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# MQA4ZD2-DMC-8VT1

## Features

- ◆ Supports 41.25Gb/s aggregate bit rate
- ◆ Multirate capability: 1.06Gb/s to 10.5Gb/s per channel
- ◆ Maximum link length of 100m links on OM3 multimode fiber or 150m links on OM4 multimode fiber
- ◆ High Reliability 850nm VCSEL technology
- ◆ Unretimed XLPPI electrical interface
- ◆ Single MPO-12 receptacle
- ◆ Digital diagnostic SFF-8436 compliant
- ◆ Case operating temperature range:0°C to +70°C
- ◆ Maximum Power dissipation < 1.5 W
- ◆ RoHS Compliant

## Applications

- ◆ 40GBASE- SR4 Ethernet
- ◆ Infiniband QDR interconnects
- ◆ Breakout to 10GBASE-SR Ethernet

## Standards

- ◆ Compliant to IEEE 802.3ba
- ◆ Compliant to SFF-8436
- ◆ RoHS Compliant

## General Description

This product is a QSFP+ Optical transceiver for 4 x10 Gb/s optical links. It operates at 10.3125Gb/s up to 100m over OM3 multimode optical fiber and 150m over OM4 fiber. The optical transmitter portion of the transceiver incorporates a 4 channels VCSEL array, a 4 channels input buffer and laser driver, diagnostic monitors, control and bias blocks. For module control, the control interface incorporates a Two Wire Serial interface of clock and data signals. Diagnostic monitors for VCSEL bias, module temperature, TX power, RX power and supply voltage are implemented and results are available through the Two Wire Serial interface. Alarm and warning thresholds are established for the monitored attributes. Flags are set and interrupts generated when the attributes are outside the thresholds. All flags are latched and will remain set even if the condition initiating the latch clears and operation resumes. The optical output will squelch for loss of input signal unless squelch is disabled.

The optical receiver portion of the transceiver incorporates a 4 channels PIN photodiode array, a 4 channels TIA array, a 4 channel output buffer, diagnostic monitors. Alarm and warning thresholds are established for the monitored attributes. Flags are set and interrupts generated when the attributes are outside the thresholds. All flags are latched and will remain set even if the condition initiating the flag clears and operation resumes. All interrupts can be masked and flags are reset upon reading the appropriate flag register. The electrical output will squelch for loss of input signal (unless squelch is disabled) and channel de-activation through Two Wire Serial interface.

## Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	Ts	-40		85	°C	
Relative Humidity	RH	5		95	%	
Power Supply Voltage	VCC	-0.3		4	V	
Signal Input Voltage		Vcc-0.3		Vcc+0.3	V	

## Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	Tcase	0		70	°C	Without air flow
Power Supply Voltage	VCC	3.13	3.3	3.47	V	
Power Supply Current	ICC			450	mA	
Data Rate	BR		10.3125		Gbps	Each channel
Transmission Distance	TD			100	m	OM3 MMF
				150	m	OM4 MMF

## Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
<b>Transmitter</b>						
Center Wavelength	$\lambda_{out}$	840		860	nm	
Average Launch Power each lane		-7.6		2.4	dBm	
Spectral Width (RMS)	$\sigma$			0.65	nm	
Optical Extinction Ratio	ER	3			dB	
Transmitter and Dispersion Penalty each lane	TDP			3.5	dB	
Optical Return Loss Tolerance	ORL			12	dB	
Transmitter eye mask definition{X1, X2, X3, Y1, Y2, Y3}		0.23, 0.34, 0.43, 0.27, 0.35, 0.4				
<b>Receiver</b>						
Receiver Wavelength	$\lambda_{in}$	840		860	nm	
Receiver sensitivity in OMA	S <sub>OMA</sub>			-11.5	dBm	1
LOS Assert	LOSA	-30			dBm	
LOS De-Assert	LOSD			-12	dBm	
LOS Hysteresis		0.5			dB	
Input Saturation Power (Overload)	Psat	2.4			dBm	
Receiver Reflectance	Rr			-12	dB	

Notes:

1. Measured with a PRBS 2<sup>31</sup>-1 test pattern, @10.3125Gb/s, BER<10<sup>-12</sup>.

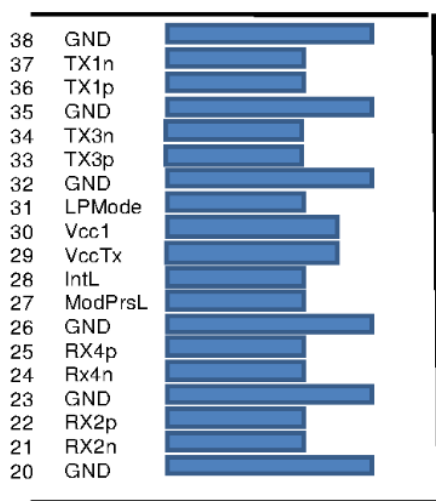
## Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	NOTE
Supply Voltage	Vcc	3.13	3.3	3.47	V	
Supply Current	Icc			450	mA	
<b>Transmitter</b>						
Input differential impedance	Rin		100		Ω	
Differential data input swing	Vin,pp	600		1000	mV	
Single ended input voltage tolerance	VinT	-0.3		4.0	V	
<b>Receiver</b>						
Differential data output swing	Vout,pp	300		850	mV	
Single-ended output voltage		-0.3		4.0	V	

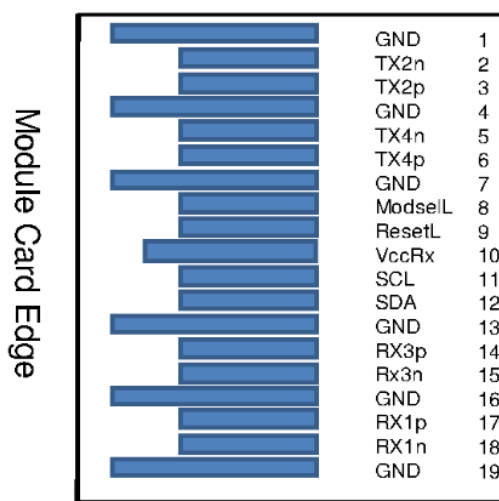
## Digital Diagnostic Monitoring Information

Parameter	Accuracy	Calibration	Note
Temperature	±3°C	Internal	0~70°C
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	-18~2.4dBm

## Pin Assignment



Top Side  
Viewed From Top



Bottom Side  
Viewed From Bottom

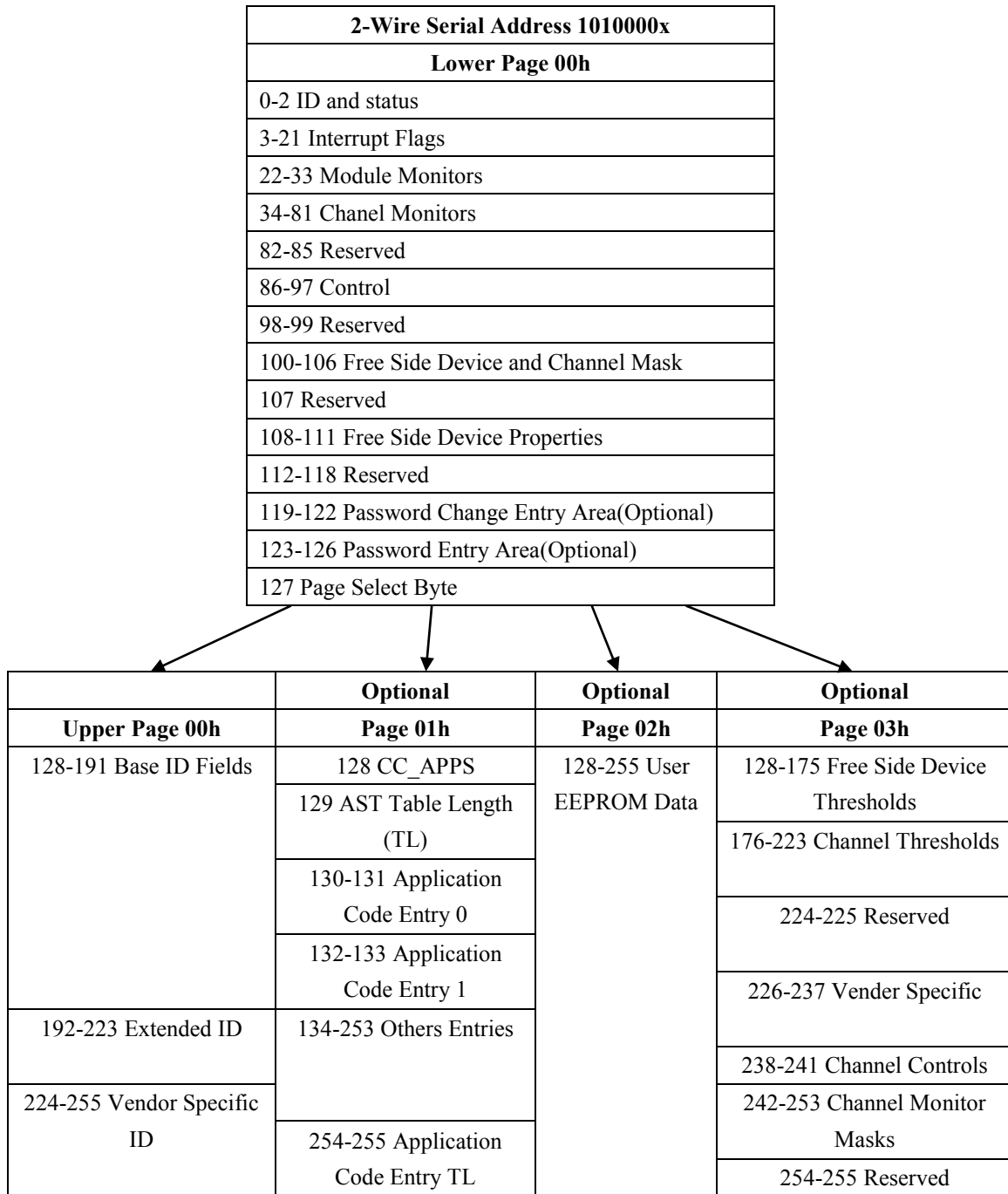
**As Viewed Through Top of Board**

PIN	Symbol	Name/Description	NOTE
1	GND	Transmitter Ground (Common with Receiver Ground)	
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data output	
4	GND	Transmitter Ground (Common with Receiver Ground)	
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data output	
7	GND	Transmitter Ground (Common with Receiver Ground)	
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	VccRx	3.3V Power Supply Receiver	1
11	SCL	2-Wire serial Interface Clock	
12	SDA	2-Wire serial Interface Data	
13	GND	Transmitter Ground (Common with Receiver Ground)	
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Transmitter Ground (Common with Receiver Ground)	
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Transmitter Ground (Common with Receiver Ground)	
20	GND	Transmitter Ground (Common with Receiver Ground)	
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Transmitter Ground (Common with Receiver Ground)	
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Transmitter Ground (Common with Receiver Ground)	
27	ModPrsl	Module Present	
28	IntL	Interrupt	
29	VccTx	3.3V power supply transmitter	1
30	Vcc1	3.3V power supply	1
31	LPMode	Low Power Mode, not connect	
32	GND	Transmitter Ground (Common with Receiver Ground)	
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Output	
35	GND	Transmitter Ground (Common with Receiver Ground)	
36	Tx1p	Transmitter Non-Inverted Data Input	

37	Tx1n	Transmitter Inverted Data Output	
38	GND	Transmitter Ground (Common with Receiver Ground)	

**Note1.** VccRx, Vcc1 and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP28 transceiver module in any combination.

## Memory Map



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

Byte	Name	Description	Hex
128	Identifier	Identifier Type of serial Module	D
129	Ext. Identifier	Extended Identifier of serial Module	00
130	Connector	Code for media connector type	C
131-138	Specification Compliance	Code for electronic compatibility or optical compatibility	04 00 00 00 40 40 02 80
139	Encoding	Code for serial encoding algorithm.	05
140	BR, nominal	Nominal bit rate, units of 100 Mbps/s	69
141	Extended Rate Select Compliance	Tags for extended rate select compliance	00
142	Length (SMF)	Link length supported for SMF fiber in km (note 1)	00
143	Length (OM3 50 um)	Link length supported for EBW 50/125 um fiber (OM3), units of 2m (note 1)	32
144	Length (OM2 50 um)	Link length supported for 50/125 um fiber (OM2)	00
145	Length (OM162.5 um)	Link length supported for 62.5/125 um fiber (OM1), units of 1m (note 1)	00
146	Length(copper)	Link length of copper or active cable, units of 1 m (note 1)Link length supported for 50/125 um fiber (OM4), units of 2 m) when Byte 147 declares 850 nm VCSEL as defined in Table 37	00
147	Device tech	Device technology	00
148-163	Vendor name	QSFP+ vendor name (ASCII)	4d 45 4e 54 45 43 48 4f 50 54 4f 20 20 20 20 20
164	Extended Module	Extended Module codes for InfiniBand	00
165-167	Vendor OUI	QSFP+ vendor IEEE company ID	00 90 65
168-183	Vendor PN	Part number provided by QSFP+ vendor(ASCII) device vendor(ASCII)	4d 51 41 34 5A 44 32 2D 44 4D 43 2D 38 56 54 31
184-185	Vendor rev	Revision level for part number provided by vendor(ASCII)	40 30
186-187	Wave length or Copper Copper cable Attenuation	Nominal laser wavelength (wavelength=value/20 in nm) or copper cable attenuation in dB at 2.5GHz (Adrs 186) and 5.0GHz (Adrs 187)	42 68
188-189	Wavelength tolerance	Guaranteed range of laser wavelength(+/- value) from nominal wavelength.(wavelength Tol.=value/200 in nm)	07 D0
190	Max case temp.	Maximum case temperature in degrees C	0
191	CC_BASE	Check code for base ID fields (addresses128-190)	B0

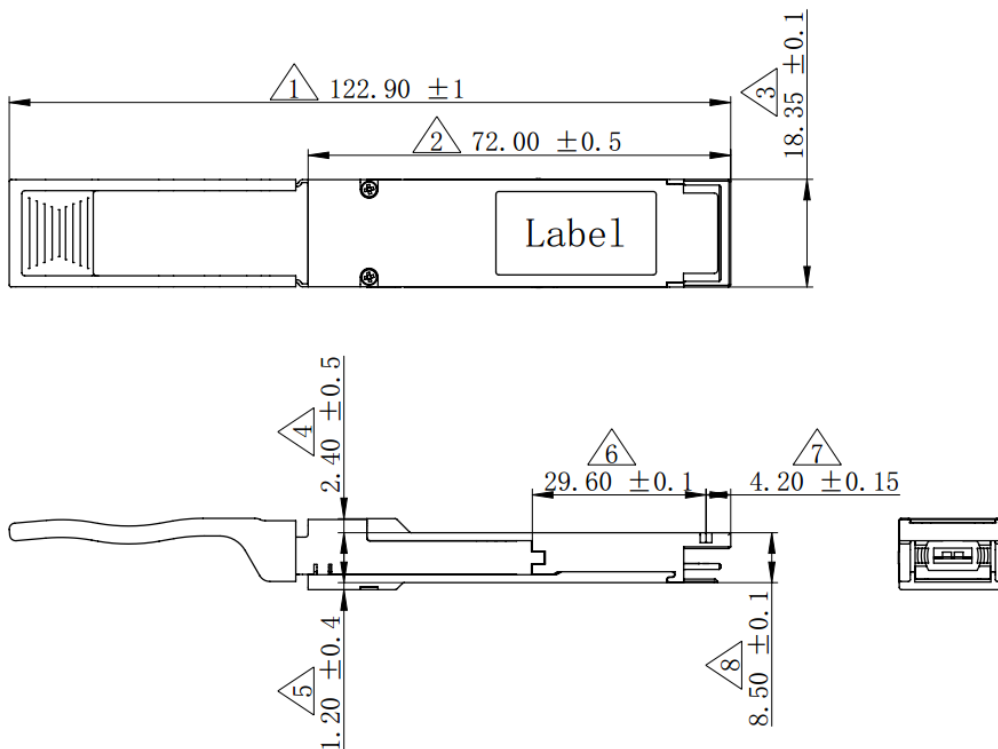
192-195	Options	Rate Select, TX Disable, TX Fault, LOS, Warning indicators for: Temperature, TX Bias	02 07 F0 04
196-211	Vendor SN	Serial number provided by vendor (ASCII)	4d 4e 43 31 39 33 4B 53 30 30 31 37 20 20 20 20
212-219	Date Code	Vendor's manufacturing date code	31 39 30 33 31 31 20 20
220	Diagnostic Monitoring Type	Indicates which types of diagnostic monitoring are implemented (if any) in the Module. Bit 1,0 Reserved	0C
221	Enhanced Options	Indicates which optional enhanced features are implemented in the Module	00
222	Reserved		
223	CC_EXT	Check code for the Extended ID Fields (addresses 192-222)	32
224-225	Vendor Specific EEPROM	Vendor Specific EEPROM	00 00

Address	Bytes	Name	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	75	°C	
134-135	2	Temp Low Warning	-5	°C	
136-143	8	Reserved			
144-145	2	Vcc High Alarm	3.6	V	
146-147	2	Vcc Low Alarm	3.0	V	
148-149	2	Vcc High Warning	3.5	V	
150-151	2	Vcc Low Warning	3.1	V	
152-159	8	Reserved	Reserved		
160-175	16	Vendor Specific			
176-177	2	RX Power High Alarm	3.4	dBm	
178-179	2	RX Power Low Alarm	-8.6	dBm	
180-181	2	RX Power High Warning	2.4	dBm	
182-183	2	RX Power Low Warning	-7.6	dBm	
184-185	2	Tx Bias High Alarm	14	mA	



186-187	2	Tx Bias Low Alarm	00	mA	
188-189	2	Tx Bias High Warning	12	mA	
190-191	2	Tx Bias Low Warning	2	mA	
192-199	8	Resrvd thresholds for channel parameter set 3			
200-207	8	Resrvd thresholds for channel parameter set 3			
208-223	16	Vendor Specific			

## Package Outline



## Ordering information

Part. No	Specifications								
	Pack	Rate* (Gbps)	Po (dBm)	RX	Sen* (dBm)	Temp (°C)	Reach (m)	Pull tap Color	DDM
MQA4ZD2-DMC-8VT1	QSFP+	10.3125	-7.6~2.4	PIN	<-9.5	0~70	150	Beige	Y

\*Note:For each channel.