TF-1000 Tunable Optical Filter User's Manual

Triple Play Communications   **Document 3013300-702**
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Melbourne, FL 32904   **Nov 2014**

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Revision History

Document Revision	Date	Description
0	10/14/14	Initial Release
1.0	11/5/14	Change maximum LOS level setting
1.1	11/24/14	Change "Settings Info" window to add IP information. Change LOS level valid range to match the optical input power range.

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1.0 Scope

This TF-1000 User's Manual gives an overview of the hardware and software design and describes module installation, configuration, alarms, and operator control and status capability.

2.0 Operational Overview

The TF-1000 is a tunable optical filter designed as a small, portable, cost-effective solution which can be used for both R&D and production test applications. This band pass filter operates in either the C (1527 to 1570 nm) or L (1570 to 1610 nm) band and allows the center frequency to be set with a ±4 GHz (32 pm typical) accuracy. A detailed block diagram showing the internal hardware connectivity of this chassis is shown in Figure 2.0.

The standard TF-1000 is USB powered (<470 mA max, 260 mA typ) and connects directly to a Windows based computer which runs the graphical user interface (GUI) software. The GUI provides complete control and status of all wavelength tuning and optical power monitoring functions. The internal optical filter latches the wavelength setting and is able to maintain its filter characteristics at the last commanded location even when the TF-1000 is completely unpowered (no USB or DC power connection).

An optional Ethernet communications hardware interface can be provided to allow the TF-1000 to be controlled via a 10/100BaseT link using either Static or Dynamic IP addressing. In this configuration, a standard HTML browser (e.g. Firefox, Chrome, Internet Explorer) provides the user interface and the various control and status HTML pages are integrated into the microcontroller's firmware.

The input and output optical power levels are measured using a 1% tap to minimize insertion loss. An onboard temperature sensor allows the power monitoring circuitry to be calibrated during production test to provide measurement resolution of 0.01 dB and linearity (relative accuracy) of 0.1 dB over an operating temperature range of 0°C to 40°C.
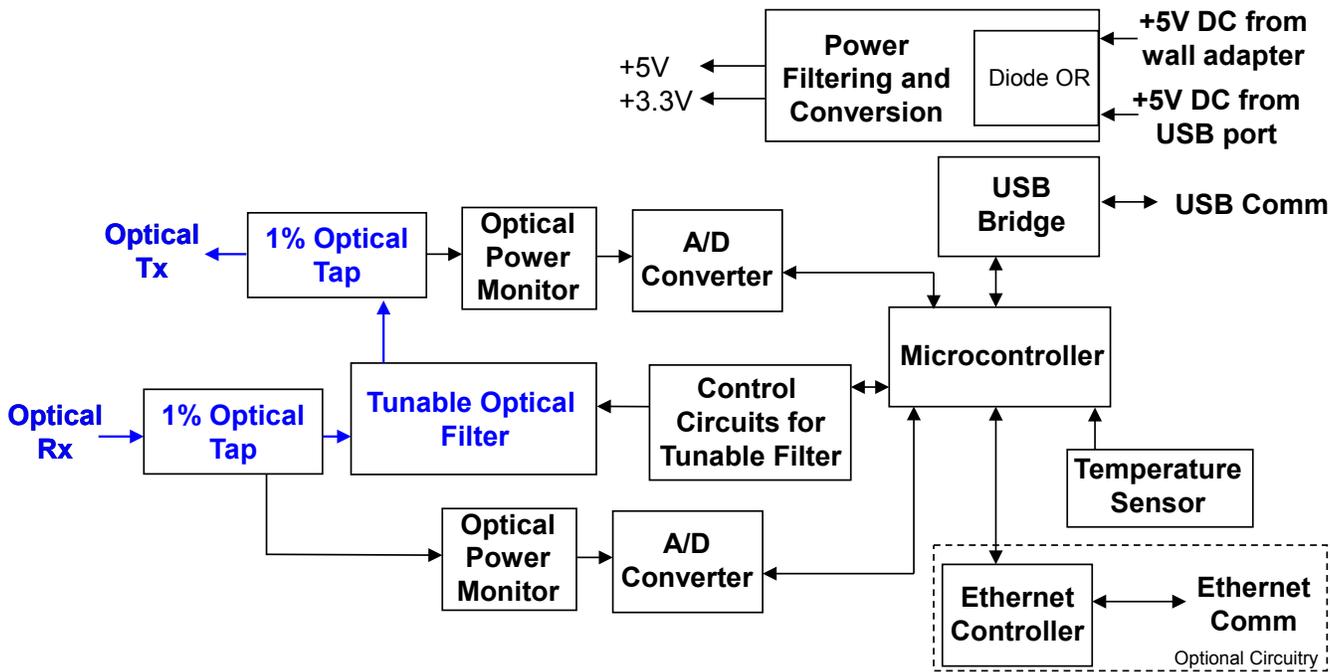
Figure 2.0-1 - TF-1000 Functional Block Diagram and Internal Connectivity

The GUI application has an additional optional feature which allows the user to perform time stamped data logging. This option includes capturing the input and output optical power levels as well as the corresponding filter wavelength, temperature, LOS level and alarms, and writing this information to a .csv file.

3.0   Description of All Items Included in TF-1000 Packaging

The photos below show all the items which are included with the TF-1000. Even the USB version includes an Ethernet cable and AC/DC power adapter since any firmware update must be performed using the Ethernet interface.

Figure 3.0-1 - TF-1000 Packaging Box

Figure 3.0-2 - ESD Container with TF-1000 Inside

Figure 3.0-3 - AC/DC Plug Adapter, Ethernet Cable, USB Cable, and CD-ROM with USB GUI

4.0 USB GUI Software Installation and Initial Power-On

This paragraph describes the USB GUI installation and power-on procedure so if only the Ethernet interface is planned to be used, please skip to paragraph 5.0.

4.1 USB GUI Installation

Before initially powering on the TF-1000 module, the USB GUI should be installed onto a Windows 7, XP, or 8 computer. The included CD-ROM contains all of the required installation files. Proceed to install the USB GUI by following the instructions in Table 4.1-1. Several screen captures of the installation process are shown in the figures below.

The installation procedure will install the TF-1000 GUI application program as well as the National Instruments Run Time Engine and all USB drivers needed to communicate with the TF-1000 module. Therefore, no additional driver or software installation is necessary.

Table 4.1-1 - Step-by-Step Instructions to Install the USB GUI

Step #	Description
1	Insert the disk into the Windows computer's DVD drive, navigate into the **USB GUI** folder and verify the file structure of the CD-ROM looks as shown in Figure 4.1-1.
2	Double click on the **Install TF-1000 GUI** file and the Windows User Account Control message shown in Figure 4.1-2 will appear. Click Yes to continue to install the software.
3	While the installation is in progress for approximately 4 minutes, the small window shown in Figure 4.1-3 will appear to indicate the installation process is in progress.
4	Once installation is complete, the window in Figure 4.1-4 will be shown to remind the user to restart the computer at the earliest convenience. The user can click OK to continue, the computer will not restart until the user specifically commands a Windows restart.
5	Whenever convenient, restart the computer.
6	Proceed to paragraph 4.2 of this document to continue the setup procedure.
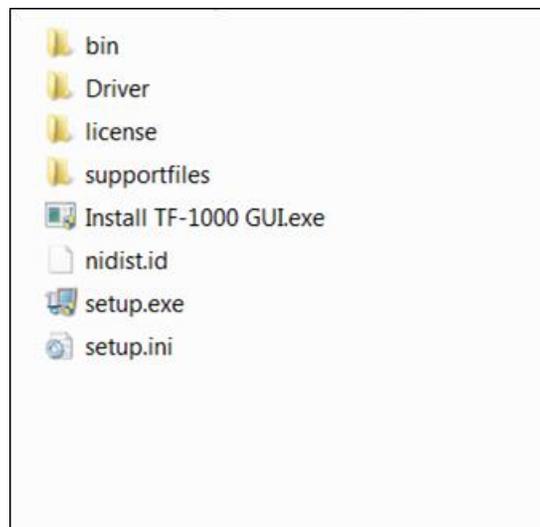
Figure 4.1-1 - TF-1000 USB GUI Installation Folder Contents on CD-ROM
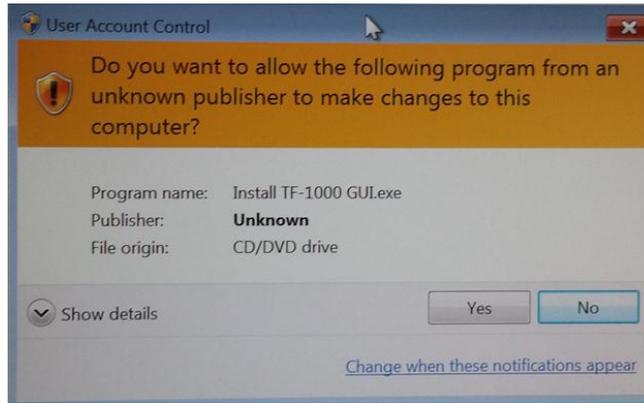
Figure 4.1-2 - Windows User Account Control Notification

Figure 4.1-3 - USB GUI Installation Progress Window
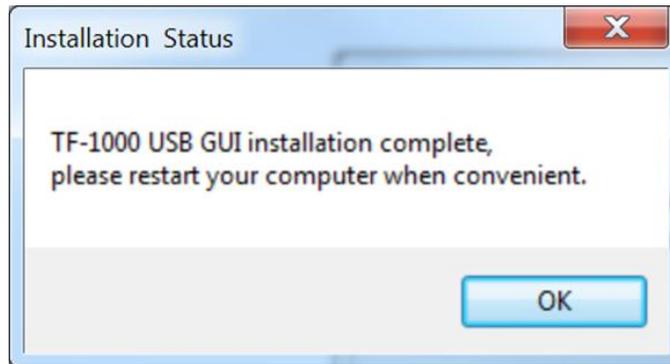
Figure 4.1-4 - USB GUI Installation Complete Window

4.2 USB Connection to TF-1000 Module and Initial Power-On

Although not required, it is recommended the TF-1000 module not be connected to any optical sources the first time it is powered on so proper operation of the LED indicator can be checked. Keeping the dust caps on the two optical connectors (and once the GUI application has been installed on a Windows computer) plug the included USB cable into the computer and into the TF-1000 module's USB port. After a few seconds, the computer should indicate it recognizes the module with the typical Windows USB connection sound. The LED on the top side of the module should illuminate to a red color indicating that DC power is being supplied to the module and that the optical power input is below the Loss-of-Signal (LOS) level. If the LED does not illuminate, it is an indication that DC power is not being supplied to the module through the USB port (or through the AC/DC power adapter). It should be noted that both the USB cable and the AC/DC power adapter can be plugged into the TF-1000 module simultaneously, an internal diode-OR circuit will allow these two DC sources to share the power load.

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Open the GUI application by clicking on the **Windows Start** icon, **All Programs**, **TPC** folder, and finally the **TF-1000** application. The GUI will open and the main menu window will display and look similar to that shown in Figure 4.2-1. At this point the module is ready to be controlled and an optical signal can be applied to the optical FC connector labeled "IN". The filtered output signal is available at the optical FC connector labeled "OUT". Please go to paragraph 6.0 in order to obtain more details regarding specific operation of the USB GUI application.
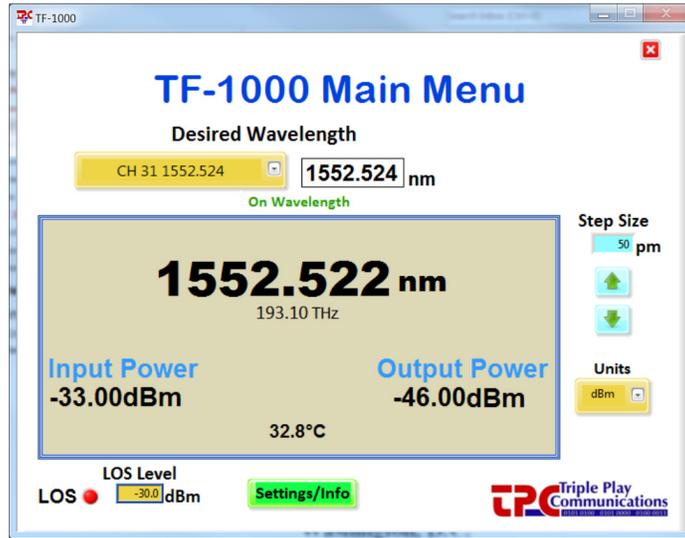
Figure 4.2-1 - Example of TF-1000 USB GUI Main Menu

If the GUI application is opened when no TF-1000 module is connected to the USB port, the error message shown in Figure 4.2-2 will appear. In this case, close the GUI, connect a TF-1000 to the USB port, then re-open the GUI application.
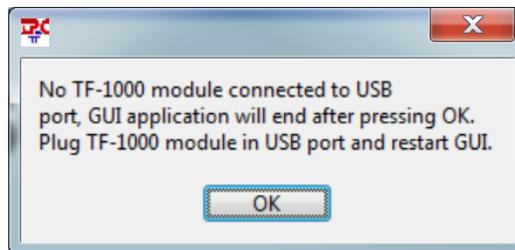
Figure 4.2-2 - Error Message Displayed When TF-1000 is Not Connected to USB Port

5.0 Ethernet Based Control/Status Setup and Initial Power-On

An external computer with a 10/100BaseT Ethernet port is required to provide control and status for the TF-1000 module using a standard HTML browser (Chrome, Firefox, Internet Explorer) based GUI. When using Ethernet communications to control/status the TF-1000 module, there is no other special software required, the browser (Chrome, Firefox, Internet Explorer) is sufficient.

There are two primary ways to configure the hardware connection between the external computer and the TF-1000 module, both are shown in Figure 5.0-1. Use the included Ethernet cable and setup the hardware connection in either of the two ways shown in the figure.
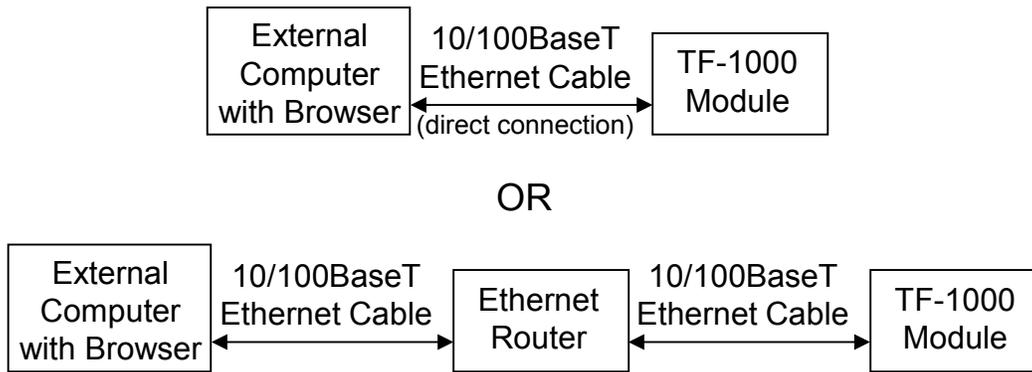
**Figure 5.0-1 - Two Methods of Using Ethernet Interface to TF-1000 Module**

Although not required, it is recommended the TF-1000 module not be connected to any optical sources the first time it is powered on so proper operation of the LED indicator can be checked. Keeping the dust caps on the two optical connectors, plug the included AC/DC power adapter into a 120 VAC wall outlet and into the TF-1000 module's "DC" port. The LED on the top side of the module should illuminate to a red color indicating that DC power is being supplied to the module and that the optical power input is below the Loss-of-Signal (LOS) level. If the LED does not illuminate, it is an indication that DC power is not being supplied to the module through the AC/DC power adapter (or through the USB port). It should be noted that both the AC/DC power adapter and the USB cable can be plugged into the TF-1000 module simultaneously, an internal diode-OR will allow these two DC sources to share the power load.

5.1 Initial Setup for Ethernet Control/Status

The TF-1000 module is shipped in Static IP address mode to allow communication via a direct connection to a standalone computer as shown in the upper block diagram of Figure 5.0-1. In order to initially communicate with the TF-1000, setup the Ethernet port of the standalone computer as given in Table 5.1-1.

Table 5.1-1 - Ethernet Port Setup for Standalone Computer Operation with TF-1000

#	Description
1	Set up the properties of your computer's LAN Ethernet connection by navigating as follows: - Select **Start, Control Panel, Network and Internet, Network and Sharing Center**, then click on **Change adapter settings** on the left side - Right click on your **Local Area Connection** and select **Properties** - Click on **Internet Protocol Version 4 (TCP/IPv4)** and select **Properties** - Click on **Use the following IP address**: type **IP address 192.168.1.235**, **Subnet Mask 255.255.255.0**, **Default Gateway (leave blank)** - Click on **Use the following DNS server addresses**: **Preferred DNS Server (leave blank)**, **Alternate DNS server (leave blank)** - Click OK to exit all the windows
2	Connect the Ethernet cable from your computer directly to the module
3	Open a Chrome, Firefox, or Internet Explorer browser window
4	In the browser's URL window, type 192.168.1.234 and wait for the TF-1000 main screen to appear.
5	Click on the menu for Optical Control and Status

If desired, the TF-1000 can be fully controlled using only a standalone computer and its HTML browser. If that is the desired method of control, please proceed to paragraph 7.0 which describes the various screens, control, and status capable of being implemented with the HTML browser.

In order to connect the TF-1000 module to an Ethernet router for remote control and status, setup the module as described in Table 5.1-2 if a Static IP address is desired, or as described in Table 5.1-3 if a Dynamic IP address is desired.

Table 5.1-2 - TF-1000 Ethernet Port Setup for Operation with Ethernet Router Using Static IP

#	Description
1	Click on **Ethernet Setup** at the top menu bar.
2	Select **Static** for the **Ethernet Mode** drop down menu.
3	Type in the new, desired **IP Address**, **IP Subnet**, and **IP Gateway** settings which are to be used with your Ethernet Router.
4	Once all the desired settings are correct, click **Apply Settings**. Please note that once Apply Settings is clicked, you will no longer be able to communicate with the module until it is connected to the Ethernet Router on which the new settings are appropriate. If there are ever problems accessing the module, the TF-1000 can always be placed back into its factory default state for the Ethernet Settings using the IP Address Reset button on the bottom side of the module. See paragraph 5.2 for more details.
5	Connect the Ethernet cable from the Ethernet Router directly to the TF-1000 module.
6	Using a computer which can also access this Ethernet Router, open a Chrome, Firefox, or Internet Explorer browser window.
7	In the browser's URL window, type the newly entered Static IP address of the module and wait for the TF-1000 main screen to appear.
8	Proceed to paragraph 7.0 which describes the various screens, control, and status capable of being implemented with the HTML browser.

Table 5.1-3 - TF-1000 Ethernet Port Setup for Operation with Ethernet Router Using Dynamic IP

#	Description
1	Click on **Ethernet Setup** at the top menu bar.
2	Select **DHCP** for the **Ethernet Mode** drop down menu. It is not necessary to change the **IP Address**, **IP Subnet**, and **IP Gateway** settings.
3	Click **Apply Settings**. Please note that once Apply Settings is clicked, you will no longer be able to communicate with the module until it is connected to the Ethernet Router setup for Dynamic IP addressing. If there are ever problems accessing the module, the TF-1000 can always be placed back into its factory default state for the Ethernet Settings using the IP Address Reset button on the bottom side of the module. See paragraph 5.2 for more details.
4	Connect the Ethernet cable from the Ethernet Router directly to the TF-1000 module.
5	Using the Admin function of the Ethernet Router, determine the Dynamic IP address which has been assigned to the TF-1000 module.
6	Using a computer which can also access this Ethernet Router, open a Chrome, Firefox, or Internet Explorer browser window.
7	In the browser's URL window, type the newly found Dynamic IP address of the module and wait for the TF-1000 main screen to appear.
8	Proceed to paragraph 7.0 which describes the various screens, control, and status capable of being implemented with the HTML browser.

5.2 IP Address Reset Button (on bottom side of module)

The IP address reset button is located on the bottom side of the module, see Figure 5.2-1, and is recessed so it is not possible to inadvertently reset the IP address. The tip of an ordinary ball point pen can be used to press this reset button. Pressing and holding the IP Address Reset button for at least 1 second reconfigures the 10/100BaseT Ethernet port to its default state which is: Static IP address mode, IP address = 192.168.1.234, Subnet mask = 255.255.255.0, Default gateway = 192.168.1.254. During the execution of this command, the optical communications link is not interrupted.

IP Address
Reset Button
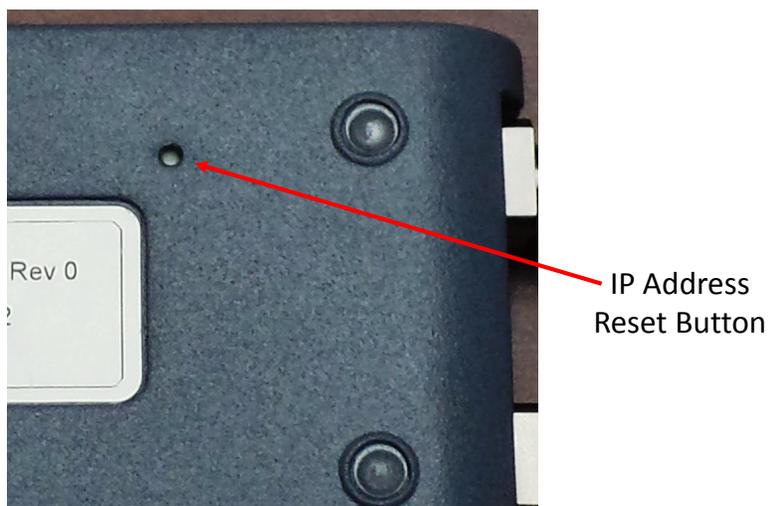
**Figure 5.2-1 - TF-1000 IP Address Reset Button Location**

6.0   USB GUI Operation

6.1 Getting Started with the USB GUI

Once the USB GUI application has been started using the steps described previously in paragraph 4.2, the TF-1000 Main Menu will appear. This window remains visible until the application is closed by clicking the "X" inside the red box in the upper right area of the Main Menu or by removing the USB cable from the TF-1000 module. This GUI application can only be active and running when a TF-1000 is physically connected to the computer using a USB cable. Otherwise, the application will automatically close if no module connection is detected.

The Main Menu window can be moved and repositioned on the screen by clicking the bar at the top of the window and dragging it to a different location. The size of this window cannot be changed.

By clicking on Settings/Info, a new window is opened to show specific module information such as the model number, part number, serial number, firmware and GUI revisions. This window also allows the user to select either 50 GHz or 100 GHz channel spacing to be shown in the wavelength drop down menu. This window cannot be repositioned and is closed by clicking the red box in the upper right corner.

Figure 6.1-1 shows an example Main Menu window with several key areas highlighted.
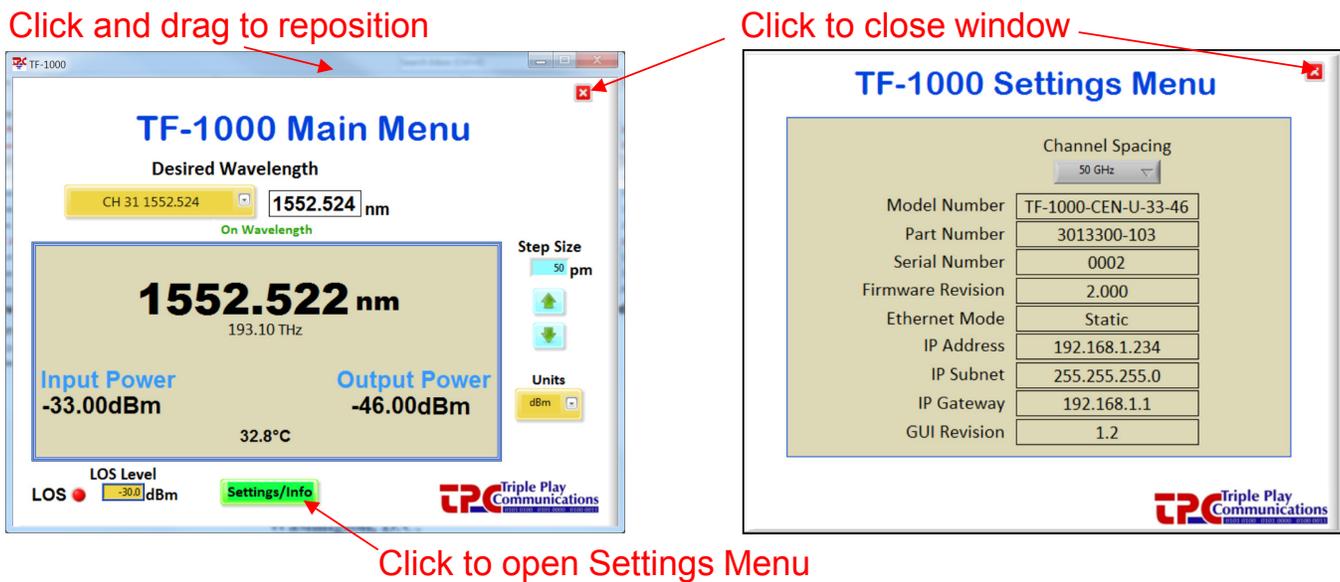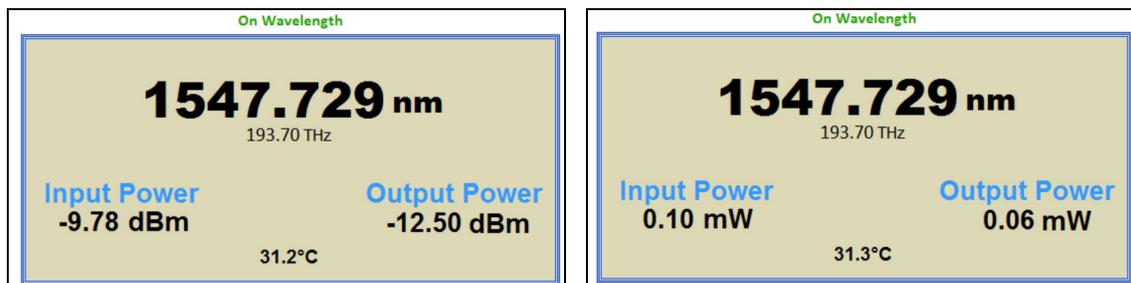
Figure 6.1-1 - How to Move and Close the Main Menu Window, Open Setting/Info Window

6.2 Main Menu Control and Status Functions

6.2.1 Primary Status Display

All of the critical status information from the TF-1000 module is shown in the central area of the Main Menu as highlighted in Figure 6.2.1-1.

Figure 6.2.1-1 - Critical Status Area of the Main Menu, in both dBm and Watts

The current TF-1000 wavelength is obtained from the module (by the external computer) and displayed in nanometers (nm) prominently in this area. This value is also converted to Terahertz (THz) and displayed in a smaller font under the wavelength. As the filter is commanded to tune to different wavelengths, the display will update in real time. The green "On Wavelength" indication changes to red "Tuning" while the filter is being moved to the new wavelength. Once the filter is positioned within a ±15 pm tolerance to the desired wavelength, the indication will return to "On Wavelength". This tolerance is the result of the filter's mechanical driving circuitry which allows it to be positioned within ±15 pm of the target wavelength.

Both the optical input power and output power are monitored using 1% taps to minimize insertion loss. Each calculated value is displayed in its designated location and can be shown in either dBm or Watts based on the user's selection of Units. The standard dynamic range is 56 dB wide for both power monitors. The standard input optical power monitor range is -33 dBm to +23 dBm and the output power monitor range is -46 dBm to +10 dBm but both can be shifted based on customer requests so please contact us if different power monitoring ranges are desired.

The minimum power level displayed for both the input and output monitors is equal to the lowest value of the respective ranges which is -33 dBm for the input and -46 dBm for the output in the standard configuration. Therefore, if no optical power is present at the input connector, the input power monitor will display -33 dBm and the output power monitor will display -46 dBm.

A temperature sensor is mounted on the PCB and its value in degrees Celsius is continuously updated on the display.

6.2.2 Primary Control Functions

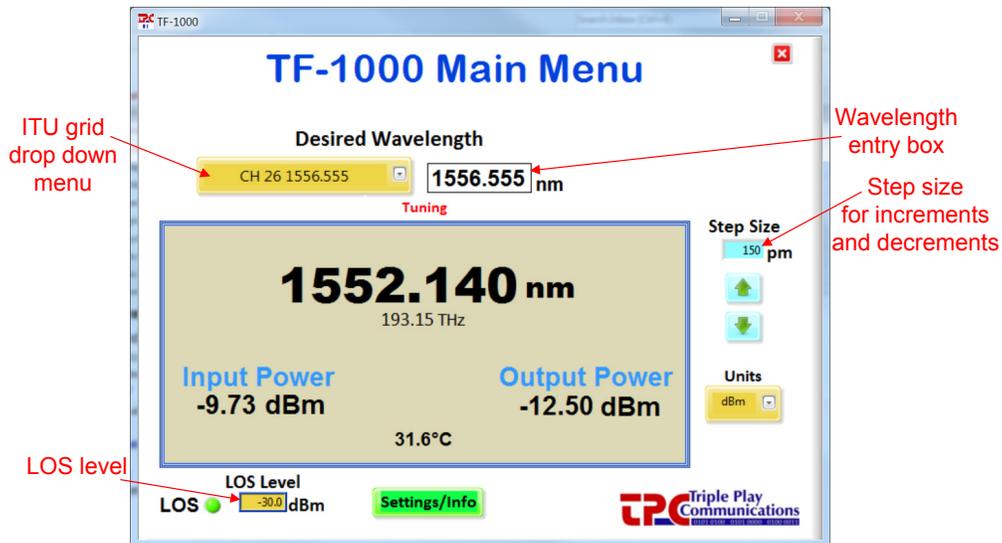The key control functions of the TF-1000 module are highlighted on the Main Menu shown in Figure 6.2.2-1.

Figure 6.2.2-1 - Key Control Functions on the Main Menu

The ITU grid drop down menu is provided as a convenience whenever the user wants to quickly go to a 50 GHz or 100 GHz ITU channel. Simply click on the ITU grid drop down menu and use the mouse to scroll to the desired channel between 1527 nm and 1570 nm. If the drop down menu already displays the desired wavelength, double click on that wavelength to reselect the channel and the filter will return to that wavelength. This menu will display only 100 GHz channels if desired, by selecting the 100 GHz channel spacing on the TF-1000 Settings Menu (click Settings/Info) described in paragraph 6.1. If the 50 GHz channel spacing is selected, all ITU grid channels are displayed on the drop down menu.

Just to the right of this menu is the manual wavelength entry box. The user is able to enter any wavelength between 1527 nm and 1570 nm down to a 1 pm resolution. To update the wavelength, click in the box, edit the wavelength value as desired, then press Enter to send the wavelength to the TF-1000 module, see Figure 6.2.2-2. This causes the optical filter to immediately begin tuning to the new wavelength. This manual wavelength entry box also serves as a duplicate wavelength status display whenever wavelength changes are commanded using the ITU grid drop down menu or by using the Step Size control.

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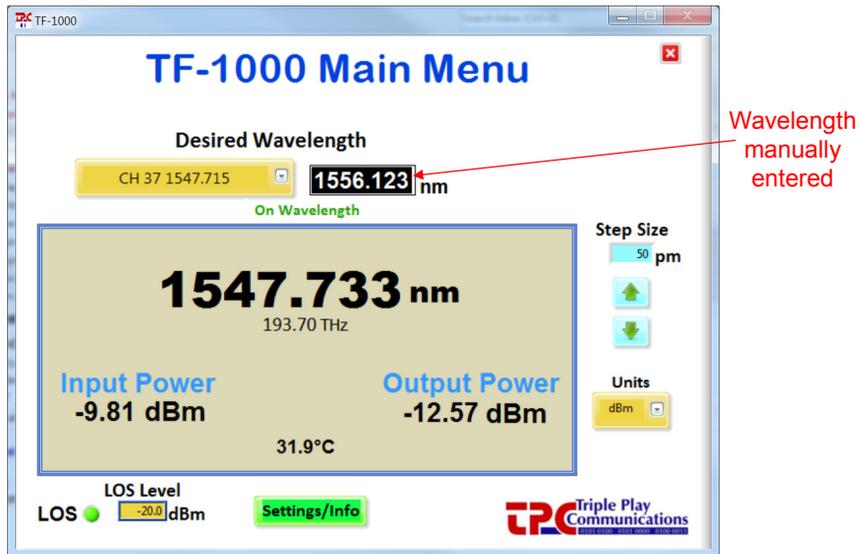
Figure 6.2.2-2 - Wavelength Manually Entered Down to Picometer Resolution

The Step Size wavelength control allows the user to incrementally increase or decrease the wavelength with a step size between 20 pm and 1000 pm. The step size can be changed by clicking inside the box and editing the size within the range previously stated. Press Enter after the editing has been completed then click on the up or down arrow located beneath the Step Size box to cause the wavelength to be increased or decreased by the given step size.

The Loss of Signal (LOS) level can also be edited by the user and has a range from -33 dBm to +23 dBm (for the standard configuration). To edit this value, click inside the box, make the necessary edits, then press Enter to send the changes to the module. The LOS indicator on the GUI will be a green color whenever the incoming optical signal is at a greater power level than the LOS level. The indicator will be red whenever the incoming optical signal level is less than the LOS level as shown in Figure 6.2.2-3.
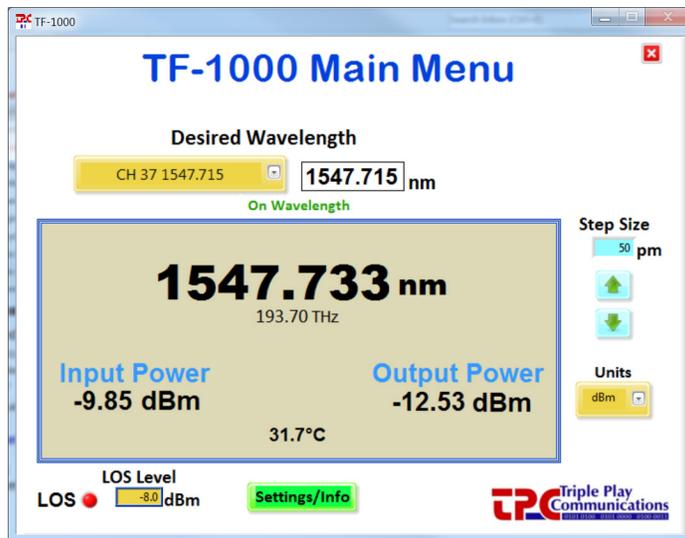
Figure 6.2.2-3 - LOS Indicator is Red When Optical Power Level is Less than LOS Level

The color of the LED indicator on the top of the module itself mirrors this LOS indicator on the GUI. It should be noted that the effective range of the LOS indicator is limited by the range of the

optical input power monitor. For example, if the optical input power monitor dynamic range is -33 dBm to +23 dBm (standard configuration), the LOS indication is only valid within that range. If the range of the input power monitor is shifted due to a customer request, the LOS indication will also shift to be valid within that new range.

7.0   Ethernet Browser GUI Operation

As mentioned previously, the TF-1000 module includes embedded web pages as part of its internal microcontroller's firmware. Standard HTML browsers such as Chrome, Firefox, and Internet Explorer can be used to provide control and status of the module. After completing the Ethernet port setup for operation with a standalone, local computer or with an Ethernet Router (Tables 5.1-1, 5.1-2, or 5.1-3), the TF-1000 module can be controlled and monitored using the steps described in paragraphs 7.1 through 7.4.

7.1   Optical Control/Status

7.1.1 Display of Status Parameters

Use a standard browser such as Chrome, Firefox, or Internet Explorer to communicate with the TF-1000 module by typing the appropriate IP address (e.g. 192.168.1.234) in the URL window of the browser as shown in Figure 7.1.1-1.
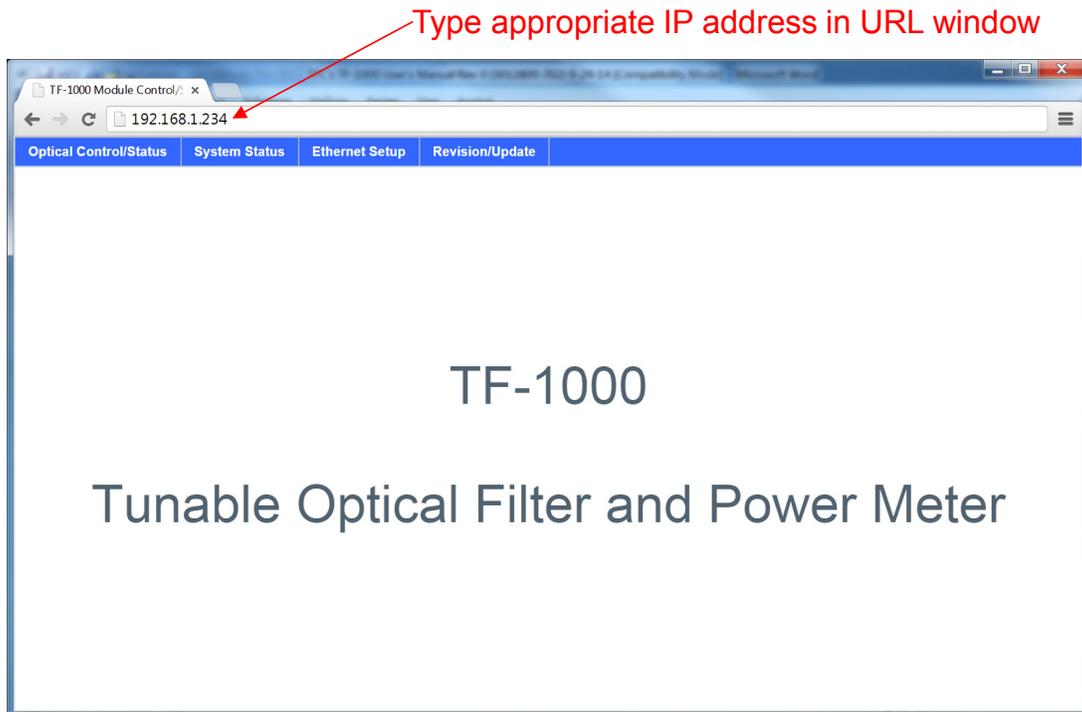
Figure 7.1.1-1 - Type Appropriate IP Address of Module to Access Home Page

Click on the **Optical Control/Status** area of the menu bar to access the page which shows all the real time status parameters and allows for control of optical functions. An example of the Optical Control and Status is given in Figure 7.1.1-2.

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Figure 7.1.1-2 - Optical Control and Status Page

The Wavelength Monitor displays the filter's current wavelength in nanometers as read from the module's internal filter position monitoring circuitry. This value is also converted to Terahertz (THz) and displayed on the Frequency row. As the filter is commanded to tune to different wavelengths, this display will update in real time. The green "On Wavelength" indication changes to red "Tuning" while the filter is being moved to the new wavelength, see Figure 7.1.1-3. Once the filter is positioned within a ±15 pm tolerance to the desired wavelength, the indication will return to "On Wavelength". This tolerance is the result of the filter's mechanical driving circuitry which allows it to be positioned within ±15 pm of the target wavelength.

Figure 7.1.1-3 - Wavelength Alarm Updates to "Tuning" While Filter is Moving to New Position

Both the optical input power and output power are monitored using 1% taps to minimize insertion loss. Each calculated value is displayed in its designated location and can be shown in either dBm or Watts based on the user's selection of the Optical Power Display, see Figure 7.1.1-4. The standard dynamic range is 56 dB wide for both power monitors. The standard input optical power monitor range is -33 dBm to +23 dBm and the output power monitor range is -46 dBm to +10 dBm but both can be shifted based on customer requests so please contact us if different power monitoring ranges are desired.

The minimum power level displayed for both the input and output monitors is equal to the lowest value of the respective ranges which is -33 dBm for the input and -46 dBm for the output in the standard configuration. Therefore, if no optical power is at the input connector, the input power monitor will display -33 dBm and the output power monitor will display -46 dBm.
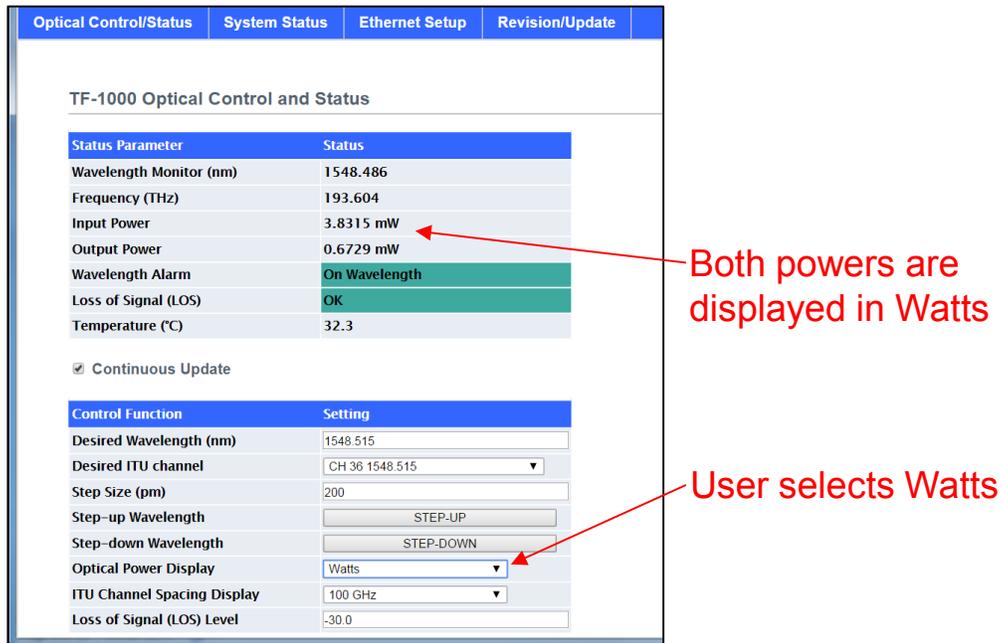
Figure 7.1.1-4 - User Can Select to Display Both Input and Output Power in Watts

A temperature sensor, used for calibrating the power monitors and filter position, is mounted on the PCB and its value in degrees Celsius is shown on the display. Also, the Loss of Signal (LOS) alarm is given as one of the status parameters. Whenever the optical input level drops below the user selectable LOS threshold, the alarm indication will be activated and turn red as shown in Figure 7.1.1-5.

| Optical Control/Status | System Status | Ethernet Setup | Revision/Update |

TF-1000 Optical Control and Status

Status Parameter	Status
Wavelength Monitor (nm)	1552.092
Frequency (THz)	193.154
Input Power	5.72 dBm
Output Power	–33.00 dBm
Wavelength Alarm	On Wavelength
Loss of Signal (LOS)	ALARM
Temperature (°C)	32.4

☑ Continuous Update

Control Function	Setting
Desired Wavelength (nm)	1552.122
Desired ITU channel	CH 31+50GHz 1552.122 ▼
Step Size (pm)	200
Step-up Wavelength	STEP-UP
Step-down Wavelength	STEP-DOWN
Optical Power Display	dBm ▼
ITU Channel Spacing Display	50 GHz ▼
Loss of Signal (LOS) Level	6.0

Figure 7.1.1-5 - LOS Alarm Occurs When the Input Power is Less Than the User Entered LOS Level

The default configuration of the status display is to continuously update all status so the Continuous Update box is checked by default. The user can select to uncheck that box which will halt the updates such that the browser page must be refreshed in order to get an update. Under most conditions, the Continuous Update box should remain checked.

7.1.2 Control Functions

For any users who are primarily working on the ITU grid, the quickest way to tune the filter is by selecting the Desired ITU Channel using the drop down menu. Simply click on the ITU grid drop down menu and use the mouse to scroll to the desired channel between 1527 nm and 1570 nm. In Figure 7.1.2-1, the drop down menu has been used to select ITU channel 11, 1568.773 nm, and the filter is in the process of being tuned to that wavelength. Note that the Desired Wavelength entry box is also updated (acts as a status in this case) with the new target wavelength selected with the drop down menu.

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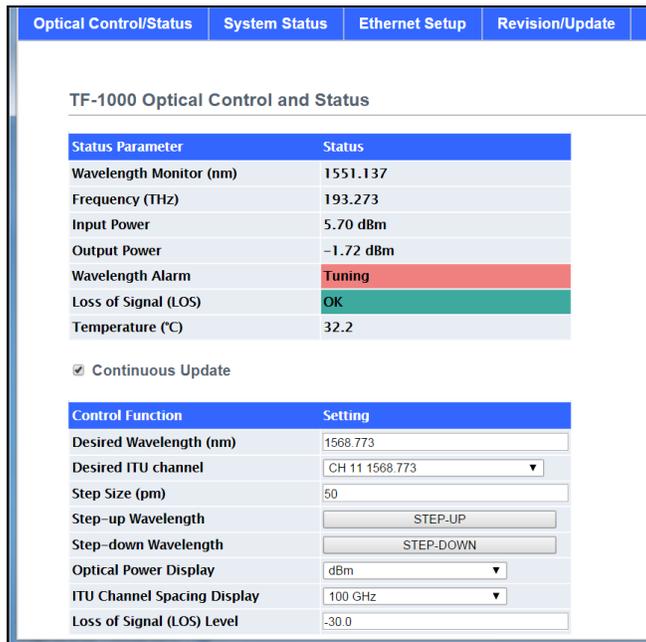
Figure 7.1.2-1 - Desired ITU Channel Drop Down Menu is Used to Command a Change in Wavelength

The menu will display only 100 GHz channels if desired, by selected the 100 GHz channel spacing on the ITU Channel Spacing Display. The user can select 50 GHz channel spacing as shown in Figure 7.1.2-2 and all ITU grid channels will be displayed on the drop down menu.
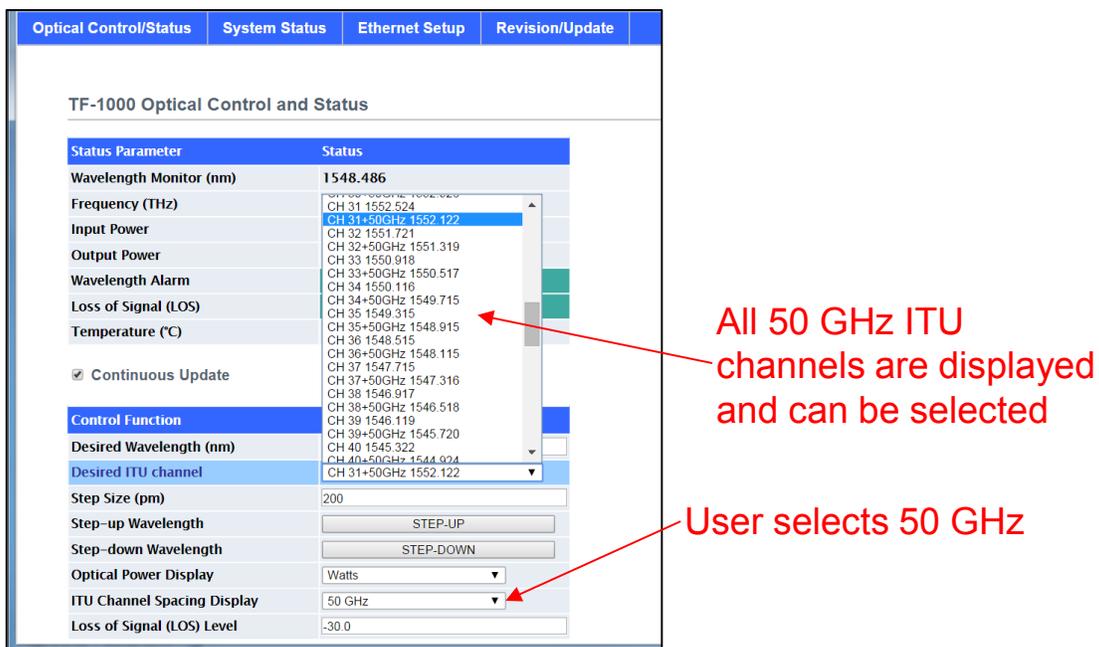
Figure 7.1.2-2 - 50 GHz ITU Channel Spacing is Selected

One of the advantages of using this filter is the continuous tuning capability and the Desired Wavelength entry box can be used to enter a target at any wavelength between 1527 nm and 1570 nm down to a 1 pm resolution. To update the wavelength, click in the box, edit the wavelength value as desired, then press Enter to send the wavelength to the TF-1000 module, see Figure 7.1.2-3. This causes the optical filter to immediately begin tuning to the new wavelength.

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This manual wavelength entry box also serves as a duplicate wavelength status display whenever wavelength changes are commanded using the ITU grid drop down menu or by using the Step Size control.
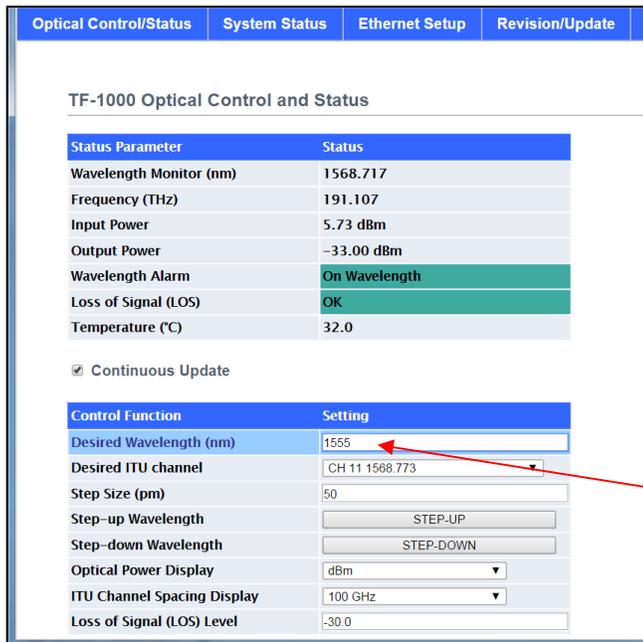
Figure 7.1.2-3 - User Enters Desired Wavelength and Presses Enter

The Step Size wavelength control allows the user to incrementally increase or decrease the wavelength with a step size between 20 pm and 1000 pm. The step size can be changed by clicking inside the box and editing the size within the range previously stated. Press Enter after the editing has been completed then click on the up or down arrow located beneath the Step Size box to cause the wavelength to be increased or decreased by the given step size as shown in Figure 7.1.2-4.
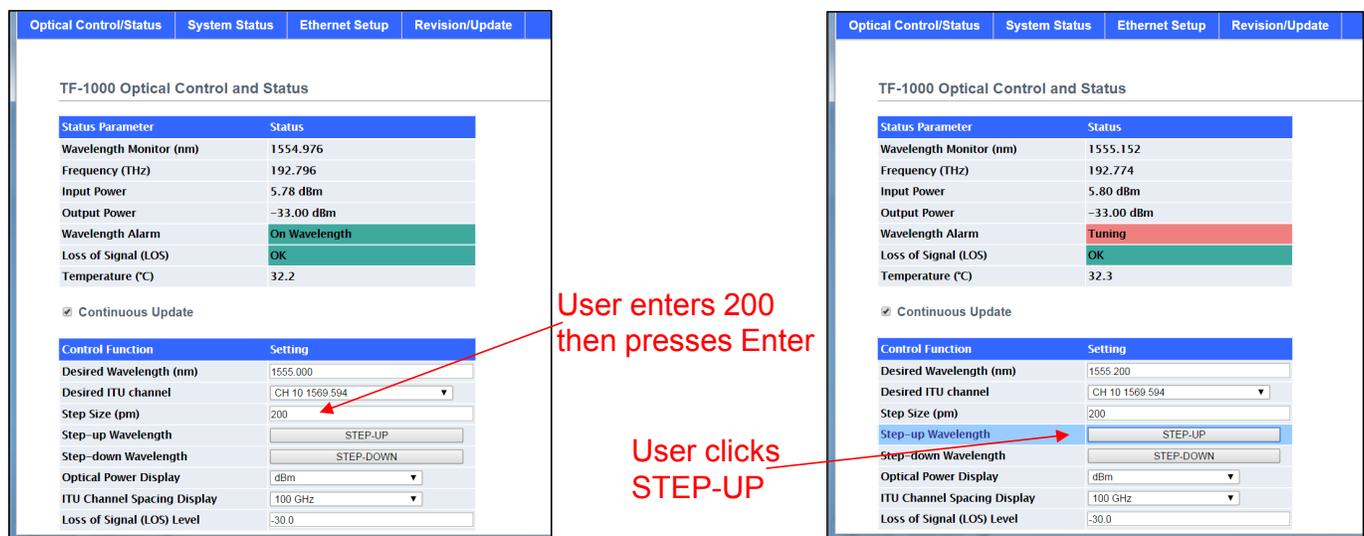
Figure 7.1.2-4 - Step Size Can Be Used to Incrementally Change Wavelength Higher or Lower

The Loss of Signal (LOS) level can also be edited by the user and has a range from -33 dBm to

+23 dBm (for the standard configuration). To edit this value, click inside the Loss of Signal (LOS) Level box, make the necessary edits, then press Enter to send the changes to the module. The LOS alarm on the GUI will be a green color whenever the incoming optical signal is at a greater power level than the LOS level. The indicator will be red whenever the incoming optical signal level is less than the LOS level. The color of the LED indicator on the top of the module itself mirrors this LOS indicator on the GUI. It should be noted that the effective range of the LOS indicator is limited by the range of the optical input power monitor. For example, if the input optical power monitor range is -33 dBm to +23 dBm (standard configuration), the LOS indication is only valid within that range. If the range of the input power monitor is shifted due to a customer request, the LOS indication will also shift to be valid within that new range.

7.2 System Status

Clicking on the **System Status** area of the menu bar provides specific module information such as the part number, model number, and serial number, see Figure 7.2-1. Additionally, a state-of-health (SOH) status indication is shown. If there is an internal power supply problem within the module, this SOH indication will be alarmed.

Figure 7.2-1 - System Status Information

7.3 Ethernet Setup

The **Ethernet Setup** menu allows the user to issue a software reboot command to the internal microcontroller and to adjust all Ethernet settings as shown in Figure 7.3-1. The software reboot/reset command should not be necessary unless, as a last resort, the user believes the module cannot recover to normal operation. It should be noted that Figure 7.3-1 shows the factory default setup configuration for the Ethernet port. Also, if the recessed button on the bottom side of the module is pressed, the Ethernet mode and IP address will be reset to this default configuration.

**Figure 7.3-1 - Ethernet Setup Controls with IP Address**

The Ethernet Mode can be set to Static or Dynamic (DHCP) depending on how the user wants to configure the module for Ethernet communication. If the user is connecting directly to a local, standalone computer, a Static IP address should be used. Similarly, if the user wants to assign a specific IP address, subnet mask, and gateway for connection to an Ethernet Router, the Static configuration must be used. The Dynamic (DHCP) IP addressing mode is used when it is sufficient to allow the Router to assign the IP address. It is important to note that after each of the items (Ethernet Mode, IP Address, IP Subnet, IP Gateway) have been modified, the user must click Apply Settings for the changes to take effect. Table 7.3-1 provides summary details for each of the entries.

**Table 7.3-1 - Ethernet Configuration Description of Parameters**

Parameter	Description	Valid Range
Ethernet Mode	Selects whether the Ethernet port is configured as a Static IP address or a Dynamic IP address. This command must be selected after the desired IP Address, IP Subnet, and IP Gateway have been entered. Once the user clicks "Apply Changes" the Ethernet configuration is immediately changed using the newly entered IP Address, IP Subnet, and IP Gateway.	Static, Dynamic (DHCP)
IP Address	If the Ethernet port is configured as a Static address, this field is used to enter the full IP Address. If Dynamic is selected, this field is not used.	xxx.xxx.xxx.xxx
IP Subnet	If the Ethernet port is configured as a Static address, this field is used to enter the full IP Subnet. If Dynamic is selected, this field is not used.	xxx.xxx.xxx.xxx
IP Gateway	If the Ethernet port is configured as a Static address, this field is used to enter the full IP Gateway. If Dynamic is selected, this field is not used.	xxx.xxx.xxx.xxx

7.4 Revision/Update

The Revision/Update menu, shown in Figure 7.4-1, allows the user to view the internal microcontroller's firmware revision and also provides the capability to download new firmware when desired. Any new firmware updates must be initiated by first choosing the file, provided by TPC, from the computer then clicking Update to start the file transfer, see Figure 7.4-2. The download and update process will take approximately 1 minute after which the user can verify the new firmware is running by reading the Firmware Revision which should now be updated to match the newly downloaded version.
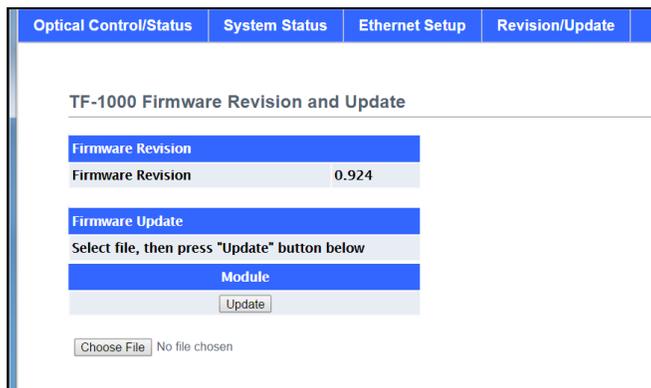
Figure 7.4-1 - Firmware Revision/Update Page

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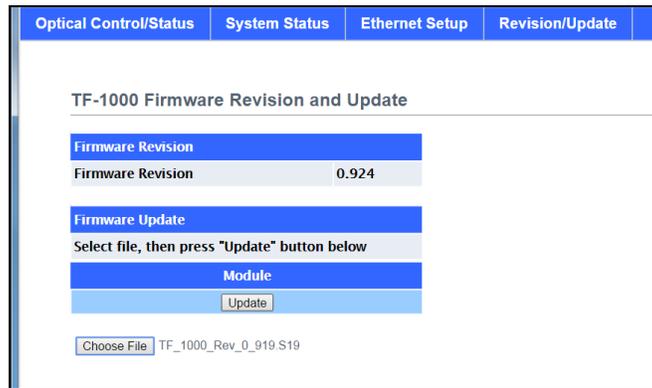
Figure 7.4-2 - Choose a File and Click Update to Begin Downloading New Firmware

When updating the Firmware Revision, once the download has completed, the user must click a confirmation window to perform a software reset of the module. After the confirmation has been clicked, the user must close the browser window by clicking the "X" in the upper right hand corner of the browser, wait 30 seconds for the chassis to reboot, then open a new browser window to restart communications.

If an error occurs during the download process, the user will be notified with a Failed indication. The user must then execute the same Firmware download procedure again to correct the failure.

8.0 Optical and Electrical Specifications

Table 8.0-1 - Optical Filter Specifications

Parameter	Minimum	Typical	Maximum
Filter Shape		Band Pass	
C-Band Tuning Range	1527 nm		1570 nm
L-Band Tuning Range	1570 nm		1610 nm
Bandwidth at -3 dB		35 GHz	
Insertion Loss			4.9 dB
Center Frequency Setting Accuracy		± 4 GHz (32 pm)	±8 GHz (64 pm)
Center Frequency Setting Resolution		2 GHz (16 pm)	
Maximum Total Input Optical Power (all chan)			+23 dBm
Maximum Per Channel Optical Power			+10 dBm
Polarization Dependent Loss			0.5 dB
Polarization Mode Dispersion			0.2 ps

Table 8.0-2 - Optical Power Meter Specifications

Parameter	Minimum	Typical	Maximum
Input Power Dynamic Measurement Range[1]	-33 dBm		+23 dBm
Output Power Dynamic Measurement Range[1]	-46 dBm		+10 dBm
Resolution	±0.01 dB		
Relative Accuracy/Linearity	±0.1 dB		
Absolute Accuracy	±1.0 dB		

Note 1: This 56 dB dynamic range can be shifted lower or higher based on the customer's desired range.

Table 8.0-3 - Electrical, Mechanical, and Environmental Specifications

| Parameter	Minimum	Typical	Maximum
Power Interface		USB (+5V)	
Alternate Operating Voltage (DC Adapter Input)		+5V	
Operating Current (USB, max while tuning)		320 mA	490 mA
Operating Current (Ethernet, max while tuning)		330 mA	500 mA
Communications Interface		USB 2.0	
Optional Communications Interface		10/100BaseT	
User Interface		Custom GUI	
User Platform		Windows	
Optical Connectors (standard, others available)		FC/PC	
Operating Temperature Range	0 °C		40 °C
Dimensions		6.3" x 3.0" x 1.3"	

9.0   Mechanical Dimensions
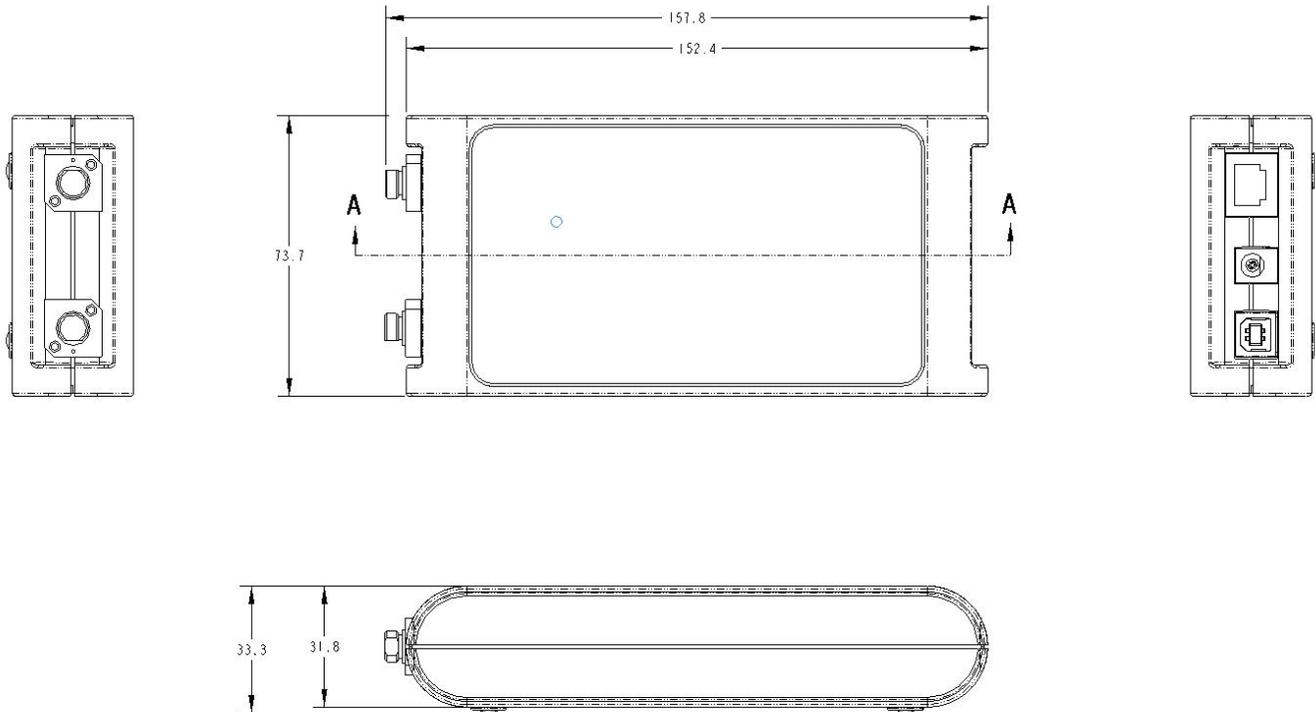
Figure 9.0-1 - TF-1000 Module Mechanical Dimensions

10.0 Part Numbers for Ordering

Table 10.0-1 - Part Numbers for Ordering

Description	Part Number
TF-1000 Tunable Optical Filter and Power Meter	TF-1000-☐☐☐-☐-☐☐-☐☐
C-Band: **C**, L-Band: **L**	
USB: **U**, or Ethernet: **E**	
Data logging: **D**, No Data logging: **N**	
FC/UPC: **U**, FC/APC: **A**	
Two digits for min input power monitor level, (Std= -33dBm): **33**	
Two digits for min output power monitor level, (Std= -46dBm): **46**	

Note that it is possible to get a customized input and output power monitoring range. The standard input power monitoring range is -33 dBm to +23 dBm and the standard output power monitoring range is -46 dBm to +10 dBm but this can be adjusted to meet the customer's needs.

Ordering Information:

XSoptix

800 Village Walk #316
Guilford, CT 06437
Ph: 203-401-8093

Email orders to: sales@xsoptix.com
Fax orders to: 800-878-7282