ATGBICS® by APPROVED TECHNOLOGY

Technical Datasheet

SFP-1G-SX

1000Base-SX SFP Transceiver

Hot Pluggable, +3.3V, LC Duplex, 850nm, up to 550m, Commercial Temperature

FEATURES

- Up to 1.25Gb/s Data Links
- Hot-Pluggable
- Duplex LC connector
- Up to 550m on 50/125μm MMF
- 850nm VCSEL laser transmitter
- Single +3.3V Power Supply
- Low power dissipation <1W typically
- Commercial Operating Temperature Range: 0°C to 70°C
- RoHS compliant and Lead Free

APPLICATIONS

- Metro/Access Networks
- 1.25Gb/s 1000Base-SX Ethernet
- 1 × Fibre Channel
- Other Optical Links

DESCRIPTION

ATGBICS SFP-1G-SX transceiver is a high-performance, cost-effective module which has a duplex LC optics interface. Standard AC coupled CML for high-speed signal and LVTTL control and monitor signals. The receiver section uses a PIN receiver and the transmitter uses a 850nm VCSEL laser, up to 8dB link budge ensures this module 1000Base Ethernet 550m application.

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ABSOLUTE MAXIMUM RATING

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Temperature	T_O	0		70	℃
Storage Temperature	T_S	-40		85	℃
Supply Voltage	V_{CC}	-0.5		4	V
Relative Humidity	RH	0		85	%

RECOMMENDED OPERATING ENVIRONMENT

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Temperature		0		70	℃
Supply Voltage	V_{CC}	3.135		3.465	V
Supply Current	Icc			300	mA
Inrush Current	I_{surge}			Icc+30	mA
Maximum Power	P_{max}			1	W

ELECTRICAL CHARACTERISTICS (VCC = 3.135 to 3.465 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
TRANSMITTER						
Input differential impedance	R_{in}	90	100	110	□	□
Single ended data input swing	$V_{in\ PP}$	250		1200	mVp-p	
Transmit Disable Voltage	V_D	Vcc – 1.3		Vcc	V	2
Transmit Enable Voltage	V_{EN}	Vee		Vee+ 0.8	V	
Transmit Disable Assert Time	$T_{dessert}$			10	us	
RECEIVER						
Single ended data output swing	Vout,p p	250		800	mv	3
LOS Fault	$V_{losfault}$	Vcc – 0.5		V_{CC_host}	V	5
LOS Normal	$V_{los\ norm}$	V_{ee}		V_{ee}+0.5	V	5
Power Supply Rejection	PSR	100			mVpp	6

Notes:

1. AC coupled.
2. Or open circuit.
3. Into 100 Ohm differential termination.
4. 20 – 80%
5. LOS is LVTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
6. All transceiver specifications are compliant with a power supply sinusoidal modulation of 20Hz to 1.5MHz up to specified value applied through the power supply filtering network shown on page 23 of the Small Form-factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA), September 14, 2000.

OPTICAL PARAMETERS (VCC = 3.135 to 3.465 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
TRANSMITTER						
Center Wavelength	λ_c	840	850	860	nm	
Spectral Width (RMS)	σ_{RMS}			0.85	nm	
Optical Output Power	P_{out}	-9		-3	dBm	1
Extinction Ratio	ER	9			dB	
Optical Rise/Fall Time	t_r / t_f			260	ps	2
Relative Intensity Noise	RIN			-120	dB/Hz	
Output Eye Mask	Compliant with IEEE802.3 z (class 1 laser safety)					
RECEIVER						
Optical Input Wavelength	λ_c	770		860	nm	
Receiver Overload	P_{ol}	0			dBm	4
RX Sensitivity	Sen			-17	dBm	4
RX_LOS Assert	LOS_A	-35			dBm	
RX_LOS De-assert	LOS_D			-18	dBm	
RX_LOS Hysteresis	LOS_H	0.5			dB	
GENERAL SPECIFICATIONS						
Data Rate	BR		1250		Mb/s	
Bit Error Rate	BER			10^{-12}		
Max. Supported Link Length on 50/125µm MMF@1250Gb/s	L_{MAX}		550		m	
Total System Budget	LB	8			dB	

Notes:

1. The optical power is launched into MMF.
2. 20-80%.
3. Jitter measurements taken using Agilent OMNIBERT 718 in accordance with GR-253.
4. Measured with PRBS 2^{7-1} at 10^{-12} BER

PIN ASSIGNMENT

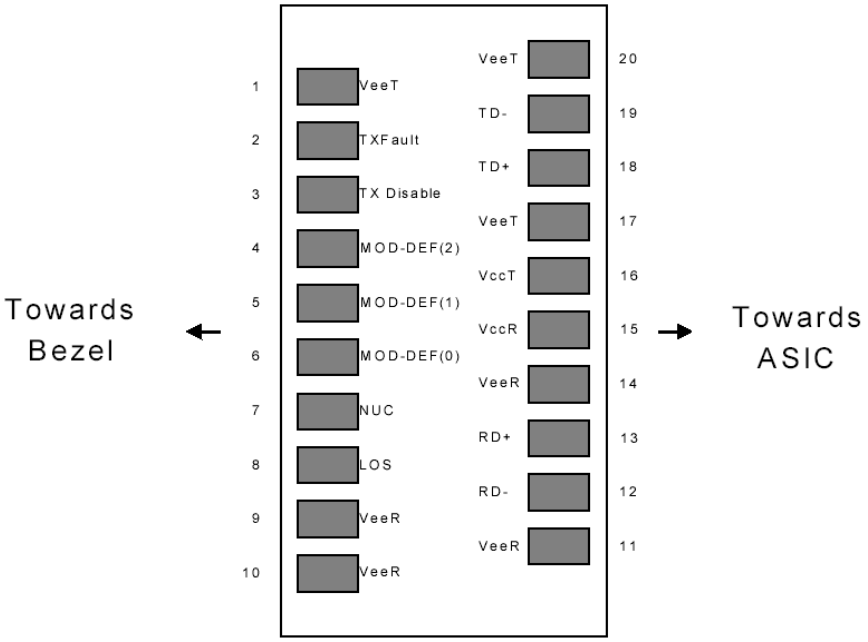


Diagram of Host Board Connector Block Pin Numbers and Names

PIN FUNCTION DEFINITIONS

Pin No	Name	Function	Plug Seq	Notes
1	VeeT	Transmitter Ground	1	1
2	TX Fault	Transmitter Fault Indication	3	
3	TX Disable	Transmitter Disable	3	2
4	MOD-DEF2	Module Definition	2	3
5	MOD-DEF1	Module Definition 1	3	3
6	MOD-DEF0	Module Definition 0	3	3
7	Rate Select	Not Connected	3	4
8	LOS	Loss of Signal	3	5
9	VeeR	Receiver Ground	1	1
10	VeeR	Receiver Ground	1	1
11	VeeR	Receiver Ground		1
12	RD-	Inv. Received Data Out	3	6
13	RD+	Received Data Out	3	6
14	VeeR	Receiver Ground	3	1
15	VccR	Receiver Power	2	1
16	VccT	Transmitter Power	2	
17	VeeT	Transmitter Ground	1	
18	TD+	Transmit Data In	3	6
19	TD-	Inv. Transmit In	3	6
20	VeeT	Transmitter Ground	1	

Notes:

1. Circuit ground is internally isolated from chassis ground.
2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3. Should be pulled up with 4.7k - 10 kOhms on host board to a voltage between 2.0V and 3.6V. MOD_DEF (0) pulls line low to indicate module is plugged in.
4. Rate select is not used
5. LOS is open collector output. Should be pulled up with 4.7k – 10 kOhms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
6. AC Coupled

SFP MODULE EEPROM INFORMATION AND MANAGEMENT

The SFP modules implement the 2-wire serial communication protocol as defined in the SFP-8472. The serial ID information of the SFP modules can be accessed through the I^2C interface at address A0h.

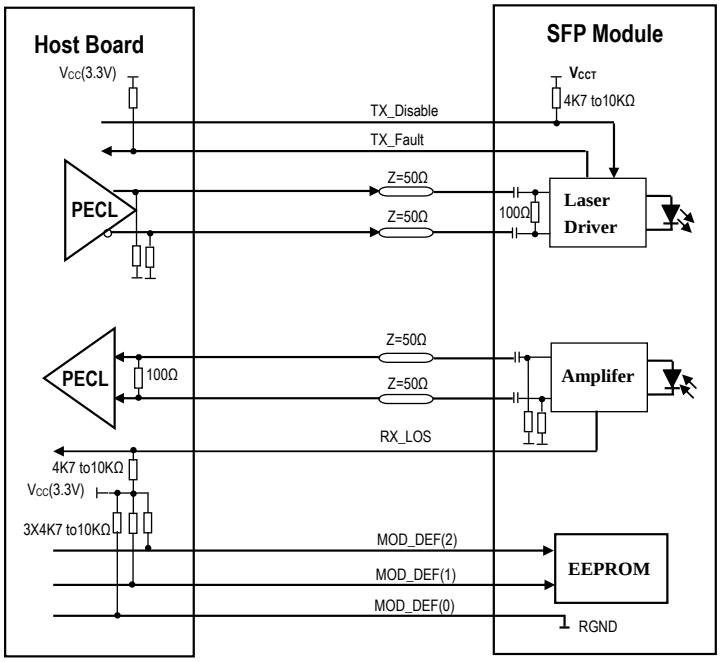
Data Address	Length (Byte)	Name of Length	Description and Contents
BASE ID FIELDS			
0	1	Identifier	Type of Serial transceiver (03h=SFP)
1	1	Reserved	Extended identifier of type serial transceiver (04h)
2	1	Connector	Code of optical connector type (07=LC)
3-10	8	Transceiver	
11	1	Encoding	NRZ (03h)
12	1	BR, Nominal	Nominal baud rate, unit of 100Mbps
13-14	2	Reserved	(0000h)
15	1	Length (9um)	Link length supported for 9/125um fiber, units of 100m
16	1	Length (50um)	Link length supported for 50/125um fiber, units of 10m
17	1	Length (62.5um)	Link length supported for 62.5/125um fiber, units of 10m
18	1	Length (Copper)	Link length supported for copper, units of meters
19	1	Reserved	
20-35	16	Vendor Name	SFP vendor name: ATGBICS
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number: “SFP-1G-SX” (ASCII)
56-59	4	Vendor rev	Revision level for part number
60-62	3	Reserved	
63	1	CCID	Least significant byte of sum of data in address 0-62
EXTENDED ID FIELDS			
64-65	2	Option	Indicates which optical SFP signals are implemented (001Ah = LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %
68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	Manufacturing date code
92-94	3	Reserved	
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
VENDOR SPECIFIC ID FIELDS			
96-127	32	Readable	Vendor specific date, read only
128-255	128	Reserved	Reserved for SFF-8079

REGULATORY COMPLIANCE

The SFP-1G-SX complies with international Electromagnetic Compatibility (EMC) and international safety requirements and standards (see details in Table following).

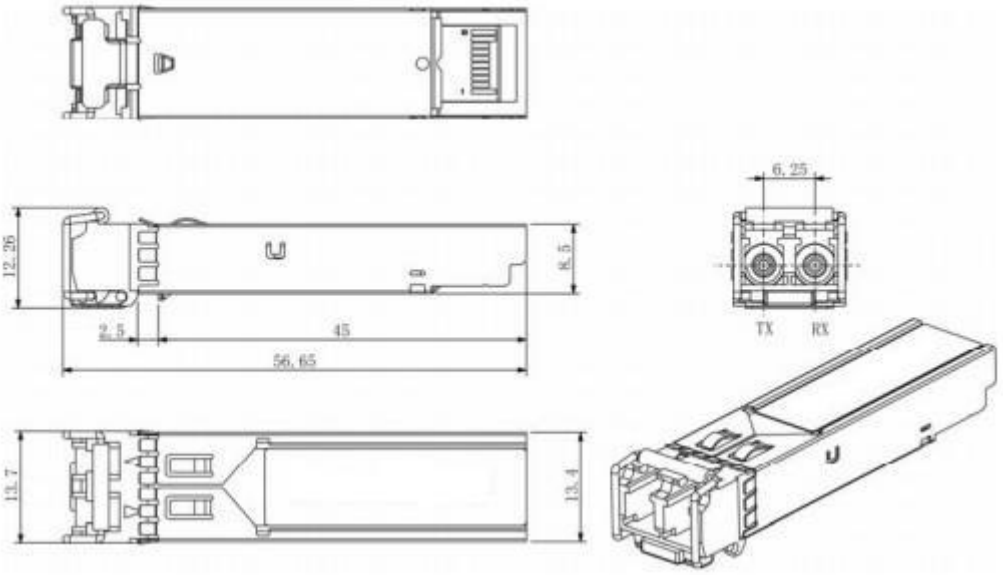
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883E Method 3015.7	Class 1(>1000 V)
Electrostatic Discharge (ESD) to the Duplex LC Receptacle	IEC 61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B	Compatible with standards
Laser Eye Safety	FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2	Compatible with Class 1 laser product.

RECOMMENDED CIRCUIT



SFP Host Recommended Circuit

MECHANICAL DIMENSIONS (UNIT: mm)



Mechanical Drawing