
OS-QS1H-3110D

100GBASE-LR4 QSFP28 Transceiver Datasheet

Features

- ◆ Supports 103Gbps
- ◆ Maximum link length of 10km on Single Mode Fiber (SMF)
- ◆ Single 3.3V Power Supply and Power dissipation < 4.5W
- ◆ 4x25.78 DML LAN-WDM channels on transmitter side
- ◆ PIN and TIA array on the receiver side
- ◆ 4x25.78G electrical interface
- ◆ Duplex LC receptacles
- ◆ I2C interface with integrated Digital Diagnostic Monitoring
- ◆ Operating Case Temperature: 0°C ~ 70°C

Applications

- ◆ 100GBASE-LR4 Ethernet

Standard

- ◆ Compliant with QSFP28 MSA Specification and IEEE 802.3ba 100GBASE-LR4
- ◆ Class 1 FDA and IEC60825-1 Laser Safety Compliant

Product Description

Ousent OS-QS1H-3110D QSFP28 transceiver module is designed for 103 Gigabit Ethernet links over 10Km single mode fiber. It is compliant with IEEE 802.3ba 100GBASE-LR4. Digital diagnostics functions are available via an I2C interface, as specified by the QSFP28 MSA.

I. Order Information

Part No.	Data Rate	Fiber	Distance	Interface	Temp.	DDMI
OS-QS1H-3110D	103Gbps	SMF	10km	LC	0°C ~ 70°C	YES

II. Optical and Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Transmitter					
Signaling Speed per Lane	BRAVE		25.78		Gbps
Data Rate Variation		-100		+100	Ppm
Lane_0 Center Wavelength	λ_{c0}	1294.53	1295.56	1296.59	nm
Lane_1 Center Wavelength	λ_{c1}	1299.02	1300.05	1301.09	nm
Lane_2 Center Wavelength	λ_{c2}	1303.54	1304.58	1305.63	nm
Lane_3 Center Wavelength	λ_{c3}	1308.09	1309.14	1310.19	nm
Side-mode Suppression ration	SMSR min	30			dB
Total Average Output Power	Po			10.5	dBm
Average Launch Power per Lane ^{*(Note1)}	Peach	-4.3		4.5	dBm
Optical Modulation Amplitude (OMA) each Lane	TXOMA	-1.3		4.5	dBm
Average launch power of OFF transmitter per lane	Poff			-30	dBm
Transmitter adn dispersion penalty (TDP), each lane				2.2	dB
Extinction Ratio	ER	4			dB
Relative Intensity Noise	RIN			-130	dB/hz
Transmitter Reflectance				-12	dB
Optical Return Loss Tolerance				20	dB
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3} ^{*(Note2)}			{0.25, 0.4, 0.45, 0.25, 0.28, 0.4}		
Receiver					
Signaling Speed per Lane	BRAVE		25.78		Gbps
Data Rate Variation		-100		+100	Ppm
Lane_0 Center Wavelength	λ_{c0}	1294.53	1295.56	1296.59	nm
Lane_1 Center Wavelength	λ_{c1}	1299.02	1300.05	1301.09	nm

Lane_2 Center Wavelength	λ_{c2}	1303.54	1304.58	1305.63	nm
Lane_3 Center Wavelength	λ_{c3}	1308.09	1309.14	1310.19	nm
Average Receive Power per Lane ^{*(Note3)}	Rpow	-10.6		4.5	dBm
Damage threshold	Rdam	5.5			dBm
Receive overload (OMA) per Lane	RxOMA	4.5			dBm
Receive Sensitivity (OMA) per Lane	Rxsens			-8.6	dBm
Optical Return Loss	ORL			-26	dB
LOS Assert	LOSA	-25			dBm
LOS De-Assert	LOSD			-12	dBm
LOS Hysteresis		0.5			dB

Note:

- 1) Average launch power, each lane (min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance.
- 2) Hit ratio 5×10^{-5} .
- 3) Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.

III. Performance Specifications - Electrical

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Differential data input swing per lane				900	mVp-p	
Input Impedance (Differential)	Zin			10	%	C
Receiver						
Output Amplitude (Differential)	Vout	200		900	mVpp	
Output Impedance (Differential)	Zout			10	%	
Output Rise/Fall Time	tr/tf		12		ps	20%~80%

IV. Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T _s	-40	+85	°C
Maximum Supply Voltage	V _{CC}	-0.5	3.6	V
Operating Relative Humidity	RH	5	85	%
Receiver Damage Threshold per Lane	Rxdmg	5.5		dBm

Note:

Exceeding any one of these values may destroy the device immediately.

V. Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating Case Temperature	T _c	0		70	°C
Power Supply Voltage	V _{CC}	3.135	3.3	3.465	V
Power Dissipation	PD			4.5	W

VI. Digital Diagnostic Functions

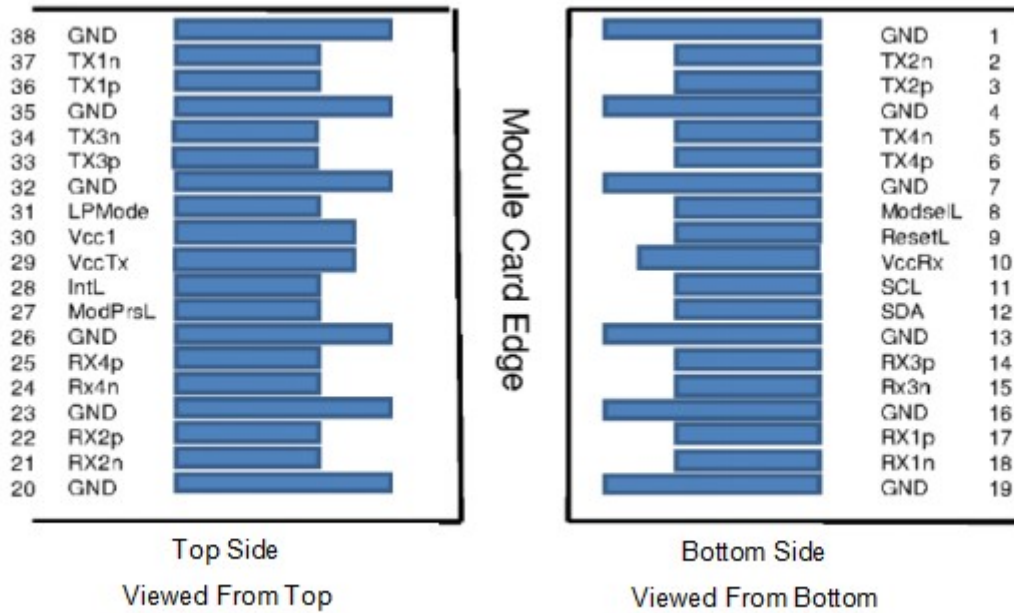
Ousent 100G QSFP28 transceivers provide an enhanced digital diagnostic.

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to 70	°C	±3°C	Internal / External
Voltage	3.0 to 3.6	V	±3%	Internal / External
Bias Current	30 to 100	mA	±10%	Internal / External
TX Power	-4.3 to 4.5	dBm	±3dB	Internal / External
RX Power	-10.6 to 4.5	dBm	±3dB	Internal / External

Note:

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA). The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

VII. QSFP28 Transceiver Electrical Pad Layout



Pin Function Definitions

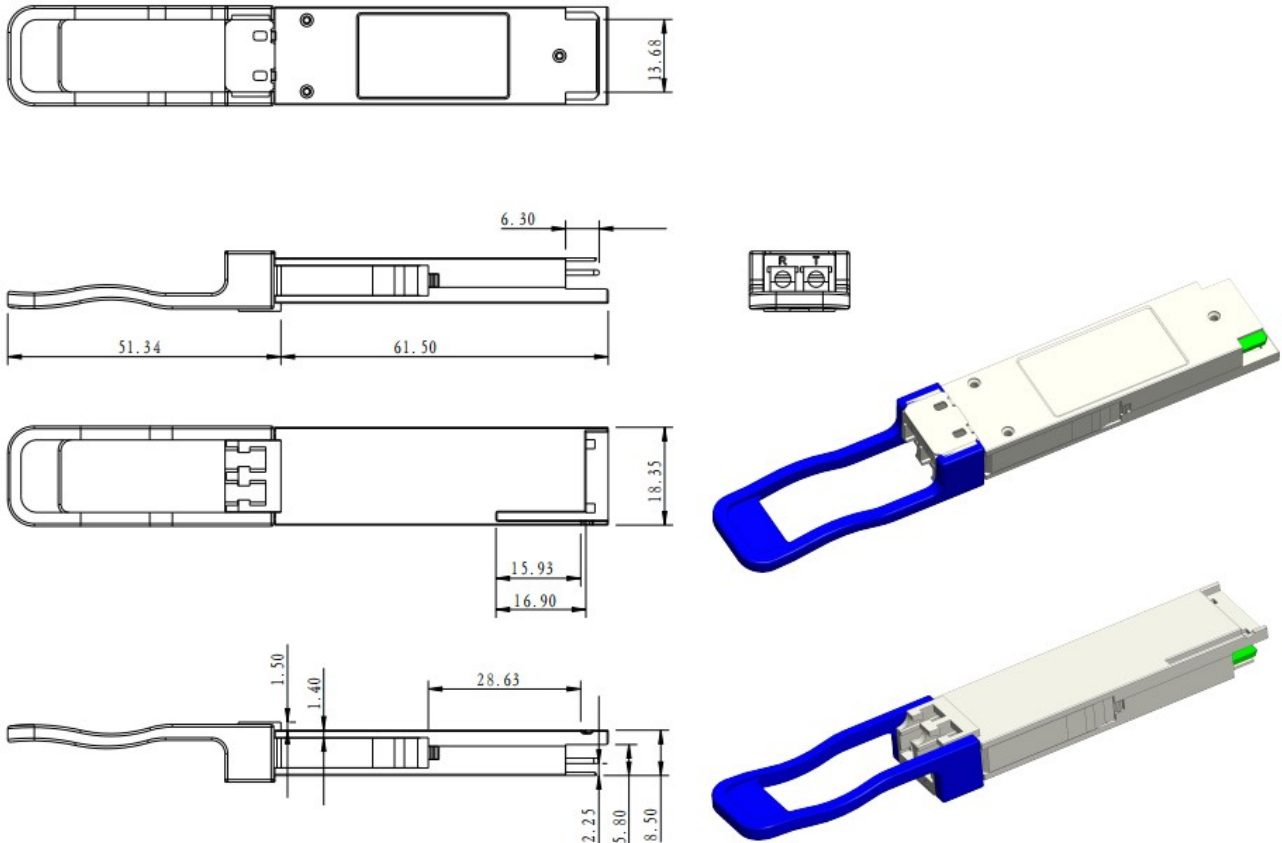
Pin	Logic	Symbol	Description	Plug Sequence	Notes
1		GND	Ground	1	1)
2	CML-1	Tx2n	Transmitter Inverted Data Input	3	
3	CML-1	Tx2p	Transmitter Non-Inverted Data Input	3	
4		GND	Ground	1	1)
5	CML-1	Tx4n	Transmitter Inverted Data Input	3	
6	CML-1	Tx4p	Transmitter Non-Inverted Data Input	3	
7		GND	Ground	1	1)
8	LVTTL-1	ModSelL	Module Select	3	
9	LVTTL-1	ResetL	Module Reset	3	
10		VccRx	+3.3V Power Supply Receiver	2	2)
11	LVC MOS-I/O	SCL	2-wire serial interface clock	3	
12	LVC MOS-I/O	SDA	2-wire serial interface data	3	
13		GND	Ground	1	1)
14	CML-O	Rx3p	Receiver Non-Inverted Data Output	3	
15	CML-O	Rx3n	Receiver Inverted Data Output	3	

16		GND	Ground	1	1)
17	CML-O	Rx1p	Receiver Non-Inverted Data Output	3	
18	CML-O	Rx1n	Receiver Inverted Data Output	3	
19		GND	Ground	1	1)
20		GND	Ground	1	1)
21	CML-O	Rx2n	Receiver Inverted Data Output	3	
22	CML-O	Rx2p	Receiver Non-Inverted Data Output	3	
23		GND	Ground	1	1)
24	CML-O	Rx4n	Receiver Inverted Data Output	3	
25	CML-O	Rx4p	Receiver Non-Inverted Data Output	3	
26		GND	Ground	1	1)
27	LVTTL-O	ModPrsL	Module Present	3	
28	LVTTL-O	IntL	Interrupt	3	
29		VccTx	+3.3V Power supply transmitter	2	2)
30		Vcc1	+3.3V Power supply	2	2)
31	LVTTL-1	LPMODE	Low Power Mode	3	
32		GND	Ground	1	1)
33	CML-1	Tx3p	Transmitter Non-Inverted Data Input	3	
34	CML-1	Tx3n	Transmitter Inverted Data Input	3	
35		GND	Ground	1	1)
36	CML-1	Tx1p	Transmitter Non-Inverted Data Input	3	
37	CML-1	Tx1n	Transmitter Inverted Data Input	3	
38		GND	Ground	1	1)

NOTES:

- 1) GND is the symbol for signal and supply (power) common for the QSFP28 module. 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) Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in Table 6. Recommended host board power supply filtering is shown in Figures 3 and 4. Vcc Rx Vcc1 and Vcc Tx may be internally connected within the QSFP28 Module in any combination. The connector pins are each rated for a maximum current of 500Ma.

VIII. Mechanical Specifications



Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883G Method 3015.7	Class 1C (>1000V)
Electrostatic Discharge (ESD) to the enclosure	EN 55035:2017/A11:2020 IEC-61000-4-2	Compliant with standards
Electromagnetic Interference (EMI)	CFR47, FCC Part 15 Subpart B, ANSI C63.4:2014 EN55032:2015+A11:2020 CISPR 16-2-1	Compliant with standards Noise frequency range: 30MHz to 6GHz. Good system EMI design practice required to achieve Class B margins. System margins are dependent on customer host board and chassis design.
Electromagnetic Immunity	EN 55024: 2010+A1:2015 IEC 61000-4-3	Compliant with standards. 1KHz sine-wave, 80% AM, from 80MHz to 1GHz. No effect on transmitter/receiver performance is detectable between these limits.
RoHS 10	2011/65/EU and the amendment directive (EU) 2015/863	Compliant with standards
Component Recognition	EN 62368-1:2014+A11 EN 60825-1:2014 EN 60825-2:2004+A1+A2	CE No.: CTB220615038E UL file: CN21EFMW 001 TüV Certificate No. R 50491717

Laser Safety:

All transceivers are Class 1 Laser products per FDA/CDRH and IEC-60825 standards. They must be operated under specified operating conditions



Ousent Technologies Co., Ltd
NAME OF MANUFACTURE:

This product complies with
21 CFR 1040. 10 and 1040. 11
Meet Class 1 Laser Safety

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Appendix: Document Revision

Version No.	Date	Description
1.0	2021-04-20	For the first time to issue