



GIGABIT COPPER SMALL FORM FACTOR PLUGGABLE (SFP) TRANSCEIVERS-1G

SFPG SERIES



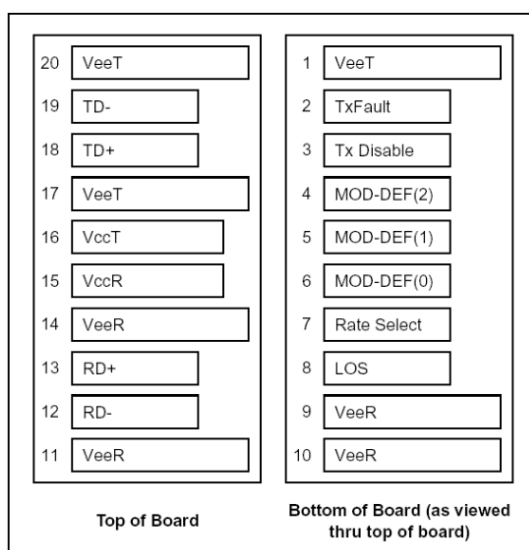
SYNOPSIS

- 10/100/1000M SFPG Eth Copper Small Form Pluggable (SFP) transceivers is high-performance, cost-effective module compliant with the Gigabit Ethernet and 1000- BASE-T standards as specified in IEEE 802. 3-2002 and IEEE 802.3ab, which support 1000Mbps data- rate up to 100 meters reach over unshielded twisted-pair category 5 cable.
- The module supports 1000 Mbps full duplex datalinks with 5-level Pulse Amplitude Modulation (PAM) signals.
- All four pairs in the cable are used with symbol rate at 250Mbps on each pair.
- The module provides standard serial ID information compliant with SFP MSA, which can be accessed with address of A0h via the 2wire serial CMOS EEPROM protocol. The physical IC can also be accessed via 2wire serial bus at address A0h.

FEATURES

- Up to 1.25Gb/s bi-directional data links
- Hot-pluggable SFP footprint
- Extended case temperature range (0°C to +70°C)
- Fully metallic enclosure for low EMI
- Low power dissipation (1.05 W typical)
- Compact RJ-45 connector assembly
- Access to physical layer IC via 2-wire serial bus
- 1000 BASE-T operation in host systems with SERDES interface
- 10/100/1000Mbps compliant in host system with SGMII interface

PIN DEFINITIONS



PIN DESCRIPTION

PIN	Signal Name	Description	Plug Sequence	Notes
1	VEET	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note1
3	TX DISABLE	Transmitter Disable	3	Note2
4	MOD_DEF (2)	SDA Serial Data Signal	3	Note3
5	MOD_DEF (1)	SCL Serial Clock Signal	3	Note3
6	MOD_DEF (0)	TTL Low	3	Note3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Note 4
9	VEER	Receiver ground	1	
10	VEER	Receiver ground	1	
11	VEER	Receiver ground	1	
12	RX-	Inv. Received Data Out	3	Note 5
13	RX+	Received Data Out	3	Note 5
14	VEER	Receiver ground	1	
15	VCCR	Receiver Power Supply	2	
16	VCCT	Transmitter Power Supply	2	
17	VEET	Transmitter Ground	1	
18	TX+	Transmit Data In	3	Note 6
19	TX-	Inv. Transmit Data In	3	Note 6
20	VEET	Transmitter Ground	1	

NOTES

- Plug Seq.: Pin engagement sequence during hot plugging.
 - TX Fault is an open collector output, which should be pulled up with a 4.7k to 10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
 - TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 "C 10 K 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
 - Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K to 10K resistor on the host board. The pull-up voltage shall be VccT or VccR
 - Mod-Def 0 is grounded by the module to indicate that the module is present
 - Mod-Def 1 is the clock line of two wire serial interface for serial ID

6. Mod-Def 2 is the data line of two wire serial interface for serial ID
7. LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K to 10K resistor. Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to <0.8V.
8. RD-/+ : These are the differential receiver outputs. They are AC coupled 100 differential lines which should be terminated with 100 (differential) at the user SERDES.
9. TD-/+ : These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 differential terminations inside the module.

+3.3 VOLT ELECTRICAL POWER INTERFACE

1. The SFPG ETH has an input voltage range of +5V +/- 5%.
2. The 3.3V maximum voltage is not allowed for continuous operation.

Parameter	Symbol	Min	Typ	Max	Units	Notes
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	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.

Table 2. Low-speed signals, electronic characteristics

Parameter	Symbol	Min	Max	Units	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

All high-speed signals are AC-coupled internally.

Table 3. High-speed electrical interface, transmission line-SFP

Parameter	Symbol	Min	Typ	Max	Units	Notes
Line Frequency	fL		125		MHz	5-level encoding, per IEEE 802.3
Tx Output Impedance	Zout,TX		100		Ohm	Differential, for all Frequencies between 1MHz and 125MHz
Rx Input Impedance	Zin,RX		100		Ohm	Differential, for all Frequencies between 1MHz and 125MHz

HIGH SPEED ELECTRICAL INTERFACE-HOST SFP

Table 4. High-speed electrical interface, host-SFP

Parameter	Symbol	Min	Typ	Max	Units	Notes
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%-80%
Tx Input Impedance	Zin		50		Ohm	Single ended
Rx Output Impedance	Zout		50		Ohm	Single ended

GENERAL SPECIFICATIONS

Table 4. High-speed electrical interface, host-SFP

Parameter	Symbol	Min	Typ	Max	Units	Notes
Data Rate	BR	10		1,000	Mb/sec	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 SFPG ETH is a full duplex device in preferred master mode
3. Automatic crossover detection is enabled. External crossover cable is not required
4. 1000 BASE-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.

ENVIRONMENTAL SPECIFICATIONS

Table 4. High-speed electrical interface, host-SFP

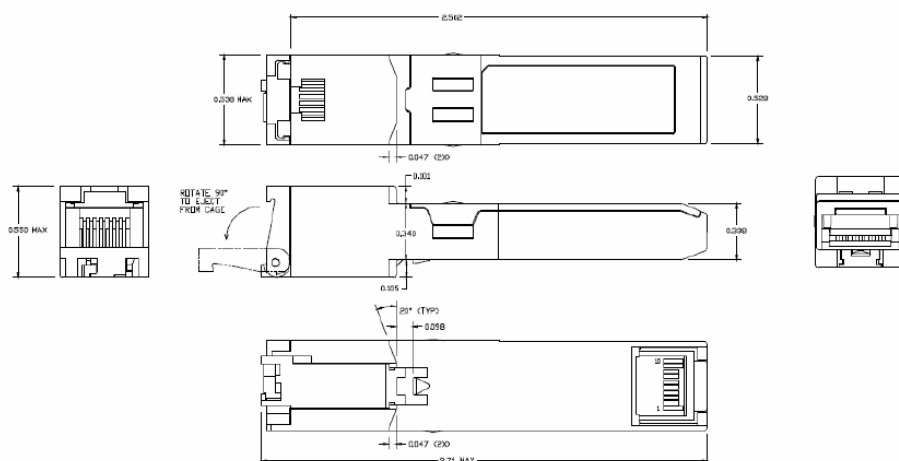
Parameter	Symbol	Min	Typ	Max	Units	Notes
Operating Temperature	Top	0		70	°C	Case temperature
Storage Temperature	Tsto	-40		85	°C	Ambient temperature

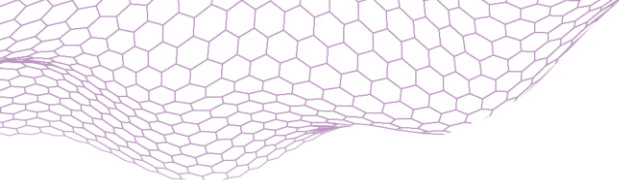
References

1. Gigabit Interface Converter (SFP) Transceiver Multi-Source Agreement (MSA),
2. IEEE Std 802.3, 2002 Edition. IEEE Standards Department, 2002.
3. "AT24C01A/02/04/08/16 2-Wire Serial CMOS E2PROM", Atmel Corporation.

MECHANICAL SPECIFICATIONS

The host-side of the SFPG ETH conforms to the mechanical specifications outlined in the SFP MSA1. The front portion of the SFP (part extending beyond the face plate of the host) is larger to accommodate the RJ-45 connector.





ORDERING CODE

SFPG Eth

SFPG Eth

10/100/1000Mbps, SGMII interface, Copper SFP with
spring latch



DATA BRIDGE
D Y N A M I C