

10/100Base-T Ethernet Fiber Optic Switch User's Manual

1. Features

- 4 Ethernet 10/100Base-T Auto-Sensing Twisted Pair Ports with RJ-45 Connectors
- 1 Fiber Optic 100Base-FX Port
- MDI/MDIX Auto Detection and Operation on Twisted Pair Ports
- Full or Half Duplex Transfer Mode for each Twisted Pair Ports
- Multimode (1310nm) and Single Mode (1310nm/1550nm)
- Distances up to 80km
- Hardened Temperature (optional), -40°C to 80°C
- Standalone or Rackmount
- Alarm Relay

2. Standards

IEEE 802.3, 802.3u, and 802.3x

3. Description

Featuring distances up to 80km, the TC3705 10/100Base-T Ethernet Fiber Optic Switch provides a 100Base-FX port that combines Ethernet Switching and Fiber Optic technology to boost total network bandwidth.

The TC3705 offers one multimode (1300nm) or single mode (1300/1550nm) optical port and four Ethernet 10/100Base-T Auto-Sensing/Auto-Negotiation switched ports. Each of these ports supports either 10Base-T or 100Base-TX. There are two optional versions (Model TC3705T) for extreme temperature applications (-20C to 70C, -40C to 80C).

Because it functions like an Ethernet bridge (connects multiple Ethernet segments to prevent unnecessary network traffic), it creates an efficient sub-divided switched LAN that provides full and transparent bandwidth for each segment.

The TC3705's modern switching technology eliminates the congestion problem inherent to the contention-oriented Ethernet CSMA/CD protocol. This improves predictable response times under heavy network loads. Previously, expensive routing technology was used to alleviate congestion from heavy traffic loads. Power is 12VDC, optional 24VDC, -48VDC, 125VDC, or 115/230VAC with an external power cube. Units are standalone or 19" rack mountable. Optical connectors can be SC, ST or FC.

4. Electrical Specifications

Data Rates: 10Mbps/100Mbps auto negotiation
Connectors: RJ-45 Female

5. Temperature

Operating.....-10°C to 50°C



6. Optical Specifications

Multimode Model

Transmitter:	LED; typical Launch Power:	-17.0 dBm* (1310nm, @62.5/125 μ m)
Receiver:	PIN Diode; typical Sensitivity: Optic saturation level:	-33.0 dBm* (1310nm, @62.5/125 μ m) -11.0 dBm*(1310nm, @62.5/125 μ m)
Loss Budget:	1310nm Multimode @62.5/125 μ m:	15 dB
Distance:	1310nm Multimode, @62.5/125 μ m:	up to 4km distance*
Wavelength:	1310nm Multimode:	
Connector:	SC ST	

Single Mode 1310nm, 20km Model

Transmitter:	FP Laser; typical Launch Power:	-15 to -7 dBm* (1310nm, @9/125 μ m)
Receiver:	PIN Diode; typical Sensitivity: Optic saturation level:	-34.0 dBm* (1310nm, @9/125 μ m) -3 dBm*(1310nm, @9/125 μ m)
Loss Budget:	1310nm Single Mode, @9/125 μ m:	19 dB
Distance:	1310nm Single Mode, @9/125 μ m:	up to 20 km distance
Wavelength:	1310nm Single Mode(LASER):	
Connector:	ST FC SC	

Single Mode 1310nm, 75km Model

Transmitter:	FP Laser; typical Launch Power:	-3 to +2dBm* (1310nm, @9/125 μ m)
Receiver:	PIN Diode; typical Sensitivity: Optic saturation level:	-36.0 dBm* (1310nm, @9/125 μ m) -3 dBm* (1310nm, @9/125 μ m)
Loss Budget:	1310nm Single Mode, @9/125 μ m:	33dB
Distance:	1310nm Single Mode, @9/125 μ m:	up to 75km distance
Wavelength:	1310nm Single Mode (LASER)	
Connector:	ST FC SC	

Single Mode 1550nm, 75km Model

Transmitter:	DFB Laser; typical Launch Power:	-10 to -1dBm* (1550nm, @9/125 μ m)
Receiver:	PIN Diode; typical Sensitivity: Optic saturation level:	-34.0 dBm* (1550nm, @9/125 μ m) 0 dBm* (1550nm, @9/125 μ m)
Loss Budget:	1550nm Single Mode, @9/125 μ m:	24dB
Distance:	1550nm Single Mode, @9/125 μ m:	up to 75km distance
Wavelength:	1550nm Single Mode (LASER)	
Connector:	ST FC SC	

7. Connectors and LED Indicators

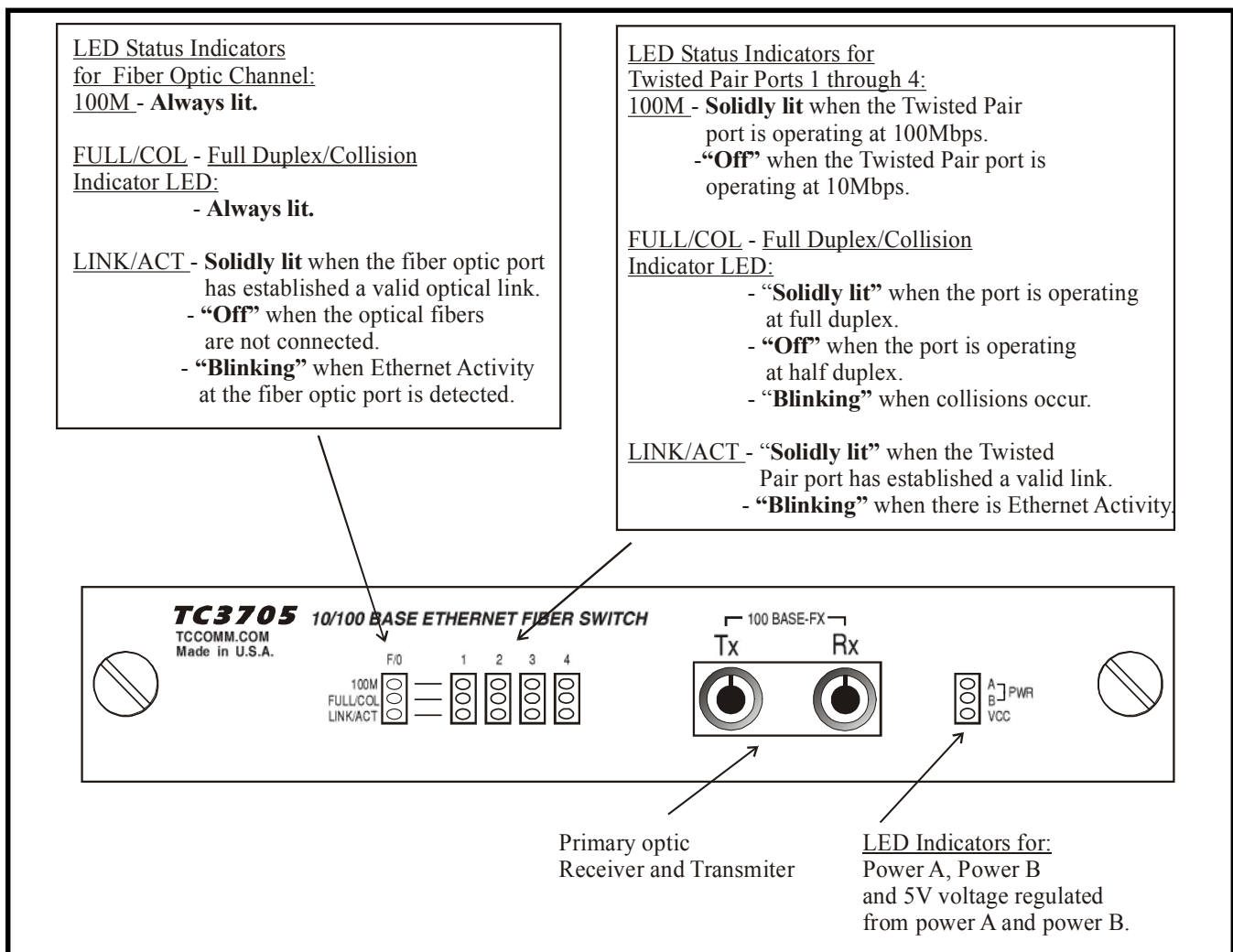


Figure 1. TC3705's Front Panel

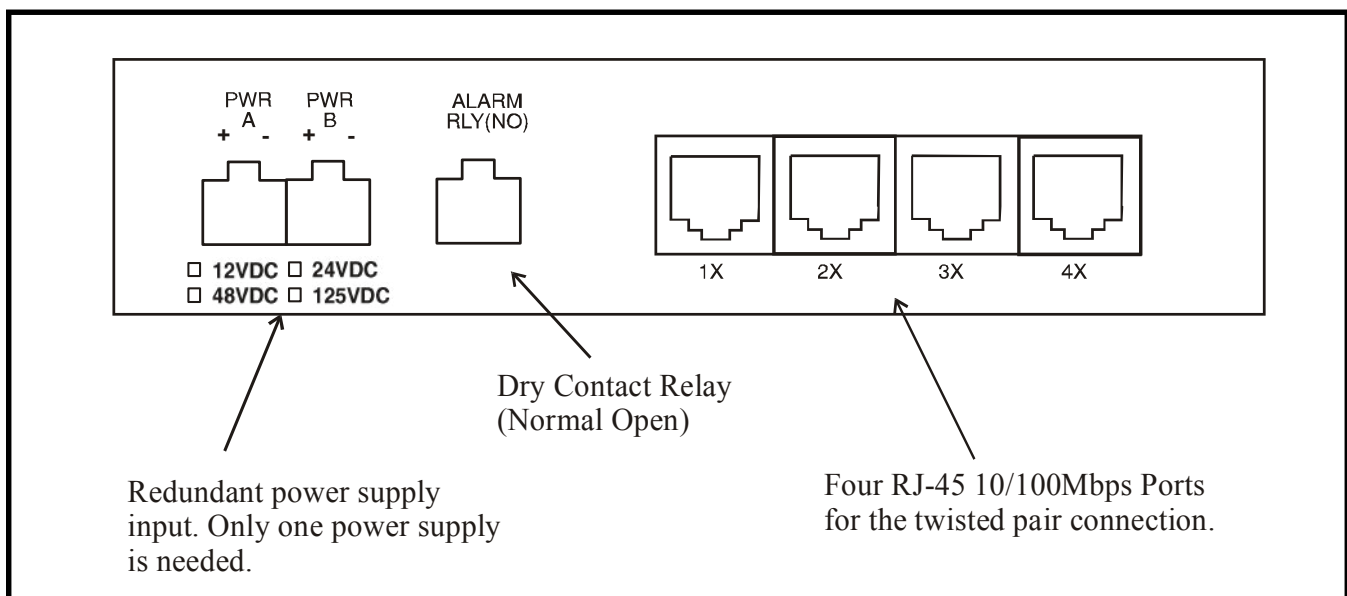


Figure 2. TC3705's Rear Panel

8. Typical Application Diagram

The TC3705 10/100Mbps Ethernet Switch is a low cost and flexible solution to extend a local area network to a remote site through fiber optic cables. Providing bandwidth solution to efficiently handle the traffic between the local and the remote workgroups of the network and reducing the need of expensive routers that usually cater to the network backbone.

This application diagram shows a network connection between two LANs. Extend PC lines from a server over fiber or have a telephone "hotlink" using our TC1910's as shown on the diagram. By connecting two TC1910's to the Twisted Pair ports and using regular telephone sets, the users at both sides of the fiber link can have a hotlink phone line setup. When one user lift up the handset, the remote side phone will start to ring. When remote side user pickup the handset, the phone stop to ring and the conversation begins.

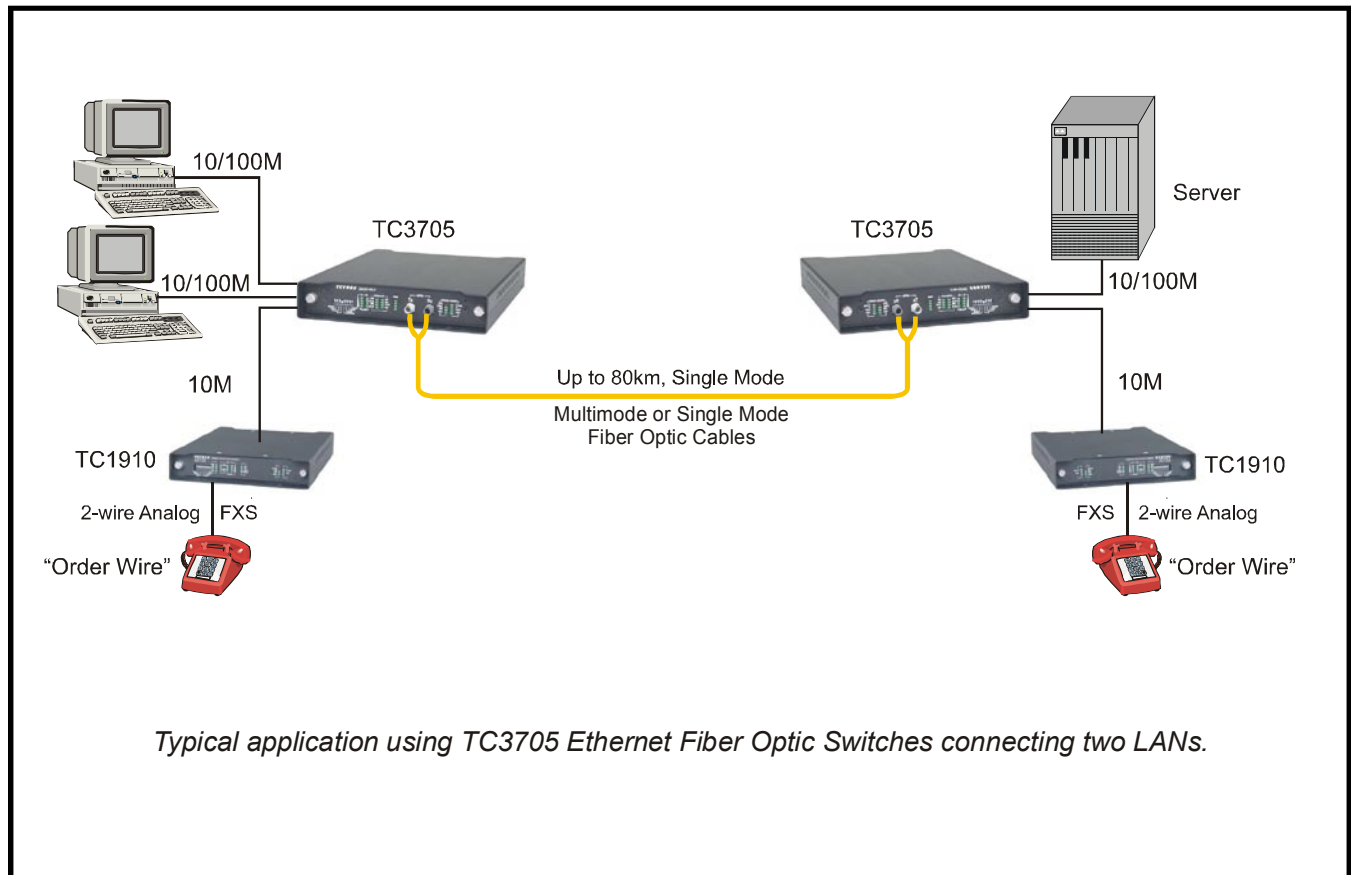


Figure 3. Typical Application Diagram for the TC3705's

9. Hub Topology Diagram

You can use the TC3705's for a variety of network configurations. For example, connect up to four hubs or switches to develop workgroups with dedicated 10/100Mbps links. Connect your routers, printers, servers, and other network devices.

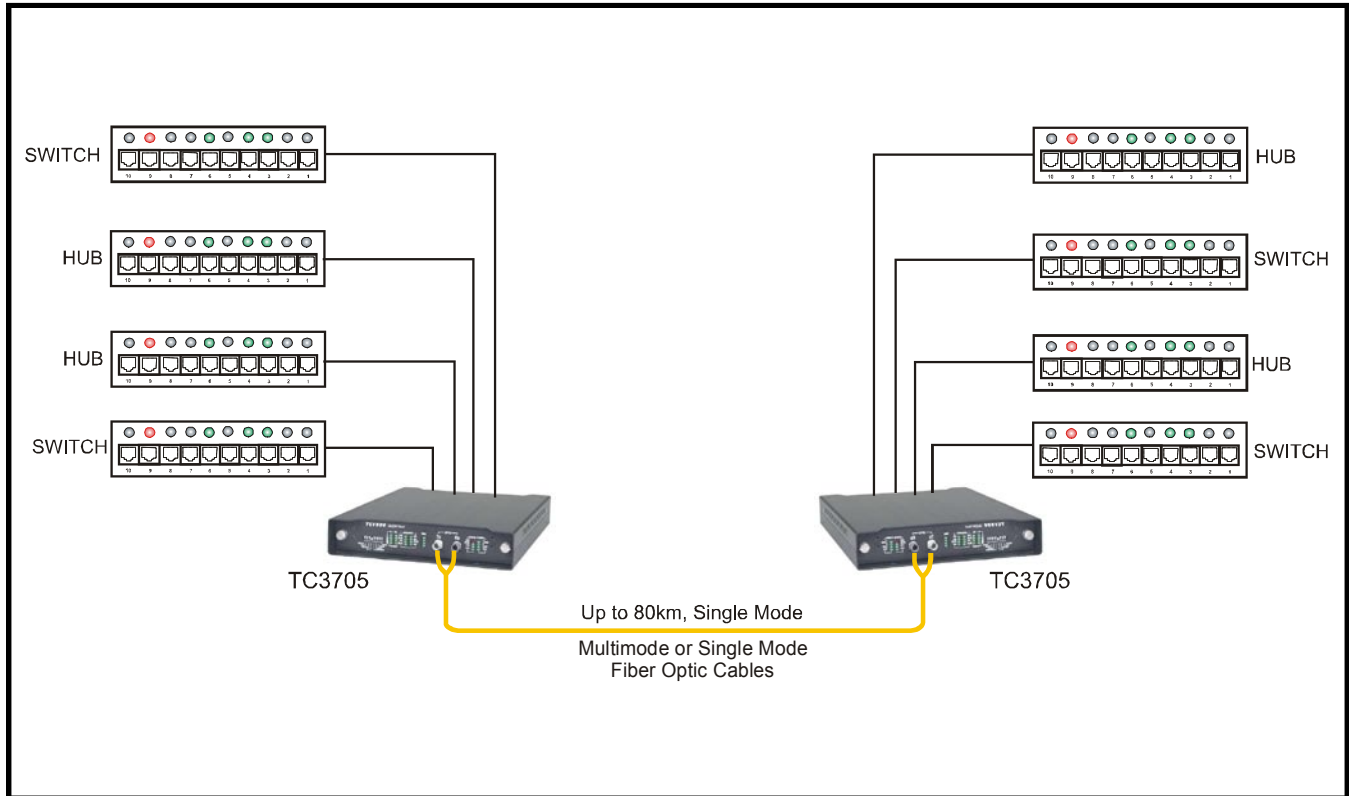


Figure 4. Backbone Using an Extended Star Topology with the TC3705's

10. Power Requirements

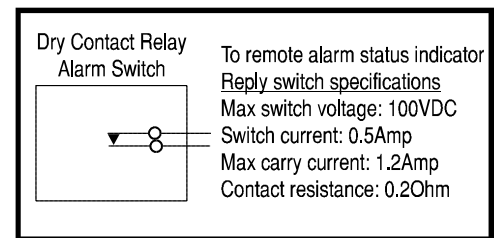
- A. The TC3705's input voltage is 12V DC and current is 600mA.
- B. The TC3705's power connectors are two terminal blocks located on the rear panel of the unit. Polarity is indicated on each connector block (see Figure 2).
- C. Should an external power adapter need to be replaced, use one with the following specifications: 12V DC @600mA. You may order it directly from TC Communications.
- D. The TC3705 can also be ordered with an optional 24 VDC, 48 VDC or power supply. Current consumption at 24VDC is 300mA, at 48VDC is 150mA, and at 125VDC is 60mA.

11. System Start Up

- 1. Apply the power by plugging the power plug into any power jack on the rear panel. The power source can be from a power adapter or from a power card (installed either on the left or right side of the rack).
- 2. The "PWR A" or "PWR B" LEDs on the front panel will light according to which power jack (A or B) is connected. Both LEDs will light when power redundancy is utilized.
- 3. The "Vcc" LED should also light, indicating an adequate operating voltage is being derived from the power source.
- 4. Connect the twisted pair cables to the RJ-45 connectors on the rear panel of the switches. If the twisted pair cables are providing an Ethernet signal, then the corresponding front LEDs for that particular channel will light as follows:
 - a). If 100Mbps full duplex is detected by the switch, the 100M & FULL/COL LEDs will be solidly lit and the LINK/ACT will blink as activity is detected.
 - b). If 10Mbps full duplex is detected by the switch, the 100M LED will be "Off" and the FULL/COL LED will be lit.
 - c). If half duplex and collisions are detected by the switch, the FULL/COL LED will be blinking.
- 5. Connect the optical fibers from the Tx connector of one unit to the Rx connector of the second unit, the LINK/ACT LED of the fiber port on the second unit will be solidly lit. Do the same for the second pair of Rx to Tx connectors and observed the LINK/ACT LED on the first unit will be lit.
- 7. When communication is established and traffic passes through the fiber between two TC3705's the LINK/ACT LED will blink.

12. Dry Contact Relay Alarm (optional)

A terminal block connector on the rear panel (labeled "ALARM") provides for the optional dry contact relay alarm (see Figure 2). Normally in the OPEN position, any loss of optical signal 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 links.



Dry Contact Alarm Condition:

When the front panel LINK/ACT LED is lit and/or blinking, the TC3705 is working well and thus it is not in Alarm Condition. Otherwise, if the LINK/ACT LED is "Off" the TC3705 will be in Alarm Condition and the Dry Contact Relay will be activated.

13. Physical Characteristics

Height:	1.4" (3.53 cm)	Depth:	6.5" (16.57 cm)
Width:	7.1" (18.14 cm)	Weight:	1.2 lbs. (544 gm)

14. Troubleshooting

Power Problem:

No LEDs are lit:

- A. "PWRA" and/or "PWRB" LEDs should be on when power is connected. If both are "Off," then no DC power is reaching the unit. Check the power supply, source, and polarity.
- B. If "PWRA" and/or "PWRB" LEDs are "On" but all other LEDs are "Off", and the Alarm switch is not closed, it indicates an internal problem with the unit. For assistance, please contact the Technical Support Department at TC Communications @ (949) 852-1973.

Electrical Problem:

If All LEDs, 100M, FULL/COL, and LINK/ACT, are OFF:

It means that there is no ethernet electrical signal detected by the TC3705. Check the twisted pair cables for good connectivity. Make sure that the units have adequate power.

Optical Problem:

If the 100M and FULL/COL LEDs are lit, and the LINK/ACT LED is OFF:

- A. Check the physical fiber optic cable connection to make sure it is not loose or broken.
- B. Optic "Tx" is connected wrongly to another TC3705's "Tx."
- C. Optic cable type is incorrect. Typically, fiber optic cable with yellow-colored insulation is designated for Single Mode use @8.2µm or 9µm; orange or gray-colored cable is for Multimode use @50µm or 62µm. If the wrong cable type is used, the unit will not function properly.

15. Frequently Asked Questions

1) What kind of Ethernet cable should I use?

Ans: Use RJ-45 standard CAT. 5 or 5E Ethernet cable. Because all twisted pair ports on the TC3705 are MDI/MDIX Auto-Detection and Operation, you can use either straight through(patch cable) or cross-over cable.

16. Warranty & Return Policy

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).