TC3005(LED/ELED/LASER)

165Mbps Fiber Optic Mode Converter/Repeater

User's Manual

1. Description

The TC3005 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 TC3005 is available in multiple configurations depending on your communication requirements. When both sides have the same wavelength, the TC3005 works like an optical signal repeater.

2. Data Rates

165Mbps*

Contact factory for higher data rates.

3. Optical Specifications

Transmitter:	**LED; typical Launch Power:**	**-16 dBm* (850nm/1310nm, Multimode @62.5/125µm)**
	ELED; typical Launch Power:	**-16 dBm* (1310nm/1550nm, Single Mode @9/125µm)**
	LASER; typical Launch Power:	**-6 dBm* (1310nm/1550nm, Single Mode @9/125µm)**
Receiver:	**PIN DIODE; typical Sensitivity:**	**-33 dBm* (850nm/1310nm, Multimode @62.5/125µm)**
		-33 dBm* (1310nm/1550nm, Single Mode @9/125µm)
		-36 dBm* (1310nm/1550nm, Single Mode @9/125µm)
Loss Budget:	**LED; 850nm/1310nm, MM @62.5/125µm**	**16 dB**
	ELED; 1310nm/1550nm, SM @9/125µm	**16 dB**
	LASER; 1310nm/1550nm, SM @9/125µm	**25 dB**
Distance:	**850nm, Multimode @62.5/125µm**	**up to 3km***
	1310nm, Multimode @62.5/125µm	**up to 4km***
	1310nm, Single Mode @9/125µm	**up to 40km***
	1550nm, Single Mode @9/125µm	**up to 110km***
Wavelength:	**Note: Any two wavelength combinations are available on each unit.**	
	850nm Multimode (LED)	
	1310nm Multimode (LED)	
	1310nm Single Mode (ELED/LASER)	
	1550nm Single Mode (ELED/LASER)	
Connector:	**ST, FC, or SC**	

Launch power, sensitivity and distance are listed for reference only. These numbers may vary. Contact factory for higher loss budgets.

4. Power Requirements

A. The TC3005 consumes very low power. The connector is a terminal block with polarity indicated on the rear panel of the unit (see Figure 2). The input voltage is typically 12 VDC and current is @600mA. The unit can be ordered with optional power options: 24 VDC@300mA, 48 VDC@150mA, or 115/230 VAC with an external power adapter.

B. Should an external power adapter need to be replaced, use one that matches the above specifications. You may order it from TC Communications.

C. There are two pairs of terminal block connectors on the rear panel (labeled "PWR A" and "PWR B"). Only one pair is required to power the unit. If both pairs are connected, the built-in power redundancy feature will be utilized. When this feature is utilized, both "A" and "B" share the load. If one power source fails, the other will assume the full load.

TC COMMUNICATIONS
FIBER OPTIC CONNECTIVITY

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5. LEDs, DIP Switches and Connectors

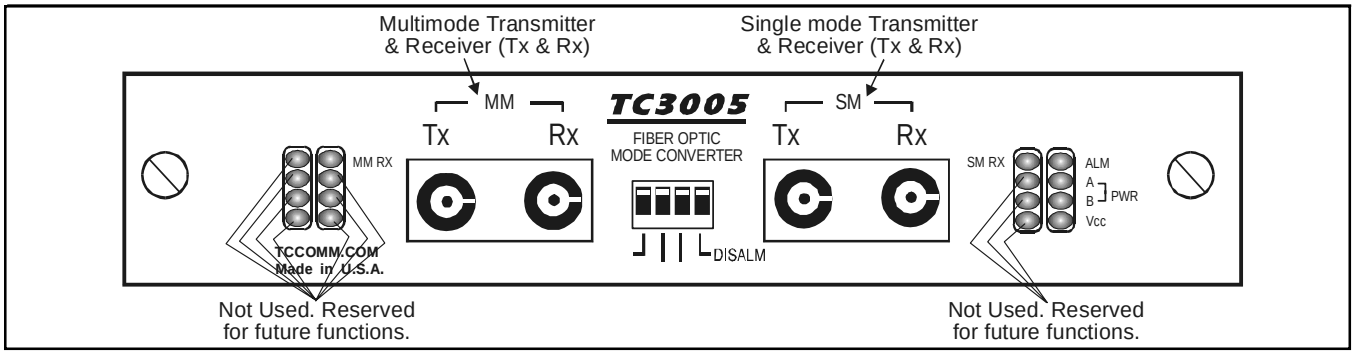


Figure 1. TC3005's Front Panel

LEDs Functions

ALARM Status Indicator-

Alarm Buzzer & Dry contact Relay: ALM LED Flashing - Indicates that the optical signal is not present or lost at the Multimode and/or Single mode receiver(s) and the alarm will be triggered.

ALM LED Off - Indicates the unit is under normal working condition (*receiving good optical signals*).

Alarm Condition:

When the Alarm is triggered, the alarm buzzer will sound & the dry contact relay will close. (*see section 6 on next page*).

Power Supply Status Indicators-

PWR A/B: When lit, these LEDs indicate which power source on the rear panel the unit is drawing from. If power redundancy is utilized, both LEDs will be lit.

Vcc: +5V Voltage indicator. The Vcc LED should light solidly whenever power is connected to the unit. It indicates the correct operating voltage is being derived from the power source.

Multimode Optic Signal Status Indicators-

MMRX: Solidly lit, indicates a valid optical signal is received at the MM receiver & it is above sensitivity threshold. Off, indicates the optical signal at the MM RX is not present, lost, bursty or questionable (not valid).
- Verify that the user's Multimode device optical wavelength matches that of the TC3005 units.
- Verify the integrity of the Multimode fiber cables and connections.

Single Mode Optic Signal Status Indicators-

SM Rx: Solidly lit, indicates optical signal at the SM optic receiver is received & it is above sensitivity threshold. Off, indicates the single mode optical signal at the SM optic receiver is not present or it is lost.

Optical Connectors

MMTx: Multimode Transmitter (Tx). - Connect to local equipment's MM receiver (Rx).
MMRx: Multimode Receiver (Rx). - Connect to local equipment's MM transmitter (Tx).

SMTx: Single mode Transmitter (Tx). - Connect to remote unit's SM receiver (Rx).
SMRx: Single mode Receiver (Rx). - Connect to remote unit's SM transmitter (Tx).

DIP Switch Functions

SW1,2,3: Not used; reserved for future functions.
SW4: DISALM - Down (or Right) disables the audio buzzer and dry contact relay alarm switch.
***Note*:** Keep the "DISALM" dip switch in the Off or "up position" under normal condition.

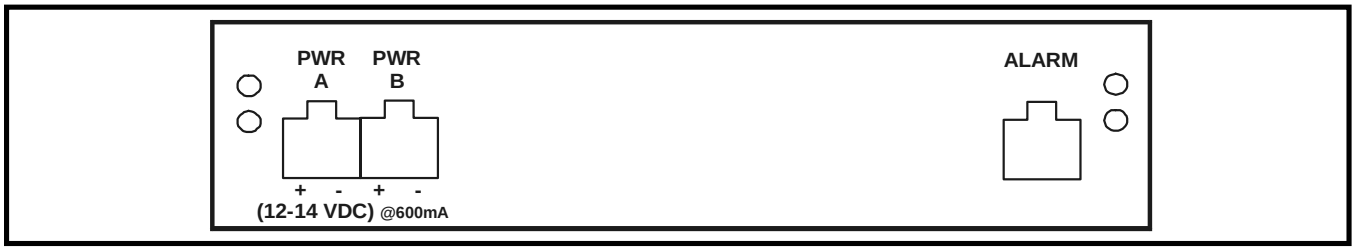
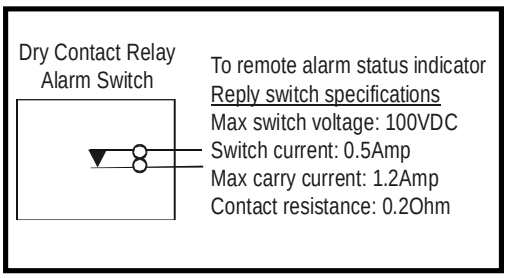


Figure 2. TC3005's Rear Panel

6. Dry Contact Relay Alarm

A terminal block connector on the rear panel (labeled "ALARM") provides for the dry contact relay alarm (see Figure 2). Normally in the OPEN position, the loss of either optic 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. Note: If SW4 (DISALM) on the front panel is in the Down position, the audio buzzer will not sound and the dry contact relay will not activate.



7. Installation

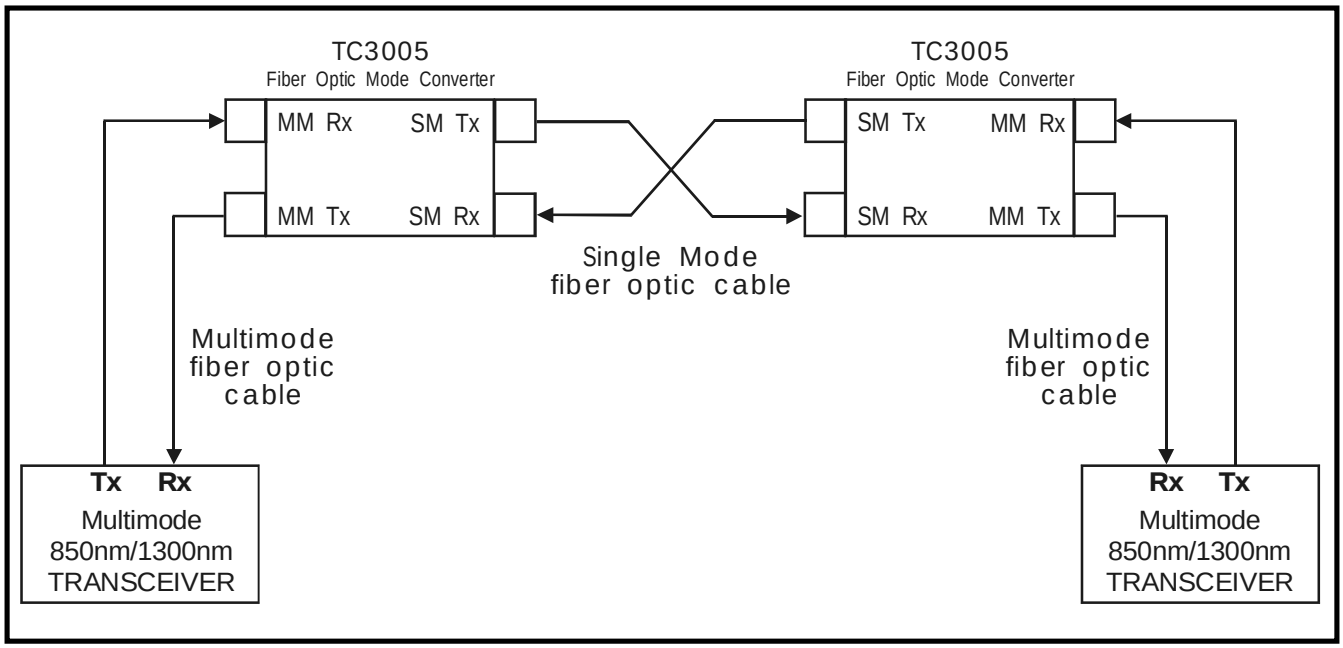


Figure 3. Installation Diagram for Dual TC3005 Application

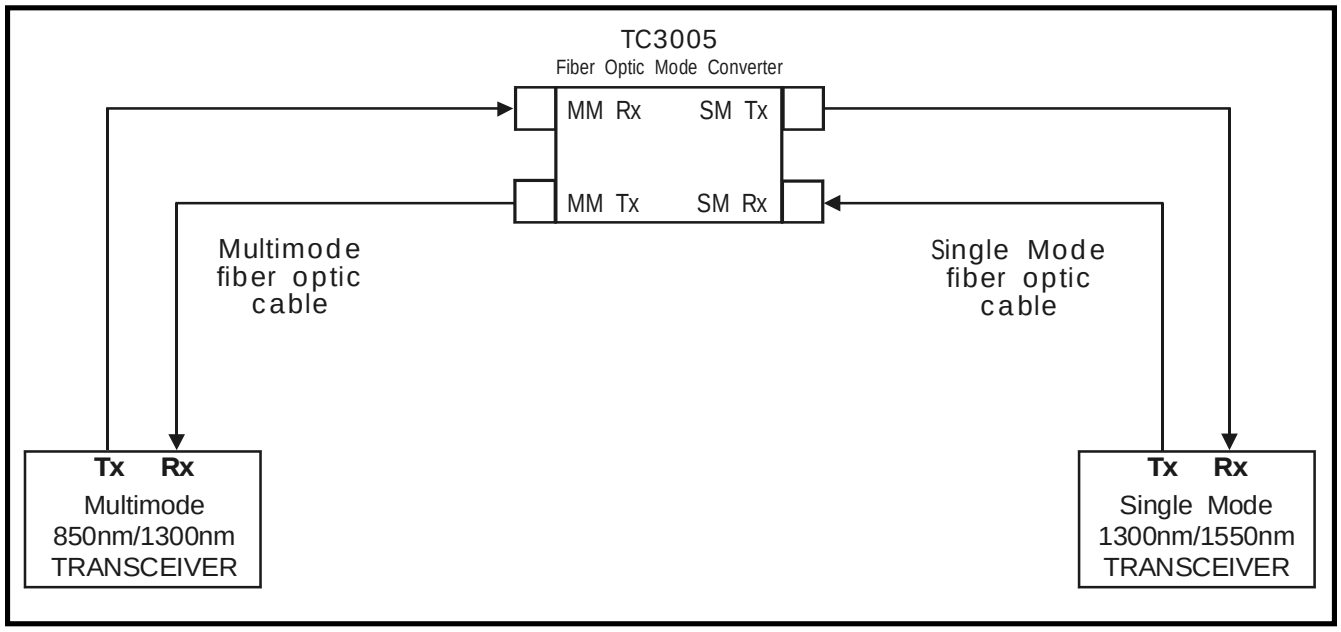


Figure 4. Installation Diagram for Single TC3005 Application

8. Troubleshooting

Typically, most problems encountered with the TC3005 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.

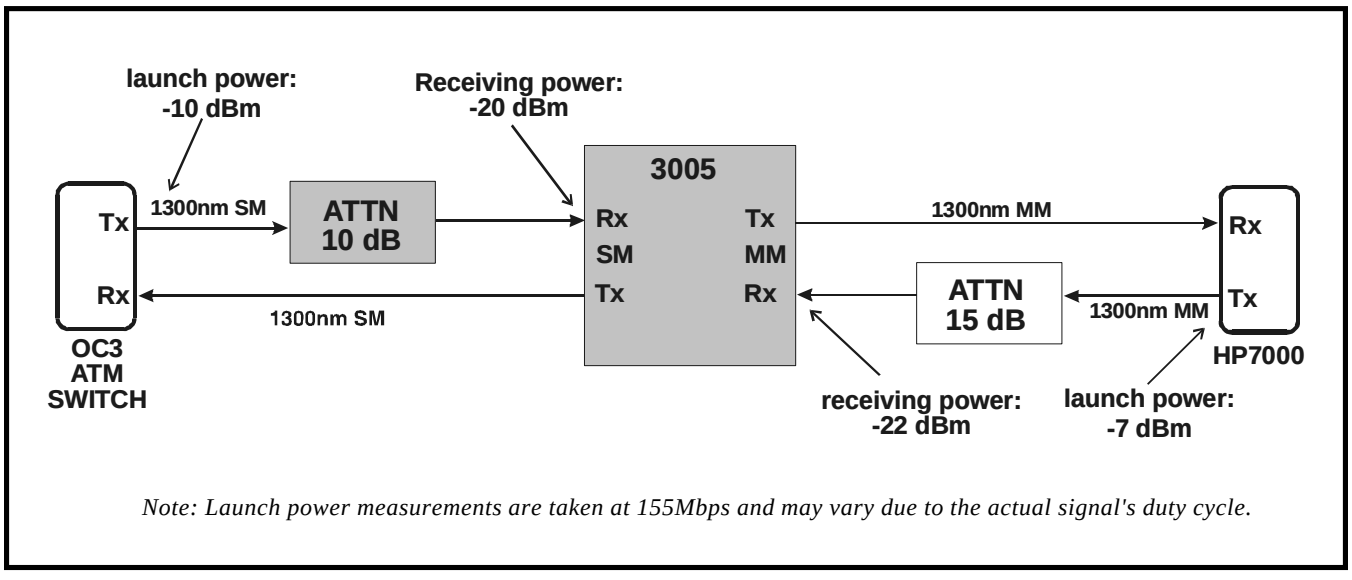
The TC3005's optic receivers have a typical saturation level of -14 dBm. If the user's equipment's launch power is higher than -14dBm (i.e. -13dBm or greater) and the fiber run is very short and has low signal loss, it is likely to overdrive the TC3005's Multimode receiver. The consequences of overdrive can be high error rates or the device's failure to recognize the incoming optic signal at all.

The TC3005 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 (727) 547-8307. 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 TC3005 Mode Converter used to convert a 1300nm Single Mode optical signal from an OC3 (155 Mbps) ATM SWITCH into a 1300nm Multimode optic signal to be received by the HP7000.* In the reverse direction, the HP7000's Multimode optic signal is converted to Single Mode format to be received by the OC3 ATM SWITCH. In-line attenuators are used to correct optic overdrive conditions that exist on either side of the TC3005.



Note: Launch power measurements are taken at 155Mbps and may vary due to the actual signal's duty cycle.

Figure 5. In-line Attenuator Placement Diagram

**HP (Hewlett Packard) and Metrotek are corporate names and are not affiliated with TC Communications, Inc.*

9. Physical Characteristics

Rack Mountable Card		Stand Alone Unit	
Height:	**7.0" (17.7 cm)**	**Height:**	**1.4" (3.5 cm)**
Width:	**1.2" (3.1 cm)**	**Width:**	**7.1" (18 cm)**
Depth:	**5.8" (14.8 cm)**	**Depth:**	**6.6" (16.6 cm)**
Weight:	**8.5 oz. (188 gm)**	**Weight:**	**1.5 lbs. (512 gm)**

10. Return Policy & Warranty

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).