

OPTILAB EDFA-C-23-R USER'S MANUAL

C-Band Erbium-Doped Fiber Amplifier Rackmount

Caution: The user must read this manual before operating the EDFA-C-23-R unit. Operations other than those described in this manual may result in personal injury and damage to the unit.

Note that any attempt to open or fix the equipment without prior approval by Optilab, LLC. voids the warranty.

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1. General Information

1.1. Introduction

This manual contains information on the installation and operation of the EDFA-C-23-R Rackmount erbium doped fiber amplifier (EDFA) unit.

1.2. Product Overview

The Optilab EDFA-C-23-R Erbium-Doped Fiber Amplifier (EDFA) is a high-gain, versatile amplifier designed for CATV networks, optical communication and other general-purpose optical applications. By using a dual stage amplifier design, EDFA-C-23-R provides optical gain of up to 30dB, while maintaining low noise figure (NF) below 5dB. The EDFA-C-23-R amplifier produces optical output level +23dBm with an input power level range from -12dBm to +7dBm. Featuring adjustable output level power via ACC through the front panel and software control through USB, this compact 1U-housing can provided up to 8 output ports. Contact Optilab for more information.

1.3. Features

- +23dBm output power
- Dual stage pump design
- Reliable 980nm and 1480nm lasers
- Input power level range: -12dBm to +7dBm
- Optical gain up to +30 dB
- ACC or APC modes selectable
- LCD digital display and LED status indicators
- Software control through USB

1.4. User Safety

1. The EDFA-C-23-R unit emits high intensity invisible light from the optical output receptacle. Avoid direct exposure to skin and eyes.
2. The module case is fully certified for EMS protection. The user should never open the module case; any attempt will void the warranty and may result in electric shock and EMS attack to equipment in the vicinity.
3. The user should avoid using any solvent or vaporizing chemical to clean the exterior. It may result in damage to the surface and internal circuits.

2. Operation

2.1. Introduction

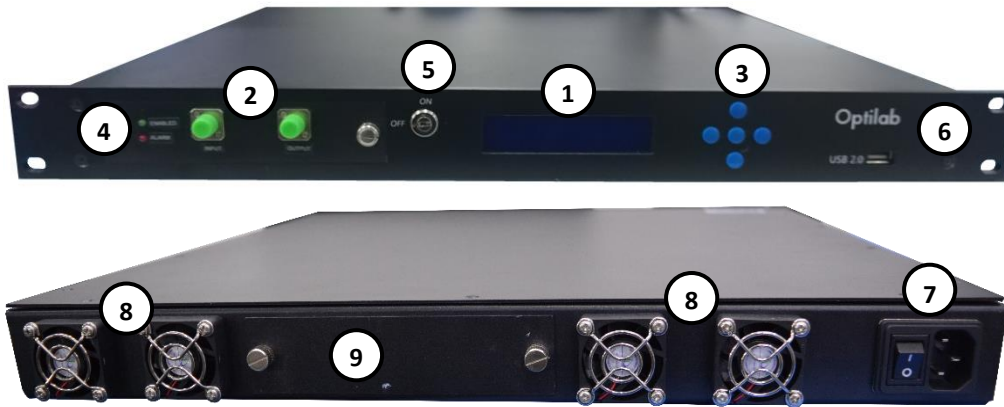
This chapter describes how to operate the EDFA-C-23-R unit, and discusses the location and function of the controls and connectors.

2.2. Initial Inspection

Your EDFA-C-23-R was carefully inspected before it left the manufacturer. It should be in proper working order upon receipt. You should, however, inspect the unit for any damage that may have occurred in transit. If the shipping container or the packing material is damaged, keep it until the contents of the shipment have been checked to be free of mechanical and electrical damages. Notify Optilab, LLC promptly if any notable damage is found.

2.3. Controls

EDFA-C-23-R – Front and Rear Panels



FEATURE	FUNCTION
① FRONT PANEL LCD	Displays the current features and functions of the rackmount EDFA system.
② OPTICAL INPUT AND OUTPUT FIBER PORTS	The optical input and output fiber ports for the EDFA unit. The fiber ports shown are FC/APC type.
③ SELECTOR BUTTONS	These buttons navigate the front panel LCD display, as well as enable editing of the mode, optical output power setting, and pump laser driving current.
④ STATUS LEDs	These LEDs show the current status of the EDFA: Top LED lights green when the EDFA output is enabled. Bottom LED lights red when there is an active status flag.
⑤ ENABLE KEY SWITCH	This key is used to enable/disable the EDFA output.
⑥ USB 2.0 PORT	This connection is used for remote access of the EDFA system, this port is 2.0 USB protocol type. Please see sections 2.5 and 2.6 for more details on the remote access commands.
⑦ AC INPUT AND MAIN POWER SWITCH	Accepts the standard 110/220 VAC power plug, with main power switch enabling/disabling electrical power to the rackmount EDFA system
⑧ EXHAUST FANS	These fans ensure proper ventilation inside the unit. The back panel of this unit should be placed at least 3 inches from the wall to dissipate heat effectively.
⑨ INTERLOCK	Install BCA with 50Ω terminator or amplification stage will not enable.

Optilab, LLC

600 E. Camelback Road, Phoenix, AZ 85012

Phone: 1-602-343-1496, Fax: (602) 343-1489, Email: sales@oequest.com

2.4. Operation Instructions

Start-up Procedure

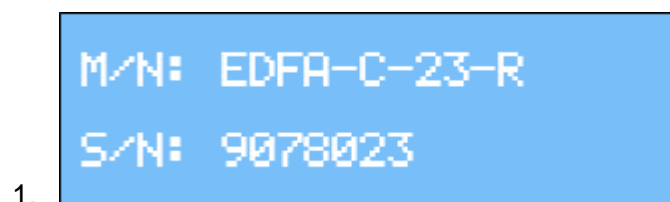
1. After plugging in the appropriate power plug into the AC input port, toggle the main AC switch to the ON position to enable electrical power to the unit. The front panel LCD will enable.
2. Ensuring the input signal is turned off, connect the optical signal for amplification via the optical input port using the indicated connector patchcords.
3. Connect the optical output port using the indicated connector patchcords to the appropriate signal destination to utilize the amplified optical output signal(s).
4. After checking all physical patchcord connections, turn the input signal laser source on.
5. Turn the EDFA Enable Key switch to the ON position.
6. The EDFA-C-23-R is now enabled, the green LED should enable indicating that the EDFA output is enabled and the red LED should disable if there are no problems.

Front Panel Navigation

1. The front panel selector buttons consist of five buttons: UP, DOWN, LEFT RIGHT, and ENTER and their position is shown in the photo below:



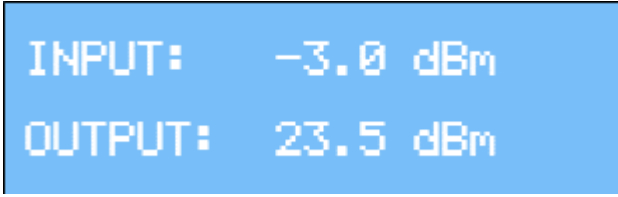
2. The UP and DOWN buttons will navigate to the following screens in the following order; Pressing the UP button while on page 1 will navigate to page 8 and pressing the DOWN button while on page 8 will navigate to page 1.



Model number and serial number

2. 
MODE: APC
GAIN: 23.5 dB

Amplification mode and EDFA gain

3. 
INPUT: -3.0 dBm
OUTPUT: 23.5 dBm

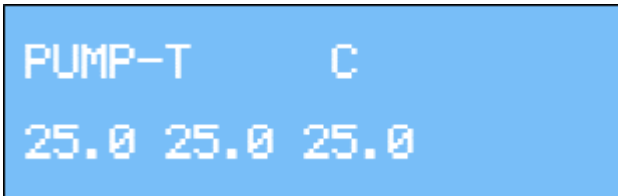
Input and output power level in dBm

4. 
PUMP-C mA
404.4 636.3 533.4

Pump currents in mA

5. 
PUMP-P mW
256 195 180

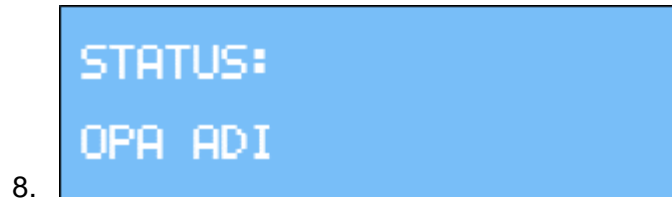
Pump output power in mW

6. 
PUMP-T C
25.0 25.0 25.0

Pump temperatures in °C

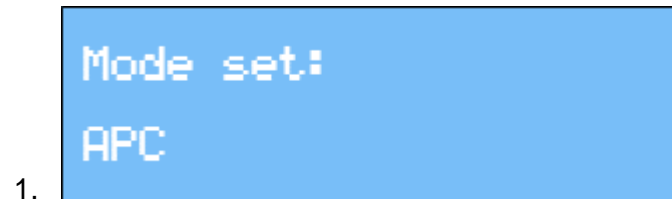
7. 
MODULE-T 27.6 C

EDFA module temperature in °C



EDFA status codes
(see Status Code Definition for details)

3. Pressing the RIGHT button while on any of the above pages will take you to the settings pages shown below in the following order:



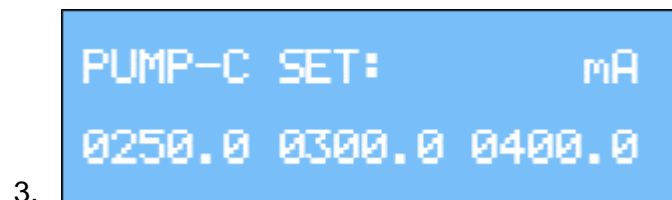
Amplification mode selection

Options:

- APC – Automatic Power Control
- ACC – Automatic Current Control
- OFF – EDFA Amplification Disabled



Output power adjustment for APC mode
Range: 09.0 to 25.0 dBm



Pump current adjustment for ACC mode
Range:

- Pump 1: 0000.0 to 0450.0 mA
- Pump 2: 0000.0 to 1320.0 mA
- Pump 3: 0000.0 to 1320.0 mA

Parameter Adjustment Procedure

1. While on any of the three settings pages pressing the enter button will allow adjustment of the parameter(s) on that page.
2. Use the LEFT and RIGHT buttons to move the cursor to the desired digit position.
3. Use the UP and DOWN buttons to adjust the desired digit(s).
4. Press the ENTER button to save the changes and return to main screen.

Patchcord Swapping Procedure

1. Turn the Enable Key switch to the OFF position to disable the EDFA-C-23-R output.
2. Swap patchcords as desired. Only connect the indicated connector patchcords to the optical input/output receptacles, cleaning them as necessary.
3. Turn the EDFA Enable Key switch back to the ON position; normal operation will resume after a few seconds.

Status Code Definition

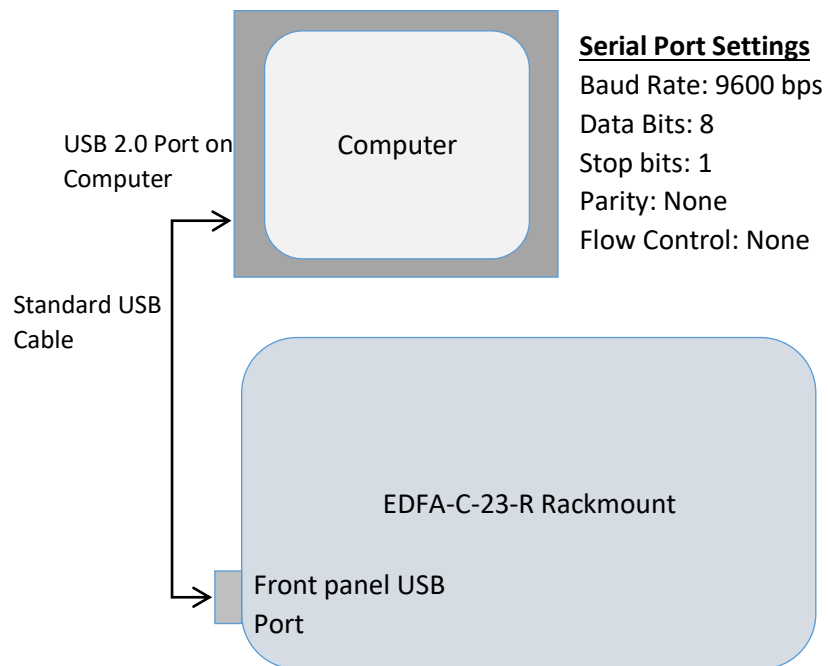
The table below shows the different status codes and their meanings:

CODE	DESCRIPTION
OK	No active alarms
PI	A pump diode current is above 95% of EOL value
ADI	Enable key is in the OFF position
OPA	Loss of output power alarm active
IPA	Loss of input power alarm active
TINT	Internal case temperature too high
PTMP	A pump diode temperature is too high

2.5. PC Connection Mode

For the standard EDFA-C-23-R, connecting the rackmount unit to an external PC will allow for parameter monitoring and adjustments of the parameters mentioned in the previous section.

Using the front panel USB 2.0 port and an appropriate serial terminal communication program (such as Termit), connect the EDFA to a PC using the following connection diagram and serial port settings:



2.6. Remote Command Set

When the electrical connections have been made, and the software settings for serial port transmission are set correctly, you are now able to send commands to the EDFA-C-23-R unit.

QUERY COMMANDS

READ{CR/LF} – Read the device information.

HELP{CR/LF} – Read the device command set and status code definition.

SET COMMANDS

SETM:XXX{CR/LF} – Set the EDFA drive mode.

OPTIONS

- ACC – Automatic Current Control
- APC – Automatic Power Control
- OFF – Disables the EDFA output

e.g. SETM:APC{CR/LF}

SETP:XX.X{CR/LF} – Set the EDFA output power in APC mode; Range: **09.0** to **25.0** dBm.

e.g. SETP:23.5{CR/LF}

SETC1:XXXX.X{CR/LF} – Set the pump 1 drive current in ACC mode; Range: **0000.0** to **0450.0** mA.

e.g. SETC1:0350.0{CR/LF}

SETC2:XXXX.X{CR/LF} – Set the pump 2 drive current in ACC mode; Range: **0000.0** to **1320.0** mA.

e.g. SETC2:0850.0{CR/LF}

SETC3:XXXX.X{CR/LF} – Set the pump 3 drive current in ACC mode; Range: **0000.0** to **1320.0** mA.

e.g. SETC3:0850.0{CR/LF}

3. Troubleshooting

SYMPTOM	POSSIBLE CAUSE AND SOLUTION
OPTICAL OUTPUT POWER NOT HIGH ENOUGH	<p>C: No optical input or optical input power too small. S: Check optical input present or check optical input power is correct.</p>
	<p>C: Optical input/output connectors dirty. S: Disable optical output and clean optical connectors.</p>
	<p>C: Use of incorrect optical adapters or connectors. S: Use only the indicated optical adapters and connectors. If measurement instruments accept different connector type, then use hybrid patchcords.</p>
	<p>C: Optical output connector damaged. S: Measure optical output power with power meter and compare with readout on PC connection 'READ' command. Return to Optilab for repair if the difference is high (>4 dB) and cannot be corrected by cleaning or replacing the optical connectors. Always apply dust cover plugs to unused optical ports to prevent the damage of optical connectors.</p>
OPTICAL OUTPUT POWER UNSTABLE	<p>C: Pump current setting is too low S: Check the front panel or remote read command for the current pump current setting, making adjustments as necessary.</p>
	<p>C: Insufficient optical output isolation. S: Connect isolator of corresponding wavelength to optical output connector.</p>
UNIT DOES NOT POWER UP	<p>C: Insufficient electrical voltage. S: Check that the electrical supply is at least 110 VAC.</p>
	<p>C: AC Power cord is loose. S: Plug power cord firmly into the unit.</p>
UNIT RESETS OR BLINKS ON AND OFF	<p>C: Insufficient electrical voltage. S: Check that the electrical supply is at least 110 VAC.</p>

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4. Service and Support

4.1. Warranty

Optilab, LLC guarantees its EDFA-C-23-R unit is guaranteed to be free of defects for 1 year from the date of shipment. The guarantee does not cover any damages resulting from the misuse or improper handling of the equipment, or any incidental or consequential loss. Note that the warranty will be void upon any attempt to open or to fix the equipment by the user without prior approval of Optilab, LLC.

4.2. Service and Calibration

Your EDFA-C-23-R unit has been designed to provide years of trouble-free operation. No internal maintenance is required provided that the equipment is properly handled, operated and kept away from contamination. For any questions regarding the operation and performance of the unit, please contact Optilab, LLC at:

*Optilab, LLC
600 E. Camelback Road
Phoenix, AZ 85012
Phone: 1-602-343-1496
Fax: (602) 343-1489
Email: sales@oequest.com*

5. Care of Fiber-optic Connectors

Damage to optical connectors account for more than 70 percent of equipment performance degradation. To avoid such damage, the user should use only industrial grade 99% pure isopropyl alcohol and follow the procedures below to keep the connectors, adaptors and receptacles clean.

Cleaning Optical Connector End-face with Wipe and Alcohol

To properly clean optical connectors utilizing lens tissue grade wipes and alcohol follow the procedure below. The moist wipe removes dust particles, oil and contaminants that may damage or blot the end-face of the connector during connection. The dry wipe removes residual alcohol that may be ignited by optical emission.

1. Disable the optical output and turn off unit to prevent accidental exposure or damage to the optical connector by optical emission.
2. Moisten a wipe with alcohol by placing on top of the alcohol dispenser and push down to saturate the wipe.
3. Place the moist wipe on a work surface, and place a second dry wipe next to it.
4. Wipe the optical connector, end-face down on the moist wipe 3 times and then repeat on the dry wipe.
5. Visually inspect the end-face of the optical connector with an optical microscope to verify cleanliness. Repeat steps 2 to 5 as needed.

Cleaning Optical Connector Sides, Receptacles, Adaptors with Swab and Alcohol

Dust or particles can adhere to the insides of receptacles and adaptors or the sides of the optical connector ferrule. Their presence can affect the alignment of the optical fiber connectors and increase connection loss. To properly clean optical connectors, receptacles, and adaptors utilizing a swab and alcohol follow the procedure below:

1. Disable the optical output and turn off unit to prevent accidental exposure or damage to the optical connector by optical emission.
2. Moisten the swab by placing it on top of the alcohol dispenser and push down to saturate the swab.
3. For receptacles, adapters, or other connection points, insert the moistened swab and rotate the tip 1/2 turn clockwise and counter-clockwise 6 times while applying light but firm pressure.
4. For fiber connectors, rotate the tip of the moistened swab 5 revolutions around the connector while applying light but firm pressure.
5. Visually inspect the end face of the connector with an optical microscope to verify cleanliness. Clean end-face as needed.