

## Features

- Up to 10.3Gb/s data rate per channel
- Distance up to 300m over OM4
- nPPI(4x10G) Electrical Interface
- Single +3.3V power supply
- DDM function implemented
- 2 Wire Serial Interface for module management
- Maximum power dissipation < 1.5W
- International Class 1 laser safety certified
- Operating temperature range: 0°C ~ 70°C
- Compliant with RoHS6



## Applications

- Compliant with QSFP+ MSA(SFF-8436 v4.8)
- Compliant with SFF-8472 v10.2
- Compliant with IEEE 802.3ba
- 40GBASE-SR4 Ethernet

USource QSFP+ transceiver modules are designed for use in 40 Gigabit Ethernet links over single mode fiber.

They are compliant with SFF-8436, INF-8438i and IEEE 802.3ba 40GBASE-SR4. Digital diagnostics functions are available via an I2C interface, as specified by the QSFP+ MSA.

Part No.	Specifications									Application
	Package	Data rate	Laser	Optical Power	Detector	Sensitivity	Temp	Reach	Other	
UQFP-SR4	QSFP+	Up to 41.2G	850nm	-7.5 ~ 0.5dBm	PIN	-11.5dBm	0~70°C	300m	DDM	40GBASE-SR4

### Pin function definitions

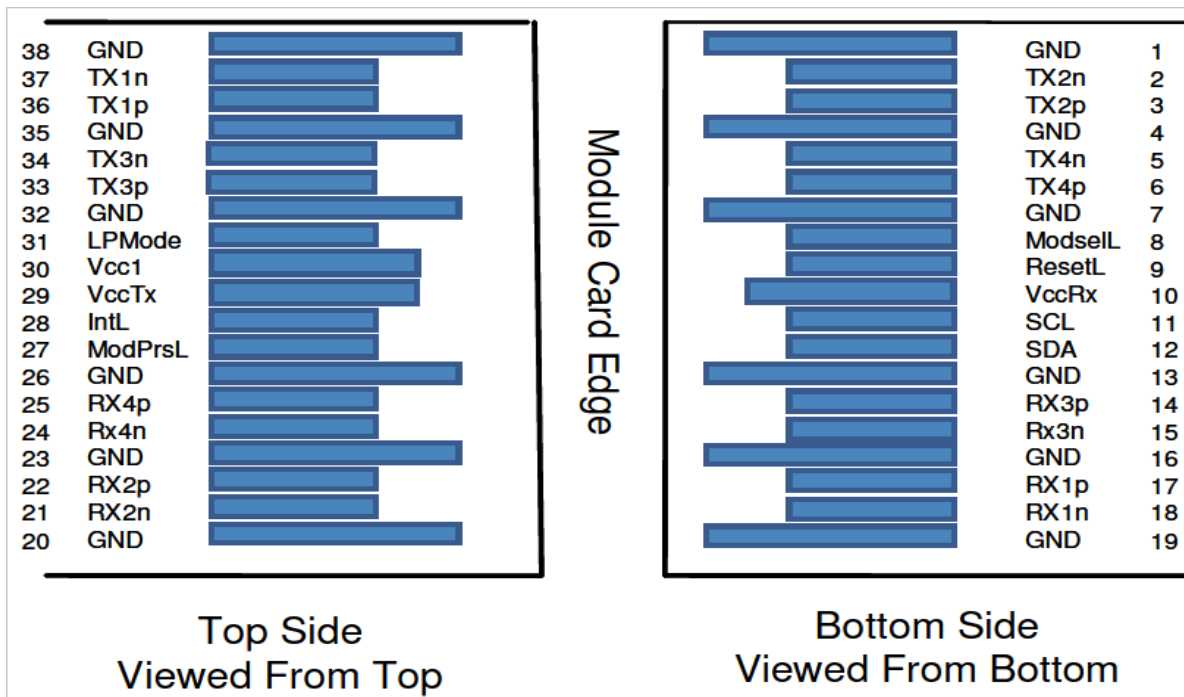


Figure 1.Pin function definitions

Table 1: Transceiver pin descriptions

Pin	Name	Description	Plug Sequence	Notes
1	GND	Ground	1	
2	Tx2n	Transmitter Inverted Data Input	3	
3	Tx2p	Transmitter Non-Inverted Data Input	3	
4	GND	Ground	1	
5	Tx4n	Transmitter Inverted Data Input	3	
6	Tx4p	Transmitter Non-Inverted Data Input	3	
7	GND	Ground	1	
8	ModSelL	Module Select	3	
9	ResetL	Module Reset	3	
10	Vcc Rx	+3.3 V Power supply receiver	2	
11	SCL	2-wire serial interface clock	3	
12	SDA	2-wire serial interface data	3	
13	GND	Ground	1	
14	Rx3p	Receiver Non-Inverted Data Output	3	
15	Rx3n	Receiver Inverted Data Output	3	
16	GND	Ground	1	
17	Rx1p	Receiver Non-Inverted Data Output	3	
18	Rx1n	Receiver Inverted Data Output	3	

## 40G QSFP+ SR4 Transceiver (UQFP-SR4) 300m via OM4 MPO-12



19	GND	Ground	1	
20	GND	Ground	1	
21	Rx2n	Receiver Inverted Data Output	3	
22	Rx2p	Receiver Non-Inverted Data Output	3	
23	GND	Ground	1	
24	Rx4n	Receiver Inverted Data Output	3	
25	Rx4p	Receiver Non-Inverted Data Output	3	
26	GND	Ground	1	
27	ModPrsL	Module Present	3	
28	IntL	Interrupt	3	
29	Vcc Tx	+3.3 V Power supply transmitter	2	
30	Vcc1	+3.3 V Power Supply	2	
31	LPMODE	Low Power Mode	3	
32	GND	Ground	1	
33	Tx3p	Transmitter Non-Inverted Data Input	3	
34	Tx3n	Transmitter Inverted Data Input	3	
35	GND	Ground	1	
36	Tx1p	Transmitter Non-Inverted Data Input	3	
37	Tx1n	Transmitter Inverted Data Input	3	
38	GND	Ground	1	

## Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Storage Temperature Range	Ts	°C	-40	85
Relative Humidity	RH	%	0	95
Maximum Supply Voltage	Vcc3	V	-0.5	4.0

## General Specifications

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Bit Rate	BR			41.2	Gb/s	1
Bit Error Ratio	BER			10e-12		2
Max. Supported Link Length	LMAX		300		m	1

Notes:

1. 40GBASE-SR4 and 10GBASE-SR IEEE 802.3ba.
2. Tested with a  $2^{31}-1$  PRBS.

## Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Operating Case Temperature Range	Tc	°C	0		70

**40G QSFP+ SR4 Transceiver (UQFP-SR4)**  
**300m via OM4 MPO-12**



Power Supply Voltage	V <sub>cc</sub>	V	3.14	3.3	3.46
Bit Rate	BR	Gb/s			41.2
Bit Error Ratio	BER				10 <sup>-12</sup>
Max Supported Link Length	L	m			300

**Electric Ports Definition**

Parameter	Symbol	Unit	Min	Typ	Max	Note
Supply Voltage	V <sub>CC</sub>	V	3.14	3.3	3.46	
Module Power	I <sub>cc</sub>	mW			1080	
<b>Transmitter</b>						
Input Differential Impedance	R <sub>IN</sub>	Ω	80	100	120	
Differential Data Input	V <sub>IN</sub>	mVp-p	150		1200	
J2 Jitter Tolerance	Jt2	UI	0.17			
J9 Jitter Tolerance	Jt9	UI	0.29			
Data Dependent Pulse Width Shrinkage	DDPWS	UI	0.07			
Eye mask coordinates{X1,X2, Y1,Y2}		UI mV	0.11,0.31		95,350	
<b>Receiver</b>						
Differential Data Output	V <sub>OD</sub>	mVp-p	300		800	
AC common mode output voltage (RMS)		mV			7.5	
Termination mismatch at 1MHx		%			5	
Differential output return loss		dB	Per IEEE P802.3ba, Section 86A.4.2.1			
Common mode output return loss		dB	Per IEEE P802.3ba, Section 86A.4.2.2			
Output transition time,20% to80%		ps	28			
J2 Jitter output	Jo2	UI			0.42	
J9 Jitter output	Jo9	UI			0.65	
Eye mask coordinates{X1,X2, Y1,Y2}		UI mV	0.29,0.5		150,425	

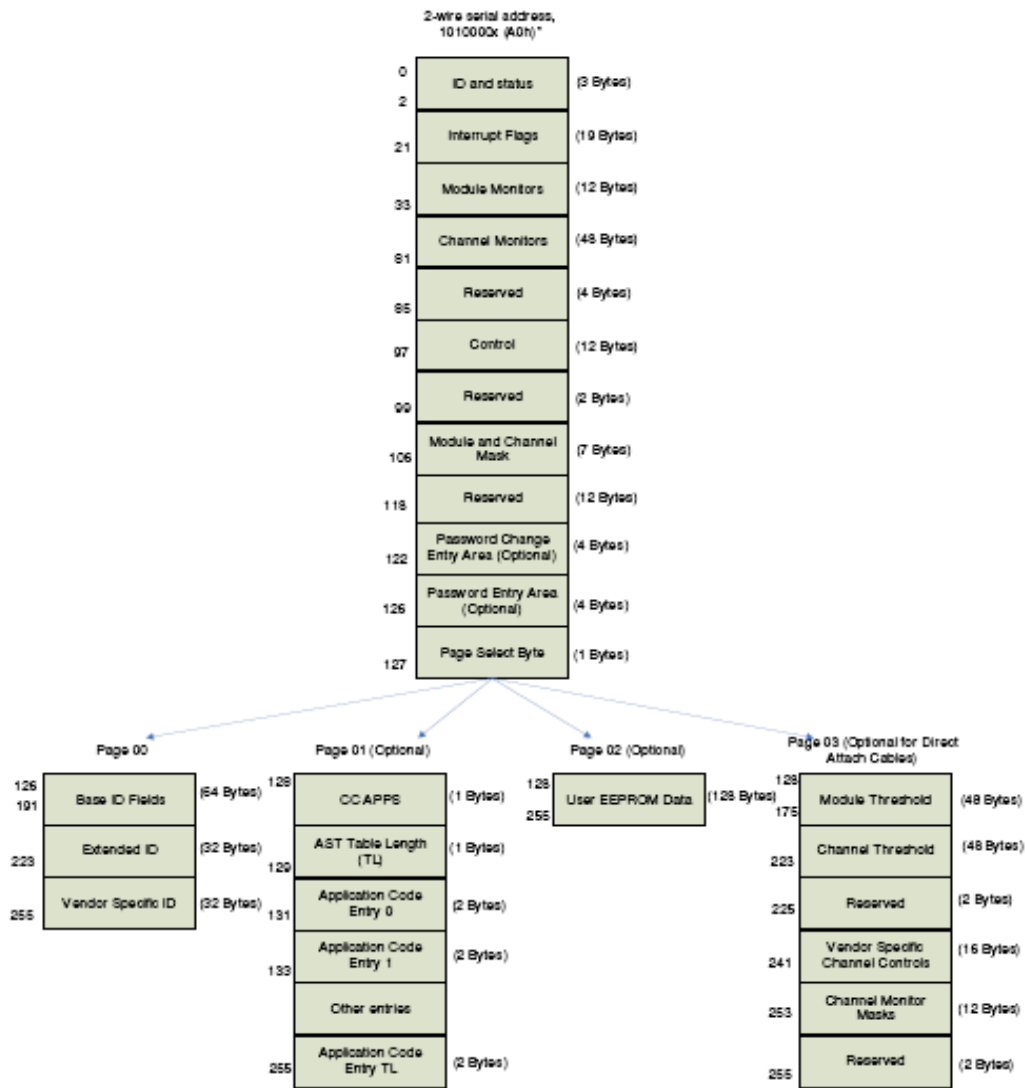
**Optical Characteristics** (T<sub>c</sub>=0 °C to 75 °C and V<sub>cc</sub>= 3.14 to 3.46)

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Transmitter(per Lane)						
Signaling Speed per Lane		GBd			10.3125	
Lane Wavelength (range):		nm	850			
Total Average Launch Power	P <sub>out</sub>	dBm			5.0	

**40G QSFP+ SR4 Transceiver (UQFP-SR4)**  
**300m via OM4 MPO-12**

Transmit OMA per Lane	TxOMA	dBm	-2.5		3.0	
Average Launch Power per Lane	TXPx	dBm	-7		2.3	
Optical Extinction Ratio	ER	dB	3.0			
Average launch power of OFF transmitter, per lane		dBm			-30	
Relative Intensity Noise	RIN	dB/Hz			-128	
Optical Return Loss Tolerance		dB			12	
Receiver(per Lane)						
Signaling Speed per Lane		GBd			10.3125	
Lane Wavelength (range):		nm	850			
Receive Power(OMA) per Lane	RxOMA	dBm			3.5	
Average Received Power per Lane	RXPx	dBm	-13.7		2.3	
Receiver sensitivity (OMA), each lane (max)		dBm			-11.5	
Stressed Receive Sensitivity(OMA) per lane	SRS	dBm			-9.6	
Damage Threshold Per Lane	Pmax	dBm			3.4	
Return Loss	RL				-26	
Vertical eye closure penalty, per lane		dB			1.9	
Receiver electrical 3dB upper cutoff frequency,per lane		GHz			12.3	
LOS De-Assert	LOSD	dBm			-15	
LOS Assert	LOSA	dBm	-30			
LOS Hysteresis		dB		1		

## Digital Diagnostic Memory Map



## Typical Application Circuit

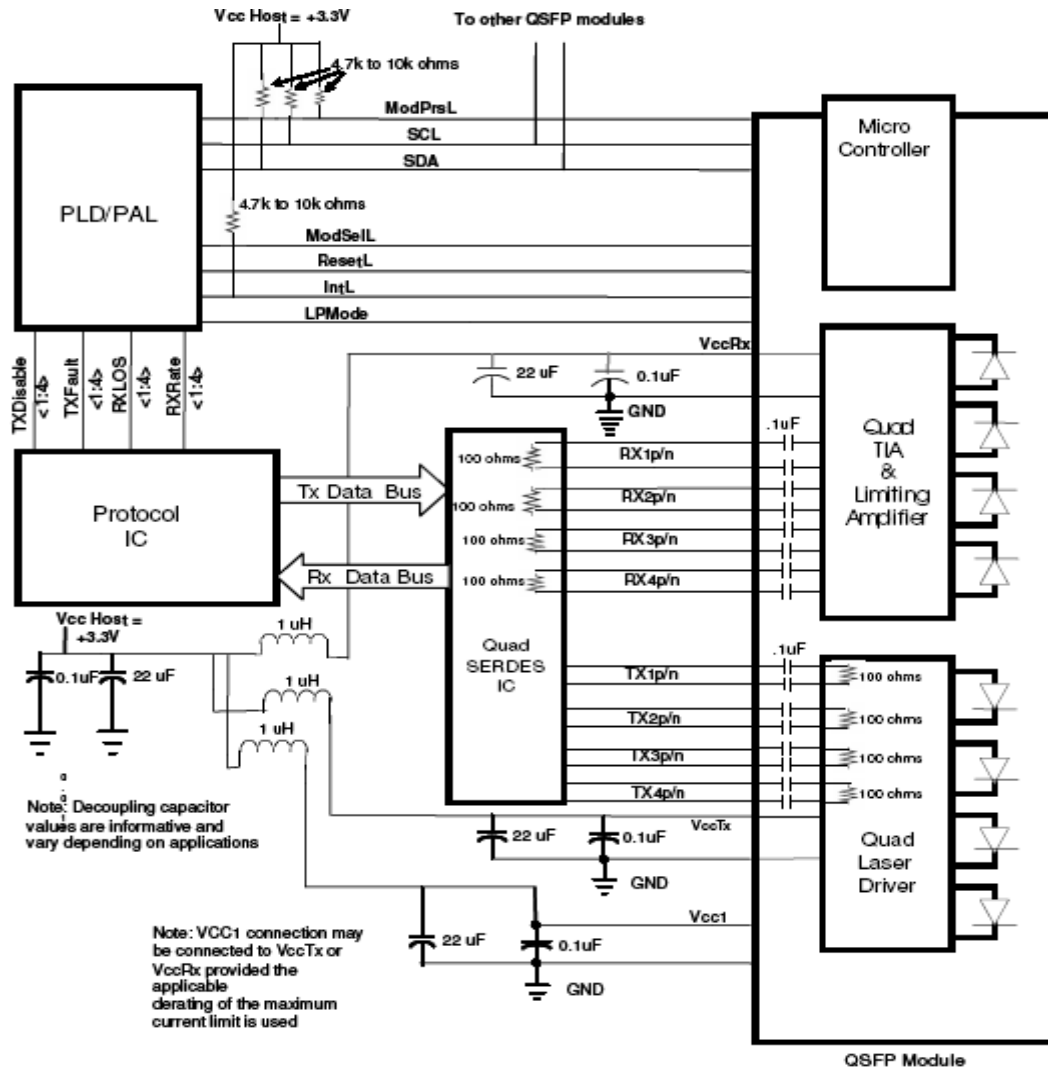


Figure 2. Typical application circuit

## Mechanical Dimensions

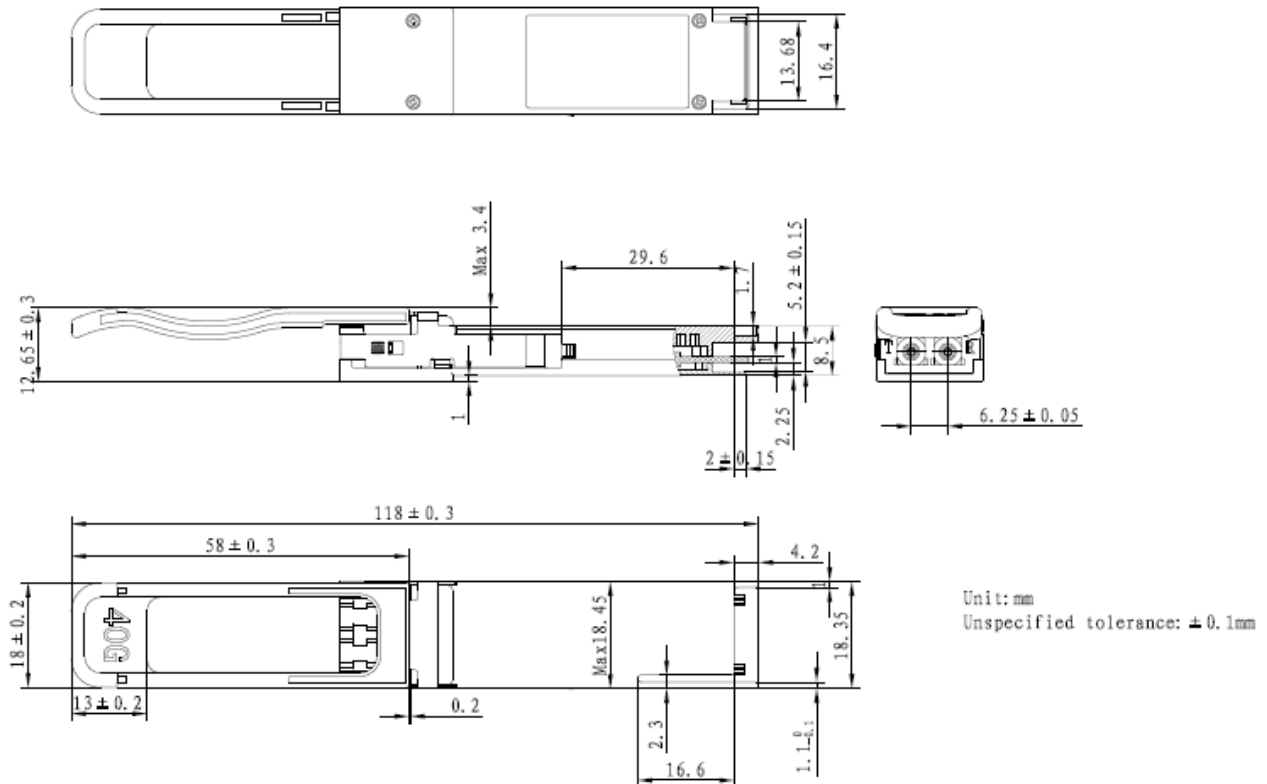


Figure 3. Module Mechanical Dimensions

## Digital Diagnostics Functions

As defined by the SFF-8436 - Specification for QSFP+ Copper and Optical Transceiver, Rev 4.7, February 2013, Our QSFP+ transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage

It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range. The operating and diagnostics information is monitored and reported by a DigitalDiagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through the 2-wire serial interface. When the serial



## **40G QSFP+ SR4 Transceiver (UQFP-SR4) 300m via OM4 MPO-12**

---

protocol is activated, the serial clock signal (SCL pin) is generated by the host. The positive edge clocks data into the SFP+ transceiver into those segments of its memory map that are not write-protected. The negative edge clocks data from the SFP+ transceiver. The serial data signal (SDA pin) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially. The 2-wire serial interface provides sequential or random access to the 8 bit parameters, addressed from 000h to the maximum address of the memory. For more detailed information, including memory map definition, please see the SFF-8436 documentation<sup>1</sup>.