

OM2012
nLaser Tunable Laser System
User Guide



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Tektronix

OM2012
nLaser Tunable Laser System
User Guide

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For product information, sales, service, and technical support:

- In North America, call 1-800-833-9200.
- Worldwide, visit www.tektronix.com to find contacts in your area.

Warranty

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product. Parts, modules and replacement products used by Tektronix for warranty work may be new or reconditioned to like new performance. All replaced parts, modules and products become the property of Tektronix.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non-Tektronix supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

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1 Safety Information

1.1 Safety Notices

CAUTION

Indicates a potentially hazardous condition or procedure that could result in damage to the instrument.



CAUTION

Indicates a potentially hazardous condition or procedure that could result in minor or moderate bodily injury.



WARNING

Indicates a potentially hazardous condition or procedure that could result in serious injury or death.



This symbol on the unit indicates that the user should consult this document for further information regarding the nature of the potential hazard and actions that should be taken to avoid or mitigate the hazard.

1.2 Laser Safety

The laser sources included in this product are classified according to IEC/EN 60825-1:1994+A1:2001+A2:2001 and IEC/EN 60825-2:2004

This laser product complies with 21CFR1040.10 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.



CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Under no circumstances should you use any optical instruments to view the laser output directly.

1.3 OM2012 Laser Labels and Locations

OM2012 C-Band nLaser



Indicates the location of a laser aperture



**INVISIBLE LASER RADIATION; DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS. CLASS 1M LASER PRODUCT
EMISSION DE RAYONS LASER INVISIBLES DE CLASSE 1M.
NE PAS OBSERVER A L'AIDE D'INSTRUMENTS OPTIQUES**



Model Number: OM2012
Serial Number: 1130140
Manufactured: July 2012
MAC Address: 0090C2E59861

COMPLIES WITH 21CFR1040.10 EXCEPT FOR DEVIATIONS PURSUANT TO LASER NOTICE NO. 50, DATED JUNE 24, 2007

2 Introduction

2.1 Purpose

The OM2012 nLaser provides two tunable C-band or L-band laser sources for use in laboratory or industrial facilities for a variety of fiber optic system applications. In operation, an Ethernet connector will connect the OM2012, via a router, to the user's computer, which will control the OM2012, using Tektronix proprietary software, and the user's DUT and related equipment. A password is required to turn on the lasers. A remote interlock for the laser is available for use if desired, through the BNC connector on the rear of the unit. An IEC power cord is connected to a wall outlet.

2.2 OM2012 nLaser Models and Options

The OM2210 Coherent Receiver Calibration Source is available in the following configurations:

OM2012 CC C-band nLaser with two C-band lasers

OM2012 LL L-band nLaser with two L-band lasers

OM2012 CL C- and L-band nLaser with one C-band and one L-band laser

3 Getting Started

3.1 Configuring the Hardware

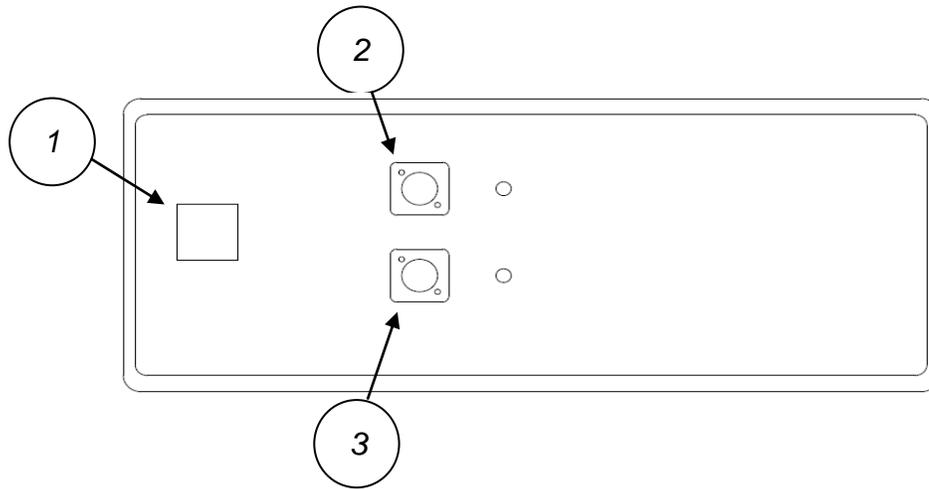
3.1.1 OM2012 nLaser

Ensure that the required power sources for the OM2012 (100, 115 or 230 VAC, 50–60 Hz, 0.4A), the equipment to be used with it, including an external computer (if applicable), are available. Use the IEC power cord provided to connect to a rack or wall outlet.

Associated cabling includes the IEC power cord, an Ethernet cable, and fiber optic cables to connect the OM2012, the Device Under Test (DUT), and other devices such as oscilloscopes.

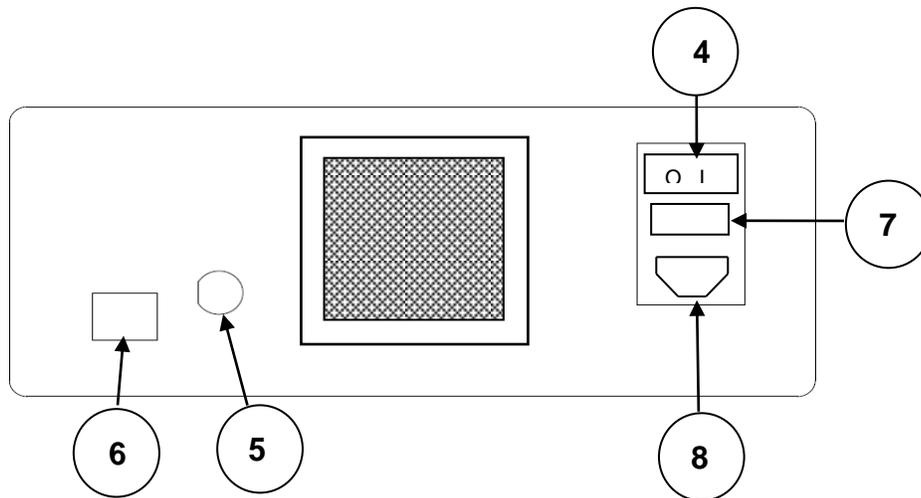
Note: A password is required to turn on the lasers through the Laser / Receiver Control Panel. The default is '1234'

3.1.2 OM2012 Controls and I/O Connections



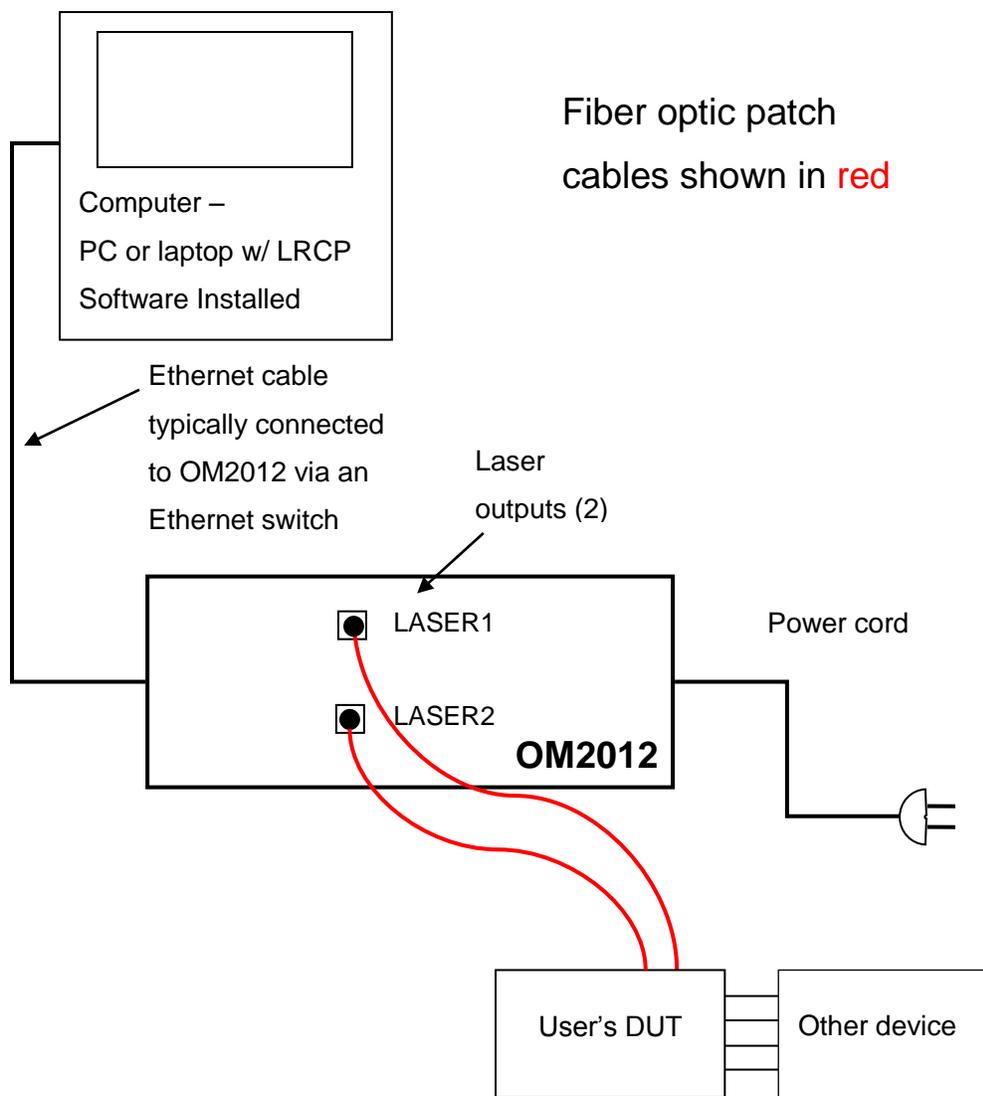
Front Panel Controls and I/O Connectors

1. On/Off switch
2. Laser 1 Output (with LED indicator)
3. Laser 2 Output (with LED indicator)



Rear Panel Controls and I/O Connectors

4. Power switch
5. BNC connector for optional laser remote interlock
6. Ethernet port
7. Fuse drawer
8. Input power receptacle



**BLOCK DIAGRAM – OM2012 AND
PERIPHERAL EQUIPMENT**

3.1.3 List of Components

OM2012 nLaser

- LRCP Software
- IEC power cable
- Ethernet cable
- BNC shorting cap for interlock
- (2) Dust covers for optical outputs not in use

Additional items supplied by Tektronix or another source:

- Mouse and keyboard (unless touch-screen controlled)
- System controller PC running Windows 7 or Windows XP
 - Monitor plus cable
 - Mouse and keyboard
 - Power cables
 - Ethernet cable
- Fiber optic patch cable (1 or 2, depending on the application) to connect the nLaser to the DUT
- An Ethernet switch or hub plus a router running DHCP, and associated cabling (not shown)



WARNING

To avoid the possibility of electrical shock, do not connect your OM2012 to a power source if there are any signs of damage to the instrument enclosure.

3.1.4 Electrical Power Requirements

The OM2012 can operate from any AC power source that provides 100, 115, or 230 VAC, at a frequency of 60 Hz or 50 Hz. The OM2012 must be connected directly to a grounded power outlet only.



WARNING

The OM2012 must be connected to a 100, 115, or 230VAC at 60Hz or 50Hz grounded outlet only. Operating the OM2012 without connection to a grounded power source could result in serious electrical shock. Always connect the unit directly to a grounded power outlet.



CAUTION

Protective features of the OM2012 may be impaired if the unit is used in a manner not specified by Tektronix.

3.1.5 Location and Positioning

Be sure to position the OM2012 so that the power switch at the rear of the unit can be easily accessed.

CAUTION

Be sure not to obstruct the fan so that there is an adequate flow of cooling air to the electronics compartment whenever the unit is operating.

3.1.6 Operating Environment

The OM2012 may be operated within the following conditions:

Temperature	10°C to +35°C (50°F to +95°F)
Humidity	<85%R.H. non-condensing from 10°C to +35°C (50°F to +95°F)
Altitude	< 2,000m (6560ft)

3.1.7 Computer

The requirements for the system controller PC will be largely determined by the equipment and DUT to be used with the OM2012. Listed below are the requirements for the Tektronix OM4000 series of Optical Modulation Analyzers and the OM2210 Coherent Receiver Calibration Source.

Operating System:	US Windows-7 64 bit OR US Windows XP Service Pack 3 32-bit (.NET 4.0 required)
Processor:	Intel i7 , i5 or equivalent; min clock speed 2 GHz; minimum: Intel Pentium 4 or equivalent
RAM:	Minimum: 4 GB, for 64-bit releases will benefit from as much memory as is available
Hard Drive Space:	At least 300 GB recommended for large data sets; minimum: 20 GB

Video Card: **nVidia** dedicated graphics board w/ **512+ MB** min. graphics memory
Note: Color grade display feature is not available on non-nVidia graphics cards and so will not be available when running native on an oscilloscope

Networking: **Gigabit Ethernet** (1 Gb/s) or Fast Ethernet (100Mb/s)

Display: **20" minimum**, Large flat screen recommended for displaying multiple graph types when using with the OM4000 Software

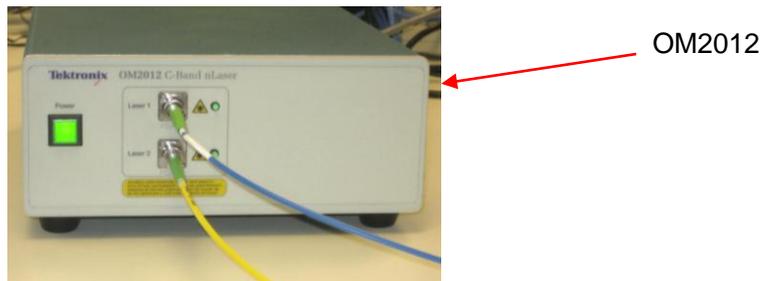
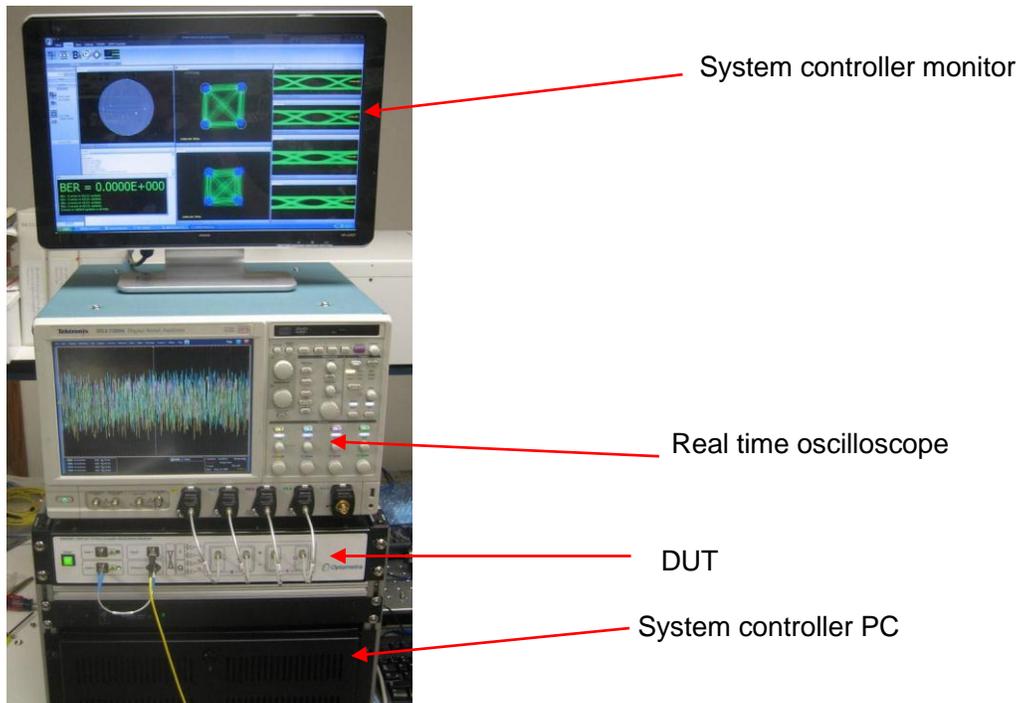
Other Hardware: DVD Optical drive, **2 USB 2.0 ports**

Other Software: To use the OM4000 or OM 2210 hardware and software, the computer must have **Matlab** installed (see the OM4006/4106 User Guide for details). Adobe **PDF Reader** is required for viewing the User Guide and Installation instructions.

3.2 First Setup

Once everything is securely placed, make electrical connections in the following order:

1. Ethernet connections and other computer connections. See 3.1.2
2. Power connections for the OM2012 and other equipment.
3. Fiber optic patch cable connections from the OM2012 to the DUT.
4. Other connections from the DUT to an oscilloscope or other equipment as required
5. Store all dust covers for future use.



Typical OM2012 system configuration shown in use with the OM4000 above

Once the equipment is positioned and connected, turn on the computer, the oscilloscope, the DUT, and the main power switch on the back of the OM2012. The OM2012 front-panel power

button will light briefly after main power is applied indicating it is searching for a DHCP server. When an IP address has been assigned or when the search fails in the case of an isolated network, the power light will go off. Press the power button one time to enable the unit. The steady power button light indicates the OM2012 is ready for use and that lasers may be activated at any time if a user connects via the Ethernet connection. The light will go out and the unit will be disabled any time main power is removed or the IP address is changed. Press the power button to re-enable. This feature prevents a remote user from activating the lasers when the local user may not be ready.

Note: Ethernet only allows devices on the same subnet to communicate.

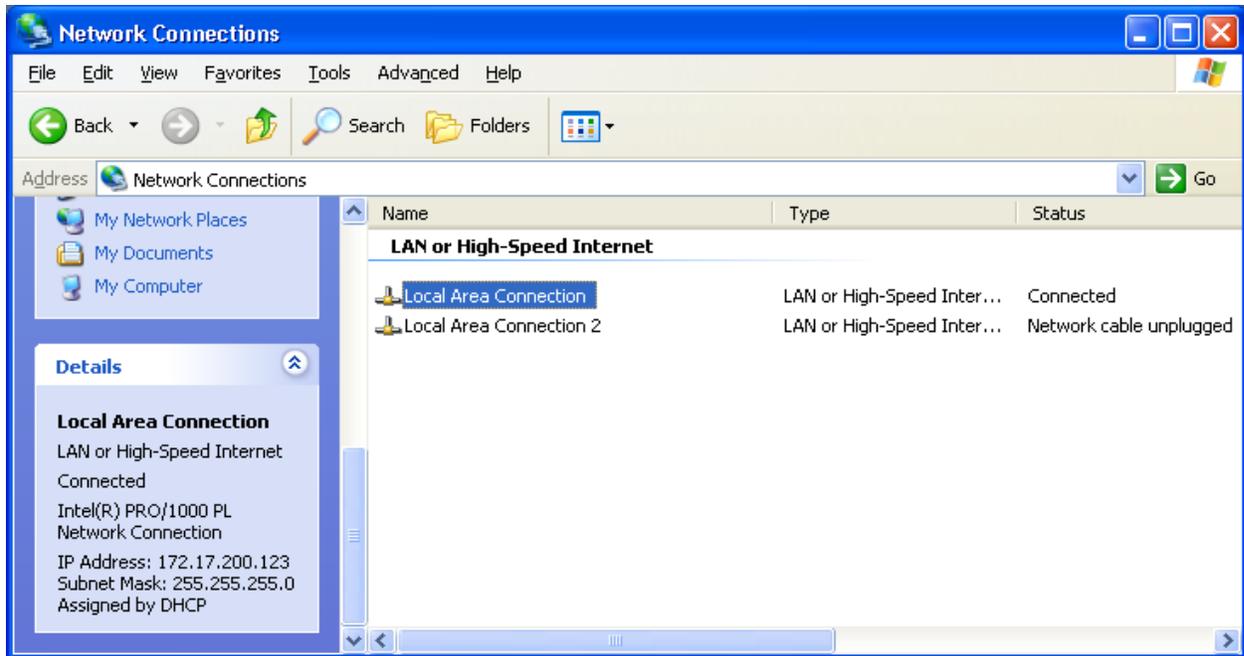
In the above example, you would now have four devices on an Ethernet network: computer, oscilloscope, DUT, and OM2012. This little network may be connected to your corporate network or router or you may choose to leave it isolated. IP setup is normally done at the time of installation. You should only need the following instructions if you are reconfiguring your network.

3.2.1 IP setup on a network with DHCP (dynamic IP assignment)

DHCP allows “automatic” assignment of the IP address the connected devices need to communicate with each other. The OM2012 is shipped with automatic IP assignment enabled. Your computer and oscilloscope will need to have this enabled if not already. You may still need the cooperation of your corporate IT department to get IP fixed addresses assigned. If you are using a centralized server, ask your network administrator to make an IP reservation for you so that you get the same number each time the device is powered on. Once these are set up for the oscilloscope and the OM2012 you will have no trouble finding them in the future.

Once your equipment gets an IP address from DHCP you can find that address using the operating system of the oscilloscope or computer. For example, in the Windows operating system there is a window that looks like the one below. Notice that when you select the active Ethernet connection the IP address shows up in the Details box in the lower-left corner of the window.

To configure the IP connection of the OM2012, please see Chapter 4 on using the Laser Receiver Control Panel (LRCP).



3.2.2 IP setup on an isolated network or one not running a DHCP server

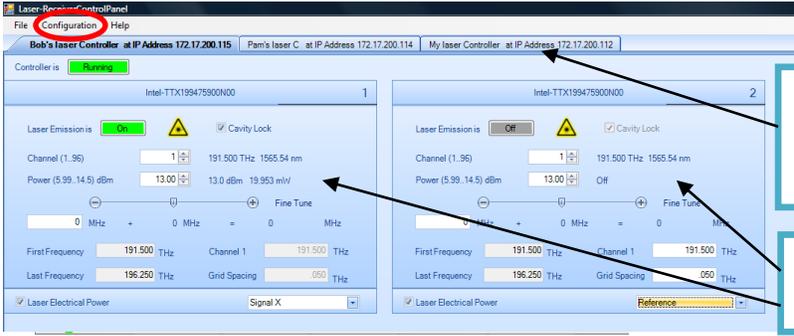
When there is no DHCP server, the Ethernet connected devices don't know what address to assign to themselves. In this case you must manually set the IP address. On a corporate network this means getting the IP addresses from your network administrator first and then setting each device. Your network administrator may need the MAC addresses of the computer, oscilloscope, and OM2012. The MAC address is printed on the rear-panel label. Please see Chapter 4 on using the Laser Receiver Control Panel (LRCP) to set the IP address. If you have a network isolated from your corporate network you are free to use any IP numbering scheme. We recommend 172.17.200.XXX where XXX is any unique number between 0 and 255 (each device needs a unique number). There is nothing special about this scheme other than that it is the default for new OM2012 units. Use the operating systems of the oscilloscope and computer to set their IP addresses. The first three sets of numbers in the IP address need to be the same on the computer and the connected devices for them to communicate, in most cases.

4 Laser / Receiver Control Panel

Installation: To install LRCP software, simply run the LRCP installer provided on a supported computer.

The Laser-Receiver Control Panel (LRCP) application (LRCP) can be used to control a variety of Integrable Tunable Laser Assembly (ITLA) lasers. The LRCP interface simplifies the control of the lasers to relieve the user from the particulars of using the low level ITLA command set. It allows the user to locate and configure all Tektronix OMA devices that are present on the local network. It also provides a Windows Communication Foundation (WCF) service interface, allowing for the creation of Automated Test Equipment (ATE) to interact directly with the controllers and lasers while LRCP is running.

There are three main components to the application: the controllers, the lasers and the receiver. The following screen shot shows a LRCP that has three active controllers.



Controller – Each tab represents one physical Laser Control device (for example, the OM4X06) on the network.

Lasers – Each panel controls one physical Laser on a specific controller.

Receiver – The OM4000 series comes with receiver hardware. This gauge displays the total photocurrent.

The status bar will provide important information about the overall state of the communications with the controllers. Each controller has a unique status bar.

4.1 Device Setup and Auto Configure

The Device Setup screen can be accessed from the LRCP main menu under “Configuration.” It will be necessary to enter this screen on initial setup of the controllers and any time network configuration changes and devices are moved to a new IP address. Clicking the

Auto Configure button will have the LRCP search for OMA Series devices and fill the screen with information.

An important setting on the Device Setup screen that users will want to adjust is the Friendly Name. Modifying this value for each device will aid in the identification of the physical location of the controllers as Friendly Names are retained and are tied to the corresponding MAC Address. Make sure to exit the form by clicking the OK button to save changes.

The screenshot shows a 'Device Setup' window with a table of device information. The table has columns for Friendly Name, Name, IP Address, MAC Address, Gateway, Net Mask, and Controller Type. Each row has a 'Set IP' button next to the IP Address column. On the right side of the window, there are buttons for 'OK', 'Cancel', and 'Auto Configure'. Three callout boxes provide additional information: one pointing to the 'Set IP' button, one pointing to the 'Friendly Name' column, and one pointing to the 'Auto Configure' button.

Friendly Name	Name	IP Address	MAC Address	Gateway	Net Mask	Controller Type
OM4106:9070110	OM3105:9070110	134.63.43.36	0090C2DCFCAE	134.63.43.1	255.255.0.0	OM4106
OM4106:12010131	OM3105:12010131	134.63.43.62	0090C2D6326B	0.0.0.0	255.255.24...	OM4106
OM2210:1130140	OM2210:1130140	134.63.43.33	0090C2E59861	0.0.0.0	255.255.24...	OM2210
OM4106:2170141	OM3105:2170141	134.63.43.57	0090C2E59874	0.0.0.0	255.255.24...	OM4106
OM4006:TEST00003	OM3005:TEST00...	134.63.43.34	0090C2DAA32D	0.0.0.0	255.255.0.0	OM4006

Press the "Set IP" only if you want to change the IP Address, gateway and/or net mask of the individual device. This is never necessary if your network uses DHCP. Changes to Friendly Name and Controller Type are saved automatically when you press "OK"

The friendly name is editable and may be modified to uniquely identify OMA devices in a way that will be more compatible with your environment.

Auto configuration will return a list of all available OMA devices located on the local network.

Auto configuration completed successfully. Located 5 device(s).

The "Set IP" button is used to modify the addressing as described in the next section. It is NOT necessary to use the "Set IP" button to change the Friendly Name or Controller Type. Those changes are saved automatically when the user presses "OK".

Each device must be assigned an IP address in order to communicate with the device. How you manage IP addresses in your network, namely with or without DHCP, will determine the method in which you connect to the devices on your network.

4.2 Configuration on a network using DHCP

The default configuration uses DHCP to find OMA devices on the network. IP Addresses will be "leased" to the devices for a period of time and then possibly reassigned at a later date when the DHCP server decides it is time to reassign addresses. This is similar to the way

most cable modem ISPs work. The drawback to this method is that when the IP address is reassigned the user **must** rerun auto configuration to reattach to the proper IP Address. This is the simplest installation requiring the following steps.

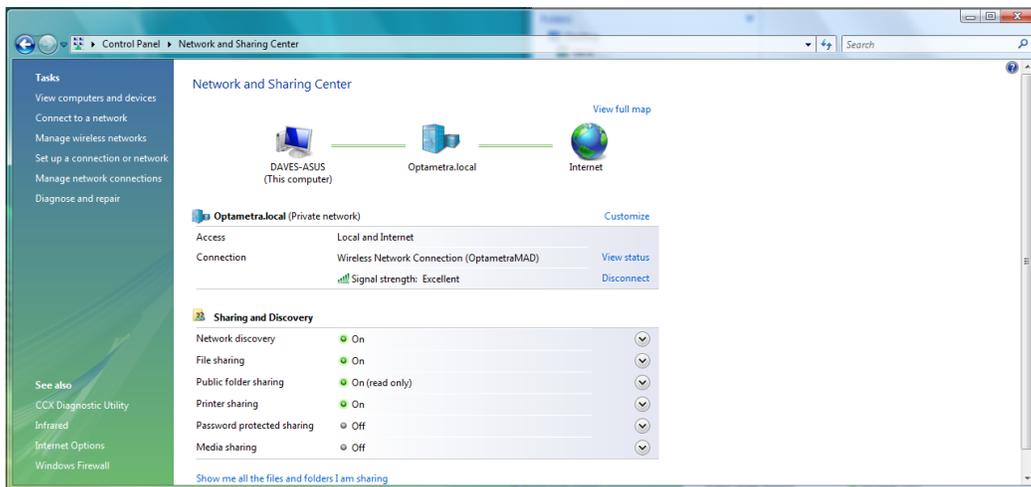
- Open the menu “Configuration/Device Setup”
- Click on “Auto Configuration”
- All devices on the same subnet will be located and displayed.

NOTE: If you would like to assign the device a fixed IP in a DHCP environment you will need to work with a network administrator to get fixed IP Addresses for devices.

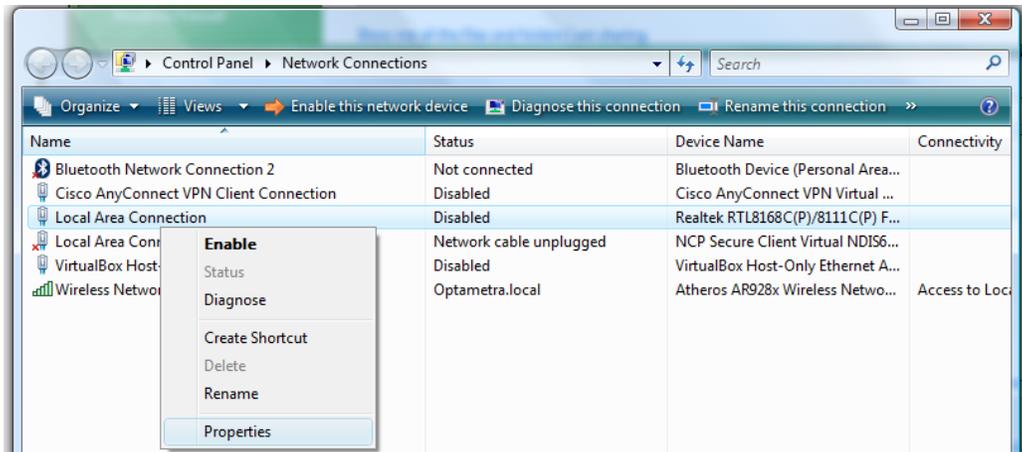
4.3 Configuration on a network with no DHCP

In some cases the OMA devices will be installed on an isolated network with fixed IP Addresses and no DHCP server. In order to talk to the device you need to first set your local network to the device’s subnet address. As shipped, the OMA devices will default to an IP Address of 172.17.200. **xxx**. This will not necessarily be the same subnet as your local network. To get the OMA device to communicate with your network you will need to do the following:

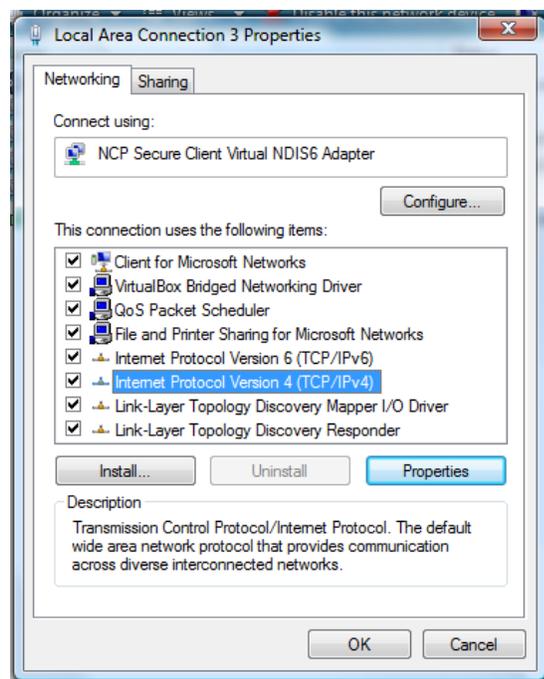
- 1) Attach a computer directly to the OMA controller via a cabled network connection
- 2) Open the “Windows Control Panel”
- 3) Find the “Network and Sharing Center” and you should see this screen:



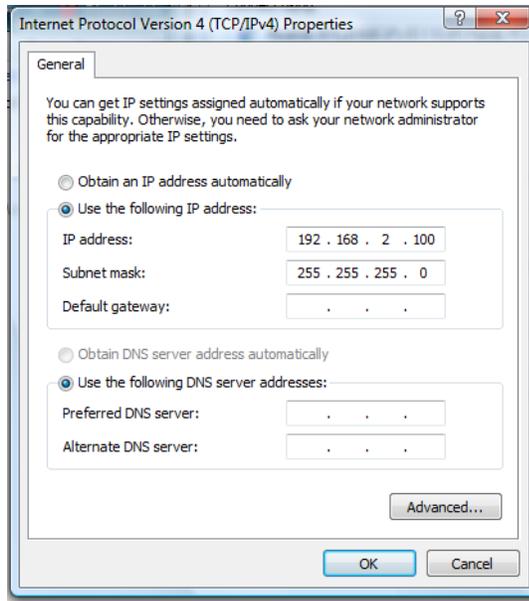
- 4) Click on “Manage Connections” and you will get the following screen:



- 5) Right-click to select the Properties for “Local Area Connection”, that is, the Ethernet port that the OMA device is connect to
- 6) In the Properties window of the computer, select “Internet Protocol Version 4” and then click “Properties”

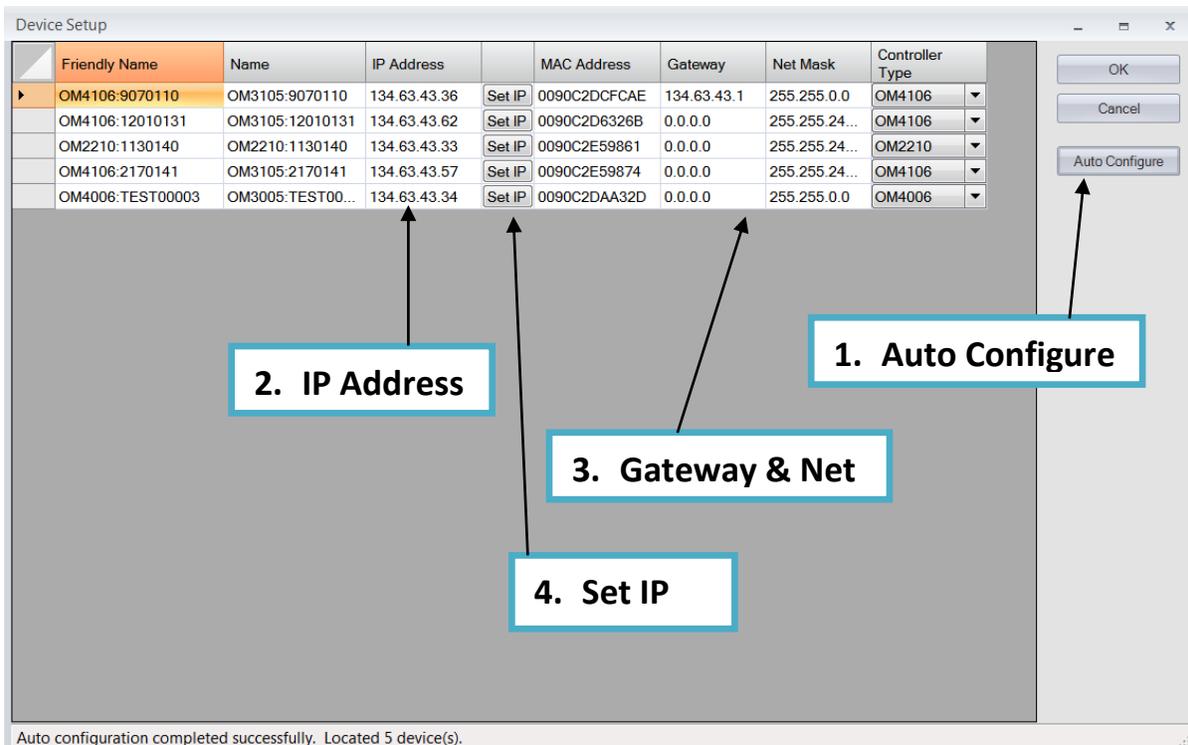


- 7) Set the IP Address of the computer. Remember that the first three numbers of the IP address entered here should match the first three numbers of the IP address used by your OMA device. This will put your computer on the same subnet as the OMA device and make it visible to the “Auto-Configuration” process.



8) Click OK to save the changes

Once the computer running LRCP has its network addressing configured, it will allow LRCP's Auto Configure button on the Device Setup screen to detect the controller so it can be configured to work with your network. On the Device Setup screen do the following:



Friendly Name	Name	IP Address		MAC Address	Gateway	Net Mask	Controller Type
OM4106:9070110	OM3105:9070110	134.63.43.36	Set IP	0090C2DCFCAE	134.63.43.1	255.255.0.0	OM4106
OM4106:12010131	OM3105:12010131	134.63.43.62	Set IP	0090C2D6326B	0.0.0.0	255.255.24...	OM4106
OM2210:1130140	OM2210:1130140	134.63.43.33	Set IP	0090C2E59861	0.0.0.0	255.255.24...	OM2210
OM4106:2170141	OM3105:2170141	134.63.43.57	Set IP	0090C2E59874	0.0.0.0	255.255.24...	OM4106
OM4006:TEST00003	OM3005:TEST00...	134.63.43.34	Set IP	0090C2DAA32D	0.0.0.0	255.255.0.0	OM4006

1. Click on “Auto Configure”. Your device should appear in the list with a valid MAC address.
2. Edit the IP Address for the single device that will appear in the list. Set the address to an IP Address that will be compatible with your network.
3. Edit the Gateway and Net Mask (generally this requires you to speak with your Network Admin to get the correct values.)

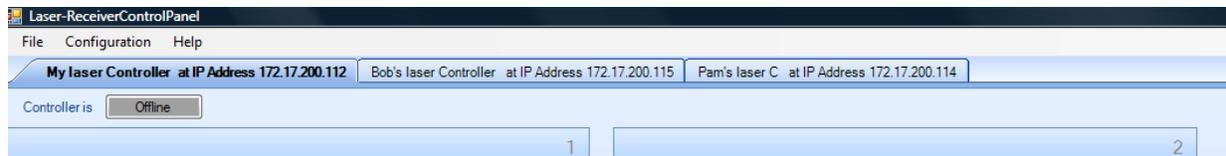
Note: If you change the Device IP Subnet Address to an address that is different than the Subnet for the computer, the **device will no longer be visible to the computer** once the Set button is pushed.

4. Click on the “Set IP” button
5. Unplug the network cable from between your computer and the OMA device and connect the device to your network switch/router. It should now be visible to the Auto Configure process and should show up with the same information each time.

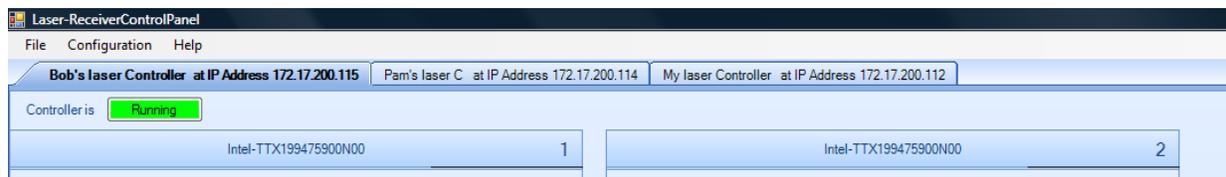
You can now set the device IP address to the desired IP network address and following the same procedure set the Windows device address **back** to the same subnet address as the device.

4.4 Connecting to your OMA Series device

Once configured, devices will appear as tabs on the main screen. They are listed with the friendly name and IP address to allow for easy identification.



Up to four lasers will be displayed in a 2x2 grid. Lasers are numbered and once the controller is brought Online the laser panels will populate with the laser manufacturer and model number.



Once the user presses the button that reads Offline the button will change colors as the control panel attaches to the OMA device. First, the button will turn yellow and read

“Connecting...” indicating that a physical network connection is being established over a socket.



Second, the button will turn teal and read “Connected...”. This indicates that a session is established between the device and Control Panel. Commands will be sent to initialize the communications with the laser and identify their capabilities.



Finally, the button will turn bright green when the controller and lasers are ready for action.



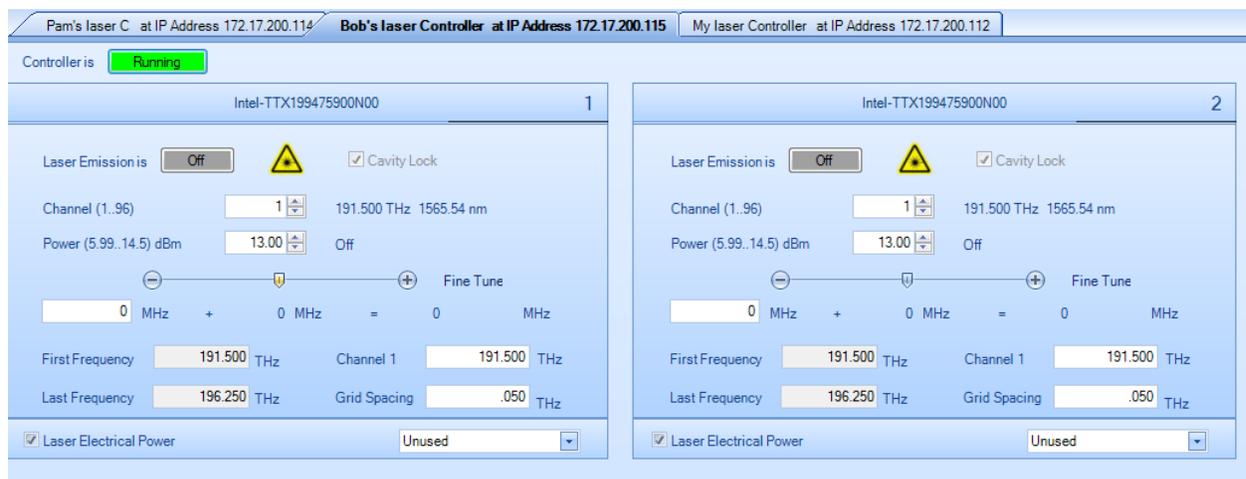
Note: The button color scheme of bright green meaning running or active, grey meaning off line or inactive and red indicating a warning or error state is consistent throughout the application.

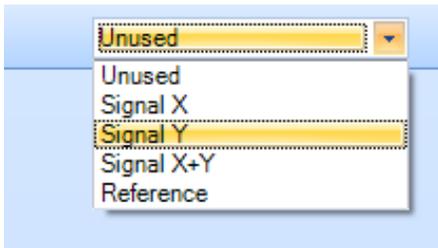
Once the controller tab is active and the laser panels have populated with the corresponding laser information the user is free to put change the laser settings and/or turn the lasers on. When the controller is first turned on the current state of the hardware is read to pre-populate the laser panel.



CAUTION

Any time you exit application, the current state of the lasers is preserved, including the emission state.

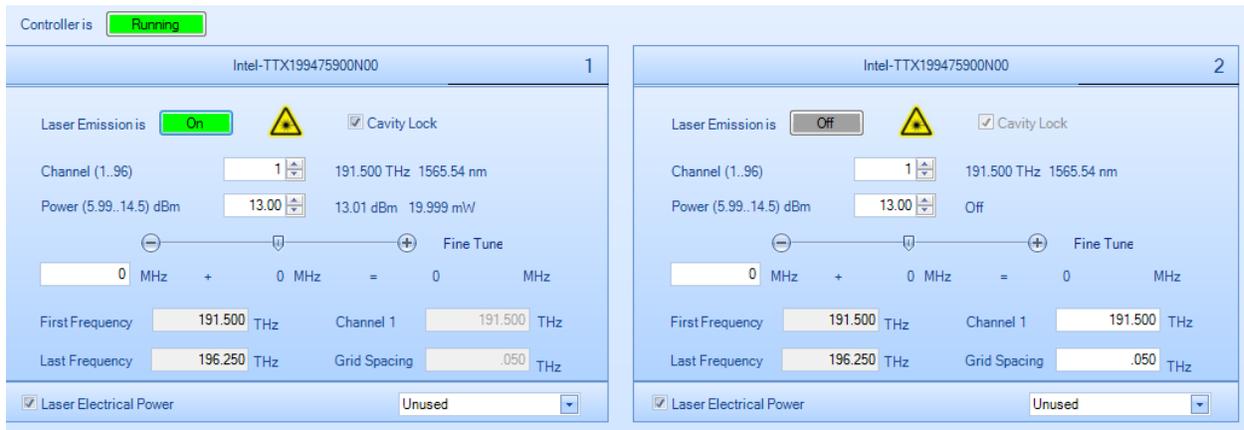




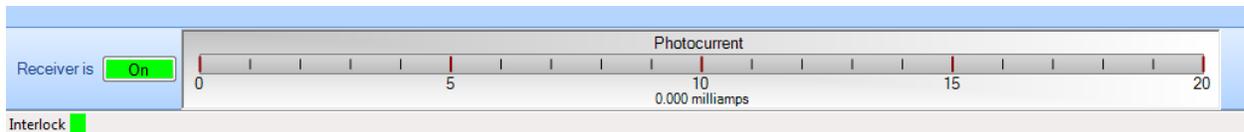
If the lasers are used in conjunction with the OM4x06UI, the laser usage type needs to be set using the dialog on the lower right corner of each laser panel. This OM4x06UI uses the setting to determine from which laser frequency information is retrieved. A usage type can only be selected once between all of the controllers

but you can have one usage type on one controller and another usage type on a second controller.

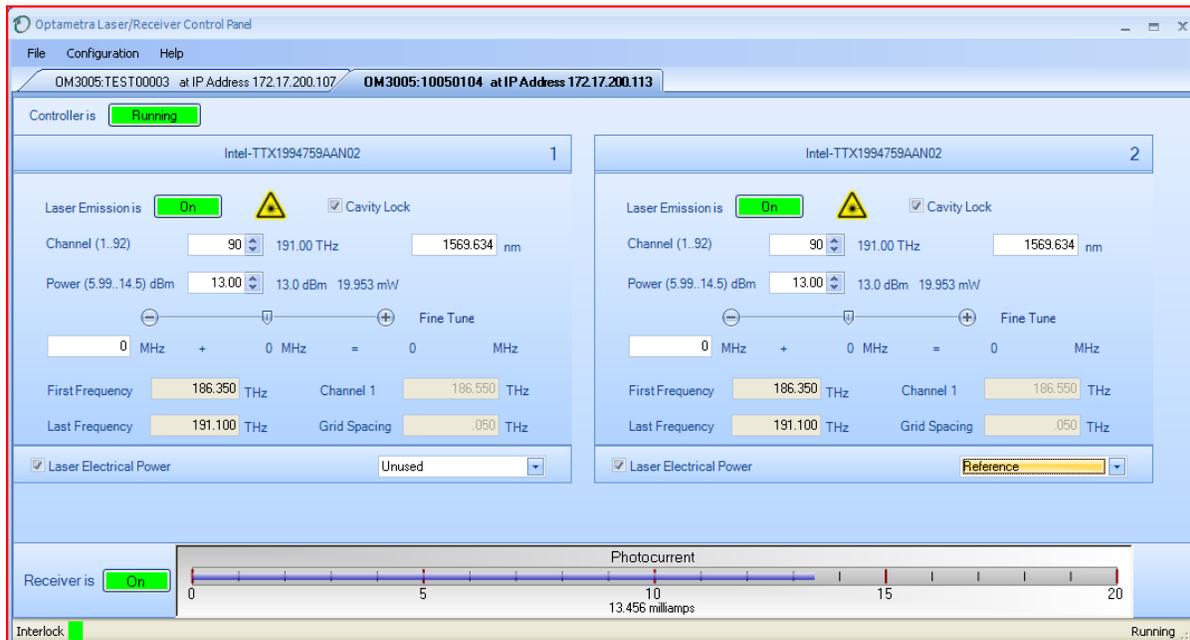
Once laser emission is “On” the channel 1 and grid spacing settings become **read only** and cavity lock becomes editable. Also the power goes from “off” to the actual power being read from the laser. Readings are taking from the laser once per second.



The receiver (shown below) is only functional on devices like the OM4000 Series that have the appropriate hardware present. The receiver, when active, displays the total photocurrent.



4.5 Setting laser parameters



Note: For all text field entries it is necessary to click away or press tab for the value entered

Channel: Type a number or use the up/down arrows to choose a channel. The range of channels available will depend on the type of laser, the First Frequency, and the Grid. The finer the Grid, the more channels are available for a given laser. The channel range is indicated next to the word Channel. The laser channel can also be set by entering a wavelength in the text box to the right of the channel entry. The laser will tune to the nearest grid frequency.

Cavity Lock: The Intel/Emcore ITLA laser that is included in the OMA Series devices has the ability to toggle its channel lock function. Ordinarily, Cavity Lock should be checked so that the laser is able to tune and lock on to its frequency reference. However, once tuning is complete and the laser has stabilized, this box can be unchecked to turn off the frequency dither needed for locking the laser to its reference. The laser can hold its frequency for days without the benefit of the frequency dither. The OM4006 software will work equally well with the Cavity Lock dither on or off.

Power: The allowed power range for the laser is listed after the word Power. Type or use the up/down arrows to choose the desired laser power level. Once entered, the actual laser power displayed to the right of the text box should come into agreement with the desired power level.

Fine Tune: The Intel/Emcore lasers can be tuned off grid up to 12GHz. This can be done by typing a number in the text box or by dragging the slider. The sum of the text box and slider values will be sent to the laser. Once the laser has accepted the new value it will be displayed after the '=' sign.

First Frequency: Not settable. This is the lowest frequency that can be reached by the laser.

Last Frequency: Not settable. This is the highest frequency that can be reached by the laser.

Channel 1: Settable when emission is off. This is the definition of Channel 1.

Grid Spacing: Settable when emission is off. 0.1, 0.05 or 0.01 THz are typical choices. Use 0.01THz if tuning to arbitrary (non-ITU-grid) frequencies. Using this grid plus Fine Tune, any frequency in the laser band is accessible.

Laser Electrical

Power: This should normally be checked. Unchecking this box turns off electrical power to the laser module. This should only be needed to reset the laser to its power-on state, or to save electrical power if a particular laser is never used.

Emission: Click to turn on or off front panel laser emission.

5 LRCP ATE Interface

The LRCP allows the user to control the OMA Series instruments and communicates status to the user interface. The LRCP has two types of WCF interfaces to allow control from a user application. Both types are provided to achieve full functionality and compatibility with simple interfaces such as Matlab and via a client application program.

5.1 LRCP ATE Interface

The Automated Test Equipment (ATE) interface exposes the LRCP functionality through a Windows Communication Foundation (WCF) service. As the LRCP is used with all OM4000 Series laser controllers, its interface exposes more commands than those used by the OM4x06 CLSA.

5.1.1 Basic/Advanced WCF Service Interface for the LRCP

The WCF services (basic and advanced) are available on port 9000 in the machine that is running the LRCP. The service (basic and advanced) interface was developed for incorporation into an ATE client application that can be developed in your choice of .NET language, typically C# or VB.NET. Both services expose most of the functionality that is available through the LRCP's user interface.

The **basic service**, implemented using a wsBasicHTTPBinding, exposes the same subset of commands as the advanced service. It was implemented using a simpler binding for compatibility with applications like MATLAB (see **Section 5.2.1** for Matlab usage details) or Labview that only support the wsBasicHTTPBinding. The basic service is referenced at the following URL:

http://localhost:9000/LaserReceiverControlPanel/Laser_ReceiverServiceBasic/

SAFETY NOTE! Turn off the front-panel power button if needed to disable lasers. WCF services can turn lasers on and off. Verify that no one is physically working with lasers or fibre while running ATE applications.

5.1.2 LRCP Service Interface Function List

Refer to **Section 4.5** for more information on the LRCP functionality of these exposed functions. The following are the available commands in both the basic and advanced service interfaces and demonstrate their functionality using the Matlab syntax:

int AvailableLasers (classname) ;

Returns the count of available lasers on the active controller.
Controller Types: All

Example: AvailableLasers(Obj);
Returns: ans = 2

bool Connect (classname) ;

Connects to the active controller, makes running.
Controller Types: All

Example: Connect(Obj);
Returns: ans = true Should see in LRCP screen →



bool Disconnect (classname) ;

Disconnects from the currently active controller, takes offline.
Controller Types: All

Example: Disconnect(Obj);
Returns: ans = true Should see in LRCP screen →



bool GetActualCavityLock (classname) ;

Gets the actual cavity lock state for the active controller / laser. Locked = True,
Controller Types: 4006, 4106, 2210, 2012

Example: GetActualCavity(Obj);
Returns: ans = true Should see in LRCP screen →



double GetActualChannel (classname) ;

Gets the actual channel number for the active controller / laser.
Controller Types: 4006, 4106, 2210, 2012

Example: GetActualChannel(Obj);
Returns: ans = 1 Should see in LRCP screen →



double GetActualChannel1 (classname) ;

Gets the actual channel 1 frequency (in THz) for the active laser.
Controller Types: 4006, 4106, 2210, 2012

Example: GetActualChannel1(Obj);
Returns: ans = 191.5 Should see in LRCP screen →



bool **GetActualEmitting (classname) ;**
Gets whether the Active Laser is emitting. Emitting = True.
Controller Types: 4006, 4106, 2210, 2012

Example: GetActualEmitting(Obj);
Returns: ans = true Should see in LRCP screen→



short **GetActualFineTuneFrequency (classname) ;**
Gets the actual fine tune frequency (in MHz) of the active laser.
Controller Types: 4006, 4106, 2210, 2012

Example: GetActualFineTuneFrequency(Obj);
Returns: ans = 0 Should see in LRCP screen→



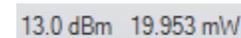
double **GetActualGridSpacing (classname) ;**
Gets the actual grid spacing (in THz) of the active laser.
Controller Types: 4006, 4106, 2210, 2012

Example: GetActualFineTuneFrequency(Obj);
Returns: ans = 0.05 Should see in LRCP screen→



double **GetActualPower (classname) ;**
Gets the actual power (in dBm) of the active laser.
Controller Types: 4006, 4106, 2210, 2012

Example: GetActualPower(Obj);
Returns: ans = 14.5 Should see in LRCP screen→



double **GetCalculatedFrequency (classname, laserusagetype
laserUsageType) ;**

Searches all of the connected controllers for the first laser of the specified laser usage type and returns the calculated frequency (in THz). Valid usage types are: unused, signalx, signaly, signalxy, reference.
Controller Types: 4006, 4106, 2210, 2012, 5110

Example: GetCalculatedFrequency(Obj, reference);
Returns: ans = 191.5

string[] **GetControllers (classname) ;**
Returns a list (array) of controller devices (strings) that are being controlled by the serving application.

Example: Controllers = GetControllers(Obj)
Returns: 'OM2210:Prototype1'
'OM2210:8180123'
'OM4006:6300121'

double **GetFirstFrequency (classname) ;**
Gets the first frequency (in THz) of the active laser.
Controller Types: 4006, 4106, 2210, 2012

Example: GetFirstFrequency(Obj);
Returns: ans = 191.5 Should see in LRCP screen→



bool GetInterlock (classname) ;

Returns the current interlock state of the active controller. The normal, working state is TRUE. If the interlock is disconnected from the back of the instrument or if the instrument is powered off, this function will return FALSE.

Controller Types: All

Example: GetInterlock(Obj);

Returns: ans = true

string GetIP (classname) ;

Returns the IP Address (as a string) for the active controller.

Controller Types: All

Example: Address = GetIP(Obj);

Returns: Address = '172.17.200.114'

double GetLastFrequency (classname) ;

Gets the last frequency (in THz) of the active laser.

Controller Types: 4006, 4106, 2210, 2012

Example: GetLastFrequency(Obj);

Returns: ans = 196.25 Should see in LRCP screen→



Last Frequency 196.250 THz

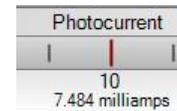
float GetPhotoCurrent (classname) ;

Gets the photocurrent (in mA) of the receiver in the active controller.

Controller Types: 4006, 4106

Example: GetPhotoCurrent(Obj);

Returns: ans = 11.034 Should see in LRCP screen→



Photocurrent
10
7.484 milliamps

polarization GetPolarization (classname) ;

Returns the polarization state. Valid Polarization states are: filter1, filter2, unknown, hardwarefailed.

Controller Types: 2210

Example: GetPolarization(Obj);

Returns: ans = filter2

bool InitializePolarization (classname) ;

Sets the initial polarization state. Returning True = Successful.

Controller Types: 2210

Example: InitializePolarization(Obj);

Returns: ans = true

bool SetActiveControllerByIPAddress (classname, string ipAddress) ;

Sets the active controller by IP Address. True = Successful.

Controller Types: All

Example: SetActiveControllerByIPAddress(Obj, '172.17.200.112');

Returns: ans = true

GetIP(Obj);

Returns: ans = '172.17.200.112'

bool SetActiveControllerByName (classname, string activeController);
Sets the active controller by name. True = Successful.
Controller Types: All

Example: SetActiveControllerByName(Obj, 'OM4106:6300121')
Returns: ans = true

bool SetActiveLaser (classname, byte activeLaser);
Sets the active laser. Returning True = Successful.
Controller Types: 4106, 4006, 2210, 2012

Example: SetActiveLaser(Obj, 2);
Returns: ans = true

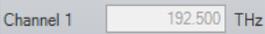
bool SetDesiredCavityLock (classname, bool desiredCavityLock);
Sets the desired cavity lock state for the active laser. 1 (True) = Locked. Returning True = Successful.
Controller Types: 4006, 4106, 2210, 2012

Example: SetDesiredCavityLock(Obj, 1);
Returns: ans = true Should see in LRCP screen → 

bool SetDesiredChannel (classname, int desiredChannel);
Sets the desired channel number for the active laser. Returning True = Successful.
Controller Types: 4006, 4106, 2210, 2012

Example: SetDesiredChannel(Obj, 45);
Returns: ans = true Should see in LRCP screen → 

bool SetDesiredChannel1 (classname, double desiredChannel1);
Sets the desired channel 1 frequency (in THz) for the active laser. Can only be set if the active laser is NOT emitting. Returning True = Successful.
Controller Types: 4006, 4106, 2210, 2012

Example: SetDesiredChannel1(Obj, 192.5);
Returns: ans = true Should see in LRCP screen → 

bool SetDesiredEmittingOff (classname);
Sets the Active Laser to not emitting. Returning True = Successful.
Controller Types: 4006, 4106, 2210, 2012

Example: SetDesiredEmittingOff(Obj);
Returns: ans = true Should see in LRCP screen → 

bool SetDesiredEmittingOn (classname);
Sets the Active Laser to emitting. Returning True = Successful.
Controller Types: 4006, 4106, 2210, 2012

Example: SetDesiredEmittingOn(Obj);
Returns: ans = true Should see in LRCP screen → 

bool SetDesiredFineTuneFrequency (classname, short desiredFineTuneFrequency);

Sets the desired fine tune frequency (in MHz) of the active laser.
Controller Types: 4006, 4106, 2210, 2012

Example: SetDesiredFineTuneFrequency(Obj, 300);
Returns: ans = true Should see in LRCP screen→



bool SetDesiredGridSpacing(classname, double desiredGridSpacing);
Sets the desired grid spacing (in THz) of the active laser. Can only be set if the active laser is NOT emitting. Returning true = Successful.
Controller Types: 4006, 4106, 2210, 2012

Example: SetDesiredGridSpacing(Obj, 0.05,0);
Returns: ans = true Should see in LRCP screen→



bool SetDesiredPower(classname, double desiredPower, bool waitUntilFinished);
Sets the desired power (in dBm) of the active laser. For WaitUntilFinished, 0 (False) = don't wait. Returning True = Successful.
Controller Types: 4006, 4106, 2210, 2012

Example: SetDesiredPower(Obj, 13, 0);
Returns: ans = true Should see in LRCP screen→



bool SetPolarizationIn(classname);
Puts both polarization filters in. Returning True = Successful.
Controller Types: 2210

Example: SetPolarizationIn(Obj);
Returns: ans = true

bool SetPolarizationOut(classname);
Puts both polarization filters out. Returning True = Successful.
Controller Types: 2210

Example: SetPolarizationOut(Obj);
Returns: ans = true

bool SetReceiverOff(classname);
Turns the receiver off in the active controller. Returning True = Successful.
NOTE: Ensure laser power is reduced to zero before doing this otherwise the photoreceiver could be damaged.
Controller Types: 4006, 4106

Example: SetReceiverOff(Obj);
Returns: ans = true Should see in LRCP screen→



bool SetReceiverOn(classname);
Turns the receiver on in the active controller. Returning True = Successful.
Controller Types: 4006, 4106

Example: SetReceiverOn(Obj);
Returns: ans = true Should see in LRCP screen→



void TogglePolarization(classname);

Toggles the polarization state by moving both filters to the opposite position.
Controller Types: 2210

Example: `TogglePolarization(Obj);`

5.2 ATE Functionality in MATLAB

Matlab supports a limited subset of the OM4000 Series services, namely the Basic service. This section describes how to create and address the functions from Matlab.

5.2.1 LRCP Control

The Laser/Receiver Control Panel communicates with other programs via port 9000 on the computer running the Control Panel software. Matlab 2009a has built in capability that makes control from Matlab easy if you are running the **Feb 2010** or later release of the Laser/Receiver Control Panel.

Note: Ensure that the LRCP is running before using this interface.

Initialize the interface in the MATLAB desktop command window with the following commands:

```
url = 'http://localhost:9000/LaserReceiverControlPanel/Laser_ReceiverServiceBasic/?wsdl';  
createClassFromWsdI(Url);  
obj = Laser_ReceiverServiceBasic;
```

The first specifies the URL or path to a WSDL application programming interface (API) that defines the web service methods, arguments, transactions. The second creates the new class based upon that API and builds a series of M-Files for accessing the Laser/Receiver Control Panel service. The third instantiates the object class name and opens a connection to the service. These commands only need to be run anytime the service interface (available methods) changes. To get an up-to-date listing of methods for the service type the following:

```
methods(obj)
```

Matlab should return the same functions as given in **Section 5.1.2** and any new functions that have been added. These functions are self-documented when they are generated. By enabling the Matlab help window, you can find out the function's parameters by typing the function name followed by a "(" and waiting for the help to pop up.

6 Maintenance and Cleaning

6.1 Maintenance

There are no user-serviceable components or subsystems within the OM2012. Attempting any internal repairs will void your warranty. Never remove the external lid on the unit.



CAUTION

Removing the dust covers from the laser output connectors while the lasers are operating may result in exposure to invisible laser radiation. Never view directly with optical instruments.

If it becomes necessary to replace the fuse in the power input module in the rear of the unit, use a 5X20mm “slo-blo” fuse rated at 1A, 250VAC. Use a small screwdriver to gently pry open the fuse drawer.



WARNING

Disconnect the unit from the power source when changing the fuse to ensure that line voltage is not present during the replacement.

6.2 Cleaning

To clean the outside of the OM2012 enclosure, use a dry, soft cotton cloth. Do not use any liquid cleaning agents or chemicals that could possibly infiltrate the enclosure, or that could damage markings or labels.

If the dust filter on the underside of the unit becomes clogged, use a small vacuum or brush to clean the filter.

From time to time it will be necessary to clean the optical input and output connectors on the front of the unit. Use square-ended swabs made for this purpose to clean each connector.

Do not attempt to clean the inside of the instrument; cleaning of internal parts is not necessary.

7 Appendix A – Reference Documents

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