

WaveReady™

L-Band Multichannel Erbium-Doped Fiber Amplifier (EDFA)

WRA-217L



Key Features



- Supports protocol and data-rate independent applications, including 10 Gbps/OC-192
- Easily configurable as a booster or as pre/inline L-band amplifier
- Easily configurable from 13 to 23 dB in constant signal gain mode
- Easily configurable from -6 to +17 dBm in constant output power mode
- Supports an optical output monitor port
- Offers a low-power consumption noise figure

Applications

- Offers DWDM booster or pre/inline amplification
- Enables access and metro optical networks
- Supports DWDM point-to-point applications and DWDM optical add-drop or X-C nodes
- Designed for Agile Optical Networks

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-217L is an L-band dense wavelength division multiplexing (DWDM) optical amplifier that is completely user-configurable. This multichannel amplifier provides a simple, economical L-band optical amplification solution in a flexible, ready-to-use package. The WRA-217L amplifier includes an advanced gain control circuit, an efficient pump laser, and a mid-stage variable attenuator.

The WRA-217L can be configured as a booster or as a pre/inline amplifier. The module works by default in constant signal gain mode but can be configured to constant total output power mode. Its ease-of-use and performance make the WRA-217L the ideal solution for high-density metro applications. Front panel light emitting diodes (LEDs) indicate module status, while integrated electronics provide alarm and control functionality.

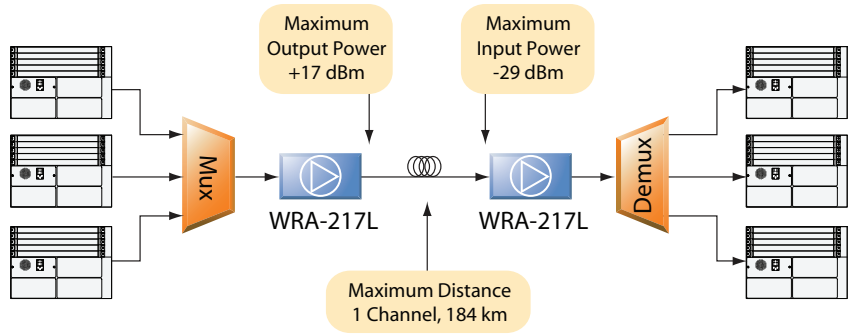
Deployed with a WaveReady communications module (COM200), these units offer remote management and configuration through TL1, SNMP, or using the WaveReady Node Manager. Local and remote management are performed through an RS232 or Ethernet port on the communications module.

The module is installed in a WaveReady 3500F or 3100 (shelf-mounted, 19- or 23-inch telecommunications racks).

AON and Agile Optical Amplifiers

The WRA-217L is part of the JDSU agile optical amplifier family, products designed for agile optical networks (AONs). Agile optical amplifiers use advanced transient suppression techniques to dynamically respond to changes in the number of wavelengths or signal power. As a result, they preserve gain flatness and output power over a wide range of input conditions to meet the needs of reconfigurable optical networks.

Amplification for Extended-Reach and Pre-Amp Application



Typical Link Budget

Number of Wavelengths	Total Output Power (dBm)	Power Per-Channel (dBm)	Per-Channel Power Budget ¹ (dB)	Maximum Distance (km)
1	+17	+17	46	184
2	+17	+14	43	172
4	+17	+11	40	160
8	+17	+8	37	148
16	+17	+5	34	136

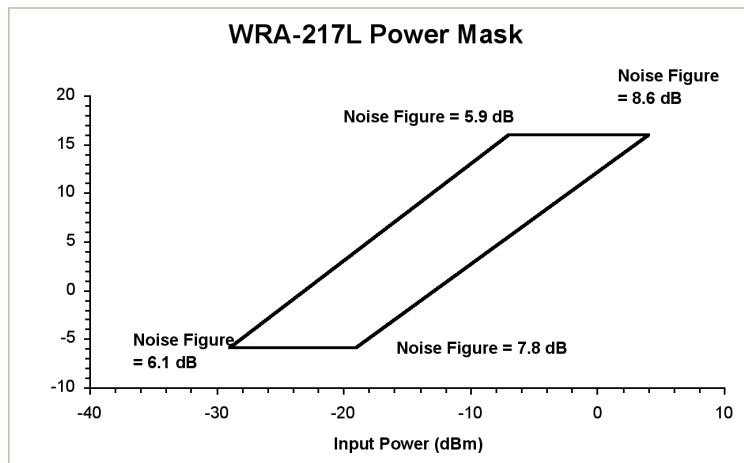


Figure 1: Power mask with noise figures² for WRA-217L

¹ Assuming a transponder OSNR tolerance of 23 dB.

² Noise figures are maximum EOL values.

3

Specifications

Optical Performance³

Parameter	Minimum	Typical	Maximum
Operating wavelength range	1570.42 nm	—	1606.60 nm
Input power range	-29 dBm	—	+4 dBm
Total output power			
(User configurable in constant P_{out} mode; 0.1 dB set resolution)	-6 dBm	—	+17 dBm
Input LOS threshold configurable range			
(User configurable; 1.0 dB set resolution)	-38 dBm	—	0 dBm
Power measurement accuracy (all detectors)			
$P \geq -29$ dBm	-0.7 dB	—	+0.7 dB
$-29 < P \leq -38$ dBm	-1.5 dB	—	+1.5 dB
Gain (User settable in constant gain mode. 0.1 dB set resolution)	13 dB	—	23 dB
Polarization dependent gain	—	—	0.5 dB
Gain flatness over all operating wavelengths			
15 to 45°C ambient to shelf	—	—	± 0.75 dB
-5 to 55°C ambient to shelf	—	—	± 1 dB
Gain accuracy			
(Relative to gain target, in constant gain mode)	-1.0 dB	—	+1.0 dB
Gain stability			
(Peak-to-peak, in constant gain mode)	-0.1 dB	—	0.1 dB
Noise figures (see Figure 1)		See Figure 1	
Monitor tap ratio	-21.5	—	-18.5 dB
Polarization mode dispersion	—	—	0.5 ps
Backward ASE at input	—	—	-30 dBm
Remnant 980 to output	—	—	-20 dBm
Return loss	-40 dB	—	—

Electrical Specifications⁴

Parameter	Minimum	Typical	Maximum
DC supply voltage	—	-48 V	—
Power dissipation	—	18 W	24 W
Alarm relay signals	Dry contact major and minor alarms. Relay open under normal operation. Relay closed when power is off.		

³Unless otherwise stated, all specifications are end-of-life over all temperature and input conditions.

⁴Electrical specifications assume installation in a WaveReady 3500F or 3100 shelf (DMS-3500FSE03 or DMS-3100DC004).

Specifications
Physical Specifications

Parameter	Minimum	Typical	Maximum
Size (H x W x D)	—	17.27 x 2.54 x 22.35 cm (6.8 x 1.0 x 8.8 inches)	—
Weight (approximate)	—	0.6930 kg (1.528 lbs)	—

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 RS-232/DB9 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-217L0001B	DWDM L-Band optical amplifier with variable gain (13 to 23 dB), +17 dBm output power

Associated Parts

DMS-3100DC004	WR3100 1U Shelf
DMS3500FSE03	WR3500F Shelf
COM-200ET003Y	COM200 Communications Module
WRT-852DT101B-100	WRT-852 Multirate Tunable C-Band with FEC 1600 ps/nm
WRT-852DT101B-200	WRT-852 Multirate Tunable L-Band with FEC 1600 ps/nm
MDX-04UXW001B	Red/Blue Band Combiner (C1,C2,L1,L2)
MDX-20UX10C1B	DWDM 20-Channel C-Band (C1)
MDX-20UX10C2B	DWDM 20-Channel C-Band (C2)
MDX-20UX10L1B	DWDM 20-Channel L-Band (L1)
MDX-20UX10L2B	DWDM 20-Channel L-Band (L2)