

SFP-10GSR-85 Data Sheet

Application

- Tri-Rate 14.025 Gb/s Fiber Channel

Features

- Up to 14.025Gbps Data Links
- 35m on 50/125μm MMF, 100m over M5E MMF (50/125μm OM3)
- Power Dissipation < 1W
- VCSEL Laser and PIN Receiver
- Metal Enclosure for Lower EMI
- 2-wire Interface with Integrated Digital Diagnostic Monitoring
- Hot-pluggable SFP+ Footprint
- Specifications Compliant with SFF-8472
- Compliant with SFP+ MSA with LC Connector
- Single 3.3V Power Supply
- Case Operating Temperature Range: 0°C to 70°C
- Compliant to SFP+ SFF-8431
- Compliant to Fiber Channel
- RoHS Compliant

Product Specifications

I. Absolute Maximum Ratings

Parameter	Symbol	Unit	Min.	Typ.	Max.	Notes
Storage Temperature	Ts	°C	-40		85	
Relative Humidity	RH	%	5		95	
Power Supply Voltage	VCC	V	-0.3		4	
Signal Input Voltage		V	Vcc-0.3		Vcc+0.3	

II. Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Type	Max	Notes
Case Operating Temperature	Tcase	°C	0		70	
Power Supply Voltage	VCC	V	3.14	3.3	3.47	
Power Supply Current	ICC	mA			290	
Data Rate	BR	Gbps		14.025		
Bit Error Rate	BER				10^- 12	1

Coupled Fiber	Multi mode fiber	50/125um MMF
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Notes: • PRBS 2^31- 1 for 16G FC
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III. Optical Specifications

• Transmitter

Parameter	Symbol	Unit	Min	Type	Max	Notes
Optical Wavelength	λ	nm	840	850	860	
Optical Modulation Amplitude 14.025Gb/s	OMA	dBm	-4.8			
Output Eye Mask	Compliant with IEEE 802.3ae					

• Receiver

Parameter	Symbol	Unit	Min	Type	Max	Notes
Unstressed Receiver OMA Sensitivity 14.025Gb/s	RSENS	dBm			- 10.5	1
Average Receiver Power	RxMAX	dBm	0			
Wavelength Range	λC	nm	770	850	860	
Optical Return Loss		dB			12	
LOS De -Assert	LOSD	dBm			- 13	
LOS Assert	LOSA	dBm	-30			
LOS Hysteresis		dB	0.5			

Notes: 1. Unstressed Rx sensitivity

IV. Electrical Characteristics

Parameter	Symbol	Unit	Min	Type	Max	Notes
Supply Voltage	Vcc	V	3.14	3.3	3.46	
Supply Current	Icc	mA			290	1

• Transmitter

Parameter	Symbol	Unit	Min	Type	Max	Notes
Input Differential Impedance	Rin	Ω		100		2
Single Ended Data Input Swing	Vin,pp	mV	150		800	
Transmit Disable Voltage	VD	V	Vcc– 1.3		Vcc	3
Transmit Enable Voltage	VEN	V	Vee		Vee+ 0.8	

• Receiver

Parameter	Symbol	Unit	Min	Type	Max	Notes
Differential Data Output Swing	Vout,pp	mV	200		400	4
LOS Fault	VLOS fault	V	Vcc- 1.3		VccHOST	5
LOS Normal	VLOS norm	V	Vee		Vee+0.8	5

 Notes:

1. With established link. The total power dissipation could exceed 1W when the module is trying to establish link at operating case temperature below 25C

2. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.

3. Or open circuit.

4. Into 100 ohms differential termination.

5. LOS is an open collector output. Should be pulled up with 4.7k – 10kohms on the host board. Normal operation is logic 0; loss of signal is logic 1. Maximum pull-up voltage is 5.5V.

V. High Speed Electrical Specifications

Parameter	Unit	Min	Type	Max
Input Differential Impedance	Ω	90	100	110
Differential Data Input Swing	V	300	25.78125	1100
Differential Data Output Swing	V	500		800
Input Logic Level High	V	2		Vcc
Input Logic Level Low	V	0		0.8
Output Logic Level High	V	Vcc-0.5		Vcc
Output Logic Level Low	V	0		0.4

VI. Digital Diagnostic Functions

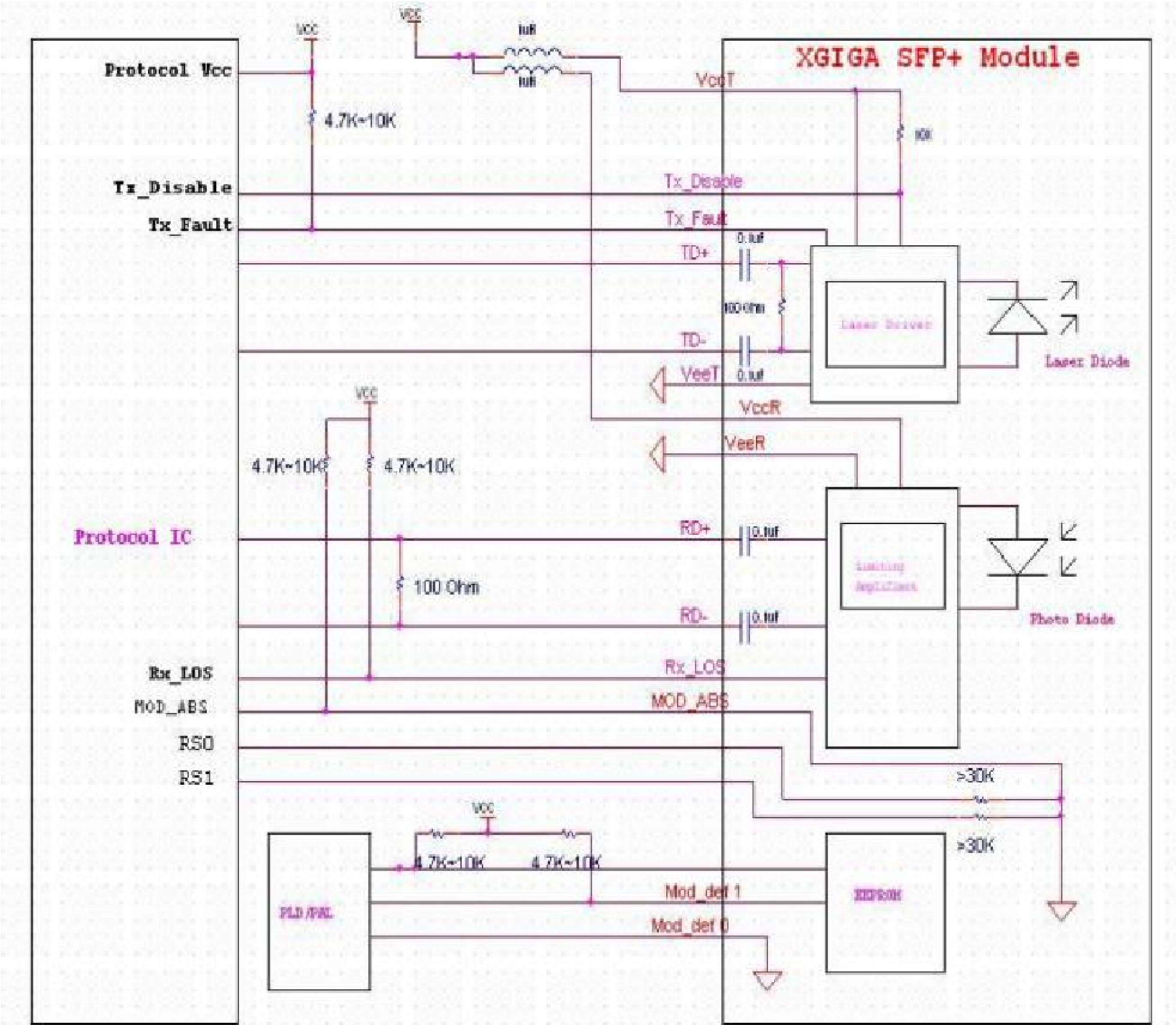
XGIGA XP-8596-02D-3 transceivers support the 2-wire serial communication protocol as defined in the SFP+ MSA. The standard SFP serial ID provides access to identification information that describes the transceiver’s capabilities, standard interfaces, manufacturer, and other information.

Additionally, XGIGA SFP+ transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

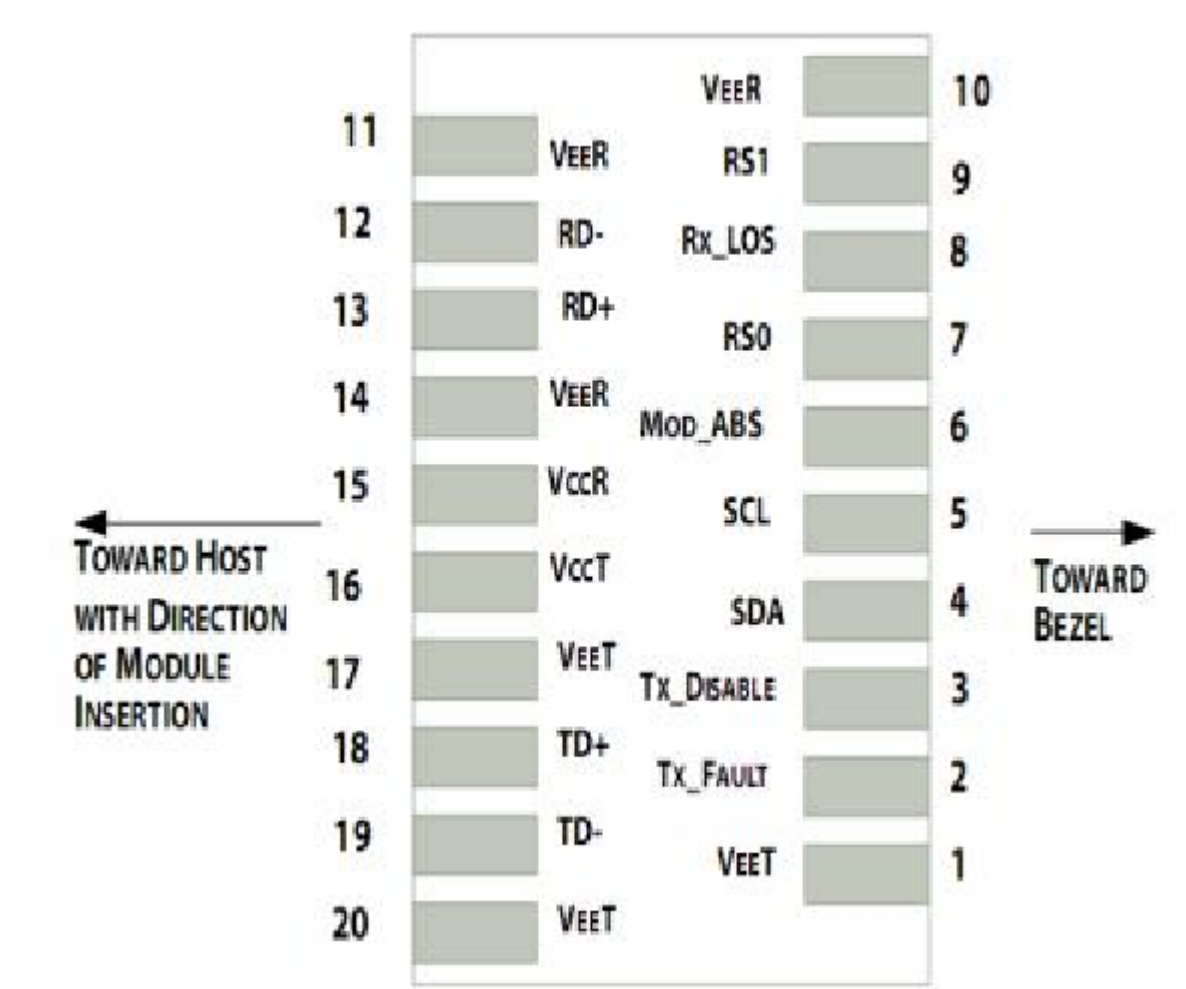
The SFP+ MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of the E2PROM that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, Mod Def 2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

VII. Host - Transceiver Interface Block Diagram



VIII. Pin Definitions



Pin	Symbol	Description	Notes
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault	2
3	TDIS	Transmitter Disable. Laser Output Disabled on hHigh or Open	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD ABS	Module Absent. Grounded within the mModule	4
7	RSO	Rate Select O	5
8	LOS	Loss of Signal Indication. Logic 0 Indicates Normal Operation.	6
9	RS1	No Connection Required	1
10	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out.AC Coupled	
14	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled	
19	TD-	Transmitter Inverted DATA in.AC Coupled	
20	VEET	Transmitter Ground (Common with Receiver Ground)	1

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Notes:
1.

Circuit ground is internally isolated from chassis ground.
2.

TFAULT is an open collector/drain output, which should be pulled up with a 4.7kΩ– 10 kΩ resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
3.

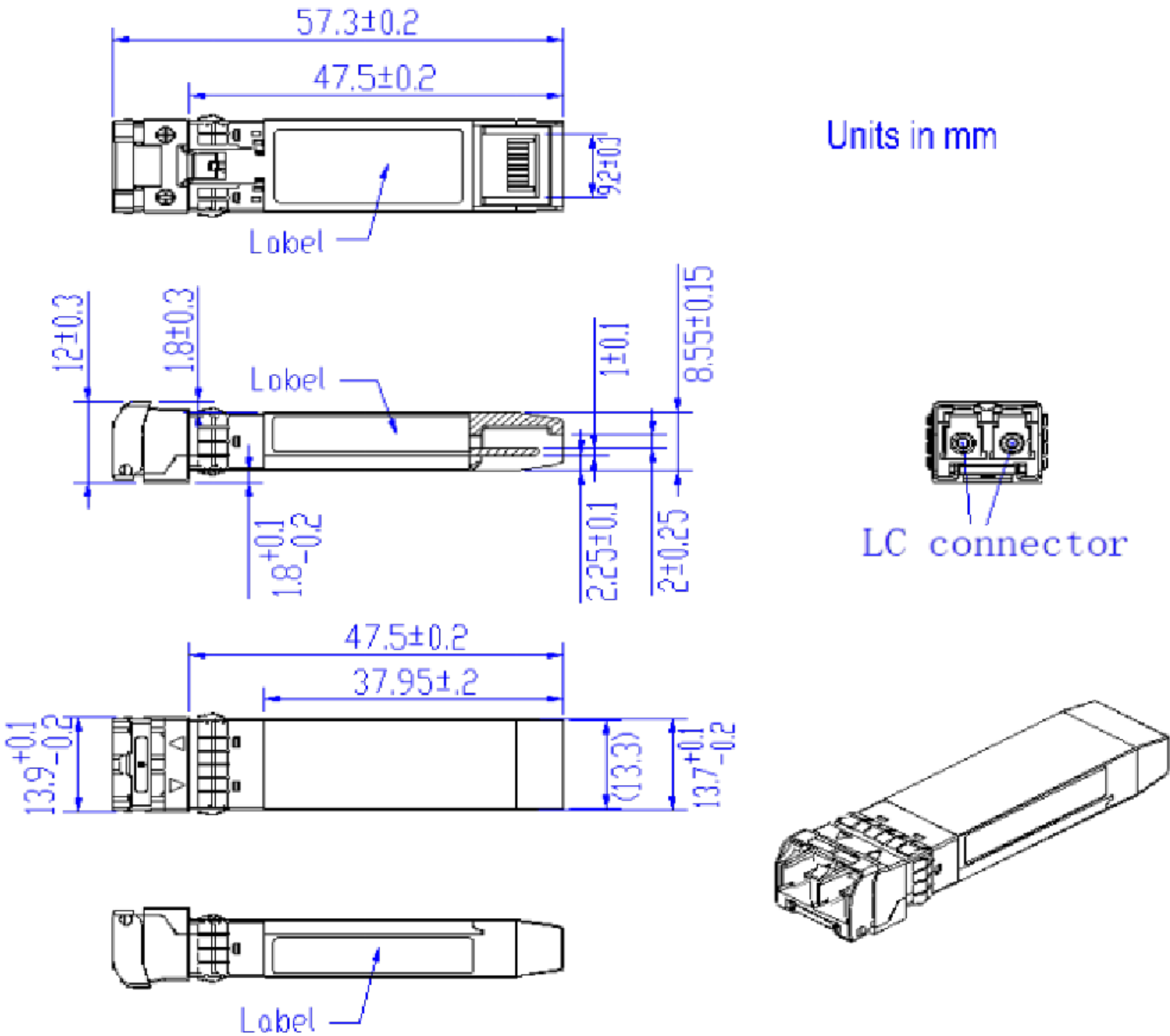
Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
4.

Should be pulled up with 4.7kΩ- 10kΩ on host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
5.

Internally pulled down per SFF-8431 Rev 4.1.
6.

LOS is open collector output. It should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

IX. Mechanical Specifications



Regulatory and Standards Compliance

Standard

1. SFF-8665: QSFP28+ 28 Gb/s 4X Pluggable Transceiver Solution (QSFP28)
2. SFF-8636: Common Management Interface
3. 802.3™-2012 IEEE Standard for Ethernet
4. IEEE 802.3ba Amendment of IEEE Std 802.3
5. IEEE 802.3bm Amendment of IEEE Std 802.3
6. GR-20-CORE: Generic Requirements for Optical Fiber and Optical Fiber Cable
7. GR-326-CORE: Generic Requirements for Single-Mode Optical Connectors and Jumper Assemblies
8. GR-468-CORE: Generic Requirements for Optoelectronic Devices Used in Telecommunications Equipment
9. GR-1435-CORE: Generic Requirements for Multifiber Optical Connectors
10. RoHS 6

Safety Instructions

Safety

- 1. Modules are compliant with Laser Class 1 as defined in IEC 60825-1, IEC 60825-2 and Comply with 21CFR 1040.10 and 1040.11
- 2. <http://www.qsfp-dd.com/specification/> (QDD Power Class)

Table 6- Power Classes

Power Class	Max Power (W)
1	1.5
2	3.5
3	7.0
4	8.0
5	10
6	12
7	14
8	>14

- 3. https://www.snia.org/technology-communities/sff/specifications?field_doc_status_value=All&combine=8679&items_per_page=20 (QSFP Power Class)

TABLE 5-3 QSFP+ MODULE POWER CLASSES

Power Class	Maximum power consumption per module (W)
1	1.5
2	2.0
3	2.5
4	3.5
5	4.0
6	4.5
7	5.0
8	10.0 (Note)

- 4. https://www.snia.org/technology-communities/sff/specifications?field_doc_status_value=All&combine=8431&items_per_page=20

(SFP Power Class)

Table 4- Power Classification

Power Class	Max Power (W)
1	1.0
2	1.5
3	2.0
4	3.5
5	5.0
6	reserved
7	reserved
8	See management register for maximum power consumption

Test Center

FS.COM transceivers are tested to ensure connectivity and compatibility in our test center before shipped out. FS.COM test center issupported by a variety of mainstream original brand switches and groups of professional staff, helping our customers makethemostefficient use of our products in their systems, network designs and deployments.

The original switches could be found nowhere but at FS.COM test center, eg: Juniper MX960 & EX 4300 series, Cisco Nexus 9396PX&Cisco ASR 9000 Series, HP 5900 Series & HP 5406R ZL2 V3(J9996A), Arista 7050S-64, Brocade ICX7750-26Q & ICX6610-48, AvayaVSP7000MDA 2, etc.



Cisco ASR 9000 Series(A9K-MPA-1X40GE)



ARISTA 7050S-64(DCS-7050S-64)



Juniper MX960



Brocade ICX 7750-26Q



Extreme networks X670V VIM-40G4X



Mellanox M3601Q



Dell N4032F



HP 5406R ZL2 V309996A)



AVAYA 7024XL5(7002QQ-MDA)

Order Information

Part Number	Description
SFP-10GSR-85	SFP+ 8G Fibre Channel 850nm 150m DOM Duplex LC/UPC MMF Optical Transceiver Module



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