

CSM-SFP1G-COP-M1 Series

1000BASE-T Copper SFP Transceiver

Description

The CSM-SFP1G-COP-M1 series Copper Small Form-factor Pluggable (SFP) transceivers are high-performance, cost-effective modules compliant with Gigabit Ethernet and 1000BASE-T standards specified in IEEE 802.3 and IEEE 802.3ab. The modules support 1000 Mbps data transmission up to 100 m over unshielded twisted-pair Category 5 cables.

The modules support 1000 Mbps full-duplex data links with 5-level pulse amplitude modulation (PAM5) signaling. All four pairs in the cable are utilized, with 250 Mbps transmitted on each pair. The modules provide standard serial ID information compliant with the SFP MSA, which can be accessed at address A0h via the 2-wire serial EEPROM protocol. The physical layer IC can also be accessed via the 2-wire serial bus at address A0h.

Features

- Up to 1.25 Gbps bidirectional data links
- Hot-pluggable SFP footprint
- Extended case temperature range
- Fully metallic enclosure for low EMI
- Low power dissipation
- Compact RJ-45 connector assembly
- Access to physical layer IC via 2-wire serial bus
- 1000BASE-T operation in host systems with SERDES interface
- 10/100/1000 Mbps compliant in host systems with SGMII interface



Applications

- Gigabit Ethernet over Cat 5 cable

Recommended Operating Condition

Table 1. Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Notes/Conditions
Supply Current	Is		320	375	mA	1.2 W max power over full range of voltage and temperature. See caution note below
Input Voltage	V _{CC}	3.13	3.3	3.47	V	Referenced to GND
Maximum Voltage	V _{max}			4	V	
Surge Current	I _{surge}			30	mA	Hot plug above steady-state current. See caution note below

Caution: Power consumption and surge current are higher than the specified values in the SFP MSA.

Low-Speed Signal Specifications

MOD_DEF(1) (SCL) and MOD_DEF(2) (SDA) are open-drain CMOS signals. Both MOD_DEF(1) and MOD_DEF(2) must be pulled up to Host_V_{CC}.

Table 2. Low-Speed Signal Specifications

Parameter	Symbol	Min	Max	Unit	Notes/Conditions
Module Output Low	VOL	0	0.5	V	4.7 kOhm to 10 kOhm pull-up to Host_V _{CC} , measured at host side of connector
Module Output High	VOH	Host_V _{CC} -0.5	Host_V _{CC} +0.3	V	4.7 kOhm to 10 kOhm pull-up to Host_V _{CC} , measured at host side of connector
Module Input Low	VIL	0	0.8	V	4.7 kOhm to 10 kOhm pull-up to V _{CC} , measured at module side of connector
Module Input High	VIH	2	V _{CC} +0.3	V	4.7 kOhm to 10 kOhm pull-up to V _{CC} , measured at module side of connector

High-Speed Electrical Specifications

All high-speed signals are AC-coupled internally.

Table 3. High-Speed Electrical Specifications, Module Interface

Parameter	Symbol	Min	Typical	Max	Unit	Notes/Conditions
Line Frequency	f _L		125		MHz	5-level encoding, per IEEE 802.3
Tx Output Impedance	Z _{out,TX}		100		Ohm	Differential, for all frequencies between 1 MHz and 125 MHz
Rx Input Impedance	Z _{in,RX}		100		Ohm	Differential, for all frequencies between 1 MHz and 125 MHz

Table 4. High-Speed Electrical Specifications, Host Interface

Parameter	Symbol	Min	Typ	Max	Unit	Notes/Conditions
Single-ended data input swing	V _{in,sing}	250		1200	mV	Single-ended
Single-ended data output swing	V _{out,sing}	350		800	mV	Single-ended
Rise/Fall Time	Tr/Tf		175		ps	20%–80%
Tx Input Impedance	Z _{in}		50		Ohm	Single-ended
Rx Output Impedance	Z _{out}		50		Ohm	Single-ended

Table 5. General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Notes/Conditions
Data Rate	BR	10		1,000	Mbps	IEEE 802.3 compatible. See Notes 2 through 4 below
Cable Length	L			100	m	Category 5 UTP. BER <10 ⁻¹²

Notes:

1. Clock tolerance is ± 50 ppm
2. By default, the module is a full-duplex device in preferred master mode
3. Automatic crossover detection is enabled. An external crossover cable is not required.
4. 1000BASE-T operation requires the host system to have an SGMII interface with no clocks, and the module PHY to be configured per Application Note AN-2036. With a SERDES that does not support SGMII, the module will operate at 1000BASE-T only.

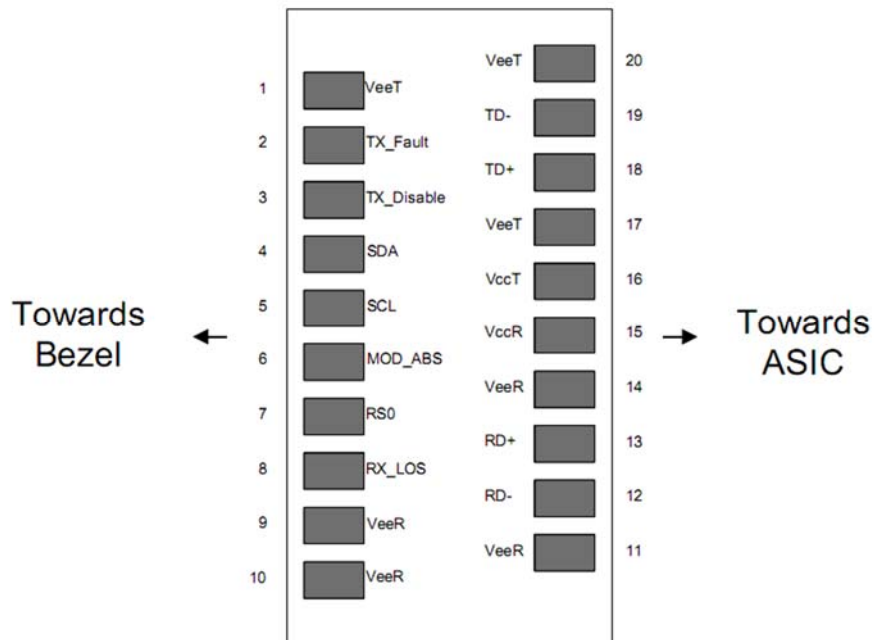
Table 6. Environmental Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Notes/Conditions
Operating Temperature	Top	0		70	°C	Case temperature
		-40		85		Case temperature
Storage Temperature	T _{sto}	-40		85	°C	Ambient temperature

References

1. Small Form-factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA).
2. IEEE Std 802.3, 2002, IEEE Standards Department, 2002.
3. AT24C01A/02/04/08/16 2-Wire Serial EEPROM, Atmel Corporation.
4. Alaska Ultra 88E1111 Integrated 10/100/1000 Gigabit Ethernet Transceiver, Marvell Corporation.

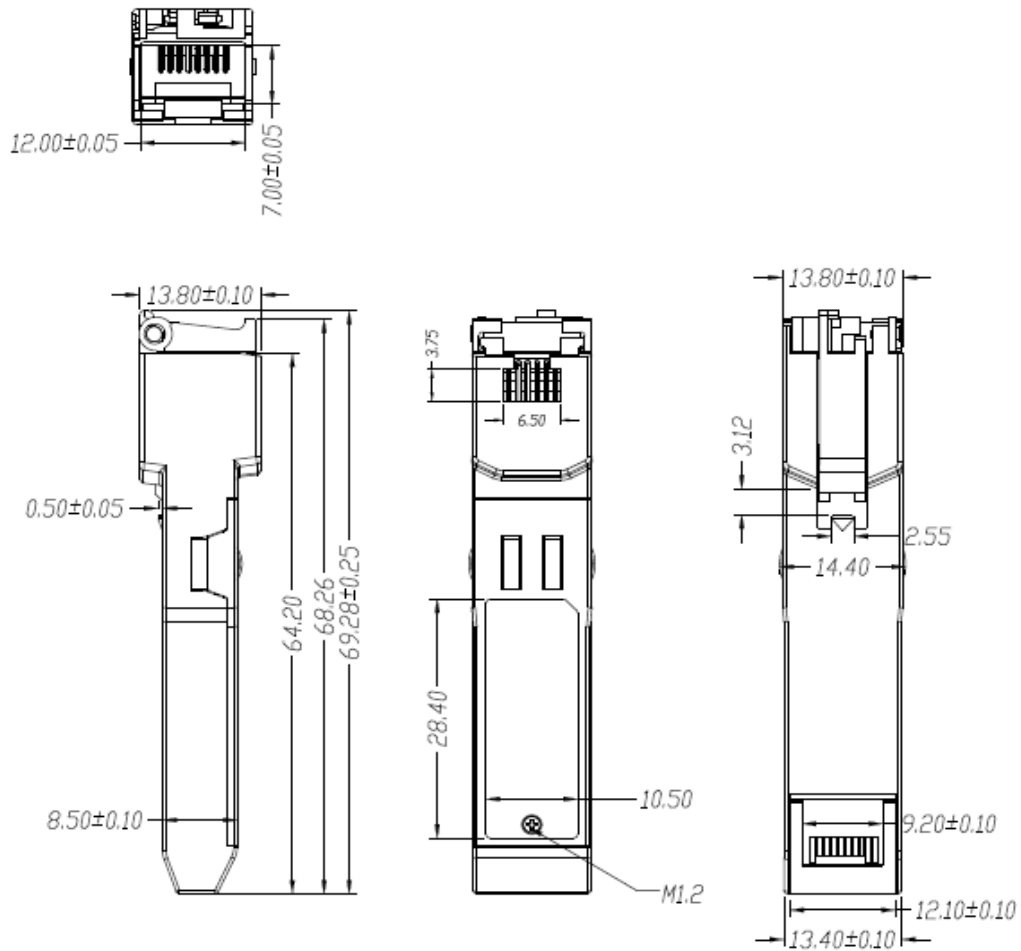
Pin Diagram



Pin Descriptions

Pin	Signal Name	Description	Plug Seq.	Notes
1	V _{EET}	Transmitter Ground	1	
2	TX_FAULT	Transmitter Fault Indication	3	Not Supported
3	TX_DISABLE	Transmitter Disable	3	
4	SDA	Serial Data Signal	3	
5	SCL	Serial Clock Signal	3	
6	MOD_ABS	Module Absent; grounded within the module	3	
7	RS0	Not Connected	3	
8	LOS	Loss of Signal	3	Not Supported
9	V _{EER}	Receiver Ground	1	
10	V _{EER}	Receiver Ground	1	
11	V _{EER}	Receiver Ground	1	
12	RD-	Inverted Received Data Output	3	
13	RD+	Received Data Output	3	
14	V _{EER}	Receiver Ground	1	
15	V _{CCR}	Receiver Power Supply	2	
16	V _{CCT}	Transmitter Power Supply	2	
17	V _{EET}	Transmitter Ground	1	
18	TD+	Transmit Data Input	3	
19	TD-	Inverted Transmit Data Input	3	
20	V _{EET}	Transmitter Ground	1	

Mechanical Specifications



Unit: mm

Ordering Information

Part Number	MAC Interface	Tx_DIS / PHY Reset	1000BASE-X Auto-negotiation enabled by default	Link Indicator on LOS Pin	Operating Temperature
CSM-SFP1G-COP-M1-RJ-E1C	SERDES	Yes	Yes	No	0~70°C
CSM-SFP1G-COP-M1-RJ-E1C	SERDES	Yes	Yes	Yes	0~70°C
CSM-SFP1G-COP-M1-RJ-E1C	SERDES	Yes	No	Yes	0~70°C
CSM-SFP1G-COP-M1-RJ-E2C	SGMII	Yes	Yes	Yes	0~70°C
CSM-SFP1G-COP-M1-RJ-E2C	SGMII	Yes	Yes	No	0~70°C
CSM-SFP1G-COP-M1-RJ-E1I	SERDES	Yes	Yes	No	-40~85°C
CSM-SFP1G-COP-M1-RJ-E1I	SERDES	Yes	Yes	Yes	-40~85°C
CSM-SFP1G-COP-M1-RJ-E1I	SERDES	Yes	No	Yes	-40~85°C
CSM-SFP1G-COP-M1-RJ-E2I	SGMII	Yes	Yes	Yes	-40~85°C
CSM-SFP1G-COP-M1-RJ-E2I	SGMII	Yes	Yes	No	-40~85°C

Notes:

Pin-function configuration options are consolidated under COSMO ordering models. The detailed differences, including MAC interface, PHY reset, auto-negotiation default setting, LOS link indicator function, and operating temperature range, are listed in the table above. Please specify the preferred configuration row or required functional options when placing an order.

For More Information

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