

**SPE-9100G / SPE-9100AG**

**(RoHS Compliant)**

**2.5 Gb/s / 100 m / SFP RJ-45 COPPER TRANSCEIVER**

**FEATURES**

- 2.5Gbps Link up to 100 Meters with Cat 5e/6a Cable
- Compliant with SFP MSA
- Compliant to IEEE 802.3az
- Compliant to SFF-8431 and SFF-8432 MSA
- Detailed Product Information in EEPROM
- Access to Physical Layer IC via 2-wire Serial Bus
- I2C to MDIO Bridge (IEEE 802.3 Clause 45)
- Hot-pluggable SFP Footprint
- Fully Metallic Enclosure for Low EMI
- Compact RJ-45 Connector Assembly
- Single +3.3 V Power Supply
- Support ACh PHY control
- Support LOS pin Function
- Support TX Disable pin Function
- RoHS Compliant
- 0 to 70°C Operating: SPE-9100G
- -40 to 85°C Operating: SPE-9100AG

**APPLICATIONS**

- 2.5Gbps Ethernet over 100Meters Category5e/6a Cable
- Distributed multi-processing
- High speed I/O for file server or high-end workstation
- Switch/Router to Switch/Router Link

**DESCRIPTION**

SPE-9100G Copper SFP transceiver acts as physical layer interface function for 2.5GBASE-T Ethernet with Cat 5e or Cat6a twisted-pair cable. This module connects to MAC interface of a switch controller at 2.5G data rate over USXGMII/XFI/2500BASE-R/2500BASE-X high-speed serial interface. The Copper SFP transceiver is designed fully compliant with IEEE 802.3 standard. It connects to network through isolated transformer for ESD and lightning protection.

SPE-9100G Copper SFP transceiver features simple application in data center network at single 2.5Gb/s rate, and allows link up exceed 100 meters. It really enables a new dimension of flexibility for Network Equipment designer, and for data center facility planner to optimize capital expense.

SPE-9100G Copper SFP Transceiver provides standard serial ID information compliant with SFP MSA, which can be accessed with address of 0xA0 via the 2-wire serial CMOS EEPROM protocol. The physical IC can also be accessed via 2-wire serial bus at address 0xAC for a write and 0xAD for a read.

**ORDER INFORMATION**

P/No.	Type	Bit Rate (Gb/s)	10GBASE	Distance (m)	Package	Temp. (°C)	RoHS Compliant
SPE-9100G	Transceiver	2.5	T	100	SFP	0 to 70	Yes
SPE-9110AG	Transceiver	2.5	T	100	SFP	-40 to 85	Yes

**Absolute Maximum Ratings**

Parameter	Symbol	Min	Max	Units	Notes
Storage Temperature	Tstg	-40	85	°C	
Operating Case Temperature	Topr	0 -40	70 85	°C	SPE-9100G SPE-9100AG
Power Supply Voltage	Vcc	-0.5	3.6	V	

**Recommended Operating Conditions**

Parameter	Symbol	Min	Typ	Max	Units / Notes
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Operating Case Temperature	Topr	0 -40		70 85	°C / SPE-9100G °C / SPE-9100AG

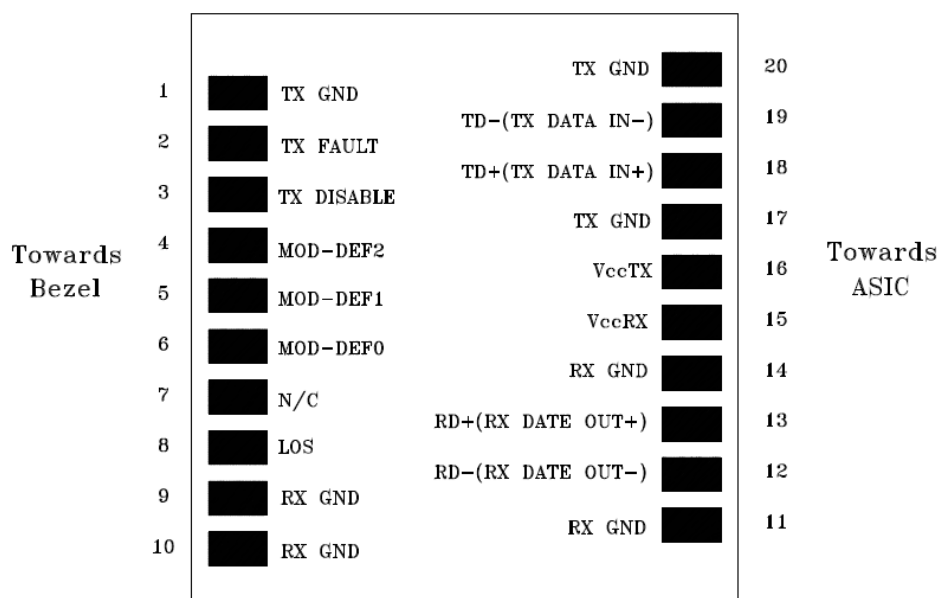
**Cable Length Operating Conditions**

Parameter	Symbol	Min	Typ	Max	Units / Notes
2.5Gbps @100m Cat5e	I		400	420	mA/1~3

1. 0 ~ 70 °C (-40 ~ 85 °C), measurement after network link up.
2. Recommend used @ Data Center switch with air flow/temperature control.
3. Single 100m cable only.

Electrical Characteristics						
Parameter	Symbol	Min	Typ	Max	Units	Notes
<b>Transmitter</b>						
Differential Input Impedance	Rin		100		$\Omega$	
Differential Data Input Amplitude		180			mVpp	Internally AC coupled
Transmitter Disable Input-High		2		Vcc		
Transmitter Disable Input-Low		GND		0.8		
<b>Receiver</b>						
Differential Output Impedance	Rout		100		$\Omega$	
Differential Data Output Amplitude		350			mVpp	Internally AC coupled
LOS Output Voltage -- High		2.4		Vcc	V	
LOS Output Voltage -- Low		GND		0.5	V	

### CONNECTION DIAGRAM



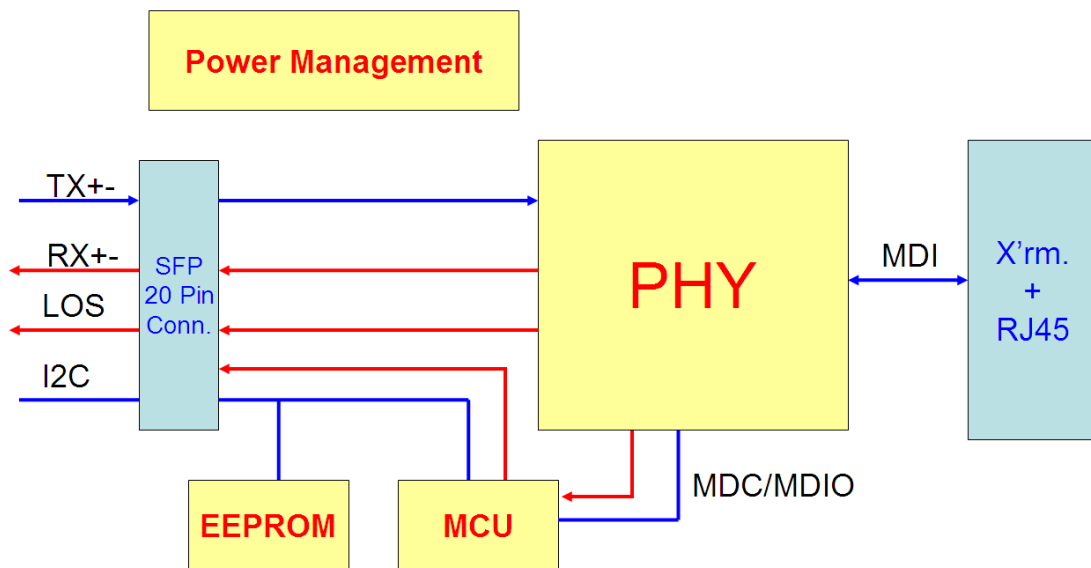
PIN	Signal Name	Description	PIN	Signal Name	Description
1	V <sub>EE</sub> T	Transmitter Ground	11	V <sub>EE</sub> R	Receiver Ground
2	TX_Fault	Not Implemented. Tied to VeeT in SFP	12	RD-	Inverted Received Data out
3	TX_Disable	Logic "1" Input (or no connection) = TX off, Logic "0" = TX on.	13	RD+	Non-Inverted Received Data out
4	SDA	Module Definition 2 - Data Line for Serial ID	14	V <sub>EE</sub> R	Receiver Ground
5	SDL	Module Definition 1 - Clock Line for Serial ID	15	V <sub>CC</sub> R	Receiver Power
6	MOD-ABS	Module Definition 0 - Tied to Vee in SFP	16	V <sub>CC</sub> T	Transmitter Power
7	RS0	Not Implemented	17	V <sub>EE</sub> T	Transmitter Ground
8	RX_LOS	Loss of Signal	18	TD+	Non-inverted Data In
9	V <sub>EE</sub> R	Receiver Ground	19	TD-	Inverted Data In
10	V <sub>EE</sub> R	Receiver Ground	20	V <sub>EE</sub> T	Transmitter Ground

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**MODULE DEFINITION**  
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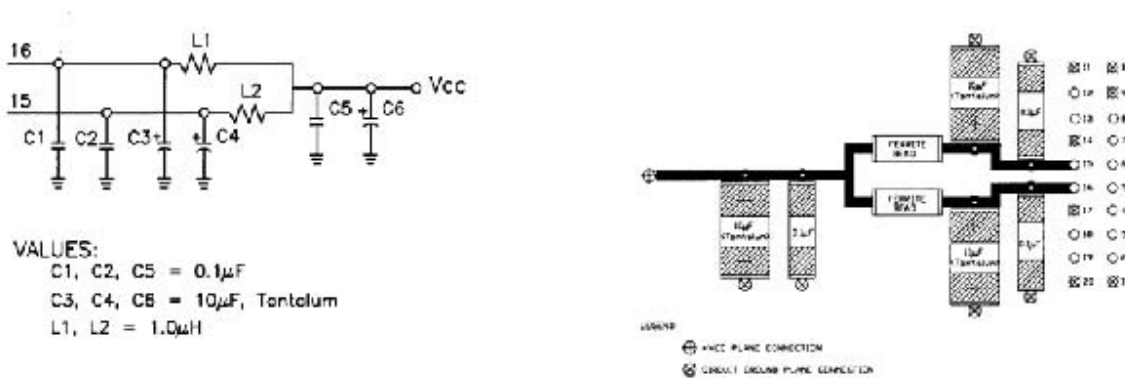
Module Definition	PIN 4	PIN 5	PIN 6	Interpretation by Host
4	SDA	SCL	MOD-ABS	Serial module definition protocol

Module Definition 4 specifies a serial definition protocol. For this definition, upon power up, SDA and SCL appear as no connector (NC) and MOD-ABS is TTL LOW. When the host system detects this condition, it activates the serial protocol. The protocol uses the 2-wire serial CMOS E<sup>2</sup>PROM protocol of the ATMEL AT24C01A/02/04 family of components.

**BLOCK DIAGRAM OF TRANSCEIVER**



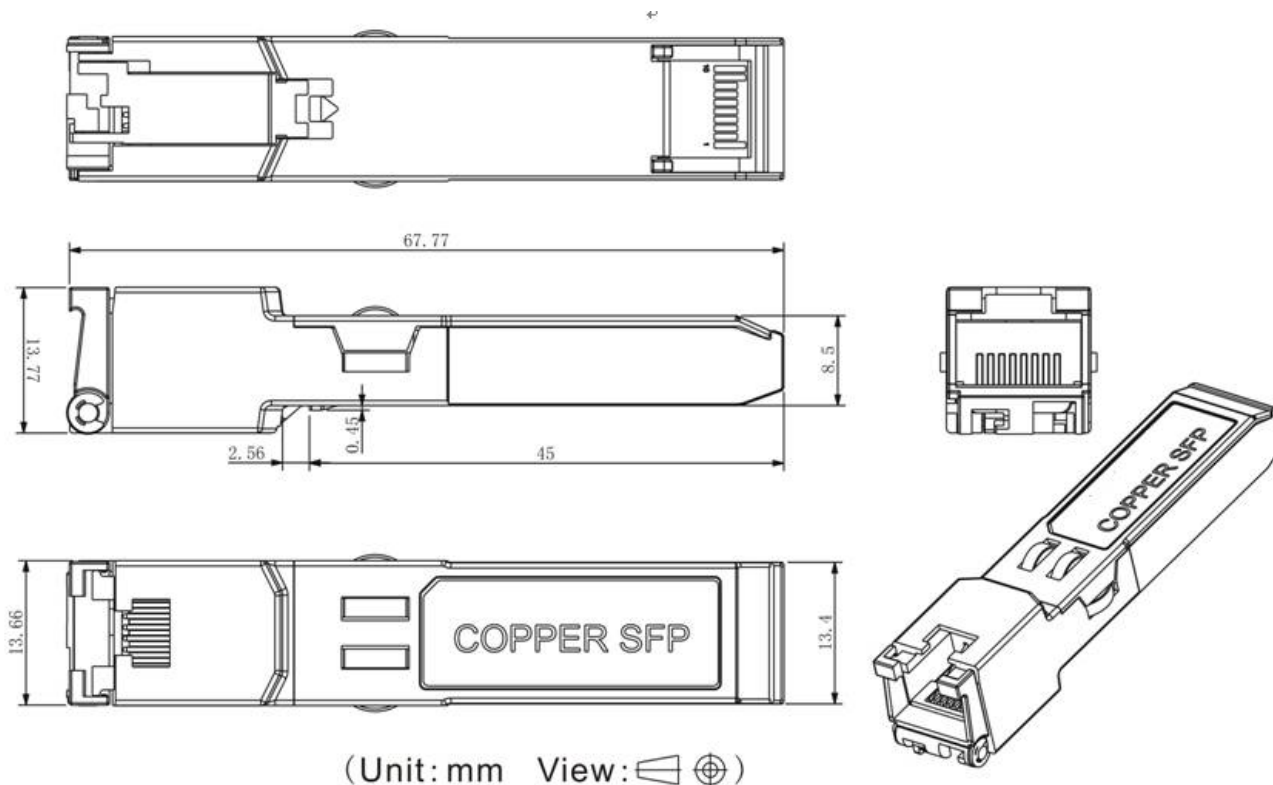
**POWER COUPLING**



A suggested layout for power and ground connections is given in Figure 1 below. Connections are made via separate voltage and ground planes. The mounting posts are at case ground and should not be connected to circuit ground. The ferrite bead should provide a real impedance of 50 to 100 ohms at 100 to 1000 MHz. Bypass capacitors should be placed as close to the 20 pin connector as possible.

### PACKAGE DIAGRAM

Units in mm



**Note:** Specifications subject to change without notice.

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**REVISION HISTORY**

<b>Version</b>	<b>Subject</b>	<b>Release Date</b>
1.0	Initial datasheet	2021/7/16