DATA SHEET

SFP-10G-SR-C-GEN

10Gb/s SFP+ Short Wavelength (850nm) Transceiver

SFP-10G-SR-C-GEN Overview

SFP-10G-SR-C-GEN SFP optical transceivers are based on 10G Ethernet IEEE 802.3ae stan- dard and SFF-8431 standard, providing a fast and reliable interface for 10G Ethernet applications. The product implements digital diagnostics via a 2-wire serial bus ,compliant with the SFF-8472 standard.

Product Features

• Supports from 9.83 Gb/s to 11.3 Gb/s bit rates

• Compliant with IEEE 802.3ae 10GBASE-SR/SW

• Compliant with SFF-8431

• Hot-pluggable SFP+ footprint

• 850nm VCSEL laser transmitter

• Duplex LC connector

• Built-in digital diagnostic functions

• Up to 300m on OM3 MMF

• Low power consumption (Module work consumption <1W)

• Single power supply 3.3V

• RoHS Compliant

• Class 1 laser product complies with EN 60825-1

• Operating temperature range:0°C to 70°C

Applications

• 10GBASE-SR/SW Ethernet

• 10G Fibre Channel

• 10G CPRI

Ordering Information

Part Number	Description	Operating temperature range	Color on Clasp
SFP-10G-SR-C-GEN	10GBASE-SR SFP+ 850nm LC Connectors 300m on MMF, with DOM function.	0°C to 70°C	black
For More Information: SONGXIN TAIPEI TECH SOLUTIONS CO., LTD. Web: www.songxin.com.tw Email: oversea@songxin.com.tw			

General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate	DR	9.83	10.3125	11.3	Gb/s	1
Bit Error Rate	BER			10^{-12}		
Operating Temperature	T_C	0		70	°C	2
Storage Temperature	T_{STO}	-40		85	°C	3
Supply Current	I_{CC}		180	220	mA	4
Input Voltage	V_{CC}	3.14	3.3	3.46	V	
Maximum Voltage	V_{MAX}	-0.5		4	V	4

Notes:
1. IEEE 802.3ae
2. Case temperature
3. Ambient temperature
4. For electrical power interface

Link Distances

Data Rate	Fiber Type	Modal Bandwidth @850nm (MHz-km)	Distance Range (m)
9.83–11.3 Gb/s	62.5/125umMMF	160	26
9.83–11.3 Gb/s	62.5/125umMMF	200	33
9.83–11.3 Gb/s	50/125umMMF	400	66
9.83–11.3 Gb/s	50/125umMMF	500	82
9.83–11.3 Gb/s	50/125umMMF	2000	300

Optical – Characteristics – Transmitter

V_{CC}=3.14V to 3.46V, T_C=0℃ to 70℃

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Output Optical Power	P_{TX}	-7		-1	dBm	1
Optical Center Wavelength	λ_C	840		860	nm	
Optical Modulation Amplitude	OMA		-1.5		dBm	2
Extinction Ratio	ER	3	5.5		dB	
Spectral Width (RMS)	$\Delta\lambda$			0.45	nm	
Relative Intensity Noise	RIN			-128	dB/Hz	
Transmitter Dispersion Penalty	TDP			3.9	dB	
Transmitter Jitter						3
Launch Power of OFF Transmitter	P_{OUT_OFF}			-30	dBm	1

Notes:
1. Average
2. IEEE 802.3ae
3. According to IEEE 802.3ae requirement

Optical – Characteristics – Receiver

V_{CC}=3.14V to 3.46V, T_C=0℃ to 70℃

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Optical Center Wavelength	λ_C	840		860	nm	
Receiver Sensitivity@10.3Gb/s	R_{X_SEN}			-10	dBm	1
Receiver Overload	P_{OL}	0.5			dBm	
Receiver Reflectance	TR_{RX}			-12	dB	
LOS Assert	LOS_A	-30			dBm	
LOS De-Assert	LOS_D			-14	dBm	
LOS Hysteresis	LOS_H	0.5			dB	

Notes:
1. Measured with worst ER;BER$<10^{-12}$;2^{31}-1 PRBS

Electrical – Characteristics – Transmitter

V$_{CC}$=3.14V to 3.46V, T$_C$=0°C to 70°C

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Input differential impedance	R$_{IN}$		100		Ω	
Differential data input swing	V$_{IN\_PP}$	180		700	mV	
Transmit disable voltage	V$_D$	2		V$_{CC}$	V	
Transmit enable voltage	V$_{EN}$	V$_{EE}$		V$_{EE}$+0.8	V	

Electrical – Characteristics – Receiver

V$_{CC}$=3.14V to 3.46V, T$_C$=0°C to 70°C

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Differential data output swing	V$_{OUT\_PP}$	300		850	mV	
Data output rise/fall time (20%-80%)	t$_r$/t$_f$	28			ps	
LOS Assert	V$_{LOS\_A}$	2		V$_{CC\_HOST}$	V	
LOS De-Assert	V$_{LOS\_D}$	V$_{EE}$		V$_{EE}$+0.5	V	

Digital Diagnostic Functions

SFP-10G-SR-C-GEN supports the 2-wire serial communication protocol as defined in SFF-8472. Digital di- agnostic information is accessible over the 2-wire interface at the address 0xA2. Digital diagnostics for SFP-10G-SR-C-GEN are internally calibrated by default. The internal micro control unit accesses the device operating parameters in real time,Such as transceiver temperature, laser bias current, transmitted op- tical power, received optical power and transceiver supply voltage.The module implements the alarm function of the SFF-8472,alerts the user when a particular operating parameter exceeds the factory-set normal range.

Block-Diagram-of-Transceiver
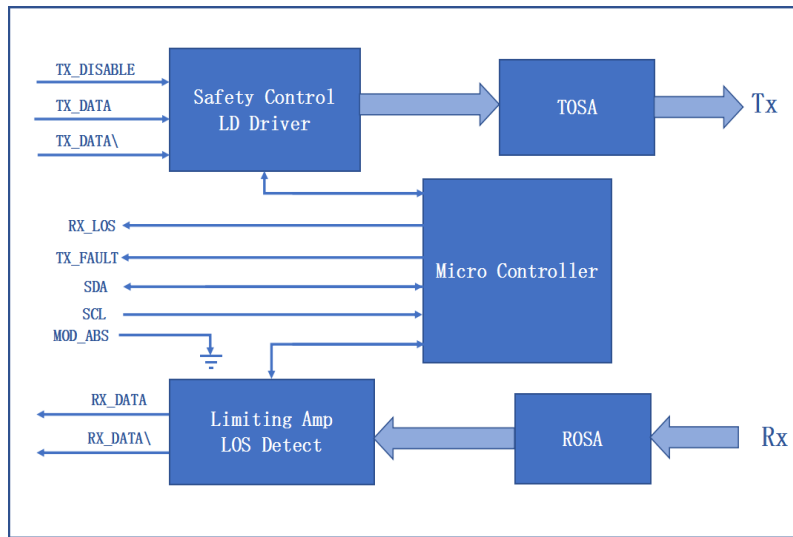
Functions Description

The transmitter consists of a laser driver chip and a TOSA (light-emitting component). The TOSA includes a 850nm VCSEL laser and a backlight photodetection chip, When the module is working, and the input signal is connected to the laser driver chip.The laser driver chip supplies the bias current and the modulation current to the laser.The laser driver chip simultaneously uses an automatic optical power control (APC) feedback loop to maintain a constant average optical power of the laser output. The purpose is to eliminate the change of the output optical signal due to temperature changes and aging of the light source device.When the transmitter enable pin (TX_Disable) is high (TTL logic "1"), the laser output is turned off. When TX_Disable is low (TTL logic "0"), the laser will turn on within 1ms.When the transmitter fault signal (TX_Fault) is reported as high,indicates a transmitter failure caused by the transmitter's bias current or transmitted optical power or laser tube temperature exceeding a preset alarm threshold. Low indicates normal operation.
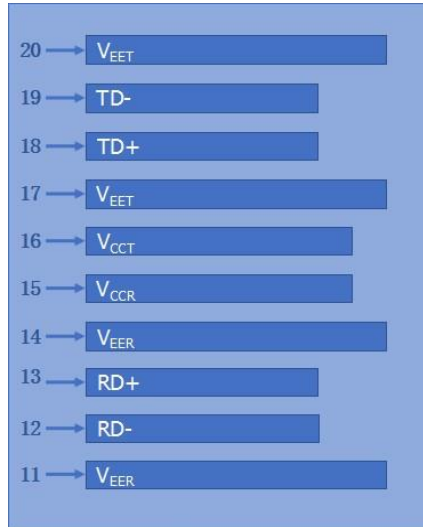
The receiver consists of a ROSA (light-receiving component) and a limiting amplifier chip, ROSA includes a PIN photodetector and a transimpedance amplifier chip.When the ROSA detects the incident light signal, it will be converted into a photo-generated current by the PIN photodetector. The photo-generated current is converted into an electrical signal after passing through the transimpedance amplifier. The electrical signal is further amplified by the limiting amplifier , then outputs a fixed-amplitude electrical signal to the host.When the amplitude of the electrical signal received from the incident light conversion of the opposite optical transceiver module is lower than the set threshold,the module reports that the received signal is lost,the RX_LOS pin is high (logic "1"),which can be used to diagnose whether the physical signal is normal.The signal is operated in TTL level.The microprocessor inside the module monitors the module's operating voltage, temperature, transmitted optical power, received optical power, and laser bias current value in real time. The host acquires this information over a 2-wire serial bus.
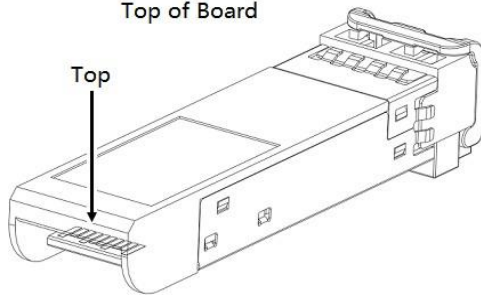
Dimensions
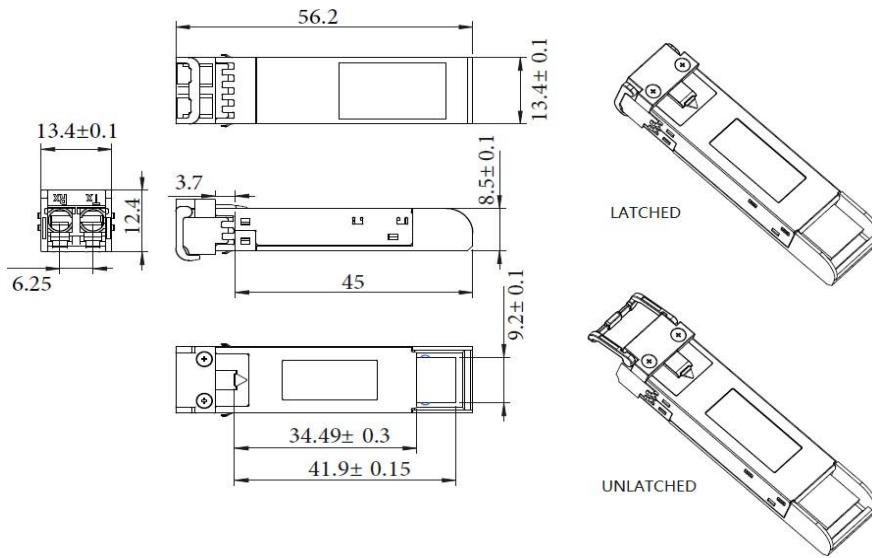
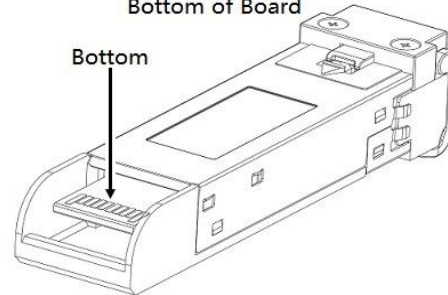ALL DIMENSIONS ARE ±0.2mm UNLESS OTHERWISE SPECIFIED
UNIT: mm

Electrical Pad Layout

	Top of Board
20 →	V$_{EET}$
19 →	TD-
18 →	TD+
17 →	V$_{EET}$
16 →	V$_{CCT}$
15 →	V$_{CCR}$
14 →	V$_{EER}$
13 →	RD+
12 →	RD-
11 →	V$_{EER}$

	Bottom of Board
1 →	V$_{EET}$
2 →	TX_FAULT
3 →	TX_DISABLE
4 →	SDA
5 →	SCL
6 →	MOD_ABS
7 →	RS0
8 →	LOS
9 →	RS1
10 →	V$_{EER}$

Top of Board

Top

Bottom of Board

Bottom

Pin Assignment

PIN #	Symbol	Description	Remarks
1	V_{EET}	Transmitter ground (common with receiver ground)	1
2	TX_FAULT	Transmitter Fault	
3	TX_DISABLE	Transmitter Disable. Laser output disabled on high or open	2
4	SDA	2-wire Serial Interface Data Line	3
5	SCL	2-wire Serial Interface Clock Line	3
6	MOD_ABS	Module Absent. Grounded within the module	3
7	RS0	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation	4
9	RS1	No connection required	1
10	V_{EER}	Receiver ground (common with transmitter ground)	1
11	V_{EER}	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	V_{EER}	Receiver ground (common with transmitter ground)	1
15	V_{CCR}	Receiver power supply	
16	V_{CCT}	Transmitter power supply	
17	V_{EET}	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	V_{EET}	Transmitter ground (common with receiver ground)	1

Notes:

1. Circuit ground is isolated from chassis ground
2. Disabled: $T_{DIS} > 2V$ or open, Enabled: $T_{DIS} < 0.8V$
3. Should Be pulled up with 4.7k –10k ohm on host board to a voltage between 2V and 3.6V
4. LOS is open collector output

References

1. IEEE standard 802.3ae. IEEE Standard Department, 2005.

2. Enhanced 8.5 and 10 Gigabit Small Form Factor Pluggable Module ˝ SFP+˝–SFF-8431.

3. Digital Diagnostics Monitoring Interface for Optical Transceivers –SFF-8472.