

## 1000 BASE-T Copper SFP Transceiver

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### SFP Series

- Up to 1.25 Gb/s bi-directional data links
- Hot-pluggable SFP footprint
- Low power dissipation (1.05W typical)
- Compact RJ-45 connector assembly
- Fully metal enclosure, for lower EMI
- RoHS compliant and lead-free
- Single +3.3V power supply
- 1.25 Gigabit Ethernet over Cat 5 cable



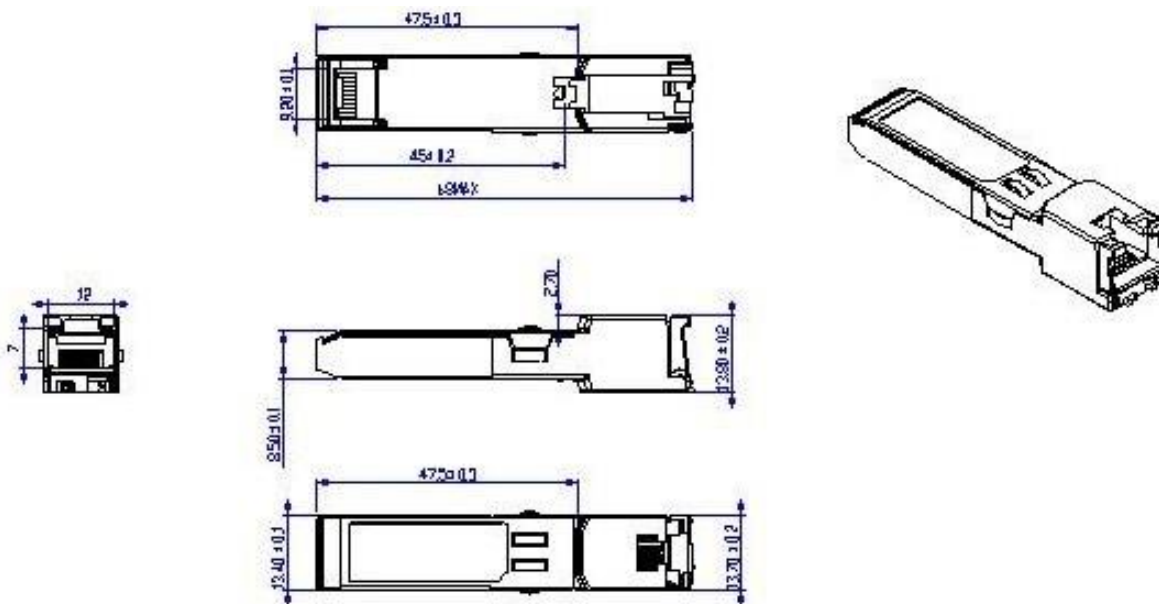
ASCENT'S SFP-AG-CO-01 1000 BASE-T Copper Small Form Pluggable (SFP) transceivers are based on the SFP Multi Source Agreement (MSA). They are compatible with the Gigabit Ethernet standards as specified in IEEE Std. 802.3. The 1000 BASE-T physical layer IC (PHY) can be accessed via I2C, allowing access to all PHY settings and features.

The SFP-AG-CO-01 uses the RX\_LOS pin for link indication, and 1000BASE-X auto-negotiation should be disabled on the host system.

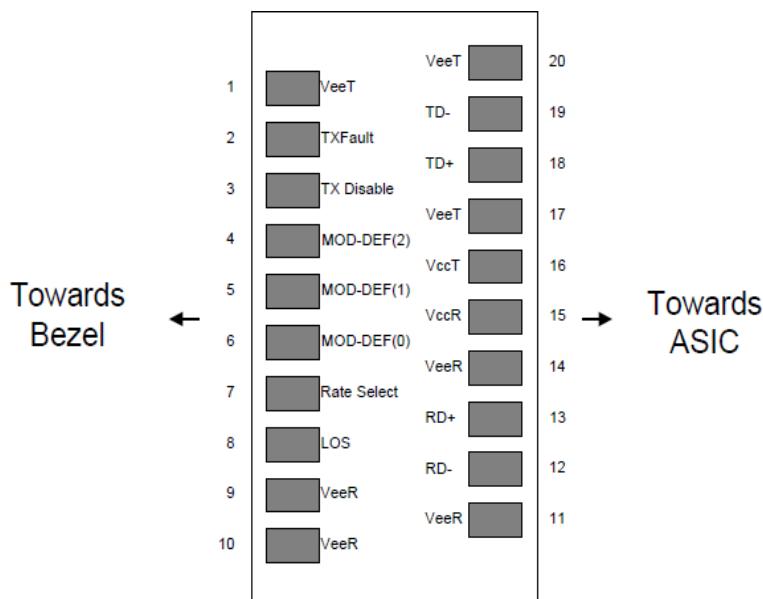
## Key Features

- Up to 1.25 Gb/s bi-directional data links
- Hot-pluggable SFP footprint
- Low power dissipation(1.05W typical)
- Compact RJ-45 connector assembly
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## Outline Diagram



## Pin Descriptions



**Diagram of host board connector block pin numbers and names**

Pin	Symbol	Name/Description	Ref.
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault. Not supported.	
3	TDIS	Transmitter Disable. PHY disabled on high or open	2
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	3
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	4
9	VEER	Receiver Ground (Common with Transmitter Ground)	1
10	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	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	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	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	VEET	Transmitter Ground (Common with Receiver Ground)	1

## Notes:

1. Circuit ground is connected to chassis ground
2. Should be pulled up with 4.7k - 10k  $\Omega$ s on host board to a voltage between 2.0 V and 3.6 V. MOD\_DEF(0) pulls line low to indicate module is plugged in.
3. LVTTTL compatible with a maximum voltage of 2.5V.

## Specifications

### 3.3 V Volt Electrical Power Interface

The SFP-AG-CO-01 has an input voltage range of 3.3 V  $\pm$  5%. The 4V maximum voltage is not allowed for continuous operation.

Parameter	Symbol	Min	Typ	Max	Unit	Notes/Conditions
Supply Current	Is		320	375	mA	1.2W max power over full range of voltage and temperature. See caution note below
Input Voltage	Vcc	3.13	3.3	3.47	V	Referenced to GND
Maximum Voltage	Vmax			4	V	
Surge Current	Isurge			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 Signals

MOD\_DEF(1) (SCL) and MOD\_DEF(2) (SDA), are open drain CMOS signals (see section VII, "Serial Communication Protocol"). Both MOD\_DEF(1) and MOD\_DEF(2) must be pulled up to host\_Vcc

Parameter	Symbol	Min	Max	Unit	Notes/Conditions
SFP Output LOW	VOL	0	0.5	V	4.7k to 10k pull-up to host Vcc, measured at host side of connector
SFP Output HIGH	VOH	host_Vcc - 0.5	host_Vcc + 0.3	V	4.7k to 10k pull-up to host_Vcc, measured at host side of connector
SFP Input LOW	VIL	0	0.8	V	4.7k to 10k pull-up to Vcc, measured at SFP side of connector
SFP Input HIGH	VIH	2	Vcc + 0.3	V	4.7k to 10k pull-up to Vcc, measured at SFP side of connector

### High-Speed Electrical Interface, Transmission Line-SFP

All high-speed signals are AC-coupled internally.

Parameter	Symbol	Min	Typ	Max	Unit	Notes/Conditions
Line Frequency	fL		125		MHz	5-level encoding, per IEEE 802.3
Tx Output Impedance	Zout,TX		100		$\Omega$	Differential, for all frequencies between 1MHz and 125MHz
Rx Input Impedance	Zin,RX		100		$\Omega$	Differential, for all frequencies between 1MHz and 125MHz

## High-Speed Electrical Interface, Host-SFP

Parameter	Symbol	Min	Typ	Max	Unit	Notes/Conditions
Single-Ended Data Input Swing	Vinsing	250		1200	mV	Single-ended
Single-Ended Data Output Swing	Voutsing	350		800	mV	Single-ended
Rise/Fall Time	Tr,Tf		175		psec	20 % to 80 %
Tx Input Impedance	Zin		50		Ω	Single-ended
Rx Output Impedance	Zout		50		Ω	Single-ended

## General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Notes/Conditions
Data Rate	BR	10		1000	Mb/sec	IEEE 802.3 compatible. See Notes 2 through 4 below
Cable Length	L			100	m	-12 Category 5 UTP. BER <10

## Notes:

1. Clock tolerance is  $\pm 50$  ppm
2. By default, the SFP-AG-CO-01 is a full duplex device in preferred master mode
3. Automatic crossover detection is enabled. External crossover cable is not required
4. SFP does not support SGMII .With a SERDES the module will operate at 1000BASE-T only.

## Environmental Specifications

Parameter	Symbol	Min	Typ	Max	unit	Notes/Conditions
Case Operating Temperature	Tcase	0		70	°C	SFP-AG-CO-01
Storage Temperature	Tsto	-40		85	°C	SFP-AG-CO-01A
		-40		85	°C	Ambient temperature

## Serial Communication Protocol Bus Timing Requirements

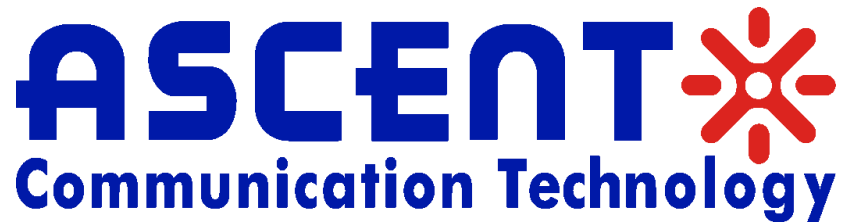
SFP-AG-CO-01 supports the 2-wire serial communication protocol outlined in the SFP MSA. It uses an Atmel AT24C02B 256 byte EEPROM with an address of A0h.

Parameter	Symbol	Min	Typ	Max	unit	Notes/Conditions
I <sup>2</sup> C Clock Rate		0		100,000	Hz	

## Ordering Information

Product Model	Product Description
SFP-AG-CO-01	SFP Plug-in, 1000 Base T Copper, 1.25Gbps, 100m, RJ45
SFP-AG-CO-01A	SFP Plug-in, 1000 Base T Copper, 1.25Gbps, 100m, RJ45, Industrial Temp -40~85°C

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