



OLRT / OLRR 3000 Manual

Rugged L-Band Fiber Optic Link
500 - 3,000MHz
10 - 3,600MHz

INSTRUCTION MANUAL



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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 wavelength 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 OLRT linear fiber optic transmitter and the OLRR linear fiber optic receiver form the basic L-Band Fiber Distribution System. The wide bandwidth 500MHz to 3,000MHz or 10MHz to 3,600MHz 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 3.6GHz 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.

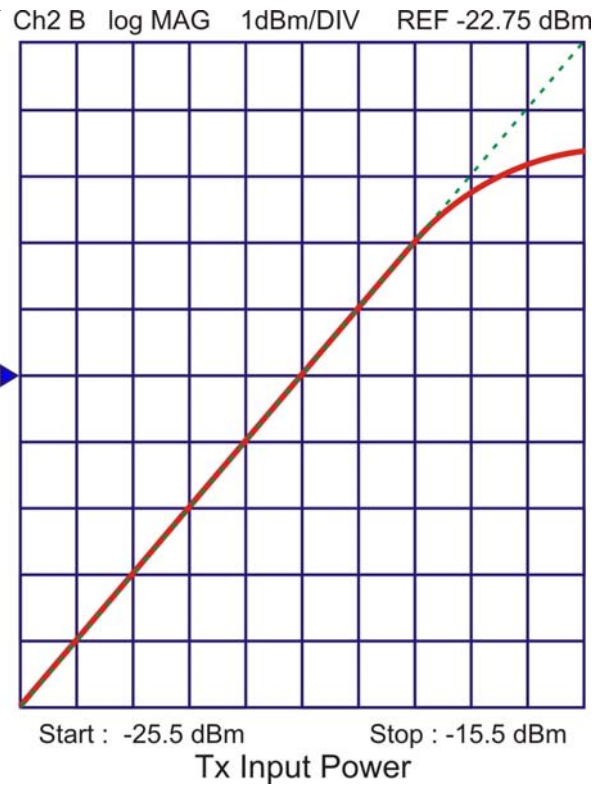
RF PERFORMANCE

The specifications are cited below with 10dB link optical loss and >55dB optical return loss.

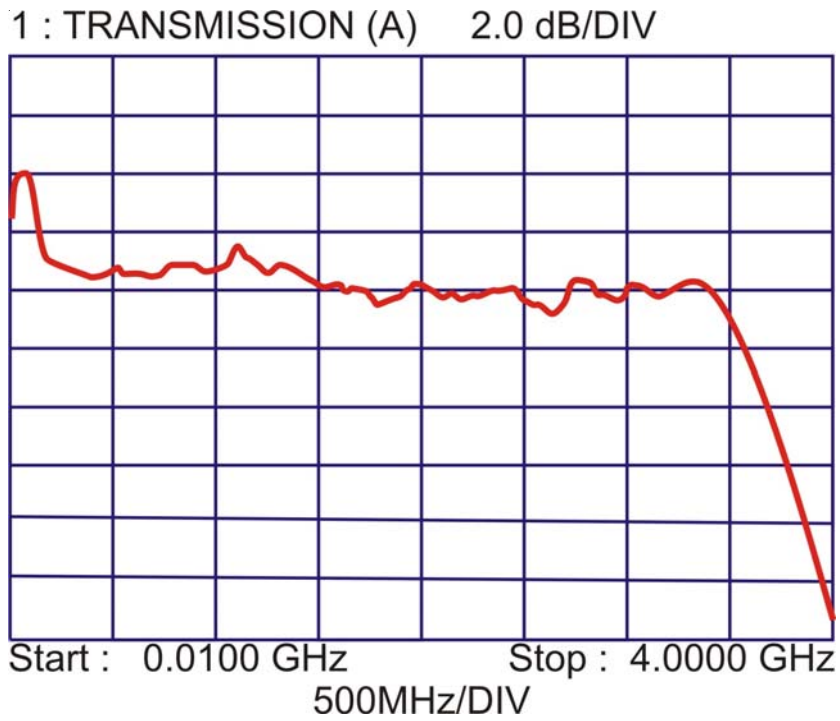
RF Frequency Range	500-3,000MHz or 10-3,600MHz depending on model
Amplitude Flatness (>50MHz)	±1.5dB for any 500MHz ±0.35dB for any 40 MHz
Return Loss	10dB
I/O Connector	F-Type Female (75 Ohm) Standard SMA, BNC (50 Ohm) Optional
Link Gain (High-Gain Receiver) @ 2GHz	-4 ± 5 dB
Link Gain (Low-Gain Receiver) @ 2GHz	-19 ± 5 dB
Noise Figure	See Table 1 Below.
Input 1 dB Compression	>-17dBm, see chart next page for typical performance
Input IP3	-9.5dBm Typical
Max. Total RF Power in	-14dBm

Table 1 - Typical Noise Figure vs. Rx Optical Input

Typical NF vs. Rx Power	
Rx Optical In	Typical NF
(dBm)	(dB)
3	13
0	16
-3	20
-6	25
-9	30
-12	35
-15	40
-18	45



Input 1dB Compression



Frequency Response

OPTICAL PERFORMANCE

Optical Fiber	Single Mode 9/125 μ m (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 #	-F3	-D5	-D4	-C4
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- XX= 47, 49, 51, 53, 55, 57, 59, 61 for each of the available ITU-grid CWDM wavelengths.

DC POWERING AND ALARMS

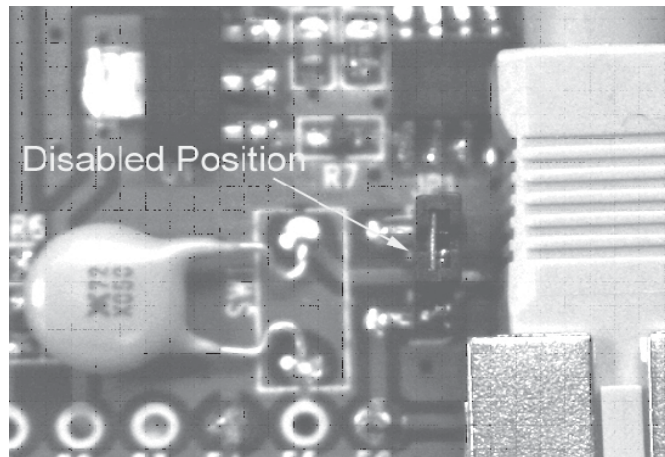
The current requirements for the Tx and Rx units are as follows:

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!

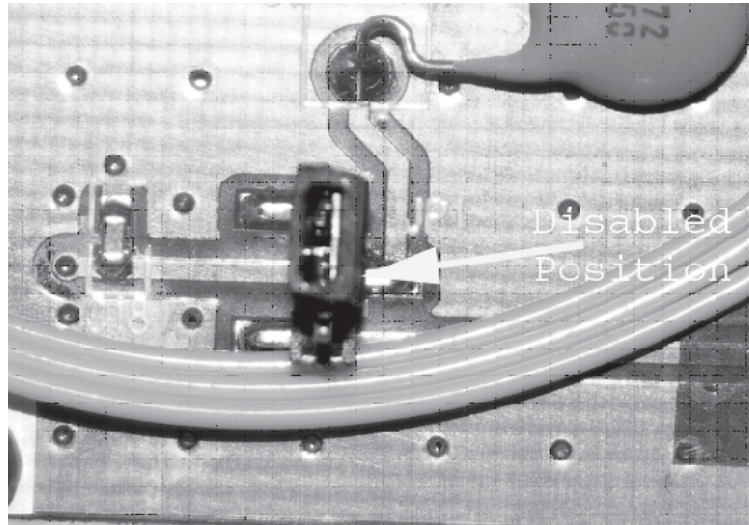
The standalone packages possess the flying leads which carry DC inputs and alarms. When connecting to these leads, any unused wires should be wrapped with electrical tape to avoid shorting that could damage the unit.

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 through 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 $+24V_{DC}$ and the Black Wire is ground or return. 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 Collector Output for Low Received Optical Power

INSTALLATION

Optical Connectors

There are several styles of optical connectors on the market, Flat Polish (PC or UPC) and Angled Polish (APC). We use only APC type connectors in the product. Most installation problems are caused by the use of the wrong type of mating optical connector. Be sure that all of your mating optical connectors are APC type. They will usually have a green marking to indicate APC style. Mating to a PC or UPC type will result in poor to no performance. PC or UPC connectors sometimes have a blue marking.

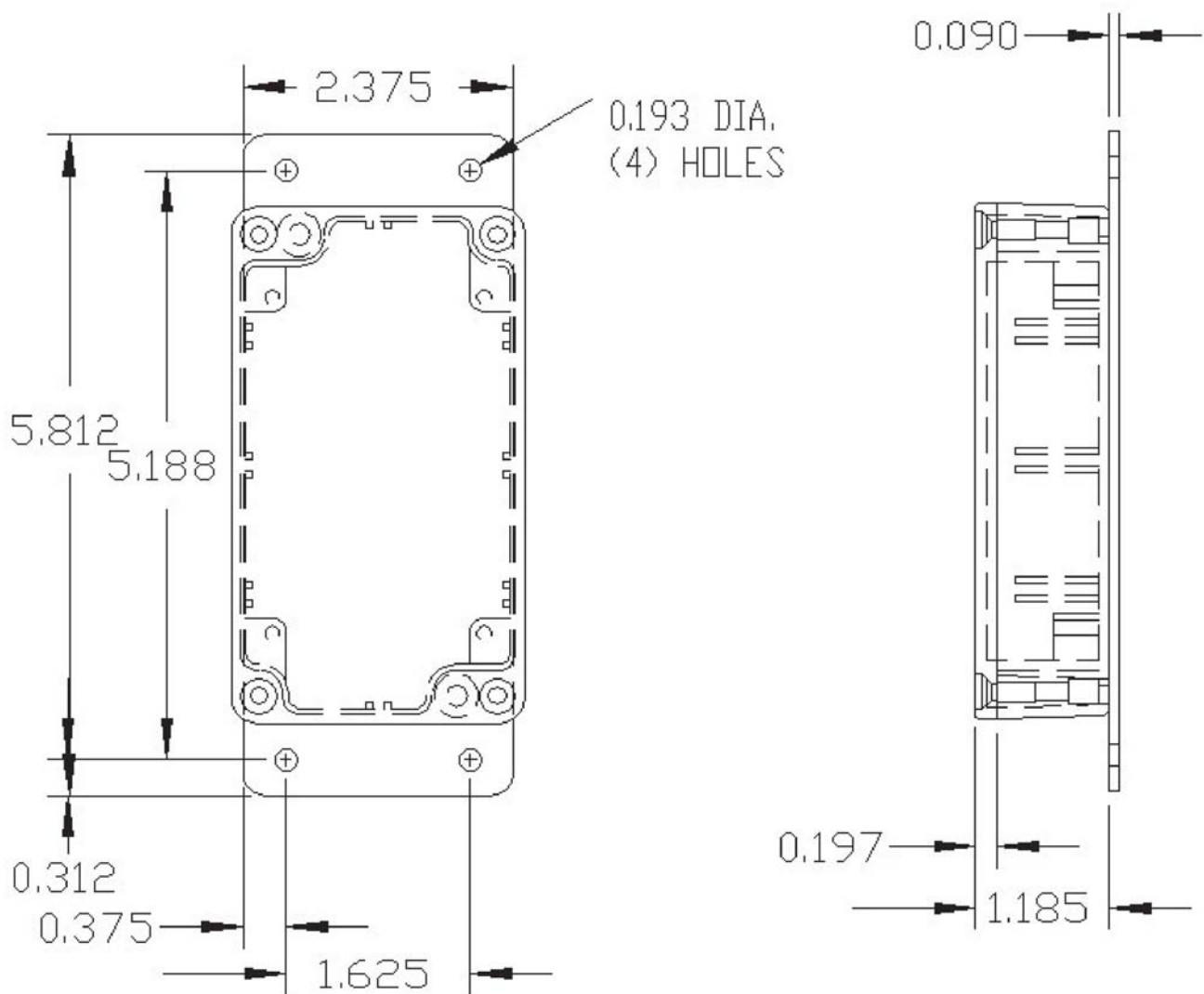
Cleaning Optical Connectors

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



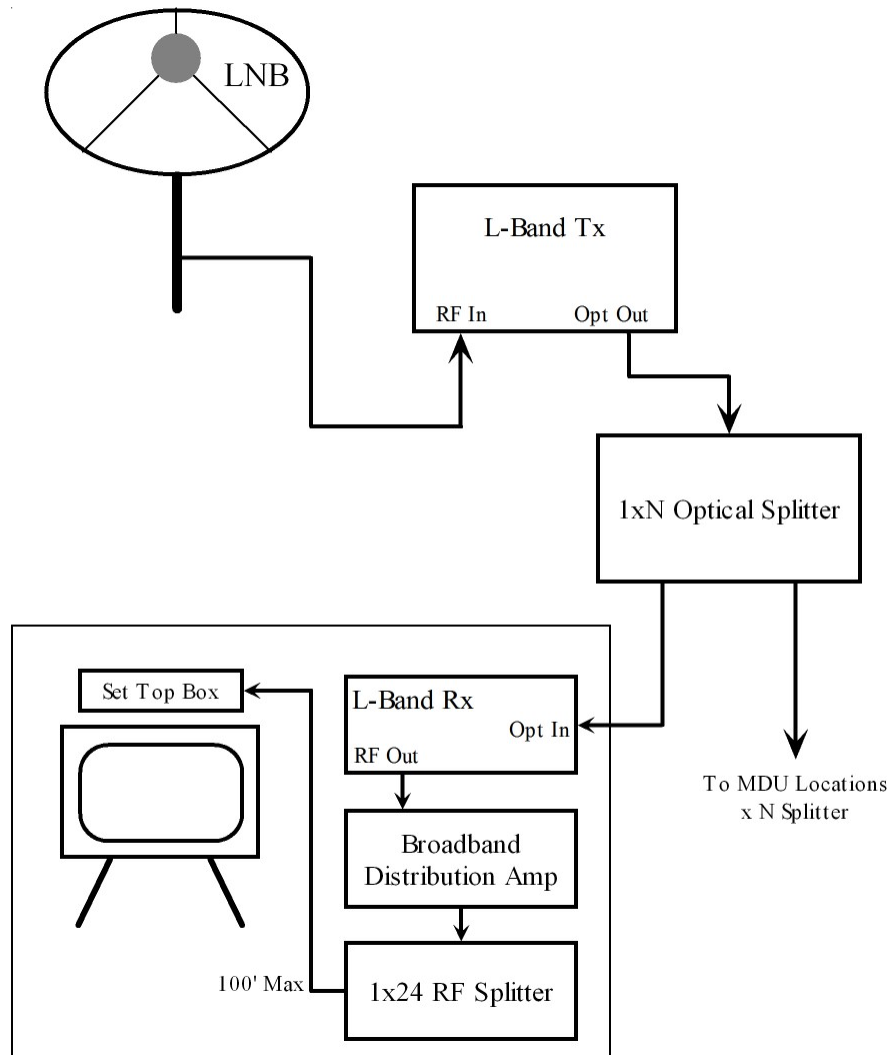
Mount modules to enclosure using #8 screws and split lock washers. It is suggested that the modules be mounted with the RF and Optical connectors mounted down to prevent moisture from entering. For a watertight seal, pot the optical connectors with RTV. If the enclosure provides enough water protection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

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

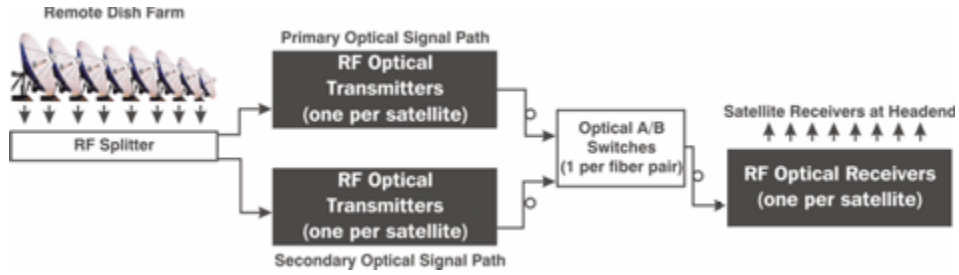
- * Connect the optical fiber to both the transmitter and receiver. Insure the optical loss to the receiver is less than the maximum allowed
- * Verify the proper RF level out of the LNB and connect the LNB output to the RF input of the transmitter
- * Connect the RF out of the receiver to the distribution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

TYPICAL Applications

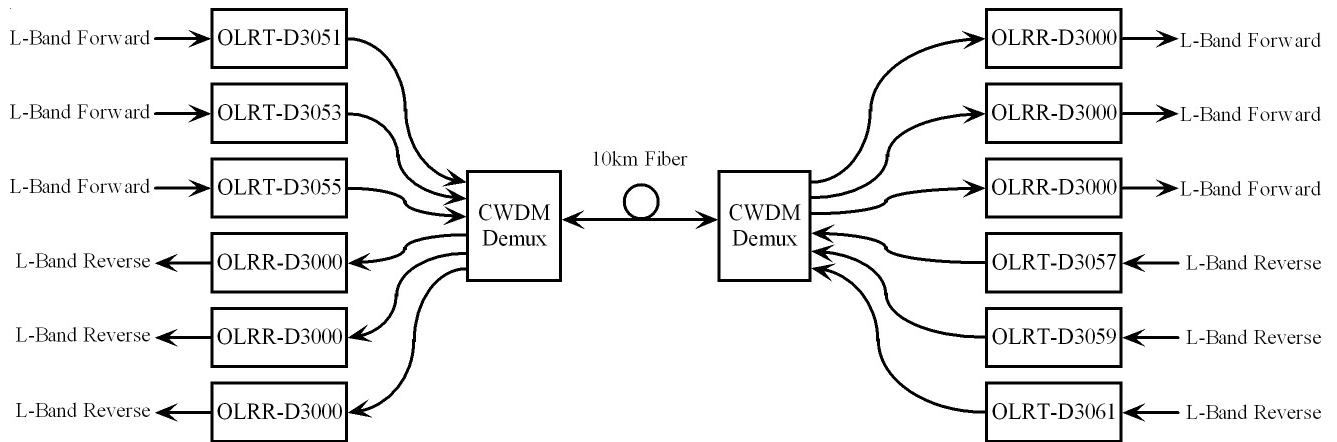
MDU (Multiple Dwelling Unit)



Typical Multiple Dwelling Unit



ANTENNA REMOTING



BASIC CWDM APPLICATION

ORDERING INFORMATION

Tx Model Number

OLRT-D3013-F3-FA	500MHz-3GHz L-Band Tx, Rugged Standalone, 1310nm, +3dBm/2mW Unisolated FP Laser, with LNB Power Option, 75 Ohm, FC/APC
OLRT-D3013-F3-SA	500MHz-3GHz L-Band Tx, Rugged Standalone, 1310nm, +3dBm/2mW Unisolated FP Laser, with LNB Power Option, 75 Ohm, SC/APC
OLRT-D3013-D5-FA	500MHz-3GHz L-Band Tx, Rugged Standalone, 1310nm, +5dBm/3mW DFB Laser, with LNB Power Option, 75 Ohm, FC/APC
OLRT-D3013-D5-SA	500MHz-3GHz L-Band Tx, Rugged Standalone, 1310nm, +5dBm/3mW DFB Laser, with LNB Power Option, 75 Ohm, SC/APC
OLRT-D3015-D4-FA	500MHz-3GHz L-Band Tx, Rugged Standalone, 1550nm, +4dBm/2.5mW DFB Laser, with LNB Power Option, 75 Ohm, FC/APC
OLRT-D3015-D4-SA	500MHz-3GHz L-Band Tx, Rugged Standalone, 1550nm, +4dBm/2.5mW DFB Laser, with LNB Power Option, 75 Ohm, SC/APC
OLRT-D30xx-C4-FA	500MHz-3GHz L-Band Tx, Rugged Standalone, 4dBm/2.5mW CWDM DFB Laser at 1xx0nm, xx = 47, 49, 51, 53, 55, 57, 59 or 61; with LNB Power Option, 75 Ohm, FC/APC
OLRT-D30xx-C4-SA	500MHz-3GHz L-Band Tx, Rugged Standalone, 4dBm/2.5mW CWDM DFB Laser at 1xx0nm, xx = 47, 49, 51, 53, 55, 57, 59 or 61; with LNB Power Option, 75 Ohm, SC/APC
OLRT-X3613-F3-FA	10MHz-3.6GHz L-Band Tx, Rugged Standalone, 1310nm, +3dBm/2mW Unisolated FP Laser, with LNB Power Option, 75 Ohm, FC/APC
OLRT-X3613-F3-SA	10MHz-3.6GHz L-Band Tx, Rugged Standalone, 1310nm, +3dBm/2mW Unisolated FP Laser, with LNB Power Option, 75 Ohm, SC/APC
OLRT-X3613-D5-FA	10MHz-3.6GHz L-Band Tx, Rugged Standalone, 1310nm, +5dBm/3mW DFB Laser, with LNB Power Option, 75 Ohm, FC/APC
OLRT-X3613-D5-SA	10MHz-3.6GHz L-Band Tx, Rugged Standalone, 1310nm, +5dBm/3mW DFB Laser, with LNB Power Option, 75 Ohm, SC/APC
OLRT-X3615-D4-FA	10MHz-3.6GHz L-Band Tx, Rugged Standalone, 1550nm, +4dBm/2.5mW DFB Laser, with LNB Power Option, 75 Ohm, FC/APC
OLRT-X3615-D4-SA	10MHz-3.6GHz L-Band Tx, Rugged Standalone, 1550nm, +4dBm/2.5mW DFB Laser, with LNB Power Option, 75 Ohm, SC/APC
OLRT-X36xx-C4-FA	10MHz-3.6GHz L-Band Tx, Rugged Standalone, 4dBm/2.5mW CWDM DFB Laser at 1xx0nm, xx = 47, 49, 51, 53, 55, 57, 59 or 61; with LNB Power Option, 75 Ohm, FC/APC
OLRT-X36xx-C4-SA	10MHz-3.6GHz L-Band Tx, Rugged Standalone, 4dBm/2.5mW CWDM DFB Laser at 1xx0nm, xx = 47, 49, 51, 53, 55, 57, 59 or 61; with LNB Power Option, 75 Ohm, SC/APC

Rx Model Number

OLRR-D3000-LG-FA	500MHz-3GHz L-Band Rx, Rugged Standalone, 1270-1610nm, -15 to +3dBm Input, Low Gain RF Option, 75 Ohm, FC/APC
OLRR-X3600-LG-SA	10MHz-3.6GHz L-Band Rx, Rugged Standalone, 1270-1610nm, -15 to +3dBm Input, Low Gain RF Option, 75 Ohm, SC/APC
OLRR-X3600-HG-FA	10MHz-3.6GHz L-Band Rx, Rugged Standalone, 1270-1610nm, -15 to +3dBm Input, High Gain RF Option, 75 Ohm, FC/APC
OLRR-D3000-HG-SA	500MHz-3GHz L-Band Rx, Rugged Standalone, 1270-1610nm, -15 to +3dBm Input, High Gain RF Option, 75 Ohm, SC/APC

PS Model Number

Model OTPS-12A	Power Supply, Universal AC Input, +12 VDC, 1.5A _{DC} Output
Model OTPS-18A	Power Supply, Universal AC Input, +18 VDC, 1.0A _{DC} Output