



# Multicom 1550nm Optical Transmitter

MUL-1550TX-1000-XX



## User Manual v.2

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# Multicom 1550nm Optical Transmitter

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### SAFETY NOTIFICATION



The Multicom 1550nm Optical Transmitter 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 26 mW at 1550nm could be accessible if optical connector is open or fiber is broken. Lasers are Powered ON whenever the unit is powered.

- ⚠ **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 1550nm Optical Transmitter 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 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 Optical Transmitter 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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# Multicom 1550nm Optical Transmitter

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### 1.0 PRODUCT DESCRIPTION

Multicom's 1550nm Direct Modulated Optical Transmitter delivers high performance signal transmission of NTSC, PAL, ATC, QAM, and related digital information for CATV and/or telephony applications. It is based upon custom high-linearity optically isolated DFB (Distributed Feedback) lasers, specifically designed for multi-channel AM video applications. The built-in control circuits provide an exceptionally low noise and inter-modulation characteristics. Automatic output power control, coupled with temperature stabilization provided by a thermoelectric cooler ensures maximum performance and longer laser life.

The units are packaged in slim 1.75-inch high (1RU), 19-inch aluminum rack-mounted enclosures. Each unit is fitted with redundant self-contained power supplies with 90-265VAC inputs.

All internal laser parameters and monitoring functions are under microprocessor control: the front panel displays status information related to laser operation, temperatures, and RF input.

### 2.0 PRODUCT FEATURES

- Transmits NTSC, PAL, ATC, and related digital information for CATV and/or telephony applications
- Available in 6 and 10dBm output levels
- High linearity, optically isolated, distributed AM feedback DFB laser.
- 45-1000MHz RF input bandwidth
- Front panel RF test point (-20dB)
- Operation wavelength: 1550nm
- Low RF drive levels enabled due to built-in RF amplifier and Automatic Gain Control
- Microprocessor-controlled diagnostics, front panel LCD display and controls
- Factory installed SNMP network interface
- Dual online redundant power supplies



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### 3.0 1550nm OPTICAL TRANSMITTER LAYOUT

#### 3.1 Front Panel Layout

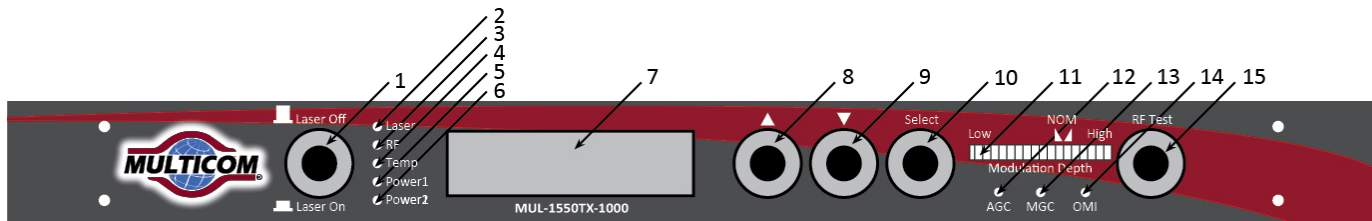


Figure 1 – Front Panel

1. Laser On/Off button
2. Laser LED – Active when lit
3. RF LED – Signal detected and within range when lit
4. Temp LED – Laser temperature
  - \* Green LED – Within nominal range
  - \* Red LED – Outside of nominal range
5. Power1 LED – Source in use when lit
6. Power2 LED – Source in use when lit
7. LCD screen (see 4.3 for menu operation)
8. LCD menu up button
9. LCD menu down button
10. LCD menu SELECT button
11. Modulation Depth bar graph measuring the input level to the laser
  - \* In AGC mode, within input range, OMI is always in nominal (NOM) range
  - \* In MGC mode, OMI can be brought within NOM range by adjusting the OMI potentiometer (14)
12. AGC LED – Automatic Gain Control mode selected when lit
13. MGC LED – Manual Gain Control mode selected when lit
14. OMI – Optical Modulation Index adjustable potentiometer only used in MGC mode

15. F-Connector test point – 20dB below RF input signal level

### 3.2 Rear Panel Layout

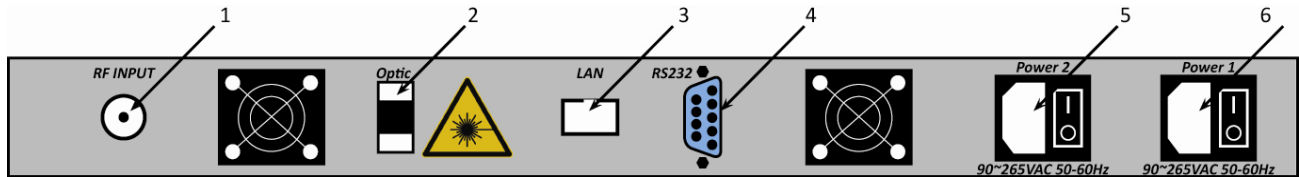


Figure 2 - Rear Panel

1. RF Input
2. Fiber Optic SC/APC Connection
3. LAN Port/SNMP Network interface
4. RS232 Port
5. Power 2 Receptacle
6. Power 1 Receptacle

## 4.0 CONTROLS, INDICATORS, AND ALARMS

This section of the manual gives an overview of the available menus in the 1550nm Optical Transmitter. All instructions in section 4 refer to the image of the front panel (Fig 1). The user scrolls through the menus using the push buttons found on the front panel, these are located just to the right of the LCD screen.

### 4.1 Front Panel Operations

When the status indicators (LEDs) are green, the unit is working properly; red LEDs indicate that the specific function is not working properly or set to off. A red flashing LED indicates a system alarm.

- A. With the power source turned on (power switches are located at the rear of the unit) and the unit working properly, the digital panel will display the Multicom Model Number of the unit, and KEY OFF! The Laser LED (2) will be red.
- B. In order to protect the laser, there is a time-delay function. After turning the laser on with the front panel "Laser On" button, the LED will display KEY ON... and the laser will start to operate after about 2 seconds. The laser LED will turn from red to green and the LCD display will become brighter.
- C. To conserve power, the LCD display will go dark after five minutes when idle.



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### 4.2 Start-up Main Menu

Pressing the ▲ and ▼ buttons will scroll through the menu sequence below. Pressing the Select button when the LCD displays '■edit' allows the entry to be edited as described in section 4.3.1.

#### **Menu #1 – Model # and S/N:**

Read-only menu, displays the Model Number and Serial Number of the unit

#### **Menu #2 – Output**

Read-only menu, displays the output power in dBm

#### **Menu #3 – Laser current**

Read-only menu, displays the laser current in mA

#### **Menu #4 – Laser temp**

Read-only menu, displays the laser temperature in °C

#### **Menu #5 – TEC heating**

Read-only menu, displays the TEC cooling in A

#### **Menu #6 - RF Mode**

Selectable menu: Displays the current RF mode, either AGC or Manual  
If RF Mode = AGC is displayed; the unit is in Automatic Gain Control mode  
If RF Mode = Manual is displayed; the unit is in Manual Gain Control mode (MGC)  
To change the RF Mode, see section 4.3.2 below

#### **Menu #7 - RF LVL**

Read-only menu, displays the RF input level

#### **Menu #8 – Unit temp**

Read-only menu, displays the unit temperature in °C

#### **Menu #9 - +5V monitor**

Read-only menu, displays the actual output voltage from the +5V supply  
There will be an alarm (red blinking LED) if the output voltage exceeds  $\pm 0.5V$

#### **Menu #10 - -5V monitor**

Read-only menu, displays the actual output voltage from the -5V supply  
There will be an alarm (red blinking LED) if the output voltage exceeds  $\pm 0.5V$

#### **Menu #11 - + 24V monitor**

Read-only menu, displays the actual output voltage from the +24V supply



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### **Menu #12 – IP**

Selectable menu: Displays the IP address for the SNMP Network Interface

### **Menu #13 – SUB**

Selectable menu: Displays the subnet IP address for the SNMP Network Interface

### **Menu #14 – GW**

Selectable menu: Displays the default gateway address for the SNMP Network Interface

### **Menu #15 – TR1**

Selectable menu: Displays the default trap address 1 for the SNMP Network Interface

### **Menu #16 – TR2**

Selectable menu: Displays the default trap address 2 for the SNMP Network Interface

## **4.3 Unit Configuration Instructions**

### **4.3.1 Changing IP Address Settings**

To change the IP address in any of these menu items:

1. Use the ▲ and ▼ buttons to scroll to **Menu# 12 – 16**
2. Pressing the Select button when '■edit' is displayed puts the menu in edit mode and allows the IP address to be changed.
3. Use the Select button when '■shift' is displayed to move the cursor through the octets of the IP address.
4. Stop in the field that you want to change
5. Press the appropriate button to ▲ increase the number, ▼ decrease the number, or ■ save the entry.

### **4.3.2 Changing RF Mode Settings – Menu #6**

The default RF Mode is AGC. The LCD screen displays the current RF Mode.

To change the RF Mode:

1. Use the Select button to scroll to **Menu #6 - RF Mode**
2. Pressing Select when '■edit' is displayed puts the menu in edit mode and allows the RF mode to be changed.
3. Press the appropriate button to change the setting to either AGC or MGC followed by the Select button to ■save the entry.





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If the RF input level is too high, there will be an alarm (red blinking LED), turn off power supply and turn on again.

If any fault occurs, there will be alarm (red blinking LED), the microprocessor will shut down the laser power automatically, and the front panel display will show the cause of the fault.

Select the MGC mode if:

- Your application has a desired variation of the input level to be passed onto the receive end of your link
- Your application has an input that is too high a level or too low a level to allow AGC to control it

In MGC mode:

- The input level to the laser can be adjusted manually by turning the OMI – Optical Modulation Index adjustable potentiometer (14) – until the level is within the NOM range on the Modulation Depth bar graph (11).

### 5.0 OPERATION NOTICE

- Changes to IP and RF Mode settings will be retained on power down/up.
- Use only Single Mode Fiber (SMF) optic cable (9/125 $\mu$ 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 from the transmitter to the receiver. Minimize the use of adapters, patch panels, and additional points of failure and signal loss.
- The 1550nm Optical Transmitter is shipped optimized for SBS (Stimulated Bernouli Scattering) suppression at a distance of approximately 5 km, or less, and a maximum fiber input level of +17 dBm optical power. When using the unit with optical amplifiers, use only fiber rated with high SBS suppression capabilities and do not exceed the power or distance limitations. For special applications, contact the factory.
- 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.



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- Do not turn on the transmitter 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 transmitter. Failure to do so may cause irreparable damage to the laser and transmitter.

### 6.0 WARRANTY AND REPAIR

The Multicom 1550nm Optical Transmitter 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.

### 7.0 PRODUCT SPECIFICATIONS

Specifications		Values	Notes
General	Operating temp. (°C)	0 – 50	32 – 122 °F
	Storage temp. (°C)	-40 – 85	-40 – 185 °F
	Operating relative humidity (%)	5 – 95	Non-condensing
	Power supply (Volt AC)	90 – 265	
	Power consumption (W)	25	
	Size (WxDxH in inches)	19x14.25x1.75	
	Interface port	RJ45, RS232	
Optical	Wavelength (nm)	1530 – 1563	
	Output power (dBm)	6 and 10	Depending on model
	Optical connector	SC/APC	
RF	RF bandwidth (MHz)	45 – 1000	
	Input level (dBmV)	18 – 22	AGC
	Flatness (dB)	-0.75 – +0.75	
	Return loss (dB)	16	75Ω impedance
	RF connector (main input)	F type	
	CNR (dB)	-50	79 channel load, back to back at 0dBm receive power
	CSO (dB)	-57	
CTB (dB)	-63		

### Product Series

Part#	Output Power
MUL-1550TX-1000-06	6 dBm
MUL-1550TX-1000-10	10 dBm