40G Base-SR4 100m QSFP+ Optical Transceiver Module

MTRQ-4S100

Features：

- Compliant to the industry standard SFF-8436 QSFP+ Transceiver Specification
- 4* 10.3125Gbps per module, bi-directional operation
- 5 DDM with MPD monitor
- High reliability 850nm VCSEL array transmitter
- Hot pluggable
- Single 3.3V power supply, Low power consumption
- 0 to 70°C case temperature operating range
- RoHS-6 compliant (lead-free)

Applications

- 10GBASE-SR &40GBASE-SR4 40G Ethernet InfiniBand QDR (4 x 10G), DDR (4 x 5G) and SDR (4 x 2.5G) interconnects
- Datacom/Telecom Switch & Router connections
- High speed multi-channel parallel data connections

Compliance

- IEEE802.3ba 40GBASE-SR4
- SFF-8436 QSFP Specification
- InfiniBand Architecture QDR Specifications

Description：

MTRQ-4S100 transceiver is a Parallel 40Gb/s Quad Small Form-factor, Hot-Pluggable optical module.

The module integrates 4 independent transmitters and 4 independent receivers inside. Four-channel 850nm VCSEL array, PIN array，amplifier and Driver are used in the module for compact size, low power consumption and low cost. Each channel can operate at 10Gbps up to 100m using OM3 fiber, and 150m using OM4 fiber.

The transceiver is compliant to the industry standard SFF-8436 QSFP+ Transceiver Specification. Digital diagnostic functionsis provided to monitor the working state of the module. The electrical interface uses a 38 contact edge type connector. The optical interface uses an 8 or 12 fiber MTP (MPO) connector.

MTRQ-4S100 transceiver features small size, parallel multi- channel, hot-pluggable, low power and high speed operation. It's very suitable for high speed short-distance density data connections such as 40G BASE-SR4, InfiniBand QDR, Switch& Route interconnects etc.

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Specifications

Absolute Maximum Ratings

Parameter	Symbols	Min	Typical	Max	Unit	Notes
Storage Temperature	TSTG	-40	-	+85	ºC	
Operating Temperature	Top	0		70		
Operating Relative Humidity	RH	5	-	85	%	
3.3V Supply Voltage	VCC	-0.5	-	+3.6	V	

Recommended Operating Conditions

Parameter	Symbols	Min	Typical	Max	Unit	Notes
Case temperature	Tc	0	-	+70	℃	
3.3V Supply Voltage	VCC	3.135	3.3	3.465	V	
Data Rate			41.25		Gbps	
Receiver Differential Data Output Load			100		Ohms	
Logic Input Voltage High	Vih	2		Vcc+0.3	V	
Logic Input Voltage Low	Vil	-0.3		0.8	V	
Two wire Serial Interface Clock Rate			100	400	KHz	
Power Supply Noise				50	mVpp	
Fiber Length(OM3 2000MHz*Km)		0.5		100	m	
Fiber Length(OM44700MHz*Km)		0.5		150	m	

Electrical Characteristics

Parameter	Symbles	Min	Type	Max	Unit	Notes
Transceiver Power Consumption				1.5	W	
Transceiver Power Supply Current				475	mA	
Maximum peak Current				900	mA	
Transceiver Power On Initialization Time	Tini			2000	ms	
Transmitter(per Lane)						
Differential Data Input Voltage Peak to Peak Swing	Vin,pp	190		700	mV	
Differential Input Impedance	Zind	90	100	110	ohm	AC Coupled Inside Module
AC common-mode input voltage tolerance(RMS)		15			mV	
Differential input return loss			Per IEEE P802.3ba, Section 86A.4.1.1		dB	10 MHz to 11.1 GHz

J2 Jitter Tolerance	Jt2			0.3	UI	
J9 Jitter Tolerance	Jt9			0.47	UI	
Eye mask coordinates: (X1, X2, Y1, Y2)			0.11, 0.31 95, 350		UI mV	Hit ratio = 5×10^{-5}
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}			0.23,0.34,0.43 0.27,0.35,0.4		UI	Hit ratio = 5×10^{-5}
Receiver(per Lane)						
Differential Data Output Voltage Peak to Peak Swing	Vopp	300		850	mV	
Differential output Impedance	Zos	90	100	110	0hms	AC Coupled Inside Module
Differential output return loss			Per IEEE P802.3ba, Section 86A.4.2.1		dB	10 MHz to 11.1 GHz
J2 Output	Jo2			0.42	UI	
J9 Output	Jo9			0.65	UI	
Eye mask coordinates: (X1, X2, Y1, Y2)			0.29, 0.5 150, 425		UI mV	10,Hit ratio = 1×10^{-12}
Data output rise/fall time （20%~80%）		28			ps	20% to 80%

Optical Characteristics

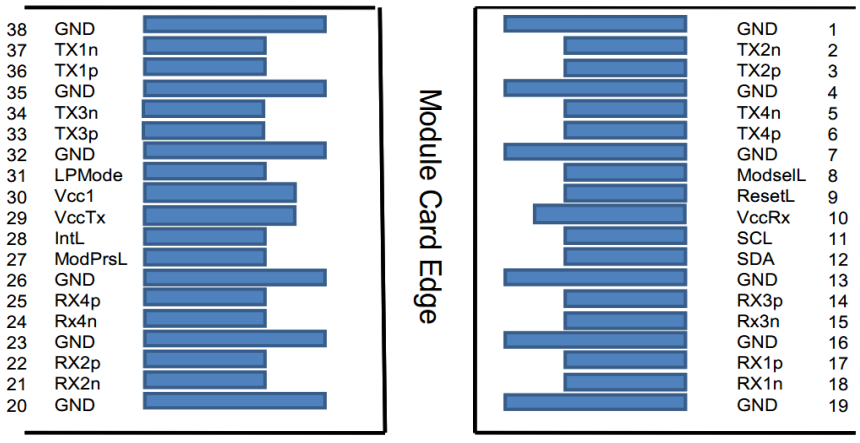
Parameter	Symbles	Min	Type	Max	Unit	Notes
Transmitter(per Lane)						
Center wavelength	λ c	840	850	860	nm	
RMS spectral width	SW			0.65	nm	
Average power, each lane(EOL)	TXP	-7.6		1	dBm	
Difference in Power between any two lanes [OMA]				6.5	dB	
Transmit OMA per Lane (EOL)		-5.6		3	dBm	
Extinction Ratio		3			dB	
TDP per Lane	TDP			3.5	dB	
Launch Power in OMA minus TDP, each lane		-6.5			dBm	
Optical Return Loss Tolerance				12	dB	
Average launch power of OFF transmitter, per lane				-30	dBm	
Relative Intensity Noise				-128	dB/Hz	

Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}		10%			IEEE802.3ba	Hit ratio = 1×10^{-12}
Receiver(per Lane)						
Center wavelength	λ c	840	850	860	nm	
Saturation power（EOL）		2.4			dBm	
Max Input power		2.4			dBm	
Average power at receiver input, each lane		-9.5		2.4	dBm	
Receive Power (OMA) per Lane				3	dBm	
Peak Power, per lane				4	dBm	
Sensitivity （OMA EOL）,each lane				-11.1	dBm	
Stressed Receiver Sensitivity (OMA EOL) per Lane				-6.4	dBm	
Receiver Reflectance				-12	dBm	
Receiver jitter tolerance [OMA], each Lane				-5.4	dBm	
Rx_Loss assert	LOSA	-30			dBm	
Rx_LossDe_assert	LOSD			-12	dBm	
LOS Hysteresis		0.5			dB	
Rx output squelch function			Yes		-	
Rx LOS in signal or RSSI			RSSI		-	
Laser status in reset			Close		-	

Digital Diagnostic Function

Parameter	Symbles	Min	Type	Max	Unit	Notes
Temperature DDMaccuracy	DMI_Temp	-3		+3	℃	
Supply voltage DDMaccuracy	DMI_VCC	-5%		+5%	V	
Rx power DDMaccuracy	DMI_Rx	-3		+3	dB	
Bias current DDM accuracy	DMI_Ibias	-10%		+10%	mA	
Tx power DDM accuracy	DMI_Tx	-3		+3	dB	

Pin Assignment



Top Side **Bottom Side**

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Viewed from Top **Viewed from Bottom**

Figure 1 – QSFP+ MSA-compliant 38-pin connector

Pin Description

Pin	Name	Description	Notes
1	GND	Ground	Note1
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	Note1
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	
8	ModSelL	Module Select	
9	ResetL	Module Reset	
10	Vcc Rx	+3.3V Power Supply Receiver	Note2
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	Note1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	Note1
19	GND	Ground	Note1
20	GND	Ground	
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	Note1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	VccTx	+3.3V Power supply transmitter	Note2
30	Vcc1	+3.3V Power supply	Note2
31	LPMode	Low Power Mode	
32	GND	Ground	Note1
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	Note1

36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	Note1

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.Recommended host board power supply filtering is shown in Figure 7. Vcc Rx Vcc1 and VccTx may be internally connected within the QSFP+ Module in any combination. The connector pins are each rated for a maximum current of 500 mA.

Optical Interface Lanes and Assignment

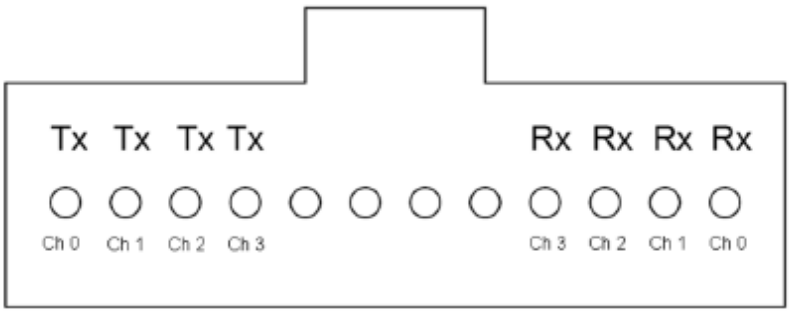

Figure 2 – Optical lane assignment (front view of MPO receptacle)

Mechanical Dimensions

Unit is millimeter. All dimensions are ±0.1mm unless otherwise specified.

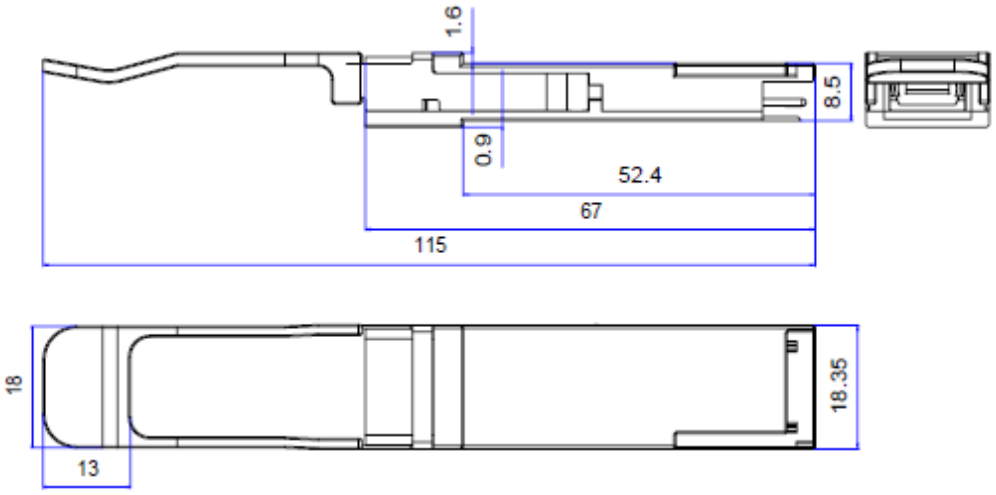

Figure3Mechanical Package Outline

Ordering Information

Part No	Specification								
	Pack	Rate	Tx	Pout	Rx	S	Top	Reach	Others
MTRQ-4S100	QSFP+	40G	850nm VCSEL	-7.6~ 1dBm	PIN	<-11.1dBm	0~70℃	100M(OM3)	DDM/RoHS

Caution

All adjustments have been done at the factory before the shipment of the devices. No maintenance and user serviceable part is required. Tampering with and modifying the performance of the device will result in voided product warranty.

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