RoHS Compliant 1000BASE-T Copper SFP Transceiver

PRODUCT FEATURES

- Up to 1.25Gb/s bi-directional data links
- Hot-pluggable SFP footprint
- Extended case temperature range (0°C to +85°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 systems with SGMII interface
- 1Gigabit Ethernet over Cat 5 cable

PRODUCT DESCRIPTIONS

HRUI 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 supporting 1000Mbps data- rate up to 100 meters reach over unshielded twisted-pair CAT 5 cable. The module supports1000 Mbps (or 10/ 100/ 1000Mbps) full duplex data-links 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 ACh.

SFP to Host Connector Pin Out

Pin	Symbol	Name/ Description	Ref
1	VEET	Transmitter ground (common with receiver ground)	1
2	TFAULT	Transmitter Fault. Not supported	
3	TDIS	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 indication.	4
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

Notes: 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 2.0 V and 3.6 V. MOD_DEF(0) pulls line low to indicate module is plugged in.

4. LVTTL compatible with a maximum voltage of 2.5V. Not supported on GE-GB-P.

Table 1. SFP to host connector pin assignments and descriptions

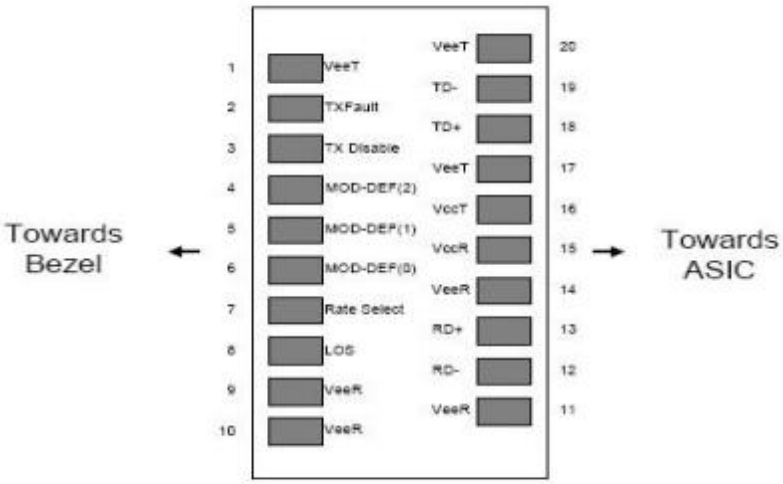

Figure 1. Diagram of host board connector block pin numbers and names

+3.3V Volt Electrical Power Interface

The copper SFP has an input voltage range of 3.3 V +/- 5%. The 4 V maximum voltage is not allowed for continuous operation.

+3.3 Volt Electrical Power Interface

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

Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
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	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

Table 1. +3.3 Volt electrical power interface

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

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	VOH	host_ Vcc	host_Vcc +	V	4 7k to 10k pull-up to host_Vcc, measured at host
HIGH		- 0.5	0.3		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

Table 2. Low-speed signals, electronic characteristics

High-Speed Electrical Interface

All high-speed signals are AC-coupled internally

High-Speed Electrical Interface Transmission Line-SFP						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Notes/ Conditions**
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

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

High-Speed Electrical Interface , host-SFP

Host-SFP						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Notes/Conditions**
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						
Rx Output Impedance	Zout		50		Ohm	Single ended

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