



Optilab EDFA-C-B-M User's Manual

**Erbium Doped Fiber Amplifier – Booster Type
Module**

Caution: The user must read this manual before operating the EDFA-C-B-M 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.

**Ver. 1.0
July , 2010**

Revision History

Version	Date	Summary
1.0	7/22/10	Manual introduced.

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1. General Information

1.1 Introduction

This manual contains information on the installation and operation of the EDFA-C-B-M modular erbium doped fiber amplifier (EDFA) unit.

1.2 Product Overview

The EDFA-C-B-M is an ultra-stable high gain optical amplifier unit designed for applications requiring high efficiency optical amplification. It is a modular unit designed to supply high and stable gain across the C-band range of the communications window for OEM integration applications. The EDFA-C-B-M is optimized for optical input power from -8 to +6 dBm.

The Optilab EDFA-C-B-M comes in several output power levels and multiple output ports. Please visit [.oequest.](#) for more details.

1.3 Features

- High saturation output power
- High stability
- Low noise
- Low polarization dependence
- Modular Design for OEM Integration

1.4 User Safety

1. The EDFA-C-B-M 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.

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2. Operation

2.1 Introduction

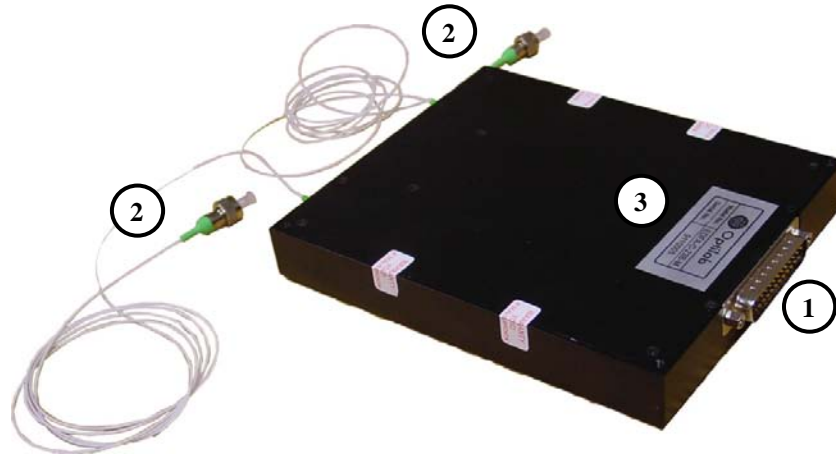
This chapter describes how to operate the EDFA-C-B-M unit, and discusses the location and function of the controls and connectors.

2.2 Initial Inspection

Your EDFA-C-B-M 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

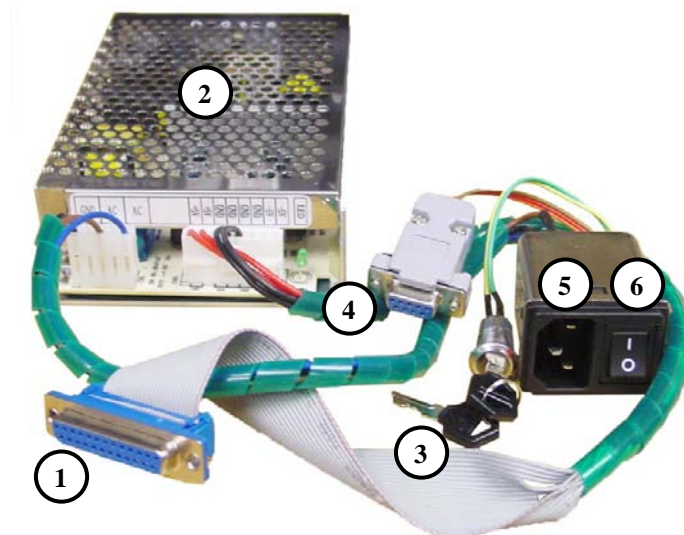
EDFA-C-B-M – EDFA Module



Feature	Function
① Electrical Connection Port	This port is used to connect the EDFA module to the power supply and RS232 cable. It is a DB25 type connector, with the full pin-out diagram shown on page 5 of this manual.
② Optical Input and Output Fiber Ports	The optical input and output fiber ports for the EDFA unit. Multiple output ports are available upon request. The fiber ports shown are FC/APC type.
③ Model and Serial Number Label	This label shows the model number and serial number of the EDFA-C-B-M device.

An external optical isolator at specified wavelength should be used to protect the EDFA-C-B-M from optical feedback and to improve stability

EDFA-C-B-M – Power Supply Assembly



Feature	Function
① EDFA Module Connector Port	This port is used to connect the power supply assembly device to the EDFA module for operation. It is a DB25 type connector.
② AC/DC Converter Supply	This device is used to convert an AC line voltage (110-220V) to the proper DC outputs for the EDFA module. The proper cable connections should be made upon receipt of the shipment, though observe proper ESD procedures when operating.
③ EDFA Key Switch	Used to enable or disable the optical amplification to the EDFA unit.
④ RS232 Female Socket	Using an RS232 cable, this port allows for remote control and monitoring through a PC workstation. <small>Limited feature on basic units.</small>
⑤ AC Power Socket	The AC power socket is the input for the AC power source. A three-pin standard power cord should be used to connect this equipment to any 110 or 220 V main supply.
⑥ Main AC Power Switch	This switch enables the electrical power to the AC/DC Converter Supply unit.

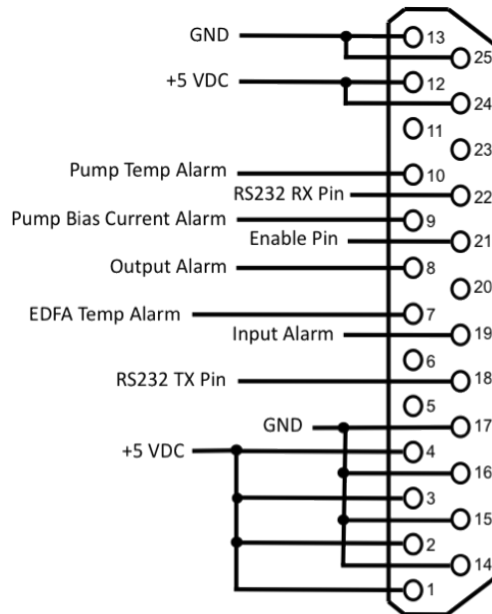
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2.4 DB25 Pin-Out Diagram

Listed below is the pin-out diagram for the DB25 pin port on the external of the EDFA-C-B-M module:



Pins 1, 2, 3, 4, 12, 24 – +5 VDC. It is important to have all pins connected for proper operation.

Pins 13, 14, 15, 16, 17, 25 – Ground

Pin 7 – EDFA Temperature Alarm*

Pin 8 – Output Alarm*

Pin 9 – Pump Bias Current Alarm*

Pin 10 – Pump Temperature Alarm*

Pin 18 – RS232 TX, for transmitting data via standard serial communication.

Pin 19 – Input Alarm*

Pin 21 – Enable, short this pin to Ground to enable EDFA operation.

Pin 22 – RS232 RX, for receiving data via standard serial communication.

Pins 5, 6, 11, 20, 23 – Not Connected

*: All alarm pins will have the alarm condition coincide with the TTL high level

2.5 Operation Instructions

Start-up Procedure

1. Ensure that the proper cable connections are made, which includes the power assembly interconnects (as shown on page 4) and the DB25 connection between the module and power supply.
2. Due to the increased temperature of the device over time, it is strongly recommended to use the EDFA in a well ventilated area with an adequate heat sink in contact with the EDFA for proper heat dissipation.

3. After plugging in the appropriate power plug into the AC Power Socket, flip the main AC switch to the On position to enable electrical power to the unit. The AC/DC converter supply's LED will enable.
4. Ensuring the input signal is turned off, connect the optical signal for amplification via the optical input port using the indicated connector patchcords.
5. Connect the optical output port using the indicated connector patchcords to the appropriate signal destination to utilize the amplified optical output signal(s).
6. After checking all physical patchcord connections, turn the input signal laser source on.
7. Turn the EDFA key switch to the On position.
8. The EDFA-C-B-M is now enabled, with the gain current set to maximum amplification for the current input signal level.

Optical Output Adjustment Procedure

To adjust the optical output level via current bias adjustment for the EDFA-C-B-M, please refer to the PC connection mode on page 7 for more information.

Patchcord Swapping Procedure

1. Turn the EDFA key switch to the OFF position to disable the EDFA-C-B-M 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 key switch back to the ON position; normal operation will resume after a few seconds.

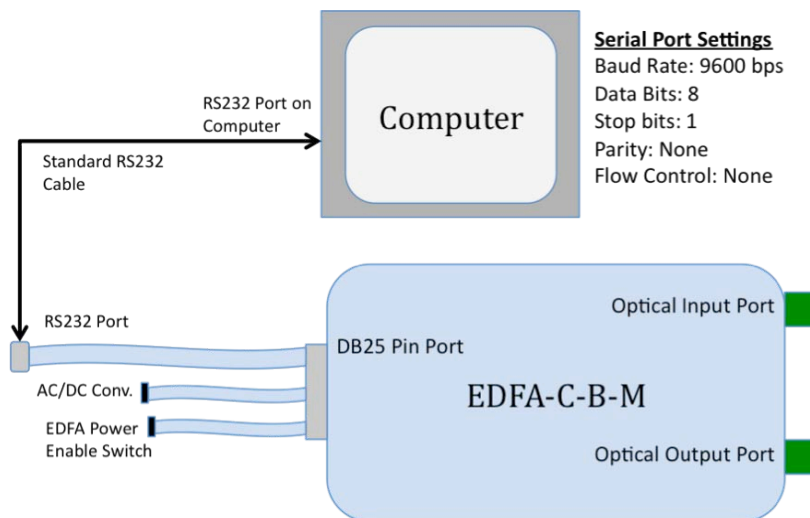
Over-temperature Procedure

1. When the **Temp Overheat** warning enables the pump laser will shutdown automatically and the system will freeze up.
2. Flip the main AC switch to the Off position.
3. Restart the unit using the Start-up Procedure described above.
4. To prevent temperature issues in the future, please allow for adequate ventilation and increased heat sinks for proper dissipation of heat.

2.6 PC Connection Mode

For the standard EDFA-C-B-M, connecting the module to an external PC will allow for parameter monitoring and pump current adjustments. If you have an EDFA-C-B-M with additional software control, please refer to the additional supplemental manual for complete information.

Using the RS232 port on the cable assembly, connect the EDFA module to a PC using the following connection diagram and serial port settings:



2.7 RS232 Command Set

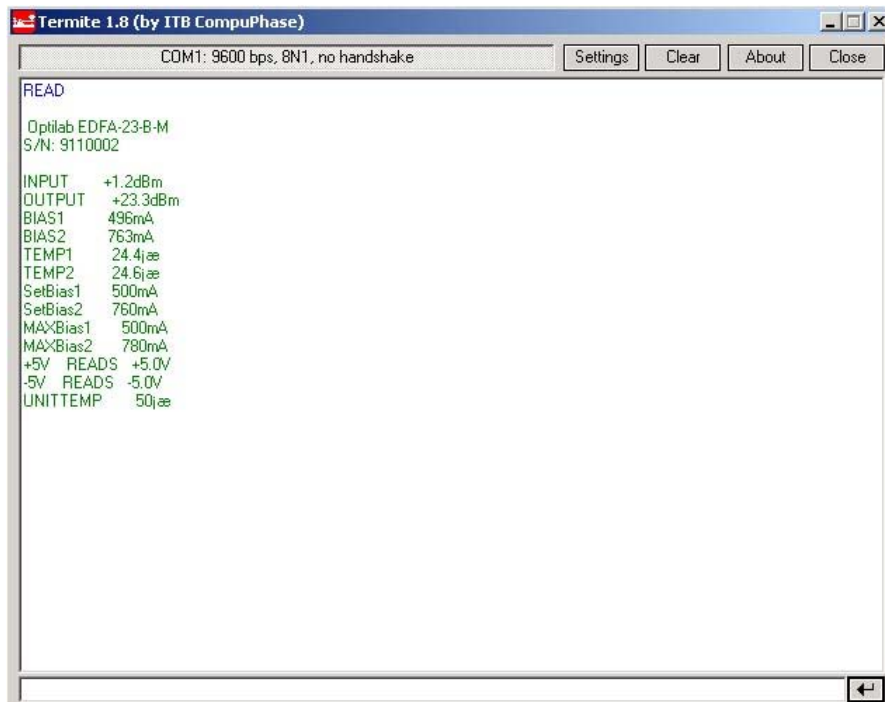
When the electrical connections have been made, and the software settings for serial port transmission are set correctly, you are now able to send commands to the LR module. For the basic EDFA-C-B-M, there are only three commands available:

READ – Displays the current parameters and settings.

SLD1Sxxx – Sets the current for the first pump (xxx = current in mA, up to the maximum displayed by the 'READ' command.)

SLD2Sxxx – Sets the current for the second pump (if applicable, xxx = current in mA, up to the maximum displayed by the 'READ' command.)

The screenshot below shows a typical RS232 response for the 'READ' command:



The screenshot shows a window titled "Termite 1.8 (by ITB CompuPhase)". The window has a status bar at the top that reads "COM1: 9600 bps, 8N1, no handshake" and buttons for "Settings", "Clear", "About", and "Close". The main text area displays the following data:

```
READ
Optilab EDFA-23-B-M
S/N: 9110002

INPUT    +1.2dBm
OUTPUT   +23.3dBm
BIAS1    496mA
BIAS2    763mA
TEMP1    24.4jæ
TEMP2    24.6jæ
SetBias1 500mA
SetBias2 760mA
MAXBias1 500mA
MAXBias2 780mA
+5V READS +5.0V
-5V READS -5.0V
UNITTEMP 50jæ
```

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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> <hr/> <p>C: Optical input/output connectors dirty. S: Disable optical output and clean optical connectors.</p> <hr/> <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> <hr/> <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> <hr/> <p>C: Improper pin connections S: If directly connecting the voltage to the DB25 pins, ensure that all +5 VDC pins are making adequate contact to your supply.</p>
EDFA module is overheating	<p>C: Insufficient ventilation / heat dissipation. S: Place unit in well-ventilated area or supply additional fans for ventilation. You may need to add a heat sink for additional heat dissipation.</p>
Optical output power unstable.	<p>C: Insufficient optical output isolation. S: Connect isolator of corresponding wavelength to optical output connector.</p>
Unit does not power up.	<p>C: Improper pin connections S: If directly connecting the voltage to the DB25 pins, ensure that all +5 VDC pins are making adequate contact to your supply.</p> <hr/> <p>C: Insufficient electrical voltage. S: Check that the electrical supply is at least 110 VAC.</p> <hr/> <p>C: AC Power cord is loose. S: Plug power cord is 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>

4. Service and Support

4.1 Warranty

Optilab, LLC guarantees its EDFA-C-B-M unit is guaranteed to be free of defects for 3 years 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-B-M 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:

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4.3 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.