EDFA Optical Amplifiers

EM316EA and EM316EDFA

Overview

Fiber Driver™ optical amplifier modules provide multi-function, low noise, Erbium-Doped Fiber Amplifier (EDFA) solutions that are ideal for metro Dense Wavelength Division Multiplexing (DWDM) applications.

The EM316EA family of C-Band EDFA Optical Amplifiers is part of the Fiber Driver optical multi-service platform solution. Many model options serve all the traditional amplifier applications in an extended optical link: booster, in-line, and pre-amplifier.

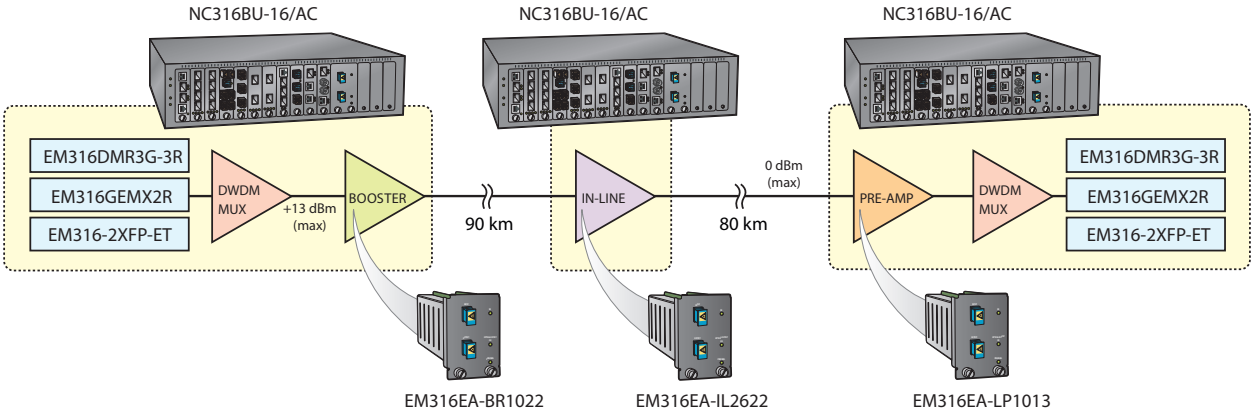
A **booster amplifier** operates at the transmission side of the link. It features high input power, high output power, and medium optical gain. Boosters are designed to amplify aggregated optical input power for reach extension.

An **in-line amplifier** operates in the middle of an optical link. It features medium to low input power, high output power, high optical gain, and a low noise figure. In-line amplifiers are designed for optical amplification between two network nodes on the main optical link.

Highlights

- Three Optical Amplifier C-Band applications:
  - Booster
  - In-line
  - Pre-amplifier
- Applications:
  - Metro DWDM distance extension
  - Single wavelength distance extension
- Automatic Gain Control (AGC)
- Midstage access
- Managed and non-managed operation
- Advanced performance monitoring
  - Input and output power levels
  - Signal gain
  - Temperature
  - Supply voltage
- Gain flattening filters (GFF) assure flat gain (<1 dB variance) over the entire amplified band (Wide-Band models only)
- Manual and automatic power shutdown
- Automatic power reduction (APR) for high power modules (output power >21.3dB)
- Status LED
  - Input power OK
  - Output power OK
- SC/UPC connector
- Hot-swap support
- Fiber Driver chassis compatibility
  - 1-slot models fit any powered chassis
  - 2-slot models fit BU-2, BU-3V, and BU-16 chassis

Long Haul Application Example



A **pre-amplifier** operates at the receiving end of an optical link. It features medium to low input power, medium output power, and medium gain. Pre-amplifiers are designed for optical amplification to compensate for losses in a demultiplexer located near the optical receiver.

When paired with the Fiber Driver EM316LNXNM-OT Network Manager (NM), full monitoring and configuration 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 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.

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 aggregate input falls below the threshold. Power shutdown may also be forced through the module management.

EM316EA optical amplifiers use automatic gain control (AGC). The module maintains constant gain for each channel in the aggregated optical signal according to the gain parameter setting as long as the total output power does not exceed the maximum rated value. (See Saturated Output values.) The module is initialized with factory values.

Some EDFA models include an additional mid-stage port designed for insertion of a Dispersion Compensation Management (DCM) unit without its inherent insertion loss. The design of these models maximizes the DCM benefits to increase deployment flexibility, including support for high-speed 10 Gbps protocols. New placement options require fewer amplifiers in the link, and they can open the door to applications that were not possible with older technology.

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

The 1-slot amplifier models fit in any Fiber Driver chassis. The 2-slot models fit only in the BU-2, BU-3V, and BU-16 chassis. For managed applications, an additional open slot must be available for the EM316LNXNM-OT manager.

Contact your MRV Communications representative or visit *http://www.mrv.com* for additional information on Fiber Driver EDFA modules and applications.

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	**1-slot:** 25 mm x 75 mm x 175 mm (1" x 3" x 7"); **2-slot:** 50 mm x 75 mm x 175 mm (2" x 3" x 7")
Approximate Weight	**1-slot:** 370 g (13 oz); **2 -slot:** 470 g (17 oz)
Total Module Power Usage	3 Watts to 11 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

Datasheet

Ordering Information: C-BAND (1529 - 1563nm)

Model	Description	Gain (dB)	Max. Output (dBm)	Min. Input (dBm)	Max. Input (dBm)	Typ. NF (dB)	Max. NF (dB)	Max. Power Consump. (W)
Booster								
EM316EA-BR0918	DWDM C-band EDFA booster, optical amplifier, 2 slots	9	18	-10	9	5.5	6.0	6
EM316EA-BR1522	DWDM C-band EDFA booster optical amplifier, with Automatic Power Reduction (APR), 2 slots	15	22.5	-10	8	5.5	6.0	11
EM316EA-BR2022	DWDM C-band EDFA booster, optical amplifier, with Automatic Power Reduction (APR),2 slots	20	22.5	-15	3	5.5	6.0	11
In-Line/Pre-Amp								
EM316EA-PR1013	DWDM C-band EDFA preamp, optical amplifier, 2 slots	10	13	-30	0	6.0	6.5	5
EM316EA-LPR2017	DWDM C-band EDFA in-line/preamp, optical amplifier, 2 slots	20	17	-28	-3	5	5.5	5
EM316EA-IL2622	DWDM C-band EDFA in-line, optical amplifier, with Automatic Power Reduction (APR), 2 slots	26	22.5	-25	-3	5.0	5.5	11

Ordering Information: 8-CHANNEL NARROW BAND (1529 - 1563nm)

Model	Description	Gain (dB)	Max. Output (dBm)	Min. Input (dBm)	Max. Input (dBm)	Typ. NF (dB)	Max. NF (dB)	Max. Power Consump. (W)
Booster								
EM316EA-NBR0918	DWDM narrow band or red band EDFA booster, optical amplifier, 2 slots	9	18	-10	9	5.5	6.0	6
EM316EA-NBR2022	DWDM narrow band or red band EDFA booster, optical amplifier, with Automatic Power Reduction (APR), 2 slots	20	22.5	-15	3	5.5	6.0	11
In-Line/Pre-Amp								
EM316EA-NPR1013	DWDM narrow band or red band EDFA preamp, optical amplifier, 2 slots	10	13	-30	0	6.0	6.5	5
EM316EA-NIL2017	DWDM narrow band or red band EDFA in-line optical amplifier, 2 slots	20	17	-28	-3	5	5.5	5
EM316EA-NIL2622	DWDM narrow band or red band EDFA in-line, optical amplifier, with Automatic Power Reduction (APR), 2 slots	26	22.5	-25	-3	5.0	5.5	11

Ordering Information: SINGLE-CHANNEL (1529 - 1563nm)

Model	Description	Gain (dB)	Max. Output (dBm)	Min. Input (dBm)	Max. Input (dBm)	Typ. NF (dB)	Max. NF (dB)	Max. Power Consump. (W)
Dual-Slot Booster								
EM316EA-SBR1518	DWDM single-channel EDFA booster, optical amplifier, 2 slots	15	18	-10	3	5.5	6.0	6
EM316EA-SBR2022	DWDM single-channel band EDFA booster, optical amplifier, with Automatic Power Reduction (APR), 2 slots	20	22.5	-15	3	5.5	6.0	11
Single-Slot								
EM316EA-SBR0913	DWDM single-channel EDFA booster, optical amplifier, single slot	9	13	-10	4	5.5	6.0	3
EM316EA-SIL2013	DWDM single-channel EDFA in-line, optical amplifier, single slot	20	13	-20	-7	5.0	6.0	3
EM316EA-SPR3010	DWDM single-channel EDFA pre-amp, optical amplifier, single slot	30	10	-35	-20	5.0	5.5	3

Datasheet

Ordering Information: C-BAND WITH MID-STAGE ACCESS (1529 - 1563nm)

Model	Description	Gain (dB)	Max. Output (dBm)	Min. Input (dBm)	Max. Input (dBm)	Typ. NF (dB)	Max. NF (dB)	Mid-Stage Access (dB)
Fixed Gain and Midstage Access*								
EM316EA-MBR0918	DWDM C-band EDFA booster, optical amplifier, midstage access, 2 slots	9	18	-10	9	5.5	6.0	3
EM316EA-MBR1522	DWDM C-band EDFA booster, optical amplifier, midstage access, 2 slots	15	22.5	-10	8	5.5	6.0	3
EM316EA-MLP2017	DWDM C-band EDFA in-line/preamp, optical amplifier, midstage access, 2 slots	20	17	-28	-3	5.5	6.0	3
EM316EA-MLP2622	DWDM C-band EDFA in-line/preamp, optical amplifier, midstage access, 2 slots	26	22.5	-28	-3	5.5	6.0	3

*The power consumption for EDFAs with mid stage access is the same as the similar unit without mid stage access

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

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