**Product Overview**

The electrical Small Form Factor Pluggable (SFP) transceiver module is specifically designed for converting 100Base-FX NRZI port interface to 10/100Base-TX interface with RJ45 connector. The transceiver module is compliant with the SFP MultiSource Agreement (MSA) and IEEE802.3u. With the hot pluggability, the module offers a flexible and easy way to be installed into SFP MSA compliant ports at any time without the interruption of the host equipments operating online.

The Copper SFP transceivers use an integrated RJ-45 connector with transformer and PHY IC.

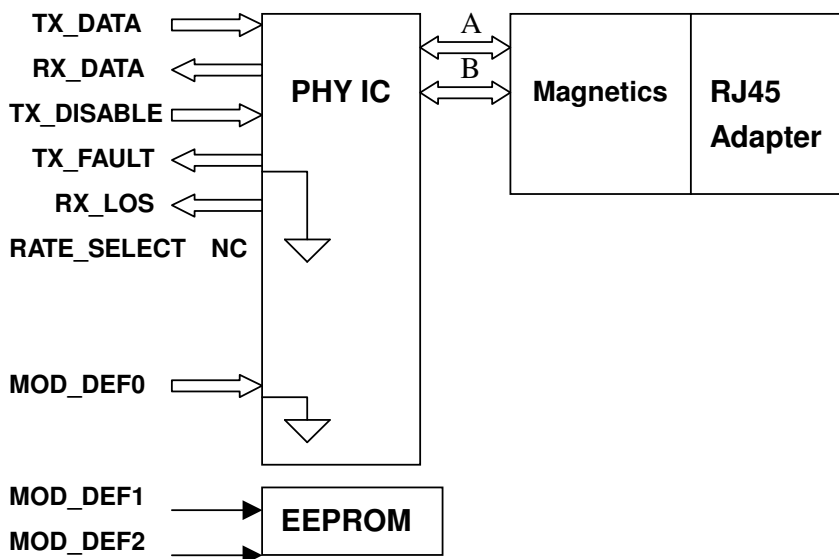
Features

- Hot pluggable
- Industry-Standard MSA-Compliant, Small Form Factor Pluggable (SFP)
- Compatible with IEEE 802.3u
- Operation temperature range 0°C ~ 70°C
- Single 3.3V power supply operation and very low power dissipation. Typical Supply Current is under 300mA
- Integrated RJ-45 connector with transformer
- Access to EEPROM via 2-wire serial bus
- It supports RX_LOS (Loss of Signal) function

Applications

- This 100Base-TX Copper SFP Transceiver supports the SFP based switch 100Base-FX ports that accept standard 100Base-FX optics SFP.

Block diagram



The transceiver is fundamentally consisted by three parts: RJ45+Magnetics, PHY IC and EEPROM. The transceiver module can be turned on by setting TX_DISABLE = LOW and can be reset by setting TX_DISABLE =High or OPEN. TX_FAULT is not supported and always connected to ground. LOS (Loss of signal) detection is an optional function . For the access of serial identification information, anEEPROM is used to store the required data via the 2-wire serial CMOS EEPROM protocol.

The detailed signal descriptions are listed in the following sections.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T _{OP}	0	70	°C	
Storage Temperature	T _{st}	- 40	85	°C	1
Supply Voltage	V _{CC}	- 0.5	3.6	V	
Supply Current	I _s		350	mA	
Inrush Current	I _{sh}		30	mA	
Relative Humidity	RH	5	95	%	

Notes:

1. Ambient Temperature

Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Temperature	T _{OP}	0		70	°C	1
Supply Voltage	V _{CC}	3.15	3.3	3.45	V	
Supply Current	I _S		200	300	mA	2

Notes:

1. Case Temperature,
2. The copper SFP transceiver Meet the requirement of SFP MSA that specifies the maximum current consumption of 300mA at 3.3V+/- 5%.

High-Speed Electrical Interface, Host to SFP

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
TD+, TD- Input Voltage Swing	V _{in+} , V _{in-}	250		1200	mV	2
RD+, RD- Output Voltage Swing	V _{out+} , V _{out-}	250		800	mV	2
Tx_Disable -High	V _{Disable_H}	2		V _{cc}	V	
Tx_Disable - Low	V _{Disable_L}	0		0.4	V	
Rise Time (Receiver)	t _r			2	ns	1
Fall Time (Receiver)	t _f			2	ns	1
Tx Input Impedance	Z _{in}		50		Ohm	2
Rx Output Impedance	Z _{out}		50		Ohm	2

Notes:

1. 10% to 90% value
2. Single ended

High-Speed Electrical Interface, Cable to SFP

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmission Frequency	f _t		125		MHz	1
Tx Output Impedance	Z _{out.Tx}		100		Ohm	2
Rx Output Impedance	Z _{in.Rx}		100		Ohm	2

Notes:

1. MLT-3 encoding per IEEE802.3u
2. Differential for frequencies from 1MHz to 125MHz

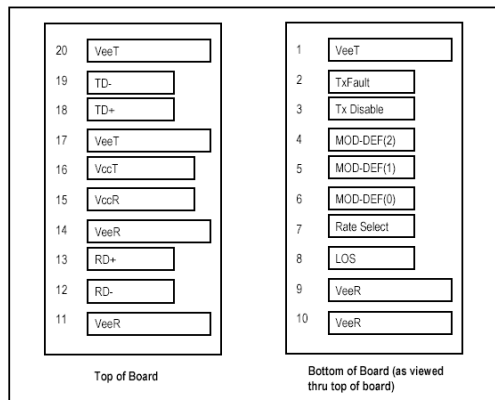
General Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Data Rate	DR			100	Mb/sec	1
Bit Error Rate	BER			10 ⁻¹⁰		2

Notes:

1. IEEE802.3u compatible. The host requires an 100Base-FX NRZI 125Mbps interface with no clock to operated 100 BASE-TX.
2. Over 100m Cat 5 UTP Cable

Pin Description



SFP Transceiver Electric Pad Layout

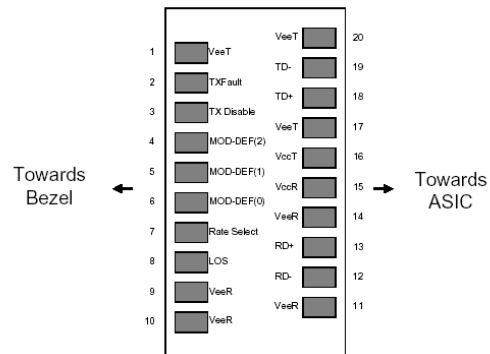


Diagram of Host Board Connector Block

Pin Numbers and Names

Pin No	Pin Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	1
3	TX Disable	Transmitter Disable	3	2
4	MOD_DEF 2	Module Definition 2	3	3
5	MOD_DEF 1	Module Definition 1	3	3
6	MOD_DEF 0	Module Definition 0	3	3
7	Rate Select	Select between full or reduced receiver bandwidth	3	4
8	LOS	Loss of Signal	3	5
9	VeeR	Receiver Ground	1	6
10	VeeR	Receiver Ground	1	6
11	VeeR	Receiver Ground	1	6

10/100Base-TX Copper SFP Transceiver

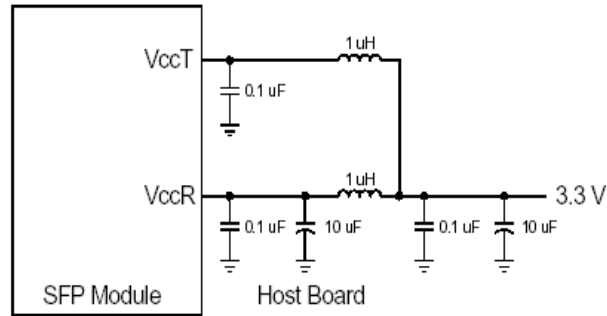
Pin No	Pin Name	Function	Plug Seq.	Notes
12	RD -	Inv. Received Data Out	3	7
13	RD +	Received Data Out	3	7
14	VeeR	Receiver Ground	1	6
15	VccR	Receiver Power	2	8
16	VccT	Transmitter Power	2	8
17	VeeT	Transmitter Ground	1	6
18	TD +	Transmit Data In	3	9
19	TD -	Inv. Transmit Data In	3	9
20	VeeT	Transmitter Ground	1	6

Notes:

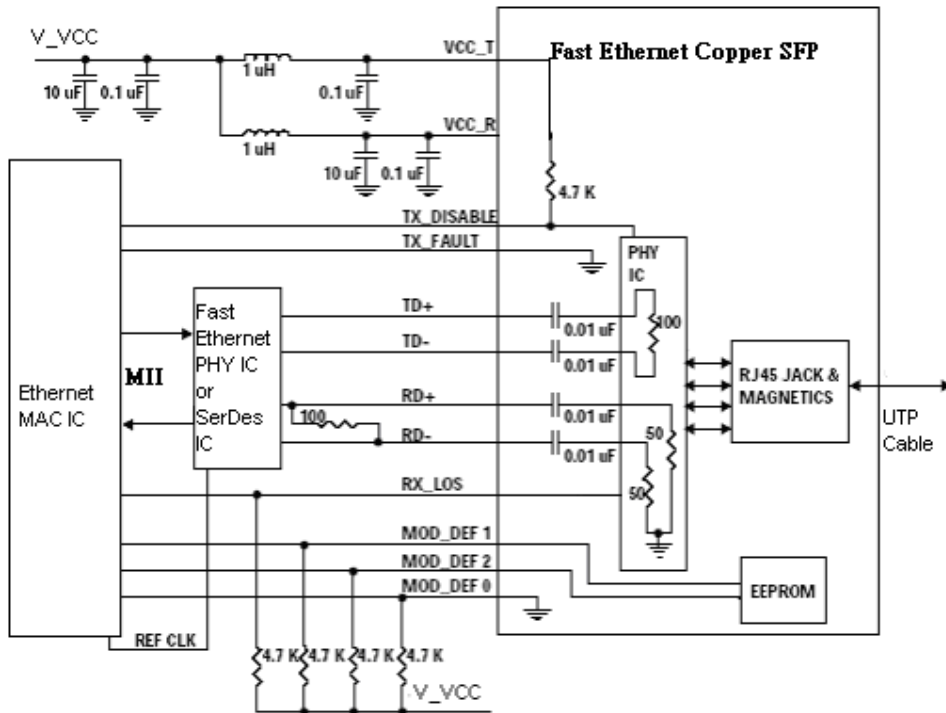
Plug Seq.: Pin engagement sequence during hot plugging.

- TX Fault is not supported and is always connected to ground.
- TX disable is an input that is used to reset the transceiver module. It is pulled up within the module with a 4.7 – 10 K resistor. Its states are:
 - Low (0 – 0.8V): transceiver module on
 - (>0.8, < 2.0V): Undefined
 - High (2.0 – 3.465V): transceiver module Disabled
 - Open: transceiver module Disabled
- Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K - 10K resistor on the host board. The pull-up voltage shall be VccT or VccR
 - Mod-Def 0 is grounded in the module to indicate that the module is present
 - Mod-Def 1 is the clock line of two-wire serial interface for serial ID
 - Mod-Def 2 is the data line of two-wire serial interface for serial ID
- Rate select is not required for connection
- RxLOS (Loss of Signal) : This active high signal is asserted when the status of network is Link Down. RxLOS is active low when the status of network is Linkup.
- VeeR and VeeT may be internally connected within the SFP module.
- RD-/+ : These are the differential receiver outputs. They are AC coupled 100Ω 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 and 2000 mV differential (185 mV- 1000 mV single ended) when properly terminated.
- VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V ±5% at the SFP connector pin. Maximum supply current is 350 mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 Ω should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.
- TD-/+ : These are the differential transmitter inputs. They are AC-coupled differential lines with 100Ω 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 – 2400mV (250 mV - 1200 mV single ended), though it is recommended that values between 500 and 1200mV differential (250 – 600mV single ended) be used for best EMI performance.

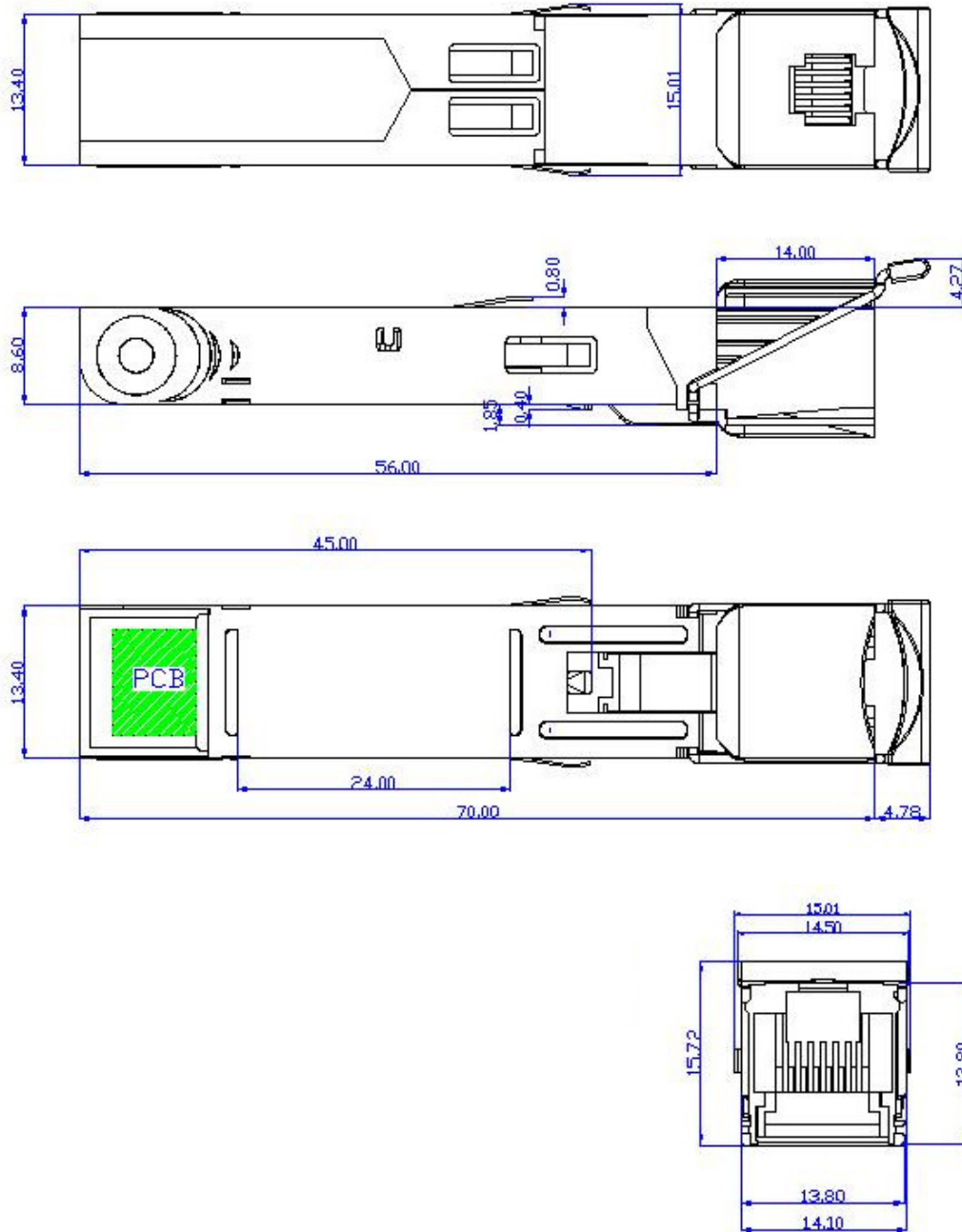
Recommended Host Board Supply Filtering Network



SFP Host Board Schematic



Mechanical Dimensions (Units in mm)



Ordering Information

Product Code	Description
SFP-100-T02	10/100Base-TX Copper SFP, 3.3V, 0~70°C , with LOS