

TC3020R/S

5Mbps Fiber Optic Mode Converter/Repeater

User's Manual

1. Description

The TC3020R/S gives users the ability to convert Multimode fiber optic signals to Single Mode format for data transmission (and vice-versa). These conversions can benefit users by extending transmission distances and/or enabling dissimilar fiber optic devices to be used with different fiber types. The optic receiver detects the incoming optical signal and regenerates it for transmission through the second optic transmitter. The TC3020R/S is available in multiple configurations depending on your communication requirements. When both sides have the same wavelength, the unit works like an optical signal repeater.

2. Data Rate

5Mbps (Burst or Continuous Data)

3. Optical Specifications

Transmitter: LED; typical Launch Power: -18 dBm* (850nm/1300nm Multimode @62.5/125 μ m)
 ELED; typical Launch Power: -18 dBm* (1300/1550nm Single Mode @9/125 μ m)

Receiver: PIN DIODE; typical Sensitivity: -25 dBm* (850nm/1300nm Multimode @62.5/125 μ m)
 -33 dBm* (1300/1550nm Single Mode @9/125 μ m)

Loss Budget: 850nm/1300nm, MM @62.5/125 μ m 7 dB
 1300/1550nm, SM @9/125 μ m 15 dB

Distance: 850nm Multimode @62.5/125 μ m up to 3km*
 1300nm Multimode @62.5/125 μ m up to 4km*
 1300nm Single Mode @9/125 μ m up to 26km*
 1550nm Single Mode @9/125 μ m up to 30km*

Wavelength: Note: Any two wavelength combinations are available on each unit.

850nm Multimode (LED)	Model TC3020R-01XX-XXXX-XX
1300nm Multimode (LED)	Model TC3020R-03XX-XXXX-XX
1300nm Single Mode (ELED)	Model TC3020R-05XX-XXXX-XX
1550nm Single Mode (ELED)	Model TC3020R-07XX-XXXX-XX

Connector: ST Model TC3020R-XXST-XXXX-XX
 FC Model TC3020R-XXFC-XXXX-XX

**Launch power, sensitivity and distance are listed for reference only. These numbers may vary.*

4. Power Requirements

The TC3020R/S consumes very low power. The connector is a terminal block with polarity indicated on the rear panel of the unit. The input voltage is 12VDC and current is typically @200mA. Should an external power adapter need to be replaced, use one that matches these specifications. You may order it from TC Communications.

5. Physical Characteristics (Stand Alone Unit)

Height: 1.4" (3.5 cm)
Width: 7.2" (18.2 cm)
Depth: 6.6" (16.6 cm)
Weight: 1.5 lbs (532 gm)



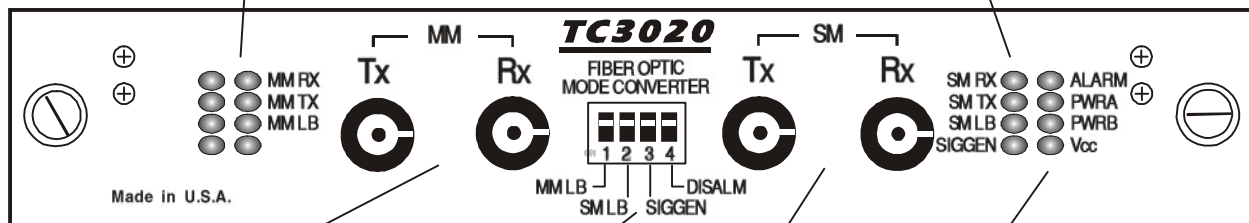
6. LEDs, DIP Switches and Connectors

Multimode Optic Signal Status Indicators

MM RX: (solidly lit) Optic signal at MM receiver is above sensitivity threshold
(flashing) MM optic fault condition exists
MM TX: Lights when MM optic transmitter is active
MM LB: Lights when MM LB switch (SW1) is enabled

Single Mode Optic Signal Status Indicators

SM RX: (solidly lit) Optic signal at SM receiver is above sensitivity threshold
(flashing) SM optic fault condition exists
SM TX: Lights when SM optic transmitter is active
SM LB: Lights when SM LB switch (SW2) is enabled
SIGGEN: Lights when SIGGEN switch (SW3) is enabled



Multimode Transmitter & Receiver

Single Mode Transmitter & Receiver

Diagnostic DIP Switches (down position activates function)

MM LB: Enables Multimode Optic Loopback
SM LB: Enables Single Mode Optic Loopback
SIGGEN: Enables the built-in Optic Signal Generator
DISALM: Disables the audio buzzer & dry contact relay

Alarm & Power Status Indicators

ALARM: Lights when an optic fault condition exists
PWRA: Lights when power is present at PWR A connector on rear panel
PWRB: Lights when power is present at PWR B connector on rear panel
Vcc: Lights when adequate power is being derived from power source A and/or B

Figure 1. TC3020R/S's Front Panel

7. Installation

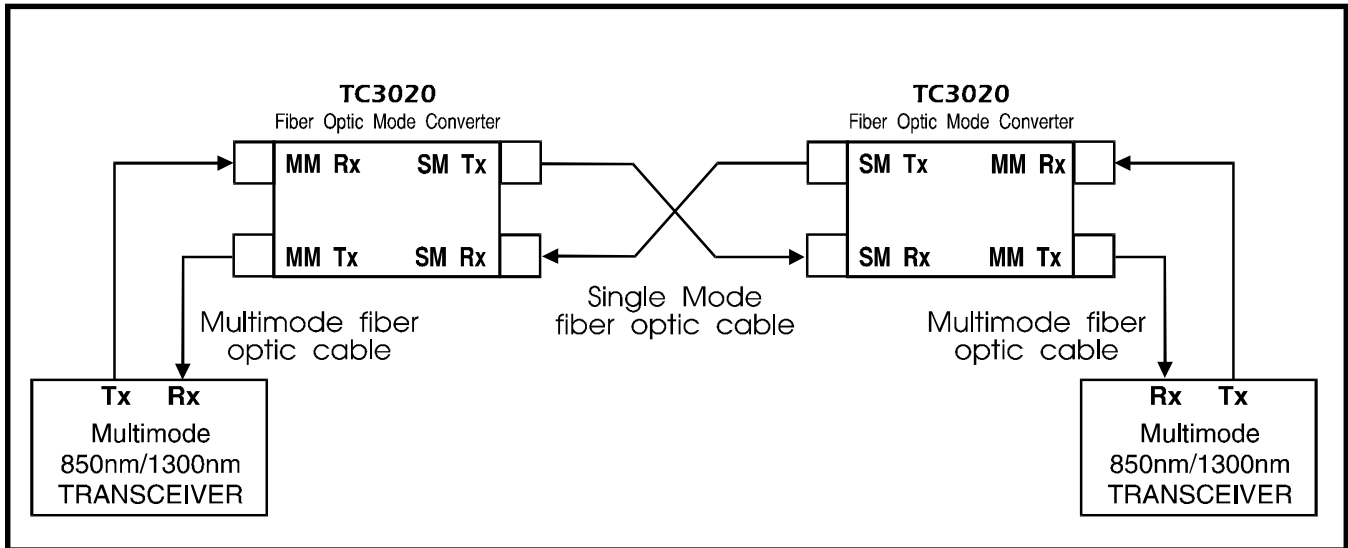


Figure 2. Installation Diagram for Dual TC3020R/S Application

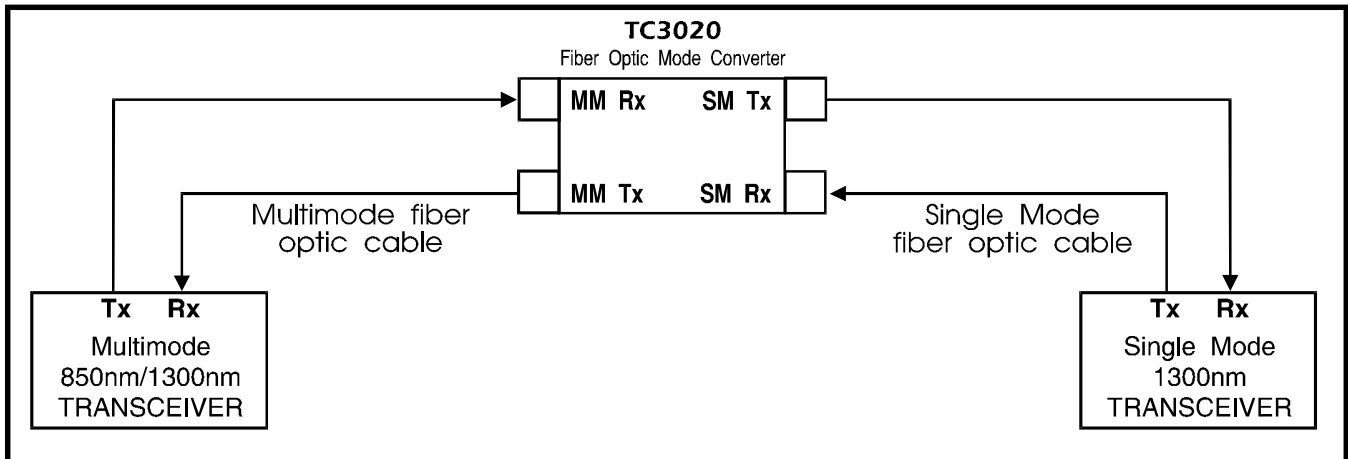


Figure 3. Installation Diagram for Single TC3020R/S Application

8. Troubleshooting

Typically, most problems encountered with the TC3020R/S are related to optic receiver overdrive. The maximum optic power that can be received without distortion is referred to as the optic receiver's "saturation level." When the incoming optic power is greater than the saturation level of the receiver, optic "overdrive" can occur.

The TC3020R/S optic receivers have a typical saturation level of -14 dBm. If the user's equipment's launch power is higher than -14dBm (i.e. -13dBm or greater) and the fiber run is very short and has low signal loss, it is likely to overdrive the TC3020R/S Multimode receiver. The consequences of overdrive can be high error rates or the device's failure to recognize the incoming optic signal at all.

The TC3020R/S has been adjusted at the factory so that the Single Mode transmitter will not overdrive the Single Mode receiver even when short cables are used to connect them; hence, the overdrive condition happens most frequently at the Multimode receiver optic.

If you suspect the Multimode receiver has an optic overdrive condition, a simple test will help verify it. At the receiving optic in question, simply disconnect the optic connector and back it out of the receptacle (about 1/8 of an inch), creating a gap between the fiber connector and the receiver. Verify that the equipment is still in "sync" with the optic signal and that the overdrive condition has been corrected. To resolve the overdrive condition permanently, insert a 5dB or 10dB in-line attenuator into the problem link. In-line attenuators can be purchased from Metrotek* at (914) 347-4112. The part numbers are:

Description:	ST@5dB	ST@10dB	FC@5dB	FC@10dB
Part Number:	68-JJ-7-0513	68-JJ-7-1013	68-FF-0513	68-FF-1013

The following diagram illustrates a TC3020R/S Mode Converter used to convert a 1300nm Single Mode optical signal from a customer's device (5 Mbps) into a 1300nm Multimode optical signal to be received by a remote device. In the reverse direction, the remote device's Multimode optical signal is converted to Single Mode format to be received by the local device. In-line attenuators are used to correct optic overdrive conditions that exist on either side of the TC3020R/S.

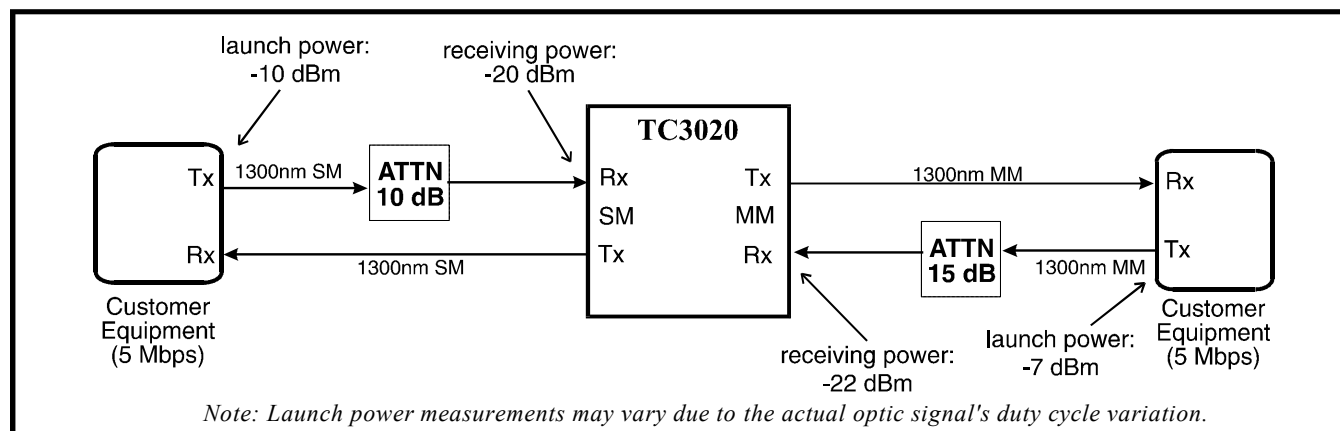


Figure 4. In-line Attenuator Placement Diagram

9. Further Troubleshooting & Assessment Tests on your TC3020 Unit(s).

If you are having trouble establishing communication with your equipment and the TC3020 unit(s), you can test the unit(s) by performing the following simple assessment tests. If your application requires the use of one or two TC3020 unit(s), then the following procedures will apply to your system. You will need to perform a Single Mode Loopback test and a Multimode Loopback test on your TC3020 unit(s). These tests should be done using your PC's hyperterminal.

Note: Make sure that your equipment's wavelengths match with that of the TC3020's. The 1310nm wavelength is shown as a reference only on the following figures.

*Metrotek is not affiliated with TC Communications, Inc.

Performing the Single Mode Loopback Test using one (1) TC3020.

The purpose of this test is to verify that the optical Singlemode TX/RX connectors are receiving and transmitting the incoming signal coming from the PC back to the PC. This test will ensure that the TC3020 unit(s) are working properly.

- A. Testing your TC3020 for performance will require the testing setup shown on Fig. 5. Follow the connections shown on this figure and connect your equipment accordingly. You must also locate the DIP switches on the front panel of the TC3020 and enable the (SM LB) switch (switch #2) to the “ON” position as shown on Fig. 5.1.
1. Use an RS-232 adapter and connect it from your PC to a Single mode TC1200 fiber modem or a compatible RS-232 fiber modem.
 2. After completing all of the connections you should be able to transmit and receive data.
 3. You should observe that the (SM RX), (SM TX), and the (SM LB) LEDs are lit solidly, therefore, indicating that the Single mode TX/RX receptacles on your TC3020 are working properly.
 4. After you finish this test, reset switch #2 (SM LB) to the “OFF” position to perform the next test.

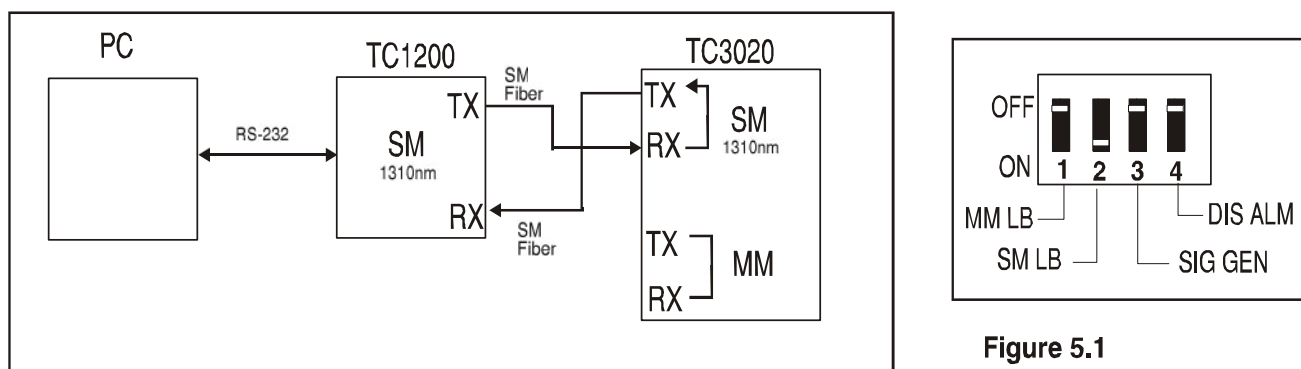


Figure 5. Single Mode loopback test on TC3020.

If your application requires the use of two TC3020's to TX/RX your data, then the following tests will verify that your TC3020's are working properly.

Performing the Single Mode Loopback Test on Unit B using two (2) TC3020 units.

The purpose of this test is to verify that the optical Single mode TX/RX connectors on Unit B are receiving and transmitting the incoming signal coming from the PC back to the PC. This test will ensure that the TC3020 unit(s) are working properly.

- B. Testing your TC3020's for performance will require the testing setup shown on Fig. 6. Follow the connections shown on this figure and connect your equipment accordingly. You will need to locate the DIP switches on the front panel of Unit B and enable switch #2 (SM LB) to the “ON” position as shown on figure 6.1.
1. Use an RS-232 adapter and connect it from your PC to a Multimode TC1200 fiber modem or a compatible RS-232 fiber modem.
 2. After completing all of the connections you should be able to transmit and receive data.
 3. You should observe that the (MM TX), (MM RX), (SM TX), and (SM RX) LEDs on Unit A are lit solidly. You should also observe that the (SM RX), (SM TX), and the (SM LB) LEDs are lit solidly on Unit B. This indicates that both of the units are working properly.
 4. After you finish this test, reset switch #2 (SM LB) on Unit B to the “OFF” position to perform the next test.

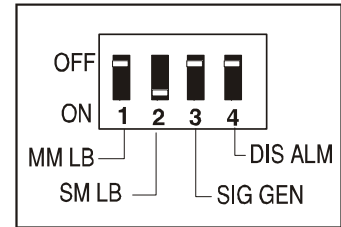
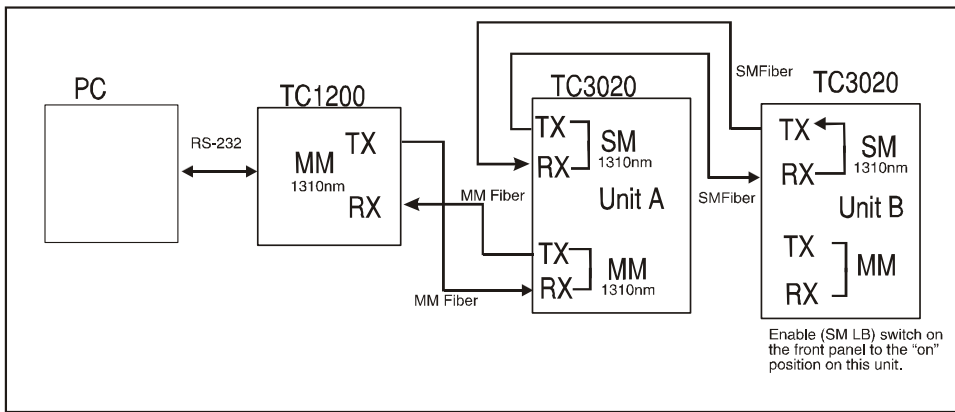


Figure 6.1

Figure 6. Single Mode Loopback test on unit B.

Performing the Multimode Loopback Test using one (1) TC3020.

The purpose of this test is to verify that the optical Multimode TX/RX connectors are receiving and transmitting the incoming signal coming from the PC back to the PC. This test will ensure that the TC3020 unit(s) are working properly.

C. This test will require the testing setup shown on Fig. 7. Follow the connections shown on the figure below and connect your equipment accordingly. You must also locate the DIP switches on the front panel of the TC3020 and enable the (MM LB) switch (switch #1) to the "ON" position as shown on Fig. 7.1.

1. Use an RS-232 adapter and connect it from your PC to a Multimode TC1200 RS-232 fiber modem or a compatible RS-232 fiber modem.
2. After completing all of the connections, you should be able to transmit and receive data.
3. You should observe that the (MM TX), (MM RX), and the (MM LB) LEDs are lit solidly. This indicates that the TC3020 unit is working properly.
3. After you finish this test, reset switch #1 (MM SB) to the "OFF" position to perform the next test.

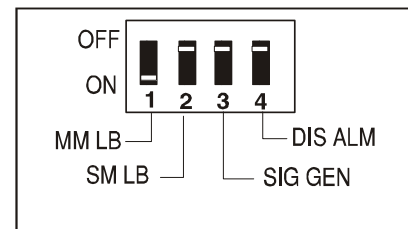
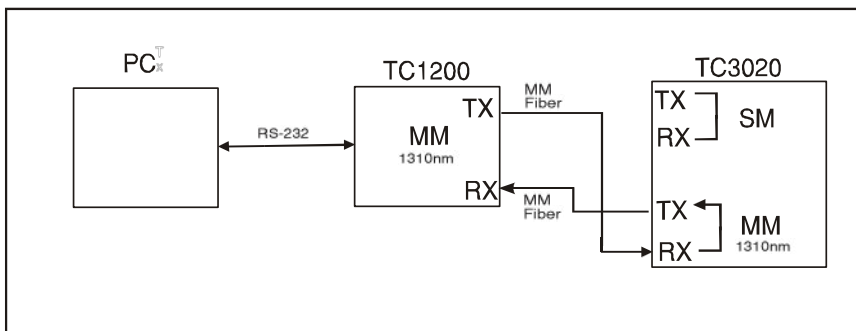


Figure 7.1

Figure 7. Multimode loopback test on TC3020.

If your application requires the use of two TC3020's to TX/RX your data, then the following tests will verify that your TC3020's are working properly.

Performing the Multimode Loopback Test on Unit B using two (2) TC3020 Units.

The purpose of this test is to verify that the optical Multimode TX/RX connectors are receiving and transmitting the incoming signal coming from the PC back to the PC. This test will ensure that the TC3020 unit(s) are working properly.

D. Testing your TC3020 for performance will require the testing setup shown on Fig. 8 below. This test should be done using your PC's hyperterminal. You will need to locate the DIP switches on the front panel of Unit B and enable switch #1 (MM LB) to the "ON" position (as shown on figure 8.1) for this test.

1. Use an RS-232 adapter and connect it from your PC to a Single mode TC1200 fiber modem or a compatible RS-232 fiber modem.
2. After completing all of the connections you should be able to transmit and receive data.
3. You should observe that the (MM TX), (MM RX), (SM TX), and (SM RX) LEDs on Unit A are lit solidly. You should also observe that the (MM RX), (MM TX), and the (MM LB) LEDs are lit solidly on Unit B. This indicates that both of the units are working properly.
4. After you finish this test, reset switch #1 (MM LB) to the "OFF" position to perform the next test..

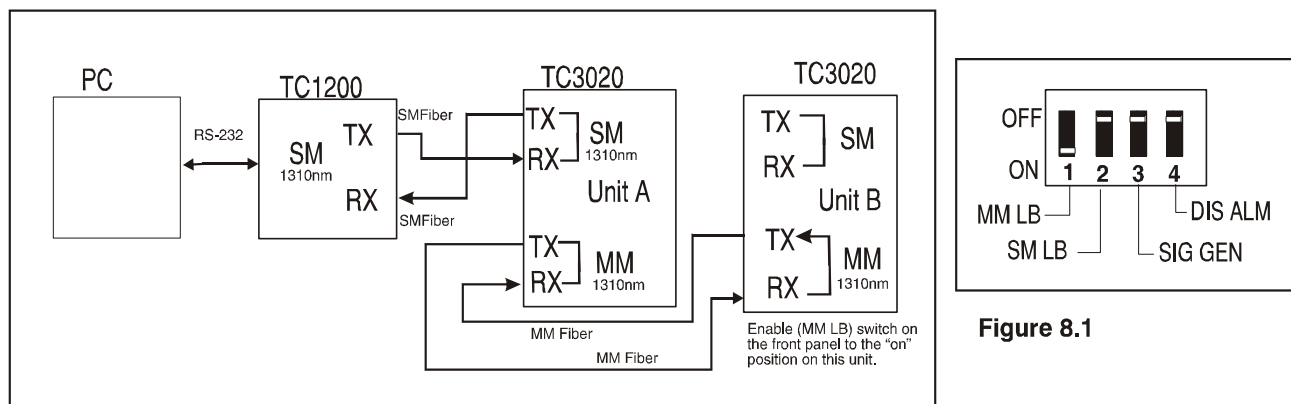


Figure 8. Multimode Loopback test on unit B.

10. Return & Warranty 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).