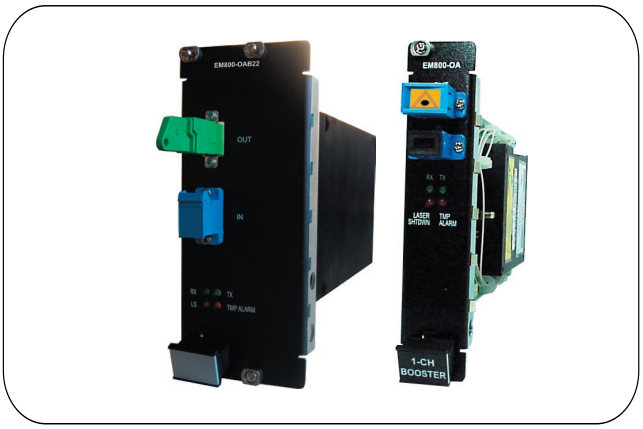
LambdaDriver® - Optical Amplifier Module (EM800-OAx/EM1600-OAx)



Optical Amplifier modules

Features

- Booster, In line and Pre-Amplifier
- Up to 22dBm maximum output power
- Protocol and bandwidth transparent
- Gain flatness (with GFF) less than 1.0 dB
- Low Noise figure
- Optical power monitoring
- Front panel status LEDs
- Fast transient suppression time
- Automatic Laser Shutdown (ALS)

Applications

- DWDM networks
- Single-channel amplification
- Distance extention

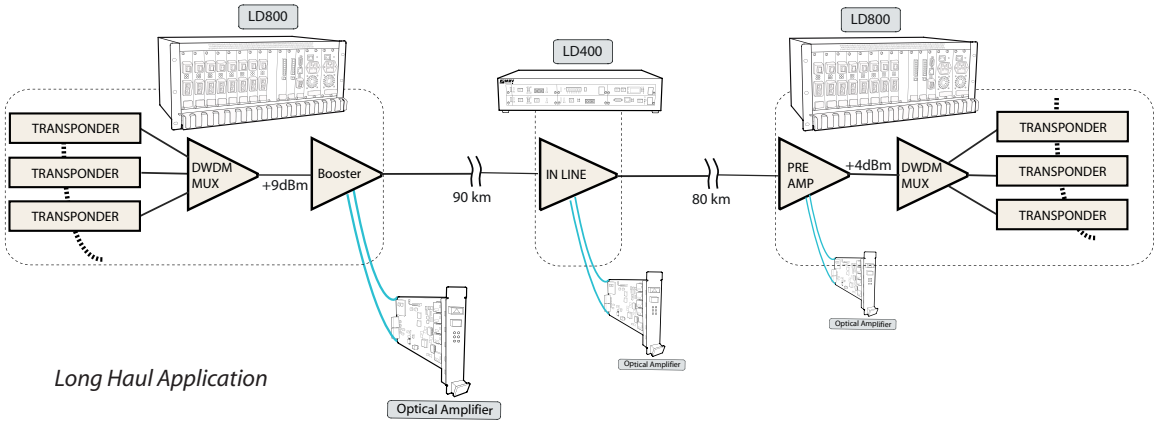
LambdaDriver® Optical Amplifier modules are a family of low-noise Erbium-Doped Fiber Amplifiers (EDFA) ideal for Metro and Long-Haul Dense Wavelength Division Multiplexing (DWDM) as well as Single Wavelength applications. The optical design, coupled with sophisticated control circuitry, allows these Optical Amplifiers to provide constant gain even with wavelengths being added or dropped in the network. Any fluctuations caused by wavelengths addition/removal can be handled by its ultra-fast transient suppression.

When paired with the **LambdaDriver®** Element Management Module , full monitoring and configuration capabilities are supported with a local RS-232 interface and Ethernet/Fast Ethernet interfaces for remote network monitoring using Telnet and SNMP.

Using MRV's MegaVision Web® NMS provides remote control reducing the costly need for many infield service calls.

The modules allow monitoring of input and output power levels (real dBm values), temperature and signal gain.
The modules can be operated in two modes: automatic gain control or automatic power control. These operating modes and their respective parameter settings are factory pre-configured but can be changed by MRV authorized personnel.

In AGC mode, the module maintains constant gain for each channel according to the Gain parameter setting, as long as the total output power does not exceed the maximum rated value (+22 dBm). This mode is factory pre-configured.



Long Haul Application

In APC mode, the module maintains the output total power constant at the pre-defined Output Power settings.
Additionaly a special OA module, EM800-OAPD, includes an integrated Tunable Optical Dispersion Compensator (TODC). Tuning of dispersion is done via the system management module.

There are 3 types of OAs: Booster, In-Line and Pre-Amplifier. The main difference between these modules is the Input power level that dictates the application of the specific module and the Gain values. For example, Booster is usually used at the beginning of the line and therefore Input levels above 0 dBm and Gain of 9 to15 dB should be expected. On the other hand, Pre-Amplifier Input level is very weak (down to –32 dBm/channel) because it is positioned at the end of the line.

Multi-channel (DWDM) amplifiers are equipped with Gain Flattening Filters (GFF) and provide flat gain response across entire C-band and input power range.
For single channel applications GFF cost is saved.

Optical Amplifier modules provide Automatic Power Shutdown, when input is below auto-shutdown threshold. Power Shutdown can be also forced through the management.

The compact, 1-slot LambdaDriver Optical Amplifier modules install into any of the LambdaDriver® chassis. Most of the standard EDFA units have maximum +18dBm total output power. Special "High Power" EDFA modules have maximum +22dBm total output power that mainly serve high wavelength count (more than 32 waves) DWDM or ultra long single span applications. These high power units are double slot size.

Each module provides visual indications of the front panel and can be operated without management as plug and play EDFA.

Besides DWDM networks application, LambdaDriver® EDFAs can be used in any Single channel application thus providing flexible means of extending an optical link by compensating for optical budget loss.

Environment Specifications

Operating Temperature		-5 ºC - 45 ºC
Storage Temperature		-10 ºC - 70 ºC
Relative Humidity		85% maximum, non-condensing
Dimensions (W x H x D)		
	EM800 + 18dBm type	26.93 mm (1.06 in) x 130.7 mm (5.145 in) x 227 mm (8.956 in) (1 slot wide)
	EM1600 + 18dBm type	26.93 mm (1.06 in) x 263.4 mm (10.37 in) x 227 mm (8.956 in) (1 slot wide)
	EM800 High Power	54.18 mm (2.13 in) x 130.7 mm (5.14 in) x 227 mm (8.956 in) (2 slot wide)
	EM1600 High Power	54.18 mm (1.06 in) x 263.4 mm (10.37 in) x 227 mm (8.956 in) (2 slot wide)
Weight:	**EM800 + 18dBm type**	0.586 Kg (1.28Lb)
	EM1600 + 18dBm type	0.865 Kg (2.11Lb)
	EM800 High Power	1.016 Kg (2.24Lb)
	EM1600 High Power	1.305 Kg (2.47Lb)
Connectors		
- All		SC
- High Power Ouput		E2000APC

Technical Specifications

Parameter	**Value**			**Units**
	Minimum	**Typical**	**Maximum**	
Wavelength Range	1528		1563	nm
Maximum Output power				
Booster & In-Line			+18	dBm
With Mid-Stage			+17	
SOAB13, SOAI & Pre-Amplifier			+13	
High Power Booster			+22	
High Power In-line			+21	
Minimum Input power				
Booster	-15			dBm
In-Line	-25			
Pre-Amplifier	-30			
Input Dynamic Range		25		dB
Input/Output Isolation (Min)	30			dB
Signal Gain * **Booster**		9 or 15		dB
In-line		20 or 25		
Pre-amp		10 or 20		
Gain Flatness at Specified Gain with GFF		+/-0.5	+/-1.0	dB
Signal- Noise Figure for Gain > 20 dB		5.0	5.5	dB
Optical Return Loss (at Input and Output ports)	25			dB
Polarization Mode Dispersion		0.3	0.5	dB
Polariziation Dependent Gain		+/-0.2	+/-0.5	dB
Transient Overshoot (10 dB Drop)		0.5	1.0	dB
Transient Suppression Time (10 dB Drop)			< 32	µs

Management

Tunable dispersion range (EM800/EM1600 - OAPD EM800/EM1600 - OABD, EM800/EM1600 - OAID)	-1700ps/nm to +1700ps/nm
LEDs	WDM transmission laser status, Temperature status, Port reception status, Port transmission status
Monitoring	Input power, Output power, Gain, Temperature
Alarm	Input power, Output power, Temperature
Power Consumption:	
18dBm type	3.3 W
High Power	15 W

* Model dependent - see ordering information section

Ordering Information

EM800-OAIM	Optical In Line Amplifier with Mid-stage +17dbm output and 20db gain
EM800-OAIM25	Optical In Line Amplifier with Mid stage +17dbm output and 25db gain
EM800-OAI	Optical In Line Amplifier + 18dbm output and 20db gain
EM800-OAP	Optical Pre-Amplifier + 13dbm output and 20db gain
EM800-OAP10	Optical Pre-Amplifier +13 dbm output and 10db gain
EM800-OAB	Optical Booster Amplifier + 18dbm output and 9db gain
EM800-OABM	Optical Booster Amplifier with Mid-stage +17dbm output and 9db gain
EM800-SOAIM	Single channel Optical in line Amplifier with Mid-stage +13dbm output and 20db gain
EM800-SOAI	Single channel Optical in line Amplifier output +13dbm output and 20db gain
EM800-SOAI25	Single channel Optical in line Amplifier output +17dbm output and 25db gain
EM800-OAI25	Optical In Line Amplifier +18dbm output and 25db gain
EM800-SOAP	Single channel Optical Pre - Amplifier +13dbm output and 20db gain
EM800-SOAB	Single channel Optical Booster Amplifier +18dbm output and 15db gain
EM800-SOAB13	Single channel Optical Booster Amplifier +13dbm output and 15db gain
EM1600-OABM	Optical Booster Amplifier with Mid-stage +17dbm output and 9db gain
EM1600-OAIM	Optical In Line Amplifier with Mid-stage +17dbm output and 20db gain
EM1600-OAI	Optical In Line Amplifier +18 dbm output and 20db gain
EM1600-OAP	Optical Pre-Amplifier +13 dbm output and 20db gain
EM1600-OAP10	Optical Pre-Amplifier +13 dbm output and 10db gain
EM1600-OAB	Optical Booster Amplifier +18 dbm output and 9db gain
EM1600-SOAIM	Single channel Optical in line Amplifier with Mid-stage + 13dbm output and 20db gain
EM1600-SOAI	Single channel Optical in line Amplifier + 13dbm output and 20db gain
EM1600-SOAP	Single channel Optical Pre-Amplifier + 13dbm output and 20db gain
EM1600-SOAB	Single channel Optical Booster Amplifier + 18dbm output and 15db gain
EM1600-SOAB13	Single channel Optical Booster Amplifier + 13dbm output and 15db gain
High Power EDFAs	
EM800-OAI21P	Optical In Line Amplifier with +21dbm output and 20db gain
EM800-OAI21PM	Optical In Line Amplifier with Mid-stage +21dbm output and 20db gain
EM800-OAI21PM25	Optical In Line Amplifier with Mid-stage +21dbm output and 25db gain
EM800-OAB22P	Optical Booster Amplifier with +22dbm output and 9db gain
EM800-OAB22PM	Optical Booster with Mid-stage+22dbm output and 9db gain
EM800-SOAB22P	Single channel Optical Booster Amplifier +22dbm output and 20db gain
EM1600-OAB22P	Optical Booster Amplifier with +22dbm output and 9db gain
EM1600-OAB22PM	Optical Booster Amplifier with Mid-stage +22dbm output and 9db gain
EM1600-OAI21P	Optical In Line Amplifier with +21dbm output and 20db gain
EM1600-OAI21PM	Optical In Line Amplifier with Mid-stage +21dbm output and 20db gain
EM1600-SOAB22P	Single channel Optical Booster Amplifier + 22dbm output and 20dB gain
EDFAs with Integrated TDC	
EM800-OAPD	Optical Pre-Amplifier with integrated DC +13dbm output and 20db gain
EM800-OABD	Optical Booster Amplifier with integrated DC +18dbm output and 9db gain
EM800-OAID	Optical In Line Amplifier with integrated DC +18dbm output and 20db gain
EM800-OAI25D	Optical In Line Amplifier with integrated DC +17dbm output and 25db gain
EM1600-OAPD	Optical Pre-Amplifier with integrated DC +13dbm output and 20db gain
EM1600-OABD	Optical Booster Amplifier with integrated DC +18 dbm output and 9db gain
EM1600-OAID	Optical In Line Amplifier with integrated DC +18 dbm output and 20db gain
EM1600-OAP10D	Optical Pre-Amplifier with integrated DC +13dbm output and 10db gain