

DATA SHEET

UTQ1HSR

100Gbps QSFP28 850nm SR4 Transceiver Overview

UTQ1HSR are designed for use in 100 Gigabit per second links over multimode fiber. They are compliant with the QSFP28 MSA and IEEE 802.3bm.

The optical transmitter portion of the transceiver incorporates a 4-channel VCSEL (Vertical Cavity Surface Emitting Laser) array, a 4-channel 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, received optical power and supply voltage are implemented and results are available through the TWS interface. Alarm and warning thresholds are established for the monitored attributes. Flags are set and interrupts generated when the attributes are outside the thresholds. Flags are also set and interrupts generated for loss of input signal (LOS) and transmitter fault conditions. All flags are latched and will remain set even if the condition initiating the latch clears and operation resumes. All interrupts can be masked and flags are reset by reading the appropriate flag register. The optical output will squelch for loss of input signal unless squelch is disabled. Fault detection or channel deactivation through the TWS interface will disable the channel. Status, alarm/warning and fault information are available via the TWS interface.

The optical receiver portion of the transceiver incorporates a 4-channel PIN photodiode array, a 4-channel TIA array, a 4 channel output buffer, diagnostic monitors, and control and bias blocks. Diagnostic monitors for optical input power are implemented and results are available through the TWS interface. Alarm and warning thresholds are established for the monitored attributes. Flags are set and interrupts generated when the attributes are outside the thresholds. Flags are also set and interrupts generated for loss of optical input signal (LOS). 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 TWS interface. Status and alarm/warning information are available via the TWS interface.

Product Features

- Up to 27.952 Gbps Data rate per channel
- Maximum link length of 100m links on OM3 multimode fiber
- High Reliability 850nm VCSEL technology
- Electrically hot-pluggable
- MTP/MPO optical connector
- Commercial operating case temperature range:
 - -5°C to 70°C
- RoHS-6 Compliant
- Power dissipation < 2.5 W

Applications

- 100G Ethernet
- Data center
- Infiniband QDR
- Fiber channel

Ordering Information

General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate per Lane	DR		25.7812		Gbps	
		5				
Operating Temperature	T _{OP}	-5		70	°C	
Storage Temperature	T _{STO}	-40		85	°C	
Power Supply Current	ICC			750	mA	
Input Voltage	V _{CC}	3.14	3.3	3.46	V	
Maximum Voltage	V _{MAX}	-0.3		4	V	

Optical Characteristics – Transmitter

V_{CC}=3.14V to 3.46V, T_C=-5°C to 70°C

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Average Launch Power each lane	P _{avg}	-8.4		2.4	dBm	
Transmitter and Dispersion Penalty each lane	TDP			4.3	dB	
Wavelength Assignment	λ ₀	840		860	nm	
Spectral Width(-20dB)	Δλ			0.6	nm	
Extinction Ratio	ER	2			dB	
Optical Return Loss Tolerance	ORL			12	dBm	
Output Eye Diagram			Compliant with IEEE802.3bm eye mask			

Optical Characteristics – Receiver

V_{CC}=3.14V to 3.46V, T_C=-5°C to 70°C

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Rx Sensitivity per lane	S			-10.3	dBm	1
Receiver Wavelength	λ ₀	840		860	nm	
Optical Power Input Overload	P _{in-max}	2.4			dBm	
Receiver Reflectance				-12	dB	

LOS Assert	P _{LOS_A}	- 30		dBm
LOS De-Assert	P _{LOS_D}		- 12	dBm
LOS Hysteresis		0.5		dB

Notes:

1. Measured with a PRBS 2³¹-1 test pattern, @25.78Gb/s, BER<10⁻¹².

Electrical Characteristics

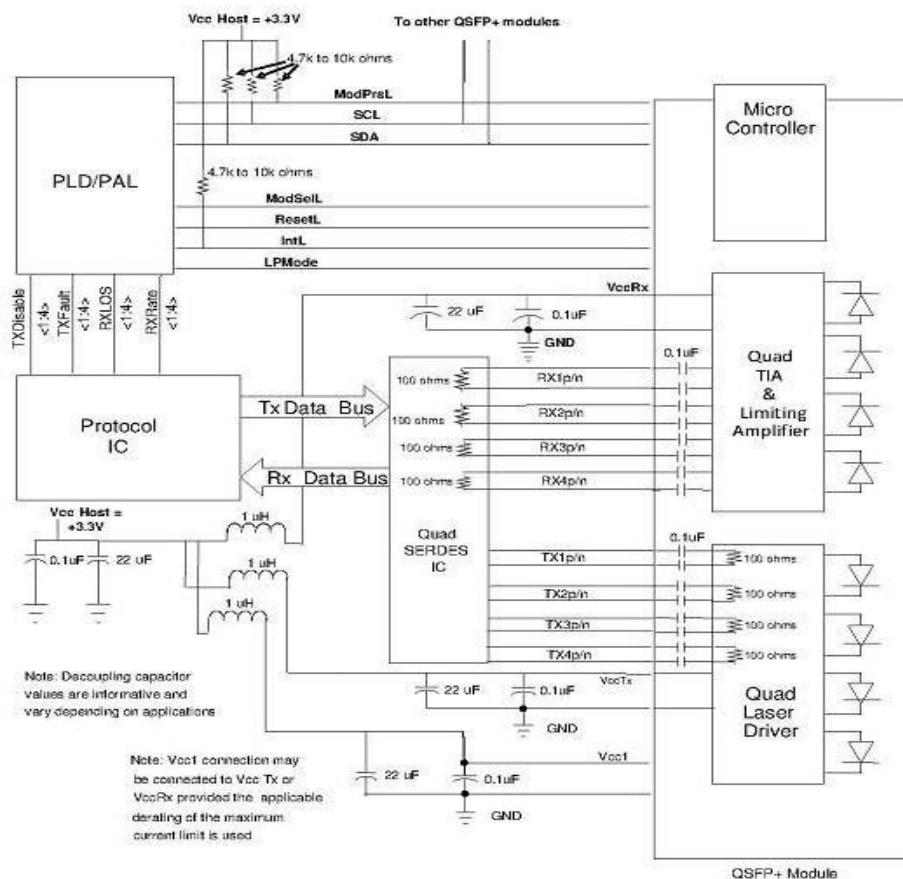
V_{CC}=3.14V to 3.46V, T_C=-5°C to 70°C

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Supply Voltage	V _{CC}	3.14	3.3	3.46	mV	
Supply Current	I _{CC}			750	mA	
Input differential impedance	R _{in}		100		Ω	1
Differential data input swing	V _{in,pp}	180		1000	mV	
Single ended input voltage tolerance	V _{inT}	-0.3		4.0	V	
Differential data output swing	V _{out,pp}	300		850	mV	2
Single ended output voltage		-0.3		4.0	V	

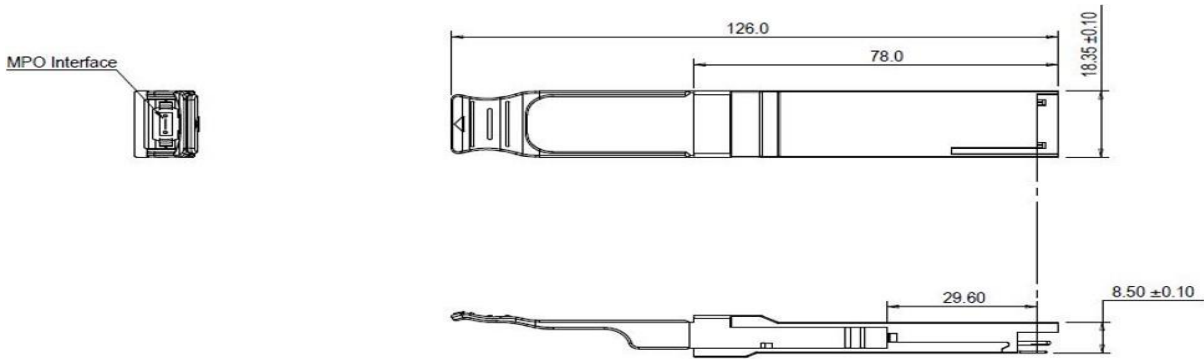
Notes:

1. Connected directly to TX data input pins. AC coupled thereafter.
2. Into 100Ω ohms differential termination

Block Diagram

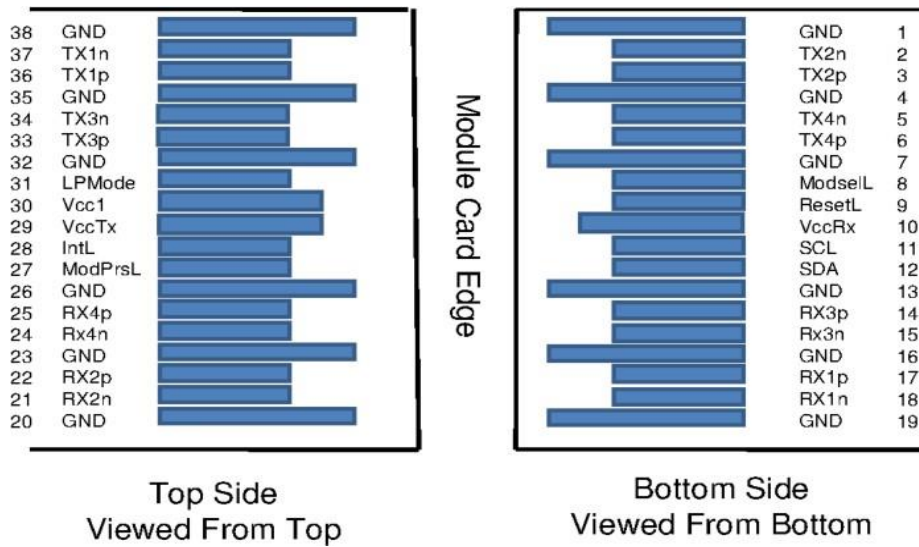


Dimensions



**ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED
UNIT: mm**

Electrical Pad Layout



Pin	Symbol	Name/Description	Notes
1	GND	Transmitter Ground (Common with Receiver 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	Vcc Rx	+3.3 V Power supply receiver	2
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	
14	RX3P	Transmitter Inverted Data Input	
15	RX3N	Transmitter Non-Inverted Data Input	
16	GND	Ground	1
17	RX1P	Transmitter Inverted Data Input	
18	RX1N	Transmitter Non-Inverted Data Input	
19	GND	Ground	1
20	GND	Ground	1
21	RX2N	Transmitter Inverted Data Input	
22	RX2P	Transmitter Non-Inverted Data Input	
23	GND	Ground	1
24	RX4N	Transmitter Inverted Data Input	1
25	RX4P	Transmitter Non-Inverted Data Input	
26	GND	Ground	1
27	ModPrsL	Module Present	
28	IntL	Interrupt	
29	Vcc Tx	+3.3 V Power supply transmitter	2
30	Vcc1	+3.3 V Power Supply	2
31	LPMODE	Low Power Mode	
32	GND	Ground	1
33	TX3P	Transmitter Inverted Data Input	
34	TX3N	Transmitter Non-Inverted Data Input	
35	GND	Ground	1
36	TX1P	Transmitter Inverted Data Input	
37	TX1N	Transmitter Non-Inverted Data Input	
38	GND	Ground	1

Notes:

GND is the symbol for signal and supply (power) common for QSFP28 modules. All are common within the QSFP28 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. VccRx, Vcc1 and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown in Figure 3 below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 500mA.

References

1. IEEE standard 802.3. IEEE Standard Department, 2005.
2. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 2000.