

OS-QS1H-8501MD

MMF 100GBASE-SR4 QSFP28 Transceiver Datasheet

Features

- ◆ Supports 103Gbps aggregate bit rates
- ◆ Up to 70m transmission on MMF OM3 and 100m transmission on MMF OM4
- ◆ Single 3.3V Power Supply and Power dissipation < 2.5W
- ◆ 4 channels 850nm VCSEL array
- ◆ 4 channels PIN photo-detector array
- ◆ 4x25.78Gbps retimed electrical interface
- ◆ Hot-Pluggable QSFP28 Footprint
- ◆ I2C interface with integrated Digital Diagnostic Monitoring
- ◆ Commercial case temperature range of 0°C to 70°C

Applications

- ◆ 100GBASE-SR4 Ethernet

Standard

- ◆ Compliant with QSFP28 MSA Specification
- ◆ Class 1 FDA and IEC60825-1 Laser Safety Compliant

Product Description

OS-QS1H-8501MD QSFP28 transceiver module is designed for 103Gbps Ethernet links over 70m OM3 and 100m OM4 multi-mode fiber. It is compliant with IEEE 802.3bm 100GBASE-SR4. 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-8501MD	103Gbps	MMF	MMF OM3 for 70m MMF OM4 for 100m	MPO	0°C~70°C	YES

II. Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Transmitter					
Signaling Speed each Lane	BR _{AVE}		25.78		Gbps
Data Rate Variation		-100		+100	Ppm
Center Wavelength	λ _C	840	850	860	nm
Average Launch Power, Each Lane ^{*(note1)}	P _{out} /lane	-8.4		2.4	dBm
Optical Modulation Amplitude (OMA) each Lane	TX _{OMA}	-6.4		3	dBm
Average launch power of OFF transmitter each lane	P _{off}			-30	dBm
Extinction Ratio ^{*(Note2)} , each lane	ER	3			dB
Optical Return Loss Tolerance				12	dB
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3} ^{*(Note2)}		0.3,0.38,0.45,0.35,0.41,0.5			
Receiver					
Signaling Speed each Lane	BR _{AVE}		25.78		Gbps
Data Rate Variation		-100		+100	Ppm
Center Wavelength	λ _C	840	850	860	nm
Average Receive Power each Lane ^{*(Note3)}	R _{pow}	-10.3		2.4	dBm
Damage Threshold , each lane	P _{max}	3.4			dBm
Receive Power (OMA) per Lane	R _{XOMA}			3	dBm
LOS Assert, each lane	LOS _A	-20			dBm
LOS De-Assert, each lane	LOS _D			-12	dBm
LOS Hysteresis, each lane		0.5			dB

Note:

- 1) Output is coupled into a 50/125μm multi-mode fiber.
- 2) Filtered, measured with a PRBS 2³¹-1 test pattern @25.78Gbps.
- 3) Minimum average optical power measured at BER less than 1E-12, with a 2³¹-1 PRBS.

III. Performance Specifications - Electrical

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Differential Input amplitude		150		1200	mVpp	
Input Impedance (Differential)	Z _{in}	90	100	110	ohms	R _{in} > 100 kohms @ DC
Receiver						
Output Amplitude (Differential)	V _{out}	200		1100	mVpp	
Output Impedance (Differential)	Z _{in}	90	100	110	ohms	
Output Rise/Fall Time	tr/tf			20	ps	10%~90%

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	%

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 Supply Current	I _{CC}			757	mA
Power Dissipation	P			2.5	W

VI. Digital Diagnostic Functions

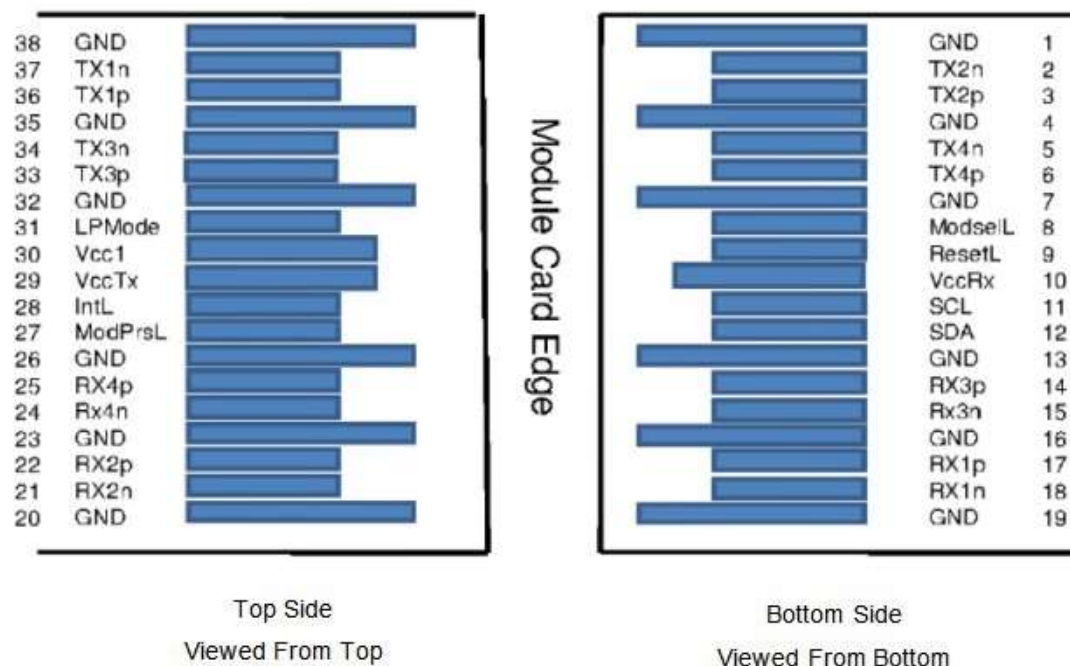
100G QSFP28 transceivers provide an enhanced digital diagnostic.

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, each lane	1 to 15	mA	±10%	Internal / External
TX Power, each lane	-8.4 to 2.4	dBm	±3dB	Internal / External
RX Power, each lane	-10.3 to 2.4	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. Electrical PIN Pad Layout and Details



Pin Function Definitions

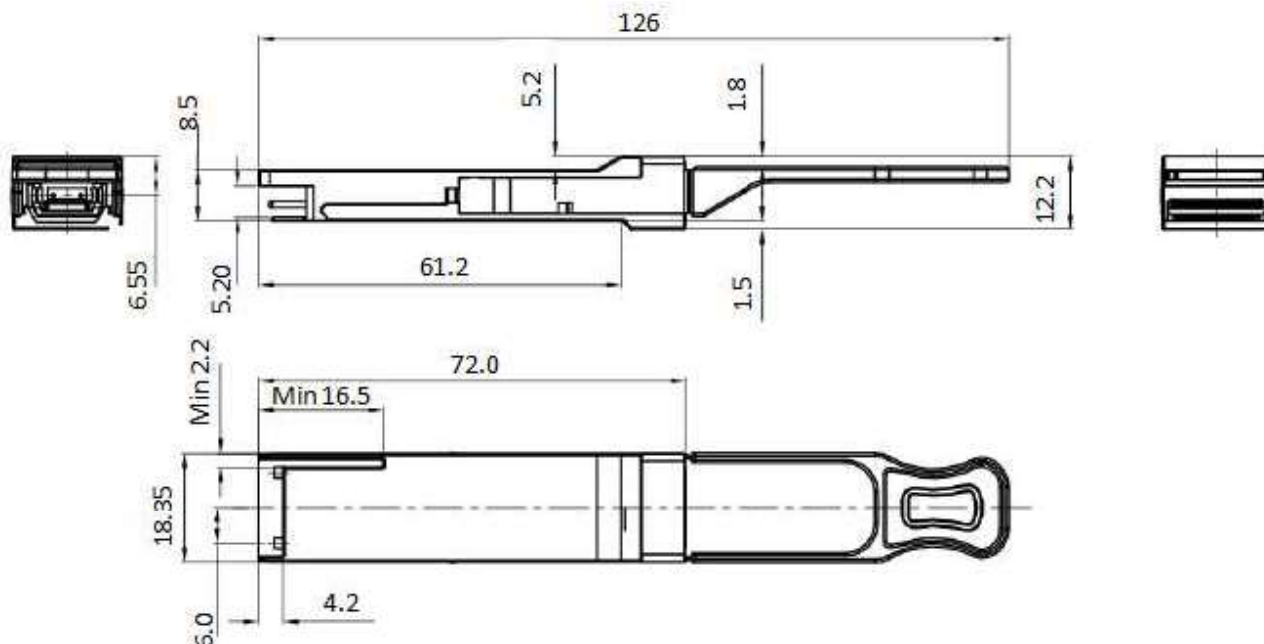
Pin	Logic	Symbol	Description	Plug Sequence	Notes
1		GND	Ground	1	1
2	CML-1	Tx2n	Transmitter Inverted Data Input	3	
3	CML-1	Tx2p	Transmitter Non-Inverted Data Input	3	
4		GND	Ground	1	1
5	CML-1	Tx4n	Transmitter Inverted Data Input	3	
6	CML-1	Tx4p	Transmitter Non-Inverted Data Input	3	
7		GND	Ground	1	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		VccI	+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:

Note1: 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.

Note2: 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



Appendix: Document Revision

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