

FEATURES AND SPECIFICATIONS



1000Base-T RJ-45 Gigabit Ethernet GBIC Copper Transceiver

74740



Features and Benefits

- 1000Base-T compliant, meets IEEE802.3z, ab specifications and is GBIC SFF-8053 Rev 5.5 compliant – For improved intermatability
- 1.63 Watt power requirement – Low heat output
- Hot pluggable – Eliminates need to power down to remove or install transceiver
- Zinc back shells – Improved EMI performance
- Auto-negotiation – Allows networking equipment to automatically determine and adjust to the required settings
- Automatic MDI crossover – Eliminates the need for crossover cables or cross-wired (MDIX) ports
- Link monitor – Detects loss of signal
- Serial ID – Allows individual identification of each GBIC transceiver
- Auto-Power shutdown – Saves energy

Applications

- Networking Equipment
 - Switches
 - Routers

Reference Information

Packaging: 1
 Mates With: GBIC Cage 73847 series
 SCA-2 Receptacle 74065 series

Electrical

Voltage: 5v
 Current: 350mA

Physical

Zinc Diecast Backshell
 PCB Thickness: .062"
 Operating Temperature: 0 to 70° C

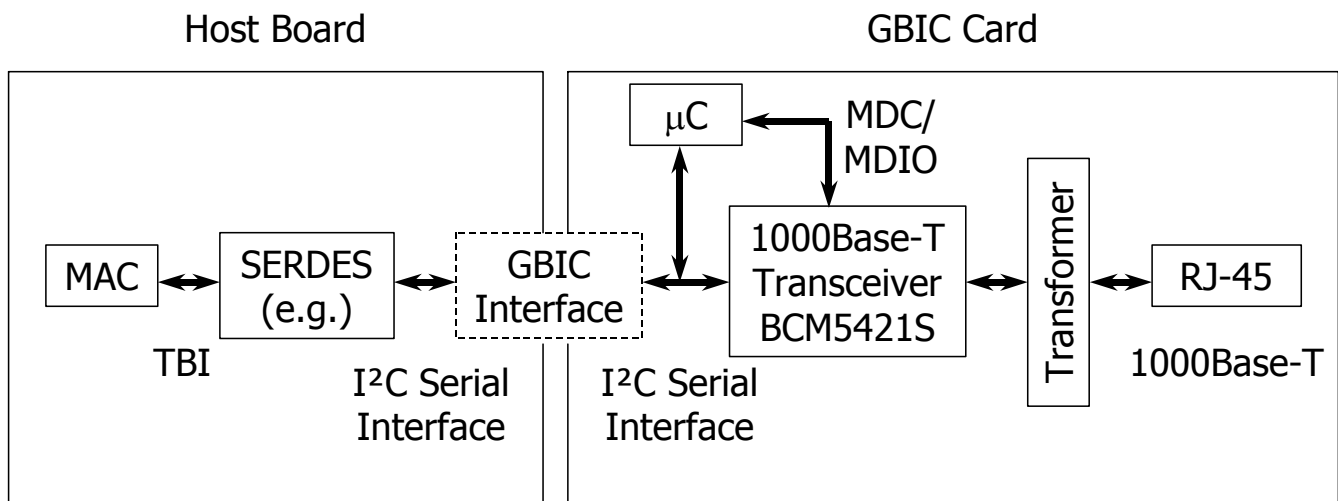
The 1000Base-T RJ-45 Gigabit Ethernet GBIC copper transceiver is a high performance integrated duplex data link for bi-directional communication over Cat-5 copper cable. The hot pluggable feature allows changing to or from another GBIC compatible module without having to remove system power. Serial ID is included.

ORDERING INFORMATION

Order Number	Description
74740-0001	RJ-45 1000Base-T GBIC Transceiver With Serial ID, Auto Negotiation On LOS GND
74740-0002	RJ-45 1000Base-T GBIC Transceiver With Serial ID, Auto Negotiation On LOS Toggle
74740-0003	RJ-45 1000Base-T GBIC Transceiver With Serial ID, Auto Negotiation Off LOS Toggle

FEATURES

Figure 1. RJ-45 GBIC 1000Base-T Application





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GBIC Mode

When the internal gigabit Ethernet transceiver (PHY) is configured to GBIC mode, the PHY can interface directly with the host serial/deserial (SERDES) interface. The host interface transmits and receives serial data differentially at 1.25Gbps. The copper interface is full featured and advertises full/half duplex, and 1000Base-T wire speed.

Auto-Negotiation

Auto-Negotiation is supported over both the twisted pair copper link and SERDES interface as defined in the IEEE 802.3 standards and is performed as part of the initial set-up of the link. The copper link is negotiated according to the IEEE 802.3 Clause 28, and Clause 37 is used in the negotiation of the SERDES interface. The two interfaces advertise 1000Base-T full-duplex, and master/slave relationships. The master establishes the time control from its local clock source. The slave however recovers the clock from the received data stream. The GBIC application is limited to 1000Base-T wire speed only. Auto-Negotiation on the SERDES link is always restarted when a change is detected on copper link (see Link Monitor and Loss-of-Signal for further details).

Automatic MDI Crossover

The 1000Base-T GBIC transceiver performs a MDI crossover during Auto-Negotiation eliminating the need for crossover cables or cross-wired (MDIX) ports.

Loss of Signal - Link Monitor

Following Auto-Negotiation, the master and slave begin sending data over the twisted pair link. The master and slave continuously monitor the copper link for quality of data. The link status bit is set after one microsecond of quality data. If the quality of copper link drops below factory PHY minimums, the GBIC will drop the SERDES link, and assert the LOS I/O interface (optional) in less than 200 milliseconds.

Auto Power Savings Mode

When the copper link is lost, the GBIC automatically enters a low power mode reducing the chip power requirements. Full power mode resumes once the copper link is re-established.

Not Implemented in GBIC Auto-Negotiation

Next page exchange and detection of remote faults are not auto-negotiated.



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Auto-Negotiation Features Supported:

General:

- ◆ SERDES Auto-Negotiation is restarted when a change is detected on the copper link
- ◆ Auto power savings mode when copper link is lost

Copper RJ-45 Interface:

- ◆ Auto-Negotiation
- ◆ Copper GBIC speed is 1000Base-T only
- ◆ Full/Half duplex
- ◆ Automatic MDI Crossover
- ◆ Master/Slave relationships
- ◆ Pause flow control (see flow charts)

Host SERDES Interface:

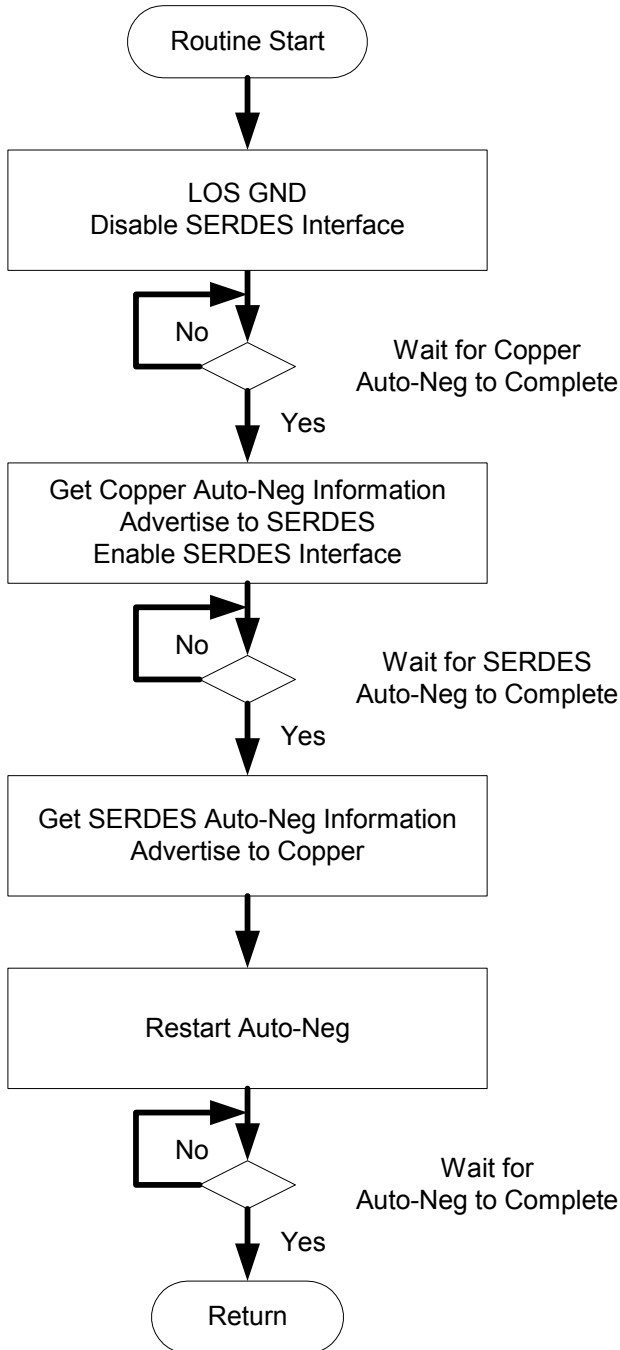
- ◆ Differential SERDES Interface at 1.25Gbps
- ◆ Master/Slave relationships
- ◆ SERDES recovers the clock from the received data stream
- ◆ Pause flow control (see flow charts)

Not Implemented in GBIC Auto-Negotiation:

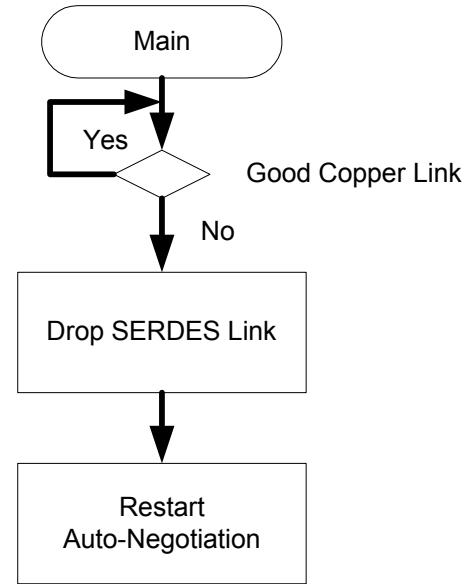
- ◆ Next page exchange
- ◆ Detect remote fault



Auto-Negotiation

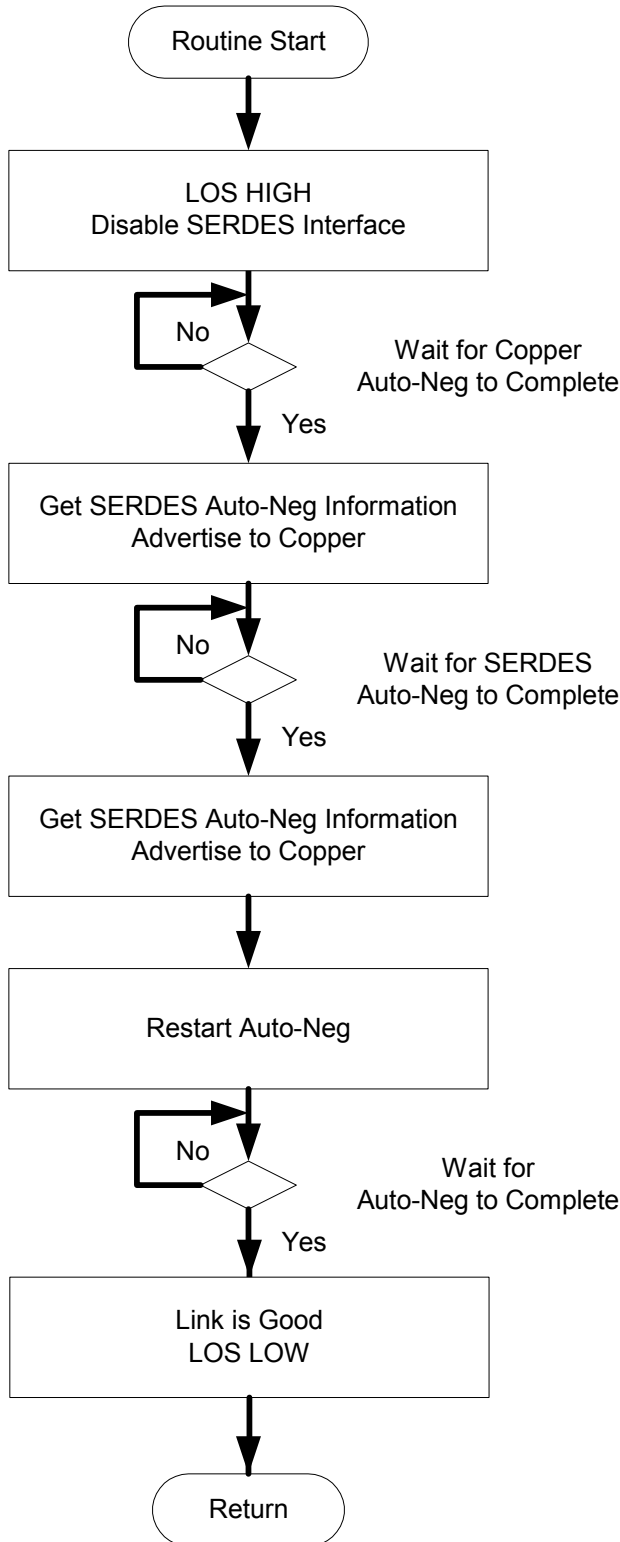


Link Dropout

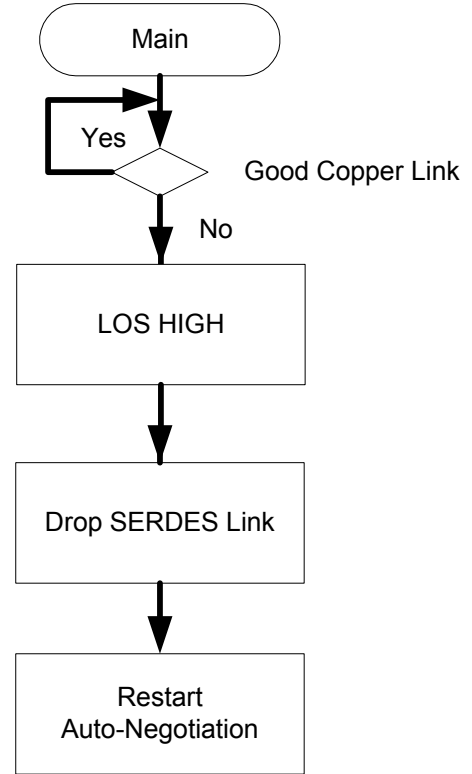




Auto-Negotiation

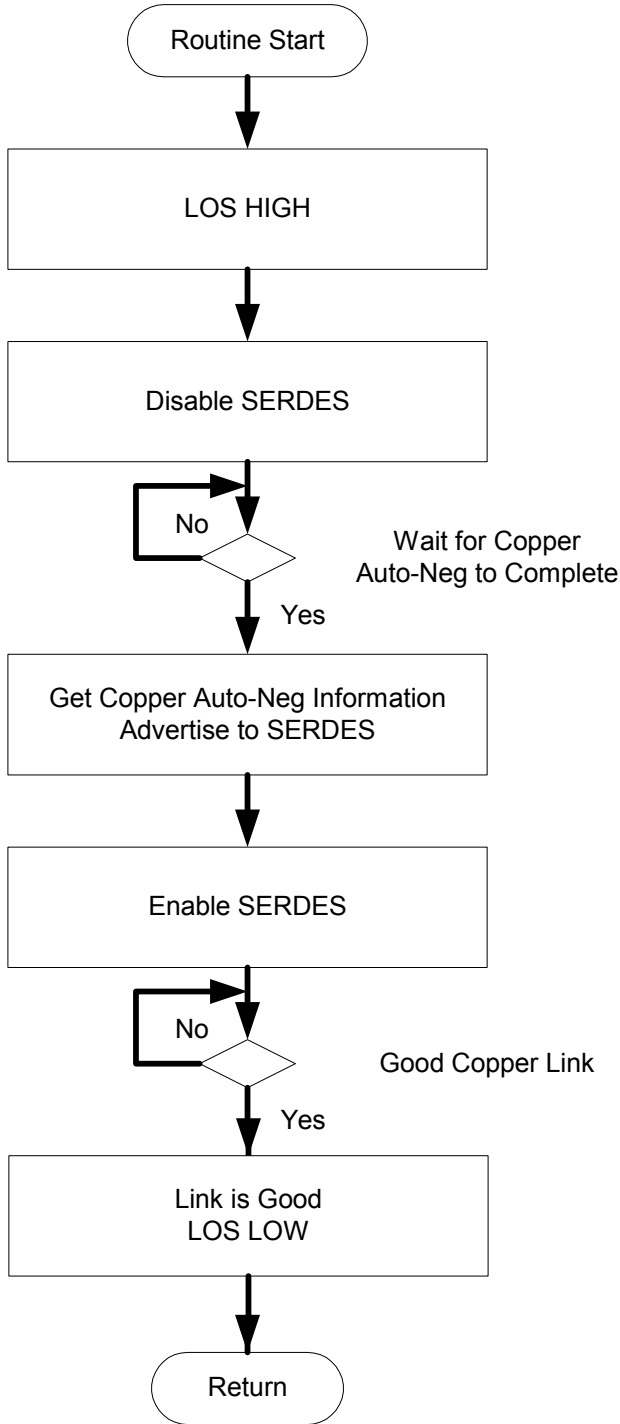


Link Dropout

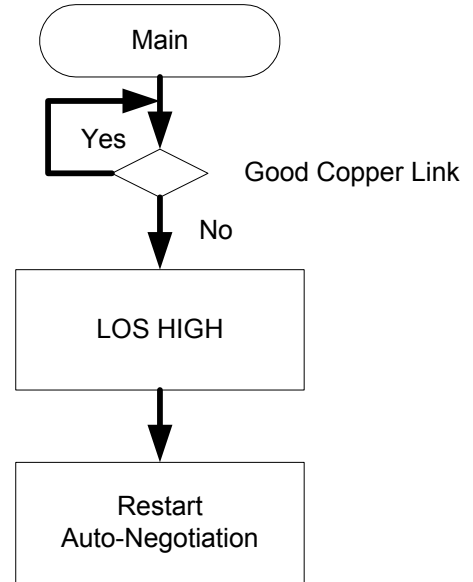




Auto-Negotiation



Link Dropout





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Through random I2C read commands, the host can change the auto-negotiation state of the GBIC. When auto-negotiation in the GBIC is off, the GBIC does not automatically query the host and advertise pause flow control on the copper interface. If the host requires advertisement of pause flow control and auto-negotiation is off, the host can set pause, and asymmetric pause using the defined I2C commands. Serial ID addresses 128-133 are used in the random I2C read commands. The read commands, and GBIC actions are defined in the I2C Command Table.

I2C Command Table

I2C Read Address	Description	GBIC Actions
128 (0x80)	GBIC Auto-Negotiation Status	<ul style="list-style-type: none"> Return Status Byte
129 (0x81)	Enable Auto-Negotiation	<ul style="list-style-type: none"> Turn Auto-Negotiation ON Restart Auto-Negotiation Return Status Byte
130 (0x82)	Disable Auto-Negotiation	<ul style="list-style-type: none"> Turn Auto-Negotiation OFF Restart Auto-Negotiation Return Status Byte
131 (0x83)	Clear SERDES Pause Flow Control Advertisement	<ul style="list-style-type: none"> Clear Pause Flow Control Clear Asymmetric Pause Return Status Byte
132 (0x84)	SERDES Pause Flow Control Advertisement (auto-negotiation off only)	<ul style="list-style-type: none"> Set SERDES Pause Flow Control Bit Return Status Byte
133 (0x85)	SERDES Asymmetric Pause Flow Control Advertisement (auto-negotiation off only)	<ul style="list-style-type: none"> Set SERDES Asymmetric Pause Flow Control Bit Return Status Byte

GBIC Status Byte

Bit	Description
7	Reserved
6	Reserved
5	Reserved
4	Copper has Advertised Asymmetric Pause
3	Copper has Advertised Pause
2	Host to Advertise Asymmetric Pause on Copper
1	Host to Advertise Pause on Copper
0	GBIC Auto Negotiation Status 1 = On / 0 = Off



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Module Specifications – Recommended Operating Conditions

PARAMETERS	SYMBOL	MIN	TYP	MAX	UNITS	NOTES
Storage Temperature	Tstg	-40		85	°C	
Ambient Operating Temperature	Ta	0		70	°C	
Supply Voltage	V _{DD} R, V _{DD} T	4.75		5.25	Vdc	Vcc-ground
Supply Current	I _{cc}			350	mA	
Surge Current	I _{surge}			55	mA	Surge above steady state value
GBIC Host Serial Interface (TX/RX)						
Data Input/Output Type						LVDS, AC coupled
Impedance (SERDES Interface)			150		ohms	Differential
Transmitter (Input to GBIC)						
Input Voltage		400		2400	mVpp	
Receiver (Output to SERDES)						
Output Voltage		875		1525	mVpp	
Max Off Voltage				170	mVpp	
Rise Time, 20%–80%		85		350	ps	
Total Jitter				192	ps	
Skew				175	ps	
Link Dropout						
74740-0001			100	200	msec	From detection of loss of signal to SERDES disable
Loss of Signal Timing						
74740-0002, 74740-0003						
RX_LOS assert delay	t _{loss_on}		100	200	msec	From detection of loss of signal to assertion of RX_LOS
RX_LOS negate delay	t _{loss_off}		3	3.5	sec	From detection of presence of signal to negation of RX_LOS



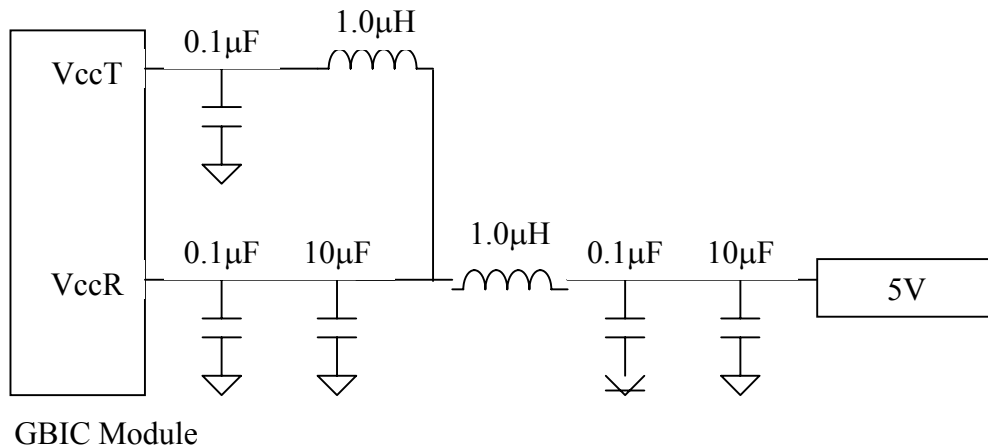
Temperature: 75°C

Assembly Name	Part Number	Failure Rate	MTBF
1000Base-T Adapter	74740-xxxx	0.309435	3,231,693
Active Components		0.178609	5,598,828
Passive Components		0.130827	7,643,711

IMPEDANCE MATCHING AND POWER SUPPLY FILTERING

Signal inputs/outputs on the GBIC transceiver modules are AC coupled and internally terminated to 75 ohms (TD+, TD-, RD+, RD-). Each leg of the differential pair was equally matched in length. Figure 2 shows the recommended power supply filtering network.

Figure 2: Recommended Host Board Supply Filtering Network

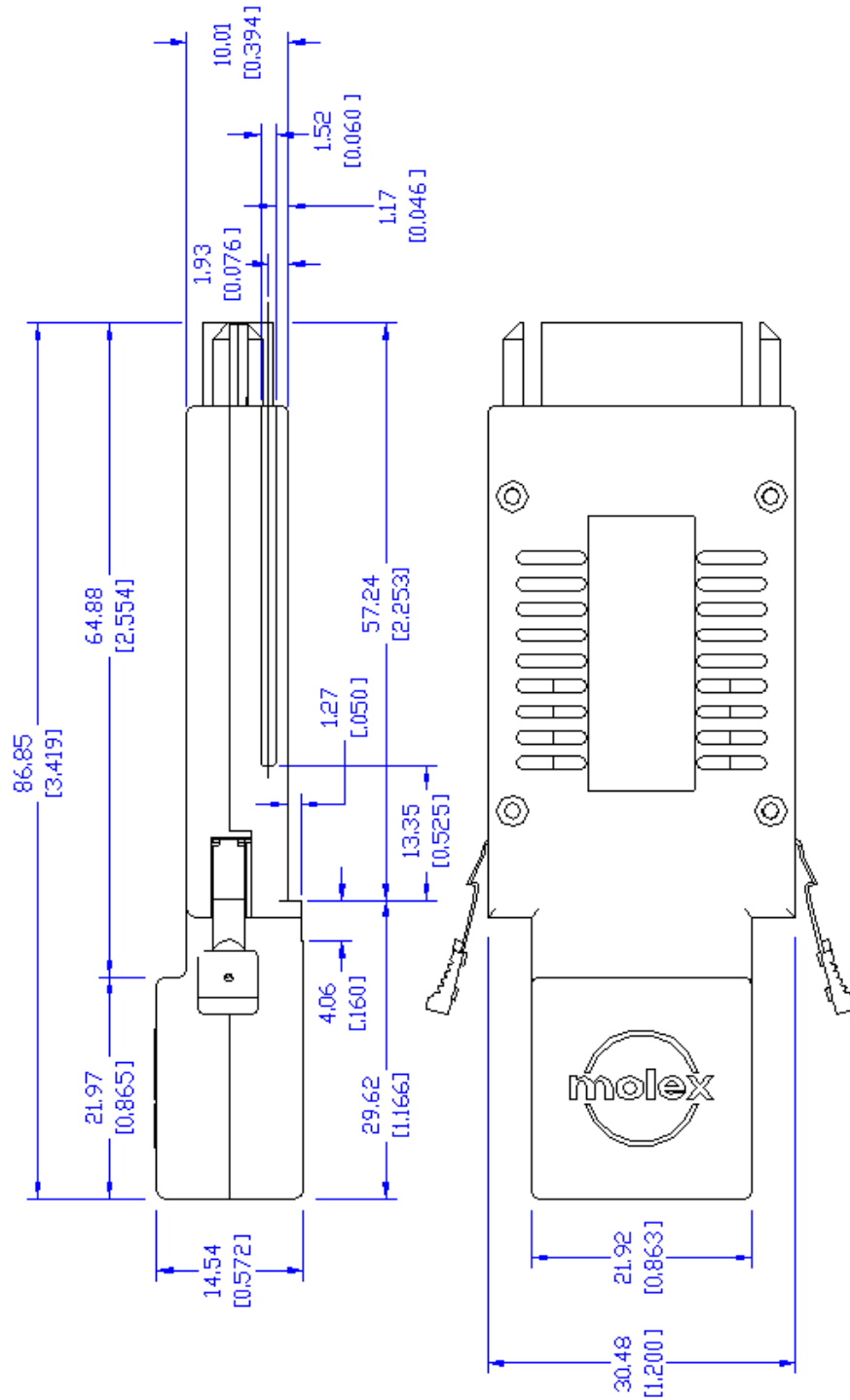




PIN	NAME	DESCRIPTION
PIN 1	RX_LOS	Receiver Loss of Signal, logic high, open collector compatible, 4.7 K to 10 K Ohm pull-up to V _{DD} T on host. See part number chart for details.
PIN 2	RGND	Receiver Ground
PIN 3	RGND	Receiver Ground
PIN 4	MOD_DEF(0)	GBIC module definition and presence, 4.7 K to 10 K Ohm pull-up to V _{DD} T on host
PIN 5	MOD_DEF(1)	Signal SCL (Clock) of the 2-wire serial ID interface, 4.7 K to 10 K Ohm pull-up to V _{DD} T on host, 100KHz maximum clock rate.
PIN 6	MOD_DEF(2)	Signal SDA (Data) of the 2-wire serial ID interface, 4.7 K to 10 K Ohm pull-up to V _{DD} T on host
PIN 7	TX_DISABLE	TX_DISABLE is <u>not</u> implemented. Transmitter Disable, logic high, open collector compatible, 4.7 K to 10 K Ohm pull-up to V _{DD} T on GBIC.
PIN 8	TGND	Transmitter Ground
PIN 9	TGND	Transmitter Ground
PIN 10	TX_FAULT	Transmitter Fault, logic high, open collector compatible, 4.7 K to 10 K Oh pull-up to V _{DD} T on host. <u>Not</u> implemented on the RJ-45 GBIC
PIN 11	RGND	Receiver Ground
PIN 12	RX_DATA (-)	Receive Data, differential AC coupled
PIN 13	RX_DATA (+)	Receive Data, differential AC coupled
PIN 14	RGND	Receiver Ground
PIN 15	V _{DD} R	Receiver Supply +5.0 Volts
PIN 16	V _{DD} T	Transmitter Supply +5.0 Volts
PIN 17	TGND	Transmitter Ground
PIN 18	TX_DATA (+)	Transmit Data, differential AC coupled
PIN 19	TX_DATA (-)	Transmit Data, differential AC coupled
PIN 20	TGND	Transmitter Ground



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High Performance Adapter Headquarters
 101 Bringer Drive
 Maumelle, AE 72113 USA
 501-851-4850
 amerinfo@molex.com

Far East North Headquarters
 Yamato, Kanagawa, Japan
 81-462-65-2324
 feninfo@molex.com

Far East South Headquarters
 Jurong, Singapore
 65-6-268-6868
 fesinfo@molex.com

European Headquarters
 Munich, Germany
 49-89-413092-0
 eurinfo@molex.com

Corporate Headquarters
 2222 Wellington Ct.
 Lisle, Illinois 60532 USA
 630-969-4550