with DSFP/NGSFP MSA
- Compliant with IEEE 802.3cd
- Compliant with IEEE 802.3bj
- Compliant with InfiniBand HDR
- Compliant with CMIS 5.0 and SFF-8636
- SFF-8417, SFF-8661, SFF-8679, SFF-8636
- Compliant with SFF-8472, SFF-8402, SFF-8419,

## Highlight

- Support 4x53.125G PAM4
- 200G to 2\*100G Data Rate
- 3.3V Power Supply
- Hot Pluggable
- Excellent SI performance
- RoHS Compliance
- I2C for EEPROM communication
- Max. power consumption 1.5W

## 1.0 General Description

This datasheet pertains to the **QSFP56 200G to 2\*DSFP56 100G Active Redriver Cable Assembly**, meticulously designed for application in the telecommunications and data center sectors. It facilitates bi-directional transmission of 200G traffic per cable, accommodating 4 lanes of 56G PAM4. The cable adheres to the standardized QSFP28(56) and DSFP28(56) form factor and complies rigorously with Multi-Source Agreement (MSA) specifications.

## 2.0 Product Specification

### 2.1 Absolute Maximum Ratings

| Parameter                          | Unit | Min. | Max. | Notes |
|------------------------------------|------|------|------|-------|
| Supply Voltage                     | V    | -0.3 | 3.6  |       |
| Data Input Voltage                 | V    | -0.3 | 3.6  |       |
| Control Input Voltage              | V    | -0.3 | 3.6  |       |
| Operating Temperature              | °C   | 0    | 70   |       |
| Storage Temperature                | °C   | -40  | +85  |       |
| Relative Humidity (Non-Condensing) | %    | 5    | 85   |       |

### 2.2 Operational Specification

| Parameter                   | Unit | Min            | Typical | Max   | Notes   |
|-----------------------------|------|----------------|---------|-------|---------|
| Supply Voltage (Vcc)        | V    | 3.135          | 3.3     | 3.465 | Per End |
| Power Consumption           | W    |                |         | 1.5   | Per End |
| Operating Case Temperature  | °C   | 0              |         | 70    |         |
| Operating Relative Humidity | %    | 0              |         | 85    |         |
| Modulation Format           |      | 56G PAM-4      |         |       |         |
| Bit Rate                    | Gbps | 200G to 2*100G |         |       |         |

### 2.3 Electrical Characteristics

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

**2.4 SI performance**

| Item                                                                                | Parameter                                                  | Require                             | Reference                                |
|-------------------------------------------------------------------------------------|------------------------------------------------------------|-------------------------------------|------------------------------------------|
| 1                                                                                   | ILdd<br>Insertion loss at 13.28 GHz                        | 17.16 dB (Max.)                     | IEEE 802.3cd Section<br>Section 136.11.2 |
| 2                                                                                   | ILdd<br>Insertion loss at 13.28 GHz                        | 8 dB (Min.)                         | IEEE 802.3cd Section<br>Section 136.11.2 |
| 3                                                                                   | ERL<br>Minimum cable assembly                              | >11 dB*.                            | IEEE 802.3cd Section<br>Section 136.11.3 |
| 4                                                                                   | RLcd<br>Differential-mode to common-mode<br>return loss    | 0.01GHz – 19GHz<br>Equation (92–28) | IEEE 802.3cd Section<br>136.11.4         |
| 5                                                                                   | ILcd<br>Differential-mode to common-mode<br>insertion loss | 0.01GHz – 19GHz<br>Equation (92–29) | IEEE 802.3cd Section<br>136.11.5         |
| 6                                                                                   | RLcc<br>Common-mode to common-mode<br>return loss          | 0.01GHz – 19GHz<br>Equation (92–30) | IEEE 802.3cd Section<br>Section 136.11.6 |
| 7                                                                                   | COM                                                        | 3dB (Min.)                          | IEEE 802.3cd Section<br>Section 136.11.7 |
| *Cable assemblies with a com greater than 4 dB are not required to meet minimum ERL |                                                            |                                     |                                          |

## 2.5 Pin Assignments

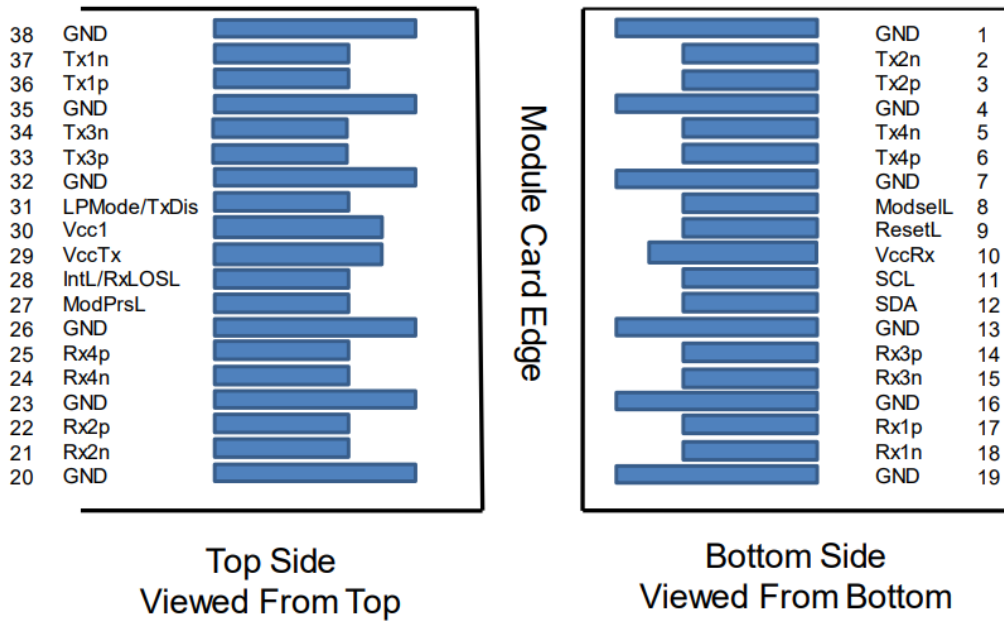


Figure 1 QSFP28(56) Module Contact Assignment

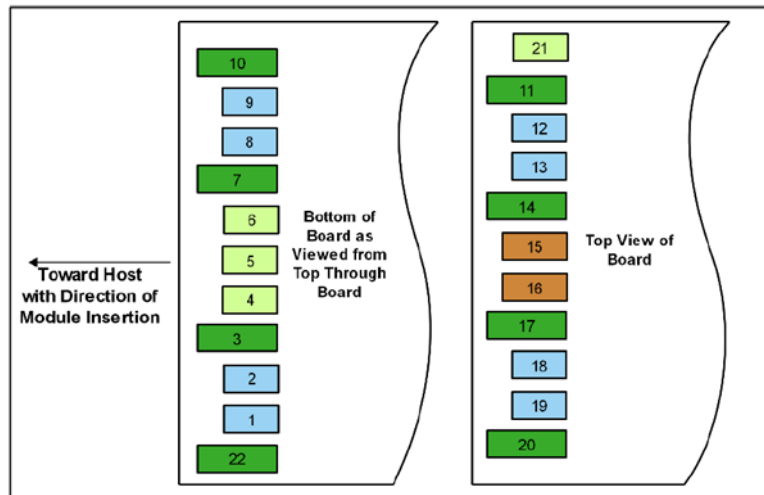


Figure 2 DSFP28(56) Module Contact Assignment

**2.6 Pin Description**
**Table 1 QSFP28(56) Module Pin Description**

| Pin | Logic       | Symbol        | Description                         | Plug Sequence | Notes |
|-----|-------------|---------------|-------------------------------------|---------------|-------|
| 1   |             | GND           | Ground                              | 1             | 1     |
| 2   | CML-I       | Tx2n          | Transmitter Inverted Data Input     | 3             |       |
| 3   | CML-I       | Tx2p          | Transmitter Non-Inverted Data Input | 3             |       |
| 4   |             | GND           | Ground                              | 1             | 1     |
| 5   | CML-I       | Tx4n          | Transmitter Inverted Data Input     | 3             |       |
| 6   | CML-I       | Tx4p          | Transmitter Non-Inverted Data Input | 3             |       |
| 7   |             | GND           | Ground                              | 1             | 1     |
| 8   | LVTTTL-1    | ModseIL       | Module Select                       | 3             |       |
| 9   | LVTTTL-1    | ResetL        | Module Reset                        | 3             |       |
| 10  |             | Vcc Rx        | +3.3V Power supply receiver         | 2             | 2     |
| 11  | LVC MOS-I/O | SCL           | 2-wire serial interface clock       | 3             |       |
| 12  | LVC MOS-I/O | SDA           | 2-wire serial interface clock       | 3             |       |
| 13  |             | GND           | Ground                              | 1             | 1     |
| 14  | CML-O       | Rx3p          | Receiver Non-Inverted Data Output   | 3             |       |
| 15  | CML-O       | Rx3n          | Receiver Inverted Data Output       | 3             |       |
| 16  |             | GND           | Ground                              | 1             | 1     |
| 17  | CML-O       | Rx1p          | Receiver Non-Inverted Data Output   | 3             |       |
| 18  | CML-O       | Rx1n          | Receiver Inverted Data Output       | 3             |       |
| 19  |             | GND           | Ground                              | 1             | 1     |
| 20  |             | GND           | Ground                              | 1             | 1     |
| 21  | CML-O       | Rx2n          | Receiver Inverted Data Output       | 3             |       |
| 22  | CML-O       | Rx2p          | Receiver Non-Inverted Data Output   | 3             |       |
| 23  |             | GND           | Ground                              | 1             |       |
| 24  | CML-O       | Rx4n          | Receiver Inverted Data Output       | 3             |       |
| 25  | CML-O       | Rx4p          | Receiver Non-Inverted Data Output   | 3             |       |
| 26  |             | GND           | Ground                              | 1             | 1     |
| 27  | LVTTTL-O    | ModPrsL       | Present                             | 3             |       |
| 28  | LVTTTL-O    | Int/RxLos     | Interrupt/optional RxLOS            | 3             |       |
| 29  |             | Vcc Tx        | +3.3 V Power supply transmitter     | 2             | 2     |
| 30  |             | Vcc1          | 3.3 V Power supply                  | 2             | 2     |
| 31  | LVTTTL-I    | LPMoDe/Tx Dis | Low Power Mode/optional TX Disable  | 3             |       |
| 32  |             | GND           | Ground                              | 1             | 1     |
| 33  | CML-I       | Tx3p          | Transmitter Non-Inverted Data Input | 3             |       |
| 34  | CML-I       | Tx3n          | Transmitter Inverted Data Input     | 3             |       |
| 35  |             | GND           | Ground                              | 1             | 1     |

|    |       |      |                                     |   |   |
|----|-------|------|-------------------------------------|---|---|
| 36 | CML-I | Tx1p | Transmitter Non-Inverted Data Input | 3 |   |
| 37 | CML-I | Tx1n | Transmitter Inverted Data Input     | 3 |   |
| 38 |       | GND  | Ground                              | 1 | 1 |

**Note 1:**

GND is the symbol for signal and supply (power) common for the module. All are common within the module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.

**Note 2:**

VccRx, Vcc1 and VccTx are applied concurrently and may be internally connected within the module in any combination. Vcc contacts in SFF-8662 and SFF-8672 each have a steady state current rating of 1 A.

**Table 2 1 DSFP28(56) Module Pin Description**

| Contacts | Logic <sup>1</sup> | Symbol     | Power Sequence Order | Name/Description                           | Note |
|----------|--------------------|------------|----------------------|--------------------------------------------|------|
| case     |                    | case       | See2                 | Module case                                |      |
| 1        | CML-I              | TD2-       | 3rd                  | Transmitter Inverted Data Input Lane 2     |      |
| 2        | CML-I              | TD2+       | 3rd                  | Transmitter Non-Inverted Data Input Lane 2 |      |
| 3        |                    | Gnd        | 1st                  | Module Ground                              | 5    |
| 4        | LVTTTL-I/O         | SDA        | 3rd                  | 2-wire Serial Interface Data Line          | 3    |
| 5        | LVTTTL-I/O         | SCL        | 3rd                  | 2-wire Serial Interface Clock              | 3    |
| 6        | Multilevel -I/O    | LPWn/ PRSn | 3rd                  | Low Power Mode/ Module Present (Mod_Abs)   |      |
| 7        |                    | Gnd        | 1st                  | Module Ground                              | 5    |
| 8        | CML-O              | RD2+       | 3rd                  | Receiver Non-Inverted Data Output Lane 2   |      |
| 9        | CML-O              | RD2-       | 3rd                  | Receiver Inverted Data Output Lane 2       |      |
| 10       |                    | Gnd        | 1st                  | Module Ground                              | 5    |
| 11       |                    | Gnd        | 1st                  | Module Ground                              | 5    |
| 12       | CML-O              | RD1-       | 3rd                  | Receiver Inverted Data Output Lane 1       | 4    |
| 13       | CML-O              | RD1+       | 3rd                  | Receiver Non-Inverted Data Output Lane 1   | 4    |
| 14       |                    | Gnd        | 1st                  | Module Ground                              | 5    |
| 15       |                    | Vcc        | 2nd                  | Module 3.3 V Supply                        |      |
| 16       |                    | Vcc        | 2nd                  | Module 3.3 V Supply                        |      |
| 17       |                    | Gnd        | 1st                  | Module Ground                              | 5    |
| 18       | CML-I              | TD1+       | 3rd                  | Transmitter Non-Inverted Data Input Lane 1 | 4    |

**QSFP56 200G to 2\*DSFP56 100G Active Redriver Cable Assembly**

|    |                |          |     |                                              |   |
|----|----------------|----------|-----|----------------------------------------------|---|
| 19 | CML-I          | TD1-     | 3rd | Transmitter Inverted Data Input Lane 1       | 4 |
| 20 |                | Gnd      | 1st | Module Ground                                | 5 |
| 21 | Multilevel-I/O | INT/RSTn | 3rd | Dual Function Module Interrupt and Reset Pin |   |
| 22 |                | Gnd      | 1st | Module Ground                                | 5 |

**Note1:**

Labeling as inputs (I) and outputs (O) are from the perspective of the module.

**Note2:**

The case makes electrical contact to the cage before any of the board edge contacts are made.

**Note3:**

DSFP 2-wire interface is based on Low Voltage TTL (LVTTTL) operating with a module supply of 3.3 V +/-5% and with a host supply range of 2.38 to 3.46 V.

The 2-wire interface protocol and electrical specifications are defined in SFF-8431 and compatible with I2C bus specifications.

**Note4:**

Backward compatible with SFF-8431 SFI interface.

**Note5:**

The module ground contacts Gnd recommended to be isolated from the module case by offering flexibility in the host EMI control strategy.

2.7 Cable Wiring

WIRING TABLE

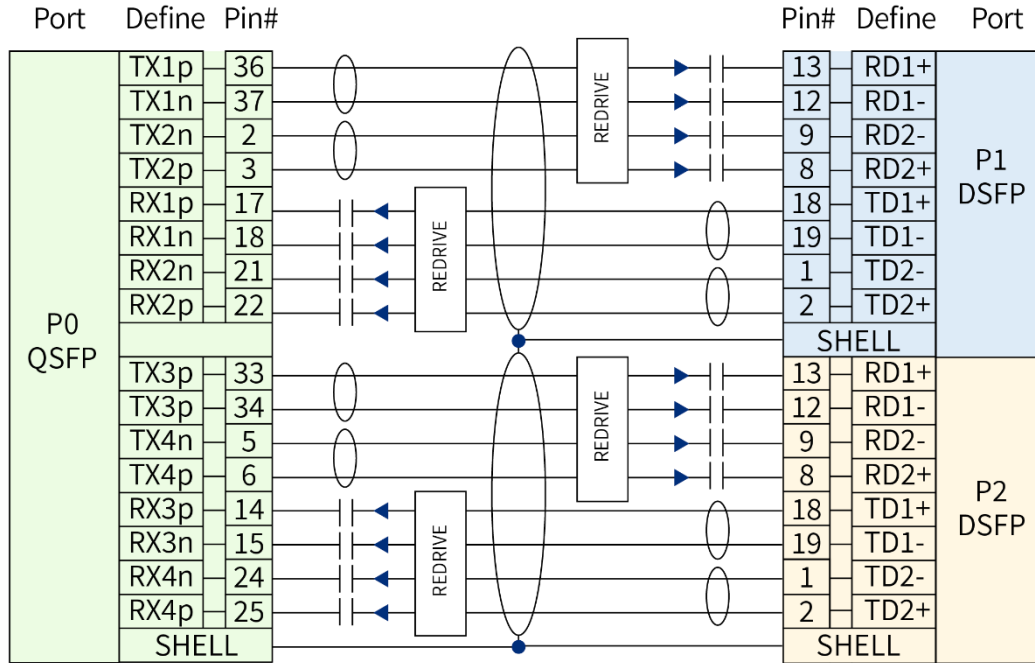


Figure 3 QSFP28(56) to 2\*DSFP28(56) Active Redriver Cable Assembly Wiring



2.8 Memory Map information (SFF-8636 Version)

Table 3 SFF-8636 Memory Map

| From                                  | To  | Content                         | No. of bytes | Type       |
|---------------------------------------|-----|---------------------------------|--------------|------------|
| <b>2-Wire Serial Address 1010000x</b> |     |                                 |              |            |
| <b>Lower Page 00h</b>                 |     |                                 |              |            |
| 0                                     | 2   | ID and Status                   | 3            | Read-Only  |
| 3                                     | 21  | Interrupt Flags (Clear on read) | 19           | Read-Only  |
| 22                                    | 33  | Free Side Device Monitors       | 12           | Read-Only  |
| 34                                    | 81  | Channel Monitors                | 48           | Read-Only  |
| 82                                    | 85  | Reserved                        | 4            | Read-Only  |
| 86                                    | 99  | Control                         | 14           | Read/Write |
| 100                                   | 106 | Free Side Interrupt Masks       | 7            | Read/Write |
| 107                                   | 110 | Free Side Device Properties     | 4            | Read-Only  |
| 111                                   | 112 | Assigned to PCI Express         | 2            | Read/Write |
| 113                                   | 117 | Free Side Device Properties     | 5            | Read-Only  |
| 118                                   | 118 | Reserved                        | 1            | Read/Write |
| 119                                   | 122 | Optional Password Change        | 4            | Write-Only |
| 123                                   | 126 | Optional Password Entry         | 4            | Write-Only |
| 127                                   | 127 | Page Select Byte                | 1            | Read/Write |
| <b>Upper Page 00h</b>                 |     |                                 |              |            |
| 128                                   | 128 | Identifier                      | 1            | Read-Only  |
| 129                                   | 191 | Base ID Fields                  | 63           | Read-Only  |
| 192                                   | 223 | Extended ID                     | 32           | Read-Only  |
| 224                                   | 255 | Vendor Specific ID              | 32           | Read-Only  |

Note: For the above refer to **SFF-8636 Management Interface for 4-lane Modules and Cables Rev 2.10.2**

2.9 Memory Map information (CMIS Version)

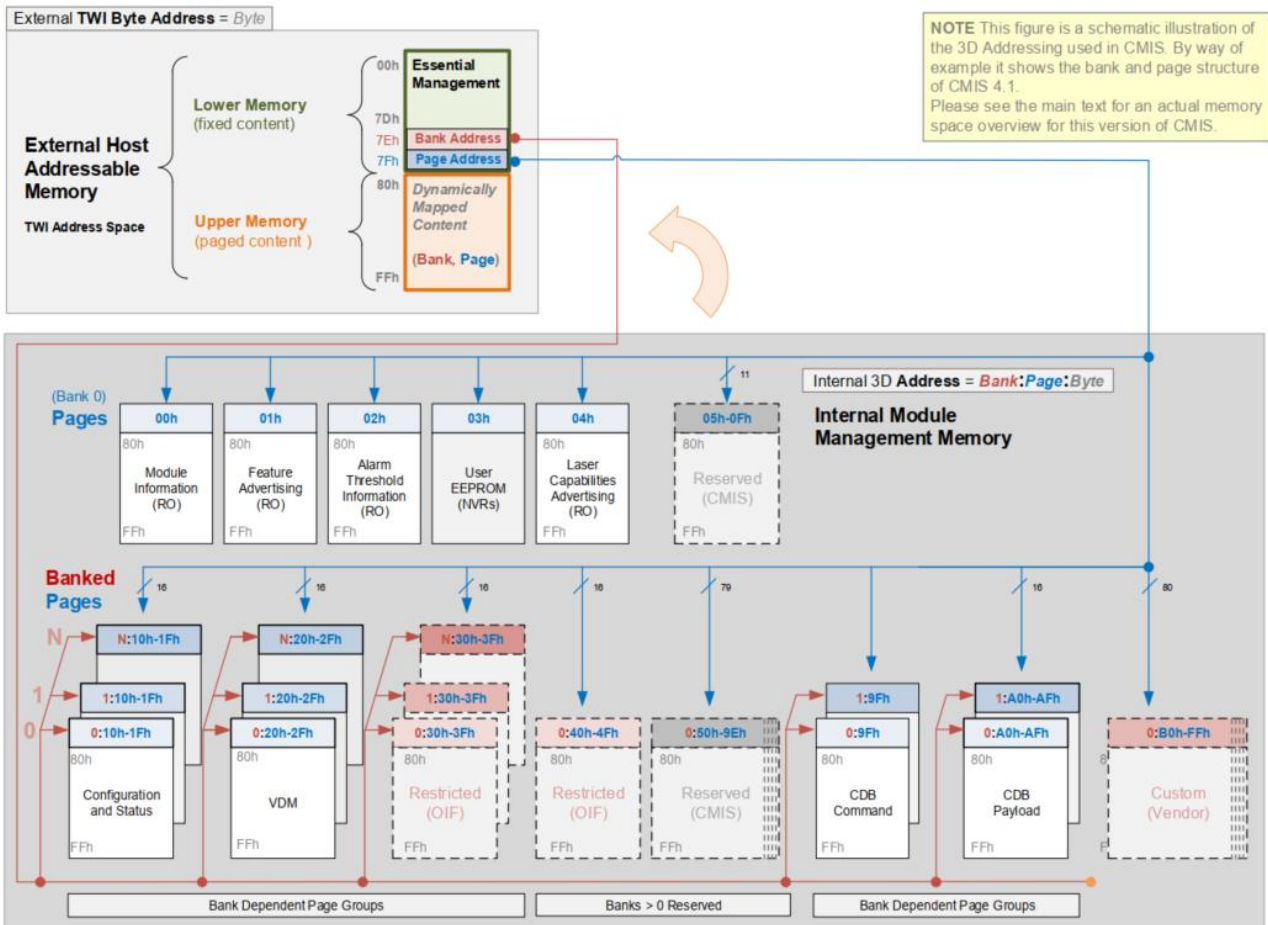


Figure 4 CMIS Module Memory Map (Conceptual View)

Table 4 CMIS Memory Map

Lower Memory Overview

| Address | Size | Subject Area            | Description                                                                                                                    |
|---------|------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| 0-3     | 4    | ID and Status Area      | Module ID from SFF-8024 list, version number, Type and status                                                                  |
|         |      |                         | Flat mem indication, CLEI present indicator, Maximum TWI speed, Current state of Module, Current state of the Interrupt signal |
| 4-7     | 4    | Lane Flag Summary       | Flag summary of all lane flags on pages 10h-1Fh                                                                                |
| 8-13    | 6    | Module-Level Flags      | All flags that are not lane or data path specific                                                                              |
| 14-25   | 12   | Module-Level Monitors   | Monitors that are not lane or data path specific                                                                               |
| 26-3    | 5    | Module Global Controls  | Controls applicable to the module as a whole                                                                                   |
| 31-36   | 6    | Module-Level Flag Masks | Masking bits for the Module-Level flags                                                                                        |
| 37-38   | 2    | CDB Status Area         | Status of most recent CDB command                                                                                              |

|         |    |                           |                                                                                                   |
|---------|----|---------------------------|---------------------------------------------------------------------------------------------------|
| 39-40   | 2  | Module Firmware Version   | Module Firmware Version                                                                           |
| 41-63   | 23 | Reserved Area             | Reserved for future standardization                                                               |
| 64-82   | 19 | Custom Area               | Vendor or module type specific use                                                                |
| 83-84   | 2  | Inactive Firmware Version | Version Number of Inactive Firmware. Values of 00h indicates module supports only a single image. |
| 85-117  | 33 | Application Advertising   | Combinations of host and media interfaces that are supported by module data path(s)               |
| 118-125 | 8  | Password Entry and Change |                                                                                                   |
| 126     | 1  | Bank Select Byte          | Bank address of currently visible Page                                                            |
| 127     | 1  | Page Select Byte          | Page address of currently visible Page                                                            |

■ Page 00h Overview

| Address | Size (bytes) | Name                            | Description                                               |
|---------|--------------|---------------------------------|-----------------------------------------------------------|
| 128     | 1            | Identifier                      | Identifier Type of module                                 |
| 129-144 | 16           | Vendor name                     | Vendor name (ASCII)                                       |
| 145-147 | 3            | Vendor OUI                      | Vendor IEEE company ID                                    |
| 148-163 | 16           | Vendor PN                       | Part number provided by vendor (ASCII)                    |
| 164-165 | 2            | Vendor rev                      | Revision level for part number provided by vendor (ASCII) |
| 166-181 | 16           | Vendor SN                       | Vendor Serial Number (ASCII)                              |
| 182-189 | 8            | Date Code                       |                                                           |
| 190-199 | 10           | CLEI code                       | Common Language Equipment Identification code             |
| 200-201 | 2            | Module power characteristics    |                                                           |
| 202     | 1            | Cable assembly length           |                                                           |
| 203     | 1            | Media Connector Type            |                                                           |
| 204-209 | 6            | Copper Cable Attenuation        |                                                           |
| 210-211 | 2            | Cable Assembly Lane Information |                                                           |
| 212     | 1            | Media Interface Technology      |                                                           |
| 213-220 | 8            | Reserved                        |                                                           |
| 221     | 1            | Custom                          |                                                           |
| 222     | 1            | Checksum                        | Includes bytes 128-221                                    |
| 223-255 | 33           | Custom Info NV                  |                                                           |

Note: For the above, refer to **Common Management Interface Specification Rev5.0**.

2.10 Mechanical Specifications

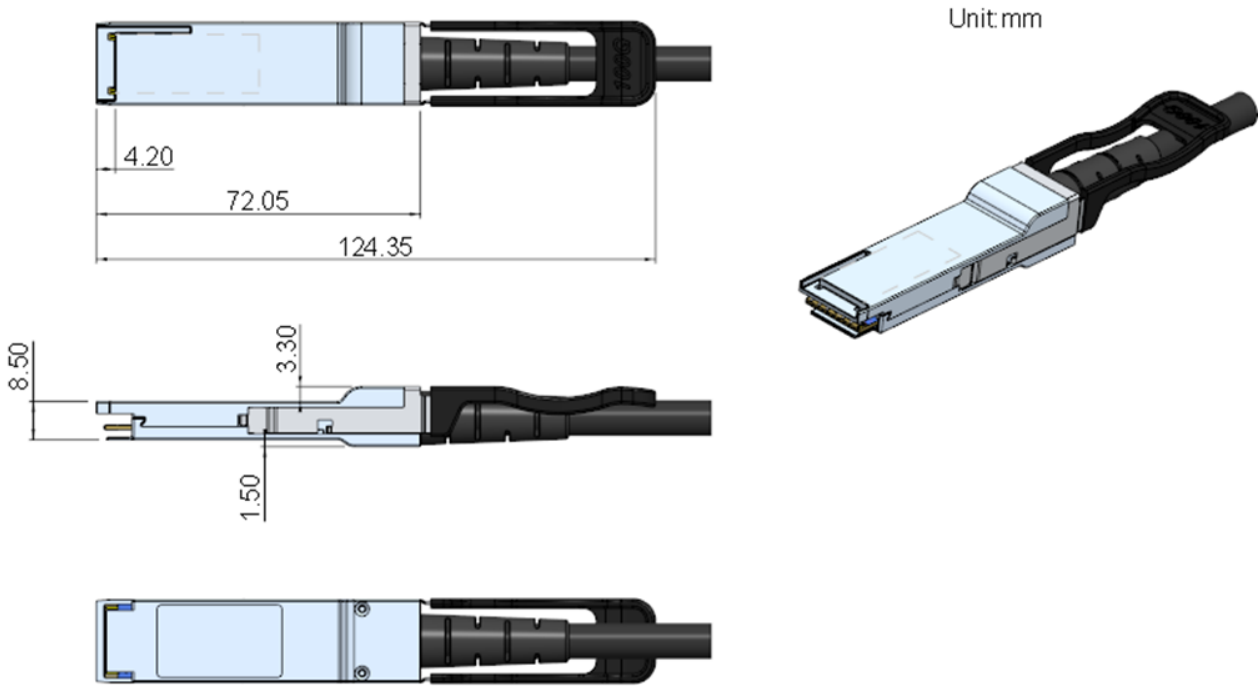


Figure 5 QSFP28(56) Form Factor

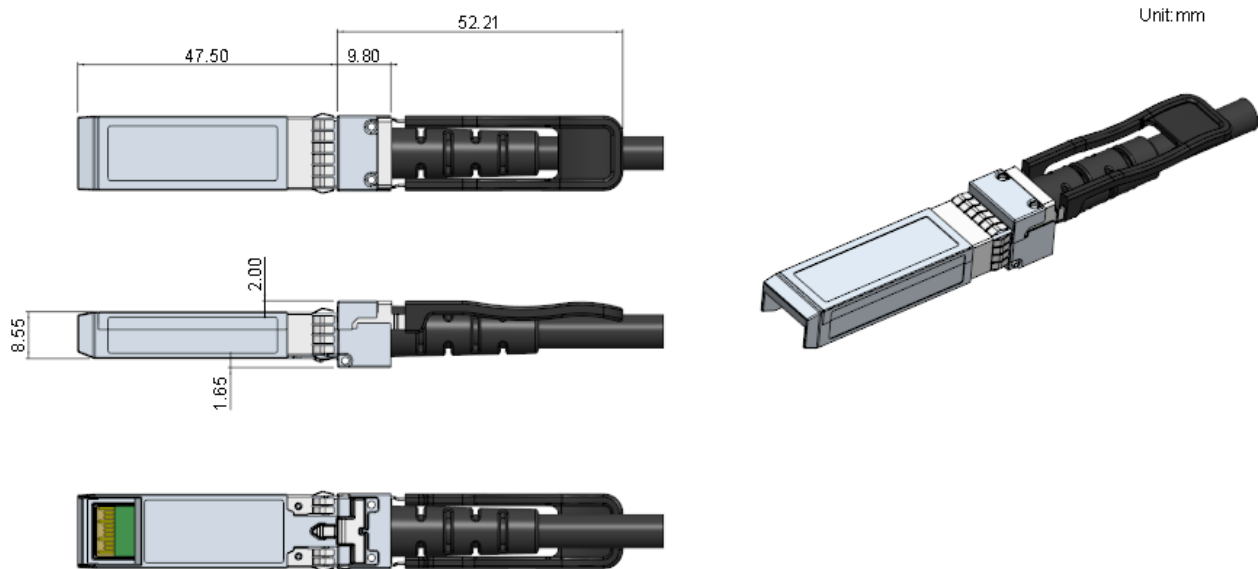
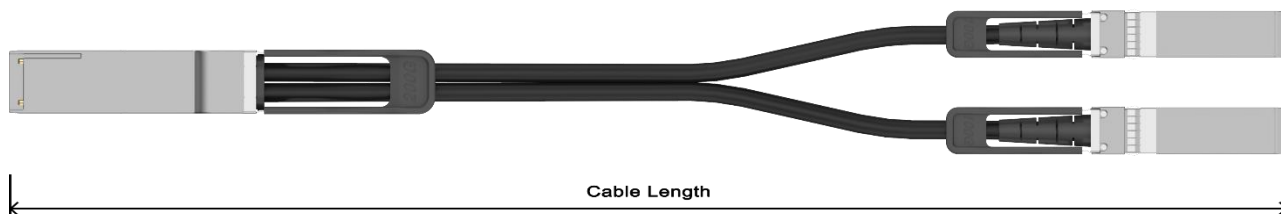


Figure 6 DSFP28(56) Form Factor

### 3.0 Product Information

Unit:mm



| Product ID                   | Product Description                                                  | Tolerance | AWG |
|------------------------------|----------------------------------------------------------------------|-----------|-----|
| Q56-200G-2*D56 100G ACC-3025 | QSFP56 200G to 2*DSFP56 (2*50G) Active Redriver Cu Cable, 30AWG-2.5M | ±50       | 30  |
| Q56-200G-2*D56 100G ACC-3030 | QSFP56 200G to 2*DSFP56 (2*50G) Active Redriver Cu Cable, 30AWG-3.0M | ±50       | 30  |
| Q56-200G-2*D56 100G ACC-3035 | QSFP56 200G to 2*DSFP56 (2*50G) Active Redriver Cu Cable, 30AWG-3.0M | ±60       | 30  |
| Q56-200G-2*D56 100G ACC-2830 | QSFP56 200G to 2*DSFP56 (2*50G) Active Redriver Cu Cable, 28AWG-3.5M | ±50       | 28  |
| Q56-200G-2*D56 100G ACC-2835 | QSFP56 200G to 2*DSFP56 (2*50G) Active Redriver Cu Cable, 28AWG-3.5M | ±60       | 28  |
| Q56-200G-2*D56 100G ACC-2840 | QSFP56 200G to 2*DSFP56 (2*50G) Active Redriver Cu Cable, 28AWG-4.0M | ±60       | 28  |
| Q56-200G-2*D56 100G ACC-2845 | QSFP56 200G to 2*DSFP56 (2*50G) Active Redriver Cu Cable, 28AWG-4.5M | ±70       | 28  |
| Q56-200G-2*D56 100G ACC-2635 | QSFP56 200G to 2*DSFP56 (2*50G) Active Redriver Cu Cable, 26AWG-3.5M | ±60       | 26  |
| Q56-200G-2*D56 100G ACC-2640 | QSFP56 200G to 2*DSFP56 (2*50G) Active Redriver Cu Cable, 26AWG-4.0M | ±60       | 26  |
| Q56-200G-2*D56 100G ACC-2645 | QSFP56 200G to 2*DSFP56 (2*50G) Active Redriver Cu Cable, 26AWG-4.5M | ±70       | 26  |
| Q56-200G-2*D56 100G ACC-2650 | QSFP56 200G to 2*DSFP56 (2*50G) Active Redriver Cu Cable, 26AWG-5.0M | ±70       | 26  |

#### Important Notice

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### 4.0 Revision Record

| Rev. | Comments        | Author     | Date       |
|------|-----------------|------------|------------|
| A01  | Initial Release | James Chen | 10/01/2023 |
|      |                 |            |            |
|      |                 |            |            |
|      |                 |            |            |
|      |                 |            |            |