

The GigaTech Products **QSF-502-GT** is programmed to be fully compatible and functional with all intended GIGAMON switching devices. This QSFP+ optical transceiver is a parallel fiber optical module with four independent optical transmit and receive channels and is compliant with SFF-8436 and QSFP+ MSA standards. This module is designed for multimode fiber using MPO/MTP connection and operates at a nominal wavelength of 850nm up to 100m over OM3 and 150m over OM4 fiber.

Features:

- Up to 41.2 Gb/s aggregate bit rates
- Four parallel lane design
- Hot-pluggable QSFP+ footprint
- Uncooled 4x10Gb/s 850nm transmitter
- MPO/MTP connector
- Built-in digital diagnostic function
- Up to 100m over OM3, 150m over OM4 fiber
- Single power supply under 1.5W
- Operating temperature range
C-Temp: 0°C to 70°C



Compliance:

- QSFP+ MSA
- MSA SFF-8436
- IEEE 802.3ba
- RoHS Compliant

Applications:

- 40GBASE-SR4 Ethernet
- Breakout to 4X 10GBASE-SR Ethernet
- Infiniband SDR, DDR and QDR

Warranty:

GigaTech Branded Optical Transceivers- Lifetime Warranty

General Specifications - Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Storage Temperature	T_{STO}	-40		100	°C	Ambient Temperature
Bit Error Rate	BER			10^{-12}		
Input Voltage	V_{CC}	3.13	3.3	3.46	V	
Maximum Voltage	V_{MAX}	-0.5		3.6	V	Electrical Power Interface

Link Distances

Parameter	Fiber Type	Modal Bandwidth @ 850nm (MHz-km)	Distance Range (m)
41.2 GBd	50/125um MMF	500 (OM2)	30
	50/125um MMF	2000 (OM3)	100
	50/125um MMF	4700 (OM4)	150 (engineered link)

Optical Characteristics - Transmitter

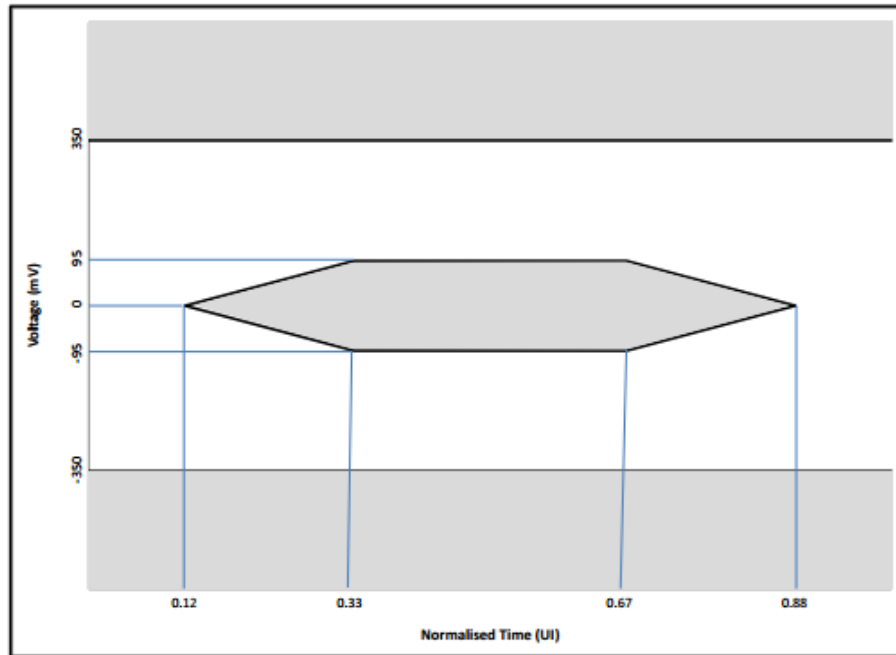
Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Center Wavelength	λ_C	840		860	Nm	
Average Launch Power	P	-7.6		2.4	dBm	Each Lane
Extinction Ratio	ER	3			dB	
RMS Spectral Width (-20 dB)	$\Delta\lambda$			0.65	nm	EIA/TIA-455-127
Relative Intensity Noise (OMA)	RIN			-128	dB/Hz	
Transmit Dispersion Penalty	TDP			3.5	dB	
Launch Power of OFF Transmit	P_{OUT_OFF}			-30	dBm	Average
Optical Eye Mask	Compliant to IEEE 802.3ba Standard					

Optical Characteristics - Receiver

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Center Wavelength	λ_C	840		860	nm	
Optical Input Power (Per Lane)	P_{IN}	-9.5		2.4	dBm	BER of 10^{-12}
Damage Threshold	P	3.3			dBm	
Receiver Sensitivity (Per Lane)	R_{X_SEN1}			-11.1	dBm	
Stressed Receiver Sensitivity				-7.5	dBm	In OMA Per Lane
Receiver Reflectance	TR_{RX}			-12	dB	
LOS Assert	LOS_A	-25			dBm	
LOS De-Assert	LOS_D			-12	dBm	
LOS Hysteresis		0.5			dB	

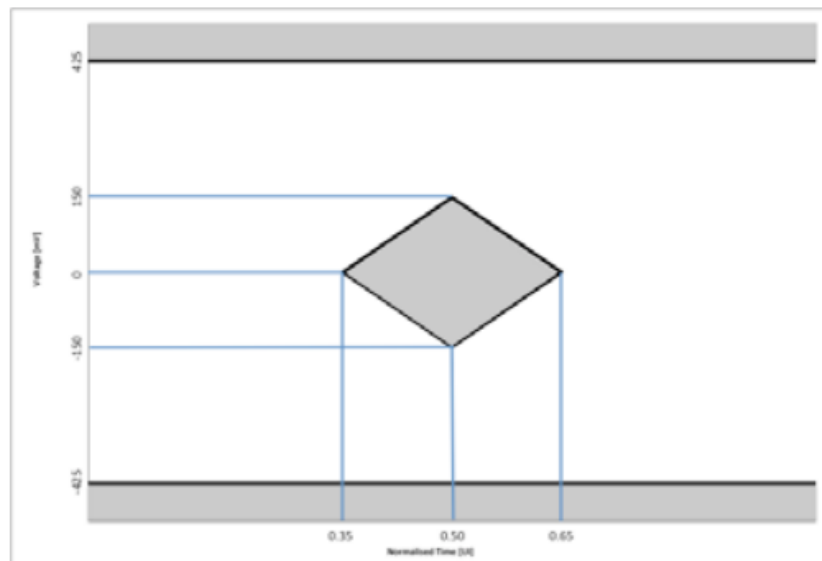
Electrical Characteristics – Transmitter

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate Per Channel	DR			10.5	GB/s	Non-Condensing
Differential Input Amplitude	V_{IN_PP}	300		1200	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	

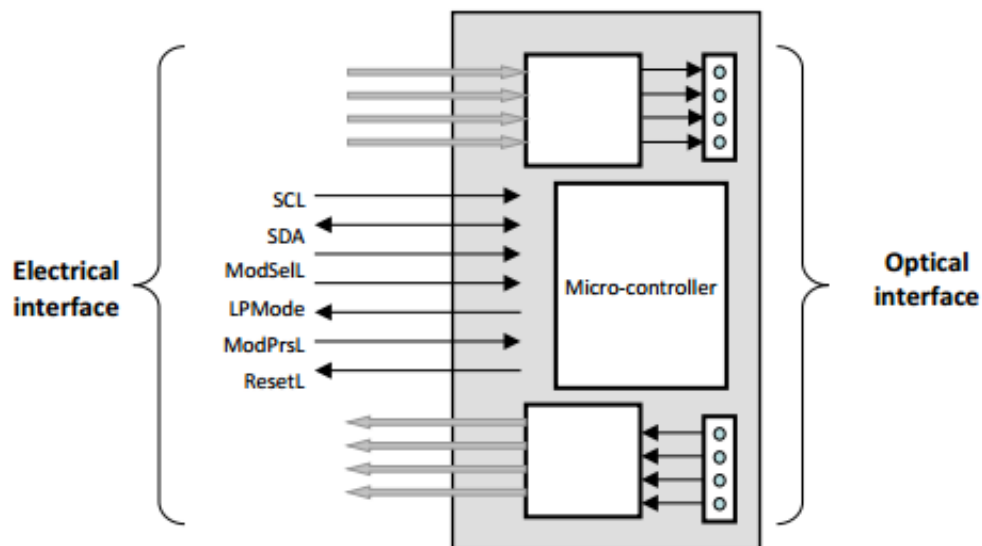


Electrical Characteristics – Receiver

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate Per Channel	DR			10.5	GB/s	Non-Condensing
Differential Output Amplitude	V_{OUT_PP}	340		700	mV	
Single Ended Voltage Tolerance	V	-0.3		3.8	V	
Output AC Common Mode Voltage	V_{CM}			7.5	mV	RMS
Output Transition Time	T_R, T_F	28			ps	
Total Jitter	T_J			0.7	Ulp-p	
Deterministic Jitter	DJ			0.4	Ulp-p	



Eye Mask for Hit Ratio = 1×10^{-12}

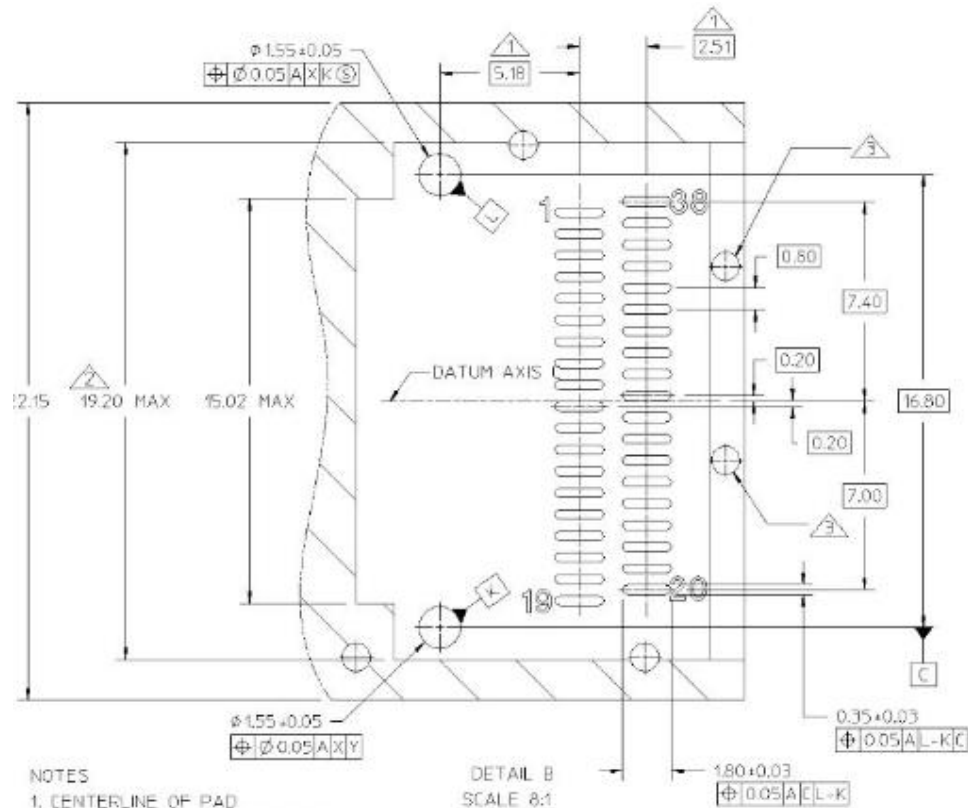
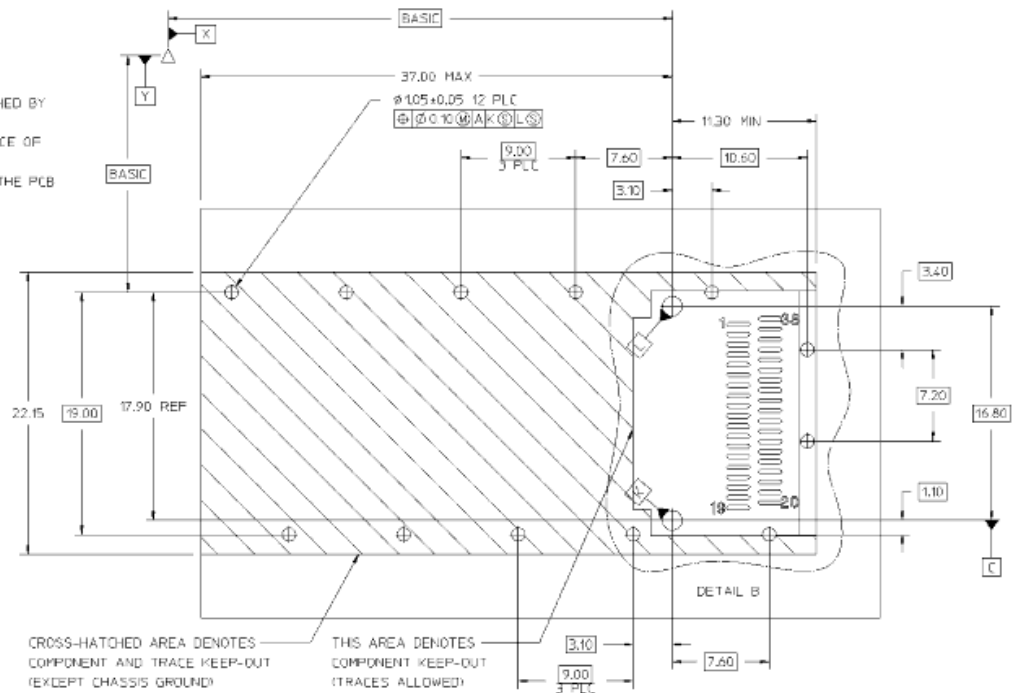
Block Diagram of Transceiver

The QSFP-SR4 has a miniature optical engine embedded into the QSFP module. The engine interconnects 4 independent transmit/receive lanes. A functional block diagram of the engine is shown in the above figure. The transmitter section consists of a 4-channel VCSEL array, a 4-channel input buffer and laser driver. An on board micro-controller provides control, diagnostic and monitoring for the cable functions, as well as the external I2C serial communication interface. The Receiver section consists of a 4-channel PIN photodiode array, a 4-channel TIA array, and a 4-channel output buffer.

PCB Layout Recommendation

NOTES

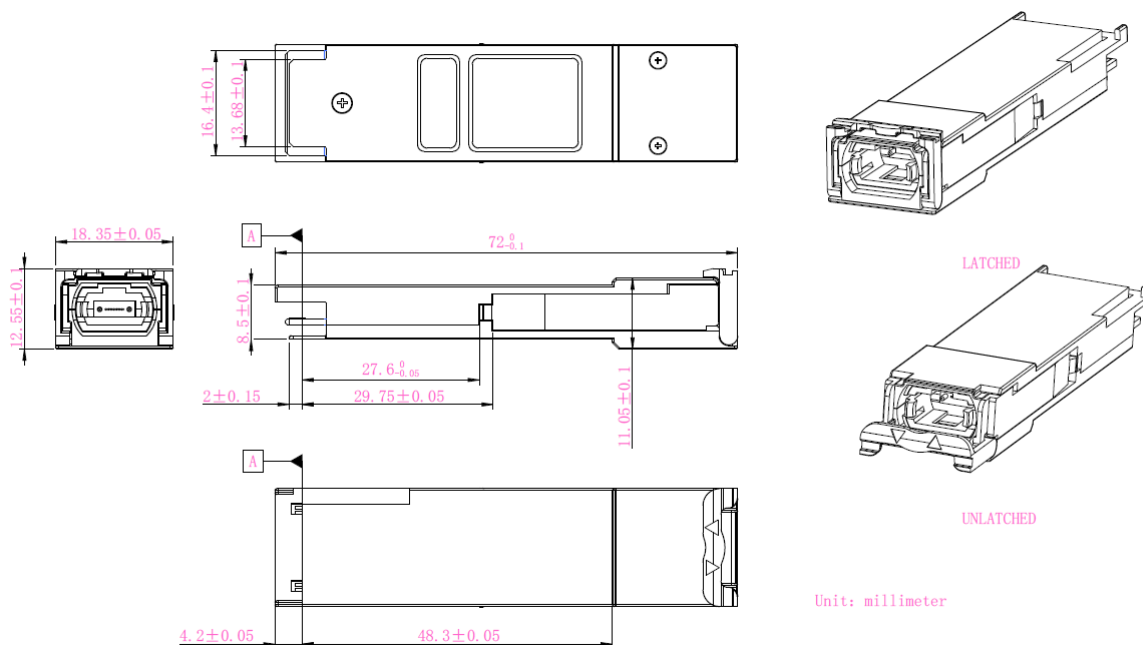
1. DATUM X & Y ARE ESTABLISHED BY THE CUSTOMER'S FIDUCIAL
2. DATUM A IS THE TOP SURFACE OF THE HOST BOARD
3. LOCATION OF THE EDGE OF THE PCB IS APPLICATION SPECIFIC
4. FINISHED PTH HOLE SIZE



NOTES

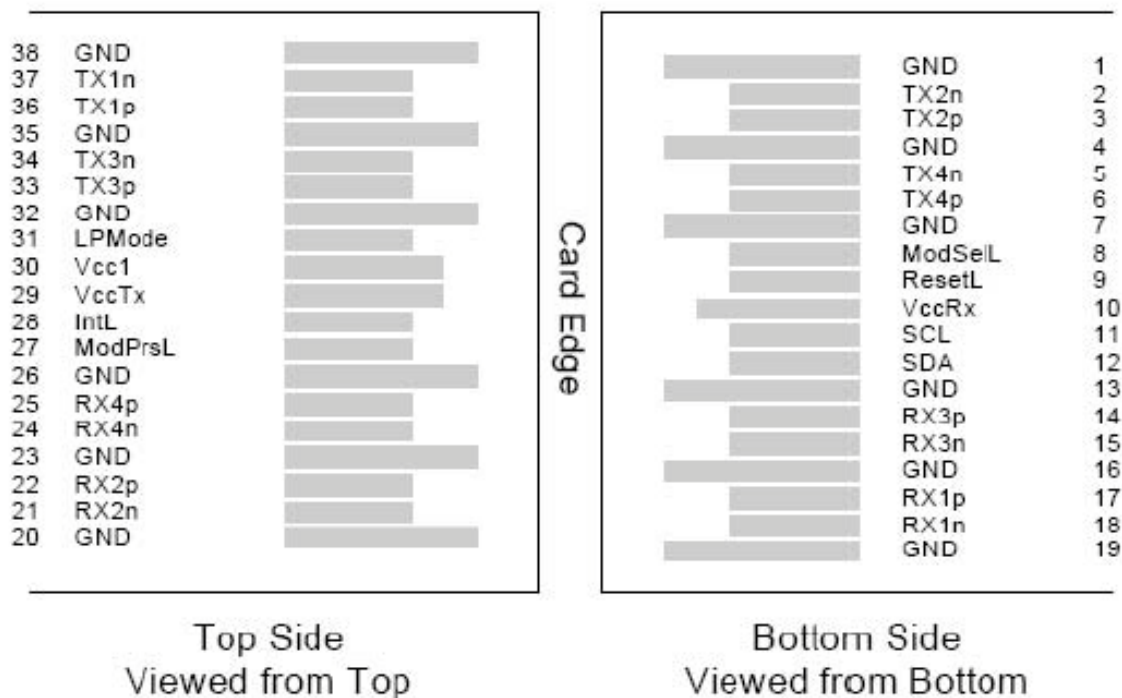
1. CENTERLINE OF PAD
2. SURFACE TRACES PERMITTED WITHIN THIS LENGTH
3. INDICATED HOLES ARE OPTIONAL

Dimensions



ALL DIMENSIONS ARE $\pm 0.2\text{mm}$ UNLESS OTHERWISE SPECIFIED UNIT: mm

Electrical Pad Layout



Pin Assignment

PIN #	Symbol	Description	Remarks
1	GND	Ground	
2	Tx2n	Transmitter Inverted Data Input	
3	Tx2p	Transmitter Non-Inverted Data Input	
4	GND	Ground	
5	Tx4n	Transmitter Inverted Data Input	
6	Tx4p	Transmitter Non-Inverted Data Input	
7	GND	Ground	
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	
14	Rx3p	Receiver Non-Inverted Data Output	
15	Rx3n	Receiver Inverted Data Output	
16	GND	Ground	
17	Rx1p	Receiver Non-Inverted Data Output	
18	Rx1n	Receiver Inverted Data Output	
19	GND	Ground	
20	GND	Ground	
21	Rx2n	Receiver Inverted Data Output	
22	Rx2p	Receiver Non-Inverted Data Output	
23	GND	Ground	
24	Rx4n	Receiver Inverted Data Output	
25	Rx4p	Receiver Non-Inverted Data Output	
26	GND	Ground	
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	
33	Tx3p	Transmitter Non-Inverted Data Input	
34	Tx3n	Transmitter Inverted Data Input	
35	GND	Ground	
36	Tx1p	Transmitter Non-Inverted Data Input	
37	Tx1n	Transmitter Inverted Data Input	
38	GND	Ground	

References

1. IEEE standard 802.3ba. IEEE Standard Department, 2010.
2. QSFP+ 10Gbs 4X PLUGGABLE TRANSCEIVER – SFF-8436