# MQA4ZD3-DMC-8VT1

## Features

- Hot Pluggable QSFP+ form factor
- Supports 41.25Gb/s aggregate bit rate
- Multirate capability: 1.06Gb/s to 10.5Gb/s per channel
- Maximum link length of 300m on OM3 MMF
- Single MPO-12 receptacle
- Power dissipation: <1.5 W
- Single 3.3V power supply
- 4x10Gb/s 850nm VCSEL and PIN array
- Unretimed XLPPI electrical interface
- Commercial case temperature range of 0°C to 70°C
- I2C management interface
- Class 1 Laser Products

## Applications

- 40GBASE-SR4 40G Ethernet
- 40G-IB-QDR /20G-IB-DDR / 10G-IB-SDR InfniBand
- Breakout to 4 x 10GBASE-SR
- Proprietary interconnections

## Standards

- Compliant with QSFP+ MSA
- Compliant to IEEE 802.3ba
- Compliant to SFF-8436
- Compliant with RoHS-6

## Specification

| Absolute Maximum Ratings | | | | |
|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Max** | **Unit** |
| Storage Ambient Temperature | $T_{STG}$ | -40 | 85 | ℃ |
| Relative Humidity(Non-condensing) | $H_S$ | 5 | 90 | % |
| Power Supply Voltage | $V_{CC}$ | -0.3 | +3.6 | V |
| Input Voltage | $V_{IN}$ | -0.3 | $V_{CC}$+0.3 | V |
| Damaged Threshold,per Lane | DT | 3.4 | | dBm |

| Recommended Operating Conditions | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typical** | **Max** | **Unit** |
| Operating Case Temperature | $T_C$ | 0 | | 70 | ℃ |
| Operating Humidity | Rh | 5 | | 85 | % |
| Data Rate,per Lane | DR | | 10.3 | 10.5 | Gbps |
| Power Consumption | $P_W$ | | | 1.5 | W |

| Electrical Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typical** | **Max** | **Unit** | **Notes** |
| Power Supply Voltage | $V_{CC}$ | 3.13 | 3.3 | 3.47 | V | |
| Power Supply Current | $I_{CC}$ | | | 450 | mA | |
| **Transmitter** | | | | | | |
| Differential input impedance | Rin | | 100 | | Ω | |
| Differential data input swing | Vin,pp | 300 | | 1100 | mV | |
| Single ended input voltage tolerance | VinT | -0.3 | | 4.0 | V | |
| **Receiver** | | | | | | |
| Differential data output swing | Vout,pp | 300 | | 850 | mV | |
| Single-ended output voltage | | -0.3 | | 4.0 | V | |

| Optical Transmitter Characteristics | | | | | | |
|---|---|---|---|---|---|---|
| **Parameter** | **Symbol** | **Min** | **Typical** | **Max** | **Unit** | **Notes** |
| Center Wavelength | $\lambda_{out}$ | 840 | 850 | 860 | nm | |
| Average Launch Power each lane | $P_{out}$ | -7.6 | | 2.4 | dBm | |
| Difference in Power between any two lanes [OMA] | $DP_X$ | | | 4.0 | dB | |
| Peak Power per Lane | $PP_X$ | | | 4.0 | dBm | |
| Spectral Width (RMS) | σ | | | 0.65 | nm | |
| Optical Extinction Ratio | ER | 3.0 | | | dB | |
| Transmitter and Dispersion Penalty each lane | TDP | | | 3.5 | dB | |
| Optical Return Loss Tolerance | ORL | | | 12 | dB | |
| Average launch power of OFF transmitter, per lane | | | | -30 | dBm | |
| Transmitter eye mask definition{X1,X2,X3,Y1,Y2,Y3} | {0.23,0.34,0.43,0.27,0.35,0.4} | | | | | |
| **Optical Receiver Characteristics** | | | | | | |
| **Parameter** | **Symbol** | **Min** | **Typical** | **Max** | **Unit** | **Notes** |
| Receiver Wavelength | $\lambda_{in}$ | 840 | | 860 | nm | |
| Average Receive Power per Lane | RXPx | -9.5 | | 2.4 | dBm | |
| Stressed Receiver Sensitivity in OMA | SRS | | | -5.4 | dBm | 1 |
| LOS Assert | LOSA | -30 | | | dBm | |
| LOS De-Assert | LOSD | | | -12 | dBm | |
| LOS Hysteresis | | 0.5 | | | dB | |
| Receiver Reflectance | Rfl | | | -12 | dB | |

Notes:

1.Measured with a PRBS $2^{31}$-1 test pattern, @10.3125Gb/s, BER<1E-12.

| Digital Diagnostic Monitoring Information | | | |
|---|---|---|---|
| **Parameter** | **Accuracy** | **Calibration** | **Note** |
| Temperature | ±3°C | Internal | 0~70℃ |
| Voltage | ±3% | Internal | 3.1~3.5V |
| Bias Current | ±10% | Internal | Specified by normal value |
| TX Power | ±2dB | Internal | -7.6~2.4dBm |
| RX Power | ±2dB | Internal | -9.5~2.4dBm |

## Pin Assignment

| Pin | Symbol | Name/Description | Notes |
|---|---|---|---|
| 1 | GND | Transmitter Ground | 1 |
| 2 | Tx2n | Transmitter Inverted Data Input | |
| 3 | Tx2p | Transmitter Non-Inverted Data output | |
| 4 | GND | Transmitter Ground | 1 |
| 5 | Tx4n | Transmitter Inverted Data Input | |
| 6 | Tx4p | Transmitter Non-Inverted Data output | |
| 7 | GND | Transmitter 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 | Receiver Ground | 1 |
| 14 | Rx3p | Receiver Non-Inverted Data Output | |
| 15 | Rx3n | Receiver Inverted Data Output | |
| 16 | GND | Receiver Ground | 1 |
| 17 | Rx1p | Receiver Non-Inverted Data Output | |
| 18 | Rx1n | Receiver Inverted Data Output | |
| 19 | GND | Receiver Ground | 1 |
| 20 | GND | Receiver Ground | 1 |
| 21 | Rx2n | Receiver Inverted Data Output | |
| 22 | Rx2p | Receiver Non-Inverted Data Output | |
| 23 | GND | Receiver Ground | 1 |
| 24 | Rx4n | Receiver Inverted Data Output | |
| 25 | Rx4p | Receiver Non-Inverted Data Output | |
| 26 | GND | Receiver Ground | 1 |
| 27 | ModPrsl | Module Present | |
| 28 | IntL | Interrupt | |
| 29 | VccTx | 3.3V power supply transmitter | 2 |
| 30 | Vcc1 | 3.3V power supply | 2 |
| 31 | LPMode | Low Power Mode，not connect | |
| 32 | GND | Transmitter Ground | 1 |
| 33 | Tx3p | Transmitter Non-Inverted Data Input | |
| 34 | Tx3n | Transmitter Inverted Data Output | |
| 35 | GND | Transmitter Ground | 1 |
| 36 | Tx1p | Transmitter Non-Inverted Data Input | |

| | | | |
|---|---|---|---|
| 37 | Tx1n | Transmitter Inverted Data Output | |
| 38 | GND | Transmitter Ground | 1 |

**Notes:**

1. GND is the symbol for signal and supply (power) common for the QSFP+ module. All are common within the QSFP+ module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
2. Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in Table 6. Recommended host board power supply filtering is shown in Figures 3 and 4. Vcc Rx Vcc1 and Vcc Tx may be internally connected within the QSFP+ Module in any combination. The connector pins are each rated for a maximum current of 500 mA.

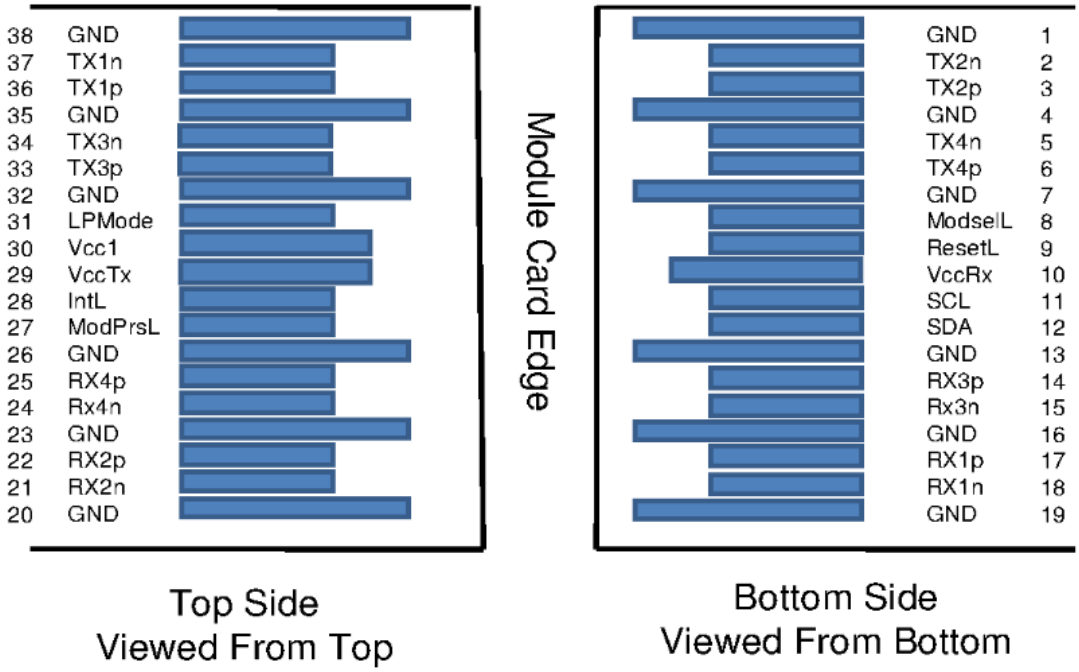



**Figure 1.Electrical Pin-out Details**

## Memory Map

| 2-Wire Serial Address 1010000x |
|---|
| **Lower Page 00h** |
| 0-2 ID and status |
| 3-21 Interrupt Flags |
| 22-33 Module Monitors |
| 34-81 Chanel Monitors |
| 82-85 Reserved |
| 86-97 Control |
| 98-99 Reserved |
| 100-106 Free Side Device and Channel Mask |
| 107 Reserved |
| 108-111 Free Side Device Properties |
| s112-118 Reserved |
| 119-122 Password Change Entry Area(Optional) |
| 123-126 Password Entry Area(Optional) |
| 127 Page Select Byte |

| | **Optional** | **Optional** | **Optional** |
|---|---|---|---|
| **Upper Page 00h** | **Page 01h** | **Page 02h** | **Page 03h** |
| 128-191 Base ID Fields | 128 CC_APPS | 128-255 User EEPROM Data | 128-175 Free Side Device Thresholds |
| | 129 AST Table Length (TL) | | 176-223 Channel Thresholds |
| | 130-131 Application Code Entry 0 | | 224-225 Reserved |
| | 132-133 Application Code Entry 1 | | 226-237 Vender Specific |
| 192-223 Extended ID | 134-253 Others Entries | | 238-241 Channel Controls |
| 224-255 Vendor Specific ID | | | 242-253 Channel Monitor Masks |
| | 254-255 Application Code Entry TL | | 254-255 Reserved |

## EEPROM Serial ID Memory Contents (Upper Memory Map Page 00h)

| Address | Name of field | Hex | Description |
|---|---|---|---|
| **BASE ID Fields** | | | |
| 128 | Identifier | 0D | Identifier Type of serial Module |
| 129 | Ext. Identifier | 00 | Extend Identifier of free side device |
| 130 | Connector | 0C | MPO 1*12 (Multifiber Parallel Optic) |
| 131-138 | Specification Compliance | 04 00 00 00 40 40 02 00 | Code for electronic or optical compatibility |
| 139 | Encoding | 05 | Code for serial encoding algorithm |
| 140 | BR, nominal | 67 | Nominal bit rate per channel, units of 100Mbps |
| 141 | Extended Rate Select Compliance | 00 | Tags for extended rate select compliance |
| 142 | Length (SMF) | 00 | Transceiver link length support for different fibers |
| 143 | Length (OM3 50 um) | 96 | |
| 144 | Length (OM2 50 um) | 00 | |
| 145 | Length (OM162.5 um) | 00 | |
| 146 | Length(copper) | C8 | |
| 147 | Device tech | 00 | Device technology |
| 148-163 | Vendor name | 4F 45 4D 20 20 20 20 20 20 20 20 20 20 20 20 20 | QSFP+ vendor name (ASCII) |
| 164 | Extended Module | 00 | Extended Module codes for InfiniBand |
| 165-167 | Vendor OUI | 00 00 00 | Free side device vendor IEEE company ID |
| 168-183 | Vendor PN | xx…..xx | Part number provided by QSFP+ vendor(ASCII) device vendor(ASCII) |
| 184-185 | Vendor rev | 41 30 | “A0”(ASCII character) |
| 186-187 | Wave length or Copper Copper cable Attenuation | 42 68 | Nominal laser wavelength or copper cable attenuation in dB at 2.5 GHz and 5.0 GHz |
| 188-189 | Wavelength tolerance | 07 D0 | Guaranteed range of laser wavelength from nominal wavelength or copper cable attenuation in dB at 7.0 GHz and 12 GHz |

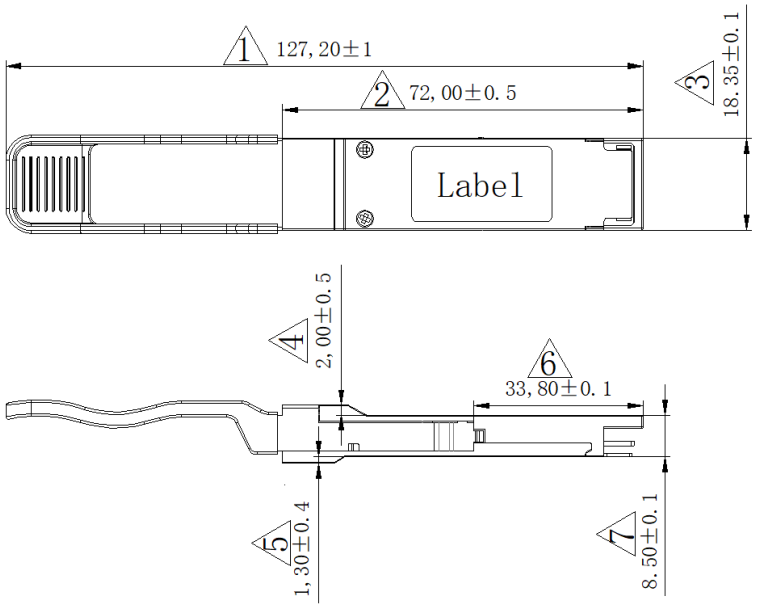
| | | | |
|---|---|---|---|
| 190 | Max case temp. | 00 | Maximum case temperature in degrees C. |
| 191 | CC_BASE | Programmed by Factory | Check code for base ID fields |
| **Extended ID Fields** | | | |
| 192-195 | Options | 02 07 F0 0A | Rate Select, TX Disable, TX Fault, LOS, Warning indicators for: Temperature, TX Bias |
| 196-211 | Vendor SN | xx……xx | Serial number provided by vendor(ASCII) |
| 212-219 | Date Code | xx……xx | Data Code |
| 220 | Diagnostic Monitoring Type | 0C | Indicates which type of diagnostic monitoring is implemented |
| 221 | Enhanced Options | 00 | Indicates which optional enhanced features are implemented in the free side device |
| 222 | Reserved | 00 | |
| 223 | CC_EXT | Programmed by Factory | Check code for the Extended ID Fields |
| **Vendor Specific ID Field** | | | |
| 224-255 | Vendor Specific | 00 | Vendor specific EEPROM |

## Module and Channel Thresholds (Page 03)

| Address | #Bytes | Name of field | Real Value | Unit | Hex |
|---|---|---|---|---|---|
| 128-129 | 2 | Temp High Alarm | 80 | °C | |
| 130-131 | 2 | Temp Low Alarm | -10 | °C | |
| 132-133 | 2 | Temp High Warning | 70 | °C | |
| 134-135 | 2 | Temp Low Warning | 0 | °C | |
| 136-143 | 8 | Reserved | Reserved | | |
| 144-145 | 2 | Vcc High Alarm | 3.63 | V | |
| 146-147 | 2 | Vcc Low Alarm | 2.97 | V | |
| 148-149 | 2 | Vcc High Warning | 3.47 | V | |
| 150-151 | 2 | Vcc Low Warning | 3.14 | V | |
| 152-159 | 8 | Reserved | Reserved | | |
| 160-175 | 16 | Vendor Specific | | | |
| 176-177 | 2 | RX Power High Alarm | 5.4 | dBm | |

| | | | | | |
|---|---|---|---|---|---|
| 178-179 | 2 | RX Power Low Alarm | -12.5 | dBm | |
| 180-181 | 2 | RX Power High Warning | 2.4 | dBm | |
| 182-183 | 2 | RX Power Low Warning | -9.5 | dBm | |
| 184-185 | 2 | TX Bias High Alarm | 14 | mA | |
| 186-187 | 2 | TX Bias Low Alarm | 2 | mA | |
| 188-189 | 2 | TX Bias High Warning | 13 | mA | |
| 190-191 | 2 | TX Bias Low Warning | 3 | mA | |
| 192-193 | 2 | TX Power High Alarm | 5.4 | dBm | |
| 194-195 | 2 | TX Power Low Alarm | -10.6 | dBm | |
| 196-197 | 2 | TX Power High Warning | 2.4 | dBm | |
| 198-199 | 2 | TX Power Low Warning | -7.6 | dBm | |
| 200-207 | 8 | Reserved | Reserved | | |
| 208-223 | 16 | Vendor Specific | | | |

## Package Outline




## Ordering information

| Part. No | Pack | Specifications | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Rate* (Gbps) | Po (dBm) | RX | Sen* (dBm) | Temp (℃) | Reach (m) | Pull tap Color | DDM |
| MQA4ZD3-DMC-8VT1 | QSFP+ | 4*10.3125 | -7.6~2.4 | PIN | <-11.1 | 0~+70 | 300 | Beige | Y |

*Note:

1.Measured with a PRBS $2^{31}$-1 test pattern, @10.3125Gb/s, BER<1E-12.

2.Receiver sensitivity in OMA