

SPE-2100G / SPE-2100AG

(RoHS Compliant)

10 Gb/s / 100 m / SFP+ RJ-45 COPPER TRANSCEIVER

FEATURES

- 10Gbps Link up to 100 Meters with Cat 6a/7 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-2100G
- -40 to 85°C Operating: SPE-2100AG

APPLICATIONS

- 10Gbps Ethernet over Category 6a/7 Cable
- Distributed multi-processing
- High speed I/O for file server or high-end workstation
- Switch/Router to Switch/Router Link

DESCRIPTION

SPE-2100G Copper SFP transceiver acts as physical layer interface function for 10GBASE-T, 1000BASE-T and 100BASE-T Ethernet with Cat 6a or Cat 7 twisted-pair cable. It connects to a switch controller through XFI/10BASE-KR for 10G and SGMII for 100/1000BASE-T. The Copper SFP transceiver is designed fully compliant with IEEE 802.3 standard. It connects to network through isolated transformer. It can be programmed to fix operating speed or auto-negotiation with advertised capabilities.

SPE-2100G Copper SFP transceiver features simple application in data center network at 10Gb/s, and allows link up exceed 30 meters. It really enables a new dimension of flexibility for Network Equipment designer, and for data center facility planner to optimize capital expense.

SPE-2100G 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-2100G	Transceiver	10	T	100	SFP+	0 to 70	Yes
SPE-2110AG	Transceiver	10	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	70	°C	SPE-2100G
		-40	85		SPE-2100AG
Power Supply Voltage	Vcc	-0.5	3.6	V	

Recommended Operating Conditions

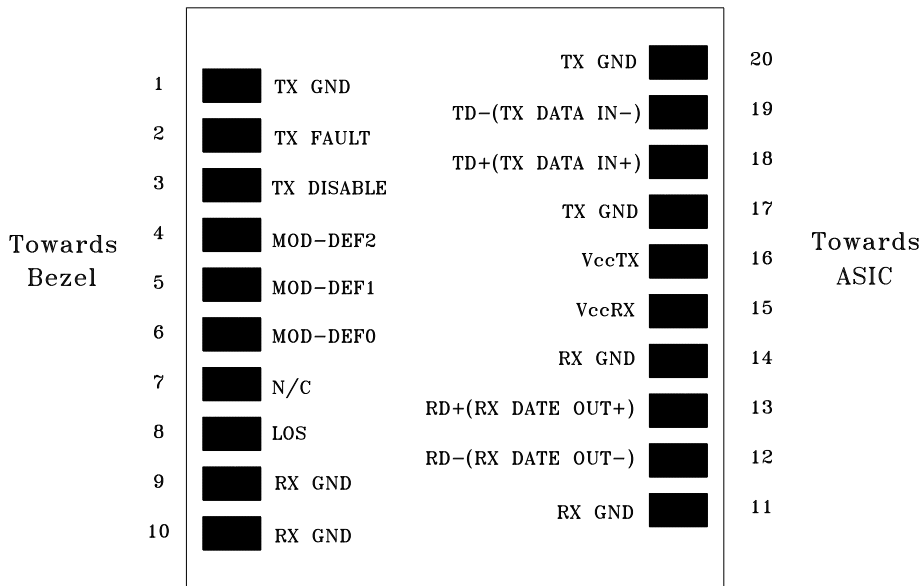
Parameter	Symbol	Min	Typ	Max	Units / Notes
Power Supply Voltage	Vcc	3.13	3.3	3.47	V
Operating Case Temperature	Topr	0		70	°C / SPE-2100G
		-40		85	°C / SPE-2100AG

Cable Length Operating Conditions					
Parameter	Symbol	Min	Typ	Max	Units / Notes
10Gbps @100m Cat7	I		580	600	mA / 1,2,3
10Gbps @100m Cat6a	I		580	600	mA / 1,2,3

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

Electrical Characteristics						
Parameter	Symbol	Min	Typ	Max	Units	Notes
Transmitter						
Differential Input Impedance	Rin		100		Ω	
Differential Data Input Amplitude		180			mVpp	Internally AC coupled
Transmitter Disable Input-High		2		Vcc		
Transmitter Disable Input-Low		GND		0.8		
Receiver						
Differential Output Impedance	Rout		100		Ω	
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



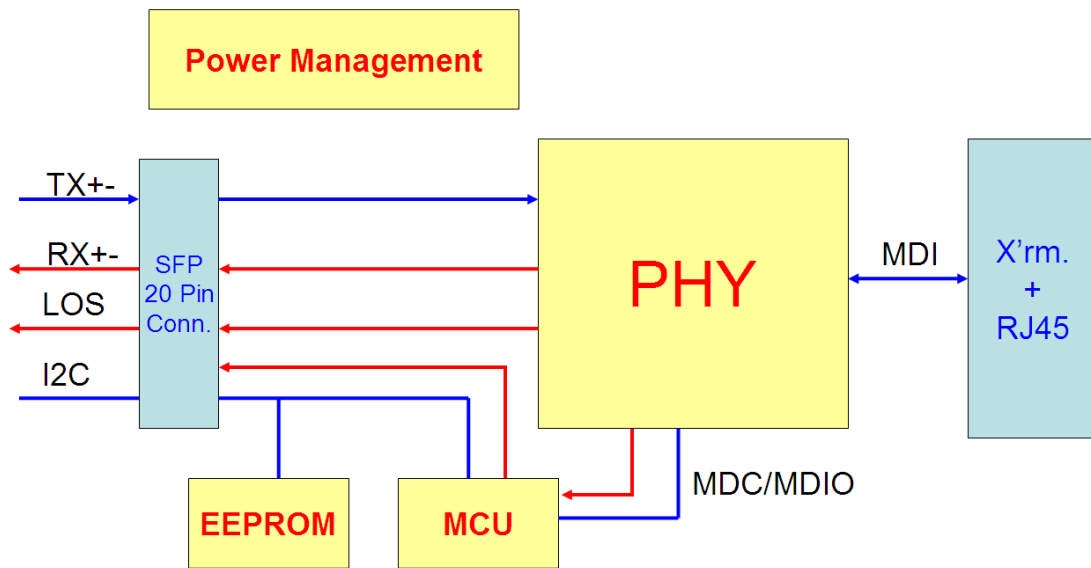
PIN	Signal Name	Description	PIN	Signal Name	Description
1	V _{EE} T	Transmitter Ground	11	V _{EE} R	Receiver Ground
2	TX_Fault	Not Implemented. Tied to V _{ee} T in SFP	12	RD-	Inverted Received Data out
3	TX_Disable	Logic "1" Input (or no connection) = TX off, Logic "0" = TX on.	13	RD+	Non-Inverted Received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

MODULE DEFINITION

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 SDL 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 E²PROM protocol of the ATMEL AT24C01A/02/04 family of components.

BLOCK DIAGRAM OF TRANSCEIVER



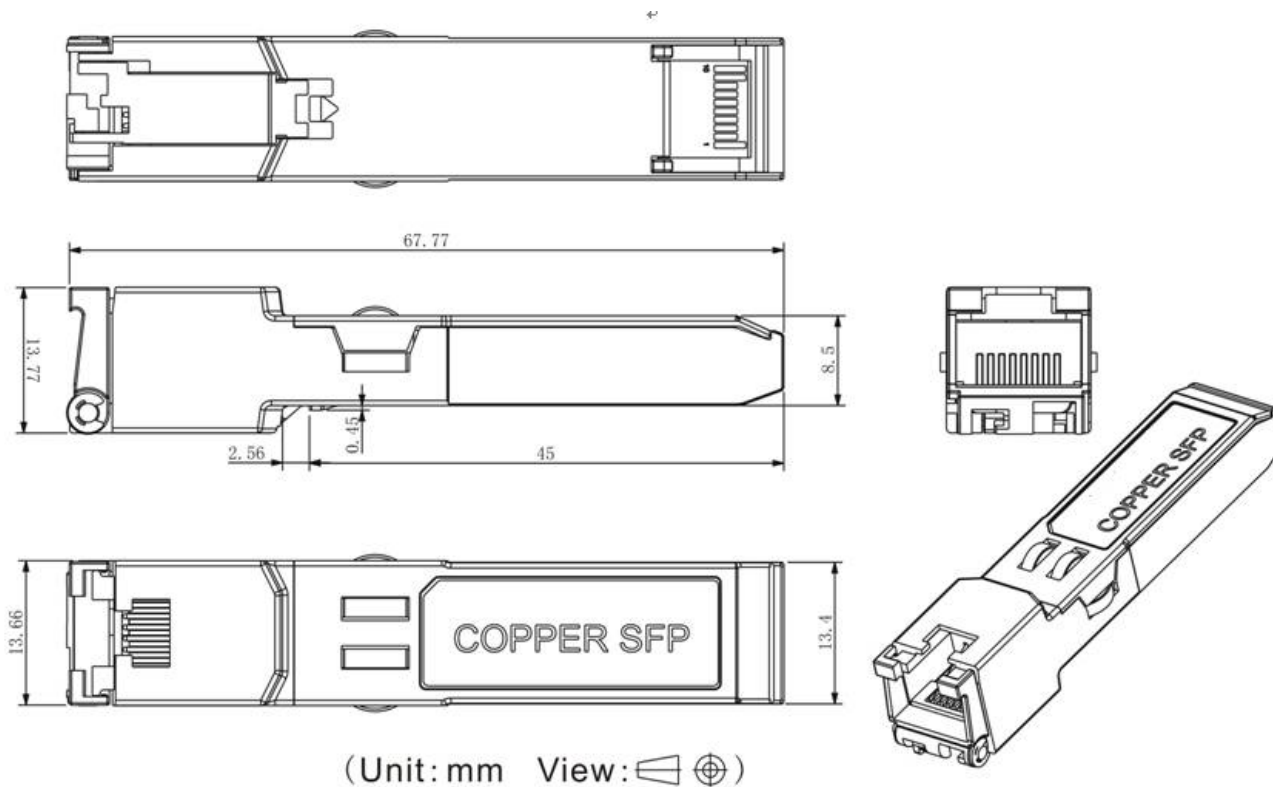
POWER COUPLING



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.

REVISION HISTORY

Version	Subject	Release Date
1.0	Initial datasheet	2018/3/6
2.0	1. Add "Support ACh PHY control" to Features 2. Add "Support LOS pin Function" to Features 3. Add "Support TX Disable pin Function" to Features 4. Update Block Diagram of Transceiver	2020/9/28
2.1	Update Cable Length Operating Conditions	2020/12/8
2.2	Correct typo error of Electrical Characteristics	2021/8/9
2.3	Update Cable Length Operating Conditions	2021/12/28