

# LaserPlus

## 1 GHz High Density Compact CATV Optical Transmission System

### Features

- Compact: Space-Efficient 3RU footprint means that up to 13 chassis can be installed in a standard 70" rack
- High Density: Up to 15 applications modules per 3RU 19" EIA chassis; 195 modules per 70" rack
- Scalable: Full lineup of application modules optimizes virtually any CATV system architecture, from traditional 4:1 "blast-and-split" HFC configurations to newer topologies with 1:1 forward path segmentation
- High Performance Fwd 1310nm Transmitters: 3dBm to 15dBm outputs @ 1310nm; 195 per 70" rack
- Triple Return Receivers: Up to 45 fully independent 1310/1550nm receivers per chassis; 585 per 70" rack
- Other Modules: 1550nm Fwd FTTP Tx; CWDM/DWDM R-Tx; DWDM QAM Tx; Block Down Converter
- Return Path Segmentation: via 2:1 or 4:1 (5-42/65 MHz) block downconverters; Field-proven since 1999
- Remote Monitoring and Control: Optional network management interface supports SNMP via Ethernet port
- Local Status Monitoring: Rear chassis DB-25 connector outputs individual module summary alarms via contact closures, and LEDs on each module indicate general operating status & key operating parameters
- Convenient Test Points: Optical and RF test points are located on the front panel of each module
- Powering Redundancy: Fully independent, universal 90-264VAC and/or  $\pm 48$ VDC power supplies
- Power Efficiency: < 150 Watts per fully-loaded chassis; Runs cooler, reduced power costs & longer life
- Thermal Efficiency: Four hot-swappable fans in chassis plenum creates more airflow than module-based fans
- Integrated Fiber Management Tray: Inside the chassis, above and in front of the application modules
- Plug-in, Modular Front-Access Design & Hot-Swap Module Capability: Easy replacement & configuration
- Very Cost-Effective

### LaserPlus System



The OLSON TECHNOLOGY, INC. LaserPlus Model LP-x is a compact, high density optical transmission system which allows hub, headend and digital transport to coexist on a single, scalable platform. It provides the outstanding performance, system design flexibility and scalability in almost any network architecture from traditional Hybrid Fiber Coax (HFC) to the newer fiber-deep Targeted Service Delivery (TSD) area topologies. As such, the LaserPlus is the ideal platform for the transport of evolving services and resultant expanding bandwidth requirements in today's advanced HFC and PON networks.

The three (3) rack-unit LaserPlus chassis accepts up to fifteen "mix-and-match" applications modules and single or dual redundant independent power supplies (AC or DC), minimizing headend space requirements. This fully-integrated, cost effective package utilizes many of the very latest RF and optical design techniques to provide superior system performance to beyond 1,000 MHz, while dramatically reducing component size and minimizing system powering requirements, and the costs normally associated with them.

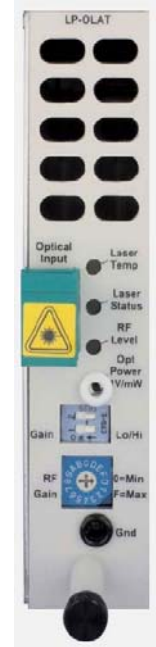
The LaserPlus transmission platform is the perfect companion to optical receiver/node products in the Olson Technology, Inc. MetroNode Model OTMN-II and PremiseNode Model OTPN-x product families, but is also designed to operate seamlessly with optical transmitters, receivers and nodes from most leading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

## LaserPlus LP-OLAT Advanced L-Band Transmitter

The Olson *LaserPlus* LP-OLAT Advanced L-Band Transmitter offers a feature-rich, versatile system in a compact rack-mount package. The Advanced L-Band Transmitter has been engineered to meet today's high performance standards for L-Band transport with an extreme bandwidth range that will also allow the system to handle the next generation of satellite signals. The Advanced L-Band system is ideal 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 4GHz allows this system to accommodate additional transponders coinciding with common European satellite communication applications.

The enhanced bandwidth to 4GHz is also unique in that it facilitates stacked LNB applications to accommodate additional transponders containing enhanced DBS programming services (e.g., HDTV, local channels, etc.) over single-mode fiber for DBS television distribution in campus, fiber-to-the-premise (FTTx), and multiple dwelling unit (MDU) environments. The transmitter is offered with 75 Ohm impedance using "F" RF connectors or 50 Ohms with SMA RF connectors. Optical connector options include SC/APC and FC/APC. Built-in test points, LED indicators and alarms allow the receiver to be easily set up and maintained.

The LP-OLAT Transmitter is housed in a machined Aluminum enclosure that fits the standard *LaserPlus* chassis allowing up to 14 or 15 modules in a 3RU space. (The exact number is determined by the number of power supplies in the chassis, single or dual).



### Specifications

#### Optical Characteristics (with SM 9/125µm Fiber)

	Min	Typ	Max	Units
Operating Wavelength		1310		nm
Operating Wavelength		1550		nm
Operating Wavelength (CWDM)	1290		1610	nm
Operating Wavelength (DWDM)	22		46	ITU ch
Tx Output Power (DFB)		+5		dBm
		3		mW
Tx Output Power (DFB, CWDM)		+4		dBm
		2.5		mW
Tx Output Power (DFB, DWDM)		+9		dBm
		8		mW
Tx Return Loss		>55		dB
Optical Connector		SC/APC		(Standard)
Optical Connector		FC/APC		(Optional)

#### NOTES:

- 1) The RFGain will change 2dB for each 1dB of optical loss.
- 2) The transmitter P<sub>1dB</sub> and also IP3 varies dB per dB as the gain is changed. See the manual for detailed data.
- 3) Noise figure is a complex variable that is influenced by the Tx and Rx attenuator settings as well as the optical loss. See the manual for detailed data.
- 4) The Hi/Lo Gain switch on the front panel changes the gain by +10dB. The hexadecimal rotary switch on the front panel changes the gain in 1dB steps. The "0" setting on the rotary switch is the lowest gain (0dB). The "F" setting on the rotary switch is the highest gain (+15dB).

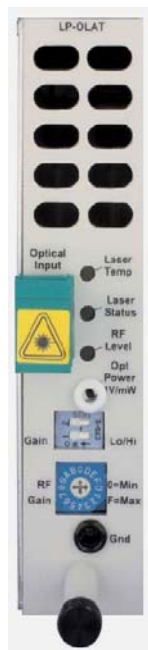
#### RF and System Characteristics

	Min	Typ	Max	Units
Frequency (non-DWDM Models)	10		4,000	MHz
Amplitude Flatness		Any 500MHz / ±1.5		dB
		Any 40MHz / ±0.35		dB
Return Loss	10			dB
Output Impedance (Standard)		75		Ohms
Output Impedance (Optional)		50		Ohms
Link Gain	-50		+30	dB
Noise Figure (See manual)	10		45	dB
Tx Input IP3	-10		+15	dBm
Tx Input P 1dB	-12.5		+12.5	dBm
Tx Input/Rx Output VSWR	1.9:1			
Tx Total RF Input Power	-25		0	dBm
Hi/Lo Gain Switch	0		+10	dB
Hexadecimal Rotary Gain Switch	0		+15	dB

#### Physical Characteristics

	Min	Typ	Max	Units
Tx Weight		14.1		oz
		0.40		kg
Transmitter Dimensions	4.5H x 1.125W x 8.75D			in
	114H x 29W x 222D			

## LaserPlus LP-OLAR Advanced L-Band Receiver



The Olson *LaserPlus* LP-OLAR Advanced LBand Receiver offers a feature-rich, versatile system in a compact rack-mount package. The Advanced L-Band Receiver has been engineered to meet today's high performance standards for L-Band transport with an extreme bandwidth range that will also allow the system to handle the next generation of satellite signals. The Advanced L-Band system is ideal 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 4GHz allows this system to accommodate additional transponders coinciding with common European satellite communication applications.

The enhanced bandwidth to 4GHz is also unique in that it facilitates stacked LNB applications to accommodate additional transponders containing enhanced DBS programming services (e.g., HDTV, local channels, etc.) over single-mode fiber for DBS television distribution in campus, fiber-to-the-premise (FTTx), and multiple dwelling unit (MDU) environments. The receiver is offered with 75 Ohm impedance using "F" connectors or 50 Ohms with SMA connectors. Optical connector options include SC/APC and FC/APC.

The standard PIN-detector receiver offers high sensitivity for a maximum optical link budget. An optional APD detector increases optical sensitivity by 7dB. Built-in test points, LED indicators and alarms allow the receiver to be easily set up and maintained.

The LP-OLAR Receiver is housed in a machined Aluminum enclosure that fits the standard chassis allowing up to 14 or 15 modules in a 3RU space. (The exact number is determined by the number of power supplies in the chassis, single or dual).

### Specifications

#### Optical Characteristics (with SM 9/125 $\mu$ m Fiber)

	Min	Typ	Max	Units
Operating Wavelength	1290		1610	nm
Optical Input Power (PIN)	-15		+3	dBm
Optical Input Power (APD)	-22		-3	dBm
Optical Return Loss		>55		dB
Optical Loss Budget (PIN)	7		25	dB
Optical Loss Budget (APD)	13		32	dB
Optical Connector	SC/APC			(Standard)
Optical Connector	FC/APC			(Optional)

#### NOTES:

- 1) The RF gain changes 2dB for each 1dB of optical loss.
- 2) The receiver  $P_{1dB}$  and IP3 is almost constant over the full RF gain range.
- 3) Noise figure is a complex variable that is influenced by the Tx and Rx attenuator settings as well as the optical loss. See the manual for detailed data.
- 4) The Hi/Lo Gain switch on the front panel changes the gain by +10dB. The hexadecimal rotary switch on the front panel changes the gain in 1dB steps. The "0" setting on the rotary switch is the lowest gain (0dB). The "F" setting on the rotary switch is the highest gain (+15dB).
- 5) Optical Loss Budget based on +10dBm transmitter launch power(DWDMDFBLaser).

#### RF and System Characteristics

	Min	Typ	Max	Units
Frequency	10		4,000	MHz
Amplitude Flatness	Any 500MHz / $\pm 1.5$			dB
	Any 40MHz / $\pm 0.35$			dB
Return Loss	10			dB
Output Impedance (Standard)		75		Ohms
Output Impedance (Optional)		50		Ohms
Link Gain	-50		+30	dB
Noise Figure (See manual)	10		45	dB
Rx Input IP3		+12		dBm
Tx Input P 1dB		-2		dBm
Hi/Lo Gain Switch	0		+10	dB
Hexadecimal Rotary Gain Switch	0		+15	dB

#### Physical Characteristics

	Min	Typ	Max	Units
Rx Weight		14.1		oz
		0.40		kg
Receiver Dimensions	4.5H x 1.125W x 8.75D			in
	114H x 29W x 222D			



# LaserPlus

## 1 GHz High Density Compact CATV Optical Transmission System

### LaserPlus Chassis



The LaserPlus Model LP-CH-16 Chassis fits into a 19-inch EIA rack, and holds up to 15 interchangeable, hot-swappable, plug-in application modules. Each chassis requires one power supply & accepts a 2nd for hot redundant backup, & has provisions for both local monitoring & remote SNMP element management.

The chassis is very compact, occupying only 5.25" (3 RU) of rack space. Universal slots accept almost any "mix-and-match" combination of Olson Technology, Inc. LaserPlus Model LP-x transmitter, receiver, EDFA,

block downconverter, passive optical coupler or WDM application modules, to accommodate a limitless variety of service delivery architectures and provide flexibility and scalability in headend/hub design and zone arrangements.

It also includes an integrated internal fiber management tray. The connecting optical fiber(s) can enter the chassis from the front, or from fiber routing apertures located on either (or both) sides of the chassis. Once the fiber connection is made, the fiber cable can be secured in an integrated fiber management tray, located above the application modules. Drop slots are conveniently placed along the tray to assure minimum fiber clutter in front of the modules. The application modules slide into the chassis from the front of the rack, and all RF coaxial cables are connected at the rear.

A single AC or DC power supply module plugged into the primary power supply slot# 16 is sufficient to power a fully loaded LaserPlus chassis; two power supplies (in slots# 15 & 16) may be used to provide hot-redundant backup. For maximum fail-safe protection, an AC module can be used in combination with a DC module to provide simultaneous AC and DC powering to the LaserPlus chassis.

#### **ELECTRICAL, ENVIRONMENTAL & MECHANICAL PARAMETERS:**

Dimensions	.5.25" H x 19" W x 14.5" D (13.3 cm x 48.3 cm x 36.8 cm)
Weight (Empty)	.10 lb (4.54 kg)
Operating Temperature Range	.0°C to +50°C (+32°F to +122°F) (Air temperature measured at air inlet of Model LP-CH-16 chassis)
Humidity Range	.to 95% non-condensing [Recommended for use only in non-condensing environments]
Cooling	.Four fans plenum-mounted; user-replaceable (PN# 037-000405)
Module Slots	.1-14=application modules; 15=apps or PS; 16=power supply
Powering	.5.25VDC per module; 90-264 VAC or -48VDC; < 150 Watts [Requires use of 1 or 2 Model LP-PS-x power supply module(s)]

#### **CHASSIS INTERFACES:**

Local Status Alarms Connector:	.DB-25 Electrical Interface: Relay Contact Closure: 100mA @ 25VDC [Provides ground closures on alarm: PINS 1-15 = SLOTS 1-15; PIN 17 = Cooling; PIN 24 = Summary; PIN 25 = GND]
SNMP Agent (Optional) Connector:	.RJ-45 Electrical Interface: 10BaseT Ethernet [Requires Model LP-CH-SNMP-1 element management agent]