

QSFP-56G-SR4

56GBase-SR4 QSFP+ Transceiver

Hot Pluggable, +3.3V, MPO, 850nm, up to 100m, MMF, Commercial Temperature

FEATURES

- Four-channel full-duplex transceiver module
- Hot Pluggable QSFP+ form factor
- Maximum link length of 60m on OM3 Multimode Fibre (MMF) and 100m on OM4 MMF
- Up to 14.0625 Gb/s per channel
- Unretimed XLPPI electrical interface
- Maximum power dissipation < 1.5W
- Reliable VCSEL array technology
- Single 1x12 MPO receptacle
- RoHS-6 Compliant
- Commercial Operating Temperature Range: 0 to 70°C

APPLICATIONS

- Infiniband 4xFDR
- Infiniband 4xFDR10
- Infiniband 4xQDR
- SAS 2.1/3.0
- IEEE 40GBASE-SR4

DESCRIPTION

ATGBICS QSFP-56G-SR4 QSFP+ transceiver modules are designed for use in Ethernet, SAS, and InfiniBand links over multimode fibre. They are compliant with the QSFP+ MSA and the Ethernet3, SAS and InfiniBand4 architecture specifications. The optical transceiver is compliant per the RoHS Directive 2011/65/EU.

GENERAL SPECIFICATIONS

Parameter	Value	Notes
Number of Lanes	4 Tx and 4 Rx	
Maximum Aggregate Data Rate	56.25Gbps	
Maximum Data Rate per Lane	14.0625Gbps	Higher bit rates may be supported
Electrical Interface and Pin-out	38-pin edge connector	Pin-out as defined by the QSFP+ MSA
Maximum Power Consumption per End	1.3W	Varies with output voltage swing and pre-emphasis settings
Management Interface	Serial, I2C-based, 400 kHz maximum frequency	As defined by the QSFP+ MSA

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Bit Rate per Lane	BR	1.0625	-	14.0625	Gbps	
Bit Error Ratio	BER	-	-	10 ⁻¹²		1
Link distance on OM3 MMF	d	-	-	60	m	
Link distance on OM4 MMF	d	-	-	100	m	

Note:

1. Tested with a PRBS 231-1 test pattern

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Typical	Max	Unit	Note
Maximum Supply Voltage	V _{cc1} , V _{ccTx} , V _{ccRx}	-0.5	-	3.6	V	
Storage Temperature	T _s	-40	-	85	°C	
Case Operating Temperature	T _{OP}	0	-	70	°C	
Relative Humidity	RH	0	-	85	%	1
Damage Threshold, per Lane	DT	3.4	-	-	dBm	

Note:

1. Non-condensing

OPTICAL CHARACTERISTICS

Parameter	Symbol	Min	Typical	Max	Unit	Note
TRANSMITTER (per Lane)						
Signalling Speed per Lane		1.0625	-	14.0625	GBd	1
Centre wavelength		840	-	860	nm	
RMS Spectral Width	SW	-	-	0.55	nm	
Average Launch Power per Lane	TXP _x	-6.0	-	-	dBm	
Transmit OMA per Lane	TxOMA	-4.5	-	3.0	dBm	2
Difference in Power between any two lanes [OMA]	DP _x	-	-	2.0	dB	
Peak Power per Lane	PP _x	-	-	4.0	dBm	
Optical Extinction Ratio	ER	4.7	-	-	dB	
Optical Return Loss Tolerance	ORL	-	-	12	dB	
Encircled Flux	FLX	> 86% at 19 um < 30% at 4.5 um			dBm	
Average launch power of OFF transmitter, per lane		-	-	-30	dBm	
Relative Intensity Noise	RIN	-	-	-128	dB/Hz	
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3}		0.23, 0.34, 0.43, 0.27, 0.35, 0.4				
RECEIVER (per Lane)						
Signalling Speed per Lane		1.0625	-	14.0625	GBd	3
Centre wavelength		840	-	860	nm	
Damage Threshold	DT	3.4	-	-	dBm	
Average Receive Power per Lane	RXP _x	-	-	2.4	dBm	
Receiver Sensitivity (OMA) per Lane	URS	-	-	-8.2	dBm	
Peak Power, per lane	PP _x	-	-	4	dBm	
Receiver Reflectance	Rfl	-	-	-12	dB	
Vertical eye closure penalty, per lane		-	-	1.9	dB	
Stressed eye J2 jitter, per Lane		-	-	0.3	UI	
Stressed eye J9 jitter, per Lane		-	-	0.47	UI	
Rx jitter tolerance: Jitter frequency and p-p amplitude		(75, 5)	-	-	kHz, UI	
		(375, 1)	-	-	kHz, UI	
LOS De-Assert	LOSD	-	-	-12	dBm	
LOS Assert	LOSA	-30	-	-	dBm	
LOS Hysteresis		0.5	-	-	dBm	

Note:

1. Transmitter consists of 4 lasers operating at a maximum rate of 14.0625Gb/s each.
2. Even if TDP is <0.9dB, the OMA min must exceed this value.
3. Receiver consists of 4 photodetectors operating at a maximum rate of 14.0625Gb/s each.

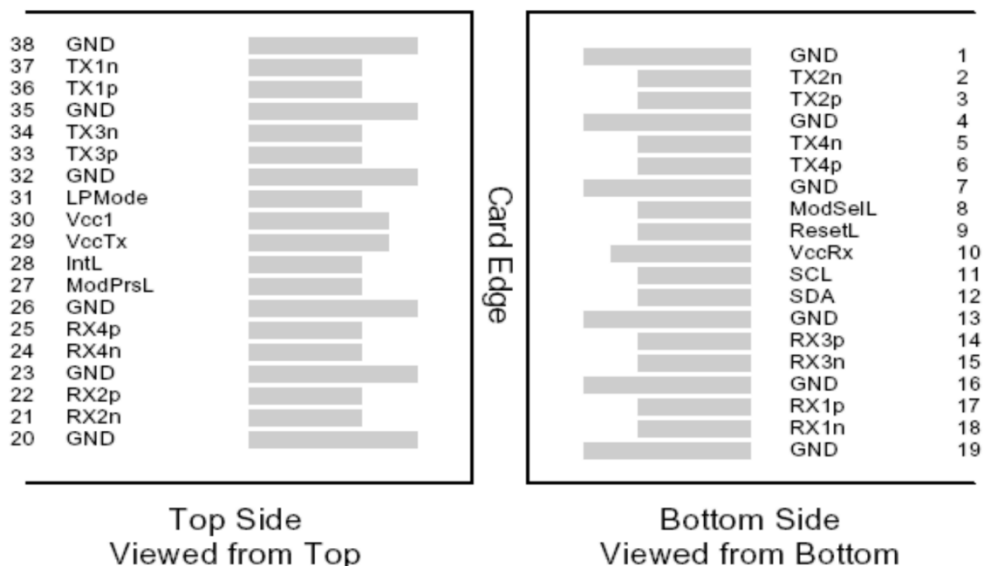
ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Min	Typical	Max	Unit	Note
Supply Voltage	Vcc1, VccTx, VccRx	3.135	-	3.465	V	
Supply Current	Icc	-	-	350	mA	
LINK TURN-ON TIME						
Transmit turn-on time		-	-	2000	ms	2
TRANSMITTER (per Lane)						
Single ended input voltage tolerance	VinT	-0.3	-	4.0	V	
Differential data input swing	Vin,pp	200	-	1200	mVpp	3
Differential input threshold		-	50	-	mV	
AC common mode input voltage tolerance (RMS)		15	-	-	mV	
Differential input return loss		Per IEEE P802.3ba, Section 86A.4.1.1			dB	4
J2 Jitter Tolerance	Jt2	0.16	-	-	UI	
J9 Jitter Tolerance	Jt9	0.29	-	-	UI	
Data Dependent Pulse Width Shrinkage	DDPWS	0.07	-	-	UI	
Eye mask coordinates {X1, X2 Y1, Y2}		0.11, 0.31 95, 350			UI mV	5
RECEIVER (per Lane)						
Single-ended output voltage		-0.3	-	4.0	V	
Differential data output swing	Vout,pp	0	-	800	mVpp	5,6
Differential output amplitude settings 00		200	-	400	mV	6
Differential output amplitude settings 01		300	-	600	mV	6
Differential output amplitude settings 10		400	-	800	mV	6
Differential output amplitude settings 11		600	-	1200	mV	6
Output pre-emphasis setting 00		-	0	-	mV	6
Output pre-emphasis setting 01		-	125	-	mV	6
Output pre-emphasis setting 10		-	175	-	mV	6
Output pre-emphasis setting 11		-	325	-	mV	6
AC common mode output voltage (RMS)		-	-	7.5	mV	
Termination mismatch at 1 MHx		-	-	5	%	
Differential output return loss		Per IEEE P802.3ba, Section 86A.4.2.1			dB	4
Common mode output return loss		Per IEEE P802.3ba, Section 86A.4.2.2			dB	4
Output transition time, 20% to 80%		28	-	-	ps	
J2 Jitter output	Jo2	-	-	0.42	UI	
J9 Jitter output	Jo9	-	-	0.65	UI	
Eye mask coordinates {X1, X2 Y1, Y2} range 0		0.29, 0.5 50, 225			UI mV	7
Eye mask coordinates {X1, X2 Y1, Y2} range1		0.29, 0.5 100, 350			UI mV	7
Eye mask coordinates {X1, X2 Y1, Y2} range2		0.29, 0.5 150, 450			UI mV	7
Power Supply Ripple Tolerance	PSR	50	-	-	mVpp	

Note:

1. Maximum total power value is specified across the full temperature and voltage range.
2. From power-on and end of any fault conditions.
3. After internal AC coupling. Self-biasing 100Ω differential input.
4. 10 MHz to 11.1 GHz range
5. AC coupled with 100Ω differential output impedance.
6. Settable via the I2C interface.
7. Hit ratio = 5×10^{-5} .

PIN DESCRIPTION



QSFP+ MSA Compliant 38-pin connector

Pin	Symbol	Name/Description	Notes
1	GND	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	+3.3V Power supply receiver	
11	SCL	2-wire serial interface clock	
12	SDA	2-wire serial interface data	
13	GND	Ground	1
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	1
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	1
20	GND	Ground	1
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	1

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

Note:

1. Circuit ground is internally isolated from chassis ground.

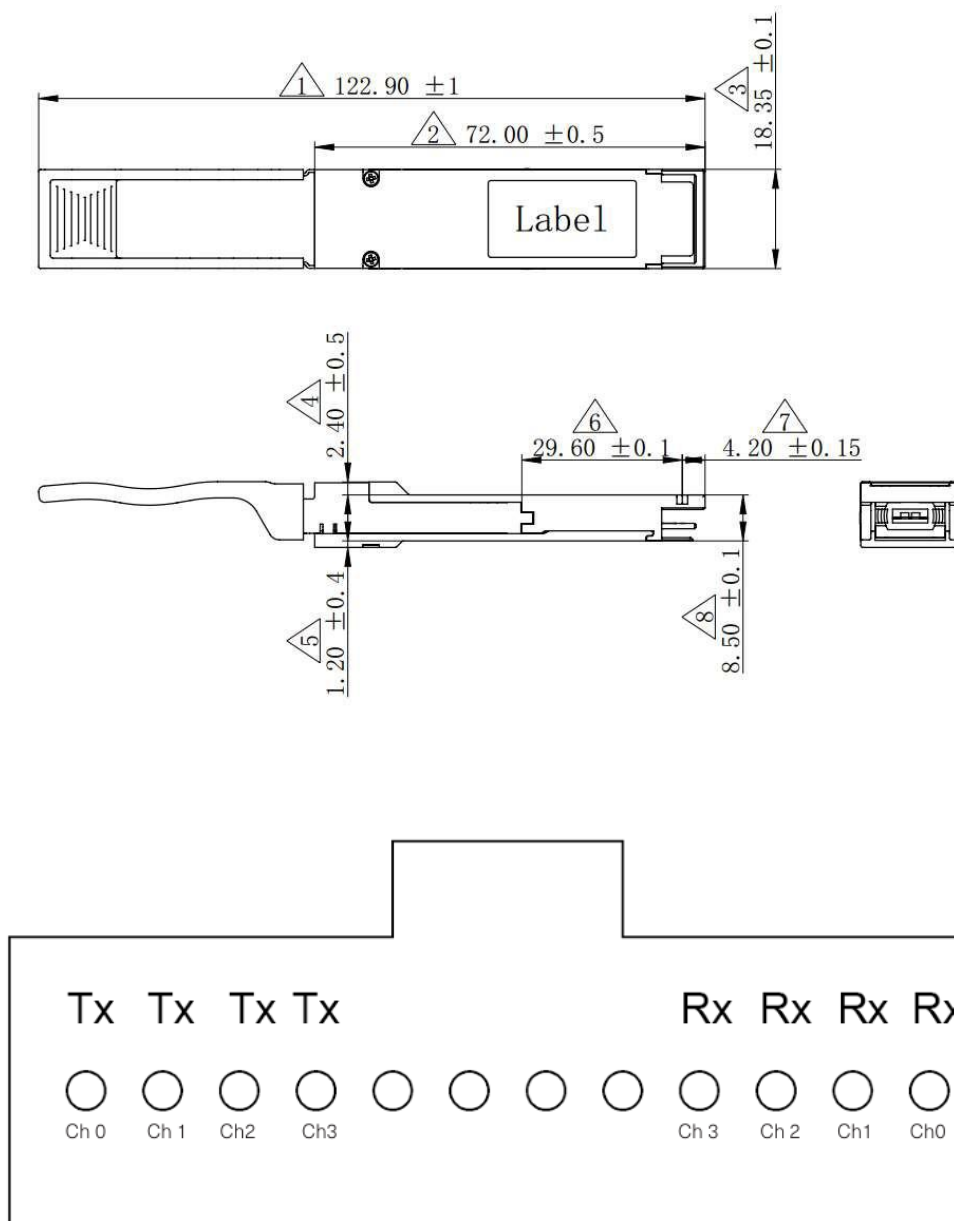
MEMORY MAP & CONTROL REGISTERS

Compatible with SFF-8436 Rev. 4.7 (QSFP+)

REGULATORY COMPLIANCE

- RoHS-6 Compliant
- Class 1 laser eye safety compliant per IEC 60825-1

MECHANICAL DIMENSIONS (UNIT: mm)



Optical Lane Assignment (Front view of MPO Receptacle)