

WaveReady™ WRA-110, WRA-113, WRA-116, WRA-119

Single-channel, Erbium-doped Fiber Amplifiers



Key Features

- Protocol and data-rate independent, including 10 Gbps/OC-192 applications
- Easily configurable as a booster or a pre/inline C-band amplifier
- Four variants WRA-110, WRA-113, WRA-116, WRA-119 to match specific application requirements
- Constant signal gain mode configurable to 13 dB (WRA-110) and to 26 dB (WRA-119)
- Constant total output power mode configurable to 10 dBm (WRA-110) and to 19 dBm (WRA-119)
- Low power consumption and noise figure

Applications

- Serves as a booster or pre/inline amplifier
- Use for Access and Metro optical networks
- Works with point-to-point applications

Compliance

- Telcordia NEBS Level 3
- FDA Class 1M laser device
- FCC Class A device
- UL 60950-1 First Edition
- CAN/CSA C22.2 No. 60950 01
- CE
- IEC 60825-2
- RoHS (exemptions 7b, 8a)

The WaveReady WRA-1xx series are user-configurable, single-channel optical amplifiers that provide simple and economical C-band optical amplification for single-channel applications in a flexible, ready-to-use package. These erbium-doped fiber amplifiers (EDFAs) are network-ready and easily configured as a booster or as a pre/inline amplifier.

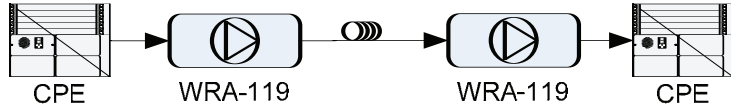
The modules work by default in constant signal-gain mode, but they can be configured to constant total output-power mode. Its ease-of-use and performance make the WRA-1xx series the ideal solution for Access and Metro optical networks.

Front-panel light emitting diodes (LEDs) indicate module status, while integrated electronics provide alarm and control functionality.

Deployed with a WaveReady communications module (COM200), these units can be managed and configured remotely through TL1, SNMP, or by using the WaveReady Node Manager. Local and remote management is performed through an RS232 or Ethernet port on the communications module.

The module can be installed in a WaveReady 3500F or 3100 shelf mounted in 19- or 23-inch telecommunications racks.

Amplification for Extended Reach and Pre-amp Application



Minimum Power	Total Power Budget	Maximum Rx Distance
-30 dBm	49 dB	200 km

WRA-110 Power Mask

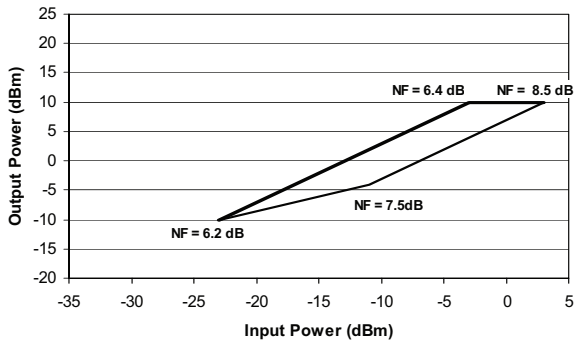


Figure 1: Power mask with noise figures¹ for WRA-110

WRA-113 Power Mask

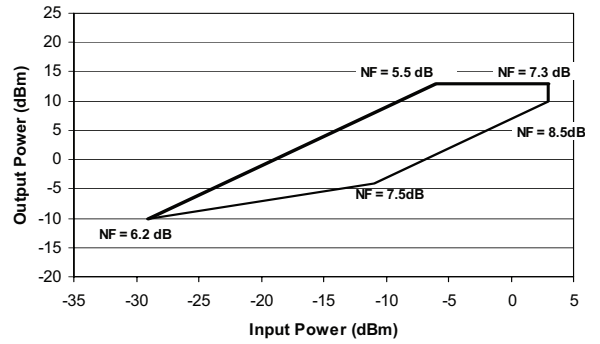


Figure 2: Power mask with noise figures for WRA-113

WRA-116 Power Mask

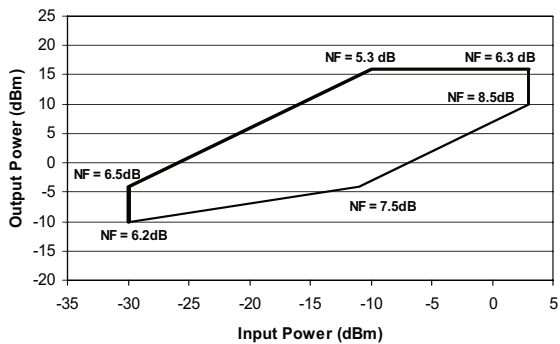


Figure 3: Power mask with noise figures for WRA-116

WRA-119 Power Mask

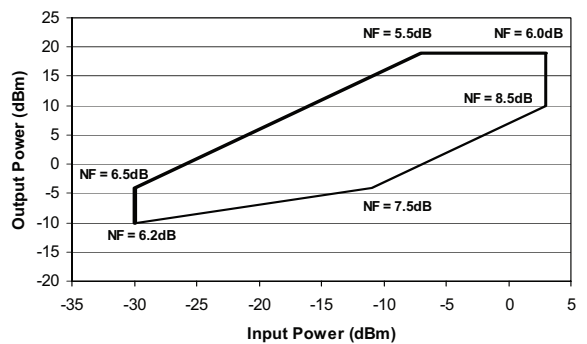


Figure 4: Power mask with noise figures for WRA-119

¹Noise figures are maximum, EOL values.

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Specifications

Optical Performance¹

Parameter	Minimum	Typical	Maximum
Operating wavelength range	1530 nm	—	1563 nm
Input power range			
WRA-110	-23 dBm	—	+3 dBm
WRA-113	-29 dBm	—	+3 dBm
WRA-116	-30 dBm	—	+3 dBm
WRA-119	-30 dBm	—	+3 dBm
Total output power (User configurable in constant P _{out} mode; 0.1 dB set resolution)			
WRA-110	-10 dBm	—	+10 dBm
WRA-113	-10 dBm	—	+13 dBm
WRA-116	-10 dBm	—	+16 dBm
WRA-119	-10 dBm	—	+19 dBm
Input LOS threshold configurable range (User configurable; 1.0 dB set resolution)	-38 dBm	—	0 dBm
Power measurement accuracy (all detectors)			
P ≥ -29 dBm	-0.7 dB	—	+0.7 dB
-29 < P ≤ -38 dBm	-1.5 dB	—	+1.5 dB
Gain (User configurable in constant gain mode; 0.1 dB set resolution)			
WRA-110	7 dB	—	26 dB
WRA-113	7 dB	—	13 dB
WRA-116	7 dB	—	19 dB
WRA-119	7 dB	—	26 dB
Polarization dependent gain	—	—	0.3 dB
Gain accuracy (Relative to gain target, in constant gain mode)	-1.25 dB	—	+1.25 dB
Gain stability (Peak-to-peak, in constant gain mode)	-0.1 dB	—	0.1 dB
Noise figures		see Figures 1, 2, 3, and 4	
Polarization mode dispersion	—	—	0.5 ps
Remnant 980 to output	—	—	-30 dBm
Return loss	-40 dB	—	—

Electrical Specifications²

Parameter	Minimum	Typical	Maximum
DC supply voltage	—	-48 V	—
Power dissipation	—	12 W	17 W
Alarm relay signals	Dry contact major and minor alarms. Relay open under normal operation. Relay closed when power is off.		

¹ Unless otherwise stated, all specifications are end-of-life, across all temperature and input conditions.

² Electrical specifications assume installation in a WaveReady 3500F or 3100 shelf (DMS-3500FSE03 or DMS-3100DC004).

Specifications
Physical Specifications

Parameter	Typical
Size (H x W x D)	17.27 x 2.54 x 22.35 cm (6.8 x 1.0 x 8.8 in)
Weight (approximate)	0.73 kg (1.6 lb)

Environmental Specifications

Parameter	Minimum	Typical	Maximum
Normal operating temperature	0°C	—	40°C
Extended operating temperature	-5°C	—	55°C
Storage temperature	-40°C	—	85°C
Relative humidity (non-condensing)	5%	—	90%

Interface Specifications

Interface	Description
Optical	LC/UPC SMF
Craft	Requires WaveReady 3100 or 3500F series shelf and a WaveReady COM200 communications module. Craft access through RS232/DB-9 connector on front panel of COM200 module.
TL1/SNMP	Requires WaveReady 3500F or 3100 series shelf and a WaveReady COM200 communications module. TL1/SNMP interfaces via the 10/100BaseT Ethernet/RJ45 connector on the front panel of a COM200.
Front panel	Six LEDs: CARD (power); MAJ/CRIT (major/critical alarm); MIN (minor alarm); TX and RX (port status), Laser On

Ordering Information

For more information on this or other products and their availability, please contact your local JDSU account manager or JDSU directly at 1-800-498-JDSU (5378) in North America and +800-5378-JDSU worldwide or via e-mail at customer.service@jdsu.com.

Product Code	Description
WRA-110	Single-channel EDFA, 10 dBm output
WRA-113	Single-channel EDFA, 13 dBm output
WRA-116	Single-channel EDFA, 16 dBm output
WRA-119	Single-channel EDFA, 19 dBm output

Associated Parts

DMS-3100DC004	WR3100 1U Shelf
DMS-3500FSE03	WR3500F Shelf
COM-200ET003Y	COM200 Communication module