TC3212

POCKET ROCKET
10/100BASE-T to 100BASE-FX
ETHERNET MEDIA CONVERTER

User's Manual

MODEL: _____

S/N: _____

DATE: _____

Notice!

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TC COMMUNICATIONS
FIBER OPTIC CONNECTIVITY

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Chapter 1 - Overview

Features

- ❒ **100M Full duplex for Fiber port and 10/100M Full/Half duplex Auto-negotiation for RJ-45 port**
- ❒ **Automatic MDI/MDIX crossover for RJ-45 port**
- ❒ **Distances up to 80km without a Switch or Router**
- ❒ **Multimode or Single Mode (1310/1550nm)**
- ❒ **Bi Directional "One Fiber" Communication (optional)**
- ❒ **Local Dry Contact Alarm Relay**
- ❒ **FPGA Technology (Field Programmable Array) Consumes Low Power**
- ❒ **Isolated Power and Various Input Voltages Available: 12VDC, 24VDC, -48VDC or 115VAC to 240VAC.**
- ❒ **Pocket Rocket Version**

Standards

802.3, 802.3u and 802.3x

Description

The TC3212 is a single channel 10/100Base-T (copper media) to 100Base-FX Fiber Optical (fiber media) Ethernet media converter that converts or connects 10/100Base-TX twisted-pair devices to single or multimode fiber optics (100Base-FX).

Designated for flexibility and interoperability, the TC3212 includes a built-in switch that enables it to extend LAN segments up to distances of 80km* without additional hardware (e.g. Switch or Router).

A one-fiber, bi directional communication option is also available to maximize fiber optic cable usage. Eight diagnostic status LEDs are provided for system monitoring.

The TC3212 combines Ethernet switching with the benefits of fiber optic technology to boost network bandwidth, increase security and maximize immunity from electro-magnetic Interference (EMI) and ground loops.

The TC3212 works with all popular sizes of single mode and multimode fiber optic cable. Standard fiber optic connectors are SC (ST and FC, optional). The TC3212 is the standard pocket rocket unit. The electrical connector is an RJ-45 Female connector. Standard input power is 12VDC@400mA, (24VDC, -48VDC, and 115/240VAC with an external power cube are optional). The standard operating temperature is -10°C to 50°C.

* Contact actory for higher requirements/availability.

Optical Specifications

Multimode 1310nm, 2km Option		
Transmitter:	LED; typical Launch Power:	-20.0 dBm @1310nm
Receiver:	PIN Diode; typical Sensitivity: Optic saturation level:	-31.0 dBm @1310nm 0 dBm @1310nm
Loss Budget:	Multimode (62.5/125μm)@1310nm:	11 dB
Distance:	Multimode (62.5/125μm)@1310nm:	up to 2km distance*
Wavelength:	Multimode 1310nm:	
Connector*:	SC	

Single Mode 1310nm, 60km Option		
Transmitter:	FP Laser; typical Launch Power:	-5.0 dBm @1310nm
Receiver:	PIN Diode; typical Sensitivity: Optic saturation level:	-34.0 dBm @1310nm 0 dBm @1310nm
Loss Budget:	Single Mode (9/125μm)@1310nm:	29 dB
Distance:	Single Mode (9/125μm)@1310nm:	up to 60 km distance*
Wavelength:	Single Mode 1310nm (LASER):	
Connector*:	SC	

Single Mode 1550nm, 80km Option		
Transmitter:	DFB Laser; typical Launch Power:	-5.0 dBm @1310nm
Receiver:	PIN Diode; typical Sensitivity: Optic saturation level:	-36.0 dBm @1310nm 0 dBm @1310nm
Loss Budget:	Single Mode (9/125μm)@1550nm:	31 dB
Distance:	Single Mode (9/125μm)@1550nm:	up to 80km distance*
Wavelength:	Single Mode 1550nm :	
Connector*:	SC	

Single Mode (One Fiber), 60km Option		
Transmitter:	FP Laser; typical Launch Power	-5.0 dBm* (1310nm/1550nm, @9/125μm)
Receiver:	PIN Diode; typical Sensitivity Optic saturation level:	-34.0 dBm* (1310nm/1550nm, @9/125μm) 0 dBm*
Loss Budget:	1310nm/1550nm Single Mode, @9/125μm	29 dB
Distance:	1310nm/1550nm Single Mode, @9/125μm	up to 60km distance*
Wavelength:	1310nm/1550nm Single Mode	
Connector:	SC Only*	

**Launch power, sensitivity and distance are listed for reference only. These numbers may vary. Contact factory for higher loss budgets and ST & FC fiber connector types (SC fiber connectors are standard).*

Typical Point to Point Application Diagrams

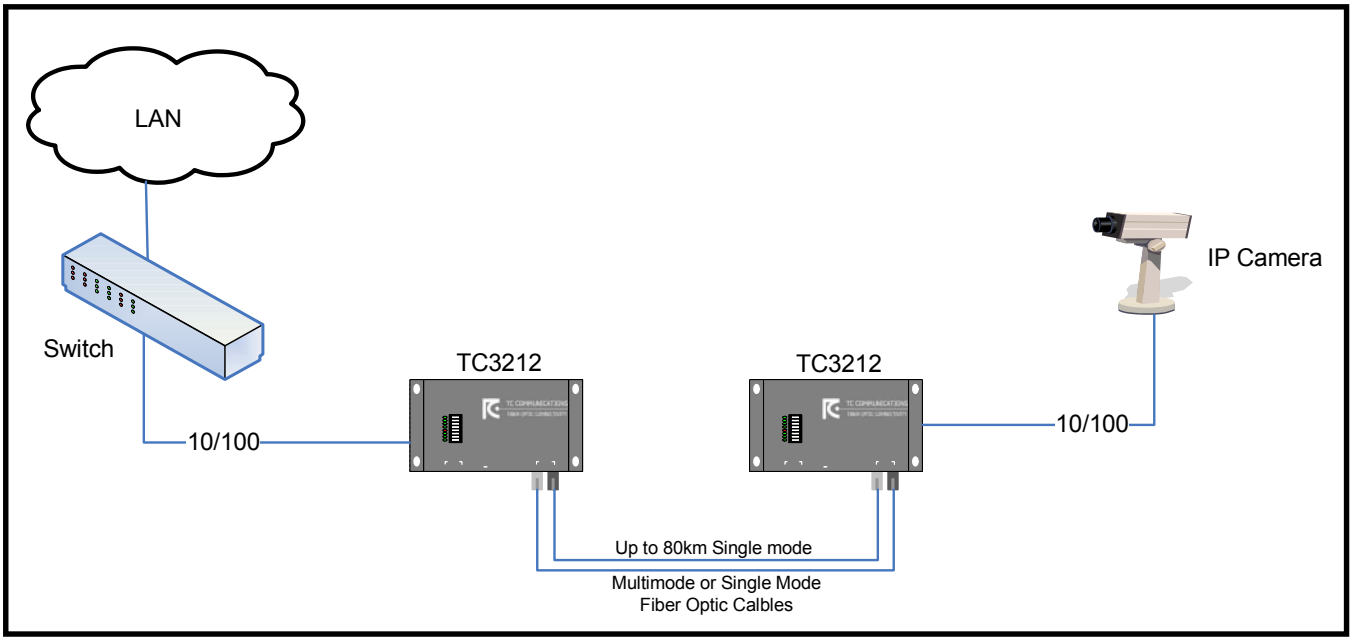


Figure 1. Application Diagram using two TC3212 units

The TC3212 has multiple status monitoring features. The fiber optic and electrical signals are monitored continually so that, should a cable breakage or other fault condition occur, an alarm will be triggered and the corresponding LEDs will indicate the type and location of the problem. Understanding the function of each LED and DIP switch will help the users simplify installation and troubleshooting.

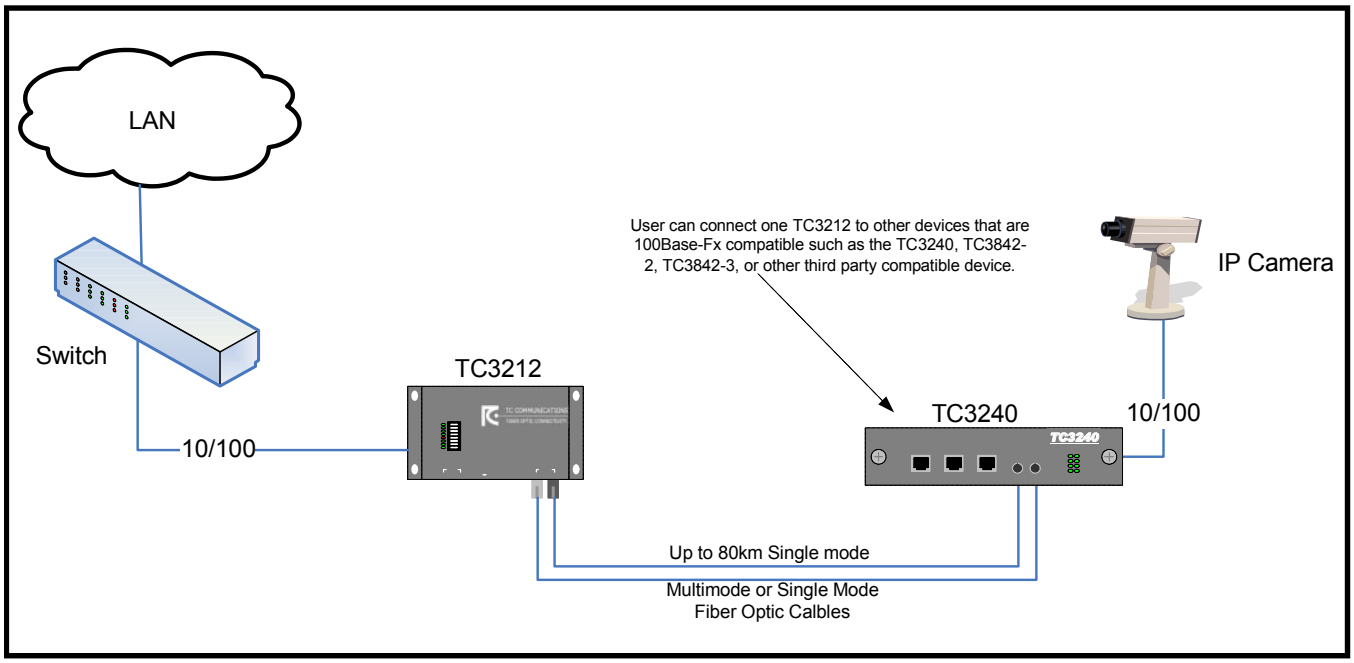
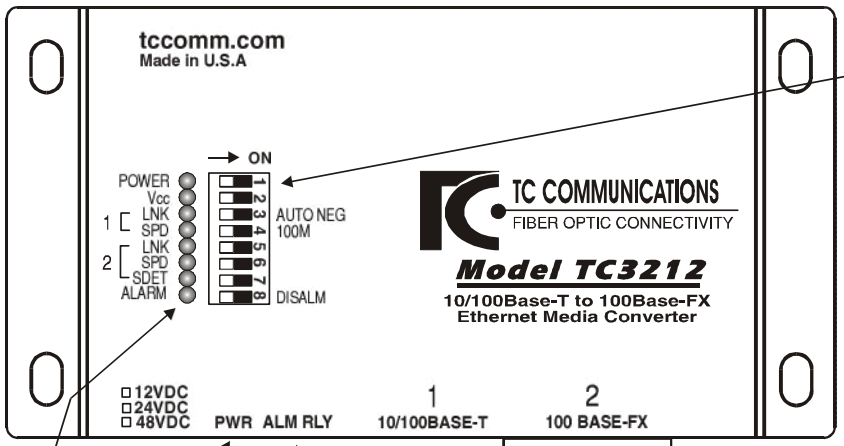


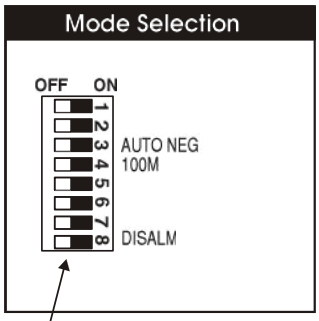
Figure 2. Application Diagram using one TC3212 and a TC3240 unit

The TC3212 has the ability to work as a single standalone unit and connect to other devices that are 100Base-FX on the fiber optic side. For example, the diagram shown above on Figure 2, shows one TC3212 being connected to a TC3240 unit. The TC3240 is a 3-port 10/100Base-T copper and 1-port of 100Base-FX fiber media converter.

***Note**: TC3240 and other models are sold separately.*

Top Panel LEDs, DIP Switches and Connectors





DIP Switch Settings

Power Connector

Alarm Relay Connector

RJ-45 Copper Port Connector

Optic Transmitter & Receiver

Front Panel Dip Switches

SW3:
AUTO NEG: Auto negatiation
"On": Auto negotiation is enabled
"Off": Auto negotiation is disabled

SW4:
100M: 10Mbps or 100Mbps setting
"On": RJ-45 port is set to 100Base-T
"Off": RJ-45 port is set to 10Base-T

SW8:
DISALM: Disable Alarm
"On": Disables the ALARM LED and the ALM RLY
"Off": ALARM LED and ALM RLY are enabled

LED Indicators

POWER: Unit has adequate power supply

Vcc: Indicates 5 VDC operating voltage is available

1 (Copper Port), 10/100Base-T Ethernet port

LNK: Indicates Copper port link or activity
Solid green: Ethernet link is established
Flash: Ethernet activity is detected
Off: No Ethernet link or activity detected

SPD: Indicates Copper port speed
Solid green: The speed is 100Mbps
Off: The speed is 10Mbps

2 (Fiber Port), 100Base-FX port

LNK: Indicates Fiber port link or activity
Solid green: Ethernet link is established
Flash: Ethernet activity is detected
Off: No Ethernet link or activity detected

SPD: Indicates Fiber port speed
Solid green: The speed is 100Mbps*
***Note: Fiber port is fixed at 100Mbps**

SDET: Indicates fiber cable connections
Solid green: Fiber cable connection is established
Off: Fiber cable connection is not established

ALARM: Indicate there are card alarms
Solid Red: Indicates there are alarm conditions
Off: Normal operating mode (no alarm conditions)

Alarm Conditions include;
*** Loss of fiber signal (either fiber is not connected or is broken)**
*** There is no link for copper port (No Ethernet cable is connected or is broken)**

NOTES:
1. If Auto Neg is enabled, it will always auto negotiate with its connected peer. The speed setting for "100M" will have no effect no matter how it is set.

2. If the desired speed is fixed at 100M/Full(set SW4 to the "on" position), Then the "Auto Neg" dip switch (SW3) must be disabled.

3. If the desired speed is fixed at 10M/Full(set SW4 to the "Off" position), Then the "Auto Neg" dip switch (SW3) must be disabled.

4. Dip switches SW1, 2, 5, 6 and 7 are not used.

Figure 3. TC3212 Top Panel View

Side Panel LEDs and Connectors

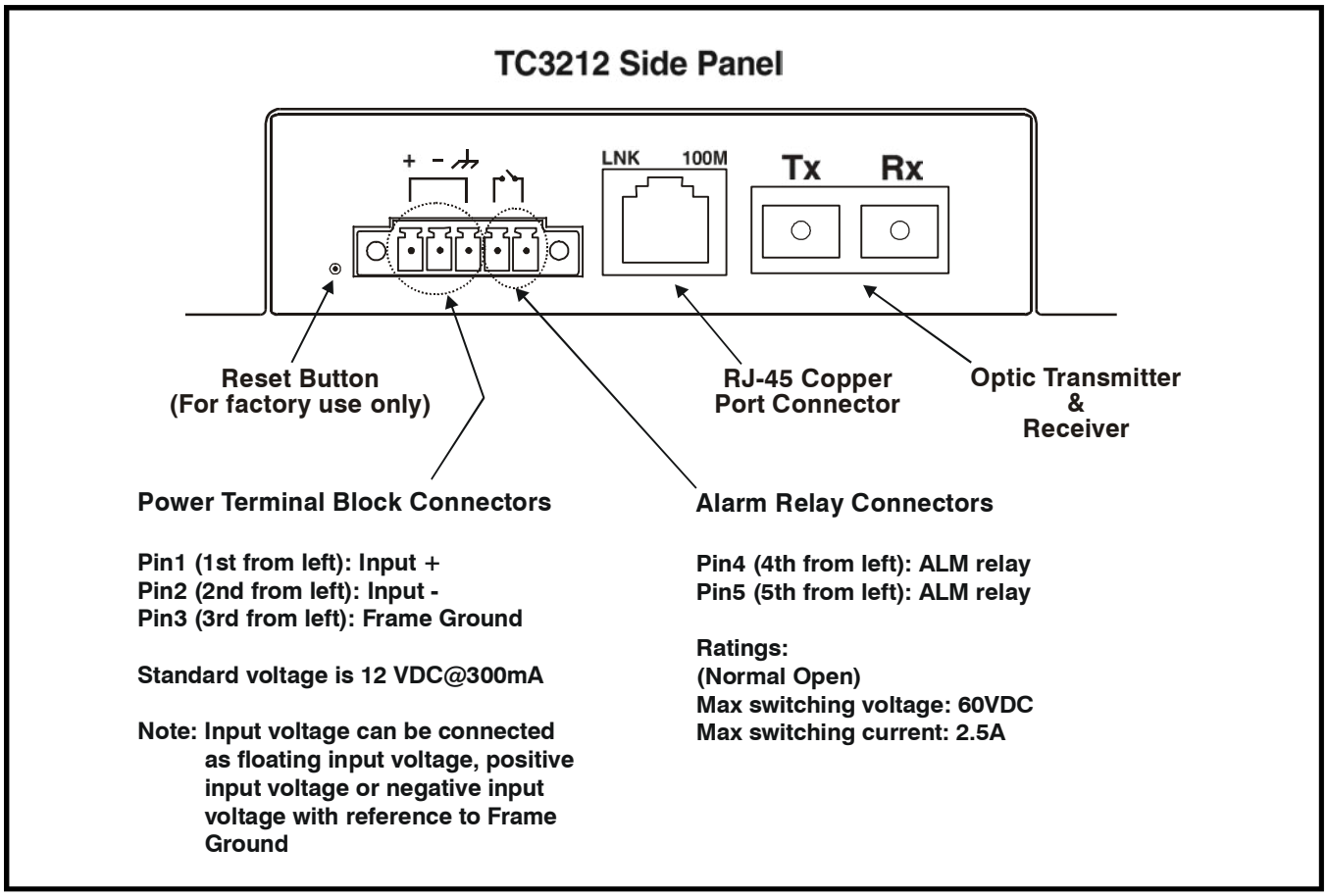


Figure 4. TC3212 Side Panel View

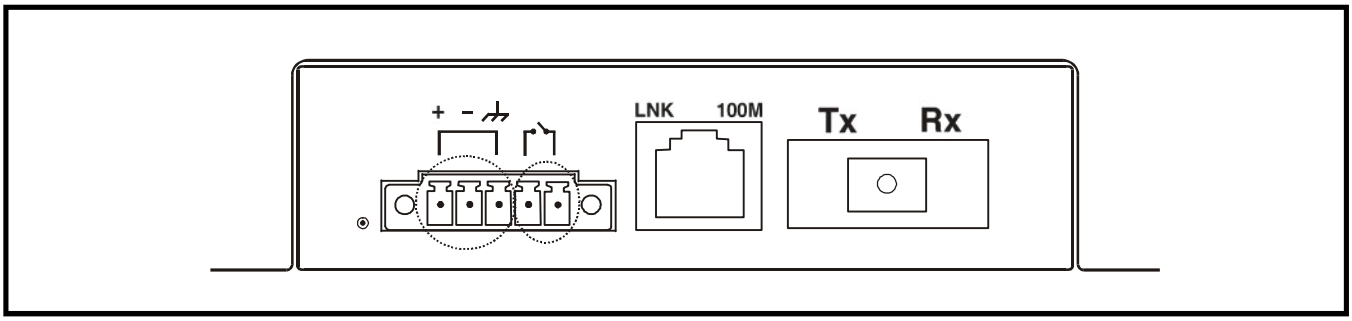


Figure 5. TC3212 "One Fiber" Option Side Panel View

Chapter 2 - Installation

Unpacking the Unit

Before unpacking any equipment, inspect all shipping containers for evidence of external damage caused during transportation. The equipment should also be inspected for damage after it is removed from the container(s). Claims concerning shipping damage should be made directly to the pertinent shipping agencies. Any discrepancies should be reported immediately to the Customer Service Department at TC Communications, Inc.

Equipment Location

The TC3212 should be located in an area that provides adequate light, work space, and ventilation. Avoid locating it next to any equipment that may produce electrical interference or strong magnetic fields, such as elevator shafts or heavy duty power supplies. As with any electronic equipment, keep the unit from excessive moisture, heat, vibration, and freezing temperatures.

Dry Contact Alarm Relay

A terminal block connector at the rear panel on the standalone unit or on the side panel of the pocket rocket unit is provided for the dry contact alarm relay. The relay is normally set in the OPEN position and any loss of optical or copper link signals will trigger an alarm condition and force the switch to the CLOSED position. This relay can be used in conjunction with an external device to monitor the condition of the fiber optic and copper links.

Power Supply

Standard input power is 12VDC@400mA for TC3212 pocket rocket unit. There is a power terminal block connector with positive & negative polarities and chassis ground indicated on the side panel of the unit (please refer to Figure 4).

The "POWER" & "Vcc" LEDs on the front panel will light up when power is applied to the power jack connector. Should an external power adapter need to be replaced, use one with the following specifications: 12VDC@400mA. You may order it directly from TC Communications.

RJ-45 Ethernet Connection

One RJ-45 Female copper connector is provided for the 10/100Base-T signal connection.

Chapter 3 - Troubleshooting

General

Alarm conditions occur when there is any loss of optical signal or loss of copper link detected by the TC3212.

It is highly recommended to conduct bench tests before actual installation. Bench testing allows the user to become familiar with all the functions and features of the TC3212 in a controlled environment. Knowledge of the TC3212 functions and features will simplify installation and troubleshooting efforts later on.

Power Problem

The "POWER" and "Vcc" LEDs should be solid “On” when power is connected to power connector. If these LEDs are “Off”, then no DC power is reaching the unit. Check the power supply, source, and polarity.

If the "POWER" LED is solid "On" but the "Vcc" LED is "Off", then no 5VDC operating voltage is supplied. Check whether the input voltage is correct or the power module may not be working. If the problem persists, contact the Technical Support Department at TC Communications, Inc. at (949) 852-1973.

Electrical Problem

If the copper port (Port 1) LEDs "LNK" and "SPD" are "Off", it means that there is no Ethernet electrical signal being detected by the TC3212. The alarm will be triggered and the "ALARM" LED will be solidly lit (red). Check the copper port connection and/or Cat5 cables for integrity.

If the copper port speed needs to be set at 100M full or 10M full, but the traffic can not go through, check whether the Auto Negotiation dip switch is disabled.

Optical Problem

If the fiber port (Port 2) LEDs "LNK", "SPD", and "SDET" are "Off", then the "ALARM" LED will be solidly lit, indicating an alarm condition. Possible causes could be wrong or improper connections, broken cables, incorrect or mis-matched optic cable types.

Optic Cable Types

Conventionally, fiber optic cable with yellow-colored insulation is used for Single Mode applications; gray or orange-colored insulated cable is for Multimode use. If Multimode cable is used in a Single Mode application, the test results could be erroneous and confusing or the unit will not function properly.

Calculating the Fiber Optic Loss Budget

The fiber optic link and/or connectors are frequently the source of various problems. Check out the connectors and the integrity of the link first. Ideally, the link should be calibrated for total loss after the installation has been completed. This will accomplish two things: (1) it will verify that the total loss of the link is within the loss budget of the device and (2) it will provide a benchmark for future testing. For example, a system that has been tested as having 6dB total loss when installed and suddenly tests out as having a loss of 10dB probably has a connector or link problem.

To calculate the loss budget:

Multimode 1310nm	**:**	**2 dB loss per km on 62.5/125μm cable***
Single Mode 1310nm	**:**	**0.5 dB loss per km on 9/125μm cable***
Single Mode 1550nm	**:**	**0.4 dB loss per km on 9/125μm cable***

**These numbers are listed for reference only. We recommend an OTDR reading be used to determine actual link loss.*

Chapter 4 - Specifications

Data Rates

Ethernet ..... 10/100Mbps Auto Negation, 100Mbps Full, 10Mbps Full

Optical

Transmitter ..... LED/FP LASER/DFB LASER
Receiver ..... PIN Diode
Wavelength ..... 1310nm Multimode
..... 1310nm/1550nm Single Mode
Fiber Optic Connectors ..... SC** (ST or FC optional)
Loss Budget ..... 15dB* Multimode 1310nm @62.5/125μm
..... 20dB* Single Mode 1310nm @9/125μm

Electrical

Ethernet Connector ..... RJ-45 Female

Visual Indicators

LEDs ..... POWER, Vcc, LNK, SPD, LNK, SPD, SDET, ALARM

Power Source

Standard ..... 12VDC @400mA (typical)
..... (Optional) 24VDC, -48VDC, or 115/240VAC with an external power cube

Temperature

Operating ..... -10°C to 50°C*
..... Hi-Temp (optional) -20°C to 70°C
..... Extreme-Temp (optional) -40°C to 80°C
Storage ..... -40°C to 90°C
Humidity ..... 95% non-condensing

Physical (Pocket Rocket unit)

Height ..... (2.86 cm) 1.13"
Width ..... (12.70 cm) 5.0"
Depth ..... (6.60 cm) 2.60"
Weight ..... (173 gm) 6.1 oz.

**Contact factory for higher loss budgets or higher temperature options.*

***SC fiber connectors are standard (ST or FC connectors are optional, check with factory for availability).*

Appendix A

Frequently Asked Questions

1) Can I test the TC3212 by just connecting a pair of TC3212 units with optical fiber cables?

Ans: *Yes, you can connect a PC on each end and ping each other.*

2) What kind of cable should I use?

Ans: *Use RJ-45 standard Cat. 5 or 5E Ethernet cable, straight through(patch cable).*

3) Do I need to reboot the unit if I unplug or replug either the fiber or copper connections?

Ans: *No, you don't have to reboot the unit.*

Appendix B - Pocket Rocket Chassis

Features

The following is the pocket rocket mount base chassis. Dimensions are measured in inches(centimeters).

Standard input power is 12VDC@400mA, (24VDC, -48VDC and 115/240VAC with an external power cube are optional).

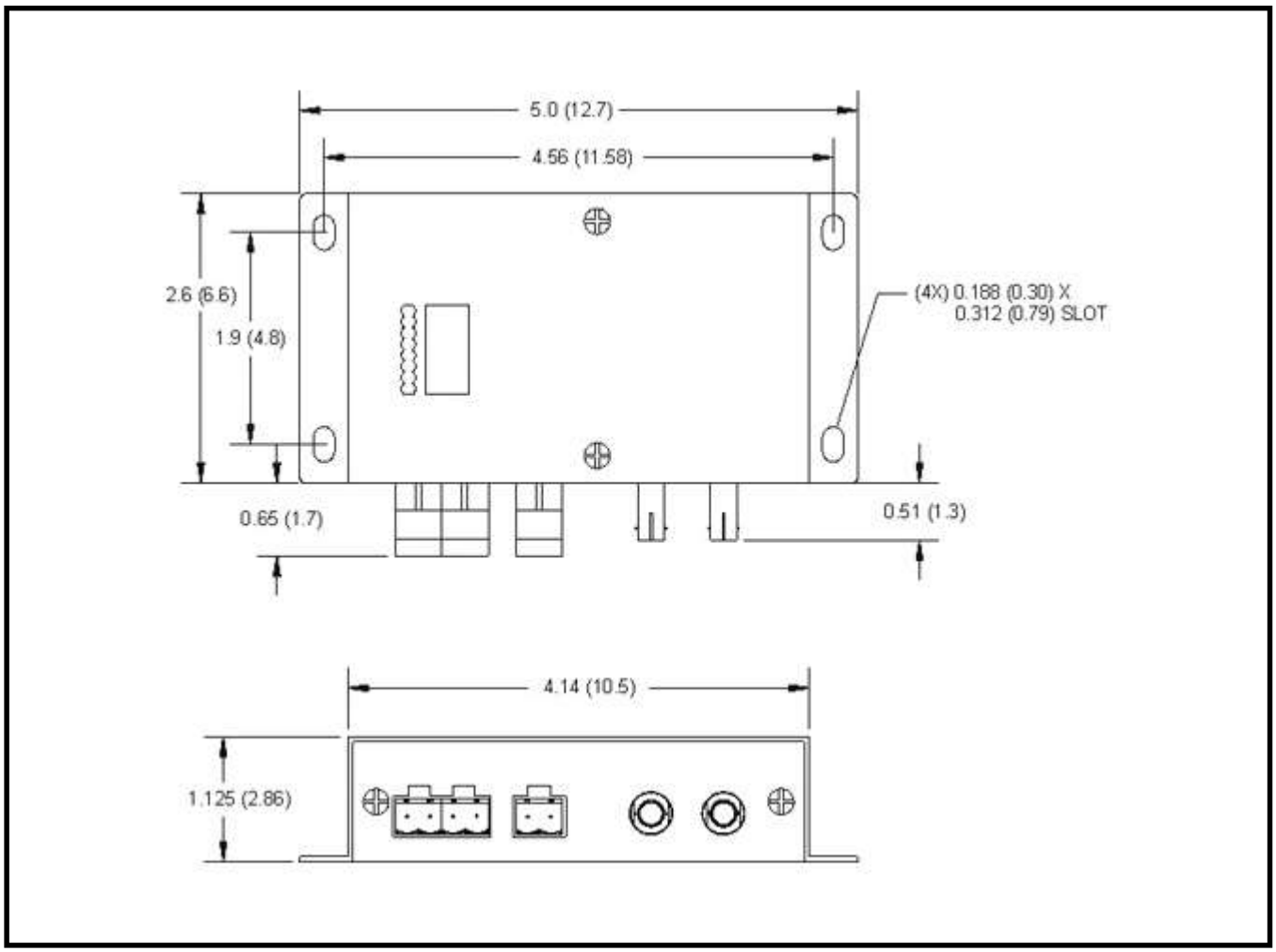


Figure 6. Pocket Rocket Mount Base Chassis

Appendix C

Return Policy

To return a product, you must first obtain a Return Material Authorization number from the Customer Service Department. If the product's warranty has expired, you will need to provide a purchase order to authorize the repair. When returning a product for a suspected failure, please provide a description of the problem and any results of diagnostic tests that have been conducted.

Warranty

Damages by lightning or power surges are not covered under this warranty.

All products manufactured by TC Communications, Inc. come with a five year (beginning 1-1-02) warranty. TC Communications, Inc. warrants to the Buyer that all goods sold will perform in accordance with the applicable data sheets, drawings or written specifications. It also warrants that, at the time of sale, the goods will be free from defects in material or workmanship. This warranty shall apply for a period of five years from the date of shipment, unless goods have been subject to misuse, neglect, altered or destroyed serial number labels, accidents (damages caused in whole or in part to accident, lightning, power surge, floods, fires, earthquakes, natural disasters, or Acts of God.), improper installation or maintenance, or alteration or repair by anyone other than Seller or its authorized representative.

Buyer should notify TC Communications, Inc. promptly in writing of any claim based upon warranty, and TC Communications, Inc., at its option, may first inspect such goods at the premises of the Buyer, or may give written authorization to Buyer to return the goods to TC Communications, Inc., transportation charges prepaid, for examination by TC Communications, Inc. Buyer shall bear the risk of loss until all goods authorized to be returned are delivered to TC Communications, Inc. TC Communications, Inc. shall not be liable for any inspection, packing or labor costs in connection with the return of goods.

In the event that TC Communications, Inc. breaches its obligation of warranty, the sole and exclusive remedy of the Buyer is limited to replacement, repair or credit of the purchase price, at TC Communications, Inc.'s option.

To return a product, you must first obtain a Return Material Authorization (RMA) number and RMA form from the Customer Service Department. If the product's warranty has expired, you will need to provide a purchase order to authorize the repair. When returning a product for a suspected failure, please fill out RMA form provided with a description of the problem(s) and any results of diagnostic tests that have been conducted. The shipping expense to TC Communications should be prepaid. The product should be properly packaged and insured. After the product is repaired, TC Communications will ship the product back to the shipper at TC's cost to U.S. domestic destinations. (Foreign customers are responsible for all shipping costs, duties and taxes [both ways]. We will reject any packages with airway bill indicating TC communications is responsible for Duties and Taxes. To avoid Customs Duties and Taxes, please include proper documents indicating the product(s) are returned for repair/retest).

Limitation of Liability

In no event shall the total liablility of TC Communications, Inc. to purchaser and/or end user for all damages including but not limited to compensatory, consequential and punitive damages, exceed the total amount paid to TC Communications, Inc. by purchaser for the goods from which the claim arose, in no event shall TC Communications, Inc. be responsible for indirect and consequential damages.

Continue on next page.

Limitation of Liability (Cont.)

In no event shall liability attached to TC Communications, Inc. unless notice in writing is given to TC Communications, Inc. within ten days of the occurrence of the event giving rise to such claim.

TC Communications, Inc. shall not be responsible for delays or non-deliveries directly or indirectly resulting from or contributed to by foreign or domestic embargoes, seizure, fire, flood, explosion, strike, act of God, vandalism, insurrection, riot, war, or the adoption or enactment of any law, ordinances, regulation, or ruling or order or any other cause beyond the control of TC Communications, Inc.

TC Communications, Inc. shall not be responsible for loss or damage in transit and any claims for such loss or damage shall be filed by the purchaser with the carrier.