Quality Network Components
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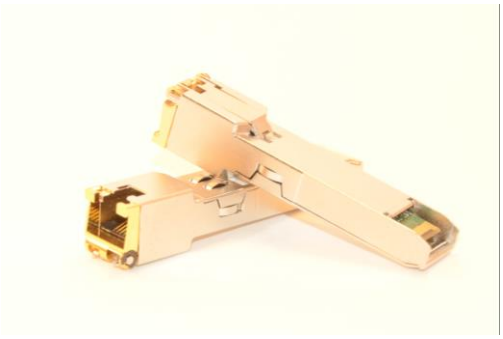
QNC-SFPT-12-02-4
10/100/1000 BASE-T Copper SFP Transceiver

PRODUCT FEATURES



- Up to 1.25 b/s Bi-Directional Data Links
- Compact RJ-45 Connector Assembly
- Hot-Pluggable SFP Footprint
- Low Power Dissipation (1.05w Typical)
- Metal Enclosure, for Lower EMI
- RoHS Compliant and Lead-Free
- Single +3.3v Power Supply
- 10/100/1000 Base-T Operation in Host Systems with SGMII Interface
- 1.25 Gigabit Ethernet over Cat 5 Cable
- Case Operating Temperature
  Commercial: 0°C to +70°C
  Extended: -10°C to +80°C
  Industrial: -40°C to +85°C

PRODUCT DESCRIPTION

Quality Network Components' (QNC) QNC-SFPT-12-02-4 10/100/1000 BASE-T Copper Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). They are compatible with the Gigabit Ethernet standards as specified in IEEE Std 802.3. The 10/100/1000 BASE-T Physical Layer IC (PHY) can be accessed via I2C, allowing access to all PHY settings and features.

The QNC-SFPT-12-02-4 is compatible with 1000BASE-X auto-negotiation, and has a link indication feature. PHY is disabled when TX disable is high or open.

Product Part Number	Link Indicator on RX_LOS Pin	1000BASE-X Auto-Negotiation Enabled by Default
QNC-SFPT-12-02-4	Yes	Yes

I. SFP to Host Connector Pin Out

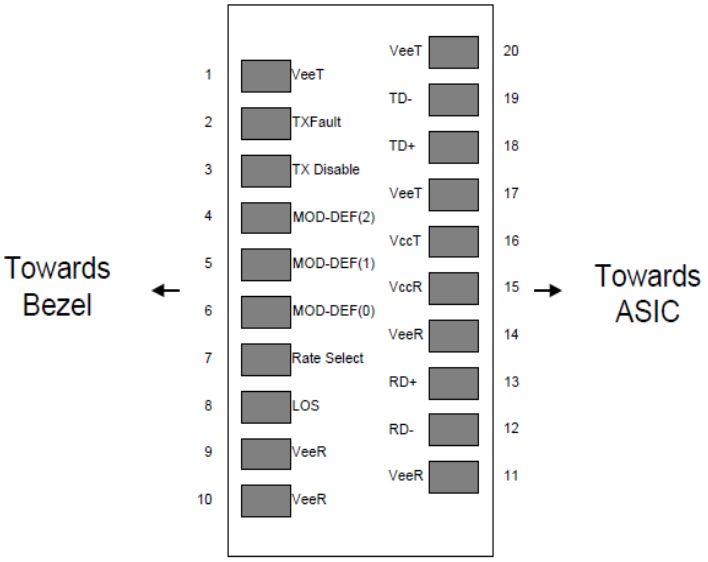


Figure 1. Pin Out of Connector Block on Host Board

Pin Descriptions

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. Logic 0 indicates normal operation.	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 T_{DIS} > 2.0V or open, enabled on T_{DIS} < 0.8V.
3. Should be pulled up with 4.7k - 10kohms 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. LVTTL compatible with a maximum voltage of 2.5V. Not supported on QNC-T-120404.

II. 3.3V Volt Electrical Power Interface

The QNC-SFPT-12-02-4 has an input voltage range of 3.3V +/- 5%. The 4V maximum voltage is not allowed for continuous operation.

+3.3 Volt Electrical Power Interface						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**	**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.

III. 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**	**Unit**	**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.

IV. High-Speed Electrical Interface

All high-speed signals are AC-coupled internally.

High-Speed Electrical Interface, Transmission Line-SFP						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**	**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

High-Speed Electrical Interface, Host-SFP						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**	**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	T_r,T_f		175		psec	20%-80%
Tx Input Impedance	Zin		50		Ohm	Single Ended
Rx Output Impedance	Zout		50		Ohm	Single Ended

V. General Specifications

General						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**	**Notes/Conditions**
Data Rate	BR	10		1000	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 QNC-SFPT-12-02-4 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.

VI. Environmental Specifications

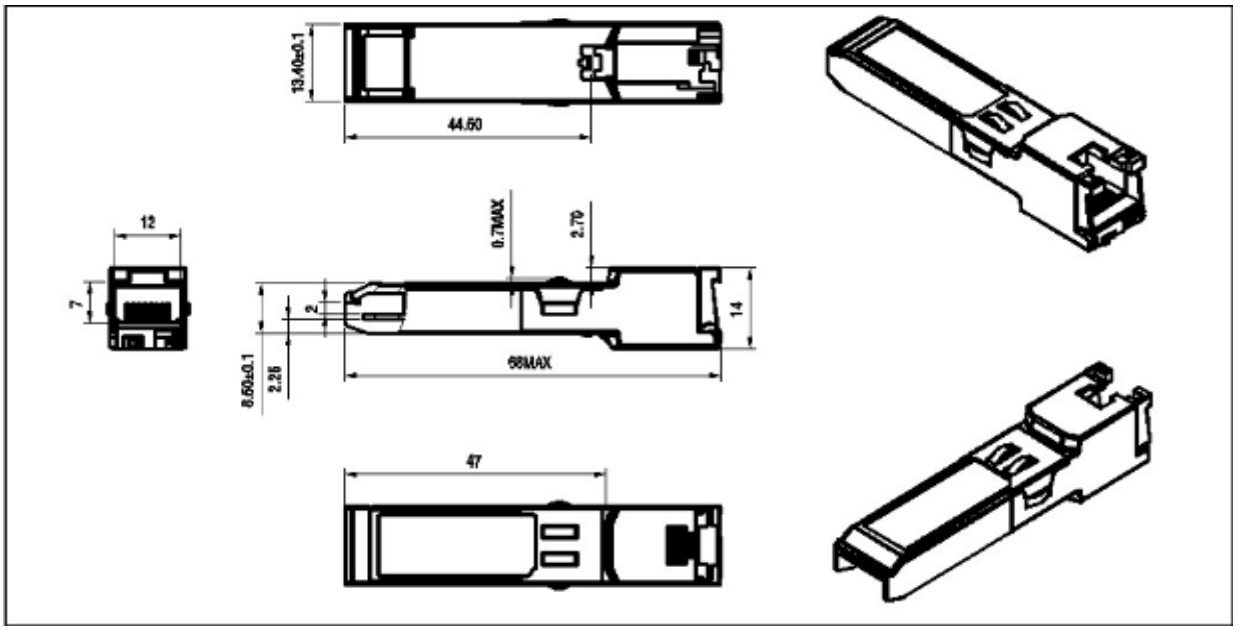
Environmental Specifications						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**	**Notes/Conditions**
Case Operating Temperature	Tcase	0		70	°C	QNC-SFPT-12-02-4
		-10		80	°C	QNC-SFPT-12-02-4E
		-40		85	°C	QNC-SFPT-12-02-4A
Storage Temperature	Tsto	-40		85	°C	Ambient Temperature

VII. Serial Communication Protocol

QNC-SFPT-12-02-4 support the 2-wire serial communication protocol outlined in the SFP MSA. It uses an Atmel AT24C02B 256 byte EEPROM with an address of A0h.

Serial Bus Timing Requirements						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Unit**	**Notes/Conditions**
I ^{2}C Clock Rate		0		100,000	Hz	

VIII. Mechanical Specifications (Unit: mm)



Appendix A. Document Revision

Version No.	Date	Description
1.0	2011-4-22	Preliminary Datasheet
2.0	2011-9-10	Update Format and Company's Logo
3.0	2012-02-02	Add Industrial Temperature Type