

## AT-QSFPDD-400G-DR4

### Optical SFP Module

400/G QSFP-DDDR4 Transceiver, SM, 1310nm, 500M



### FEATURES

- Supports 425Gb/s PAM4
- Built-in 400G PAM4 DSP
- Uncooled 4 channels 1310nm EML
- 4 channels PIN photo detector array
- Maximum link length of 500m SMF with KP-FEC
- Single MPO12 receptacle
- Hot pluggable QSFP-DD form factor
- Digital Diagnostics Monitoring Interface
- Commercial operating case temperature range: 0~ 70° C
- Compatible with RoHS
- Power dissipation <10W
- TDECQ<3.4dB

### APPLICATION

- 400G Ethernet
- Data Center
- InfiniBand QDR
- Fiber channel

### STANDARD

- IEEE 802.3bs 400GBASE-DR4
- QSFP-DD MSA compliant
- Compliant to SFF-8636

### Absolute Maximum Ratings

| Parameter                   | Symbol | Min | Max | Unit |
|-----------------------------|--------|-----|-----|------|
| Storage Ambient Temperature | TSTG   | -40 | 85  | °C   |

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|                      |     |         |          |   |
|----------------------|-----|---------|----------|---|
| Operating Humidity   | HO  | 5       | 85       | % |
| Power Supply Voltage | Vcc | -0.3    | 3.6      | V |
| Signal Input Voltage |     | Vcc-0.3 | Vcc +0.3 | V |

### Recommended Operating Conditions

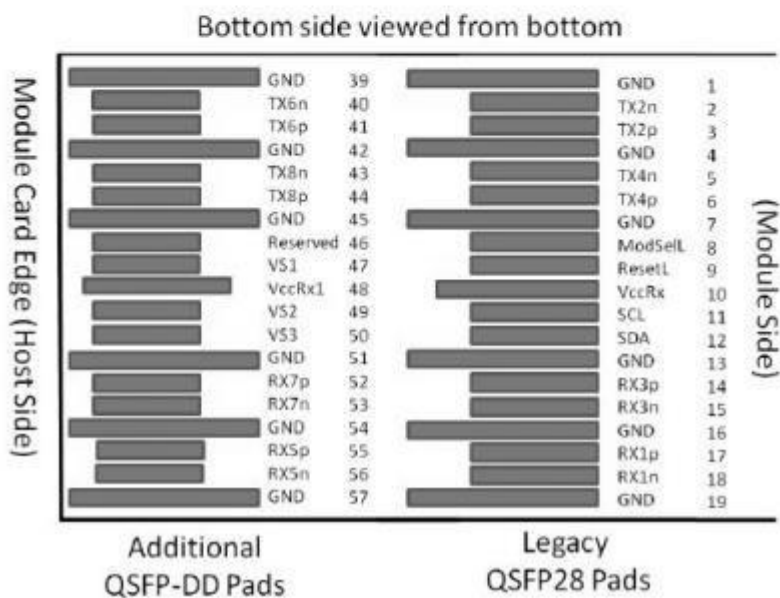
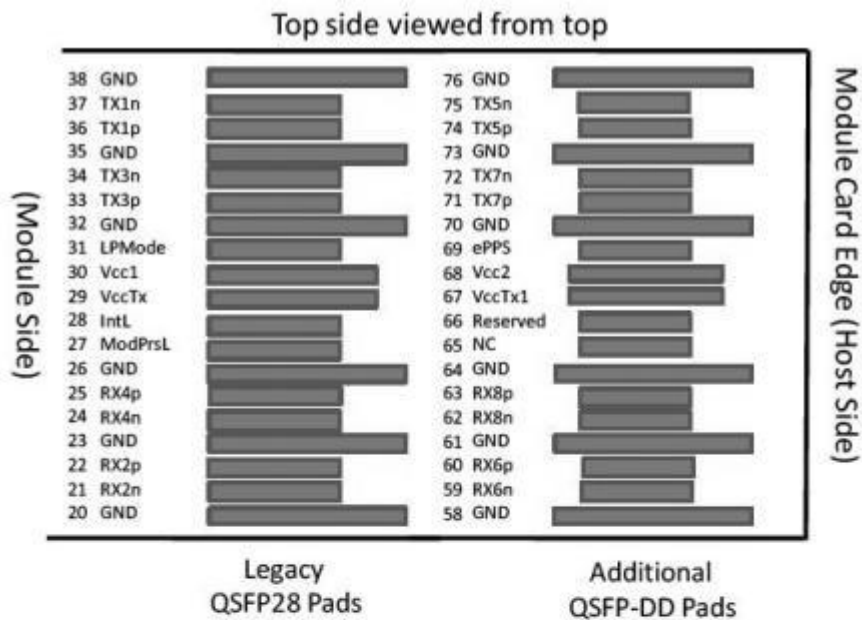
| Parameter                      | Symbol | Min  | Typical | Max  | Unit |
|--------------------------------|--------|------|---------|------|------|
| Operating Case Temperature     | Tc     | 0    |         | 70   | °C   |
| Power Supply Voltage           | Vcc    | 3.13 | 3.3     | 3.47 | V    |
| Data Rate, each Lane (PAM4)    |        |      | 106.25  |      | Gbps |
| Fiber Length 09/125µm core SMF |        | -    | -       | 500  | m    |

### Optical and Electrical Characteristics

| Optical Transmitter Characteristics           |                 |        |         |        |      |       |
|-----------------------------------------------|-----------------|--------|---------|--------|------|-------|
| Parameter                                     | Symbol          | Min    | Typical | Max    | Unit | Notes |
| Launched Power (avg.) Per Lane                | Pavg            | -2.9   |         | 4      | dBm  |       |
| Wavelength Range                              | $\lambda_0$     | 1304.5 | 1310    | 1317.5 | nm   |       |
| Spectral Width(-20dB)                         | $\Delta\lambda$ |        |         | 0.6    | nm   |       |
| Extinction Ratio                              | ER              | 3      |         |        | dB   |       |
| Transmitter OFF Output Power                  | POff            |        |         | -30    | dBm  |       |
| Optical Modulation Amplitude(OMA outer)       | OMA             | -1.46  |         | 4      | dBm  |       |
| Transmitter and dispersion eye closure(TDECQ) | TDECQ           |        |         | 3.4    | dB   |       |
| Optical Receiver Characteristics              |                 |        |         |        |      |       |
| Parameter                                     | Symbol          | Min    | Typical | Max    | Unit | Notes |
| Receiver Wavelength Range                     |                 | 1304.5 |         | 1317.5 | nm   |       |
| Average Receiver Power Per Lane               |                 | -5.9   |         | 4      | dBm  |       |
| Receiver Sensitivity Per Lane                 | Sen             |        |         | -4.4   | dBm  |       |
| Optical Power Input Overload                  | Pin-max         | 5      |         |        | dBm  |       |
| Receiver Reflectance                          | Rr              |        |         | -26    | dB   |       |

## Pin Definitions

### Pin Diagram



### QSFP-DD MSA-compliant 76-pin connector

| Pin | Symbol | Name/Description | Notes |
|-----|--------|------------------|-------|
|-----|--------|------------------|-------|

|    |          |                                                                                       |   |
|----|----------|---------------------------------------------------------------------------------------|---|
| 1  | GND      | Ground                                                                                | 1 |
| 2  | Tx2n     | Transmitter Inverted Data Input                                                       |   |
| 3  | Tx2p     | Transmitter Non-Inverted Data Input                                                   |   |
| 4  | GND      | Ground                                                                                | 1 |
| 5  | Tx4n     | Transmitter Inverted Data Input                                                       |   |
| 6  | Tx4p     | Transmitter Non-Inverted Data Input                                                   |   |
| 7  | GND      | Ground                                                                                | 1 |
| 8  | ModSelL  | Module Select                                                                         |   |
| 9  | ResetL   | Module Reset                                                                          |   |
| 10 | VccRx    | +3.3V Power Supply Receiver                                                           | 2 |
| 11 | SCL      | 2-wire serial interface clock                                                         |   |
| 12 | SDA      | 2-wire serial interface data                                                          |   |
| 13 | GND      | Ground                                                                                | 1 |
| 14 | Rx3p     | Receiver Non-Inverted Data Output                                                     |   |
| 15 | Rx3n     | Receiver Inverted Data Output                                                         |   |
| 16 | GND      | Ground                                                                                | 1 |
| 17 | Rx1p     | Receiver Non-Inverted Data Output                                                     |   |
| 18 | Rx1n     | Receiver Inverted Data Output                                                         |   |
| 19 | GND      | Ground                                                                                | 1 |
| 20 | GND      | Ground                                                                                | 1 |
| 21 | Rx2n     | Receiver Inverted Data Output                                                         |   |
| 22 | Rx2p     | Receiver Non-Inverted Data Output                                                     |   |
| 23 | GND      | Ground                                                                                | 1 |
| 24 | Rx4n     | Receiver Inverted Data Output                                                         |   |
| 25 | Rx4p     | Receiver Non-Inverted Data Output                                                     |   |
| 26 | Ground   | Ground                                                                                | 1 |
| 27 | ModPrsL  | Module Present                                                                        |   |
| 28 | IntL     | Interrupt                                                                             |   |
| 29 | Vcc Tx   | +3.3V Power supply transmitter                                                        | 2 |
| 30 | Vcc1     | +3.3V Power supply                                                                    | 2 |
| 31 | InitMode | Initialization mode; In legacy QSFP applica- tions, the InitMode pad is called LPMODE |   |
| 32 | GND      | Ground                                                                                | 1 |
| 33 | Tx3p     | Transmitter Non-Inverted Data Input                                                   |   |
| 34 | Tx3n     | Transmitter Inverted Data Input                                                       |   |
| 35 | GND      | Ground                                                                                | 1 |
| 36 | Tx1p     | Transmitter Non-Inverted Data Input                                                   |   |
| 37 | Tx1n     | Transmitter Inverted Data Input                                                       |   |
| 38 | GND      | Ground                                                                                | 1 |
| 39 | GND      | Ground                                                                                | 1 |

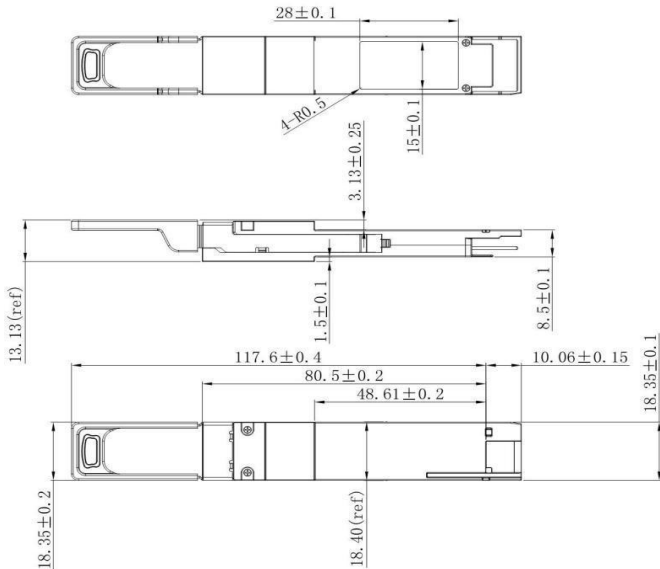
|    |          |                                     |   |
|----|----------|-------------------------------------|---|
| 40 | Tx6n     | Transmitter Inverted Data Input     |   |
| 41 | Tx6p     | Transmitter Non-Inverted Data Input |   |
| 42 | GND      | Ground                              | 1 |
| 43 | Tx8n     | Transmitter Inverted Data Input     |   |
| 44 | Tx8p     | Transmitter Non-Inverted Data Input |   |
| 45 | GND      | Ground                              | 1 |
| 46 | Reserved | For Future Use                      |   |
| 47 | VS1      | Module Vendor Specific 1            |   |
| 48 | Vcc Rx1  | +3.3V Power Supply Receiver         | 2 |
| 49 | VS2      | Module Vendor Specific 2            |   |
| 50 | VS3      | Module Vendor Specific 3            |   |
| 51 | GND      | Ground                              | 1 |
| 52 | Rx7p     | Receiver Non-Inverted Data Output   |   |
| 53 | Rx7n     | Receiver Inverted Data Output       |   |
| 54 | Ground   | Ground                              | 1 |
| 55 | Rx5p     | Receiver Non-Inverted Data Output   |   |
| 56 | Rx5n     | Receiver Inverted Data Output       |   |
| 57 | GND      | Ground                              | 1 |
| 58 | GND      | Ground                              | 1 |
| 59 | Rx6n     | Receiver Inverted Data Output       |   |
| 60 | Rx6p     | Receiver Non-Inverted Data Output   |   |
| 61 | GND      | Ground                              | 1 |
| 62 | Rx8n     | Receiver Inverted Data Output       |   |
| 63 | Rx8p     | Receiver Non-Inverted Data Output t |   |
| 64 | GND      | Ground                              | 1 |
| 65 | NC       | For Future Use                      |   |
| 66 | Reserved | Interrupt                           |   |
| 67 | Vcc Tx1  | +3.3V Power supply transmitter      | 2 |
| 68 | Vcc2     | +3.3V Power supply                  | 2 |
| 69 | Reserved | For Future Use                      |   |
| 70 | GND      | Ground                              | 1 |
| 71 | Tx7p     | Transmitter Non-Inverted Data Input |   |
| 72 | Tx7n     | Transmitter Inverted Data Input     |   |
| 73 | GND      | Ground                              | 1 |
| 74 | Tx5p     | Transmitter Non-Inverted Data Input |   |
| 75 | Tx5n     | Transmitter Inverted Data Input     |   |
| 76 | GND      | Ground                              | 1 |

### QSFP-DD Module PIN Definition

#### Notes:

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 referred to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
2. VccRx, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 shall be applied concurrently. VccRx, VccRx1, Vcc1, Vcc2, VccTx and VccTx1 may be internally connected within the module in any combination. Each connector Vcc pin is rated for a maximum current of 1000 mA.

## Mechanical Dimensions



## Ordering information

| Part. No           | Specifications |             |          |          |     |           |           |           |     |
|--------------------|----------------|-------------|----------|----------|-----|-----------|-----------|-----------|-----|
|                    | Pack           | Rate (Gbps) | Tx (nm)  | Po (dBm) | RX  | Sen (dBm) | Temp (°C) | Reach (m) | DDM |
| AT-QSFPDD-400G-DR4 | QSFP-DD        | 400G        | EML 1310 | -2.9~4   | PIN | <-4.4     | 0~70      | 500       | Y   |

## ORDERING INFORMATION: -

|                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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