ma**X**com
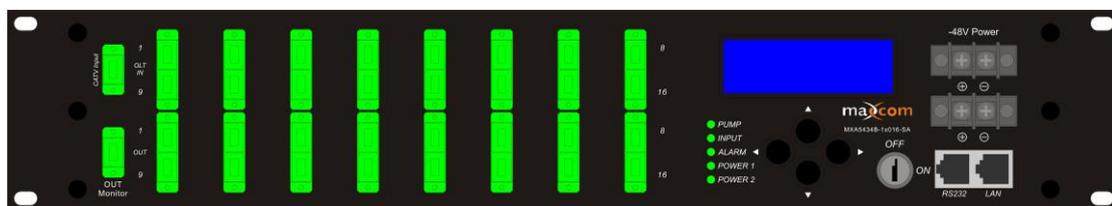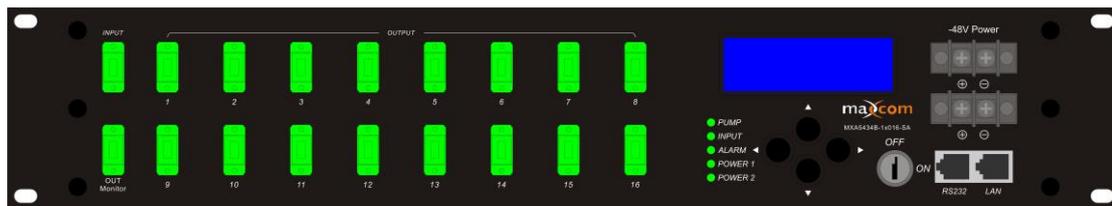
1550nm Erbium Doped Fiber Amplifier · MX-A5400 Series

USER MANUAL

Sample Illustrations of MX-5400 Series

Available in several configurations, sizes and outputs

CONTENT

1.0   PRODUCT SUMMARY

The Maxcom MX-A5400 Erbium Doped Fiber Amplifier (EDFA) has been designed for CATV, FTTH and HFC applications. The EDFA is suitable for long haul transmission networks or FTTH distribution networks. This optical amplifier is packaged in a 19" rack mount housing to provide a complete optical communications solution. Maxcom offers our MX-A5400 platform which can be ordered with 8, 16 and 32 output ports and various output powers.

The output power available is from 16.5 dBm to 23 dBm.

The MX-A5400 series is a high-power multi-port EDFA with a gain spectrum band within 1540~1563nm. It is designed for the application of a single channel or 1~8 continuous ribbon channels (ITU wavelengths). This series of EDFA offers a flexible and low-cost solution for a CATV systems large coverage area.

The MX-A5400 series EDFA's are a high performance, multiple optical output EDFA's designed for analog and digital CATV QAM signals. Maxcom's 1550 optical amplifiers and EDFA's adopt world class pump lasers and American OFS erbium-doped optical fiber components. Excellent APC, ACC and ATC control, superb design in the ventilation and heat-dissipation ensure long life and a highly reliable operation of the pump laser.

The LCD at the front panel offers equipment status and warning alarms. The laser will switch off automatically if optical power is lost, which offers security protection for the laser

MX-A5400(A) EDFA: 1RU chassis, total output power up to 18.5 dBm, offers 8 optical outputs.

MX-A5400(B) EDFA: 2RU chassis, total output power up to 22 dBm, offers up to 32 optical outputs.

2.0   INSTALLATION

2.1   Unpacking

Please inspect the shipping boxes for any obvious damage.
Unpack the unit from all packaging and boxes.
Inspect the appearance of the unit for any shipping damage.
Document and inform the shipping company and your local representative, if any damage was observed.

NOTE: If returning the product to the Maxcom, please use original packaging, Maxcom disclaims all responsibility for damage caused by non-use of original packaging.

2.2   EDFA Mounting and Power Connection

1. Place the unit into a 19-inch wide rack or cabinet. Make sure to leave a 1.75-inch (about 4.5cm) space above and below the unit.

2. Per design requirements, the MX-T5400 series 1550nm EDFA can operate between 0°C~50°C（32°F~122°F）temperature range. We recommend 25°C（77°F）environment temperature.
Humidity should be not more than 95%（under non-coagulation condition）.
It is recommended installing this unit in a dust free environment.

3. The equipment can be powered by AC or steady voltage DC. If using both AC & DC, AC is the primary operational power supply.
Request of power supply:

AC input	94-245VAC, 50-60Hz
DC input	36-60VDC, floating
Power consumption	Maximum 50W

4. The DC power supply for this equipment must comply with a SELV circuit stipulated as in the CAN/CSA C22.2 No.950-95 standard.

5. The unit should be grounded with grounding resistance＜4Ω. According to the international standard, 120V plug-in adopts a tri-wire rule and the center wire is the ground wire.

Before connecting circuit, please use (#20AWG and larger) 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 grounded.

2.3   Optic connection

1. Insure all fiber patch cords are clean before connecting to the transmitter.

Cleaning Guidelines:

Fiber Patch cord connectors

- Remove the dust cap of the fiber connectors and wipe the fiber connector tip with a dry lint-free cloth. Check if there are scratches or debris on the connector surface by using a microscope (ie.100x or 200x).

- If no scratch or debris is found, the connector is ready for connection. If scratches or debris are found, repeat the fiber patch cord connector cleaning guidelines.

Fiber Bulkhead connectors

- Compressed air may be used to clean fiber bulkhead connectors. Use compressed air according to the following specifications:

- Non-residue, inert gas for precision dust removal

- Ultra-filtered to < 0.2 microns

- Recommended for optical systems

- Using compressed air as listed above, remove the bulkhead dust cover and hold the can of compressed air about 6 inches away from the connector. After spraying a few short bursts into the bulkhead, the connector is clean and ready for connection.

- If compressed air is not available, the transmitter fiber bulkhead connector may be cleaned by a 2.5 mm `alcohol sponge`, or the connector plate may be removed to clean the internal fiber patch cords.

-To remove the transmitter optical connector plate, remove the screw on the far left of the optical plate and remove the screw on the far right of the optical plate. Do not remove the screws on the optical bulkhead connector.

- Slowly remove the optical connector plate from the rear panel and disconnect each fiber connector from the bulkhead mounted on the plate.

- Clean each fiber connector according to the fiber cleaning guidelines.

2. Make sure the laser key switches on the front panel of the transmitter is in the OFF position.

3. Connect the fiber patch cord from the output of the transmitter to the optical power meter.

4. Turn the transmitter laser key switch to the ON position.

5. Use the optical power meter to verify that the transmitter optical power follows the specification.

6. Turn the transmitter laser key switch to the OFF position.

3.0 EDFA CONTROLS, INDICATORS, AND ALARMS

This section of the manual will give an overview of the available menus in the MX-A5400 series EDFA and their descriptions. All instructions in Section 3.0 refer to the representation of the front panel shown in the diagram below. The user can scroll through the EDFA menus by using the push buttons that are on the front panel and are located in the right of the LCD screen.

*Note, some models may have different configurations and button displays

MX-A5400A:
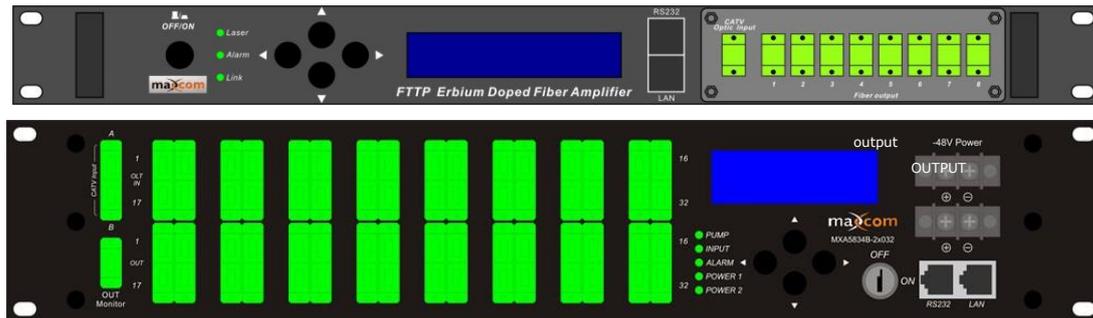
3.1 Operation of the panel

3.1.1 Open menu

A.   Plug in power supply

B.   Turn on power switch located on the back panel (for AC powered units),

Front panel display "KEY OFF"

Laser   Status lamp   Red

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

Front panel shows "**KEY ON...**",

PUMP- Status lamp Red
INPUT- Status lamp Red
ALARM - Status lamp Red
POWER1 - Status lamp Green (no light when power is off)
POWER2 - Status lamp Green (no light when power is off)

3.1.2 Start-up main menu

Press ▲\▼ button, the following menu items will be displayed in sequence.

1   Model
Read-only menu, indicates the type of equipment

2 S/N

Read-only menu, indicates the serial number of the equipment

3 INPUT

Read-only menu, indicates the input optical power in dBm.

4 TOTAL OUTPUT

Read-only menu, indicates the output optical power in dBm.

5 EACH OUPUT

Read-only menu, indicates the output optical at each output.

6 PA CURRENT

Read-only menu, indicates the pre pump current

7 PA TEMP

Read-only menu, indicates the pre pump temperature

8 BA CURRENT

Read-only menu, displays the current of the multi-mode PUMP

9 UNIT TEMP

Read-only menu, indicates the case temperature

10 IP

Adjustable list, displays the IP address

11 SUBMASK

Adjustable list, display the address of net mask

12 GATEWAY

Adjustable list, displays the gateway address

13 TRAP ADDR1

Adjustable list, displays the TRAP1 address

14 TRAP ADDR2

Adjustable list, displays the TRAP2 address

15 LCD Contrast Level

Read-only menu, LCD contrast adjustment

3.1.3 Modifying Settings

You can easily navigate the menu by using the arrow buttons to select and modify settings as desired.

For example, Press ▶ key to amend the address menu item that needs to be modified, press ▶ to shift the value, push ▲\▼ to increase/decrease value, then shift the value to the next digit as desired, press ▶ to the save, press ◀ all the way to the left and exit.

For example, amend IP setup menu, IP: 192.168.000.015; if changing 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

16 PORT AND CABLE ASSIGNMENTS

MX-A5400 series provides the following management port:

RS232 port: suitable for examining the MX-A5400 parameters and some system configuration by a PC RS232 port.

SNMP: Simple network management protocol.

Before connecting the MX-A5400 series to a port, please read the following instructions and port connectivity requirements.

a. Management Port (RJ-45)

i. Port Description

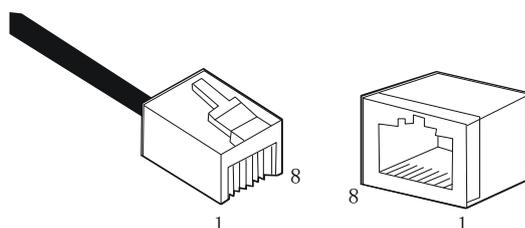The MX-A5400 series management port connector type is RJ-45.

Figure 4.1.1 RJ–45 Connector Plug and Socket

The Management port (RJ-45) can be connected to any device that uses a standard network interface (e.g., a workstation, server, bridge or router). RJ-45 MDI can be connected with similar network equipment (such as other MX-A5400 or network Hub). Use unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable for RJ-45 connections: 100-ohm Category 3, 4 or 5 cable for 10 Mbps connections or 100- ohm Category 5 cable for 100 Mbps connections. Please ensure that the cable length does not exceed 100 meters.

ii. Pin assignment

When a network management cable (RJ-45 connector in each side) connects NMS PC and the MX-A5400 series directly, it should use a straight through cable. See Figure 4.1.2.
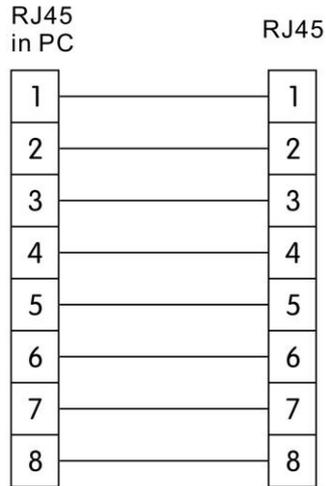
Figure 4.1.2 RJ-45 connector straight through connecting

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			
(HA5400)		(Adapter)		(HA5400)			(HUB/ HA5400)
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

iii. Port Connection

The MX-A5400 series can automatically detect the Ethernet cable type (Straight-through or Crossover), so either type may be used. An Ethernet

twisted pair cable should be connected between the RJ-45 connector (MDI-X) of the MX-A5400 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).

1) Ensure that the device to be connected has a 10BASE-T or 100BASE-TX network interface card (NIC).

2) Prepare a twisted pair Ethernet cable with RJ-45 plugs on each end. Use Cat 3, 4 or 5 cable for standard 10Mbps Ethernet connections, or Cat 5 cable for 100Mbps Fast Ethernet connections.

3) Plug one end of the cable into the PC's NIC and plug the other end into any RJ-45 port of the MX-A5400 series. All the MX-A5400 RJ-45 ports support both 10Mbps and 100Mbps Ethernet connections. Ensure that the plug's locking tab clicks into proper position to make good connection.

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.

Note:

1) Connect other compatible MX-A5400 series or network hub, adopt direct or across cable to connect MDI port in other devices.

2) Ensure that the twisted pair cable length does not exceed 100 meters.

3) Cat 5 cable is recommended for all network connections to avoid confusion or inconvenience, when upgrading to Fast Ethernet devices in the future.

4) Cascade length provision: IEEE 802.3 standard prescribes that through twisted pair at most 4 hub (such as repeaters) can be cascaded, and IEEE 802.3u standard has more strict order for high-speed Ethernet. So, when cascading devices except for this MX-A5400 series, please follow the above connection requirements.

iv. Connection Management (Out-Band)

Remote management can be performed through the dedicated Management port (10/100BASE-TX port) on the front of the MX-A5400 or any 10/100BASE port of the MX-A5400.

Before the Management port is accessed through LAN port, please configure the IP address and subnet mask by serial port according to network configuration requirement.

b. RS232 Console port (DB9)
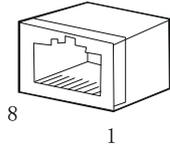
i. Port Description

Figure 4-2.1 DB9 interface

DB9 interface is a standard connector used in RS232 in series communication connections. OLT adopts 9 pin standard connector which is same as the connector of PC Com interface.
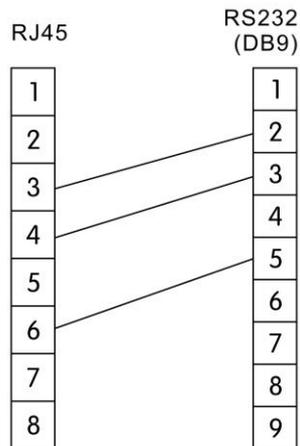
ii. Pin assignment

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

c. Power Connection

i. Connection Description

The power module provides stable operating power for the system. The input voltage is −48VDC. The Power module provides output voltages, +12VDC, to meet the power supply requirements of all the components in the system.

17 FAULT DISPOSAL

The MX-A5400 series FTTP EDFA can monitor system operation and offer brief

notices of warnings, and can correct the majority of status deflections of the equipment, such as: system parameter floating, equipment tolerance, laser aging, RF level changes, and temperature changes. The PUMP laser will continue operating when alarming. The alarm will disappear if the facility is self-detecting continually or the relative system parameter recovers into normal range. Some serious warnings can be eliminated by restarting the power supply of the unit. The warning will disappear automatically if the relative parameters recover to normal range.

Most of warnings will be sent out when the correction ability is close to or exceeds the permitted range. For most situations, the user cannot modify these statuses. Status modification needs special equipment & available facility, thus the modification can only be processed in the factory.

a. Warning status

When pump laser is in warning status, the status LED will turn red and the brief note of the status will be displayed on the screen. The warning will not make the EDFA stop operation, and it only shows the relative parameter exceeding to normal scope slightly. If the warning stops, it indicates that the relative parameter has returned into the permitted scope. The screen & LBD will return to their normal status and there is no need for user to interfere. Note that we should emphasize that the problem displayed by the alarm should not be ignored, there may be a serious system fault.

Work status	Status display	LED color	Explanation
Present laser deflection is low	Key Off	Red	The EDFA isn't operating. It's shut down.
Present case temp	-	Red	Warning when the temp ≥60°C.
Input	Input Low	Red	Optical input power is low.
Output	Output Low	Red	Optical output power is low.

Table 5-1 Warning status

b. Alarm status

When the pump laser displays a warning, it will stop operating generally. The alarm is may be that a relative parameter exceeds its safety operational scope or that some sort of situation has caused damage to the laser. The alarm can be eliminated by restarting the power supply or resetting the key switch. If the user cannot eliminate the alarm, please contact our company immediately.

c. Fault prevention

Please read the below information to prevent potential problems.

1. Please place the pump laser within an environmental temperature of 0°C

~50°C, and conditions that follow the required operating range. We suggest placing the EDFA in low dust environment.

3. Ensure the rear panel fan & front panel sockets have access to ventilation; insure the rear panel fans are able to run flow without obstruction.

4. Insure all power supply connections are solid.

5. Insure RF input and RF gain are within the permitted range.

6. Keep the optic fiber connector clean & properly connected. Prevent the output optic power from decreasing caused by optic leakage.

18 GUARANTEE AND REPAIR ITEMS

1. Each unit is backed by Maxcom's standard warranty.
2. The micro-processor software of the device has the function of monitoring laser status, digital display, trouble alarm, network management etc. If the Red lamp is blinking (Alarm), please send contact us to arrange shipping the product back Maxcom for repairs. The user should not open the top cover or warranty may be voided.

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