

10/100/1000 BASE-T Copper SFP Transceiver

SFP Series



- Up to 1.25 Gb/s data links
- Hot-pluggable SFP footprint
- Low power dissipation
- Contact RJ45 connector assembly
- Full metal enclosure, for lower EMI
- 10/100/1000 BASE-T operation in host systems
- Compliant with SFP MSA
- Compliant with IEEE Std 802.3TM-2002
- RoHS compliant

Ascent's SFP-AG-CO-02 10/100/1000BASE-T copper SFP transceiver is high-performance, cost-effective module compliant with the Gigabit Ethernet and 10/100/1000BASE-T standards as specified in IEEE 802.3-2002 and IEEE 802.3ab, which supporting 10/100/1000Mbps data rates up to 100 meters reach over unshielded twisted-pair category 5 cable.

SFP-AG-CO-02 supports 10/100/1000 Mbps full duplex data-links with 5-level Pulse Amplitude Modulation (PAM) signals. All four pairs in the cable are used with symbol rate at 250 Mbps on each pair.

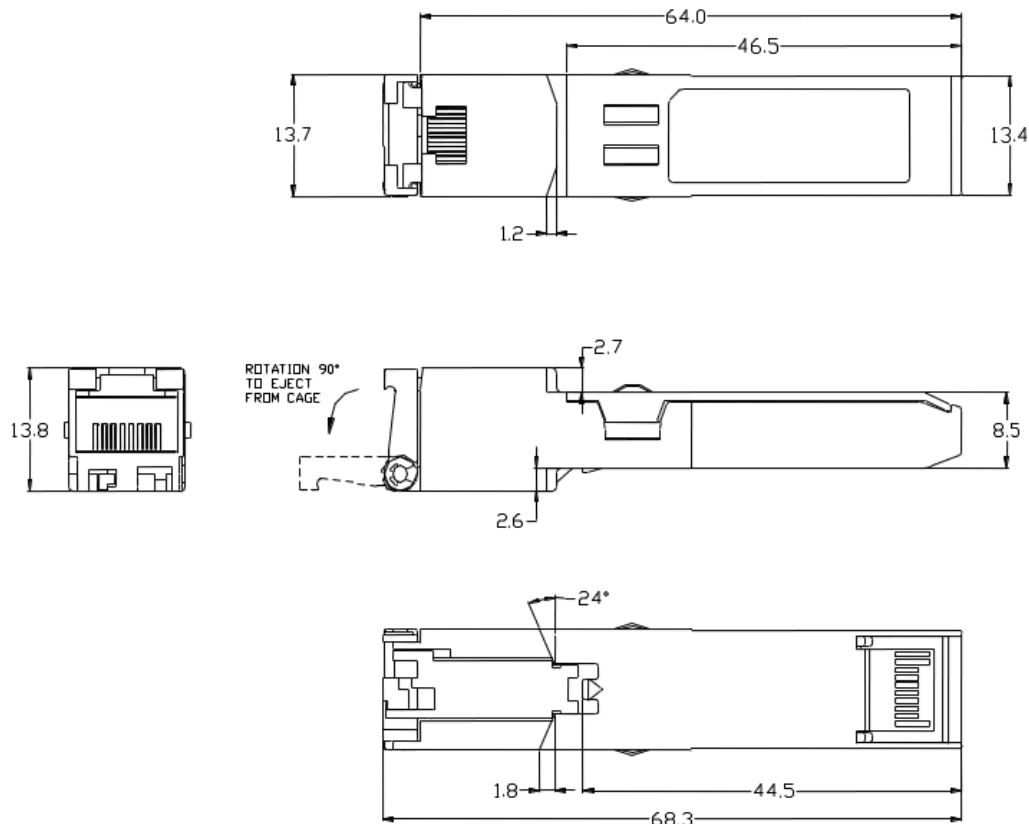
SFP-AG-CO-02 provides standard serial ID information compliant with SFP MSA, which can be accessed with address of A0h via the 2-wire serial CMOS EEPROM protocol. The physical IC can also be accessed via 2-wire serial bus at address ACh.

This 10/100/1000 BASE-T Copper SFP Transceiver is compliant with the SFP Multi Source Agreement (MSA).

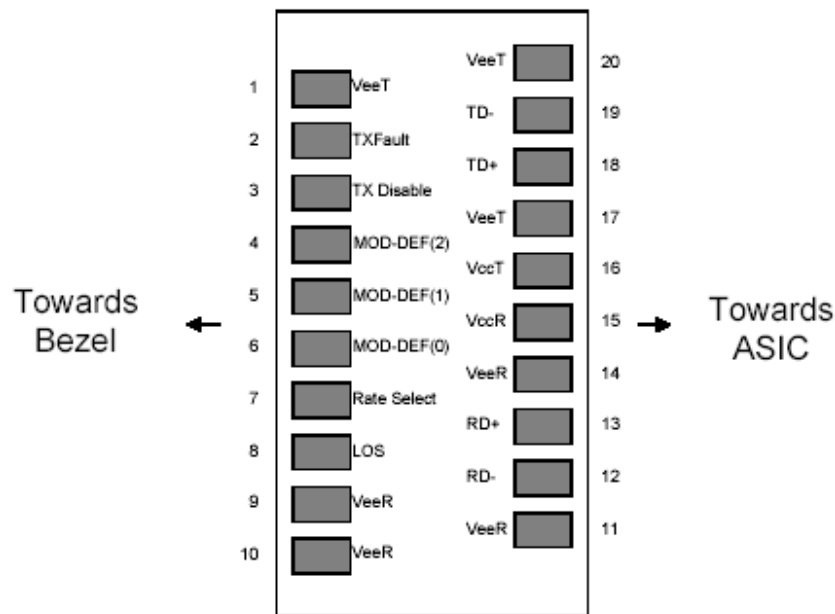
Key Features

- Hot-pluggable SFP footprint
- Fully metallic enclosure for low EMI
- Low power dissipation
- Compact RJ45 connector assembly
- Detailed product information in EEPROM
- +3.3V single power supply
- Access to physical layer IC via 2-wire serial bus
- 10/100/1000 BASE-T operation in host systems with SGMII interface
- Compliant with SFP MSA
- Compliant with IEEE Std 802.3TM-2002
- RoHS Compliant
- Case temperature range (0°C to +70°C)

Outline Diagram



Pin Descriptions



Pin	Signal name	Description	Note
1	V _{EET}	Transmitter ground (common with receiver ground)	
2	TX _{FAULT}	Transmitter Fault. Not supported	1
3	T _{DIS}	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 - High Indicates Loss of Signal	
9	V _{EER}	Receiver Ground (common with transmitter ground)	
10	V _{EER}	Receiver Ground (common with transmitter ground)	
11	V _{EER}	Receiver Ground (common with transmitter ground)	
12	RD-	Receiver Inverted DATA out. AC Coupled	4
13	RD+	Receiver Non-inverted DATA out. AC Coupled	4
14	V _{EER}	Receiver Ground (common with transmitter ground)	
15	V _{CCR}	Receiver Power Supply	5
16	V _{CCT}	Transmitter Power Supply	5
17	V _{EET}	Transmitter Ground (Common with Receiver Ground)	
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	6
19	TD-	Transmitter Inverted DATA in. AC Coupled.	6
20	V _{EET}	Transmitter Ground (common with receiver ground)	

Notes:

1. TX Fault is not used and is always tied to ground through a 100 Ω resistor.

2. TX Disable is an input that is used to shut down the transmitter output. It is pulled up within the module with a 4.7 k Ω to 10 k Ω resistor.

Its states are:

- Low (0 to 0.8V): Transmitter on
- (>0.8, < 2.0V): Undefined
- High (2.0 to 3.465V): Transmitter Disabled
- Open: Transmitter Disabled

3. Mod-Def 0, 1, 2. These are the module definition pins. They should be pulled up with a 4.7-10 k Ω resistor on the host board to a supply less than VCCT + 0.3 V or VCCR + 0.3 V.

- Mod Def 0 is tied to ground through a 100 Ω resistor to indicate that the module is present.
- Mod-Def 1 is clock line of two wire serial interface for optional serial ID
- Mod-Def 2 is data line of two wire serial interface for optional serial ID

4. RD-/+: These are the differential receiver outputs. They are ac coupled 100 Ω differential lines which should be terminated with 100 Ω differential at the user SerDes. The ac coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 370 mV and 2000 mV differential (185 mV to 1000 mV single ended) when properly terminated. These levels are compatible with CML and LVPECL voltage swings.

5. VCCR and VCCT are the receiver and transmitter power supplies. They are defined as 3.3 V \pm 5 % at the SFP connector pin. The maximum supply current is about 300 mA and the associated in-rush current will typically be no more than 30 mA above steady state after 500 nanoseconds.

6. TD-/+: These are the differential transmitter inputs. They are ac coupled differential lines with 100 Ω differential termination inside the module. The ac coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 500 mV to 2400 mV (250 mV to 1200 mV single ended), though it is recommended that values between 500 mV and 1200 mV differential (250 mV to 600 mV single ended) be used for best EMI performance. These levels are compatible with CML and LVPECL voltage swings.

Specifications

+3.3V Volt Electrical Power Interface

The SFP-AG-CO-02 has an input voltage range of 3.3 V \pm 5%. The 4 V maximum voltage is not allowed for continuous operation.

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Supply Current	I _s		320	375	mA	1.2W 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
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 Signals

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_Vcc.

Parameter	Symbol	Min.	Max.	Units	Note
SFP Output LOW	VOL	0	0.5	V	4.7 kΩ to 10 kΩ pull-up to host_Vcc.
SFP Output HIGH	VOH	host_Vcc -0.5	host_Vcc + 0.3	V	4.7 kΩ to 10 kΩ pull-up to host_Vcc.
SFP Input LOW	VIL	0	0.8	V	4.7 kΩ to 10 kΩ pull-up to Vcc.
SFP Input HIGH		2	Vcc + 0.3 V	V	4.7 kΩ to 10 kΩ pull-up to Vcc.

High-Speed Electrical Interface

All high-speed signals are AC-coupled internally.

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Transmission Line-SFP						
Line Frequency	f _L		125		MHz	5-level encoding, per IEEE 802.3
Tx Output Impedance	Z _{out, TX}		100		Ω	Differential
Rx Input Impedance	Z _{in, RX}		100		Ω	Differential
Host-SFP						
Single-Ended Data Input Swing	V _{insing}	250		1200	mV	Single-ended
Single-Ended Data Output Swing	V _{outsing}	350	100	800	mV	Single-ended
Rise/Fall Time	Tr, Tf		175		psec	20 % to 80 %
Tx Input Impedance	Z _{in}		50		Ω	Single-ended
Rx Output Impedance	Z _{out}		50		Ω	Single-ended

General Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Data Rate	BR	10		1, 000	Mb/s	IEEE 802.3 compatible.
Cable Length	L			100	m	Category 5 UTP. BER <10 ⁻¹²

Notes:

1. Clock tolerance is ±50 ppm
2. By default, the SFP-AG-CO-02 is a full duplex device in preferred master mode
3. Automatic crossover detection is enabled. External crossover cable is not required
4. 10/100/1000 BASE-T operation requires the host system to have an SGMII interface with no clocks, with a SERDES that does not support SGMII, the module will operate at 1000BASE-T only.

Environmental Specifications

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Operating Temperature	T _{op}	0		70	°C	Case temperature
Storage Temperature	T _{sto}	-40		85	°C	Ambient temperature

Ordering Information

Product Name	Product Description
SFP-AG-CO-02	SFP Plug-in, 10/100/1000 Base T Copper, 1.25 Gbps, 100 m, auto-negotiation, RJ45

Contact Information



Ascent Communication Technology Ltd

AUSTRALIA

140 William Street, Melbourne
Victoria 3000, AUSTRALIA
Phone: +61-3-8691 2902

CHINA

Unit 1933, 600 Luban Road
200023, Shanghai CHINA
Phone: +86-21-60232616

EUROPE

Pfarrer-Bensheimer-Strasse 7a
55129 Mainz, GERMANY
Phone: +49 (0) 6136 926 3246

HONG KONG SAR

Unit 9, 12th Floor, Wing Tuck Commercial Centre
177 Wing Lok Street, Sheung Wan, HONG KONG
Phone: +852-2851 4722

USA

2710 Thomes Ave
Cheyenne, WY 82001, USA
Phone: +1-203 816 5188

VIETNAM

15 /F TTC Building, Duy Tan Street
Cau Giay Dist., Hanoi, VIETNAM
Phone: +84 243 795 5917

WEB: www.ascentcomtec.com

EMAIL: sales@ascentcomtec.com

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Ver. ACT_SFP-AG-CO-02_Datasheet_V1d_Dec_2020