OTLT / OTLR 3000 Manual

L-Band Fiber Optic Link
500 - 3,000 MHz

INSTRUCTION MANUAL

Phone: (209) 586-1022
(800) 545-1022
Fax: (209) 586-1026
E-Mail: sales@olsontech.com
www.olsontech.com

REV. X4 06/19/08

SAFETY

Safety Precautions

The optical emissions from the units are laser-based and may present eye hazards if improperly used. **NEVER USE ANY KIND OF OPTICAL INSTRUMENT TO VIEW THE OPTICAL OUTPUT OF THE UNIT.** Be careful when working with optical fibers. Fibers can cause painful injury if they penetrate the skin.

Laser Safety Procedure

ALWAYS read the product data sheet and the laser safety label before powering the product. Note the operation wavelength, optical output power and safety classifications.

If safety goggles or other eye protection are used, be certain that the protection is effective at the wavelength emitted by the device under test **BEFORE** applying power.

ALWAYS connect a fiber to the output of the device **BEFORE** power is applied. Power should never be applied without an attached fiber output. If the device has a connector output, a connector should be attached that is connected to a fiber. This will ensure that all light is confined within the fiber waveguide, virtually eliminating all potential hazard.

NEVER look at the end of the fiber to see if light is coming out. **NEVER!** Most fiber optic laser wavelengths (1310nm and 1550nm) are totally invisible to the unaided eye and will cause permanent damage. Shorter wavelengths lasers (e.g. 780nm) are visible and are very damaging. Always use instruments, such as an optical power meter to verify light output.

NEVER, NEVER, NEVER look into the end of a fiber on a powered device with **ANY** sort of magnifying device. This includes microscopes, eye loupes and magnifying glasses. This **WILL** cause a permanent and irreversible burn on your retina. Always double check that power is disconnected before using such devices. If possible, completely disconnect the unit from any power source.

If you have questions about laser safety procedures, please call ***OLSON TECHNOLOGY INC. (OTI)*** before powering your product.

GENERAL FEATURES

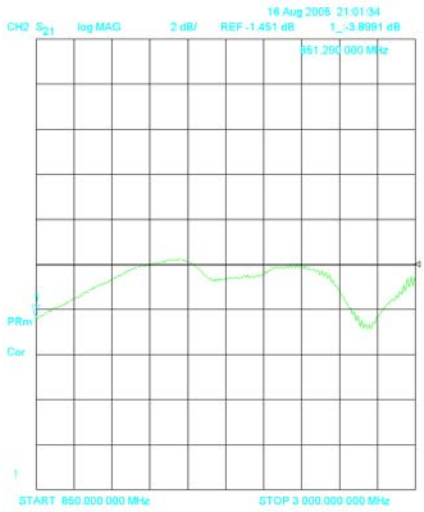
The OTLT linear fiber optic transmitter and the OTLR linear fiber optic receiver form the basic L-Band Fiber Distribution System. The wide bandwidth of 500MHz to 3,000MHz allows for a wide variety of communications applications including L-Band satellite antenna remoting, trunking radio, telemetry tracking and time and frequency reference distribution. The extended frequency range to 3.0GHz allows this to accommodate additional transponders including European satellite communications applications. The enhanced bandwidth also facilitates stacked LNB applications to accommodate additional transponders containing enhanced DBS services (HDTV, local channels, etc.) over single-mode fiber for DBS distribution.

These stand-alone versions are designed for mounting in outdoor enclosures or in other small spaces. For powering, the stand-alone units both the transmitter and receiver can be powered via the wire leads or on the center of the coax connector.

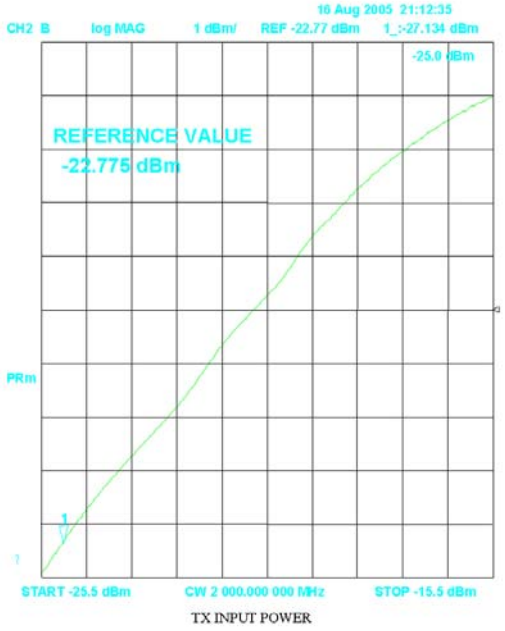
RF PERFORMANCE

The specifications are cited below with 12dB link optical loss and >55dB optical return loss. RF input level to Tx @12dBmV, the level to the high gain Rx is -9dBm Optical Power unless otherwise specified.

RF Frequency Range	500-3,000MHz
Amplitude Flatness	±1.5dB for any 500MHz, ± 0.35dB for any 40 MHz
Return Loss	10 dB
I/O Connector	F-Type Female (75 Ohms) Standard)
Link Gain @ 25°C	-4 ± 5 dB
Noise Figure with -9dBm Optical Pwr to Rx	45dB MAX, typically better than 32dB
CNR @ 12dBmV IN, 27MHz BW	Better than 17.7dB
Input 1 dB Compression to -20°C	>-17dBm, see chart next page for typical performance
Input IP_3 to -20°C	-9.5dBm
Gain vs. Temperature	Tx= 0.12dB/°C Rx= 0.09dB/°C
Max. Total RF Power in	-14dBm



Input 1 dB Compression



Frequency Response

OPTICAL PERFORMANCE

Optical Fiber	Single Mode 9/125µm (Corning SMF-28 or Equivalent)
Tx/Rx Optical Return Loss	>55dB
Tx/Rx Optical Connector	SC/APC (Standard) FC/APC (Optional)
Rx Wavelength	1270-1610nm
Rx Optical Input Power	-15 to +3dBm
Rx Alarm Standalone	Optical Input Power Low (Open Collector Output) Trip level set for optical levels less than -15dBm

Tx Model #	-302	-304	-505	-5XX
Tx Laser Type	Fabry-Perot	DFB	DFB	DFB/CWDM
Tx Output Power	3dBm	5dBm	4dBm	4dBm
Tx Wavelength	1310	1310	1550	XX
Tx/Rx Link Optical Budget	0 to -18dB	0 to -20dB	0 to -19dB	0 to -19dB

XX= 47, 49, 51, 53, 55, 57, 59, 61 for each of the available ITU-grid CWDM wavelengths.

DC POWERING AND ALARMS

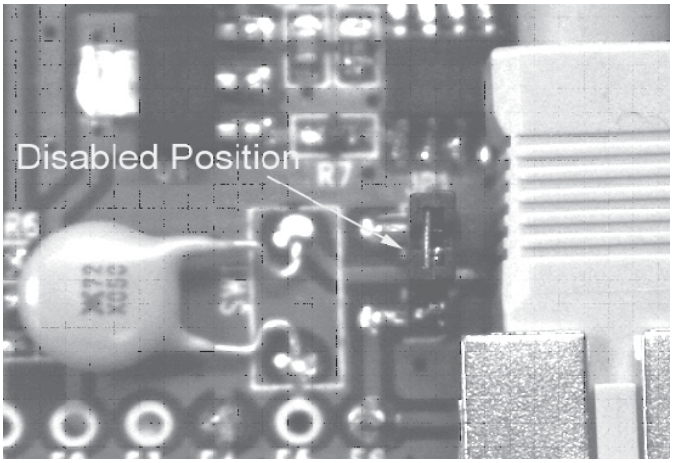
The current requirements for the Tx and Rx units are as follows:

Input Voltage	$8V_{DC}$	$12V_{DC}$	$15V_{DC}$	$18V_{DC}$	$24V_{DC}$
Tx	250mA	170mA	135mA	115mA	85mA
Rx	200mA	150mA	120mA	100mA	70mA

CAUTION!

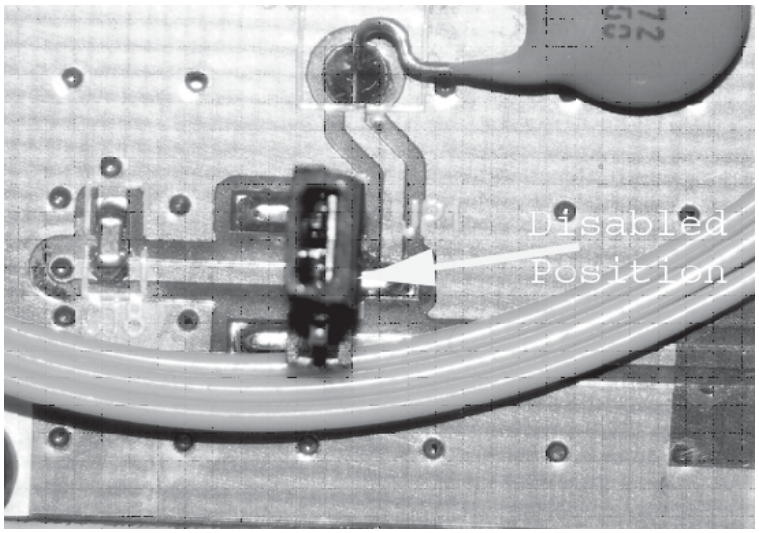
The standalone packages possess the flying leads which carry DC inputs and alarms. When connecting to these leads, any unused wires should be wrapped with electrical tape to avoid shorting that could damage the unit.

The Tx standalone unit has built in bias-T for remote powering of the LNB or could be used to power Tx though the RF connector, this feature can be enabled or disabled (Factory Preset) by moving the internal jumper, see picture below. The Tx unit is normally fed via the two flying leads, the Red Wire is $+8V_{DC}$ to $+24\ V_{DC}$ and the Black Wire is ground or -. The flying cable also has a shield wire that can be connected to ground to help shield any external signals.



TX JUMPER JP1

The Rx standalone unit can be powered though the RF connector, this feature can be enabled or disabled (Factory Preset) by moving internal jumper, see picture below. The Rx unit is normally fed via the two flying leads, the Red Wire is +8V_{DC} to +24 V_{DC} and the Black Wire is ground or -. The flying cable also has a shield wire that can be connected to ground to help shield any external signals. The Brown (may also be White) Wire is an Open Collector Low Optical Level Alarm that alarms when the optical level falls below -15 dBm.



Rx JUMPER JP1

Flying Lead Signal Description:

COLOR	Tx/Rx	SIGNAL DESCRIPTION
Red	Tx	DC Input, 8-24 V_{DC}
Black	Tx	Ground, DC Return
Silver	Tx	Shield, Shield wire, connect to Ground
Red	Rx	DC Input, 8-24 V_{DC}
Black	Rx	Ground, DC Return
Silver	Rx	Shield, Shield wire, connect to Ground
Brown	Rx	Open Collect Output for Low Received Optical Power

I*NSTALLATION*

Optical Connectors

There are many optical connectors on the market. There are also different ways the optical cable is terminated such as "Flat" and "Angled". We use only use APC type of connectors Angled Precision encountered in the field is the use of the wrong type of connectors. The most common is using SC/PC (Flat) with SC/APC(angled). The connectors will fit together but the optical loss will be in the neighborhood of 10 dB.

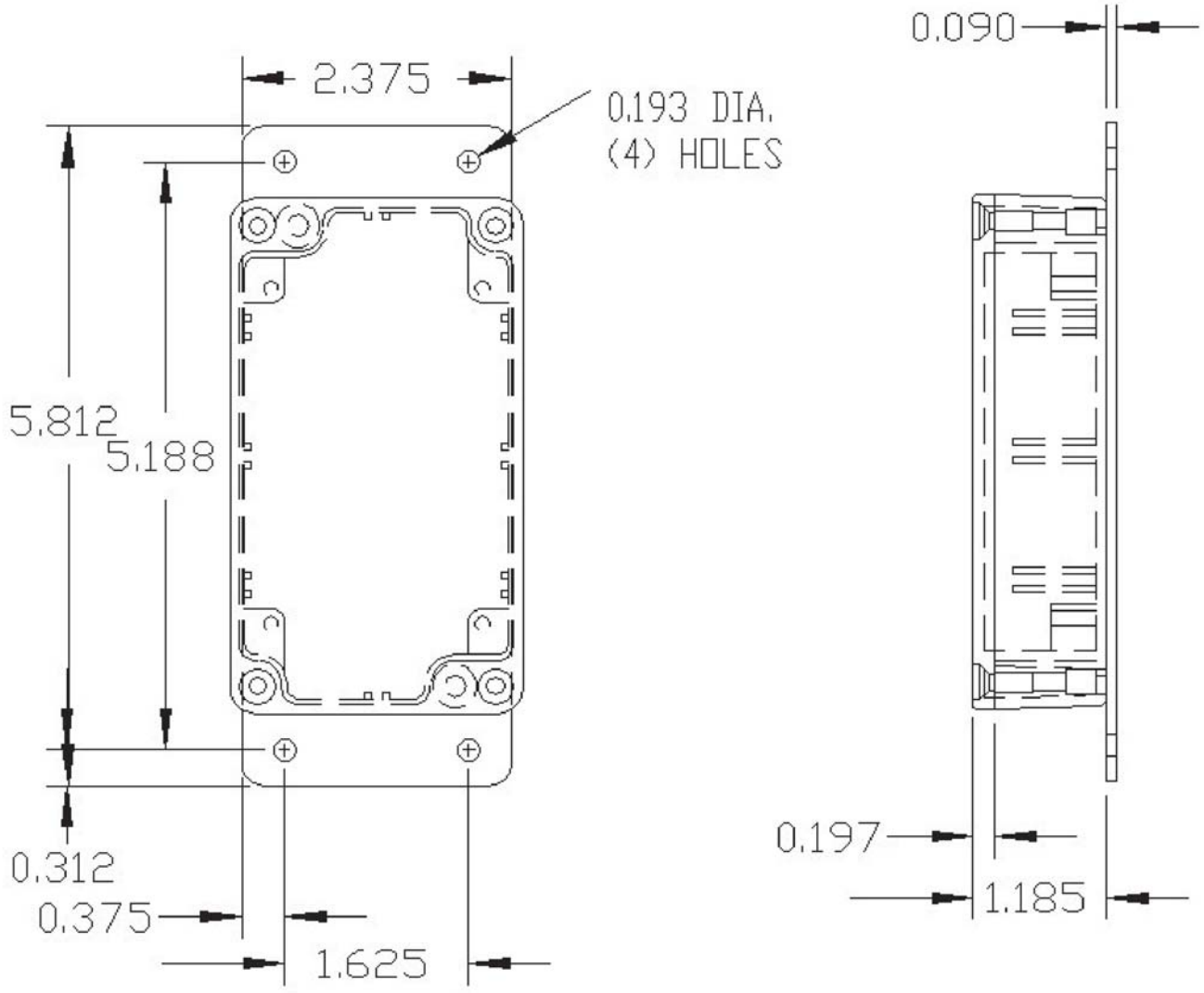
Cleaning Optical Connectors

Fiber optic connectors on the cable come pre-terminated should be clean and capped, so one can usually remove the cap and make the connection without cleaning the connector, but, if there is any doubt it is good practice to clean the optical connectors before making the connection. Once the connection is made, there should be no need clean the connector as long as the connector remains connected.

Use caution when handling the connectors. Any grease from your finger, scratch or small piece of dust or dirt can effect the optical performance. To clean use a lint free wipe such as Kimwipes or cotton swab, moisten with alcohol and gently wipe the tip of the connector. Let the connector air dry completely or use dry compressed air to dry.

When making the connection be sure the key is aligned with the bulkhead connector. In the case with the SC connectors, gently press in until the connector "clicks" in to place.

Physical Size



Mounting Template

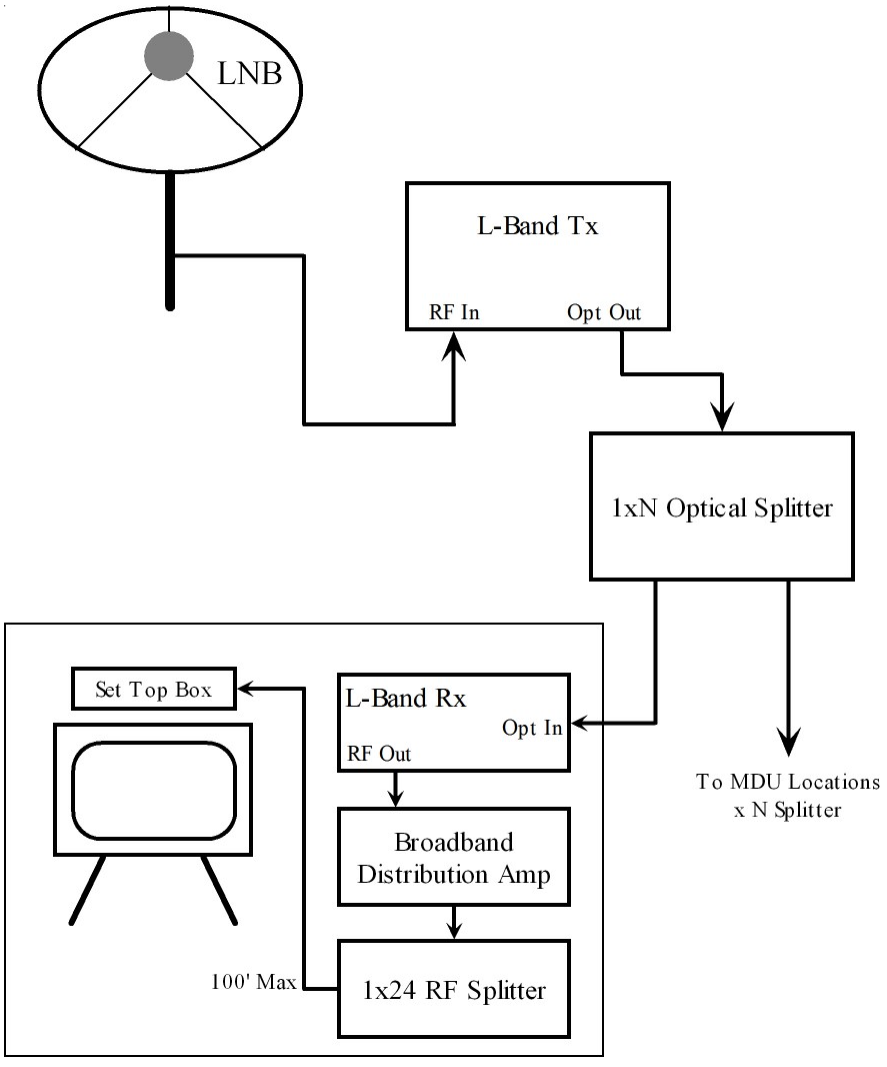
Mount modules to enclosure using #8 screws and split lock washers. It is suggested that the modules be mounted with the RF and Optical connectors mounted down to prevent moisture from entering. For a watertight seal, pot the optical connectors with RTV. If the enclosure provides enough water protection you can skip this step.

There are no user adjustments on modules. To optimize Tx RF input, external attenuators maybe required.

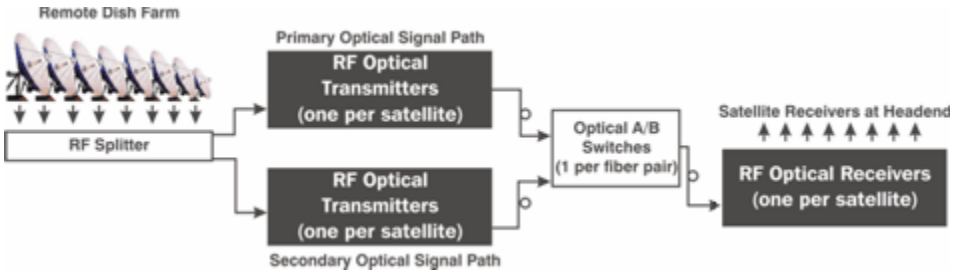
* Connect the optical fiber to both the transmitter and receiver. Insure the optical loss to the receiver is less than the maximum allowed
* Verify the proper RF level out of the LNB and connect the LNB output to the RF input of the transmitter
* Connect the RF out of the receiver to the distribution amplifier or TV set top receiver
* Apply power to both modules, the system should now be operational as there are no user adjust ments required on the modules

TYPICAL Applications

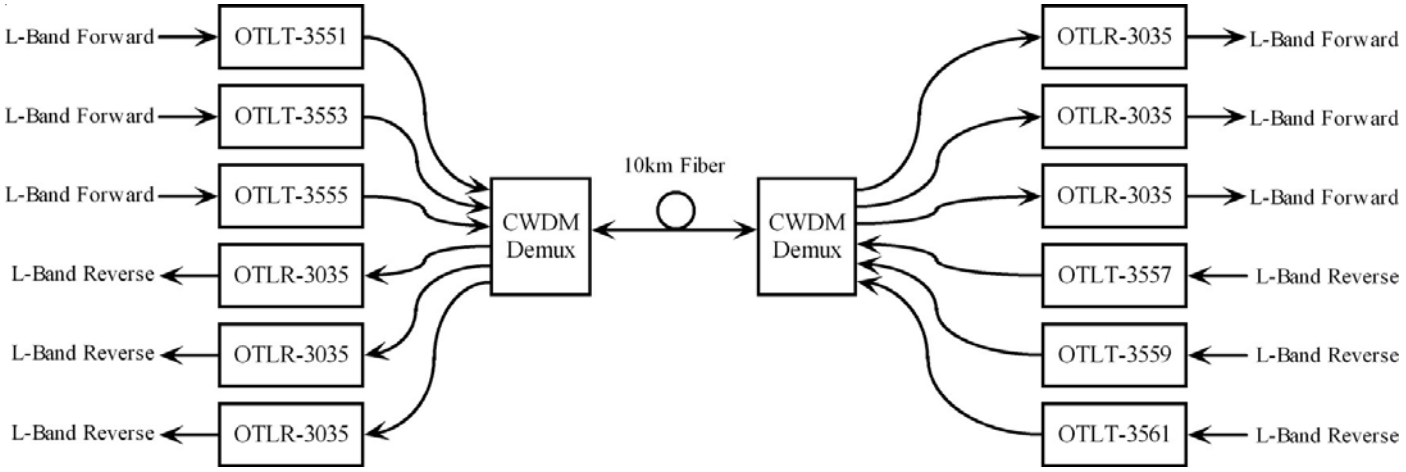
MDU (Multiple Dwelling Unit)



Typical Multiple Dwelling Unit



ANTENNA REMOTING



BASIC CWDM APPLICATION

ORDERING INFORMATION

Transmitters

Model OTRT-D301x-X3-ZA Transmitter, 500MHz-3GHz, +3dBm Optical Output, 75 Ohm (F Conn.)
Model OTRT-D301x-X4-ZA Transmitter, 500MHz-3GHz, +4dBm Optical Output, 75 Ohm (F Conn.)
Model OTRT-D301x-X5-ZA Transmitter, 500MHz-3GHz, +5dBm Optical Output, 75 Ohm (F Conn.)

Receivers

Model OTRR-D3000-XX-ZA Receiver, 500MHz-3GHz, RF, 1270-1610nm, 75 Ohm (F Conn.)

Power Supply

Model OTLB-PS-15DC Power Supply, 110 V_{AC} Input and +15 V_{DC} Output

NOTES:

1) The "Z" in all part numbers specifies the optical connector type: FA = FC/APC; SA = SC/APC.
2) The lowercase "x or "xx"" in the Tx part numbers specifies the wavelength: 13 = 1310nm; 15 = 1550nm, xx = CWDM (47 to 61).
3) The uppercase "X" in the Tx part numbers specifies the laser type: F = FP; I = Isolated FP; D = DFB; C = CWDM.
4) The uppercase "X" in the Rx part numbers specifies the gain: LG = low gain; HG = high gain.