

# 8.5Gbps 850nm SFP+ Transceiver,100m Reach

## SOSP-8585-01

### 1. Applications

- Tri-Rate 8.5 Gb/s Fibre Channel
- Other optical links

### 2. Features

- Up to 8.5Gb/s bi-directional data links
- Hot-pluggable SFP+ footprint
- Built-in digital diagnostic functions
- Built-in CDR with shut off control
- 850nm Oxide VCSEL laser transmitter
- Duplex LC connector
- RoHS compliant and Lead Free
- 35m on 50/125um MMF
- 150m on high-bandwidth 50/125um (OM3)
- Metal enclosure, for lower EMI
- Single 3.3V power supply
- Operating temperature range:0° C to 70° C

### 3. Description

Sinovo's 8.5G SW SFP+ transceivers are designed for use in Fibre Channel links up to 8.5 Gb/s data rate over multimode fiber. They are compliant with FC-PI-5 Rev. 6.00a, SFF-8472 Rev 11.0c and SFF-8081h, and compatible with SFF-8432b and applicable portions of SFF-8431 Rev. 4.1d. The optical transceiver is compliant per the RoHS.

## 4. standard

- Electrical interface compliant to SFF-8431
- Compliant with SFF-8472 Rev 10.2
- Compliant with IEEE 802.3ae 10GBASE-LR and 10GBASE-LW
- RoHS Compliant

## 5. Performance Specifications

### 5.1. Absolute Maximum Ratings

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

*Table.1 Absolute maximum ratings*

Parameter	Symbol	Min	Max	Unit
Maximum Supply Voltage	Vcc	-0.5	4.0	V
Storage Temperature	Ts	0	70	°C
RX Input Average Power	Pmax		0	dBm
Relative Humidity	RH	5	85	%

### 5.2. Recommended Operating Conditions

*Table.2 Recommended Operating Conditions*

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Standard Tc	0	25	70	°C
Power Supply Voltage	Vcc	3.15	3.3	3.46	V
Power Supply Current	Icc			290	mA
Power Dissipation	PD	90		800	mW
Data Rate	DR		8.5		Gbps
Transmission Distance	TD		150		m

### 5.3. Transmitter Specification

**Table.3 Transmitter Specification (Optical)**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note	
Average Output Power	Po	-6		-1	dBm		
Disable Power	Poff			-40	dBm		
Extinction Ratio	ER	3.5			dB		
Output Centre Wavelength	$\lambda_c$	840		860	nm		
Spectral Width (RMS) @ 8.5Gb/s	$\Delta\lambda$			0.59	nm		
Optical Modulation Amplitude @ 8.5 Gb/s	OMA	-5.2			dBm		
Optical Return Loss	ORL			-12	dB		
Transmitter Waveform and Dispersion Penalty	DP			4.3	dB		
Optical Rise/Fall Time (20%~80%)	tr/tf			0.09	ns		
Optical Eye Mask	MM	Compliant to IEEE802.3ae					1
Relative Intensity Noise	Rin			-128(12dB reflection)	dB/Hz		

Note: 1. Measured at 8.5Gbps, PRBS2<sup>7</sup>-1, NRZ

**Table.4 Transmitter Specification (Electrical)**

Parameter	Symbol	Min	Typical	Max	Unit
Data Input Swing Differential	V <sub>IN</sub>	90		800	mV
Input Differential Impedance	Z <sub>IN</sub>	90	100	110	$\Omega$
Transmit Disable Input	High	V <sub>IH</sub>	2.0	V <sub>CC</sub> +0.3	V
	Low	V <sub>IL</sub>	0	0.8	V
Transmit Enable Output	High	V <sub>OH</sub>	V <sub>EE</sub>	V <sub>EE</sub> +0.8	V
	Low	V <sub>OL</sub>	0	0.4	V

## 5.4. Receiver Specification

**Table.5 Receiver Specification (Optical)**

Parameter	Symbol	Min	Typical	Max	Unit	note
Centre Wavelength	$\lambda_c$	840	850	860	nm	
Receiver Sensitivity	Sen			-11.2	dBm	2
Receiver Overload	Psat	0			dBm	2
LOS De-Assert	LOSD			-13	dBm	
LOS Assert	LOSA	-30			dBm	

<b>LOS Hysteresis</b>		0.5			dB	
<b>Receiver Reflectance</b>	Rrx			-12	dB	

Note :2. Measured at BER 10<sup>-12</sup>, 8.5Gbps, PRBS2<sup>17</sup>-1, NRZ

**Table.6 Receiver Specification (Electrical)**

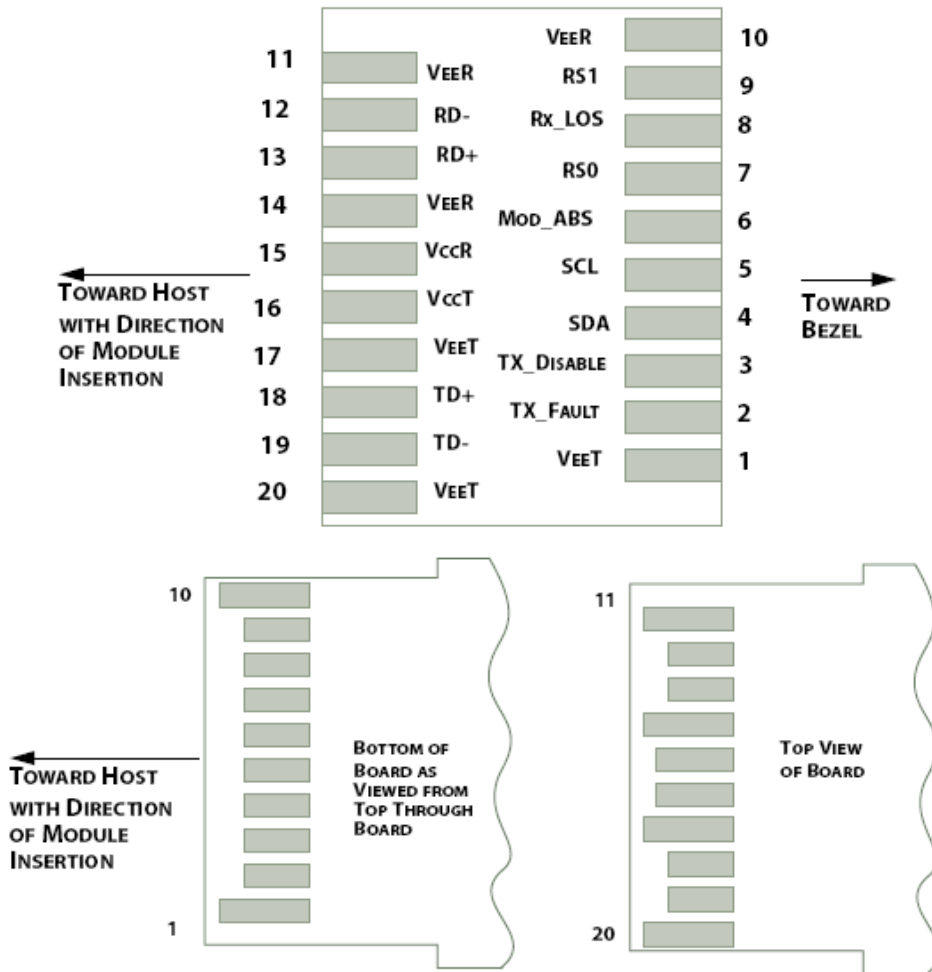
Parameter	Symbol	Min	Typical	Max	Unit	note
<b>Data Output Swing Differential</b>	Vout	185		425	mV	
<b>Deterministic Jitter @ 8.5 Gb/s</b>	RX DJ			0.22	UI	
<b>LOS Output</b>	<b>High</b>	V <sub>OH</sub>	2	V <sub>cc</sub> +0.3	V	
	<b>Low</b>	V <sub>OL</sub>	V <sub>ee</sub>	V <sub>ee</sub> +0.8	V	

## 5.5. Diagnostics Specification

**Table.7 Diagnostics Specification**

Parameter	Range	Unit	Accuracy	Calibration
<b>Temperature</b>	0 to 70	□	±3□	Internal / External
<b>Voltage</b>	3.0 to 3.6	V	±3%	Internal / External
<b>Bias Current</b>	0 to 100	mA	±10%	Internal / External
<b>TX Power</b>	-7.8 to 0	dBm	±3dB	Internal / External
<b>RX Power</b>	-30 to 0	dBm	±3dB	Internal / External

## 5.6. Pin Definitions



**Table.8 Pin Definitions**

PIN	Symbol	Description	Remarks
1	V <sub>EE</sub> T	Transmitter ground (common with receiver ground)	Circuit ground is isolated from chassis ground
2	Tx_Fault	Transmitter Fault. Not supported	
3	Tx_Disable	Transmitter Disable. Laser output disable on high or open	Disabled: TDIS>2V or open Enabled: TDIS<0.8V
4	SDA	2-wire Serial Interface Data Line	Should Be pulled up with 4.7k – 10k ohm on host board to a voltage between 2V and 3.6V
5	SCL	2-wire Serial Interface Clock Line	
6	MOD_ABS	Module Absent. Grounded within the module.	
7	RS0	No connection required	
8	RX_LOS	Loss of Signal indication. Logic 0 indicates normal operation	LOS is open collector output
9	RS1	No connection required	
10	V <sub>EE</sub> R	Receiver ground (common with transmitter ground)	Circuit ground is isolated from chassis ground
11	V <sub>EE</sub> R	Receiver ground (common with transmitter ground)	
12	RD-	Receiver Inverted DATA out. AC coupled	
13	RD+	Receiver Non-inverted DATA out. AC coupled	
14	V <sub>EE</sub> R	Receiver ground (common with transmitter ground)	Circuit ground is isolated from chassis ground

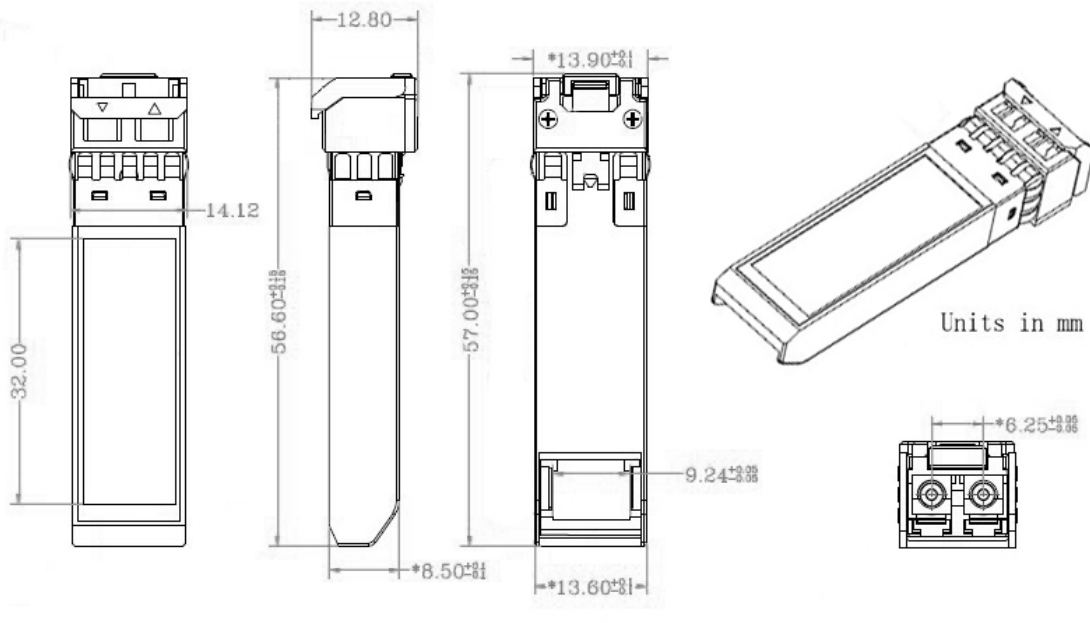
15	V <sub>CC</sub> R	Receiver power supply	
16	V <sub>CC</sub> T	Transmitter power supply	
17	V <sub>EE</sub> T	Transmitter ground (common with receiver ground)	Circuit ground is isolated from chassis ground
18	TD+	Transmitter Non-Inverted DATA in. AC coupled	
19	TD-	Transmitter Inverted DATA in. AC coupled	
20	V <sub>EE</sub> T	Transmitter ground (common with receiver ground)	Circuit ground is isolated from chassis ground

## 5.7. Timing Electrical Interface

**Table.9 Timing Electrical Interface**

Parameter	Symbol	Min	Max	Units	Conditions
Tx_Disable Assert Time	t <sub>off</sub>		100	us	Rising edge of Tx_Disable to fall of output signal below 10% of nominal
Tx_Disable Negate Time	t <sub>on</sub>		2	ms	Tx_Disable negate time. Falling edge of Tx_Disable to rise of output signal above 90% of nominal. This only applies in normal operation, not during start up or fault recovery.
Time to initialize	t <sub>start_up</sub>		300	ms	From power supplies or hot plug or Tx disable negated during power up, or Tx_Fault recovery, until non-cooled power level I is fully operational.
Tx_Fault Assert Time	Tx_Fault		1	ms	From occurrence of fault to assertion of Tx_Fault
Tx_Fault to Reset	t <sub>reset</sub>	10		us	Time Tx_Disable must be held high to reset Tx_Fault
Rx_LOS Assert Time	t <sub>los_on</sub>		100	us	From occurrence of loss of signal to assertion of Rx_LOS
Rx_LOS De-Assert Time	t <sub>los_off</sub>		100	us	From occurrence of presence of signal to negation of Rx_LOS

## 5.8. Mechanical Dimensions



**Diagram of Mechanical Dimensions**

## 6. Application Cautions

### 6.1. ESD

This transceiver is specified as ESD threshold 1kV for high speed pins and 2kV for all other electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

### 6.2. LASER SAFTY

This is a Class 1 Laser Product according to IEC 60825-1:1993+A1:1997+A2:2001. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (July 26, 2001)

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