SFP-1GA-T-I

1.25GBase-T Copper SFP Transceiver

Hot Pluggable, 1.25Gb/s, RJ45, up to 100m, Industrial Temp

FEATURES

- Up to 1.25Gbps bi-directional data links
- RJ45 Max100m
- Fully metallic enclosure for low EMI
- Compact RJ-45 Connector assembly
- Hot-pluggable SFP footprint
- Low power dissipation
- RoHS compliant and Lead Free
- Access to physical layer IC via 2-wire serial bus over Cat 5 cable
- 10/100/1000BASE-T operation in host systems with SGMII interface
- Industrial Operating Temperature Range: -40 to 85°C

APPLICATIONS

- 1.25 Gigabit Ethernet

DESCRIPTION

ATGBICS SFP-1GA-T-I is a Copper Small Form pluggable (SFP) transceiver, which is based on the SFP Multi-source Agreement (MSA). It is compatible with Gigabit Ethernet and 1000BASE-T standards as specified in IEEE802.3. The 1000BASE-T physical layer IC(PHY) can be accessed via I2C, allowing access to all PHY settings and features. It is also compatible with 1000BASE-X auto-negotiation.

+3.3V VOLT ELECTRICAL POWER INTERFACE

The SFP-1GA-T-I has an input voltage range of 3.3V ±5%. The 4V maximum voltage is not allowed for continuous operation.

Parameter	Symbol	Min.	Typical	Max.	Units	Notes/Conditions
Supply Current	Is	300	325	345	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
Surge Current	Isurge	-	-	345	mA	Hot plug above steady state current. See caution note

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

LOW-SPEED SIGNALS

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

Parameter	Symbol	Min.	Typical	Max.	Units	Notes/Conditions
TRANSMISSION LINE-SFP						
Line Frequency	Is	10	125	1000	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
HOST-SFP						
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

Parameter	Symbol	Min.	Typical	Max.	Units	Notes/Conditions
Data Rate	BR	10	-	1000	Mbps	IEEE 802.3 compatible. See Notes 2 through 4 below
Tx Output Impedance	L	-	-	100	M	Category 5 UTP.BER<10^{-12}

Notes:
1. Clock tolerance is +/- 50 ppm
2. By default, the SFP-1GA-T-I 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, and the module PHY to be configured per Applications Note AN-2036. With a SERDES that does not support SGMII, the module will operate at 1000BASE-T only.

ENVIRONMENTAL SPECIFICATIONS

Parameter	Symbol	Min.	Typical	Max.	Units	Notes/Conditions
Operating Temperature	Top	-40	-	85	°C	Case temperature
Storage Temperature	Tsto	-40	-	85	°C	Ambient temperature

PIN DESCRIPTION
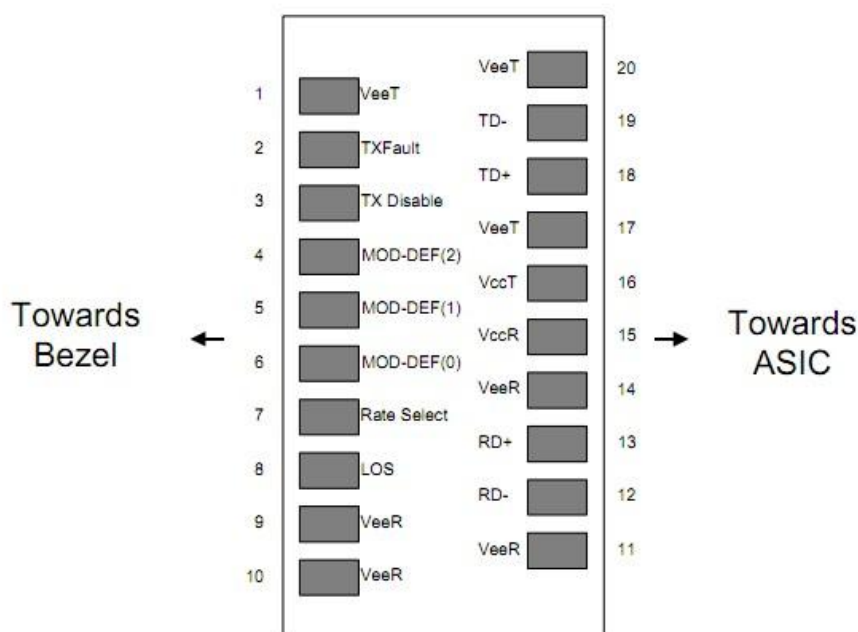
Diagram of Host Board Connector Block Pin Numbers and Names

Pin	Symbol	Description	Note
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault. Not supported.	
3	TDIS	Transmitter Disable. Laser output 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	Grounded	
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

Note:

1. Circuit ground is connected to chassis ground.
2. PHY disabled on TDIS>2.0V or open, enabled on TDIS<0.8V.
3. Should be pulled up with 4.7k - 10k Ohms on host board to a voltage between 2.0V and 3.6V. MOD_DEF(0) pulls line low to indicate module is plugged in.

SERIAL COMMUNICATION PROTOCOL

All ATGBICS SFPs support the 2-wire serial communication protocol outlined in the SFP MSA. These SFPs use an Atmel AT24C01A 128-byte E2PROM with an address of A0h. For details on interfacing with the EEPROM, see the Atmel data sheet titled "AT24C01A/02/04/08/16 2-Wire Serial CMOS EEPROM."

The 1000BASE-T physical layer IC can also be accessed via the 2-wire serial bus at address Ach. For details interfacing with the PHY IC, see Marvell data sheet titled "Alaska Ultra 88E1111 Integrated Gigabit Ethernet Transceiver" (Marvell document number MV-S100649-00).

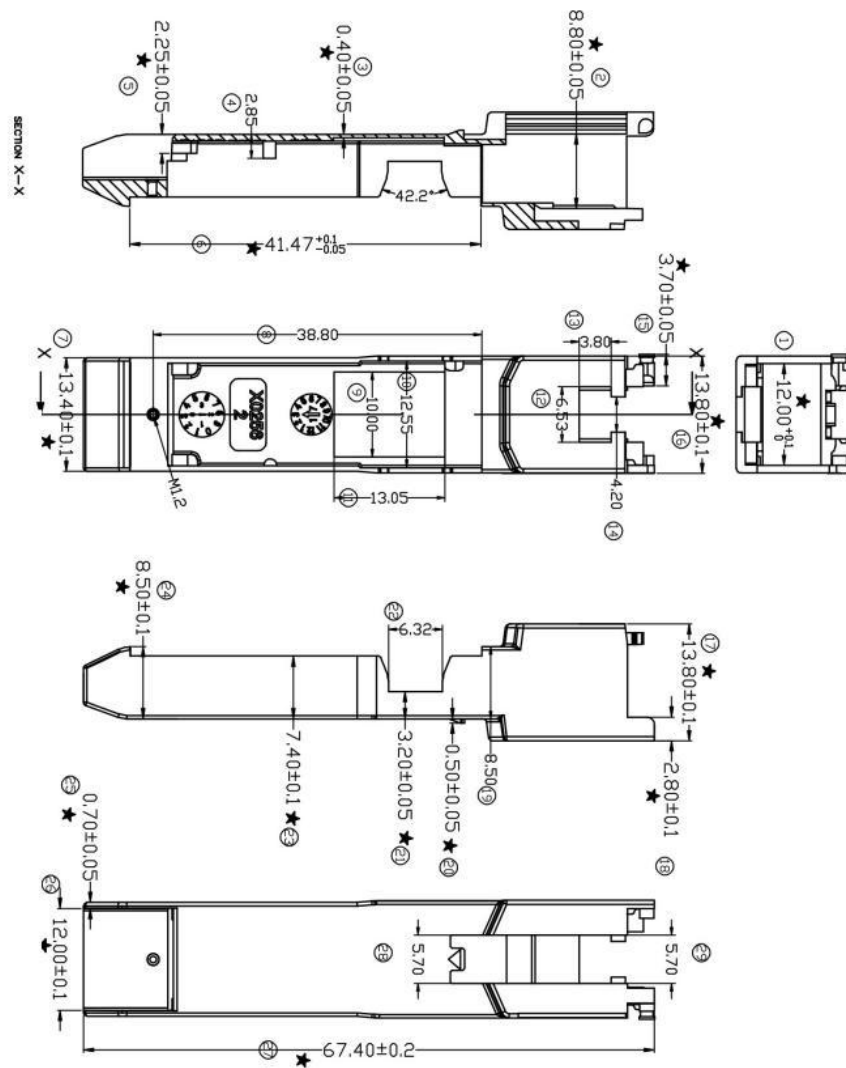| Parameter	Symbol	Min.	Typical	Max	Units	Notes/Conditions
IC Clock Rate		0		100000	Hz	

Serial Bus Timing Requirements

EEPROM

2 wire address 1010000X (A0h)

0~95 Serial ID Defined by SFP MSA (96 bytes)
96~127 Vendor Speific (32 bytes)
128~255 Reserved (128 bytes)

EEPROM SERIAL ID MEMORY CONTENTS

Data Address	Length (Byte)	Name of Length	Description and Contents
BASE ID FIELDS			
0	1	Identifier	SFP
1	1	Ext. Identifier	SFP function is defined by serial ID only
2	1	Connector	RJ45 Connector
3-10	8	Transceiver	Transmitter Code
11	1	Encoding	8B/10B
12	1	BR, Nominal	1.25Gbps
13	1	Reserved	
14	1	Length (9um) km	Transceiver Transmit Distance
15	1	Length (9um) 100m	
16	1	Length (50um) 10m	
17	1	Length (62.5um) 10m	
18	1	Length (Copper)	100m
19	1	Reserved	
20-35	16	Vendor Name	ATGBICS
36	1	Reserved	*OEM available
37-39	3	Vendor OUI	
40-55	16	Vendor PN	
56-59	4	Vendor Rev	*OEM available
60-61	2	Wavelength	01
62	1	Reserved	0nm
63	1	CC_BASE	
EXTENDED ID FIELDS			
64-65	2	Options	
66	1	BR, Max	
67	1	BR, Min	
68-83	16	Vendor SN	SN of Transceiver (ASCII)
84-91	8	Date Code	Exp. 120727
92	1	Diagnostic Monitoring	DDM Not implemented
93	1	Enhanced Options	Optional flags not implemented
VENDOR SPECIFIC ID FIELDS			
96-127	32	Vendor Specific	Depends on Customer Info
128-255	128	Reserved	Depends on Customer Info

MECHANICAL SPECIFICATIONS (UNIT: mm)

Mechanical Drawing