

LaserPlus: TSD 1310nm DFB Transmitter (LP-OT-L) 1 GHz HIGH DENSITY COMPACT CATV OPTICAL TRANSMISSION SYSTEM

Features / Benefits



- **Low Cost** 1 GHz design facilitates **Forward Path Segmentation** in newer 1:1 ratio (transmitter-to-node) **Targeted Services Delivery (TSD)** narrowcast architectures
- **3 & 6 dBm** low optical output for loss budgets from 1dB to 10 dB (< 30 km)
- Lowers cost of narrowcast bandwidth = Accelerates advanced services deployment
- Simple Plug-and-Play initial set-up: adjust transmitter for RF input level and GO!
- Front Panel RF Input test point: 75-ohm F-type
- Front Panel Optical Power & Laser Current test points: via high-impedance voltmeter
- Front Panel status LEDs: Optical Power, Laser Current and Cooler summary alarms
- Advanced predistortion circuitry = excellent CSO/CTB performance
- Revolutionary laser cooler design = improved cost-to-performance ratio
- Energy-efficient internal circuit design = low power consumption & long-term reliability
- Single-slot width, plug-in, front-access module with hot-swap capability, slides into one of the fifteen (15) available applications slots in the LaserPlus LP-CH-16 Chassis
- Chassis-based plenum with four large fans creates more airflow & better reliability than module-based fans; if fan-failure occurs, transmitters remain in operation

The **Olson Technology, Inc. Model LP-OT-x Targeted Services Delivery (TSD) 1310nm DFB Optical Transmitter family** is a single-slot module for the **LaserPlus** optical transmission platform. It was engineered specifically to meet recent requirements for a one-transmitter-per-one-node (1:1 ratio) system design. This architecture, being implemented by an ever-increasing number of MSO's in metro area applications, assumes a short (<10dB or <25km) optical path from headend to node. This approach is gaining popularity for 2 reasons:

- 1) 80-90% of system nodes are typically within 7 dB (~20 km) from the headend or hub, and;
- 2) the need to reduce the subscriber/node ratio to accommodate new advanced services offerings.

This rugged, low-profile, amplitude-modulated **Model LP-OT-L** transmitter utilizes a high-quality, optically isolated 1310 nm DFB laser with a +3 or +6 dBm optical output. It is packaged as a convenient, hot-swappable plug-in module, and features an RF driver, state-of-the-art laser cooler circuitry, advanced predistortion electronics, front panel RF and optical test points, and front panel LEDs which provide immediate visual status of the unit. Enhanced local and remote monitoring of the transmitter is also provided via summary alarms to LEDs on the **Model LP-PS-x** power supplies, via contact closures on the **Model LP-CH-16** chassis, and also via the optional **Model LP-CH-SNMP-1** element manager agent which is compatible with third-party solutions.

The design of this transmitter facilitates initial setup by requiring only a simple RF input gain adjustment via easily accessible front panel variable attenuator to bring the unit online. The Model LP-OT-x accepts a 79 channel flat RF input from +18dBmV to +22dBmV per channel from 50-550MHz. The transmitter has a full 50–1000 MHz bandwidth and meet stringent industry requirements for the carriage of standard analog CATV signals (50-550MHz) plus 64/256 QAM digital tiers, high speed data traffic, cable telephony, video-on-demand (VOD), and other advanced services deployments (550MHz to 1000MHz @ -6dB below analog).

The **LaserPlus Model LP-OT-L** is the perfect companion to optical receiver/node products in the Olson Technology, Inc. **MetroNode Model OTMN-x** and **PremiseNode Model OTPN-x** product families, but is also designed to operate seamlessly with optical transmitters, receivers and nodes from most leading manufacturers.

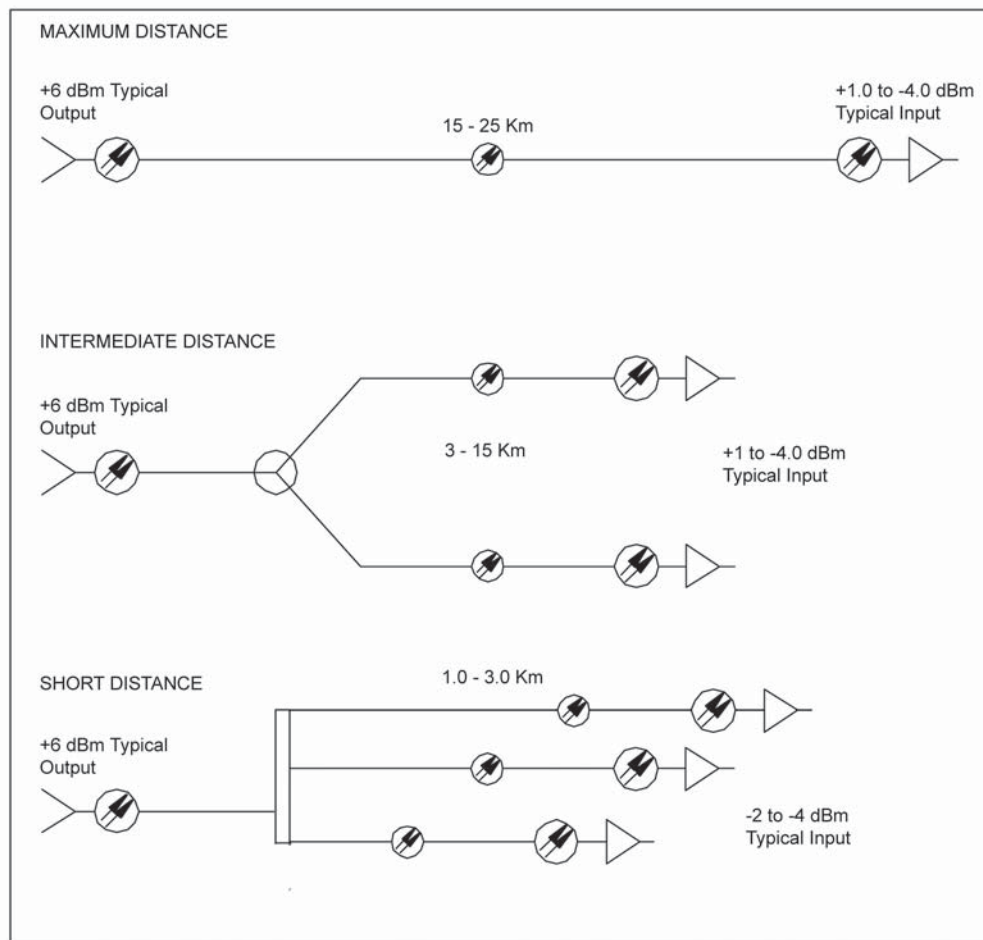
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1 GHZ HIGH DENSITY, COMPACT CATV OPTICAL TRANSMISSION PLATFORM

The *LaserPlus Model LP-OT-6* Transmitter is a model of efficient design. The transmitter meets system design criteria which assumes a short optical path from the headend (or hub) to the node/receiver, usually 7dB to 10 dB (or less). As shown in the diagram below, an optical output of +6dBm can provide a 1:1 single transmitter-to-node connection over distances up to 40Km utilizing Olson Technology, Inc. *MetroNode* or *PremiseNode* high-sensitivity node/receivers, or up to 30Km utilizing nodes from most other leading manufacturers. By splitting the transmitter output with the appropriate 1x2 optical splitter/coupler, one can also provide a 1:1 dual redundant feed to a single node, using diverse optical path routing.

Since many campus, institutional, military or other metropolitan area applications typically require even shorter headend-to-node distances, it is also very common to utilize a common, commercially-available, balanced or unbalanced 1x2, 1x3 or 1x4 optical splitter/coupler to feed up to four (4) remote node locations from a single source transmitter. The *LP-OT-6* also delivers excellent performance in these traditional 1:2, 1:3 and 1:4 “blast-and-split” topologies. When used with low-loss, high-performance optical couplers, like the *LaserLite Model OTCP-x* family, it is possible to deploy shared optical fiber feeds to several independent, remote node/receivers located 1Km to 10Km from the central headend or hub source location.

Typical Applications of the LaserPlus Model LP-OT-6 1310nm DFB Forward Path Transmitter



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Specifications



RF INPUT & PERFORMANCE PARAMETERS:

Frequency Range	48 MHz to 1000 MHz
Frequency Response	+/- 1.0 dB
Input Impedance	75 ohms
Input Return Loss	> 16 dB
Input Level for Optimum Performance	Analog Channels: +18 dBmV/carrier minimum Digital QAM Channels: +9dBmV/carrier minimum (79 NTSC channels to 550MHz & 320 MHz digital at -6dBc) (RF Input spec based on unmodulated CW carriers. Typical modulated carrier input will be 2dB higher)
Input Slope	0 dB
Distortion Performance	see next page

OPTICAL PARAMETERS:

Wavelength	1310 nm +/- 20nm
Output Power	3 dBm; 6dBm

ELECTRICAL, ENVIRONMENTAL & MECHANICAL PARAMETERS:

Dimensions	4.5" H x 1.125" W x 8.75" D (11.4 cm x 2.9 cm x 22.2 cm)
Weight	1 lb. (.454 kg)
Operating Temperature Range	0 degrees C to +50 degrees C (+32 to +122 degrees F) (Air temperature measured at air inlet of Model LP-CH chassis)
Humidity Range	to 95% non-condensing (Recommended for use only in non-condensing environments)
Mounting	In applications slot in Model LP-CH-16 LaserPlus Chassis
Module Slots	One slot width: Slot# 1-15 (inclusive)
Powering	5.25VDC per module
Protection	3A SB fuse [Littelfuse PN# 0454033; Olson PN# 286-000009]

TRANSMITTER INTERFACES:

RF Input Connector	F-Type (rear of module)
RF Input Test Point (F-Type Connector)	+10dBmV/carrier @550MHz for optimal OMI & performance
Input Level Adjust	+4dB (to+22dBmV/carrier) via variable attenuator (front of module)
Optical Output Connector	SC/APC standard; FC/APC optional (front of module)
LED Indicators (Green/Red)	Optical Power Alarm; Laser Current Alarm; Cooler Alarm
Laser Enable/Disable	Recessed push-button switch (front of module)

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Distortion Performance

LP-OT-6

Composite Triple Beat (CTB) -67 dBc

Composite Second Order (CSO) -63 dBc

Cross Mod (XMOD) -65 dBc

Carrier-to-Noise (CNR)

Low Channel Load (79 NTSC) CNR Performance

High Channel Load (110 NTSC) CNR Performance

Olson Tech Model Number	Output Power (dBm)	Link Loss (dBm)	All Fiber No Passive Loss (CNR db)	Fiber + 3.5 dB Passive Loss (CNR db)	Fiber + 7 dB Passive Loss (CNR db)	All Fiber No Passive Loss (CNR db)	Fiber + 3.5 dB Passive Loss (CNR db)	Fiber + 7 dB Passive Loss (CNR db)
LP-OT-3	3	3	53	54	-	-	-	-
		4	55	56	-	53	50	-
		5	54	55	-	52	51	-
LP-OT-6	6	6	53	54	-	51	52	-
		7	52	53	54	50	51	52
		8	51	52	53	59	50	51
		9	50	51	52	48	49	50
		10	49	50	51	47	48	49

Notes:

1. "Load" refers to total analog modulated channel loading. Power levels are per channel peak envelope power.
2. Specifications are for unmodulated (CW) carriers (Matrix test set) per SCTE standards.
3. Measured at specified RF input level of +18 dBmV/carrier.
4. Activation of digital loading @ -6dB reduced level may negatively impact analog performance. Testing of QAM digital loading with (77) 6 MHz analog video channels (i.e. 550 MHz) and (33) 64 QAM channels to 750 MHz indicates a typical CNR degradation of less than 0.5 dB.
5. Specifications measured using an Olson Technology, Inc. OTMN-II node/ receiver, @ 0 dBm optical input to the receiver.

Block Diagram of the LaserPlus LP-OT-6 1310nm DFB Transmitter

