DATA SHEET

UNIVISO: UMQ1HE4

100G QSFP28 ER4 Lite Transceiver

UMQ1HE4 Overview

UNIVISO's 100G QSFP28 ER4 Lite optical Transceiver integrates receiver and transmitter path on one module. In the transmit side, four lanes of serial data streams are recovered, retimed, and passed to four laser drivers. The laser drivers control 4-EML with center wavelength of 1296 nm, 1300nm, 1305nm and 1309 nm. The optical signals are multiplexed to a single–mode fiber through an industry standard LC connector. In the receive side, the four lanes of optical data streams are optically de-multiplexed by the integrated optical demultiplxer. Each data stream is recovered by a APD and trans-impedance amplifier, retimed. This module features a hot-pluggable electrical interface, low power consumption and MDIO management interface. The product compliant with QSFP28 Multi-Source Agreement (MSA) and IEEE 802.3bm.

Product Features

• Support line rates from 103.125 Gbps to 111.81 Gbps
• Compliant with QSFP28 Standard:
    SFF-8665 Revision 1.9, SFF-8636 Revision 2.6
• Compliant with 100G 4WDM-40 MSA technical specification rev 1.0
• High speed I/O electrical interface (CAUI-4) compliant with IEEE 802.3bm
• Maximum power consumption 5.0W
• LAN WDM EML laser and APD Receiver
• QSFP28 MSA package with duplex LC connector
• Two Wire Serial Interface with Digital Diagnostic Monitoring
• Single 3.3V Supply Voltage
• RoHS compliant
• Operating temperature range: 0°C to 70°C

Applications

• 100GBASE-ER4 100G Ethernet
• ITU-T OTU4

Ordering Information

Part Number	Description	Color on Clasp
UMQ1HE4	100G QSFP28 LC Connectors, Up to 30km on SMF, with DOM function.	orange
For More Information: UNIVISO Limited Email: sales@UNIVISO.com		

General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate	DR		25.78		Gb/s	
Operating Temperature	T_C	0		70	$^\circ$C	1
Storage Temperature	T_{STO}	–40		85	$^\circ$C	2
Input Voltage	V_{CC}	3.14	3.3	3.46	V	
Maximum Voltage	V_{MAX}	–0.5		3.6	V	3
Maximum Power Dissipation	P_D			5.0	W	

Notes:

1.Case temperature

2.Ambient temperature

3.For electrical power interface

Optical – Characteristics – Transmitter

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Total Average Optical Launch Power	P_T			12.5	dBm	
Average Optical Launch Power (Each Lane)	P_{TX}	−2.5		6.5	dBm	
Optical Center Wavelength (L0 Lane)	λ_C	1294.53	1295.56	1296.59	nm	
Optical Center Wavelength (L1 Lane)	λ_C	1299.02	1300.06	1301.09	nm	
Optical Center Wavelength (L2 Lane)	λ_C	1303.54	1304.59	1305.63	nm	
Optical Center Wavelength (L3 Lane)	λ_C	1308.09	1309.14	1310.19	nm	
Optical Modulation Amplitude(Each Lane)	OMA	0.5		6.5	dB	
Extinction Ratio	ER	4.5			dB	
Side Mode Suppression Ratio	SMSR	30			dB	
Relative Intensity Noise	RIN			−128	dB/Hz	
Transmitter and Dispersion Penalty (Each Lane)	TDP			3	dB	
Optical Return Loss Tolerance	ORLT	20			dB	

Optical – Characteristics – Receiver

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Center Wavelength (L0 Lane)	λ_C	1294.53	1295.56	1296.59	nm	
Optical Center Wavelength (L1 Lane)	λ_C	1299.02	1300.06	1301.09	nm	
Optical Center Wavelength (L2 Lane)	λ_C	1303.54	1304.59	1305.63	nm	
Optical Center Wavelength (L3 Lane)	λ_C	1308.09	1309.14	1310.19	nm	
Average Receive Power (Each Lane)	P_{RX}	−20.5		−3.5	dBm	
Receiver sensitivity (OMA), each lane at 5×10^{-5} BER	R_{X_SEN1}			−18.5	dBm	

Electrical- Characteristics - Transmitter

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Input differential impedance	R_{IN}		100		Ω	
Differential data input swing	V_{IN_PP}	180		1000	mV	
Transmit disable voltage	V_D	$V_{CC}-1.3$		V_{CC}	V	
Transmit enable voltage	V_{EN}	V_{EE}		$V_{EE}+0.8$	V	

Electrical-Characteristics - Receiver

| Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Differential data output swing	V_{OUT_PP}	300		800	mV	
LOS Fault	$V_{LOS\ A}$	$V_{CC}-1.3$		$V_{CC\ HOST}$	V	
LOS Normal	$V_{LOS\ D}$	V_{EE}		$V_{EE}+0.8$	V	

Block-Diagram-of-Transceiver
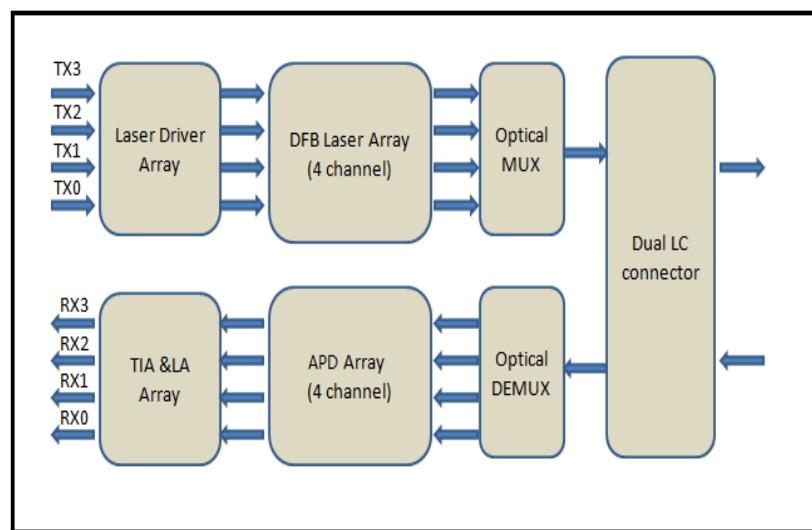
This product converts the 4-channel 25Gb/s electrical input data into LAN WDM optical signals (light), by a driven 4-wavelength Distributed Feedback Laser (DFB) array. The light is combined by the MUX parts as a 100Gb/s data, propagating out of the transmitter module from the SMF. The receiver module accepts the 100Gb/s LAN WDM optical signals input, and de-multiplexes it into 4 individual 25Gb/s channels with different wavelength. Each wavelength light is collected by a discrete photo diode, and then outputted as electric data after amplified by a TIA.

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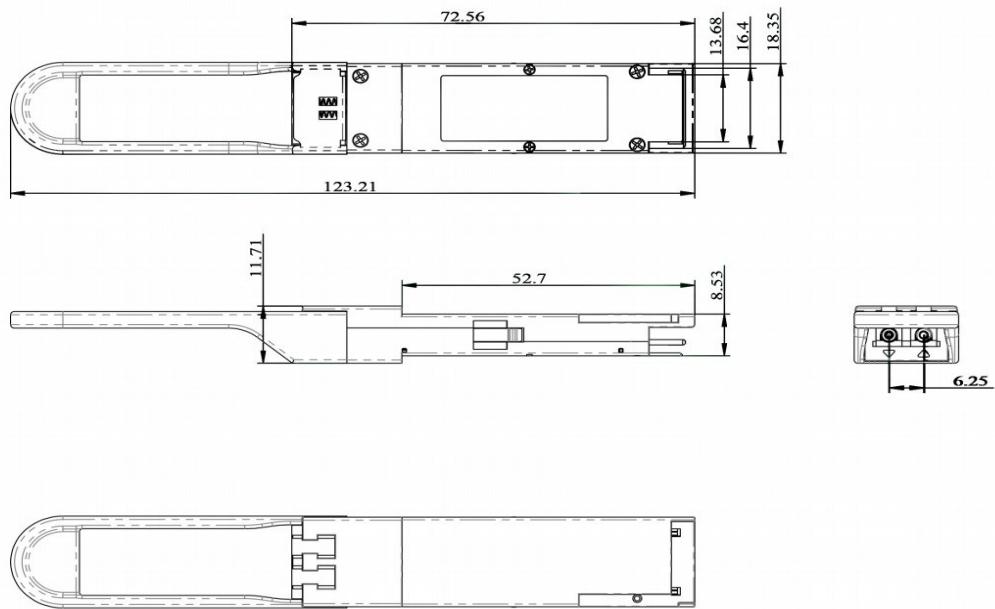
ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED
UNIT: mm

Electrical Pad Layout

	Top Board		Bottom Board	
38	GND		GND	1
37	TX1n		TX2n	2
36	TX1p		TX2p	3
35	GND		GND	4
34	TX3n		TX4n	5
33	TX3p		TX4p	6
32	GND		GND	7
31	LPMode		ModSeIL	8
30	$V_{CC}1$		ResetL	9
29	$V_{CC}T_X$		$V_{CC}R_X$	10
28	IntL		SCL	11
27	ModPrsL		SDA	12
26	GND		GND	13
25	RX4p		RX3p	14
24	RX4n		RX3n	15
23	GND		GND	16
22	RX2p		RX1p	17
21	RX2n		RX1n	18
20	GND		GND	19
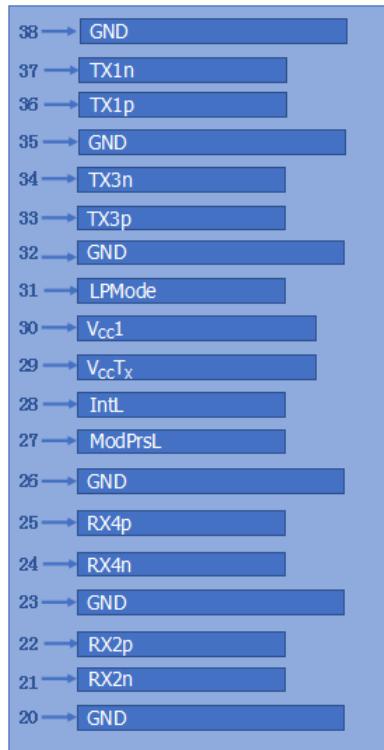
Top Board
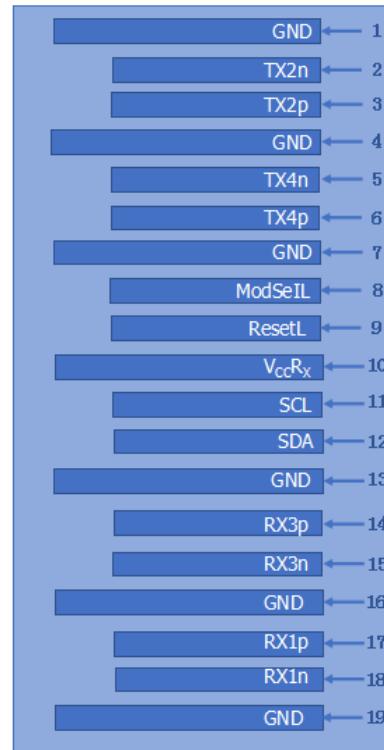
Bottom Board

Pin Assignment

PIN #	Symbol	Description	Remarks
1	GND	Ground	5
2	Tx2n	Transmitter Inverted Data Input, LAN2	
3	Tx2p	Transmitter Non-Inverted Data Input, LAN2	
4	GND	Ground	5
5	Tx4n	Transmitter Inverted Data Input, LAN4	
6	Tx4p	Transmitter Non-Inverted Data Input, LAN4	
7	GND	Ground	5
8	ModSelL	Module select pin, the module responds to two-wire serial communication when low level	1
9	ResetL	Module Reset	2
10	$V_{cc}R_X$	+3.3V Power Supply Receiver	
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	5
14	Rx3p	Receiver Non-Inverted Data Output, LAN3	
15	Rx3n	Receiver Inverted Data Output, LAN3	
16	GND	Ground	5
17	Rx1p	Receiver Non-Inverted Data Output, LAN1	
18	Rx1n	Receiver Inverted Data Output, LAN1	
19	GND	Ground	5
20	GND	Ground	5
21	Rx2n	Receiver Inverted Data Output, LAN2	
22	Rx2p	Receiver Non-Inverted Data Output, LAN2	
23	GND	Ground	5
24	Rx4n	Receiver Inverted Data Output, LAN4	
25	Rx4p	Receiver Non-Inverted Data Output, LAN4	
26	GND	Ground	5
27	ModPrsL	The module is inserted into the indicate pin and grounded in the module.	3
28	IntL	Interrupt	4
29	$V_{cc}T_X$	+3.3V Power Supply transmitter	
30	V_{cc1}	+3.3V Power Supply	
31	LPMode	Low Power Mode	5
32	GND	Ground	5

33	Tx3p	Transmitter Non-Inverted Data Input, LAN3	
34	Tx3n	Transmitter Inverted Data Input, LAN3	
35	GND	Ground	5
36	Tx1p	Transmitter Non-Inverted Data Input, LAN1	
37	Tx1n	Transmitter Inverted Data Input, LAN1	
38	GND	Ground	5

Notes:

1. ModSelL is the input pin. The module responds to 2-wire serial communication commands when it is held low by the host. ModSelL allows multiple QSFP modules to be used on a single 2-wire interface bus. If ModSelL is High, the module will not respond to any 2-wire interface communication from the host. ModSelL has internal pull-up resistors in the module

2. The module restart pin, when the low level on the ResetL pin lasts longer than the minimum pulse length, resets the module and restores all user modules to their default state. When performing reset device, the host should ignore all status bits. Until the module reset interrupt is completed, please note that during hot plugging, the module will issue this information to complete the reset interrupt without resetting

3. This pin is active high, indicating that the module is running under a low power module.

4. IntL is the output pin, which is the open collector output and must be pulled up to Vcc on the motherboard. When it is low, it indicates that the module may malfunction. The host uses a 2-wire serial interface to identify the interrupt source

5.Circuit ground is internally isolated from chassis ground.

References

1. IEEE standard 802.3bm. IEEE Standard Department.

2. QSFP28 4X PLUGGABLE TRANSCEIVER –SFF-8665.