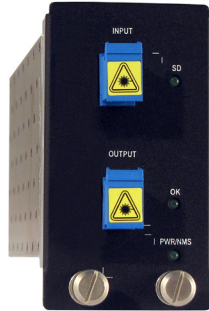


Datasheet

EDFA Optical Amplifiers with Variable Gain

EM316EA-Vxxxxxx



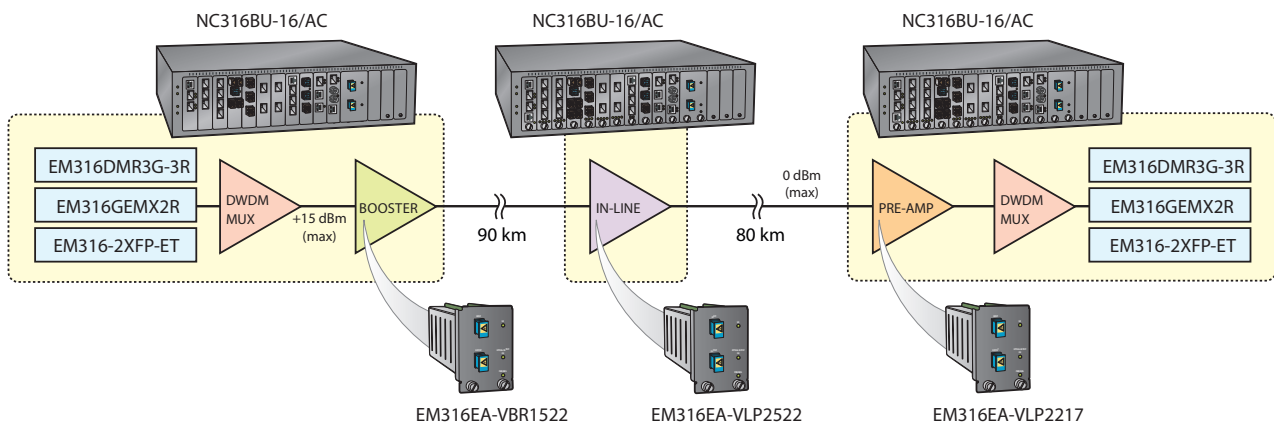
Overview

Erbium-Doped Fiber Amplifiers (EDFA) extend the range of optical links including metro area networks (MAN) and wavelength division multiplexing (WDM). Fixed gain EDFA modules provide low noise solutions for all traditional amplification applications, but changing network conditions can affect amplifier requirements. Fiber Driver® variable gain EDFA modules provide a flexible solution to optimize amplification without expensive equipment replacement even as other network elements change.

Traditional Amplifier Applications:

Application	Symbol	Position	Input	Output	Gain
Booster	BR	Transmitter	High	High	Medium
In-Line	IL	Mid-Link	Medium/Low	High	High
Preamp	PR	Receiver	Medium/Low	Medium	Medium

Long Haul Application Example



Highlights

- C-Band optical variable gain amplification
- Automatic gain control (AGC)
- Gain Flattening Filters (GFF) for <1.5dB variance
- Wide input power range
- Fast transient suppression
- Manual / Automatic power shutdown
- Automatic power reduction
- Improved link budget and OSNR-sensitivity
- Unmanaged application support at maximum gain
- Network management and alarms
 - I/O power
 - Gain
 - Temperature
 - Supply voltage
- SC/UPC connector
- Status LEDs
- Hot-swap support in BU-2*, BU-3V, and BU-16 chassis

* Unmanaged only

Applications

- Booster, in-line, and pre-amplifier applications
- Metro DWDM link extension
- Single wavelength link extension
- Changing network configurations
- Adjusting for span changes
- Adding and dropping wavelengths (WDM)

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Variable gain amplifiers are tunable to match a range of network needs rather than optimized for a specific set of conditions. The variable modules are therefore more flexible for network design and inventory control. When link ranges or network nodes change, the installed module may be simply retuned for the new conditions rather than replaced by a new fixed-gain device. A single variable-gain EDFA module can also serve as replacement inventory for a range of installed fixed-gain devices. For example, the same module may address both in-line and pre-amplifier applications.

When paired with the Fiber Driver EM316LNXM-OT Network Manager (NM), full monitoring and provisioning capabilities are supported locally with serial RS-232 and remotely with RJ-45 and SFP Ethernet interfaces. Telnet and secure shell (ssh) provide convenient access for remote command line management. MegaVision Pro®, a network management system (NMS) from MRV, uses SNMP to provides a graphical user interface (GUI) to control the modules in realistic windows that model the devices. Either management method greatly reduces costly service calls. The NM requires another slot in the chassis with the EDFA module.

EM316EA advanced performance monitoring functions include real time reporting of input and output power levels, temperature, and signal gain.

The EM316EA modules use sophisticated automatic gain control (AGC) circuitry to provide constant gain across the aggregated band even when wavelengths

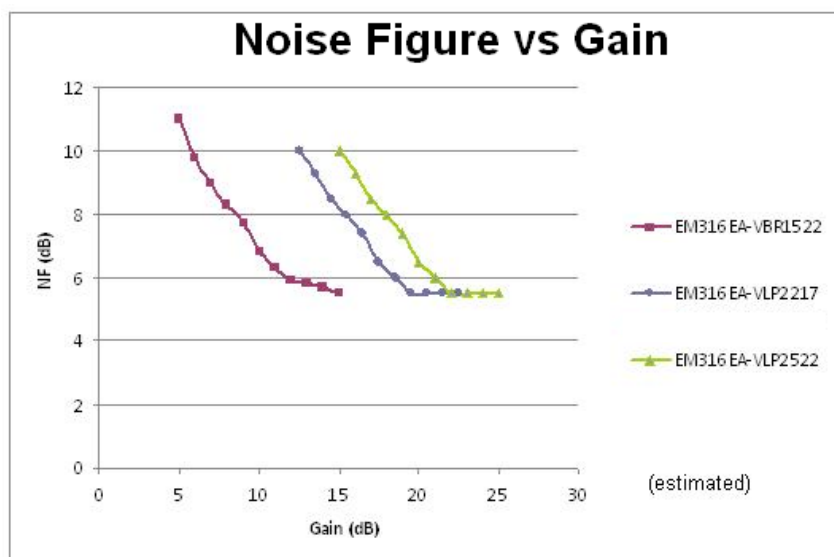
are added and dropped in the signal. AGC works within the limits of the total output power rating. Ultra-fast transient suppression handles fluctuations caused by wavelength variation.

As state-of-the-art multi-channel DWDM optical devices, EM316EA family amplifiers are equipped with gain flattening filters (GFF) that assure a flat gain response across the entire C-band and input power range. EM316EA optical amplifiers provide automatic power shutdown when input falls below the threshold. Power shutdown may also be forced through the module management.

In addition, EM316EA amplifiers with high power above 21.3 dB include a sophisticated eye-safety protection mechanism. Automatic power reduction (APR) lowers the output power when the egress fiber is disconnected or cut.

The Fiber Driver variable gain EM316EA modules are compact, two-slot wide modules. The 2-slot chassis supports the EM316EA modules in unmanaged applications. The 3-slot "V" and 16-slot chassis supports unmanaged mode or managed optical amplifier applications with the EM316LNXM-OT module. Other chassis do not support the two-slot EM316EA modules.

Changing the gain in an EM316EA-ffggss amplifier module affects the noise figure. The graph below shows the variable gain relationship to the noise figure for each of the variable gain models. The values are estimates at the point of power saturation for each module.



**Datasheet****Specifications**

Diagnostic LEDs	Power On, Input Optical Power (in range), Output Optical Power (in range)
Electrical Requirement	Power provided by chassis
Operating Temperature	0°C to 50°C (32°F to 122°F)
Storage Temperature	-40°C to 70°C (-40°F to 158°F)
Relative Humidity	85% maximum, non-condensing
Physical Dimensions	50 mm x 75 mm x 175 mm (2" x 3" x 7")
Approximate Weight	350 g (12 oz)
Total Module Power Usage	11 to 15 Watts
Regulatory Compliances	Class 1M Laser Product, complies with EN 60825-1 and 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007; FCC Part 15 (Class A); IC (Class A); EMC Directive: Emission (Class A) and Immunity; Certified by one or more of the following agencies: TÜV, UL, CSA RoHS Directive; China RoHS; WEEE Directive; The Quality Management System is certified to ISO 9001 by QMI-SAI Global The Environmental Management System is in compliance with ISO 14001

Ordering Information: C-BAND (1529-1561nm)

Model	Description	Gain (dB)		Output (dBm)	Input (dBm)		NF (dB)		Power Consump. (W)
		Min	Max	Max	Min	Max	Typ ¹	Max ²	Max
EM316EA-VBR1522	DWDM C-Band variable gain EDFA booster, optical amplifier, with Automatic Power Reduction (APR)	5	15	22.5 ³	-10	15	5.5	11	15
EM316EA-VLP2522	DWDM C-Band variable gain EDFA in-line/pre-amp optical amplifier, with Automatic Power Reduction (APR)	15	25	22.5 ³	-28	3	5.5	10	15
EM316EA-VLP2217	DWDM C-Band variable gain EDFA in-line/pre-amp optical amplifier	12.5	22.5	17	-28	0	5.5	10	11

¹ Max Gain at saturation power² Min Gain at saturation power³ Includes automatic power reduction (APR)**Ordering Information: ACCESSORIES**

Model	Description
CAK-SM-SCASCU-2	SC/APC fiber optic cable and adaptor kit for booster amplifiers (SC/UPC to SC/APC fiber optic cable with SC/APC adaptor) 2 meters, single mode, simplex
CAK-SM-LCASCU-2	LC/APC fiber optic cable and adaptor kit for booster amplifiers (SC/UPC to LC/APC fiber optic cable with LC/APC adaptor) 2 meters, single mode, simplex

MRV has more than 50 offices throughout the world. Addresses, phone numbers and fax numbers are listed at www.mrv.com.
Please e-mail us at info@mrv.com or call us for assistance.

MRV Los Angeles
20415 Nordhoff Street
Chatsworth, CA 91311
800-338-5316
818-773-0900

MRV Boston
300 Apollo Drive
Chelmsford, MA 01824
800-338-5316
978-674-6800

MRV International
Business Park Moerfelden
Waldeckerstrasse 13
64546 Moerfelden-Walldorf
Germany
Tel. (49) 6105/2070
Fax (49) 6105/207-100

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