

## DATA SHEET

### MODULETEK : DAC-QSFP28-4SFP28-P-x-xxAWG-aa.aaM-C0C0C

QSFP28 to 4xSFP28 Passive Copper Cable Assembly

### DAC-QSFP28-4SFP28-P-x-xxAWG-aa.aaM-C0C0C Overview

ModuleTek's QSFP28 to 4SFP28 passive cable is the preferred solution for 100G rate short-range data transmission, it has the characteristics of low power consumption, good stability and high cost performance. The QSFP28 to 4SFP28 passive cable is used for data transfer between a 100G QSFP28 port and four 25GSFP28 ports, providing a low-cost solution for data transmission services within and between data center racks. The product complies with the QSFP28 MSA and SFP28 MSA standards.

### Product Features

- QSFP28 End: Compliant with QSFP28 MSA specifications
- SFP28 End: Compliant with SFP28 MSA specifications
- 4 independent duplex channels operating at 25Gbps
- AC coupled inputs and outputs
- 100 Ohm differential impedance
- All-metal housing for superior EMI performance
- Single power supply 3.3V, low power consumption
- RoHS Compliant
- Operating temperature range: 0°C to 70°C

### Applications

- 100Gigabit Ethernet
- Infiniband EDR
- Serial Data Transmission
- Networking
- Storage
- Fiber Channel

## Ordering Information

| Part Number  | Description   | Gauge | Length              |
|--|---|-------|---------------------|
| DAC-QSFP28-4SFP28-P-E-30AWG-aa.aaM-C0C0C   | QSFP28 to 4 SFP28 Passive Direct Attach Copper Cable Assembly,without MCU, aa.aa $\leq$ 2   | 30AWG | $\leq$ 2m           |
| DAC-QSFP28-4SFP28-P-E-28AWG-aa.aaM-C0C0C   | QSFP28 to 4 SFP28 Passive Direct Attach Copper Cable Assembly,without MCU, 2<aa.aa $\leq$ 3 | 28AWG | 2m<length $\leq$ 3m |
| DAC-QSFP28-4SFP28-P-M-30AWG-aa.aaM-C0C0C   | QSFP28 to 4 SFP28 Passive Direct Attach Copper Cable Assembly,with MCU, aa.aa $\leq$ 2      | 30AWG | $\leq$ 2m           |
| DAC-QSFP28-4SFP28-P-M-28AWG-aa.aaM-C0C0C   | QSFP28 to 4 SFP28 Passive Direct Attach Copper Cable Assembly,with MCU, 2<aa.aa $\leq$ 3    | 28AWG | 2m<length $\leq$ 3m |
| <p><b>Note:</b></p> <ol style="list-style-type: none"> <li>1. "P" indicates passive cable</li> <li>2. "E" indicates no built-in MCU,"M" indicates built-in MCU</li> <li>3. "aa.aa" indicates the cable length in meters.</li> <li>4. The wire diameter of the products in the above list is the default value under different lengths. We can also provide other wire products to customers with special requirements.</li> <li>5. The cable used in this product is produced by Belden Hessmann Industrial (Suzhou) Co., Ltd. (Brand: BELDEN).</li> </ol> |   |       |                     |
| <p><b>For More Information:</b><br/>           ModuleTek Limited<br/>           Web: <a href="http://www.moduletek.com">www.moduletek.com</a><br/>           Email: sales@moduletek.com</p>  |   |       |                     |

## General Specifications

| Parameter             | Symbol           | Min  | Typ | Max               | Unit | Remarks |
|-----------------------|------------------|------|-----|-------------------|------|---------|
| Bit Error Rate        | BER              |      |     | 10 <sup>-12</sup> |      |         |
| Operating Temperature | T <sub>C</sub>   | 0    |     | 70                | °C   | 1       |
| Storage Temperature   | T <sub>STO</sub> | -40  |     | 85                | °C   | 2       |
| Input Voltage         | V <sub>CC</sub>  | 3.14 | 3.3 | 3.46              | V    |         |

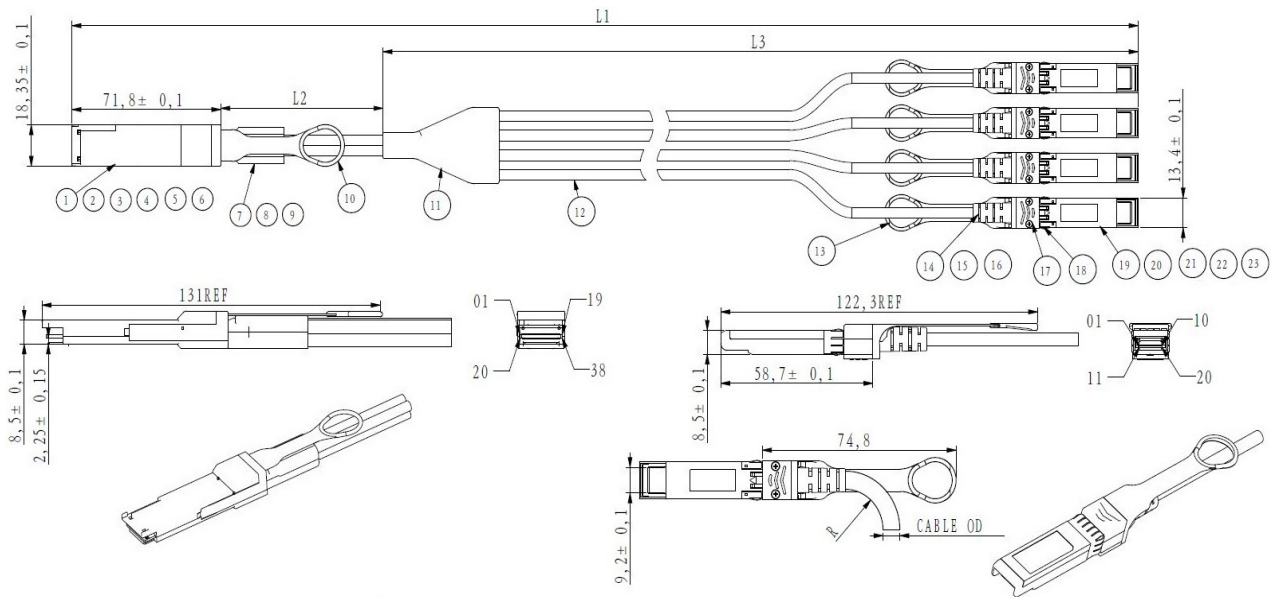
**Notes:**

1. Case temperature
2. Ambient temperature

## Cable Specifications

| Parameter       | Symbol | Min   | Typ | Max   | Unit | Remarks |
|-----------------|--------|-------|-----|-------|------|---------|
| Wire Gauge      |        | 30AWG |     | 26AWG | AWG  |         |
| Cable Impedance | Z      | 90    | 100 | 110   | Ohm  |         |

## Dimensions



ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED  
UNIT: mm

## Cable dimension

| serial number | Standard Wire Gauge AWG | Cable diameter OD (mm) | Minimum bending radius R (mm) |
|---------------|-------------------------|------------------------|-------------------------------|
| 1             | 30                      | 4.6                    | 26                            |
| 2             | 28                      | 5.0                    | 28                            |

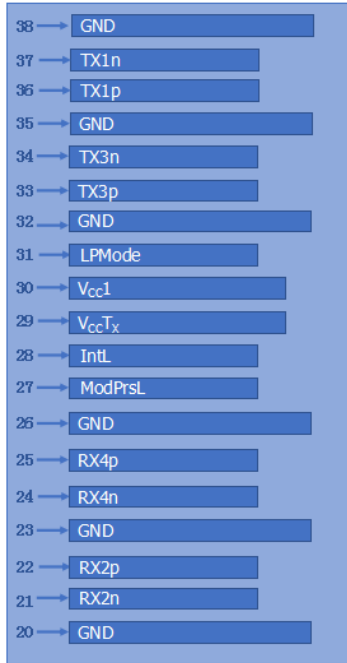
## Nominal length

| Serial number | Module nominal length L1 (cm) | Module nominal length L3(cm) |
|---------------|-------------------------------|------------------------------|
| 1             | 100                           | 70                           |
| 2             | 200                           | 100                          |
| 3             | 300                           | 200                          |
| 4             | 400                           | 200                          |
| 5             | 500                           | 200                          |

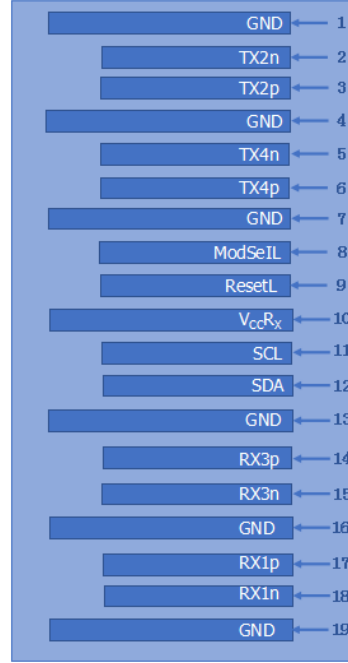
## Product Structure

| Serial number | Name                     | Description                  | Amount |
|---------------|--------------------------|------------------------------|--------|
| 1             | Bottom Shell for QSFP28  | Zn Alloy , Plated Ni Over Cu | 1      |
| 2             | Top Shell for QSFP28     | Zn Alloy , Plated Ni Over Cu | 1      |
| 3             | PCB Assembly for QSFP28  | QSFP PCB ,38P,Au 30u"Min     | 1      |
| 4             | Spring for QSFP28        | Handed Rotation,SWPB         | 2      |
| 5             | Pull Rod for QSFP28      | Zn Alloy, Plated Ni Over Cu  | 1      |
| 6             | Screw for QSFP28         | Mild Steel                   | 4      |
| 7             | Plastic Boot for QSFP28  | PC AND ABS ,Black            | 1      |
| 8             | Copper Ring for QSFP28   | Copper, Plated Ni            | 1      |
| 9             | Aluminum Ring for QSFP28 | Aluminium Alloy              | 1      |
| 10            | Pull TAB for QSFP28      | PA66,Blue 300C               | 1      |
| 11            | Plastic Splitter         | PC AND ABS ,Black            | 1      |
| 12            | Raw cable                | 2Pairs,Black,Roths2.0        | 4      |
| 13            | Pull TAB for SFP28       | PA66 ,Blue 300C              | 4      |
| 14            | Plastic Boot for SFP28   | PVC , Black                  | 4      |
| 15            | Copper Ring for SFP28    | Copper, Plated Ni            | 4      |
| 16            | Aluminum Ring for SFP28  | Aluminium Alloy              | 4      |
| 17            | Screw for SFP28          | Mild Steel                   | 8      |
| 18            | Grounding Springs        | SUS303                       | 4      |
| 19            | Bottom Shell for SFP28   | Zn Alloy , Plated Ni Over Cu | 4      |
| 20            | Top Shell for SFP28      | Zn Alloy , Plated Ni Over Cu | 4      |
| 21            | PCB Assembly for SFP28   | SFP PCB ,38P,Au 30u"Min      | 4      |
| 22            | Spring for SFP28         | Handed Rotation,SWPB         | 8      |
| 23            | Pull Rod for SFP28       | SUS316                       | 8      |

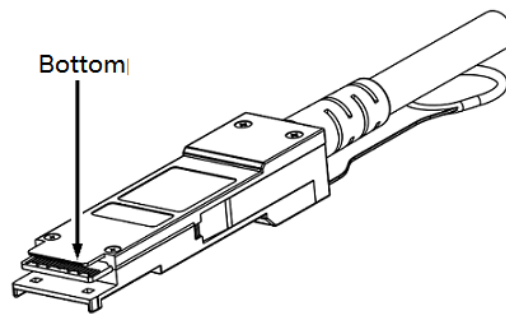
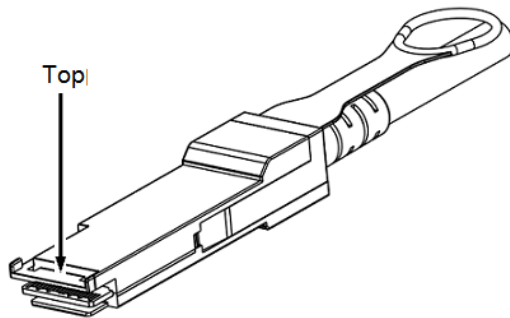
## Electrical Pad Layout (QSFP28 END)



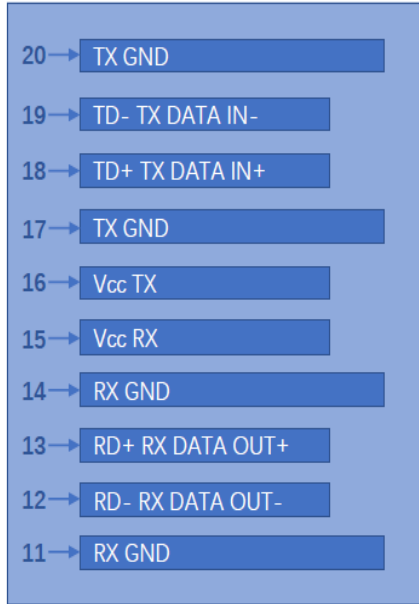
Top Board



Bottom Board



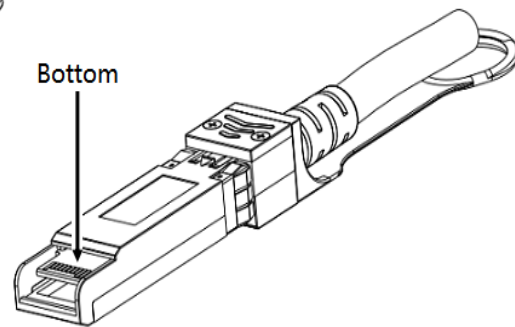
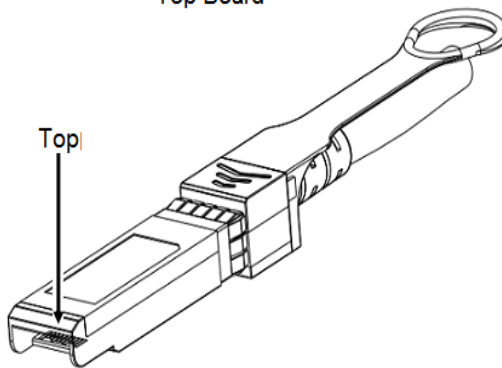
## Electrical Pad Layout (SFP28 END)



Top Board



Bottom Board



## Pin Assignment (QSFP28 END)

| PIN # | Symbol             | Description                         | Remarks |
|-------|--------------------|-------------------------------------|---------|
| 1     | GND                | Ground                              | 5       |
| 2     | Tx2n               | Transmitter Inverted Data Input     |         |
| 3     | Tx2p               | Transmitter Non-Inverted Data Input |         |
| 4     | GND                | Ground                              | 5       |
| 5     | Tx4n               | Transmitter Inverted Data Input     |         |
| 6     | Tx4p               | Transmitter Non-Inverted Data Input |         |
| 7     | GND                | Ground                              | 5       |
| 8     | ModSelL            | Module Select                       | 1       |
| 9     | ResetL             | Module Reset                        | 2       |
| 10    | V <sub>CC</sub> RX | +3.3V Power Supply Receiver         |         |
| 11    | SCL                | 2-wire serial interface clock       |         |
| 12    | SDA                | 2-wire serial interface data        |         |
| 13    | GND                | Ground                              | 5       |
| 14    | Rx3p               | Receiver Non-Inverted Data Output   |         |
| 15    | Rx3n               | Receiver Inverted Data Output       |         |
| 16    | GND                | Ground                              | 5       |
| 17    | Rx1p               | Receiver Non-Inverted Data Output   |         |
| 18    | Rx1n               | Receiver Inverted Data Output       |         |
| 19    | GND                | Ground                              | 5       |
| 20    | GND                | Ground                              | 5       |
| 21    | Rx2n               | Receiver Inverted Data Output       |         |
| 22    | Rx2p               | Receiver Non-Inverted Data Output   |         |
| 23    | GND                | Ground                              | 5       |
| 24    | Rx4n               | Receiver Inverted Data Output       |         |
| 25    | Rx4p               | Receiver Non-Inverted Data Output   |         |
| 26    | GND                | Ground                              | 5       |
| 27    | ModPrsL            | Module Present                      | 3       |
| 28    | IntL               | Interrupt                           | 4       |
| 29    | V <sub>CC</sub> TX | +3.3V Power Supply transmitter      |         |
| 30    | V <sub>CC</sub> 1  | +3.3V Power Supply                  |         |
| 31    | LPMODE             | Low Power Mode                      | 5       |
| 32    | GND                | Ground                              | 5       |
| 33    | Tx3p               | Transmitter Non-Inverted Data Input |         |



|    |      |                                     |   |
|----|------|-------------------------------------|---|
| 34 | Tx3n | Transmitter Inverted Data Input     |   |
| 35 | GND  | Ground                              | 5 |
| 36 | Tx1p | Transmitter Non-Inverted Data Input |   |
| 37 | Tx1n | Transmitter Inverted Data Input     |   |
| 38 | GND  | Ground                              | 5 |

**Notes:**

1. ModSelL is the input pin. The module responds to 2-wire serial communication commands when it is held low by the host. ModSelL allows multiple QSFP modules to be used on a single 2-wire interface bus. If ModSelL is High, the module will not respond to any 2-wire interface communication from the host. ModSelL has internal pull-up resistors in the module
2. The module restart pin, when the low level on the ResetL pin lasts longer than the minimum pulse length, resets the module and restores all user modules to their default state. When performing reset device, the host should ignore all status bits. Until the module reset interrupt is completed, please note that during hot plugging, the module will issue this information to complete the reset interrupt without resetting
3. This pin is active high, indicating that the module is running under a low power module. The signal has no effect on the functionality of this product.
4. IntL is the output pin, which is the open collector output and must be pulled up to Vcc with a 4.7kΩ-10kΩ resistor on the motherboard. When it is low, it indicates that the module may malfunction. The host uses a 2-wire serial interface to identify the interrupt source
5. Circuit ground is internally isolated from chassis ground.

## Pin Assignment (SFP28 END)

| PIN # | Symbol             | Description   | Remarks |
|-------|--------------------|---|---------|
| 1     | V <sub>EET</sub>   | Transmitter ground (common with receiver ground)              | 1       |
| 2     | T <sub>FAULT</sub> | Transmitter Fault.  |         |
| 3     | T <sub>DIS</sub>   | Transmitter Disable. Laser output disabled on high or open    |         |
| 4     | SDA                | Data line for serial ID                                       | 2       |
| 5     | SCL                | Clock line for serial ID                                      | 2       |
| 6     | MOD_ABS            | Module Absent. Grounded within the module                     | 2       |
| 7     | RS0                | No connection required  |         |
| 8     | LOS                | Loss of Signal indication. Logic 0 indicates normal operation |         |
| 9     | RS1                | No connection required  |         |
| 10    | V <sub>EER</sub>   | Receiver ground (common with transmitter ground)              | 1       |
| 11    | V <sub>EER</sub>   | Receiver ground (common with transmitter ground)              | 1       |
| 12    | RD-                | Receiver Inverted DATA out. AC coupled                        |         |
| 13    | RD+                | Receiver Non-inverted DATA out. AC coupled                    |         |
| 14    | V <sub>EER</sub>   | Receiver ground (common with transmitter ground)              | 1       |
| 15    | V <sub>CCR</sub>   | Receiver power supply   |         |
| 16    | V <sub>CCT</sub>   | Transmitter power supply                                      |         |
| 17    | V <sub>EET</sub>   | Transmitter ground (common with receiver ground)              | 1       |
| 18    | TD+                | Transmitter Non-Inverted DATA in. AC coupled                  |         |
| 19    | TD-                | Transmitter Inverted DATA in. AC coupled                      |         |
| 20    | V <sub>EET</sub>   | Transmitter ground (common with receiver ground)              | 1       |

### Notes:

1. Circuit ground is isolated from chassis ground
2. Should Be pulled up with 4.7k - 10k ohm on host board to a voltage between 2V and 3.6V

## References

1. IEEE standard 802.3bj. IEEE Standard Department, 2008.