



Multicom 1550nm High Power Erbium Doped Fiber Amplifier

MUL-2RU-EDFA-1550-XX-xx



User Manual v.2

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Multicom 1550nm High Power EDFA

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SAFETY NOTIFICATION



The Multicom MUL-2RU-EDFA-1550 is classified as Class 1M per IEC/EN 60825-1/A2:2001. This product complies with FDA/CDRH, 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50 dated 26 July, 2001.

Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers and microscopes) within a distance of 100 mm may pose an eye hazard.

Laser power up to 4,000 mW at 1550nm could be accessible if optical connector is open or fiber is broken.

CAUTION: Use of controls, adjustments, and procedures other than those specified herein may result in hazardous laser radiation exposure.

IMPORTANT SAFEGUARDS

Multicom strongly advises you to read the following safety instructions prior to installing and operating this equipment.

- **Read These Instructions First** – All safety and operating instructions should be read before installing or operating this equipment.
 - **Retain This Instruction Manual** – Safety and operating instructions must be retained for future reference.
 - **Ventilation** – Do not block or cover openings in this equipment. These are provided for ventilation and protection from overheating. **Maximum operating ambient temperature is 122°F (50°C).**
 - **Power Sources** – The Multicom MUL-2RU-EDFA-1550 must have a grounding resistance of <4 ohms. All power must be provided via a three wire, grounded power supply and cord. The mains circuit should be a dedicated, unswitched supply. Keeps the unit away from high voltage or other interference creating devices such as motors, compressors, etc.
 - **Grounding or Polarization** – This equipment is equipped with a polarized AC line plug. This plug will fit into the power outlet only one way. This is a safety feature. Do not defeat the safety purpose of a polarized plug. This equipment must be installed and grounded per NEC regulations.
- ⚠ CAUTION: For continued protection against risk of fire, replace circuit breakers/fuses (if necessary) with one of only the same type and rating.**
- ⚠ Optical Output Safety: The Erbium Doped Fiber Amplifier units may emit harmful invisible laser radiation if powered on and the case is opened or the beam path is exposed.**



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1.0 PRODUCT DESCRIPTION

The Multicom 1550nm Erbium Doped High Power EDFA is a low noise 1550nm optical amplifier is designed to amplify 1550nm optical signals to increase the optical transmission distance over fiber, and can be used in conjunction with the Multicom 1550nm optical transmitter. Featuring a built-in CWDM integrating a 1490nm/1310nm data stream from the OLT and ONU into single fiber transmission through the EDFA, the MUL-2RU-EDFA dramatically reduces component count and improves system performance while saving costs.

With low noise and high linearity, this High Power EDFA can be used in the transmission of video, voice and data signals. It offers a flexible and low-cost solution for CATV large area coverage of metropolitan and medium-sized cities.

The MUL-2RU-EDFA-1550 series is equipped with APC, ACC, ATC control, and has superior heat-dissipation which guarantees a durable and highly reliable pump laser.

2.0 PRODUCT FEATURES

- 2RU chassis
- Up to 64 optical ports
- Low noise, high performance
- Total output power: 400~4000mW
- Offers maximum 64 optical outputs (2RU)
- Perfect RS232 communication interface and SNMP function
- High-efficiency installation, easy operation, flexible
- High performance to price ratio

3.0 INSTALLATION

1. Place the unit into a 19-inch wide rack or cabinet. Make sure leaving sufficient space above or below the unit for airflow heat-transfer purpose.

2. MUL-2RU-EDFA series 1550nm EDFA is designed to work between 0°C~50°C (32°F~122°F) temperature range. Humidity should not exceed 95%. Installation is recommended in a temperature & humidity controlled, dust-free environment.

3. The equipment is designed to be powered by AC or steady voltage DC. In both of AC & DC, AC is the chief power supply.

Request of power supply:

AC input 100-240VAC, 50-60Hz - - 100-240VAC, 50-60Hz

DC input 36-60VDC, floating - - 36-60VDC, floating

Power consumption - - Maximum 50W

4. The DC power supply of the equipment must be the SELV supply stipulated as CAN/CSA C22.2 No.950-95 standard.



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5. The machine must have good grounding with grounding resistance $< 4\Omega$. Before connecting circuit, use #20AWG and higher electric wire to connect the grounding screw on the bottom and the grounding frame. When using DC input power supply the equipment chassis must be grounding.

4.0 OPERATION

A. Plug in city power supply

B. Turn on power switch in the back panel, Front panel display "KEY OFF"

Laser Status lamp Red

Alarm Status lamp Green

Link Status lamp Off / Green

C. Input power, then press laser start-up key switch

Front panel shows "KEY ON..." , Laser status lamp turns green from red.

4.1 Start-Up Main Menu

Press ▲ ▼ buttons to following the menu.

Menu #1 – Model - Read-only menu, tells the model of this equipment

Menu #2 - S/N - Read-only menu, tells the serial number of this equipment

Menu #3 – INPUT - Read-only menu, tells the input optical power in dBm

Menu #4 – OUTPUT - Read-only menu, tells the output optical power in dBm

Menu #5 - BIAS1 - Read-only menu, tells the current of PUMP1

Menu #6 - BIAS2 - Read-only menu, tells the current of PUMP2

Menu #7 - BIAS3 - Read-only menu, tells the current of PUMP3

Menu #8 - BIAS4 - Read-only menu, tells the current of PUMP4

Menu #9 - BIAS5 - Read-only menu, tells the current of PUMP5

(Higher total power units may have additional pumps #6-#9)

Menu #10 - TEC1 - Read-only menu, tells the refrigeration current of PUMP1

Menu #11 - TEC2 - Read-only menu, tells the refrigeration current of PUMP2

Menu #12 - TEC3 - Read-only menu, tells the refrigeration current of PUMP3

Menu #13 - TEC4 - Read-only menu, tells the refrigeration current of PUMP4

Menu #14 - TEC5 - Read-only menu, tells the refrigeration current of PUMP5

(Higher total power units may have additional pumps #6-#9)

Menu #15 - TEMP1 - Read-only menu, tells the laser temperature of PUMP1

Menu #16 - TEMP2 - Read-only menu, tells the laser temperature of PUMP2

Menu #17 - TEMP3 - Read-only menu, tells the laser temperature of PUMP3

Menu #18 - TEMP4 - Read-only menu, tells the laser temperature of PUMP4

Menu #19 - TEMP5 - Read-only menu, tells the laser temperature of PUMP5

(Higher total power units may have additional pumps #6-#9)

Menu #20 - +5V Monitor - Read-only menu, displays the voltage

Menu #21 - -5V Monitor - Read-only menu, displays the voltage

Menu #22 - UNIT TEMP - Read-only menu, tells the case temperature

Menu #23 – IP - Adjustable list, displays the IP address

Menu #24 – SUBNET - Adjustable list, display the address of net mask

Menu #25 – GATEWAY - Adjustable list, displays the gateway address



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Menu #26 - TRAP ADDR1 - Adjustable list, displays the TRAP1 address

Menu #27 - TRAP ADDR2 - Adjustable list, displays the TRAP2 address

4.2 IP Addressing

Press ▼ key to amend the address menu that should be amended, press < to choose the amend place, push > currently value +1, press ▼ to the end of the address to enter into save and exit. For example, amend IP setup menu, IP: 192.168.000.015; if change 5 to 6, use < key to choose the place of 5, then press > key to change 5 to 6, then press ▼ to save amended IP:192.168.000.016

5.0 PORT AND CABLE ASSIGNMENTS

The MUL-2RU-EDFA series provides the following manage ports:

RS232 Port: Suitable for examining MUL-2RU-EDFA parameters and system configuration

SNMP: Simple Network Management Protocol. Before connection MUL-2RU-EDFA read the following instructions for port connectivity requirements.

5.1 Port Description

The MUL-2RU-EDFA series management port connector type is RJ-45.

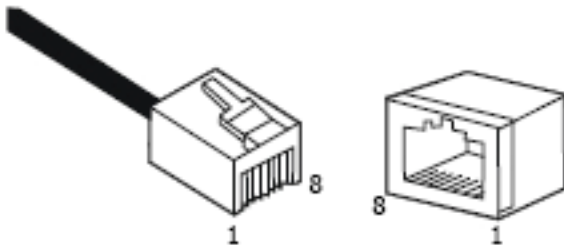


Figure 4.1.1 RJ-45 Connector Plug and Socket

5.2 Pin Assignments

Connecting RJ-45 connector from PC to MUL-2RU-EDFA directly using straight through pin assignment. See Figure 4-1, 4-2.



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PIN	Workstation port	MDI
1	Input receive data+	Output transmit data+
2	Input receive data-	Output transmit data-
3	Output transmit data+	Input receive data+
6	Output transmit data-	Input receive data-
4, 5, 7, 8	Nonuse	Nonuse

Table 4-1 RJ-45 Pin assignment

Straight				Cross			
(TA5400B)		(Adapter)		(TA5400B)		(HUB/ TA5400B)	
1 IRD+	_____	_____	1 OTD+	1 IRD+	_____	_____	1 IRD+
2 IRD-	_____	_____	2 OTD-	2 IRD-	_____	_____	2 IRD-
3 OTD+	_____	_____	3 IRD+	3 OTD+	_____	_____	3 OTD+
6 OTD-	_____	_____	6 IRD-	6 OTD-	_____	_____	6 OTD-

Table 4-2 Straight and cross cable connecting

5.3 Port Connection

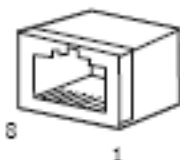
MUL-2RU-EDFA series can automatically detects the Ethernet cable type (Straight-through or Crossover), so either type can be used. An Ethernet twisted pair cable should be connected between the RJ-45 connector of the MUL-2RU-EDFA series and any device with a standard network interface (such as a work station or server), or to a network interconnection device (such as a bridge or router).

Caution: Do not plug a phone jack connector into the RJ-45 port. This may damage the EDFA. Instead, use only twisted-pair cables with RJ-45 connectors that conform to FCC standards.

5.4 Connection Management (Out-Band)

Remote management can be performed through the dedicated Management port (10/100BASE-TX port) on the front of the MUL-2RU-EDFA or any 10/100BASE port of MUL-2RU-EDFA. Before the Management port is accessed through LAN port, configure the IP address and subnet mask by serial port according to network configuration requirement.

5.5 RS232 Console port (DB9)



DB9 interface is a standard connectors used in RS232 in series communication connects. OLT adopts 9-pin standard connector which is same as the connector of PC Com interface.



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5.6 Pin assignment

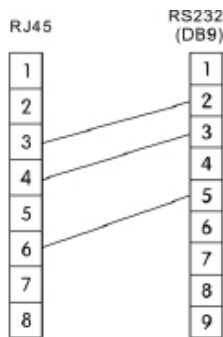


Figure 4-2.2 DB9/RS232 pin assignment

Pin	Distribution
2	RXD: accepting of data
3	TXD: transmitter data
5	SG: signal

Table 4-3 Pin information

6.0 WARNING & ALARMS

MUL-2RU-EDFA series monitors system operation and adjusts to the majority of power fluctuations. The PUMP laser will continue to work when in alarm. The alarm will disappear if the system parameter recovers into normal range. Some serious alarms can be eliminated by restarting the unit's power supply.

Most alarms are sent when the parameter is close to or exceeds the permitted range. In most situations the user cannot modify this status. Status modification needs special equipment and can only be modified in the factory.

6.1 Alarm Status

When the pump laser is in alarm, the status LED will turn red and be displayed the alarm status on the LCD screen. The alarm will not stop the EDFA but shows the parameter is out of range. If the alarm stops, the parameter is within range.

When the Laser LED is green, the device is working properly and the laser is on

When the Laser LED is red, the laser is not in use

When the Laser LED is flashing red it is in alarm

In the case of an alarm, the unit's microprocessor will shut off the laser automatically and the LCD screen will display fault information.

7.0 OPERATION NOTICE

- Use only Single Mode Fiber (SMF) optic cable (9/125 μ m). Multi-Mode Fiber (MMF) is incompatible with the equipment and will result in unacceptable performance and possible damage to the equipment.
- All fiber splices should be fusion-type splices. Avoid mechanical or compression type connections.
- For optimum performance, fiber runs should be made directly to and from the EDFA. Minimize the use of adapters, patch panels, and additional points of failure and signal loss.



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- In order to ensure return loss is maximum, use only SC/APC connectors. Clean and inspect connectors and fiber endfaces prior to installation, and every plug in/out cycle.
- Use only industry approved methods, materials, and solutions for cleaning.
- Do not turn on the EDFA alone or without a protector cover at the unit connector end, otherwise the laser can do harm, especially to eyes. This is especially critical because the laser is invisible.
- Always turn off the laser prior to making connections to the EDFA. Failure to do so may cause irreparable damage to the laser and EDFA.

8.0 WARRANTY AND REPAIR

The Multicom MUL-2RU-EDFA-1550 has a one year warranty and is subject to Multicom's standard warranty terms. There are no user serviceable components inside the unit. The warranty is void if the unit is opened or is damaged due to misuse.

9.0 PRODUCT SPECIFICATIONS

	Specifications	Values			Notes
		Min	Type	Max	
Optical	Operation wavelength (nm)	1540		1560	
	Input power range (dBm)	0	3		
	Total output power (dBm)	26		36	>4000mW
	Each port output power (dBm) (dBm)	10		22	
	Number of output ports	8		32	
	Noise figure (dB)	4.5		6.5	
	CNR deterioration (dB)			1	Pin=6dBm
	Pol. dependence loss (dB)			0.3	
	Pol. dependence gain (dB)			0.4	
	Pol. mode dispersion (ps/nm)			0.5	
	Pump power leakage (dBm)			-30	
	Input optical isolation (dB)	40			
	Output optical isolation (dB)	30			
	Echo loss (dB)	50			
Connector type	SC/APC				
General	SNMP network interface	RJ45			
	Communication/Serial interface	RS232			
	Power supply (V)	100		250	-48 VDC optional
	Power consumption (W)	50		170	
	Working temperature (°C)	-5		50	23-122°F
	Storage temperature (°C)	-40		85	-40-185°F
	Operating rel. humidity (%)	5		95	
	Size (W x D x H in inches)	19 x 14.25 x 3.5			2RU

Product Series

Part#	Total Output Power	# Output Ports	Each Port Output Power	Connector
MUL-2RU-EDFA-1550-30-16	≥30dBm (1000mw)	16	≥16.0dBm	SC/APC