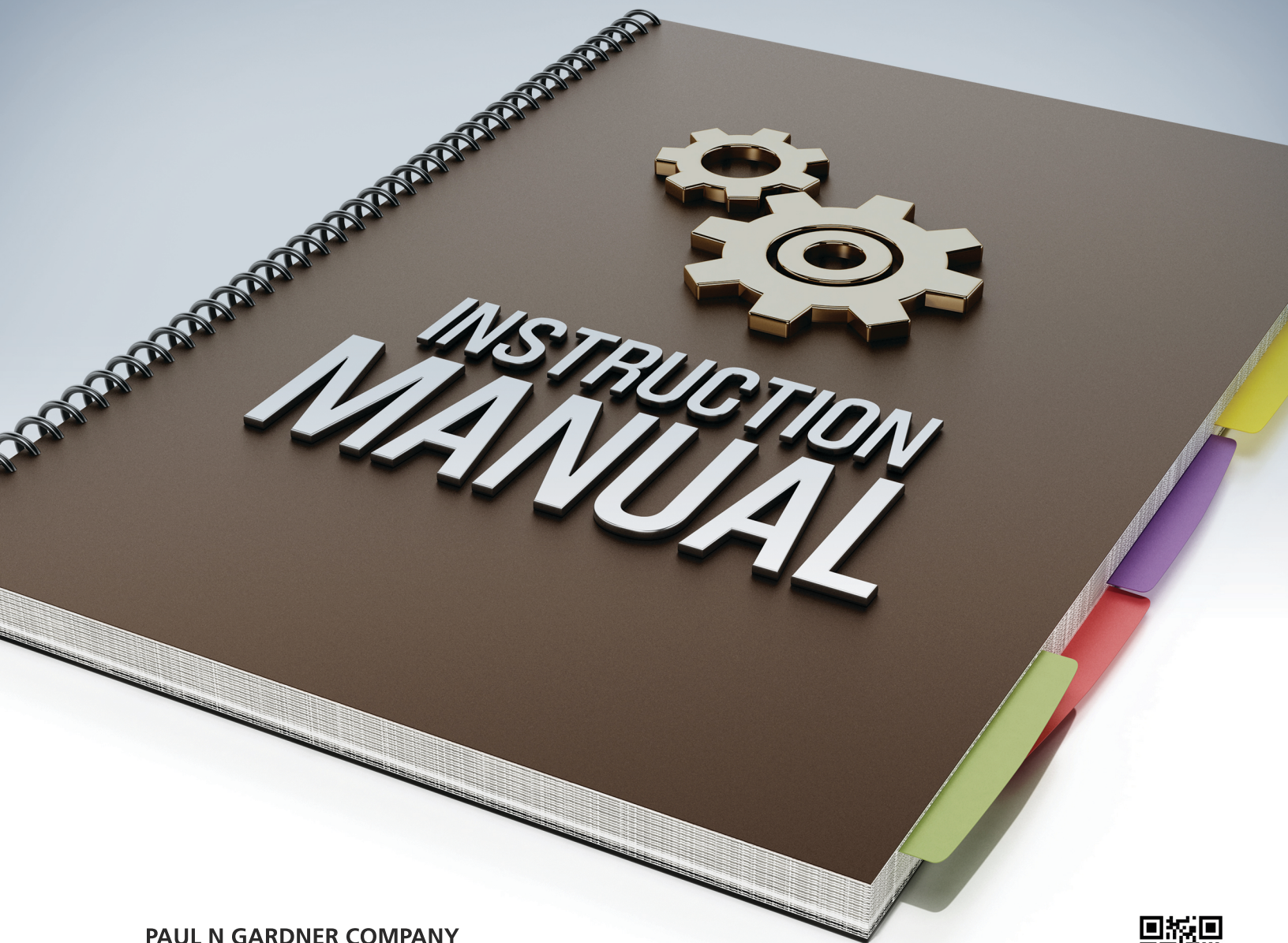




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INSTRUCTIONS

GARDCO DISTRIBUTED PRODUCTS





UV PowerView Software® III

UV Radiometer Profiling Software

User's Guide

**For use with the EIT® PowerMAP® II, LEDMAP™, LEDCure™
Profiler, Power Puck® II Profiler and UviCure® Plus II Profiler
Radiometers**



EIT®, PowerMAP® II, Power Puck® II, UviCure® Plus II, UV PowerView Software® III, LEDMAP™ and LEDCure™ are registered ® marks or trademarks™ of Electronic Instrumentation and Technology LLC

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1. Basics of UV Measurement

1. Basics of UV Measurement

Congratulations! As a PowerView Software® III user, you have made a strong commitment to accurate and reproducible UV measurement by purchasing the finest and most popular tools available. The EIT PowerView Software® III application provides data analysis and file sharing capabilities for your PowerMAP II, LEDMAP, LEDCure Profiler, Power Puck II Profiler and/or UviCure Plus II Profiler instruments.

Note: This manual uses the term “*Map*” to refer to PowerMAP II & LEDMAP and the term “*Profiler*” to indicate Profiler versions of the LEDCure, Power Puck II and UviCure Plus II.

This section is intended to be a quick explanation of the basic principles of UV measurement.

Why Should I Measure?

A common mantra in quality control is that “you cannot control what you do not measure.” The best companies do not haul out their test equipment only when things fail – they monitor the condition of their process often and make corrections as they are warranted.

Here are a few reasons to measure the performance of your UV system:

- To avoid costly downtime, rework and scrap due to diminished UV output
- As part of an ISO or QS- SPC or other quality assurance program
- To optimize your curing process and increase productivity and profits
- To communicate more clearly with partners, suppliers and customers
- For suppliers- to document a curing process so it can be replicated in the field

What Should I Measure?

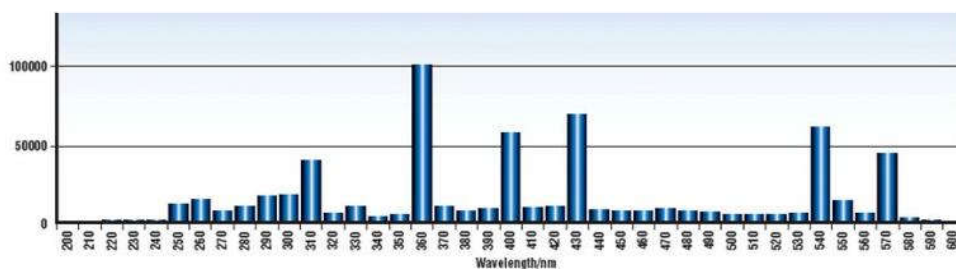
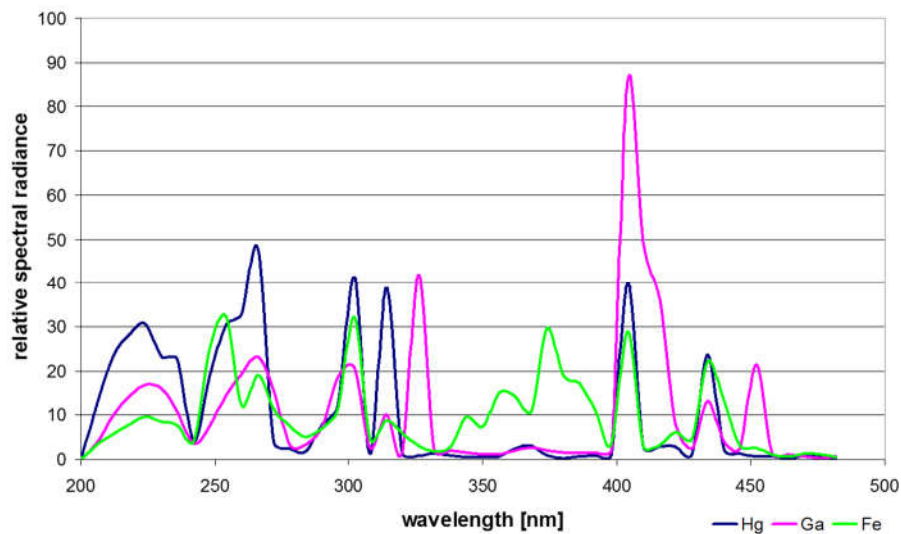
When you bake a cake, you care about two variables: oven temperature and cooking time.

When you cure UV materials you are concerned about three factors: Wavelength(s) of the UV, Power (or irradiance), and Energy (or energy density). Each of these parameters can alter the degree of cure at the surface, at the substrate, or throughout the material.

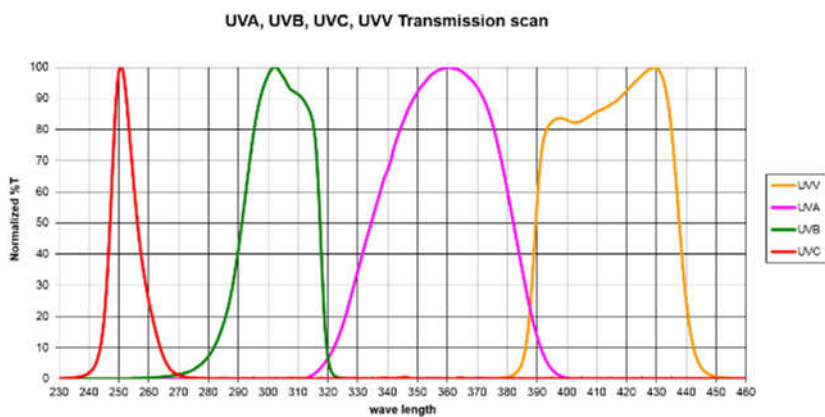
Wavelength: The output of a UV source can vary based on the source type and whether is it a UV broadband or UV LED source.

UV Broadband Sources: These are mercury based and characterized by a “broad” (wide) output across the UV spectrum. Typical bulb types include mercury (sometimes called H), mercury-iron (D) or mercury-gallium (V). The actual output can vary from supplier to supplier and how the output is displayed. Two different examples are shown below.

1. Basics of UV Measurement



**Top: Mercury, Mercury-Iron and Mercury-Gallium Bulbs
Bottom: Mercury (H) Courtesy of Heraeus Noblelight**

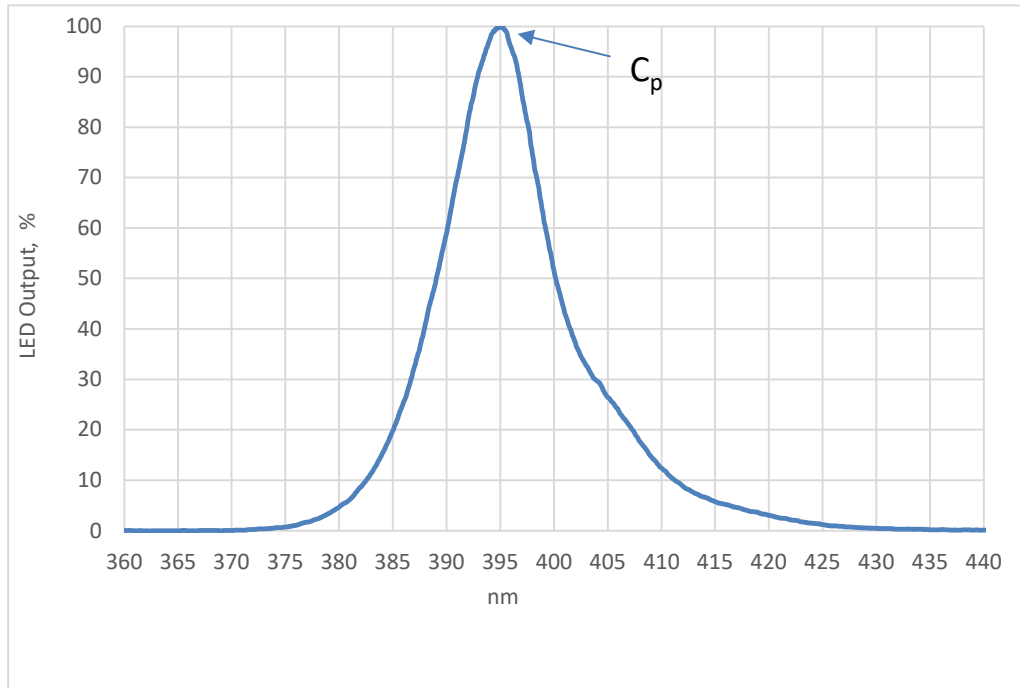


EIT UVA, UVB, UVC & UVV Response bands

The EIT UVA, UVB, UVC & UVV Instrument response bands have been designed to support the UV output from broadband (mercury) sources.

1. Basics of UV Measurement

UV LED Sources: The output from an UV LED source is determined by the source manufacturer. UV LED sources are usually specified by the center wavelength (CWL), in nanometers (nm). The CWL can vary +/- 5nm and the typical energy distribution at the 50% power point is 20-25 nm wide. Compared to a broadband source, an UV LED is fairly monochromatic.



Typical UV LED Output (EIT LLC)

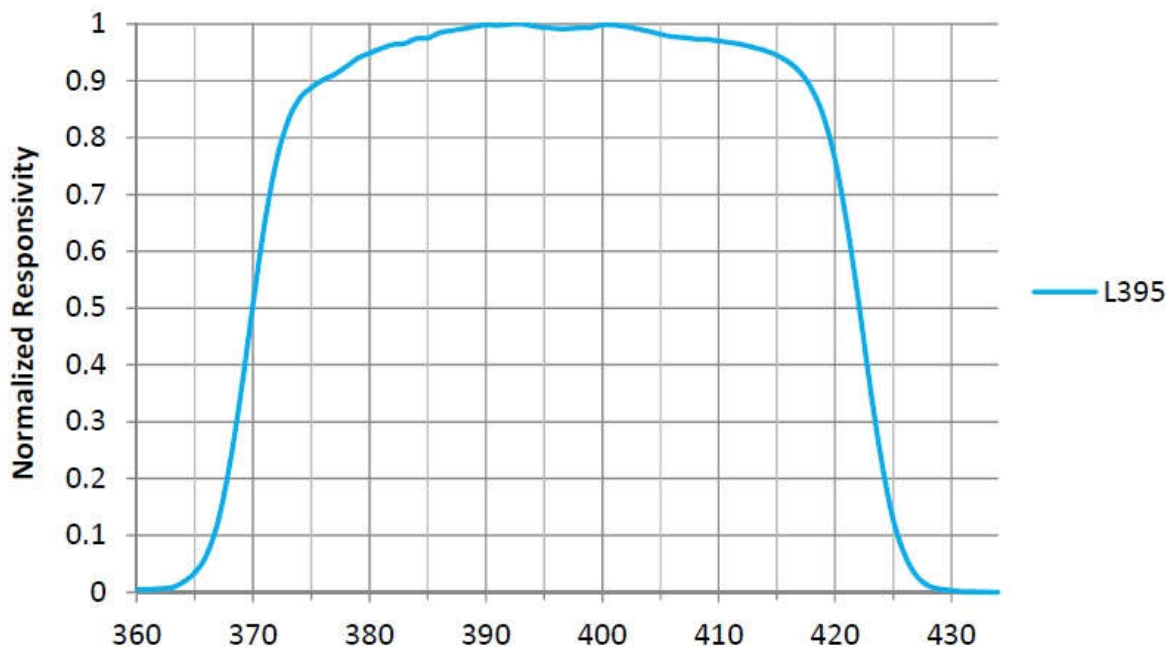
The distribution of energy across these bands depends on the design and operation of the LED source. UV LEDs are also supplied with output specified at particular wavelengths. Unintended changes in energy within various bandwidths can adversely affect properties such as surface or “through-cure”.

EIT has designed and patented a Total Measured Optic Response for LED wavelengths. Designated “L-Bands”, the optic response and band is identified by the letter “L” and the nanometer range (“395”) in which it was designed to measure.

“L” Band responses are available for 365, 385, 395 and 405 nm sources.

1. Basics of UV Measurement

The L395 band response is shown below.



The bandwidth response of EIT's LEDCure™ radiometer for the L395 band measurement.

UV Measurement Terminology

Power/Irradiance: Irradiance is the “brightness” of the light source. Irradiance generally falls off with distance as you move away from the UV source and/or as the light source output diminishes (reduced power) for any reason. If you move twice as far away from a broadband source, you expect the irradiance to fall off by the square (2^2) of the distance change and be approximately $\frac{1}{4}$ (25%) of the original value

Users will need to test how their LED system, made of many ‘point’ sources, responds as the distance and applied power change.

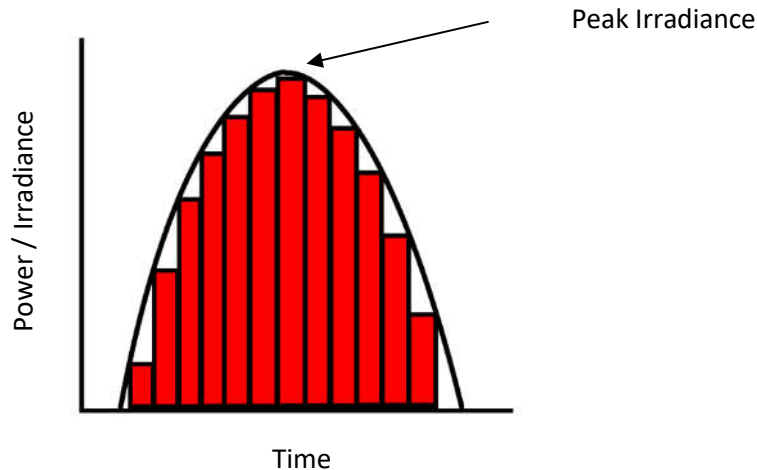
Irradiance is measured in Watts (W/cm^2) or milliWatts (mW/cm^2) per square centimeter. Although different in meaning from a technical definition, irradiance is sometimes also called intensity.

Energy/Energy Density: Irradiance alone is not a sufficient measure of the UV cure process since proper curing requires a certain amount of exposure time. Energy density is a measure of how much power was received over a length of time. Energy is measured in Joules (J/cm^2) or milliJoules (mJ/cm^2) per square centimeter. If you chart irradiance on a vertical axis against time on the horizontal axis, energy density is the area under the curve.

1. Basics of UV Measurement

To calculate the area under the curve, your EIT radiometer takes frequent irradiance readings, and then calculates and integrates this area.

Although different in meaning from a technical definition, Energy Density is sometimes also called “dose”. Be sure to communicate in the same language and terms.



Energy density is the total amount of energy exposure over time. It is the mathematical calculation of the area under the irradiance curve. The instrument calculates energy density by adding many irradiance samples together. The numerical irradiance reported is the peak irradiance value recorded by the instrument

Instrument Sample Rate: The irradiance value reported by the instrument can vary based on the effective sample rate of the instrument and the speed at which the data was collected. The faster the sample rate, the more accurate the instrument is able to capture the peak irradiance, especially at faster speeds.

The effective sample rate is based on the Data (not Optical) Filter Bandwidth. EIT instruments use different bandwidths for the data filters. From a technical standpoint we use 7, 35 and 700 Hz data filters in the “**Profiler**” (LEDcure Profiler, Power Puck II Profiler and UviCure Plus II Profiler) instruments and filters from 7-700 Hz in the “**Map**” (PowerMAP II & LEDMAP) instruments.

From a practical stand point we refer to the data filtering as an effective sample rate. The three data filters in the “**Profiler**” units equate to the following sample rates:

- 7 Hz: Effective sample rate of 25 samples/second, referred to as **Smooth On**
- 35 Hz: Effective sample rate of 128 samples/second, referred to as **Smooth Profiler**
- 700 Hz: Effective sample rate of 2048 samples/second, referred to as **Smooth Off**

The “Map” instruments have a user adjustable sample rate from approximately 128-2048 samples per second. The “Map” sample rate used is shown in the **Sample Information and Notes** pane in PowerView III.

1. Basics of UV Measurement

The “Profiler” instruments over sample. The effective sample rate of the data collected shown on the display of these instruments is user adjustable between Smooth On (25 Samples/Second), Smooth Profiler (128 Samples/Second) or Smooth Off (2048 Samples/Second). The irradiance profile (Watts/cm² as function of time) that is calculated by PowerView III for the “Profiler” instruments is fixed at 128 samples per second. Matching between the “Profiler” display and PowerView III calculated values is best achieved when the “Profiler” instrument is set to Smooth Profiler. The “Profiler” display sample rate is shown in the **Sample Information and Notes** pane in PowerView III. The PowerView III Software always calculates the irradiance at an effective sample rate of 128 samples per second for “Profiler” instruments.

Where Should I Measure?

The EIT “Map” and “Profiler” instruments are designed to be self-contained, compact instruments that can be placed in the UV process environment.

The optical window on the radiometer should be positioned so that it faces the UV source in the same location and orientation as production parts in order to provide the most representative measurement of irradiance at the part surface.

Your EIT radiometer is a sensitive electronic device and should not be exposed to long, high UV intensity runs with extremely high temperatures. An over temperature alarm will sound if the internal temperature of the device goes over 65°C. Modify your data collection procedures to avoid damaging the instrument if the alarm sounds.

If you elect to use the thermocouple on the “Map” units, we suggest securing it to the body of the instrument or the substrate/coating. The thermocouple should not be left to ‘flap around’ freely if you need temperature measurements.

The display window on the “Profiler” instruments should not be exposed UV. If needed, cover it during the collection of data.



If your instrument is too hot to touch, it is probably too hot to take a reading.

How Often Should I Measure?

Regular measurement will help you detect problems before they affect your process. You should establish a regimen that fits your production schedule. The frequency of measurement is a function of understanding your system, process/process window and product. Some customers, especially in the medical field, measure each lot of product produced while others will measure the UV once per production shift or even once per day.

1. Basics of UV Measurement

You should measure your process each time you make a significant alteration to your curing system, such as lamp changes, quartz window cleaning, lamp repositioning or line speed changes.

EIT also manufactures several products that provide continuous measurement of UV irradiance for those customers who wish to constantly monitor UV output in real-time. These devices do very good job or tracking changes and when used in combination with an EIT “Map” or “Profiler” instrument.

Using both approaches provides a powerful combination for tracking real time changes and having absolute values. Visit the EIT website <http://www.eit.com/uv-products/radiometers-online-monitors> for more information about online monitoring products.

Where Can I Get More Information on UV/UV LED Measurement?

There are a number of helpful publications and technical papers on UV/UV LED measurement and process control posted on our website: <http://www.eit.com/uv-products/technical-papers-presentations>. EIT frequently presents educational talks and seminars at industry & trade show events.

We also have a knowledgeable, trained group of sales representatives and distributors worldwide who can help and advice. To locate a representative in your region, visit:

<http://www.eit.com/uv-products/representatives-and-distributors>

Care & Cleaning of your Measurement Device

EIT radiometers are used to design, measure and control industrial UV applications in a wide variety of locations. The environmental conditions that our instruments are exposed to vary from pristine (medical clean room) to challenging (wood manufacturing facility). Careful cleaning of the outer optics using the guidelines described will help your EIT instrument perform as designed between service intervals at EIT. The guidelines are general and specific questions should be directed to EIT (uv@eit.com).

Instruments that stop functioning when accidentally dropped, get stuck in equipment or wind up covered or immersed with the product being cured need to come back to EIT for further evaluation using a Service Request Form found under Customer Service & Support. (<https://www.eit.com/uv-products/customer-service-support>)

A detailed set of instructions for cleaning the optical window of your radiometer is provided in **Appendix E** of this manual. Additional details can be found on the EIT web site at <https://www.eit.com/uv-products/care-and-cleaning> including information about how to purchase pre-packaged EIT Instrument Wipes specifically designed for maintaining your radiometer.

2. Collecting Data / Instrument Overview

2. Collecting Data / Instrument Overview

Do I Have the Proper Instrument and Software?

The latest version of EIT's PowerView Software® III is posted on our website: <https://www.eit.com/products/eit-instrument-markets-software> **Note:** PowerView III Version 4.3.5 or higher is required for the EIT LEDMAP. The version of your PowerView III is shown in **Help→About** from the main menu

Profiler “enabled” Puck style units can be identified on the top line of the display.



LEDCure Profiler units can also be identified by the label on the face of the unit.



PowerView III software will **not** work with Standard (i.e., Non-Profiler) Puck units. Please contact EIT to see if a “Standard” LEDCure, Power Puck II or UviCure Plus II can be upgraded to “Profiler” version of the unit. The unit cannot be upgraded in the field and must be returned to EIT.

SOFTWARE NOTES

PowerView III is the recommended software and it will download information from the “Maps” and “Profiler” enabled Pucks. Changes were also made to simplify the operation of PowerView III compared with previous versions of PowerView II.

- The file format (*.tdms) is the same file format used in PowerView II.
- Files collected with PowerView II can also be opened with PowerView III.
- PowerView III will not support communication with the original, legacy version of PowerMAP
- These files can then be viewed with PowerView II or PowerView III.

2. Collecting Data / Instrument Overview

Basic Instrument Layout & Controls: “Puck” Style *Profiler* Units

Power Puck II Profiler

- Optimized for broadband (mercury) sources it has four bands (UVA, UVB, UVC and UVV)
- Data is transferred to PowerView III at fixed sample rate of 128 Hz

UviCure Plus II Profiler

- Optimized for broadband (mercury) sources it has a single band (UVA, UVB, UVC or UVV) specified at the time of order
- Data is transferred to PowerView III at a fixed sample rate of 128 Hz

LEDCure Four Band Profiler

- Optimized for LED sources it has four bands (L365, L385, L395 and L405)
- Data is transferred to PowerView III at fixed sample rate of 128 Hz
- Additional information on the LEDCure Four Band Profiler can be found in the application notes in Appendix G

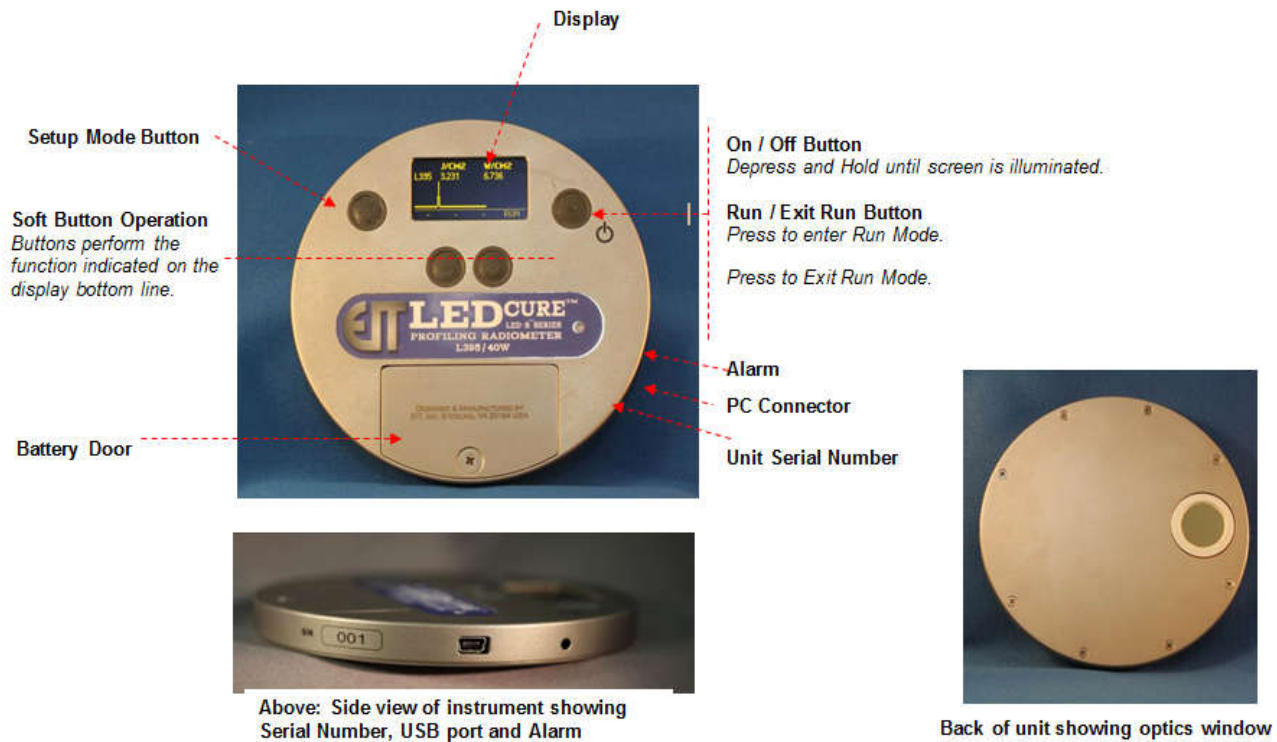
LEDCure Profiler

- Optimized for LED sources it has a single band (L365, L385, L395 or L405) specified at the time of order
- Data is transferred to PowerView III at a fixed sample rate of 128 Hz

Operation of Puck Series Instruments

The basic layout and controls for the EIT LEDCure, Power Puck II/UviCure Plus II Profiler devices are similar.

2. Collecting Data / Instrument Overview

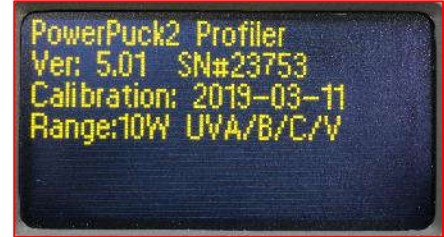


2. Collecting Data / Instrument Overview

Basic operations of the “Puck” Style Instruments are below. For detailed information, refer to the full product manuals posted on www.eit.com

Turning On the Radiometer

Press and Hold the ON / OFF button until the display illuminates. The display will briefly display the Radiometer Model Name, Serial Number, Software Version, Calibration Date, Range, and Wavelength Band(s) installed. The display will then enter the default mode and display the data from the last run before the unit was turned off.



Turning OFF the Radiometer

Press and Hold the ON / OFF button. A tone will sound. When tone stops, release the button. The unit turns off.

Entering the RUN MODE

A short press of the “RUN” button clears the memory and puts the unit in the “RUN” mode. The display shows “RUNNING” after shortly displaying the internal temperature of the unit. Confirm that the unit displays “RUNNING” before initiating a reading.



Place the radiometer on the belt or object with the optic window looking toward the UV source. The display and buttons will be facing away from the UV source. When the radiometer exits the curing chamber, the display will still be flashing “RUNNING”.

CAUTION: Exposing the display to high UV radiation will damage it.

Exiting the RUN MODE

A short press of the “STOP” button (Soft button display bar indicates “STOP” next to the “ON / OFF” button) will exit the “RUN” mode. The display will have the new UV values.

Setup Mode

To enter the Setup Mode, use the soft button to the left of the display, Press and hold for 0.5 second, then release. The Setup screen will display the current settings. The current settings are indicated by an (*) asterisk.



UV Power Puck II Setup Screen

2. Collecting Data / Instrument Overview

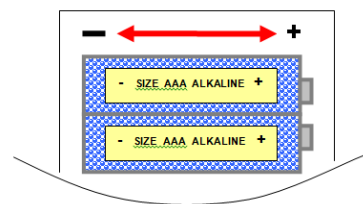
To change selections, use the down ▼ and right → arrow buttons located under the arrows to scroll in the indicated direction. To change the default selection, first select the line, then the setting on each line. Press the SAVE button to save the setting as the new default. An *asterisk will appear next to the setting.

When changes are completed, press the EXIT button to return to the default mode.

Replacing the Batteries in EIT Puck-style Instruments

The UV Power Puck II, UVICURE Plus II and LEDCure utilize user replaceable AAA alkaline cells. When replacing these batteries, the radiometer must be turned OFF. To replace the batteries:

1. Loosen the screw on the battery door and remove the door.
2. Remove the old batteries.
3. Install two new AAA size alkaline cells, observing polarity. As shown in the figure below, **both cells are installed in the same direction**. The proper direction is indicated on the PCB and on the housing inside the battery compartment. The unit is designed so it will not operate with reversed cells.
4. Replace the door and the screw.



Battery orientation in a Puck style radiometer

Expected battery lifetime is 20 hours of operation. The Puck instrument features a Low Battery *LB indicator. If a low battery indication occurs during a data collection run, the readings are still valid. The low battery indicator is designed to illuminate early enough so that your data remains valid. Under severe low battery conditions, the unit does not operate. Therefore, confirm that the unit flashes “RUNNING” before initiating a reading.

Basic Instrument Layout, Controls & Overview: “Map” Units

PowerMAP II

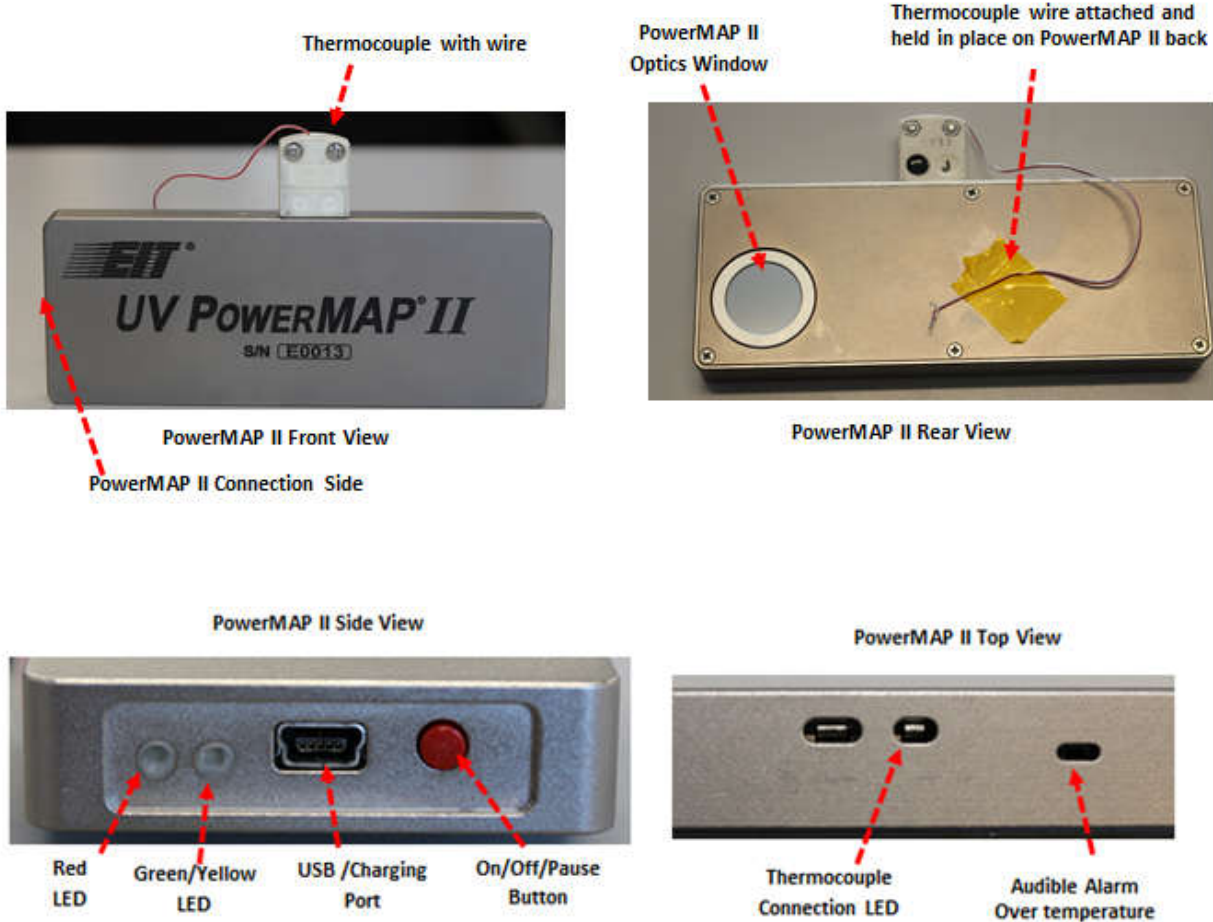
- Optimized for broadband (mercury) sources it has four bands (UVA, UVB, UVC and UVV)
- User adjustable sample rate (128-2048 Hz) and thermocouple

LEDMAP

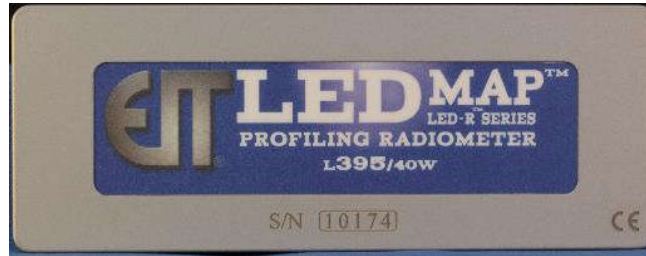
- Optimized for LED source, as of April 2020 it is available with single L395 band
- User adjustable sample rate (128-2048 Hz) and thermocouple
- Note: PowerView III Version 4.3.5 or higher is required for the LEDMAP
- Additional information on the LEDMAP can be found in the Application Notes in Appendix H

2. Collecting Data / Instrument Overview

The basic layout and controls for the PowerMAP II/LEDMAP are shown below:



2. Collecting Data / Instrument Overview



EIT LEDMAP



Flashing Red LED: Unit On and in Standby mode



Flashing Green LED: Active Data Collection



Flashing Yellow LED: Unit in Pause



No LED: Unit in Off Mode

PowerMAP II/LED MAP Button Functions

The “Map” button is used to toggle the instrument between four different modes: Standby, Data Collection Mode, Pause and Off

Push and Hold (Approximately 1 Second)

1. Turns unit on from off mode. Goes from No LED to Red Flashing LED
2. Turns Unit off from Red Flashing Mode

Quick Short Push (Approximately 0.25 second)

1. Allows you to switch from Flashing Red (Standby Mode) to Flashing Green Data Collection Mode.
2. The “Map” deletes previous files when the unit switches to Flashing Green Mode
3. Switch from Green Active Data Collection Mode to Yellow Pause Mode
4. The “Map” will allow the user to pause the unit up to 8 times to collect multiple files from different lines around a facility
5. Each push of the Pause function causes the PowerView III software to decrement the file into separate data files when transferred to the computer.

Long Push (Approximately 0.5 Seconds)

1. Move from Yellow or Green to Red
- Note: You may also elect to do a Push and Hold when you are done collecting data to go from the Yellow or Green Modes to unit off Mode.

2. Collecting Data / Instrument Overview

PowerMAP II/LEDMAPI Batteries and Charging

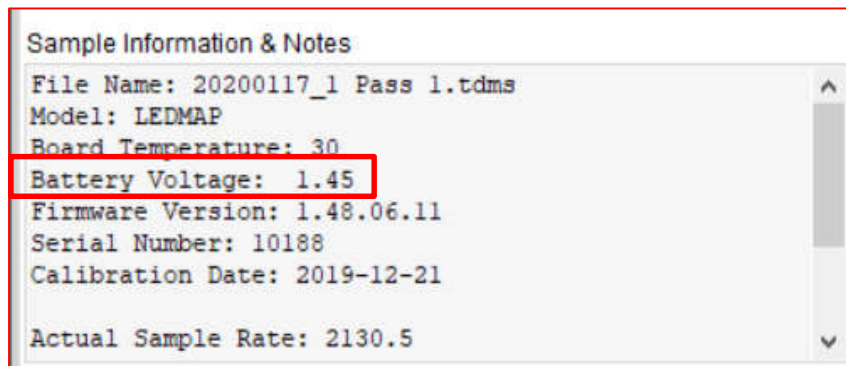
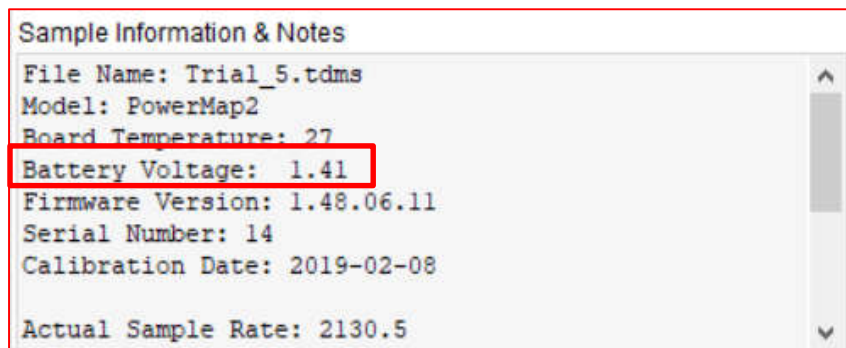
The PowerMAP II and LEDMAP utilize a long-lifetime, rechargeable battery. This battery is not field-replaceable and is charged through the mini-USB port on the device. A mini-USB to USB cable is provided with the unit along with an AC power Smart Charger. The Smart Charger has universal plug adaptors.

The Smart charger provided with unit recharges in fast mode (+/- 90 minutes).

The unit may also be charged via a USB port (i.e. computer). The charge time when using a USB port varies based on the USB port performance.

Battery life of 100 minutes is typical on a full charge.

The battery charge status is shown in the **Sample Information & Notes** pane in the PowerView III. A full charge will show as up to 1.5 Volts. In the examples below, the PowerMAP II (top) Battery Voltage was 1.41 Volts while the LEDMAP (bottom) battery voltage was 1.45 Volts.



3. Installing the Software

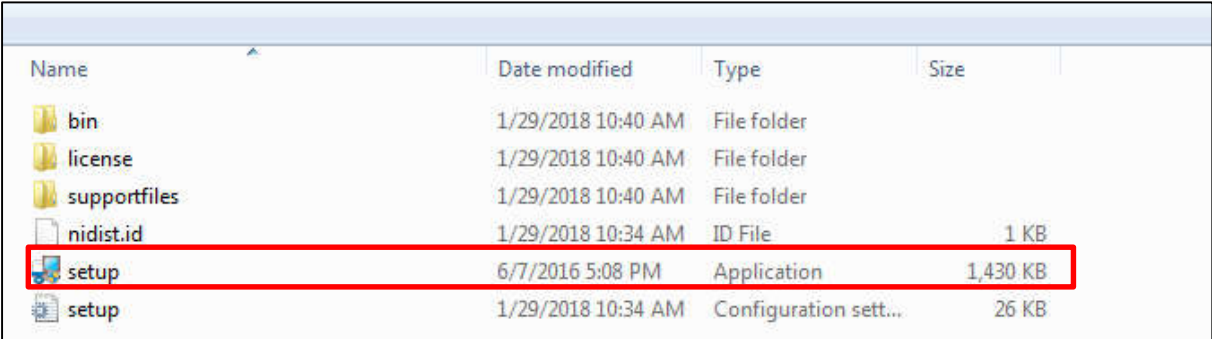
3. Basic Software Installation Procedure

The EIT PowerView® Software III is digitally signed, designed to run in a Microsoft Windows environment and can be installed on Windows 7-10 platforms. The system can also be installed on Apple computers that provide a dual boot operating system by running the program using a compatible Windows operating system.

The latest version of the PowerView III Software is located on the EIT website at: <https://www.eit.com/products/eit-instrument-markets-software>

PowerView III is available as a 32-bit or 64-bit program. When downloading the software from the EIT website, first download and save the software and then click on the **setup.exe** file. Do not try to install the software directly from the EIT website.

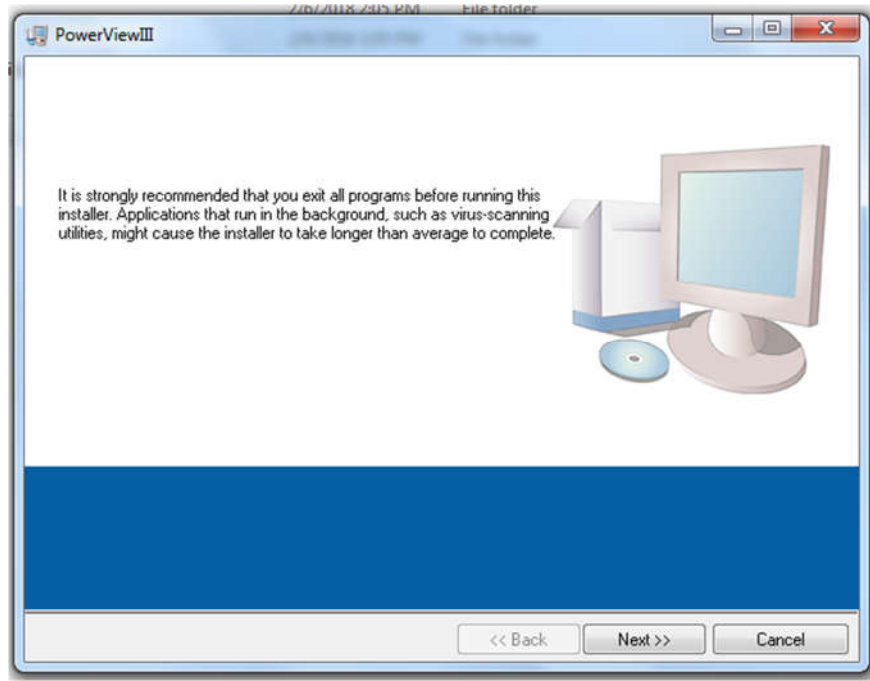
As part of the installation procedure, the software will also install needed National Instruments LabVIEW files. The installation utility will guide you through the PowerView Software® III installation process.



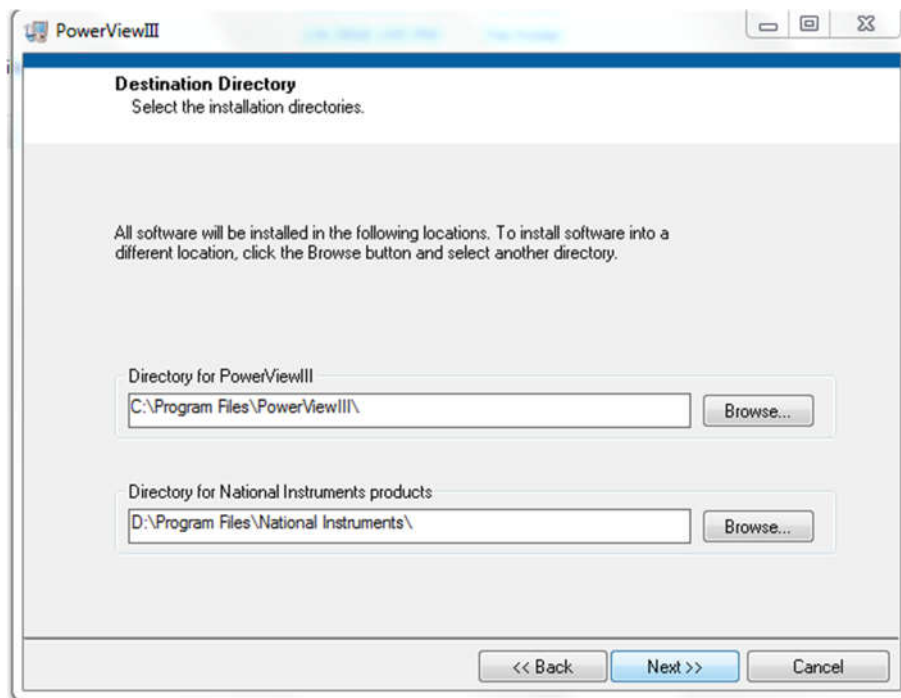
Name	Date modified	Type	Size
bin	1/29/2018 10:40 AM	File folder	
license	1/29/2018 10:40 AM	File folder	
supportfiles	1/29/2018 10:40 AM	File folder	
nidist.id	1/29/2018 10:34 AM	ID File	1 KB
setup	6/7/2016 5:08 PM	Application	1,430 KB
setup	1/29/2018 10:34 AM	Configuration sett...	26 KB

Select the setup.exe file to begin the PowerView Software III

3. Installing the Software

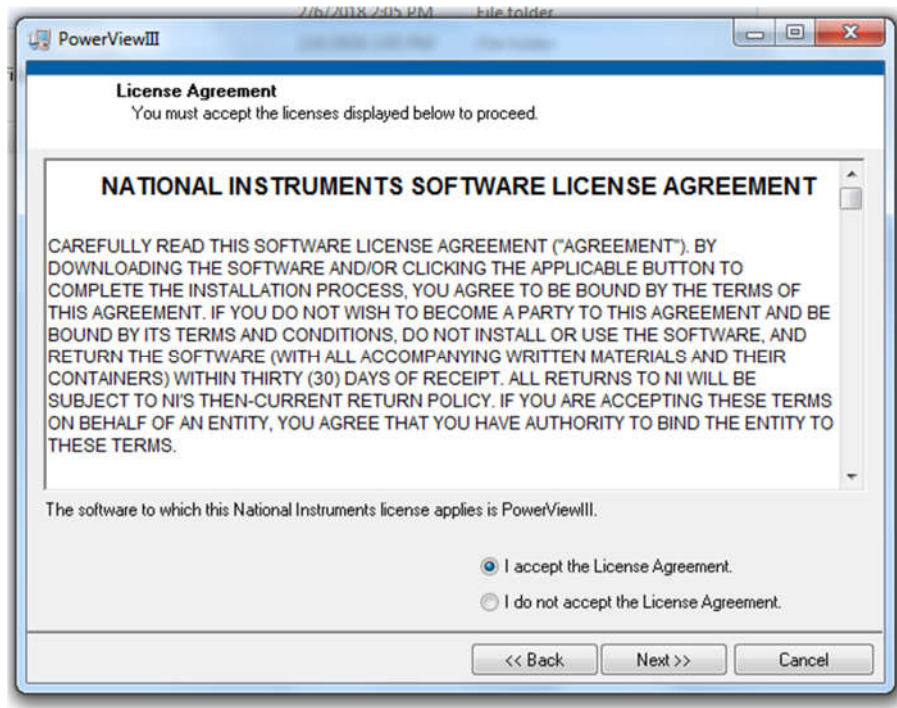


Step 1 of the process. Getting ready for download.

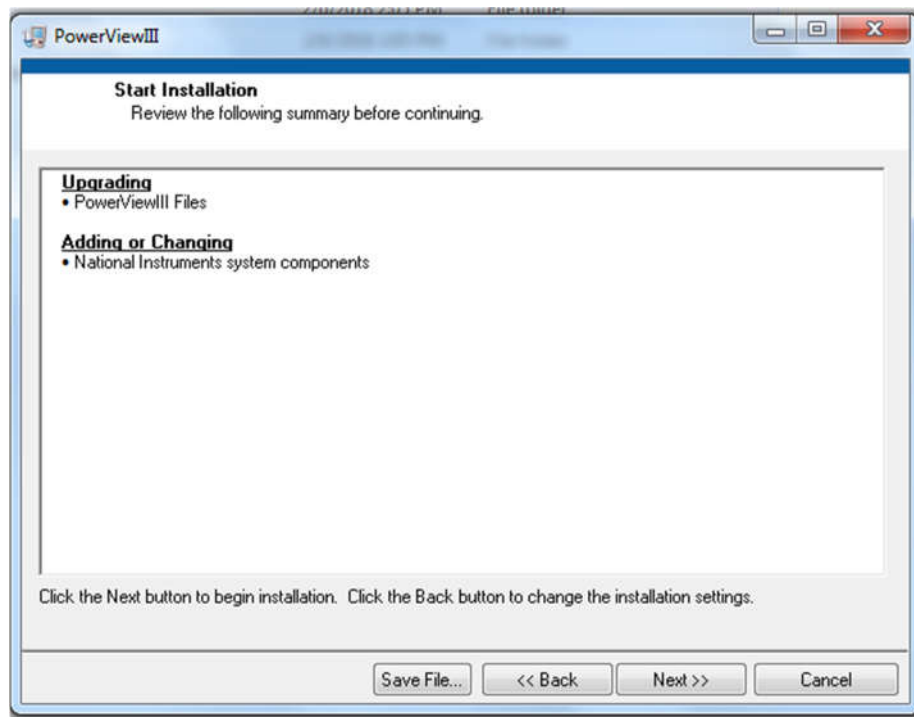


Step 2 of the process. Set the location for the PowerView software or use the default setting.

3. Installing the Software

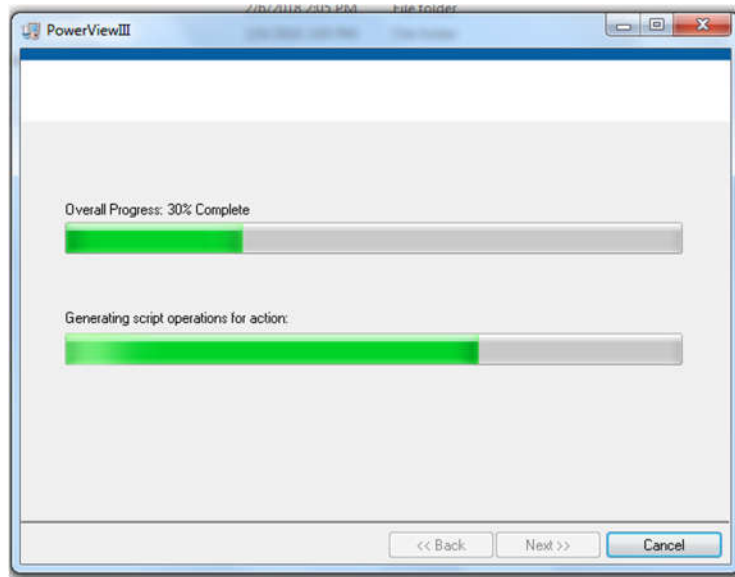


Step 3. Accept the installation license terms and select “Next>>” to continue

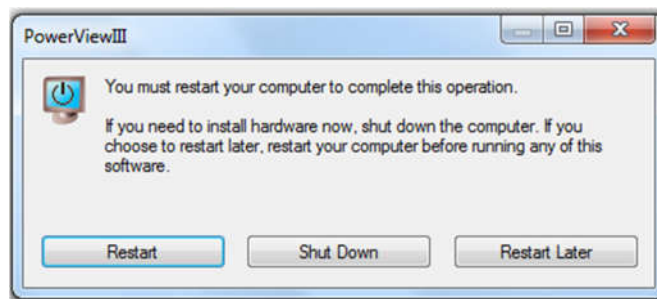
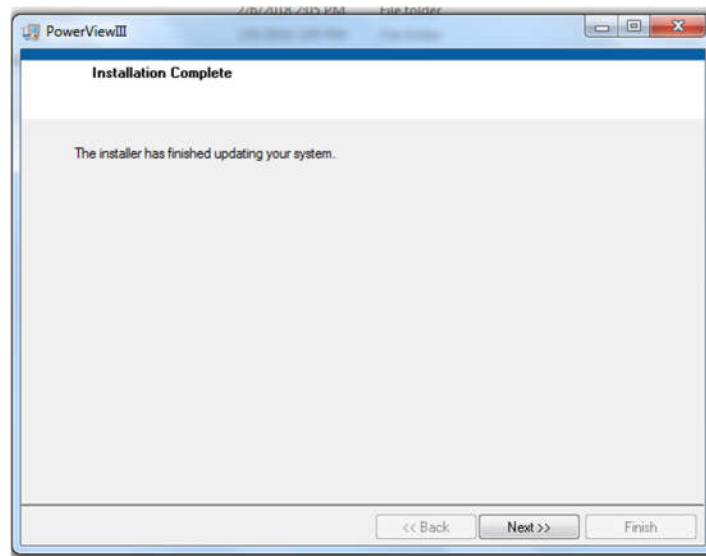


Select Next>> to accept the software changes and additions

3. Installing the Software



Do not interrupt installation process until it is complete.



Finally, you must restart your computer to complete the installation process.

3. Installing the Software

The software has been optimized for a display resolution of 16:9

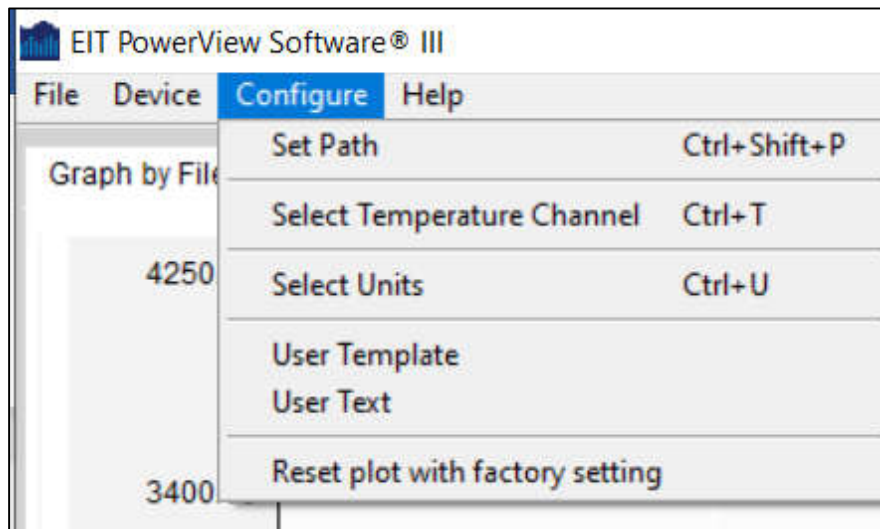
You may also want to install a Shortcut to the PowerView program on computers desktop following the procedures of your Windows operating system version.

Demonstration (Demo) Data Files

PowerView Software III contains demonstration or “Demo” data files, some of which are used in this manual to illustrate how to use your profiler. These files can be accessed by clicking on the Demo Button in the upper right of the screen. The “Back to Data Folder” button points the PowerView III software back to the location where you have placed collected data files.



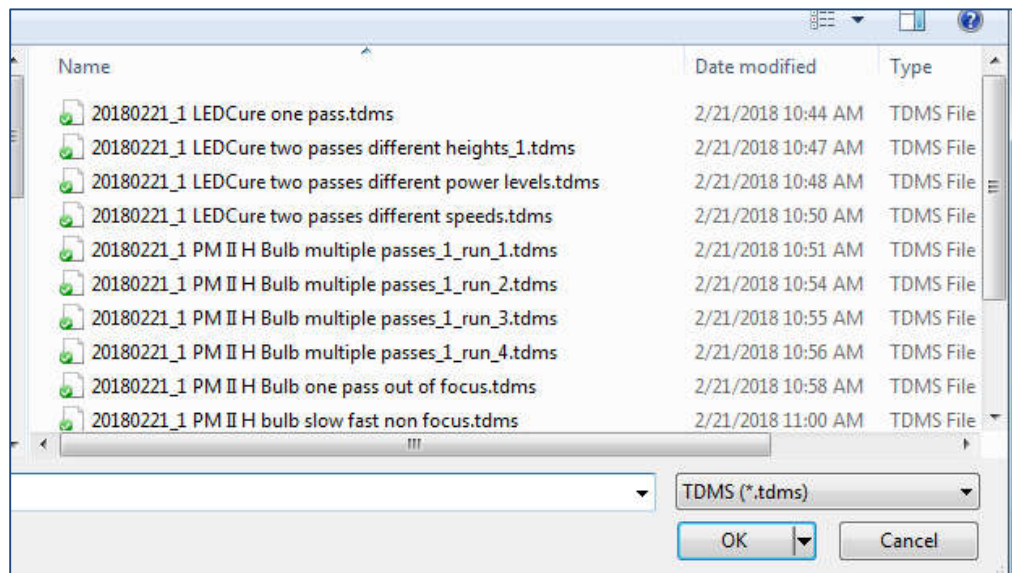
The “path” to your files can be specified under the configure tab on the tool bar. This is described in Section 5 of this manual in more detail.



There are 14 demonstration data files:

- 4 UV LED files collected with an L-395 LEDCure™ Profiler
- 6 microwave source files collected using a UV PowerMAP® II
- 4 arc lamp systems: 2 of which with a UV PowerMAP® II, 2 Power Puck® II Profiler
- The instrument used is displayed in the System Information panel at the bottom of the screen
- A thumbnail of each of these files is shown in Appendix E

3. Installing the Software

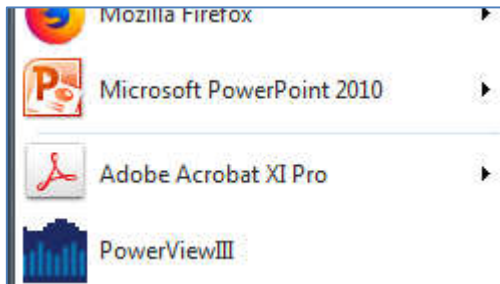


You may open any of the 14 supplied LED, microwave or arc lamp demo files

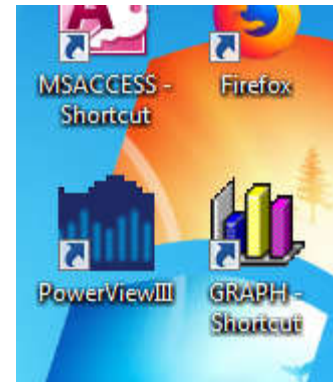
4. Starting PowerView Software III

4. Starting the PowerView Software® III

Once installed, the EIT PowerView Software® III application can be started by clicking on the **PowerView III** icon the Programs menu of your Start Button. From the Start Button you can select **EIT → PowerView III → PowerView III** to open the application. You may also create a shortcut.



Accessing PowerView III from the START Menu



The PowerView III from a shortcut Desktop Icon

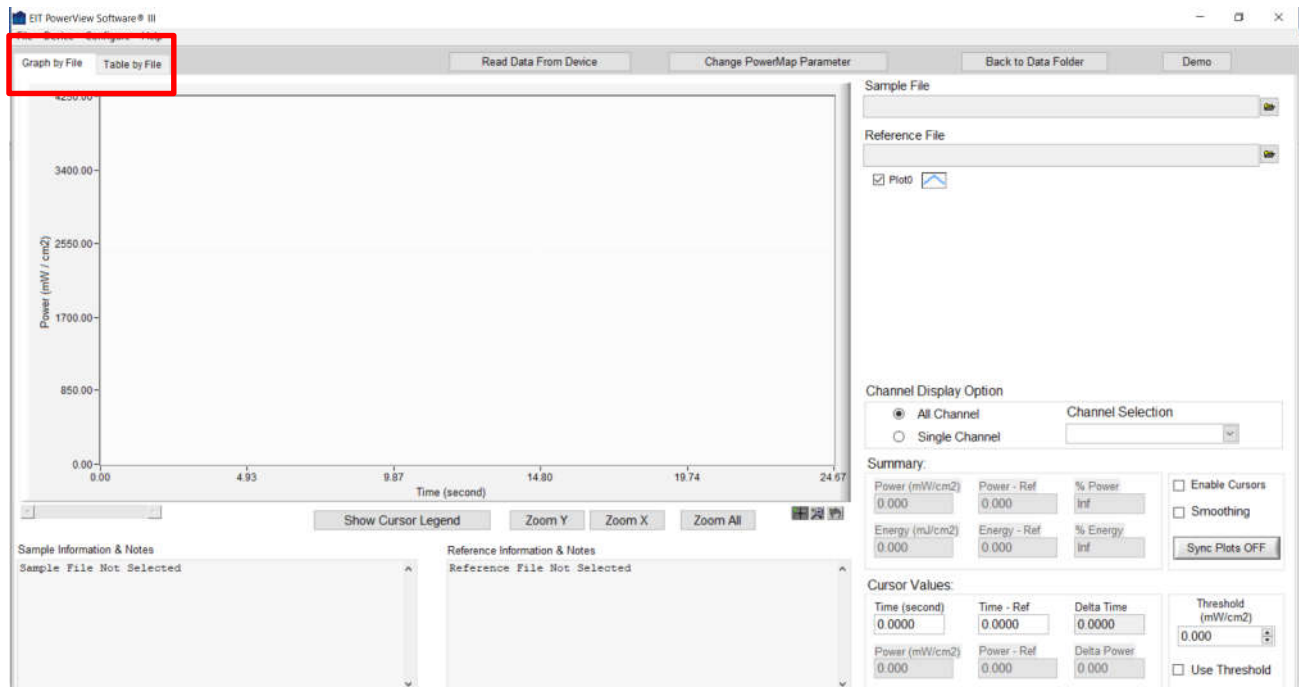
Either action should launch the PowerView Software® III application. It may take a moment or two to load the software package during which time you should see the following welcome screen:



The PowerView III Welcome Screen

4. Starting PowerView Software III

Once the software has fully loaded, the main EIT PowerView Software® III screen should appear. You may need to adjust your monitor's display settings so that you can see the entire screen on your monitor. Notice that there are two “tabs” and the default “**Graph by File**” view is selected.



The default PowerView III screen showing the Graph by File view

Configuring Your “Profiler” Device for PowerView Software® III

As described in the Basics of UV Measurement, calculating energy density accomplished by mathematically summing many irradiance samples together (see Chapter 1). The rate at which these samples are collected can result in slightly different values.

EIT “Puck Style” instruments have 3 Smooth settings: “Smooth On”/ “Smooth Off”/ “Smooth Profiler”. Adjusting your instrument to “PROFILER” mode, sets the effective sample rate of the instrument to 128 samples/second. This is the rate PowerView III Software uses to calculate the irradiance, irradiance profile and energy density readings from the transferred data, no matter how the instrument display is set. This allows the values calculated by your radiometer (and shown on the instrument display) to closely match the values calculated by PowerView Software® III.

4. Starting PowerView Software III

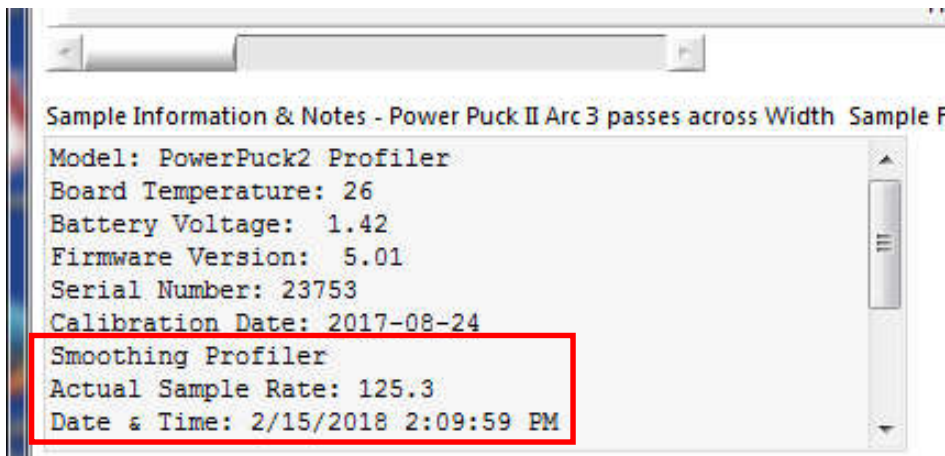


For matching between PowerView Software® III and the instrument display select SMOOTH PROFILER in SETUP Mode. Be sure to SAVE the setting prior to exiting the Setup Mode.

To Change The SMOOTH Instrument Setting:

1. Enter the Setup Mode, using the soft button to the left of the display
2. Press and hold for 0.5 second, then release. The Setup screen will display the current settings.
3. Default modes will appear proceeded with an *asterisk.
4. To change selections between SMOOTH ON, SMOOTH OFF and SMOOTH PROFILER, use the down ↓ and right → arrow buttons located under the arrows to scroll in the indicated direction.
5. To change the default selection, first select the line, then the setting on each line.
6. Press the SAVE button to save the setting as the new default.
7. An *asterisk will appear next to the setting to confirm it.
8. When the changes are completed, press the EXIT button to return to the default mode.

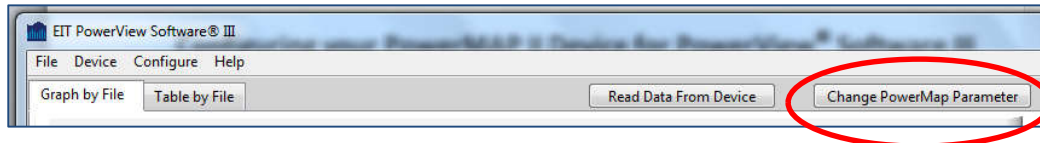
Note: The selected “Smooth” mode the user has set in the instrument will be displayed by the PowerView Software® III program. Note that the “Actual Sample Rate” and the “Date & Time” that the information was transferred to the computer are also displayed in the Sample Information & Notes box.



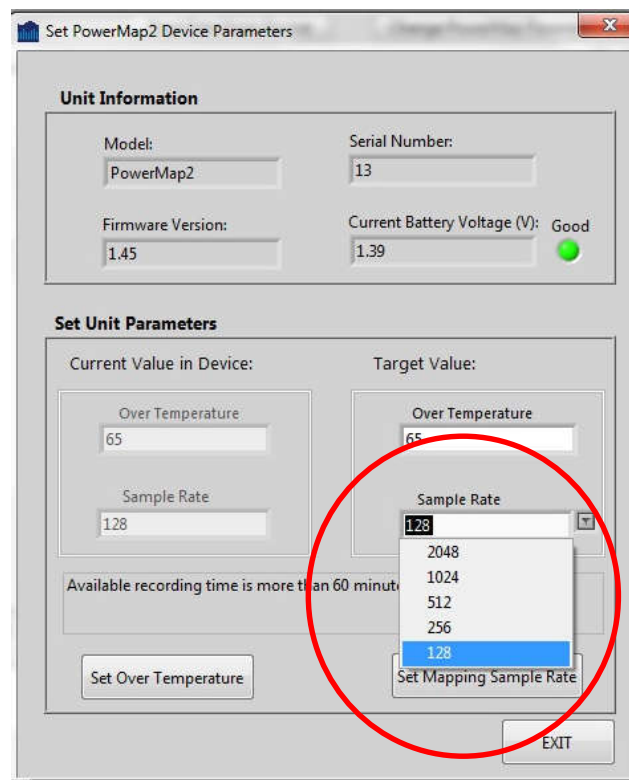
4. Starting PowerView Software III

Configuring your “Map” (PowerMAP II/LED MAP) Device using PowerView® Software III

The “Map” has user adjustable configurations. In order to make changes to the default parameters, the PowerMAP II or LEDMAP must be connected to your computer via the USB cable and powered on in the Standby (Red LED) Mode. Once in this mode you may select the Change PowerMAP II Parameter tab below the main toolbar:



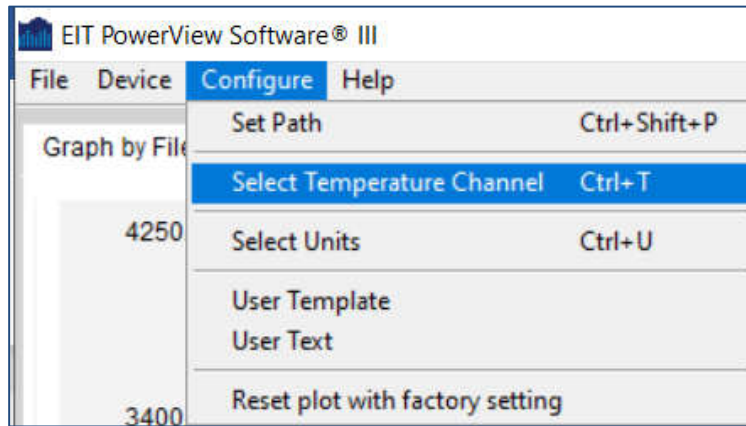
You may set desired sample rate from 128-2048 Hz.



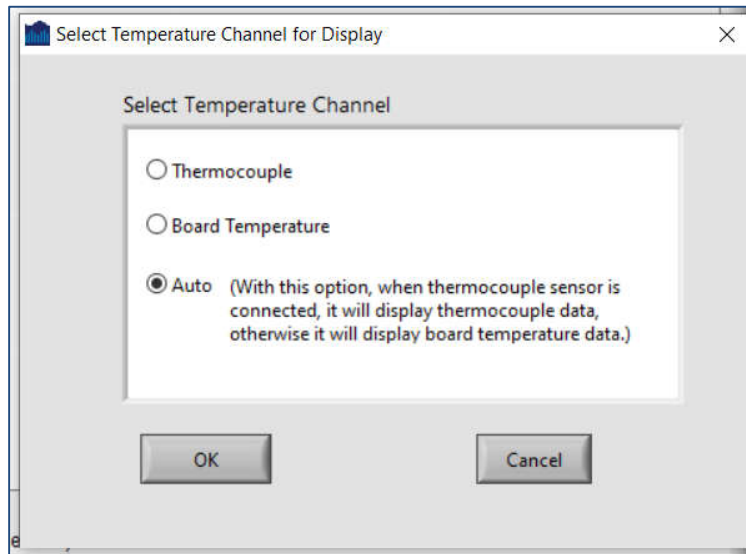
The PowerMAP II can collect 65 minutes of data, even at the fastest effective sample rate of 2048 Hz. There is more resolution at faster sample rates but the tradeoff is longer download times and larger data files.

4. Starting PowerView Software III

You may also select the temperature parameter you would like the software to display (Board, Thermocouple, or Auto), by selecting **Configure** → **Select Temperature Channel** from the main toolbar.



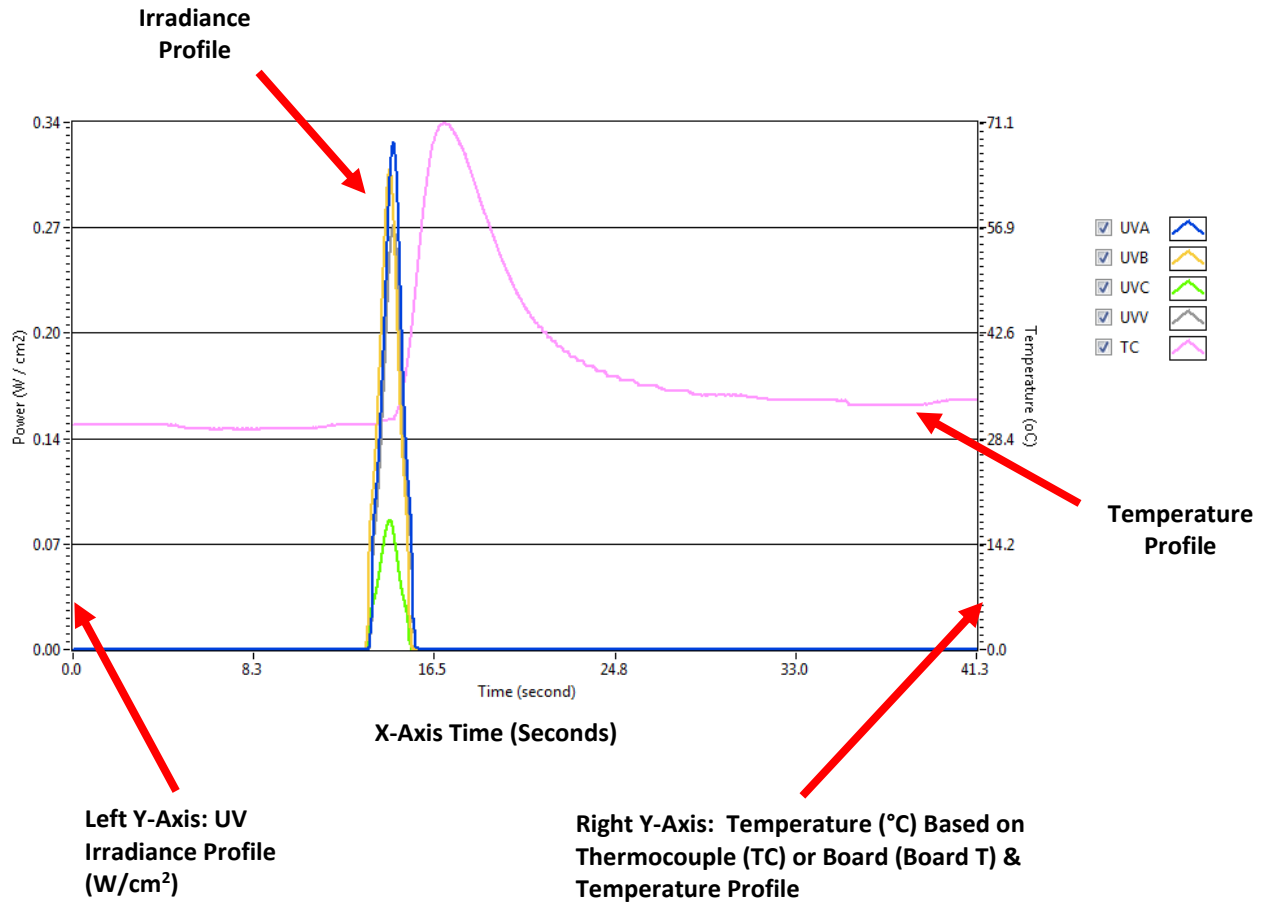
This will open the Select Temperature Channel radio button dialog box:



Selecting Auto will display the Thermocouple Temperature when it is connected or the internal board temperature of the PowerMAP II printed circuit board when the Thermocouple is not connected.

4. Starting PowerView Software III

Elements of PowerView III GraphView with “Map” Instrument



The temperature profile is often much higher than the UV profile. It is sometimes best to turn off the Thermocouple (TC), scale the UV irradiance profile and then turn the temperature profile (TC) back on.

Warning: The Map or Profiler Instruments are NOT designed to collect data while they are connected to a computer via the USB cable.

Data collected by the “Map” or “Profiler” radiometers can be downloaded from the device and saved on your computer as a data file (.tdms). This data can then be viewed and analyzed using the EIT PowerView Software® III application. The PowerView III .tdms file may also be analyzed with Microsoft Excel® by using the TDM ADD-IN available for Excel.

5. Importing Data from an EIT Radiometer

5. Importing Data from an EIT Radiometer

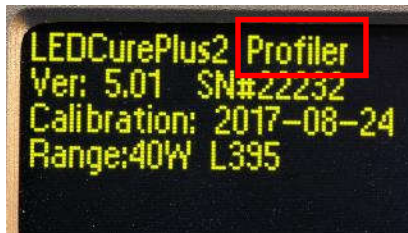
To Download Data from a “Profiler” Radiometer:

1. Connect the device to the computer using the factory supplied USB to mini-USB connector. (Note: The USB-mini USB cable is a standard cable that is widely available if your cable is lost, misplaced or damaged. The cable can also be purchased from EIT if desired.)



Connecting a Radiometer via the radiometer's mini-USB connector

2. Confirm you have a Profiler unit. Turn on the device by depressing the Power On/Off button



5. Importing Data from an EIT Radiometer

To Download Data from a “Map” Radiometer:

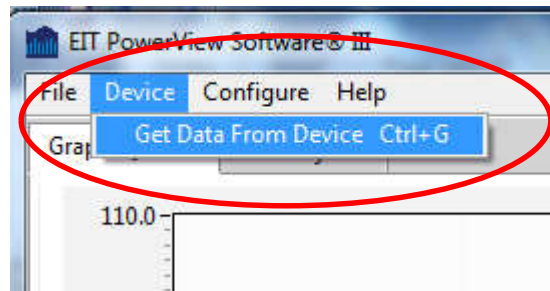
1. Connect the device to the computer using the factory supplied USB to mini-USB connector. (Note: The USB-mini USB cable is a standard cable that is widely available if your cable is lost, misplaced or damaged. The cable can also be purchased from EIT if desired.)



Connecting a Radiometer via the “Map” mini-USB connector

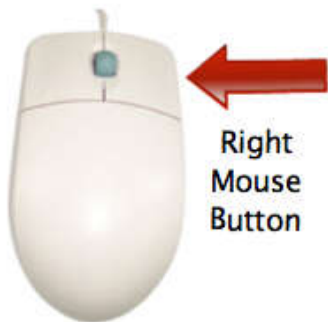
2. Turn the “Map” on and make sure the Red light is blinking

On the EIT PowerView Software® III toolbar, select: **Device** → **Get Data From Device**



Transfer data by selecting → **Device** → **Get Data From Device**

As you will see with PowerView III, there are often multiple ways to perform common tasks. In addition to the toolbar, try right clicking throughout the software with your mouse.



Many PowerView Software® III features can be accessed easily by right-clicking when your mouse is properly positioned on the screen.

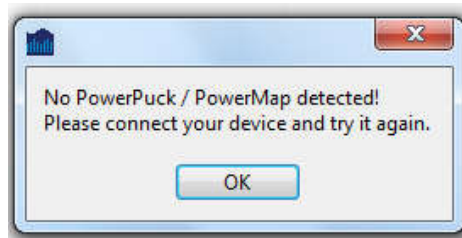
5. Importing Data from an EIT Radiometer

To transfer data from your radiometer to the PowerView Software® III program, you can also point your mouse to the Device **Read Data From Device** tab at the top center of the screen. This will activate a dialog box which contains the **Read Instrument** option



Transfer data by selecting → Read Data From Device is located at the top-center of the screen.

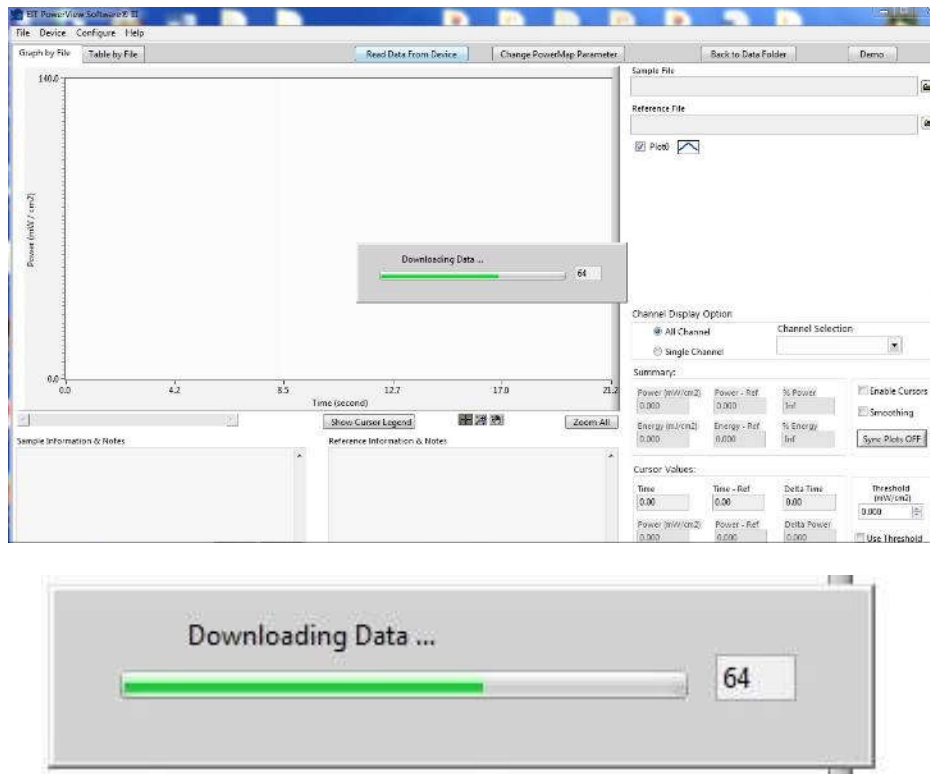
If a device is properly connected, a dialog box that allows you to select the location to download the data will open. If no device is recognized an error message will appear. Please assure the device is properly connected and powered on.



If no device is connected or the unit is off, you will receive a message

You should observe the “Downloading Data” dialog box (though it may flash by too quickly to read) while data is being imported from your device into the EIT PowerView Software® III application.

5. Importing Data from an EIT Radiometer



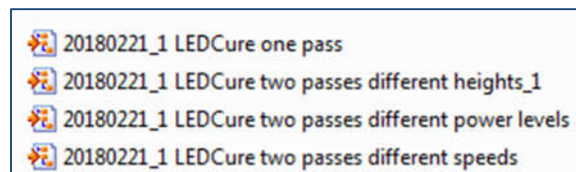
Download Data which shows progress bar and counter in seconds

Reading data from your radiometer does not remove any data from the device, but merely transfers the data into the software for analysis. Your original data is preserved in the instrument until you take a new reading by entering the RUN mode.

Note: The file structure and storage location for ‘behind the scenes’ files varies significantly for different versions of Windows. The Driver which allows communication between the instrument and Windows is digitally signed. If the PowerView Software® III fails to recognize your EIT radiometer, or successfully transfer data contact your internal IT resource or EIT (uv@eit.com).

Creating Data File Names

Once the file is downloaded, you will be prompted to save the file. PowerView III will prompt you with a “YYYYMMDD_” format. You may elect to use this format and further name the file or save the files in any manner that meets your needs. You may use the factory selected default location, or create a new file folder and location.



Default file format structure showing “YYYYMMDD_” format plus user added name

5. Importing Data from an EIT Radiometer

Name	Date modified	Type	Size
20180221_1 LEDCure one pass	2/21/2018 8:22 AM	TDMS File	13 KB
20180221_1 LEDCure two passes different...	2/21/2018 8:32 AM	TDMS File	17 KB
20180221_1 LEDCure two passes different...	2/21/2018 8:25 AM	TDMS File	27 KB
20180221_1 LEDCure two passes different...	2/21/2018 8:29 AM	TDMS File	25 KB
20180221_1 PM II H Bulb multiple passes...	2/21/2018 8:14 AM	TDMS File	35 KB
20180221_1 PM II H Bulb multiple passes...	2/21/2018 8:14 AM	TDMS File	33 KB
20180221_1 PM II H Bulb multiple passes...	2/21/2018 8:14 AM	TDMS File	36 KB
20180221_1 PM II H Bulb multiple passes...	2/21/2018 8:14 AM	TDMS File	46 KB
20180221_1 PM II H Bulb one pass out of ...	2/21/2018 8:11 AM	TDMS File	460 KB
20180221_1 PM II H bulb slow fast non fo...	2/21/2018 8:07 AM	TDMS File	1,218 KB
20180221_1 PM II Hg arc bulb two passes ...	2/21/2018 8:20 AM	TDMS File	161 KB
20180221_1 PM II Hg arc bulb	4/30/2018 8:52 AM	TDMS File	105 KB
Power Puck II Arc 3 passes across Width ...	2/15/2018 2:10 PM	TDMS File	268 KB
Power Puck II Arc Slow Fast Sample File	2/15/2018 1:54 PM	TDMS File	122 KB

The collected data from the “Map” or “Profiler” is contained in a TDMS File.

Earlier versions of PowerView (PowerView II/PowerView III) also generated a shortcut file called a TDMS_INDEX File. The TDMS_INDEX file is a shortcut to the file but does not contain any data.

Name	Date modified	Type	Size
20180221_1 LEDCure one pass	2/21/2018 8:22 AM	TDMS File	13 KB
20180221_1 LEDCure one pass.tdms_index	2/21/2018 8:22 AM	TDMS_INDEX File	1 KB
20180221_1 LEDCure two passes different heights_1	2/21/2018 8:32 AM	TDMS File	17 KB
20180221_1 LEDCure two passes different heights_1.tdms_index	2/21/2018 8:32 AM	TDMS_INDEX File	1 KB
20180221_1 LEDCure two passes different power levels	2/21/2018 8:25 AM	TDMS File	27 KB
20180221_1 LEDCure two passes different power levels.tdms_index	2/21/2018 8:25 AM	TDMS_INDEX File	1 KB
20180221_1 LEDCure two passes different speeds	2/21/2018 8:29 AM	TDMS File	25 KB
20180221_1 LEDCure two passes different speeds.tdms_index	2/21/2018 8:29 AM	TDMS_INDEX File	1 KB

When the “Map” Pause feature is utilized, the files are automatically broken down into individual files as shown below with the suffix “run_1” through and up to “run_8”

20180221_1 PM II H Bulb multiple passes_1_run_1
20180221_1 PM II H Bulb multiple passes_1_run_1.tdms_index
20180221_1 PM II H Bulb multiple passes_1_run_2
20180221_1 PM II H Bulb multiple passes_1_run_2.tdms_index
20180221_1 PM II H Bulb multiple passes_1_run_3
20180221_1 PM II H Bulb multiple passes_1_run_3.tdms_index
20180221_1 PM II H Bulb multiple passes_1_run_4
20180221_1 PM II H Bulb multiple passes_1_run_4.tdms_index

Paused file format structure in directory

“Profiler” instruments do not have a Pause feature.

PowerView® III files (.tdms) may be shared and exchanged electronically (e.g., via Email, USB Stick).

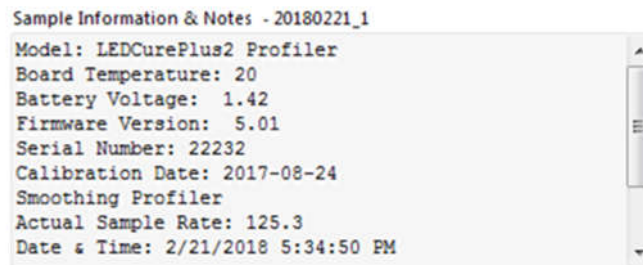
5. Importing Data from an EIT Radiometer

Organizing your Data Files

All data files are the same to PowerView Software® III. The file selected as “the sample”, is always compared to the file selected as “the reference”. The data points by themselves cannot tell you anything about which line, lamp, or for what product, the data was collected, or who collected it. So, if these details are important to track, proper note taking and data organization is imperative.

PowerView Software® III provides several tools to help you add notes and organize your data files. The note taking capabilities will be described in Chapter 7, but you should first decide how you want to organize your files. Common choices include by:

- Date (Default File name starts with Date)
- System or production line
- UV system type (LED, arc, microwave)
- Lamp type (395 nm, 365 nm, broad band mercury, mercury-iron, etc.)
- Customer, R&D parameter such as the formulation, power supply, substrate type, work order, etc.

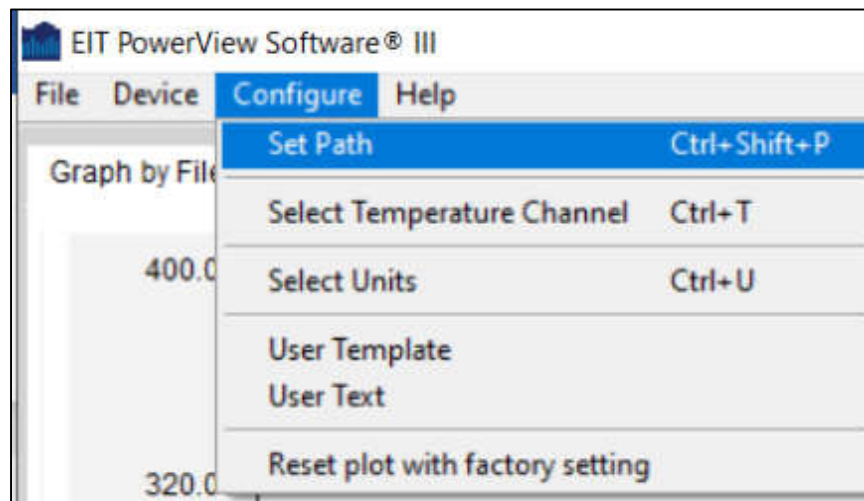


Sample Information & Notes - 20180221_1

Model: LEDCurePlus2 Profiler
Board Temperature: 20
Battery Voltage: 1.42
Firmware Version: 5.01
Serial Number: 22232
Calibration Date: 2017-08-24
Smoothing Profiler
Actual Sample Rate: 125.3
Date & Time: 2/21/2018 5:34:50 PM

Example of standard data transferred to the computer from the instrument

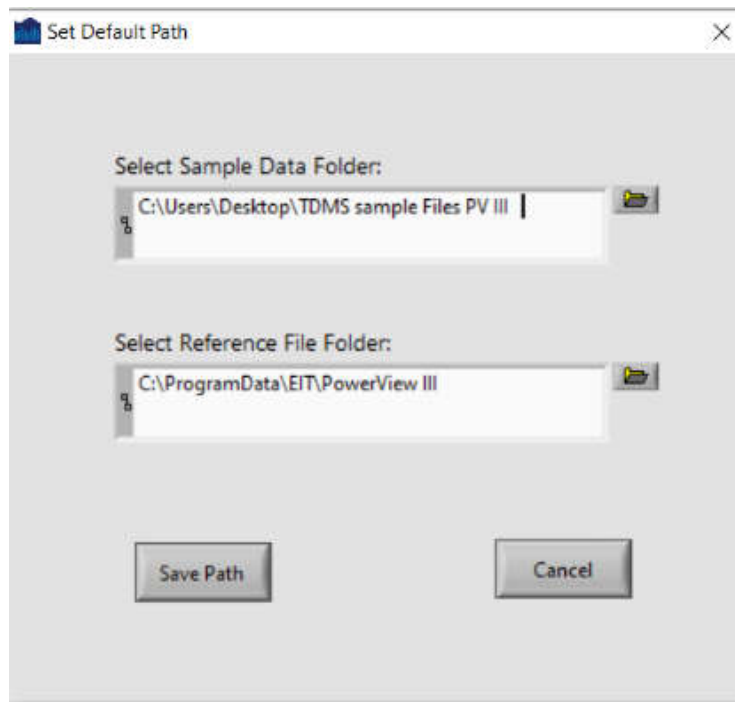
To change where you store your files: From the Toolbar select **Configure** → **Set Path**



Launch the Configure Paths window from the Toolbar

5. Importing Data from an EIT Radiometer

This opens the **Configure Paths** window which will allow you to specify a new folder name, or location for your data files, and sample and reference shortcuts. You may choose locations that are appropriate to your work environment and naming conventions by clicking the folder icons.



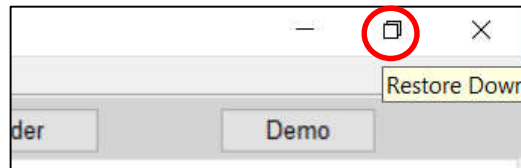
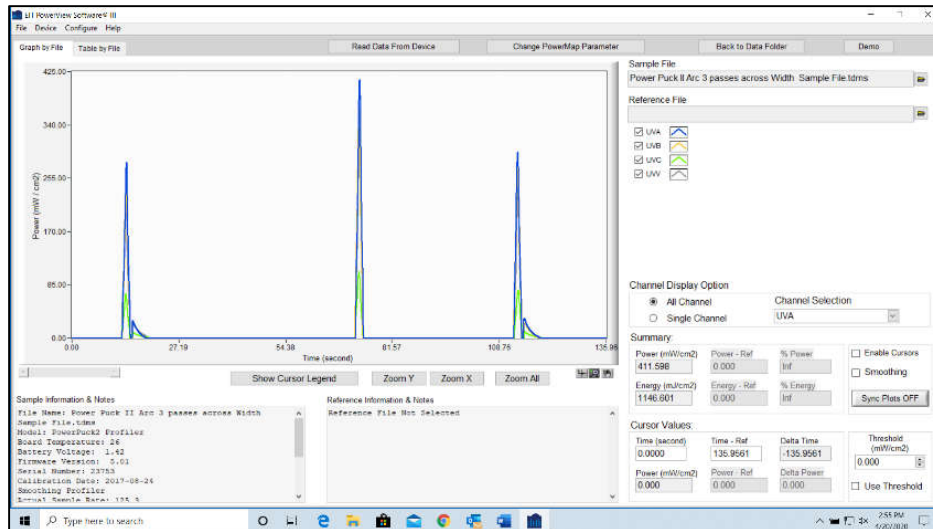
Change folder names and locations for your files from the Configure Paths window

6. Quick overview: Two Views of your Data

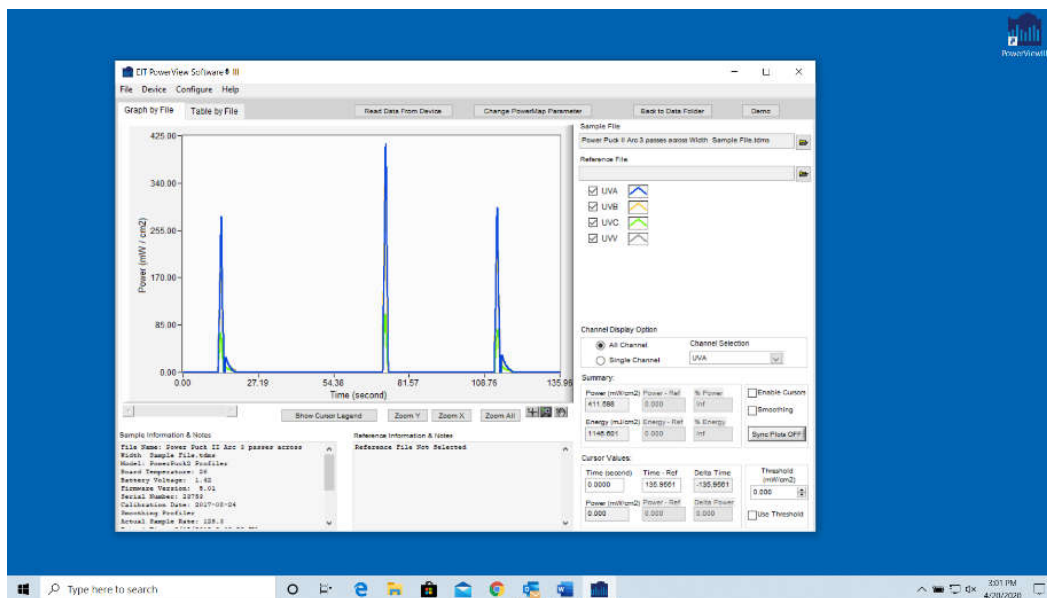
6. Quick Overview – Two Views of Your Data

PowerView III Software Aspect Ratio

The PowerView Software® III is optimized for a 16:9 aspect ratio as shown below in full screen view.

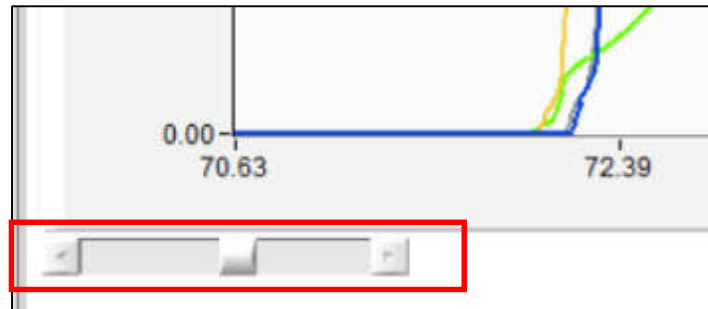


When the Restore Down Icon is used, the software maintains the 16:9 ratio as shown below

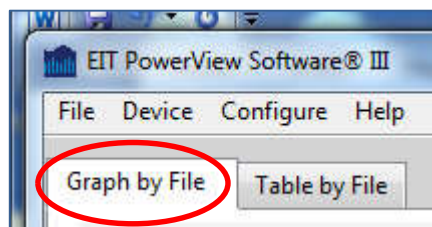


6. Quick overview: Two Views of your Data

When PowerView is used on a monitor with a 4:3 aspect ratio, scrolling with the slide bar may be required to access all fields in the software. The slide bar also appears if only part of collected data is shown on the screen



When the EIT PowerView Software® III loads, it defaults to the **Graph by File** screen. This is one of two basic ways to view data in PowerView Software® III. The other choice is to **Table by File**. Simply select the Tab for the view you wish to use. These two choices present the same radiometric data in different formats. They make it more convenient to perform different types of data analysis.



Data may be viewed in Graph by File or Table by File format Band.

The basic function and motivation for each of the two views is explained before describing how to navigate and manipulate these views.

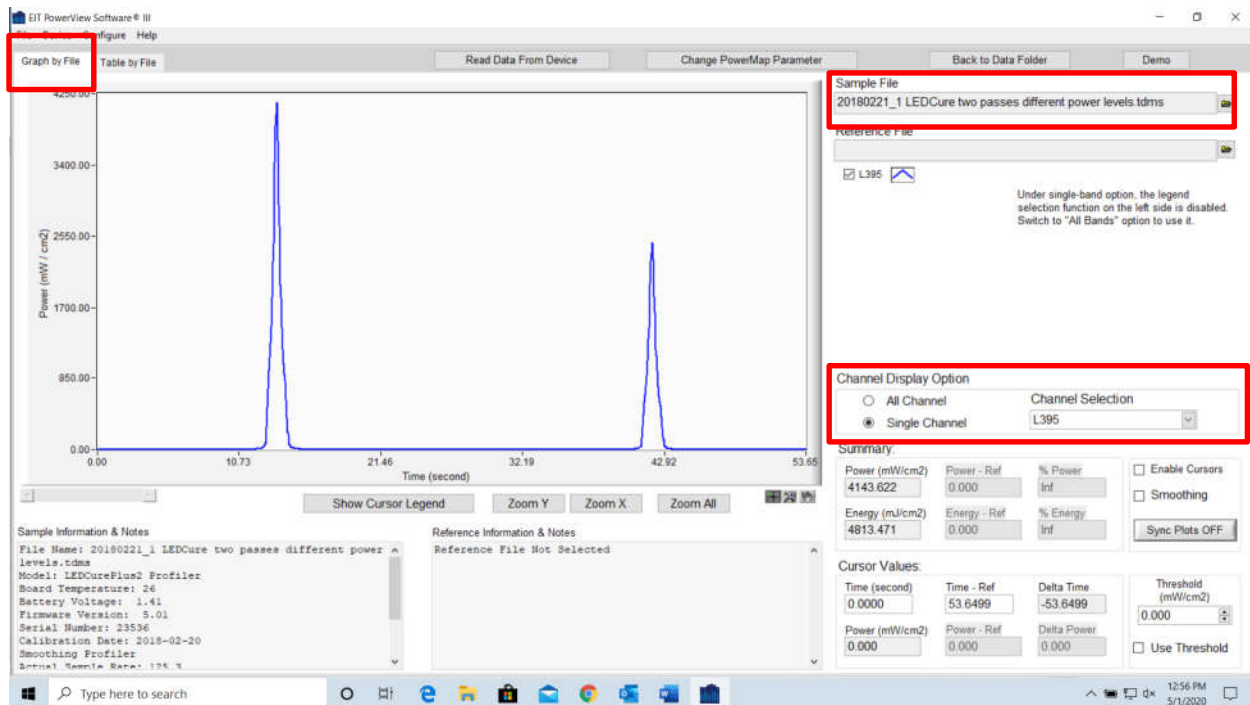
1. The Graph by File Tab

The Graph by File view is ideal for visually comparing two different data files. One of these files is referred to as a SAMPLE file, and the other file is described as the REFERENCE file.

There is nothing physical that differentiates a sample file from a reference file other than referring to them by these names. It is common practice however to compare fresh data samples to a benchmark, or reference set of data that might have been collected when new lamps were installed and the line was operating perfectly. We suggest that you give files that are ideal or 'golden' files a name they can be easily identified that distinguishes them.

6. Quick overview: Two Views of your Data

The screen below shows a typical plot in the Graph by File view. Drop down menus in the upper right corner allow you to select a sample file and reference file for comparison. (There is nothing that requires you to plot two graphs and often will want to display only a single plot.) Below is a graph of the EIT LED Sample Data file provided as an example.



The EIT LED Sample Data file graph. Note: Remember to select a Band to get Summary data.

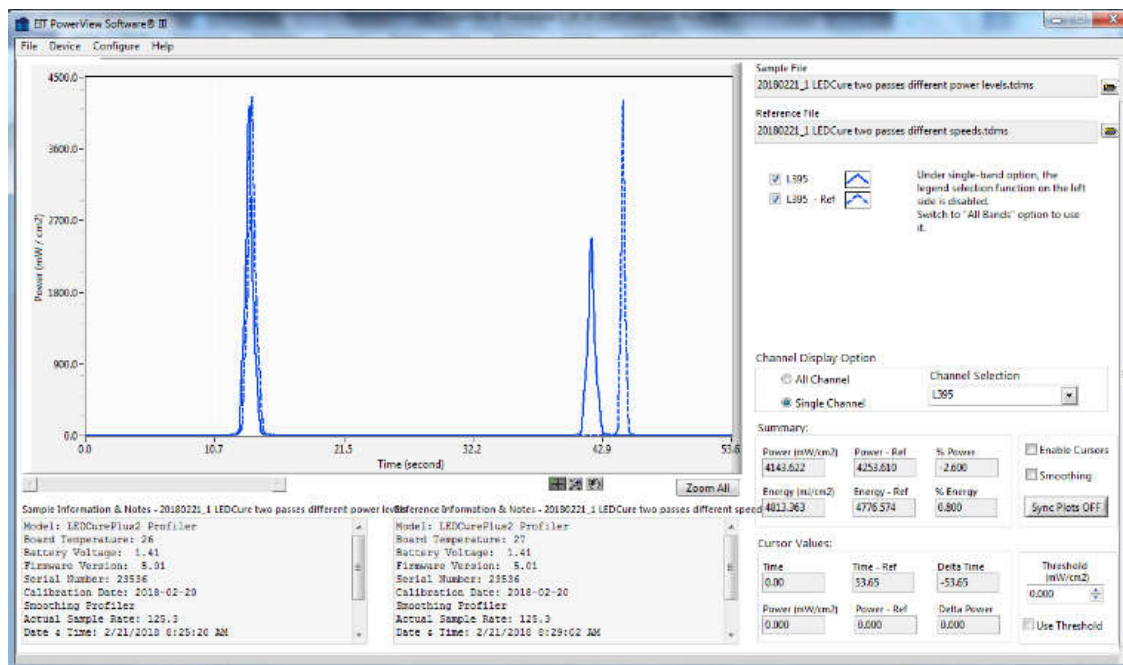
When using a Profiler Instrument (in this case LEDCure Profiler) to view summary information you have the option to select a Band. Here, the L395 band has been selected. The numerical calculations performed in this Summary Section compare the radiometer data for the sample file to the reference file. Since we have not yet selected a Reference File, only the data for our Sample is shown.

Now, select a Reference File. In the Graph below we have selected the EIT LED as the Reference Data file.



Opening the reference file first, before the sample file, is a good practice since the software will automatically scale the graph according to the reference data which is usually equal to, or greater than subsequent samples. However, if you open data files and the scaling is improper you can always select the Zoom All button to rescale the graph.

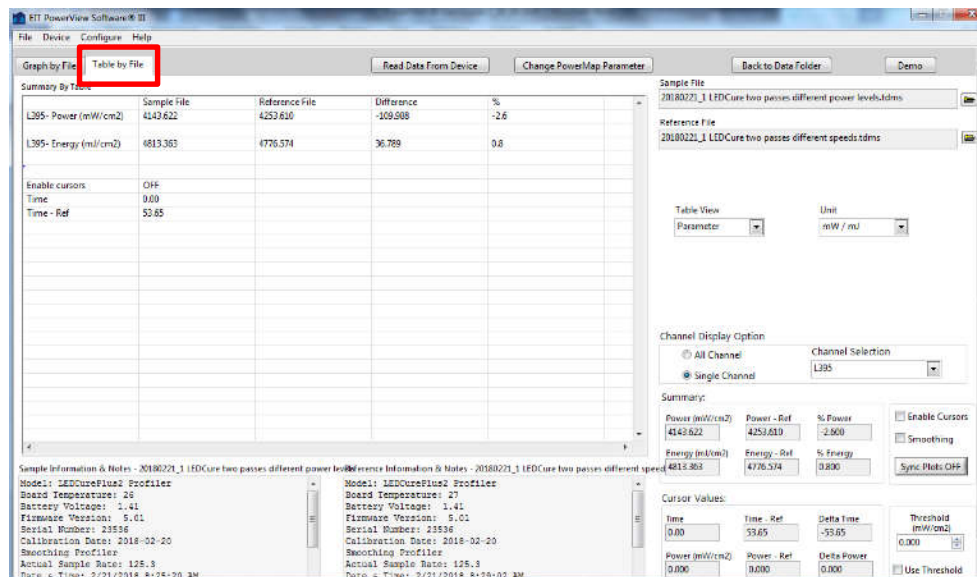
6. Quick overview: Two Views of your Data



Comparing a reference file (dotted lines) and sample file (solid line) for an LED system

2. The Table by File Tab

Table by File is a numerical view of the same data used to produce the **Graph by File** plots. Like **Graph by File**, **Table by File** is used to compare various aspects of two data files, usually a sample and a reference file. For example by selecting the **Table by File** tab using the xample above you see:

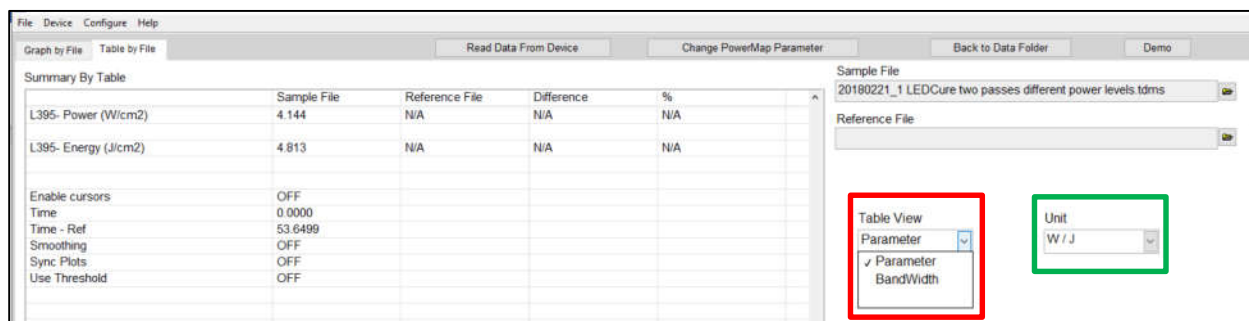


The same LED Sample and Reference files in Table by File view

6. Quick overview: Two Views of your Data

In Table by File view shown later in this section, numerical data for each file is presented in adjacent columns. A third column, labelled “Difference” compares the data in the Sample and Reference file columns and, by convention, computes the absolute difference between the sample and the reference file (i.e. Reference – Sample = Difference) and also the percentage difference between the Sample and Reference.

The organization of the rows of the Table by File view is determined by the **Table View** dropdown menu (red box) which can be set to either **Parameter** view or **Bandwidth** view. You also have the option to change how the units are displayed on the Table by View Screen (green box)



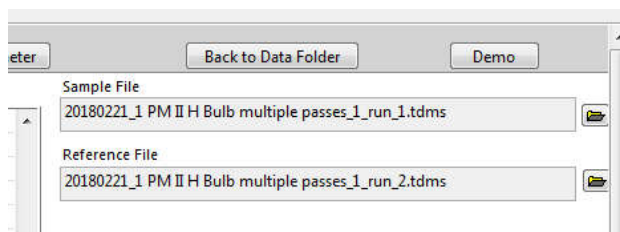
The Table by File dropdown menu

A) Parameter View:

When **Parameter** view is selected, the rows of the table contain the UV parameters: Power (grouped by UV band) and Energy (grouped by UV band). Each parameter is presented in both absolute terms (e.g. mw/cm^2 and mJ/cm^2) and as Power % and Energy % which reports the percentage difference between the Sample and the Reference (grouped again by UV band).

Note: If the cursors are turned OFF, (as will be discussed in the Advanced User Tools chapter), the maximum values for each bandwidth are displayed and used to compute the differences. If the cursors are turned ON, the values displayed will correspond to the sample and reference cursor locations. The status of the cursors is indicated on the cursor row near the bottom of the table.

As an example, compare the demonstration file for the H bulb run_1 (loaded as the sample file) and the H bulb run_2 loaded as the reference file.



6. Quick overview: Two Views of your Data

In **Parameter** view we obtain a table where rows are grouped by irradiance, and then energy density:

Graph by File	Table by File	Read Data From Device		Chan
Summary By Table				
	Sample File	Reference File	Difference	%
UVA- Power (mW/cm2)	322.503	313.679	8.825	2.8
UVB- Power (mW/cm2)	329.029	327.668	1.361	0.4
UVC- Power (mW/cm2)	76.009	77.357	-1.347	-1.7
UVV- Power (mW/cm2)	422.908	425.038	-2.130	-0.5
TC_Peak(oC)	59.002	59.276	-0.275	-0.5
UVA- Energy (mJ/cm2)	226.097	216.549	9.547	4.4
UVB- Energy (mJ/cm2)	232.118	223.791	8.328	3.7
UVC- Energy (mJ/cm2)	52.184	50.908	1.276	2.5
UVV- Energy (mJ/cm2)	302.989	291.994	10.995	3.8
TC_Mean(oC)	39.431	42.010	-2.579	-6.1
Enable cursors	OFF			
Time	0.00			
Time - Ref	13.29			

If the dropdown Table View menu is changed to **Bandwidth** view, our data is grouped by “EIT band”:

Graph by File	Table by File	Read Data From Device		Chan
Summary By Table				
	Sample File	Reference File	Difference	%
UVA- Power (mW/cm2)	322.503	313.679	8.825	2.8
UVA- Energy (mJ/cm2)	226.097	216.549	9.547	4.4
UVB- Power (mW/cm2)	329.029	327.668	1.361	0.4
UVB- Energy (mJ/cm2)	232.118	223.791	8.328	3.7
UVC- Power (mW/cm2)	76.009	77.357	-1.347	-1.7
UVC- Energy (mJ/cm2)	52.184	50.908	1.276	2.5
UVV- Power (mW/cm2)	422.908	425.038	-2.130	-0.5
UVV- Energy (mJ/cm2)	302.989	291.994	10.995	3.8
TC_Peak(oC)	59.002	59.276	-0.275	-0.5
TC_Mean(oC)	39.431	42.010	-2.579	-6.1
Enable cursors	OFF			
Time	0.00			
Time - Ref	13.29			

In **Bandwidth** view, the same data is arranged differently. In this view, the Sample, Reference and Difference columns remain the same, but the rows are organized by grouping the parameters (Power level, Power%, Energy level and Energy %) by **Bandwidth** as shown below. The influence of the cursor status on the numerical values displayed is the same as it is in Parameter view.

Hint

Remember that with cursors turned off (discussed in Chapter 8) the Energy Density reported is the total energy density for ALL UV sources collected in the Sample), but the peak irradiance is the intensity of the highest UV source observed.

6. Quick overview: Two Views of your Data

When a Reference File is selected (such as the Reference Data file used in this example), the Table by File chart allows you to easily compare the Sample and Reference data files.

Summary By Table				
	Sample File	Reference File	Difference	%
UVA- Power (mW/cm2)	322.503	313.679	8.825	2.8
UVB- Power (mW/cm2)	329.029	327.668	1.361	0.4
UVC- Power (mW/cm2)	76.009	77.357	-1.347	-1.7
UVV- Power (mW/cm2)	422.908	425.038	-2.130	-0.5
TC_Peak(oC)	59.002	59.276	-0.275	-0.5
Table by File using Bandwidth View				
UVA- Energy (mJ/cm2)	226.097	216.549	9.547	4.4
UVB- Energy (mJ/cm2)	232.118	223.791	8.328	3.7
UVC- Energy (mJ/cm2)	52.184	50.908	1.276	2.5
UVV- Energy (mJ/cm2)	302.989	291.994	10.995	3.8
TC_Mean(oC)	39.431	42.010	-2.579	-6.1

In this example, the Sample Data has less Power than the Reference Data for UVC and UVV wavelengths (-1.7% and -0.5 respectively), but more Power for UVA and UVV (+2.8% and +0.4% respectively), but more Energy Density at all wavelengths. .

The Graph by File and Table by File views are motivated by similar questions such as “how do I compare two radiometers and examine the differences between the two?” The Graph by File and Table by File views are the most common choice.

7. Basic Navigation & Tools

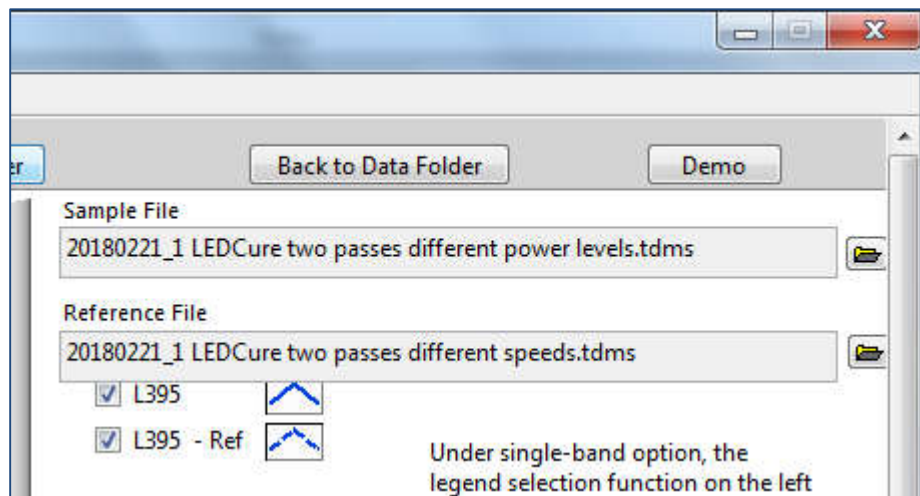
The EIT PowerView Software® III application has several powerful tools for analyzing UV radiometer data. In this chapter, we begin by describing how to open your data, select which bandwidths to display, and how to navigate the graphs using the ZOOM control options. We also introduce the Summary feature of obtaining numerical values and comparisons from your datasets.

Opening Your Data Files for Analysis

Once data has been downloaded from an EIT “Profiler” or “Map”, these files are accessible within the PowerView Software® III application from the **Sample File** and **Reference File** pull down menus that are located near the upper right corner of the screen.

It is a common practice to create a “reference file”, made when the line is operating under optimum conditions. This reference file can be used as a benchmark for comparing subsequent samples to verify that the process is operating properly. It is a good idea to name the reference file so that it can be easily identified and distinguished from sample data files to avoid confusion.

For example, to open the reference file, click on the dropdown menu and select the desired reference file by name. In this example we will compare the two LED files (two passes at different power levels as the Sample, and two passes at different speeds, as shown below:



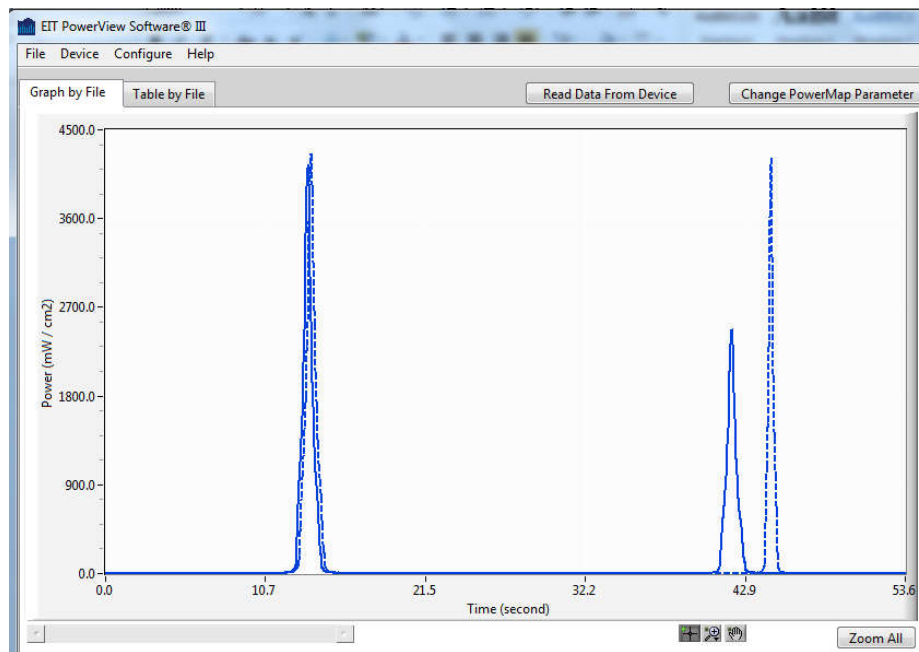
To begin, access data files via the dropdown menus

7. Basic Navigation & Tools

Hint

As noted in the previous section, a good practice is to open the Reference file before the Sample file, since the software will automatically scale the graph according to the reference data - which is usually equal to, or greater than subsequent samples.

After selecting these files, you should see the following graph:



Graph by File view of the Sample and Reference files

Sample Information & Notes - 20180221_1 LEDCure two passes different power level	Reference Information & Notes - 20180221_1 LEDCure two passes different speed
Model: LEDCurePlus2 Profiler	Model: LEDCurePlus2 Profiler
Board Temperature: 26	Board Temperature: 27
Battery Voltage: 1.41	Battery Voltage: 1.41
Firmware Version: 5.01	Firmware Version: 5.01
Serial Number: 23536	Serial Number: 23536
Calibration Date: 2018-02-20	Calibration Date: 2018-02-20
Smoothing Profiler	Smoothing Profiler
Actual Sample Rate: 125.3	Actual Sample Rate: 125.3

Radiometer data is visible in the Information & Notes panes

Note that the software automatically displays the instrument's display values in the Information & Notes panes for both the sample and reference files. Along with the recorded data, the software also displays the device's Serial Number, internal temperature, and other device specific parameters.

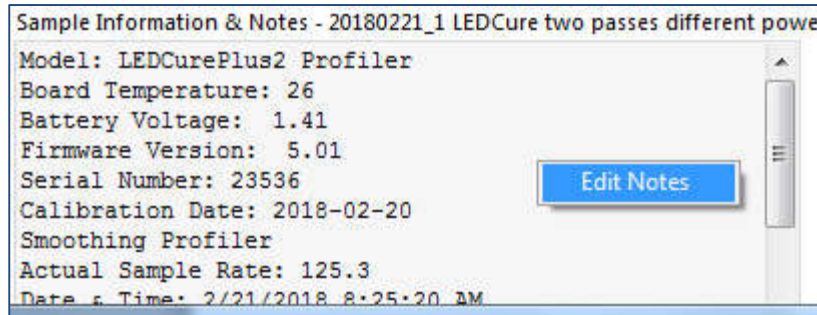
7. Basic Navigation & Tools

Editing Sample Information & Notes

Since accurate record keeping and organizing data is of such great importance, we introduce the Information & Notes editor feature of the PowerView Software® III early in this manual. Some additional editing tools for note taking are presented in Chapter 11.

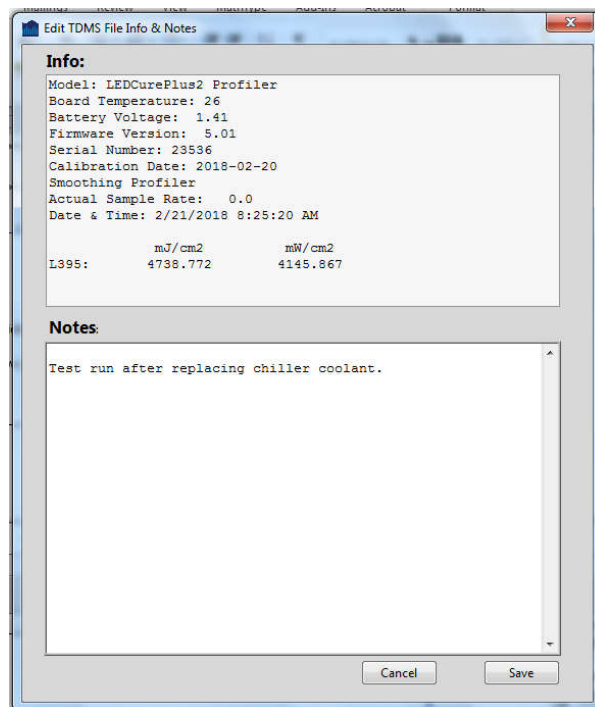
The Information & Notes can be edited and annotated by a simple procedure:

1. Right Click while the cursor is positioned within the **Information & Notes** pane.



Right click in the pane to launch the Edit Notes button

2. Click on the **Edit Notes** button that appears. This will open an editing window that permits free form entry of additional information:

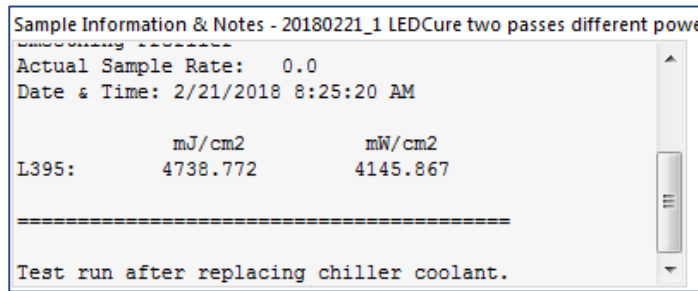


The Information & Notes editor screen

7. Basic Navigation & Tools

3. After editing, click **SAVE**

The editing window will be closed, and the Sample Information & Notes will be updated.

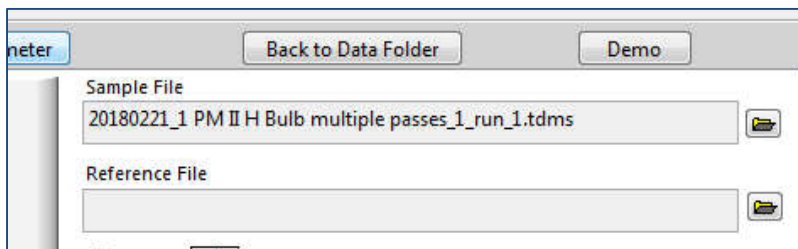


Example of additional notes and comments added

Selecting which Bandwidths to Display

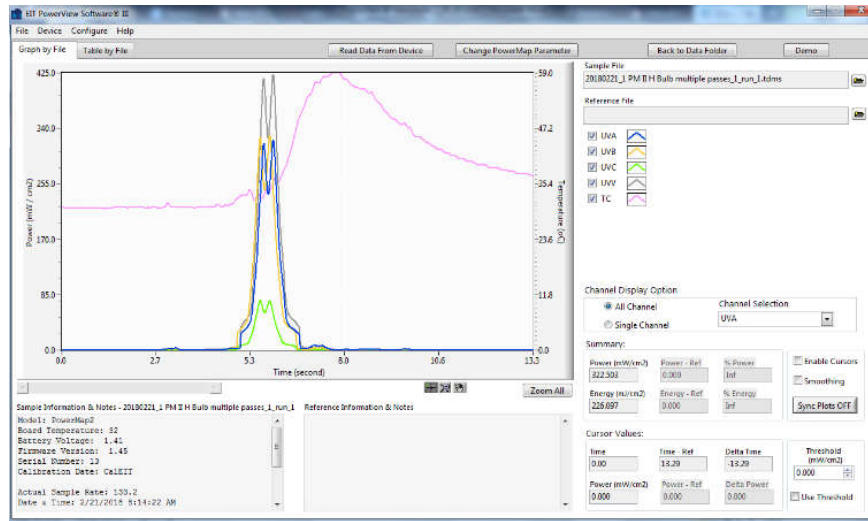
The PowerView III software allows you to analyze UV output data from single band (UviCure Plus II Profiler /LEDCure Profiler/LEDMAP) or multiband (PowerMAP II /Power Puck II Profiler/LEDMAP/LEDCure Four Band Profiler) instruments. You can view data collected in EIT's mercury based (e.g. UVA, UVB, UVC, UVV) or LED based (e.g. L-365, L-385, L-395, L-405) bands depending on your radiometer. This makes it easier to focus on band specific features of the data.

Let's look at an example using data from a mercury H-bulb collected using the four-band PowerMAP II radiometer. Load the Sample file shown below:

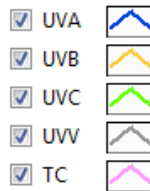


This produces the following Graph:

7. Basic Navigation & Tools

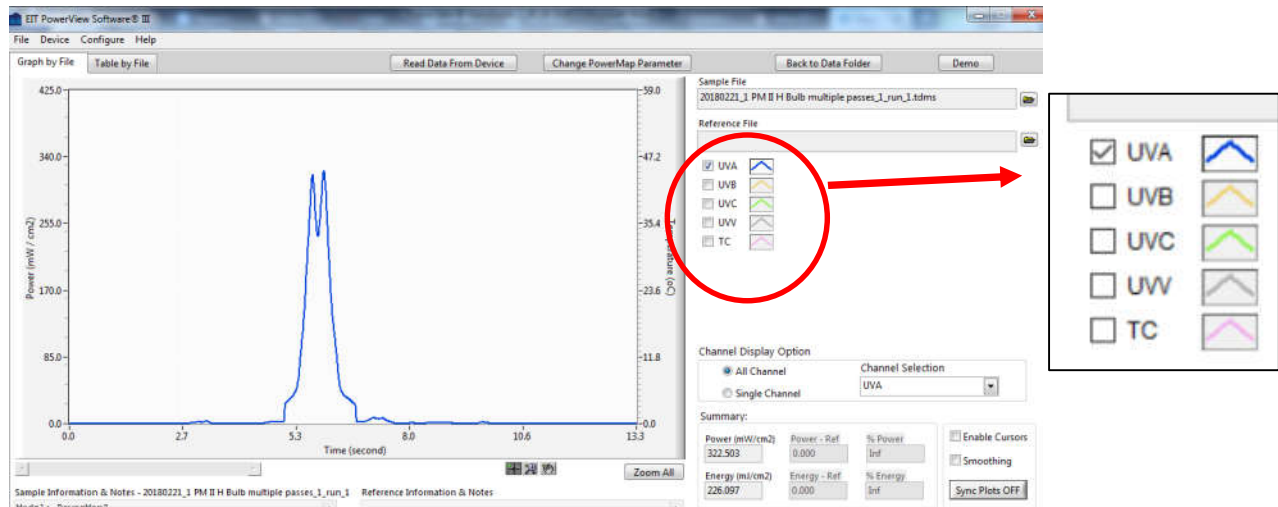


By default, the software shows data for all of the available channels.



Note: For PowerMAP II/LED MAP either TC (ThermoCouple) or Board T (Circuit Board Temperature) will be displayed based on the selection made during set up.

You may focus on a single or group of bands by selecting/deselecting the check mark next to the band of interest. For example, the graph below is the result of selecting only the UVA channel.



Only selected bands are plotted in the resulting graph

7. Basic Navigation & Tools

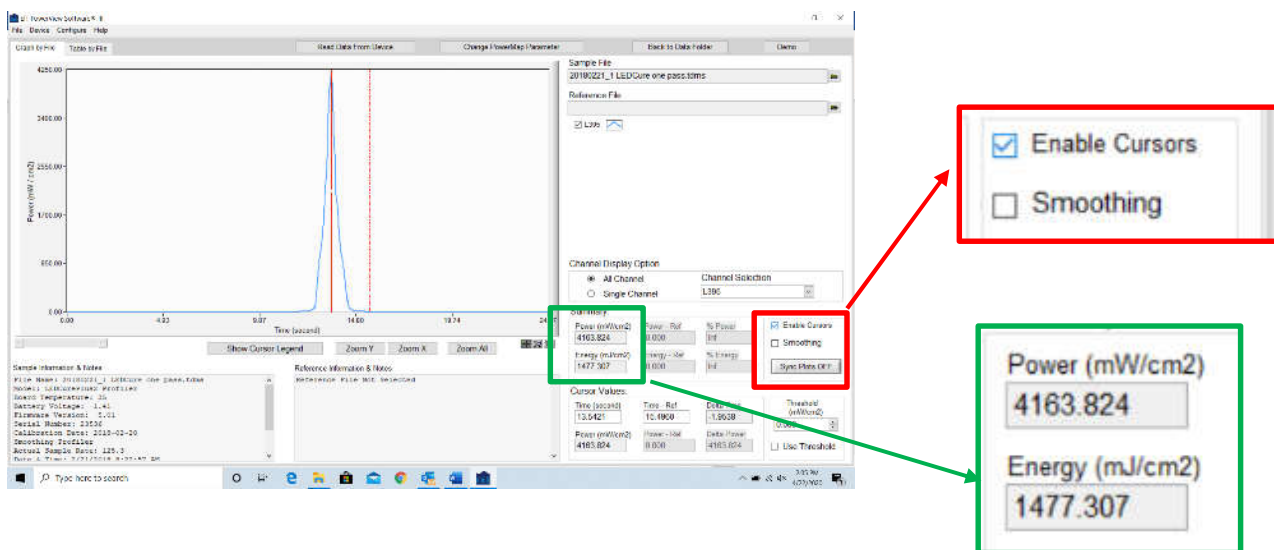
Viewing Summary Data

Though the EIT PowerView Software® III provides several graphical analysis tools, it is also useful for analyzing hard numerical data using **Table by File** view.

Numeric data is also summarized in the **Graph by File** view. The **Summary** data window located in the lower right of the screen is useful in comparing values for the peak irradiance (**Power**) and energy density (**Energy**) between reference and sample readings.

The values displayed in the Summary data pane depend upon whether the cursors feature has been turned on or off. For more information about using cursors, see Chapter 8 below.

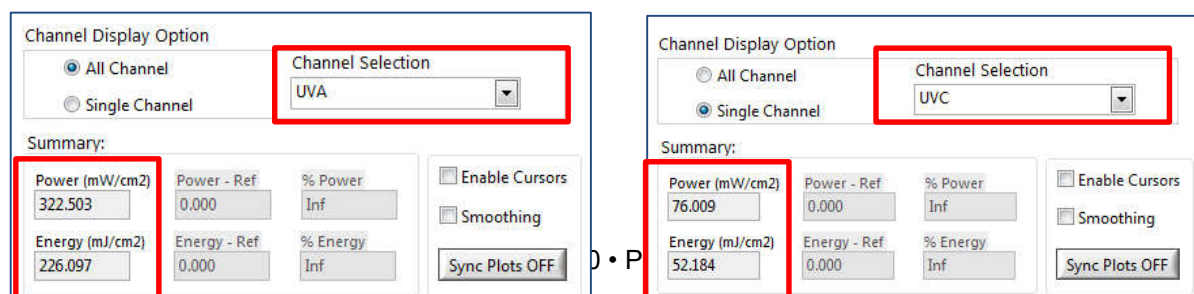
When the Enable CURSORS button is checked (on), the data displayed will be the Power and Energy values of the selected bandwidth **at the current cursor location**. When the Enable CURSORS button is not checked (off), the summary data will display the maximum value for the selected Bandwidth.



Red Box: Checkmark indicates Cursors have been enabled

Green Box indicates the Power and Energy values at the location of the Cursor

In order to obtain proper measurement data in the summary section, the radio button must be changed from the default All Channel setting to Single Channel and a single channel is then selected from the drop- down menu. For example (e.g. UVA vs. UVC in this example)



7. Basic Navigation & Tools

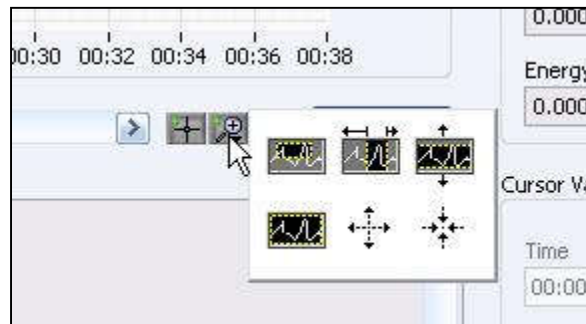
7. Basic Navigation and Tools

Using the Zoom Controls

The **Zoom** tool (identified by a magnifying glass icon) provides several aids to navigating graphs.



Clicking on the Zoom (magnifying glass) icon will reveal several Zoom options.



Several Zoom tools are available for different tasks

The Zoom Control options perform the following tasks:



This tool zooms on a **user-selected rectangular area**. Click on the tool to select it, and then position the cursor so that it is located at one corner of the desired rectangular area. Press the left mouse control button to select that corner of the desired area. Then, while continuing to depress the left mouse button, drag the mouse to the opposite diagonal corner of the desired rectangle. Releasing the left mouse button will anchor the entire rectangle, and the software will zoom on the selected area.



This tool zooms on a user-selected portion of the graph time line (**x-axis**). Click on the tool to select it, and then position the cursor so that it is located at one end of the time period of interest. Press the left mouse control button to select one extreme of the desired range. Then, while continuing to depress the left mouse button, drag the mouse to the opposite edge of the range. Release the left mouse button to zoom on the selected time period of the graph.



This tool zooms on a user-selected portion of the graph **y-axis**. It is useful for magnifying portions of the graphs to look at Power (irradiance) detail. Click on the tool to select it, and then position the cursor so that it is located at one end of the power level of interest. Press the left mouse control button to select one extreme of the desired range. Then, while continuing to depress the left mouse button,

7. Basic Navigation & Tools

drag the mouse to the opposite edge of the range. Release the left mouse button to zoom on the selected irradiance portion of the graph. Note that this expands the Power axis across the entire time period of the graph.



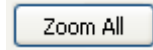
This tool performs a **Zoom Out** function. Click on the tool to select it, and then position the cursor on that portion of the graph you wish to Zoom Out from. Pressing the left click button will zoom out from the current cursor location in both the X- and Y- direction. Each time the button is clicked, the magnification will be increased. If the mouse is moved to a new location and pressed, the graph will **Zoom Out** from the new location.



This tool performs a **Zoom In** function. Click on the tool to select it, and then position the cursor on that portion of the graph you wish to Zoom In from. Pressing the left click button will zoom in from the current cursor location in both the X- and Y- directions. Each time the button is clicked, the magnification will be decreased. If the mouse is moved to a new location and pressed, the graph will **Zoom In** from the new location.

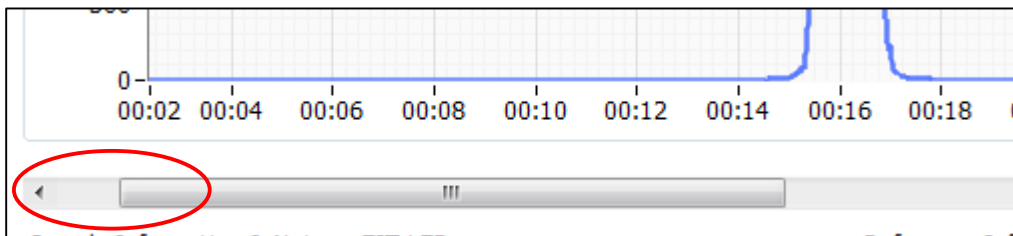


This tool is a **Zoom “undo”** button. Click on this icon to restore the graph to its default zoom setting. This button has the same effect as the **Zoom All** button:



Use the Zoom All or Zoom Undo buttons if you want to quickly restore the graph settings to the default view.

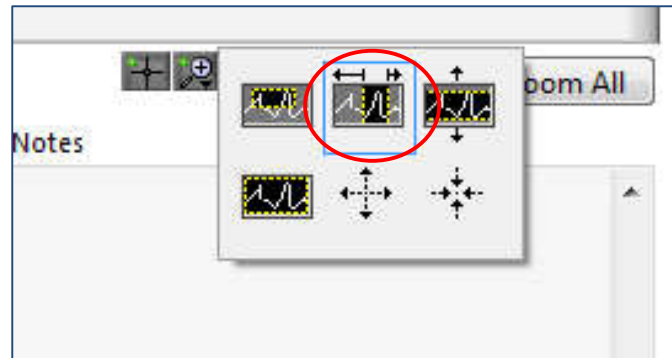
A slider control located just below the graph allows the graph to be repositioned from left to right should portions of interest be out of range in the current display. This is especially useful when the ZOOM controls are used.



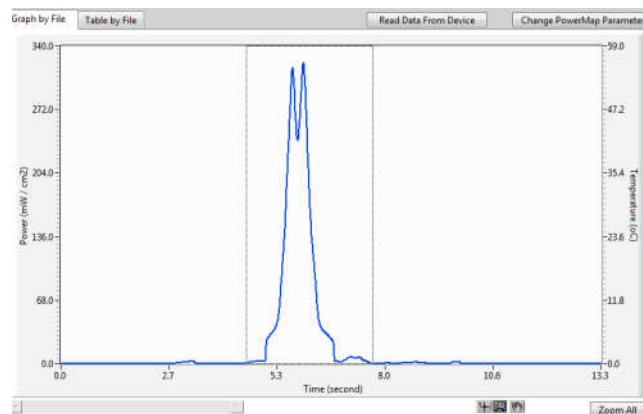
Detail of the Slider Control used to reposition a Graph on the X-axis

7. Basic Navigation & Tools

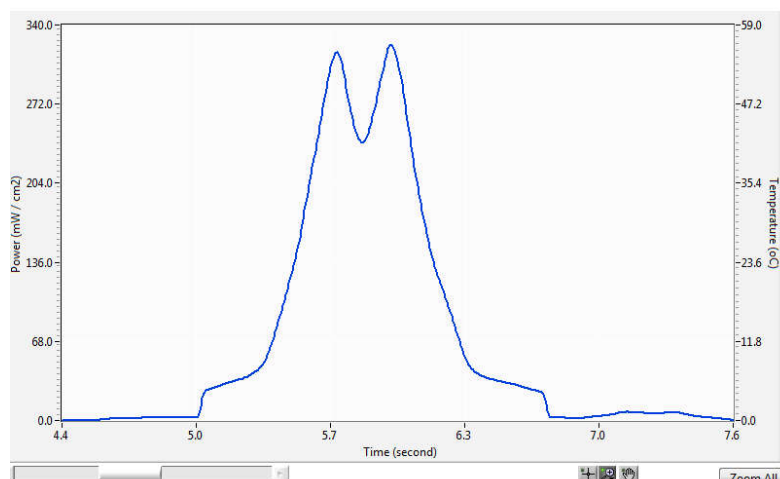
To Zoom on the selected area, select the Zoom tool to get the Zoom choice menu. In this example we choose the horizontal zoom option (though we could select from other vertical or rectangular area zoom choices):



Next, Zoom Horizontally by first grabbing and dragging the left and right Zoom MARKERS near the edges of the peak of interest.



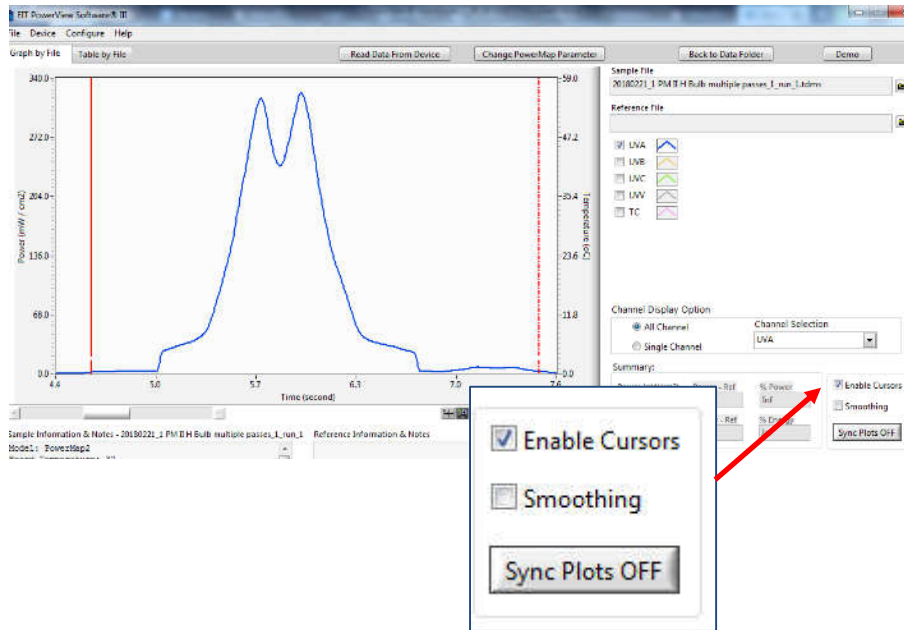
Releasing the mouse button after indicating the zoom range results in a more detailed view:



8. Using Cursors – Numerical Analysis

8. Using Cursors: Numerical Analysis

You can turn on the cursors by selecting the Enable Cursors radio button.



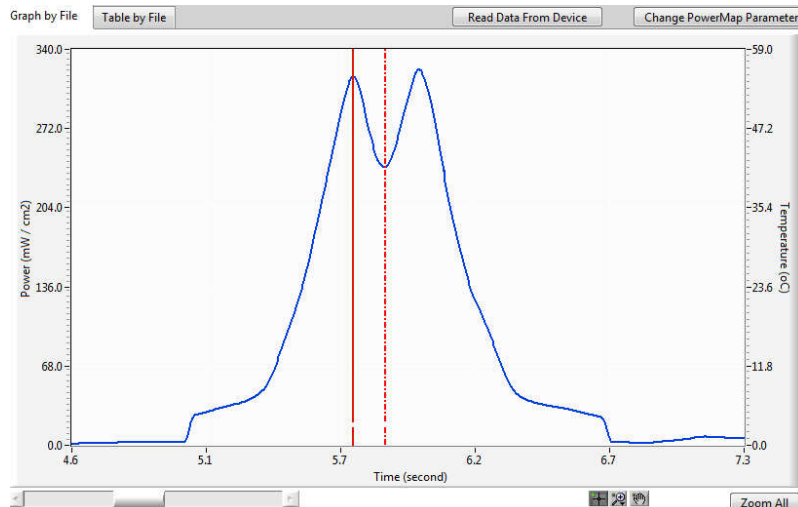
This will activate the Sample (solid) and Reference (dashed) cursors. As you Drag either cursor to a desired measurement location, the irradiance value will be displayed. Note that to compare two locations on a single plot, you can select the same file for the Sample and Reference. This will allow you to measure the Power at the location of each cursor, to compare the two, and to calculate the Energy Density between the two cursors.

To move the cursors, select the Cursor handle tool:



You may now click on and move each cursor to any location on the plot you wish to measure. For example, we can measure the dip in the center of the lamp by locating the cursors as shown:

8. Using Cursors – Numerical Analysis

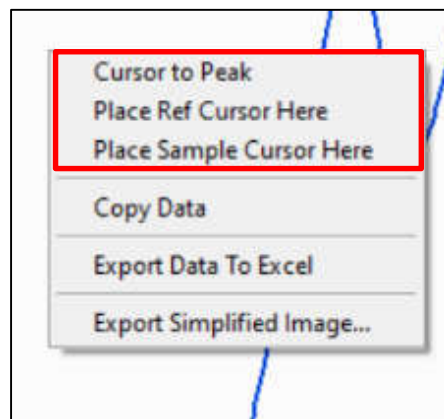


This produces the following data:

Cursor Values:			
Time	Time - Ref	Delta Time	Threshold (mW/cm ²) 0.000 ☐ Use Threshold
5.70	5.83	-0.13	
Power (mW/cm ²)	Power - Ref	Delta Power	
316.085	239.070	77.016	

Detail of Summary data for a Reference and Sample file

Here we see the left hand (sample) cursor located at 5.70 seconds, and the second (reference) cursor at 5.83 seconds (the Delta Time is therefore 0.13 seconds as shown). In this example there is a 77 mW/cm² difference between the peak at 316.085 mW/cm² and the dip of 239.070 mW/cm².

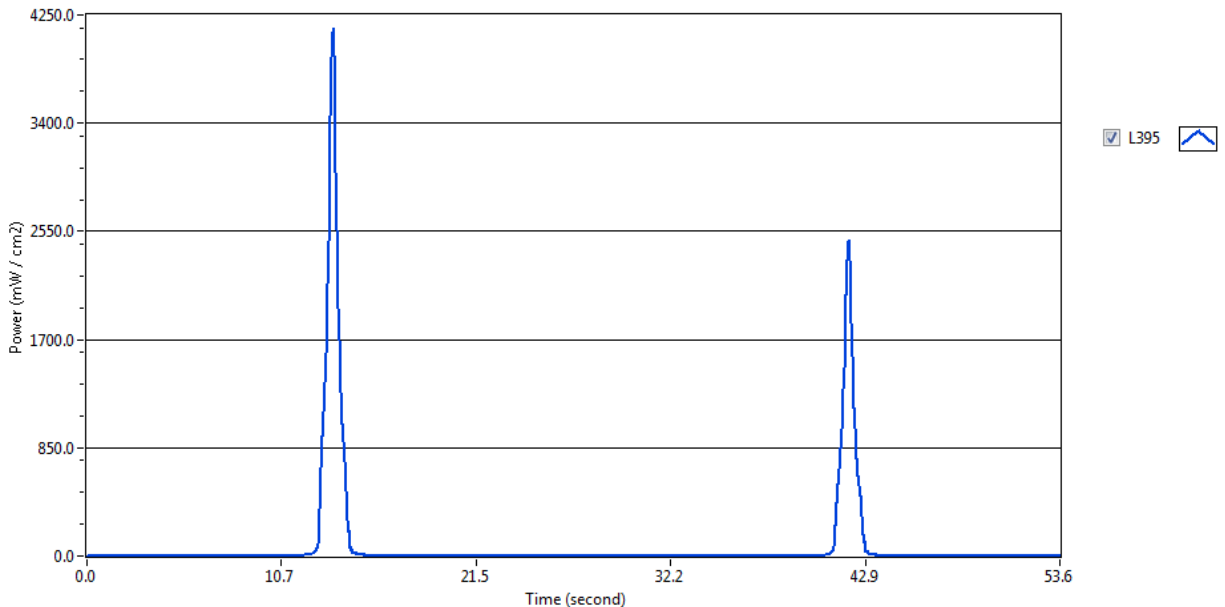


When the Enable Cursors is checked, can also Right-Click on the Graph by File pane to get additional Cursor Commands options that are shown above.

8. Using Cursors – Numerical Analysis

Understanding the Graph Axes

The previous section introduced the basics of displaying graphs and data. Graphs in PowerView Software® III display Power on the vertical, or Y-axis, and Time along the horizontal, or X-axis.



Graphs in PowerView III present data by plotting Time on the X-axis and Power on the Y-axis

Time begins at 00:00 (minutes: seconds) and corresponds to the time when data was encountered on time scale. The graph above shows the data recorded by a LEDCure® Profiler traveling on a conveyor with two lamps. The peak of the first lamp is at approximately 13.5 seconds, and the second at approximately 42.0 seconds.

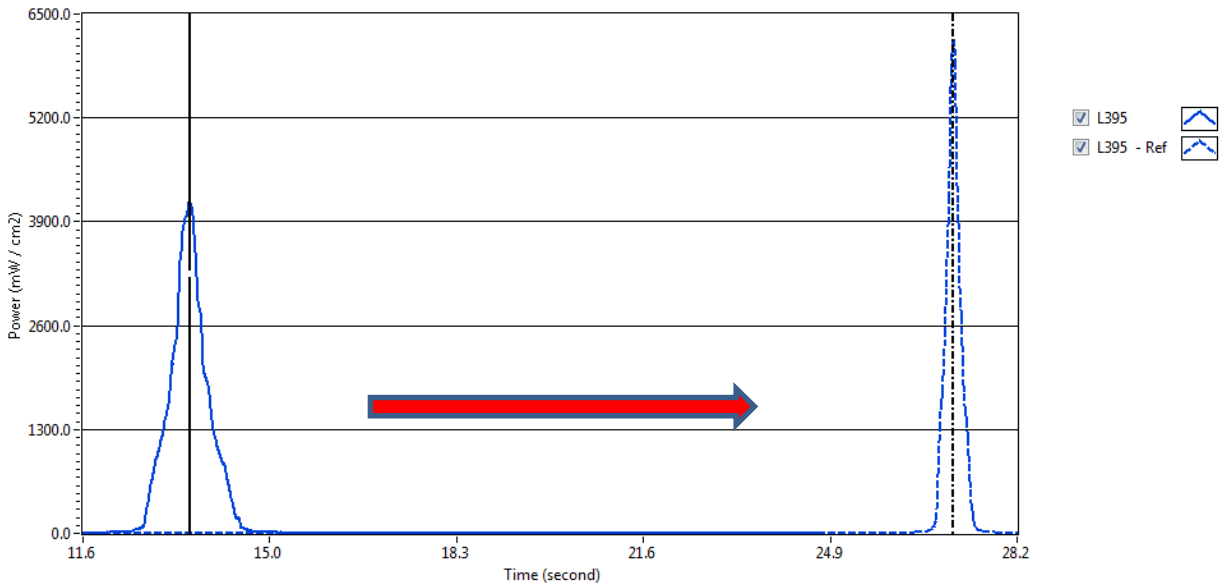
Superimposing Graphs with the Sync Tool

It is frequently instructive to compare two graphs by superimposing them. This technique makes it easier to visually compare different features that could be associated with properties of the lamps, reflectors, or other components. The SYNC PLOTS button is used to overlay two points in the plot area. It does this by horizontally aligning the Reference and Sample cursors.

To overlay two graphs using the EIT PowerView Software® III application:

Position each of the two cursors on corresponding parts of the curve. These two locations will be used to sync the graphs. For example, a cursor has been located on each of the peaks in the graph below.

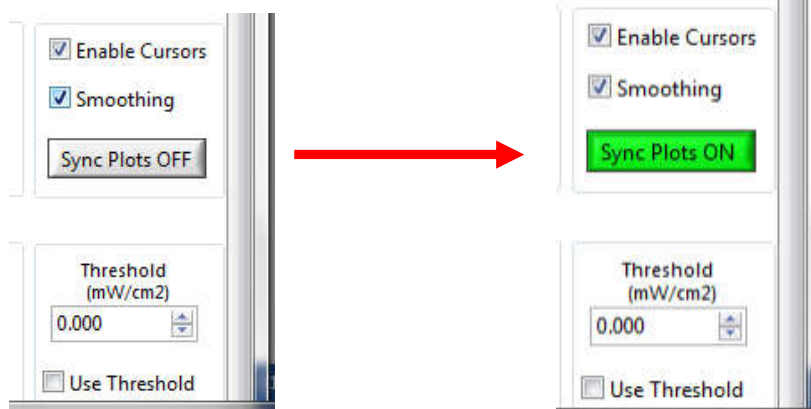
8. Using Cursors – Numerical Analysis



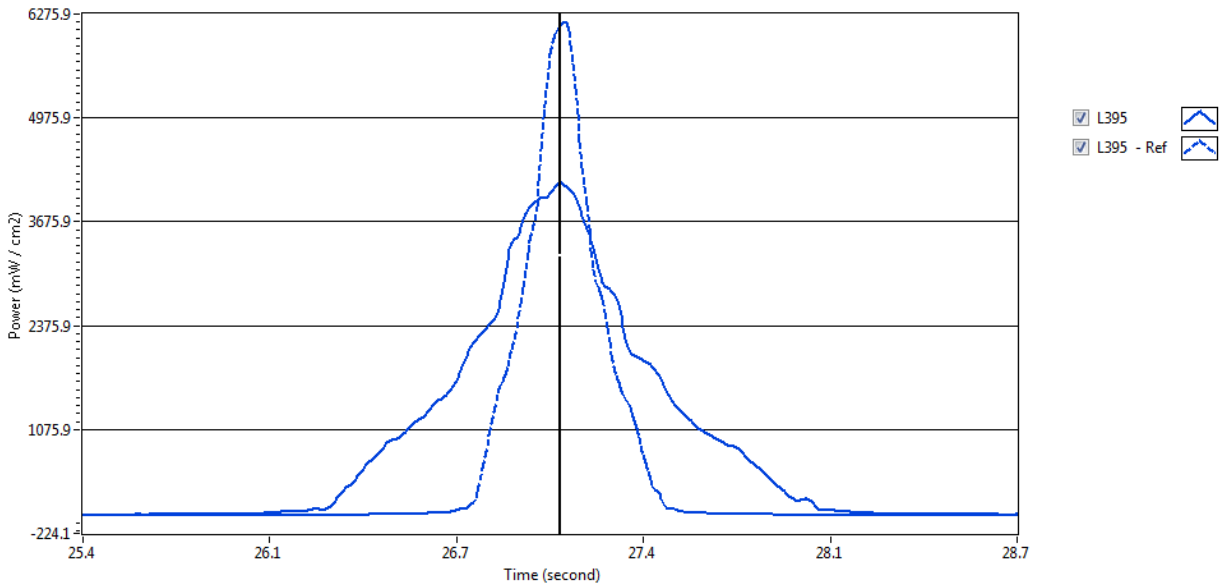
Position cursors to the points on each plot that will be superimposed. The file on the left will be “synched” with the file on the right

Click on the SYNC PLOTS Off button to turn it

Green

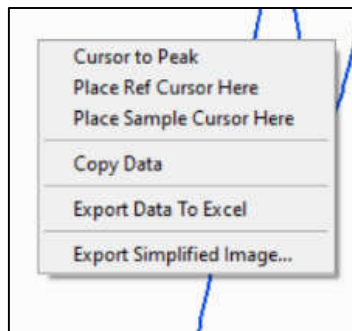


8. Using Cursors – Numerical Analysis



Net result of the two files syncing with one another on the time (X) axis. The solid Sample file has lower peak irradiance and was run slower than the Reference file

As with many functions in PowerView III, there are multiple ways adjust the Cursor position. With



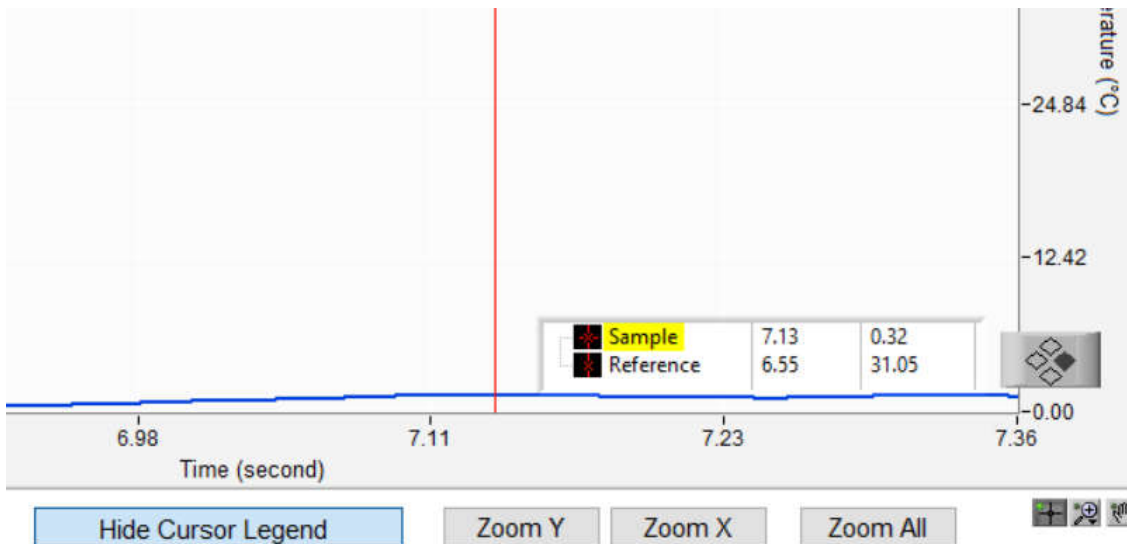
Cursors Enabled, Right Clicking on the Graph by File pane will bring up the dialog box below.

- You can place the cursor on the peak irradiance value by selecting Cursor to Peak
- You can also use your mouse to place the Sample and Reference Cursor at a place in the open Graph by File pane

Click on the Show Cursor Legend to open the Cursor Legend shown below

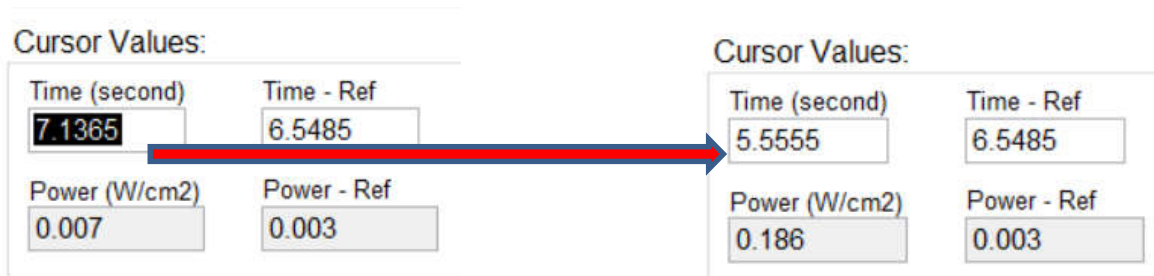
Show Cursor Legend

8. Using Cursors – Numerical Analysis



Highlight one of the cursors by clicking on the small black square next to it. The diamond pattern on the Cursor Legend allow you to move the position of the cursor

You may also adjust the position of the Cursor value by highlighting the value in the Time box with your mouse and typing in a new value (5.5555). The Cursor will move to that value. In the example below, the Sample Cursor would move from 7.1365 Seconds to 5.5555 Seconds. The same can be done for the position of the Reference Cursor



9. Setting Thresholds

9. Setting Thresholds

Why Set a Threshold?

A threshold “sets the bar” for what UV measurements the PowerView Software® III will consider for display and calculations. Readings below the threshold will be disregarded for these purposes.

Sometimes a threshold is used to eliminate stray UV measurements inadvertently recorded by the instrument (due to poor system shielding for example). Setting a threshold can be used if the instrument reports “negative numbers.” The negative numbers are normally very small when compared to the overall full scale range in the instrument. These small negative numbers can add up when the actual “UV exposure time” on production lines is extremely short compared to the “instrument on time”.

In some applications, the actual UV exposure time is measured in single digit seconds with an “instrument on” time of 10 minutes or more. Any small negative value on such a run can impact the Energy Density values. Setting ten threshold at zero or even 1 mW eliminates any negatives values and makes Energy Density calculations more realistic.



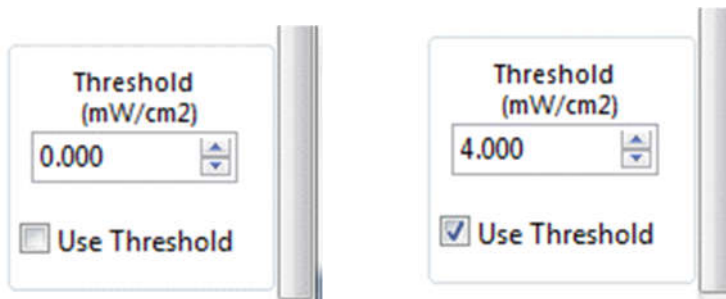
Be sure to turn off any Infra-Red (IR) or heated sections of the production line or insert the “Map” or “Profiler” after the IR/heated section.

How to Set a Threshold

The EIT PowerView Software® III uses NO THRESHOLD as its default. This means all data recorded is used for display and calculation.

To set a threshold:

1. Check the **Use Threshold** box in the lower right corner of the screen.



By default, thresholds are turned off.

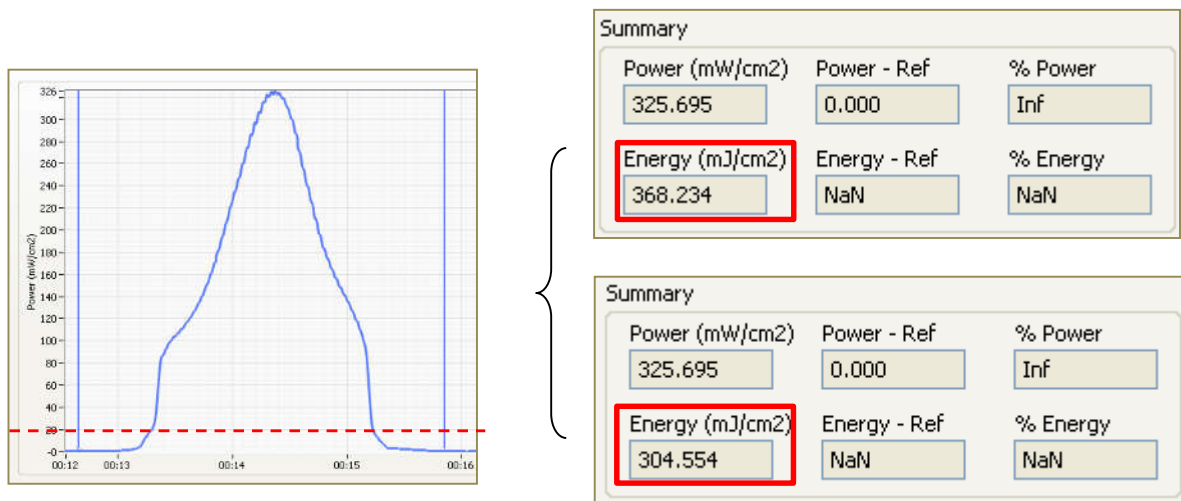
9. Setting Thresholds

2. The numerical value for the threshold may be entered directly by clicking in the number display pane, or by incrementing/decrementing the threshold value up/down buttons. Here a (small) value of 4 mW/cm^2 is entered.

The Effect of a Threshold

Setting a threshold to disregard radiometer data below the designated value, will reduce the Energy Density (mJ/cm^2) when positive Power values are ignored, and raise the Energy Density when negative Power values are disregarded.

Consider the following example:



An example of the effect Threshold level on Energy calculations

In this example, without applying a Threshold, the peak Power is 325.695 mW/cm^2 in the UV band with total Energy of 368.234 mJ/cm^2 (between the two cursors shown).

When a Threshold of 20.000 mW/cm^2 is applied, there is no change in the Power level, but the Energy is reduced to 325.695.

For purposes of illustration, we have used a high threshold value (20 mW/cm^2) and depicted the threshold value (which is not actually displayed in PowerView® III) by the dashed red line on the sample graph. The effect of the Threshold control, is to cause all measurements below the dashed line to be eliminated from the Energy computation.

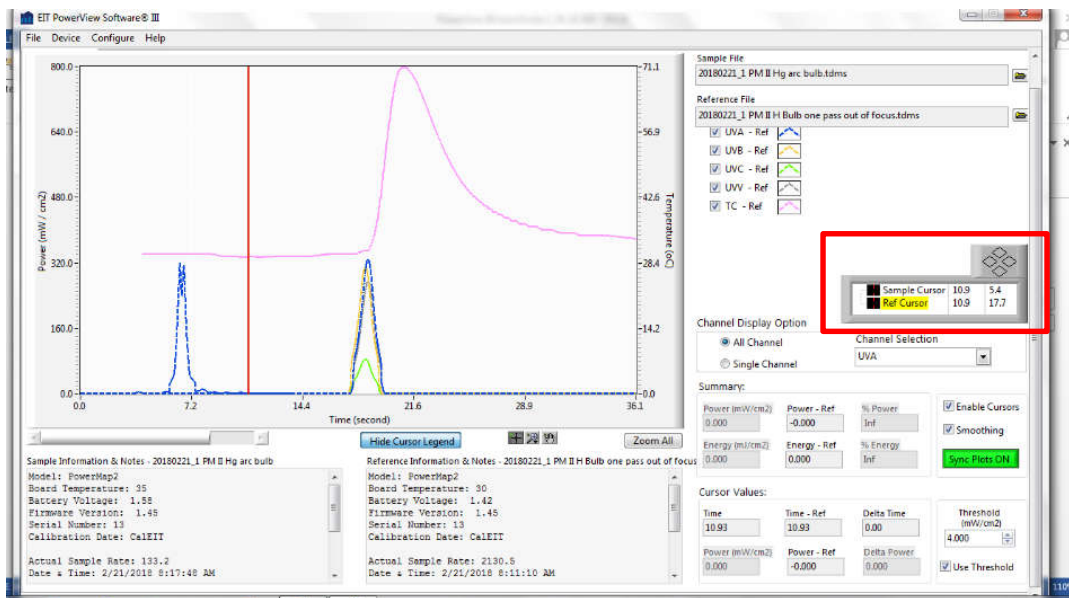
9. Setting Thresholds

Cursor Legend

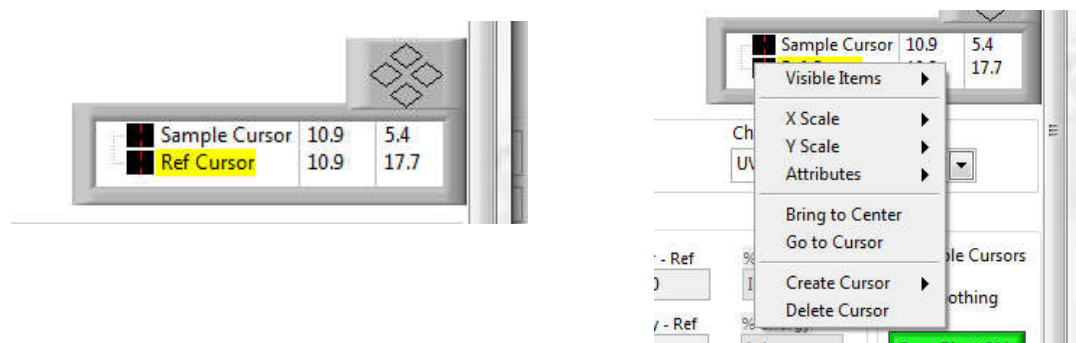
An adjustment for the Cursor Legend is shown under the graph.



When activated a pop up menu is displayed on the screen



Clicking on the black box to the right of the name allows you to highlight a cursor.



Right clicking on the black box brings up a menu to allow you to adjust the look of the cursor

10. Exporting Graphs, Tables, and Data Sets

10. Exporting Data

There are times you will want to share graphs, data tables and even your raw PowerView III data for use with other programs, perhaps for further analysis, reporting, or sharing with colleagues and suppliers. The software has tools that allow you to save graph images and data tables and export data sets in standard formats that can be read by programs like Microsoft Excel® and other statistical software.

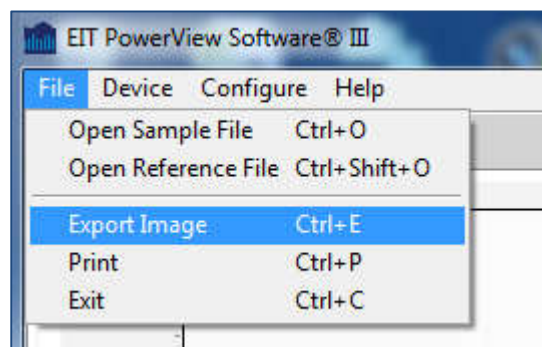
Sharing Graph and Table View Images

There are multiple ways to capture and share the PowerView® III screen and graph.

The entire PowerView III screen can be shared using the PrtScr key on your computer keyboard

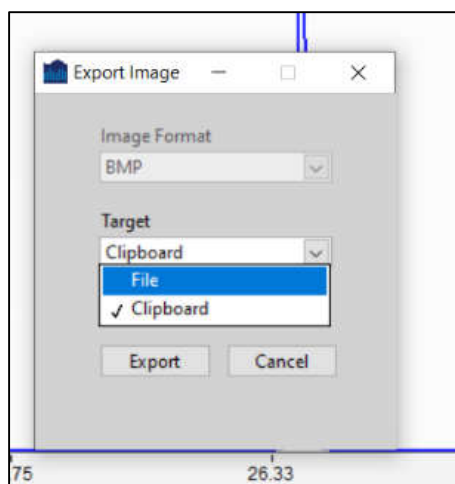
The PowerView® III allows you to also share the graph as an image in standard file formats such as a Bitmap (.bmp), Encapsulated Postscript (.eps) or Enhanced Metafile (.emf) graphic files. The image can easily be used in reports, presentations and communications with supply chain partners or customers.

1. Share Graph Image from the Toolbar: Select **File** → **Export Image**

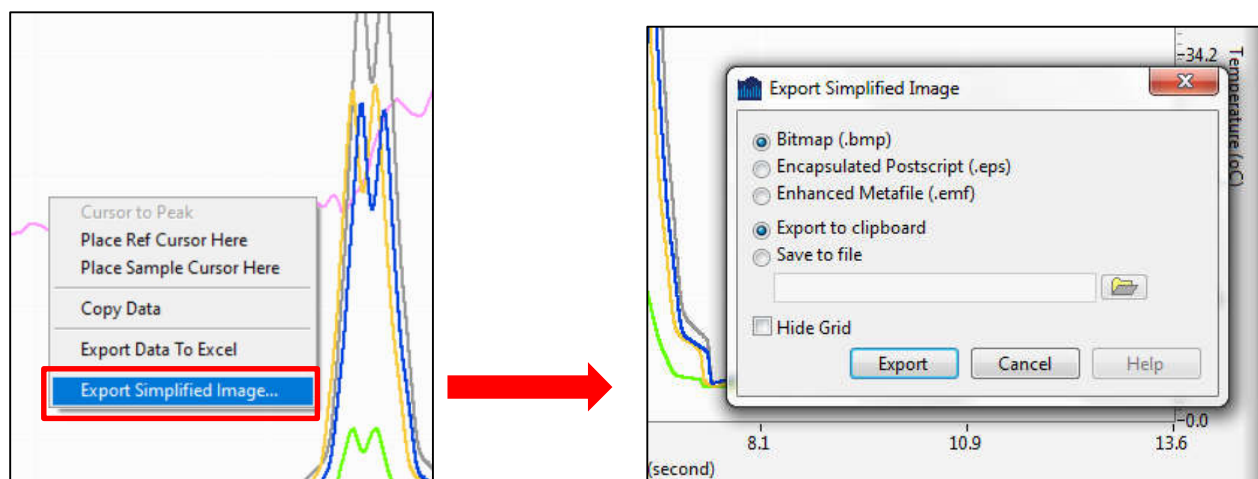


2. This will launch the Export Front Panel dialog box. You have the choice to save the image as a BMP to the Clipboard or File

10. Exporting Graphs, Tables, and Data Sets



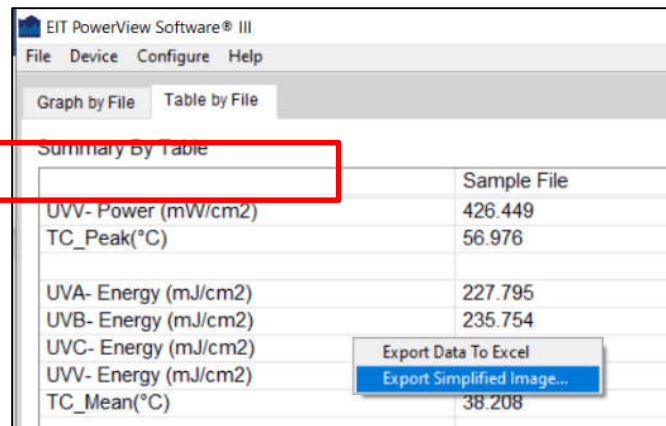
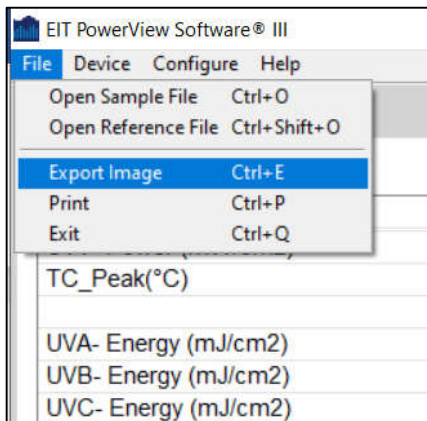
3. Share the Graph Image with a mouse right click on the Graph. The dialog box will appear if you hold the cursor on the graph and right click.



The exported file is usually easier to view if you check the Hide Grid box

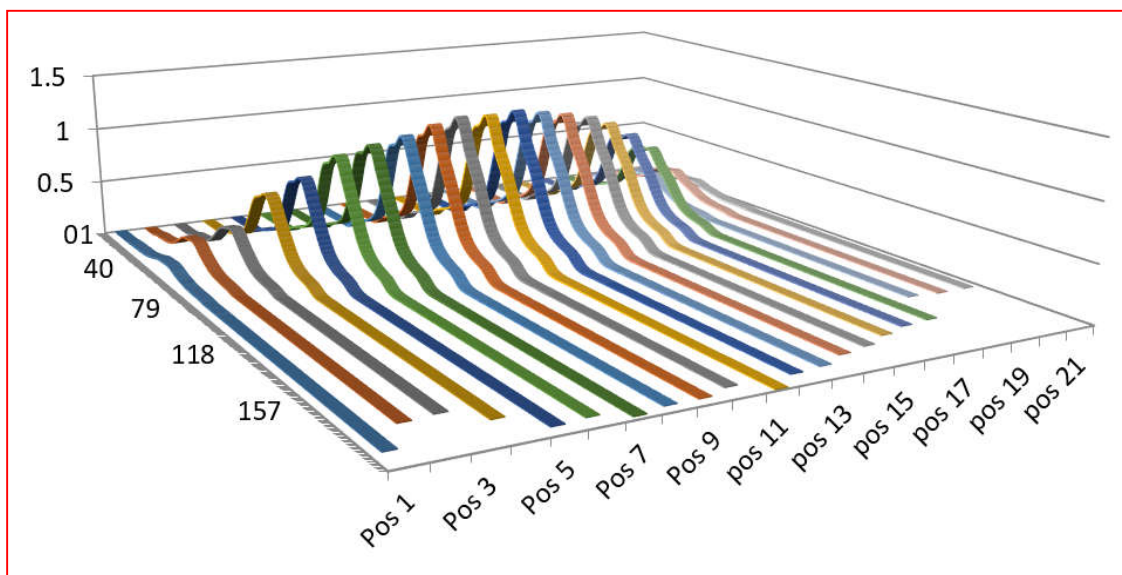
4. Clicking on Export Simplified Image will bring up the dialog box on the right above. The file may be saved either to the Clipboard so it can be cut and pasted into another application, or saved to a File on your computer.
5. When in Table by File: The Export Image on the **Toolbar** menu (below left) may be used. You may also right-click on the table (below right) to export a simplified image.

10. Exporting Graphs, Tables, and Data Sets



Exporting Data

EIT provides users with access to the raw sample data collected by your radiometer. This data allows advanced users to create their own graphical and numeric analysis using Excel®. Other software applications may be used to further view or manipulate the data from Excel including comma delimited or .csv file formats.

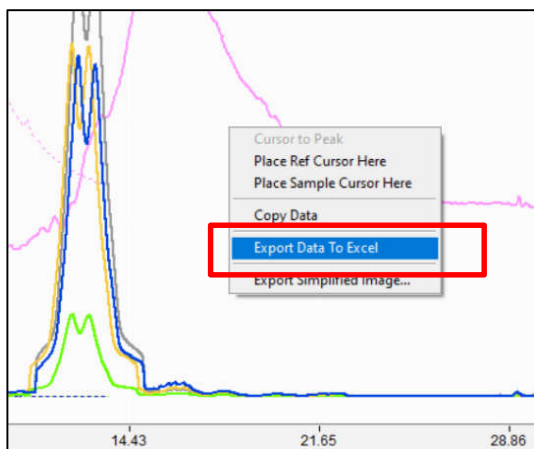


Uniformity of an arc lamp in 21 different positions across the width and length of the bulb.
Courtesy of Jenton International Ltd. (UK)

10. Exporting Graphs, Tables, and Data Sets

There are multiple ways to Export the Data to Excel:

1. From within the PowerView III program, right-click on the graph in the **Graph by File** tab



Right click on a Graph to open Export dialog box

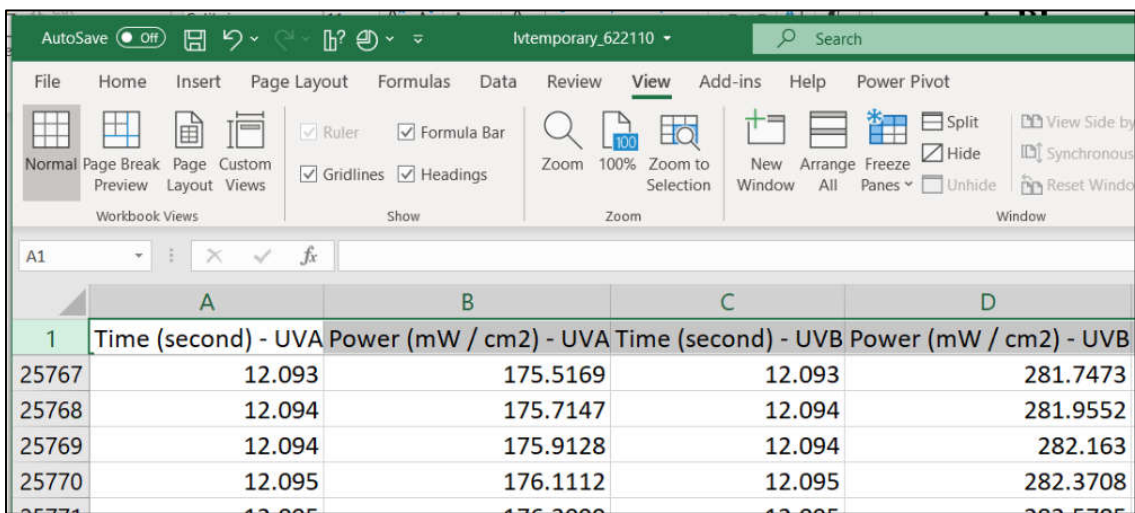
This will open a file in Excel with the raw sample data.

	A	B	C	D	E	F	G	H	I
	Time (second) - UVA	Power (mW / cm2) - UVA	Time (second) - UVB	Power (mW / cm2) - UVB	Time (second) - UVC	Power (mW / cm2) - UVC	Time (second) - UVV	Power (mW / cm2) - UVV	Time (second) - TC
25767	12.093	175.5169	12.093	281.7473	12.093	65.4234	12.093	238.3889	
25768	12.094	175.7147	12.094	281.9552	12.094	65.4735	12.094	238.648	
25769	12.094	175.9128	12.094	282.163	12.094	65.5235	12.094	238.9075	
25770	12.095	176.1112	12.095	282.3708	12.095	65.5735	12.095	239.1673	
25771	12.095	176.3099	12.095	282.5785	12.095	65.6234	12.095	239.4275	
25772	12.096	176.509	12.096	282.786	12.096	65.6734	12.096	239.688	
25773	12.096	176.7083	12.096	282.9936	12.096	65.7233	12.096	239.9487	
25774	12.097	176.908	12.097	283.201	12.097	65.7733	12.097	240.2098	
25775	12.097	177.1079	12.097	283.4083	12.097	65.8232	12.097	240.4711	
25776	12.098	177.3081	12.098	283.6156	12.098	65.8731	12.098	240.7327	
25777	12.098	177.5085	12.098	283.8227	12.098	65.923	12.098	240.9945	
25778	12.099	177.7092	12.099	284.0298	12.099	65.9728	12.099	241.2565	
25779	12.099	177.91	12.099	284.2368	12.099	66.0227	12.099	241.5188	
25780	12.1	178.1111	12.1	284.4436	12.1	66.0726	12.1	241.7813	
25781	12.1	178.3124	12.1	284.6504	12.1	66.1224	12.1	242.044	
25782	12.1	178.5139	12.1	284.8571	12.1	66.1722	12.1	242.3068	
25783	12.101	178.7155	12.101	285.0638	12.101	66.2221	12.101	242.5699	
25784	12.101	178.9173	12.101	285.2703	12.101	66.2719	12.101	242.8331	
25785	12.102	179.1193	12.102	285.4768	12.102	66.3216	12.102	243.0964	
25786	12.102	179.3215	12.102	285.6832	12.102	66.3714	12.102	243.3599	
25787	12.103	179.5237	12.103	285.8894	12.103	66.4211	12.103	243.6234	
25788	12.103	179.7261	12.103	286.0956	12.103	66.4708	12.103	243.8871	

An Excel file with data exported from PowerView III

Columns will list the Time (seconds) and Irradiance by UV band followed the temperature data if the unit is a “Map”. Each row represents a new reading taken by the instrument. The sample data is listed in columns first followed by the reference data if a ‘reference’ file was open.

10. Exporting Graphs, Tables, and Data Sets



	A	B	C	D
1	Time (second) - UVA	Power (mW / cm2) - UVA	Time (second) - UVB	Power (mW / cm2) - UVB
25767	12.093	175.5169	12.093	281.7473
25768	12.094	175.7147	12.094	281.9552
25769	12.094	175.9128	12.094	282.163
25770	12.095	176.1112	12.095	282.3708

2. In the **Table by File** tab right-click on the table and select **Export Data to Excel**

Graph by File

Table by File

Read Data From Device

Change Por

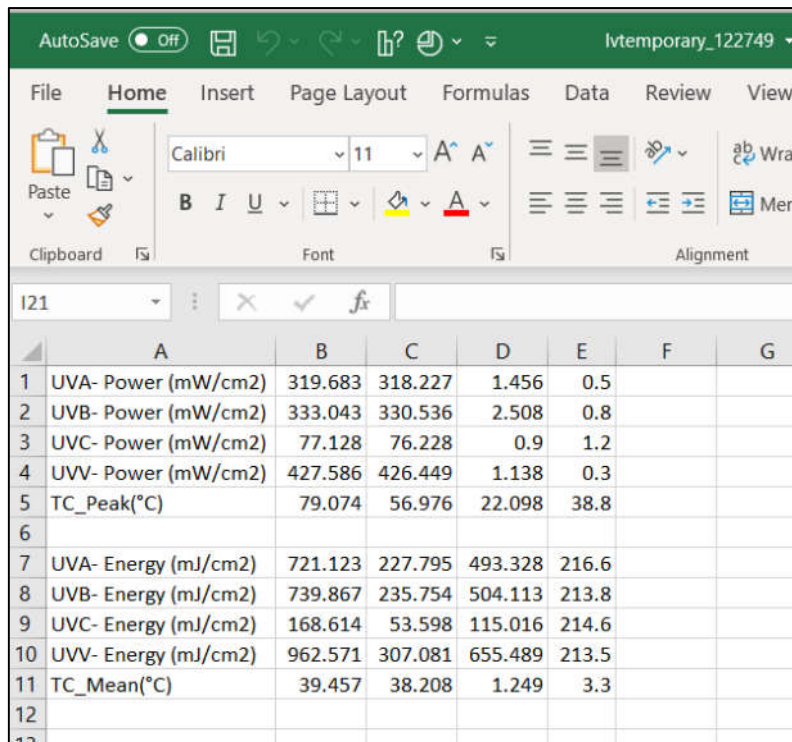
Summary By Table

	Sample File	Reference File	Difference	%
UVA- Power (mW/cm2)	319.683	318.227	1.456	0.5
UVB- Power (mW/cm2)	333.043	330.536	2.508	0.8
UVC- Power (mW/cm2)	77.128		0.900	1.2
UVV- Power (mW/cm2)	427.586		1.138	0.3
TC_Peak(°C)	79.074	56.976	22.098	38.8
UVA- Energy (mJ/cm2)	721.123	227.795	493.328	216.6
UVB- Energy (mJ/cm2)	739.867	235.754	504.113	213.8
UVC- Energy (mJ/cm2)	168.614	53.598	115.016	214.6
UVV- Energy (mJ/cm2)	962.571	307.081	655.489	213.5
TC_Mean(°C)	39.457	38.208	1.249	3.3

PowerView III Table by File Tab

Excel will open and transfer the data values to the spreadsheet as shown below

10. Exporting Graphs, Tables, and Data Sets



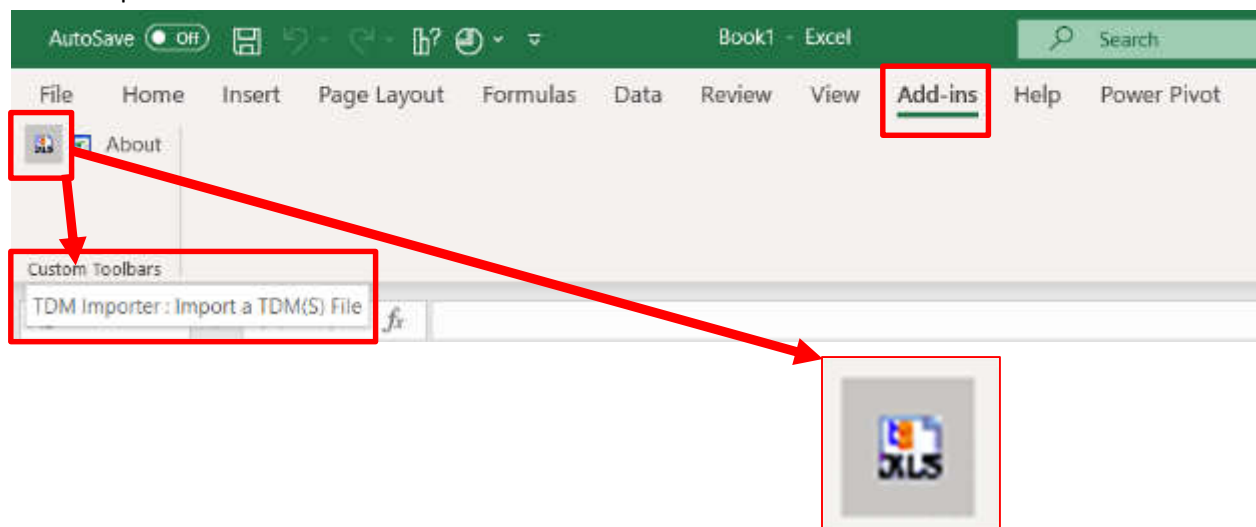
The screenshot shows a Microsoft Excel spreadsheet with a table of data. The table has 12 rows and 7 columns (A-G). The data is as follows:

	A	B	C	D	E	F	G
1	UVA- Power (mW/cm2)	319.683	318.227	1.456	0.5		
2	UVB- Power (mW/cm2)	333.043	330.536	2.508	0.8		
3	UVC- Power (mW/cm2)	77.128	76.228	0.9	1.2		
4	UVV- Power (mW/cm2)	427.586	426.449	1.138	0.3		
5	TC_Peak(°C)	79.074	56.976	22.098	38.8		
6							
7	UVA- Energy (mJ/cm2)	721.123	227.795	493.328	216.6		
8	UVB- Energy (mJ/cm2)	739.867	235.754	504.113	213.8		
9	UVC- Energy (mJ/cm2)	168.614	53.598	115.016	214.6		
10	UVV- Energy (mJ/cm2)	962.571	307.081	655.489	213.5		
11	TC_Mean(°C)	39.457	38.208	1.249	3.3		
12							

Right click on a Table by File and Export to Excel

3. Open Excel and select Add-ins on the Tool Bar. A small icon should appear which corresponds to **TDM Importer: Import a TDM(S) File**. Click on this icon and navigate to the file you would like to export to Excel.

Once selected, Excel should open automatically. Exporting the data this way should give a spreadsheet with multiple tabs as shown below.



10. Exporting Graphs, Tables, and Data Sets

Root Name	Title	Author	Date/Time	Groups	Description	Battery_Voltage	Board_Temperature	Calibration_Date	Date_Time	error	Firmware_Version	has_Temperature_data
20180221_1 PM II H bulb slow fa						1.423239946		29	2/21/2018 8:07:21 AM		1.450000048	
UV Signals	Channels	Description										
Temp Signals												
UV Signals												
Channel	Datatype	Unit	Length	Minimum	Maximum	Description	Energy_Density	NI_ChannelName	Peak_Irradiance	wf_increment	wf_samples	wf_start_offset
UVA	DT_FLOAT		76863				0.695862919	UVA	0.81986953	0.000169373		76863
UVB	DT_FLOAT		76863				0.713080227	UVB	0.645809472	0.000469373		76863
UVC	DT_FLOAT		76863				0.164514586	UVC	0.140763849	0.000469373		76863
UVV	DT_FLOAT		76863				0.935717463	UVV	0.710626256	0.000469373		76863
Temp Signals												
Channel	Datatype	Unit	Length	Minimum	Maximum	Description	NI_ChannelName	wf_increment	wf_samples	wf_start_offset	wf_start_time	Start Index
Thermocouple	DT_FLOAT		1201				0.030039897		1201	0	02/21/2018 08:07:21.451 AM	
Internal Temperature	DT_FLOAT		1201				0.030039897		1201	0	02/21/2018 08:07:21.451 AM	
board voltage	DT_FLOAT		1201				0.030039897		1201	0	02/21/2018 08:07:21.451 AM	



The **first** workbook tab contains the .tdms file name and presents instrument information. This information only transferred when the Export is done by starting with Excel first and using the TDM Importer icon in the Add-ins menu.

The **second** workbook tab lists the “UV Signals” or irradiance values for each active band.

23419	0.035833701	0.045594558	0.009907365	0.051722586
20180221_1 PM II H bulb slow fa	UV Signals	Temp Signals		

10. Exporting Graphs, Tables, and Data Sets

	A	B	C	D
1	UVA	UVB	UVC	UVV
23392	0.005080898	0.007825932	0.001822955	0.012778522
23393	0.016579773	0.022116764	0.004755535	0.026165545
23394	0.03663595	0.046955589	0.009907365	0.048984334
23395	0.050006732	0.06396848	0.013553276	0.065109611
23396	0.048669655	0.061926935	0.01323624	0.064805359
23397	0.040914599	0.052059457	0.011175508	0.056894846
23398	0.036903366	0.046955589	0.010145142	0.052635338
23399	0.036903366	0.046955589	0.010224401	0.052635338
23400	0.037438195	0.047636103	0.010462177	0.053243838
23401	0.03663595	0.046615332	0.010145142	0.05233109
23402	0.033694375	0.042872492	0.009273293	0.048984334
23403	0.028880894	0.03674785	0.008005151	0.042899322
23404	0.022730334	0.028921921	0.006261455	0.035293058
23405	0.016312357	0.020755731	0.004279982	0.026469795
23406	0.010696627	0.013610316	0.002694803	0.017950781
23407	0.006417977	0.008506447	0.001822955	0.01217002
23408	0.004546067	0.0064649	0.001347402	0.009736016
23409	0.003476404	0.005444126	0.001268143	0.009431766
23410	0.006952808	0.010207737	0.002298509	0.014908275
23411	0.021660671	0.028581662	0.006023678	0.031946305
23412	0.041716848	0.053420488	0.011254767	0.05476509
23413	0.051343814	0.065329514	0.013870311	0.066630863
23414	0.046797745	0.05954513	0.012839945	0.062979855
23415	0.039577521	0.050017908	0.010858472	0.055373594
23416	0.03663595	0.046615332	0.010065882	0.05233109
23417	0.036903366	0.046955589	0.010224401	0.052635338
23418	0.037170779	0.047295846	0.010303659	0.05293959
23419	0.035833701	0.045594558	0.009907365	0.051722586
20180221_1 PM II H bulb slow fa				UV Signals

	A	B	C	D	E	F
1	L395					
1217	4.215450764					
1218	4.193004131					
1219	4.132398605					
1220	4.035878658					
1221	3.90568924					
1222	3.757542372					
1223	3.598172426					
1224	3.423089743					
1225	3.227805138					
1226	3.050477982					
1227	2.922533035					
1228	2.850704193					
1229	2.785609484					
1230	2.664398432					
1231	2.462379932					
1232	2.242404222					
1233	2.076300383					
1234	1.991003633					
1235	1.968557119					
1236	1.966312528					
1237	1.948355317					
1238	1.901217699					
1239	1.820410371					
1240	1.717156529					
1241	1.607168674					
1242	1.503914833					
1243	1.418618202					
1244	1.351278663					
20180221_1 LEDCure two passes d						UV Signals

Left: UV Signals (UVA, UVB, UVC and UVV) from a PowerMAP II

Right: UV Signals (L395) from a single band LEDCure L-395

The **third tab** workbook tab lists the “Temp Signals” if the file being Exported was collected with a “Map” instrument.

29	25.85070229	25.578125	1.374940038
20180221_1 PM II H bulb slow fa			UV Signals
			Temp Signals

Check the heading on each column as the Thermocouple, Internal Temperature and Board Voltage are collected. The Temperature Signals are collected at a fixed rate of 32 Hz.

10. Exporting Graphs, Tables, and Data Sets

	A	B	C	D	E	F
1	Thermocouple	Internal Temperature	board voltage			
2	25.89142799	25.578125	1.37816			
3	25.85070229	25.578125	1.374940038			
4	25.85070229	25.578125	1.374940038			
5	25.86088371	25.578125	1.37816			
6	25.92197227	25.578125	1.374940038			
7	25.98306084	25.578125	1.374940038			
8	25.98306084	25.578125	1.374940038			
9	25.98306084	25.578125	1.374940038			
10	25.99324226	25.578125	1.374940038			
11	26.01360512	25.578125	1.374940038			
12	26.0441494	25.578125	1.37816			
13	26.03396797	25.578125	1.374940038			
14	25.99324226	25.578125	1.374940038			
15	25.95251656	25.578125	1.374940038			
16	25.95251656	25.578125	1.374940038			
17	25.97287941	25.578125	1.374940038			
18	25.97287941	25.578125	1.374940038			
19	25.94233513	25.578125	1.374940038			
20	25.91179085	25.578125	1.374940038			
21	25.90160942	25.578125	1.374940038			
22	25.86088371	25.578125	1.374940038			
23	25.85070229	25.578125	1.374940038			
24	25.90160942	25.578125	1.374940038			
25	25.9321537	25.578125	1.374940038			
26	25.88124657	25.578125	1.374940038			
27	25.85070229	25.578125	1.374940038			
28	25.86088371	25.578125	1.374940038			
29	25.85070229	25.578125	1.374940038			

20180221_1 PM II H bulb slow fa UV Signals **Temp Signals**

Temp Signals from a "Map" instrument

Note: You may observe negative values or values close to zero for some readings. This is due to some slight variation from reading to reading and is not uncommon. You should be aware of potential negative values and decide how to treat them in your own calculations.



It is a good practice to always back up important data to protect against unintended loss when performing these data handling procedures.

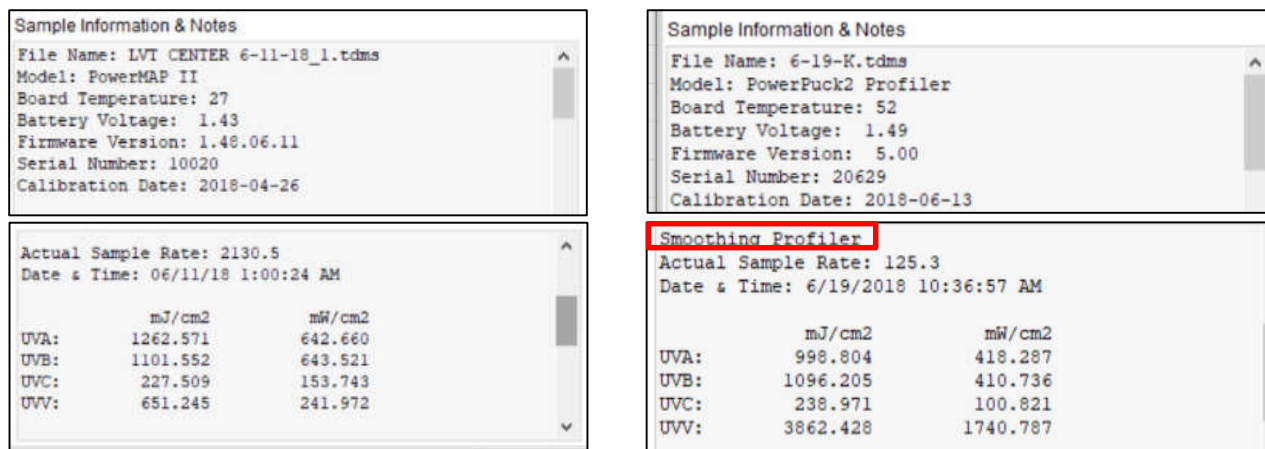
11. Advanced Editing & Navigation

11. Advanced Editing & Navigation

Advanced Text Editing: Sample Information & Notes

In Chapter 5 we described that the **Sample Information & Notes** pane contains important information for record keeping. **Note:** If your file is opened as a Reference, the header will show **Reference Information and Notes**.

There is fixed information provided that the user cannot edit or change. The information in the Sample Information & Notes pane will vary slightly based on the type of instrument (“Map” or “Profiler”). “Profiler” units add information about how the display Smoothing was set (Red box). The scroll bar to the right of the pane is used to access all information. For clarity, I have shown the information in two separate graphics for each model below. This information is part of the .tdms file.

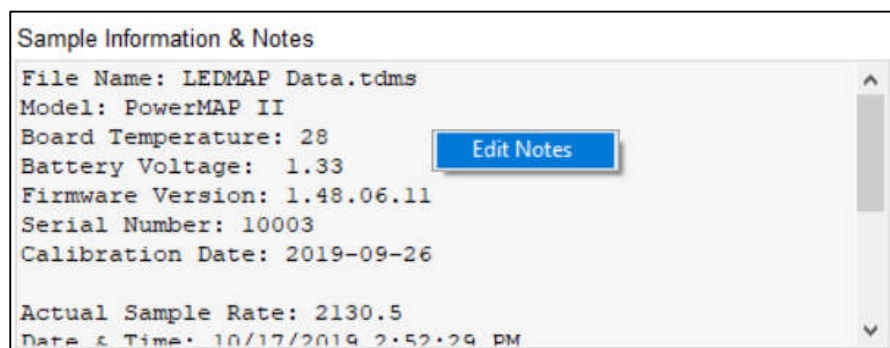


Left: Sample Information & Notes from a PowerMAP II

Right: Sample Information & Notes from a Power Puck II Profiler

To add your process information or notes to the file:

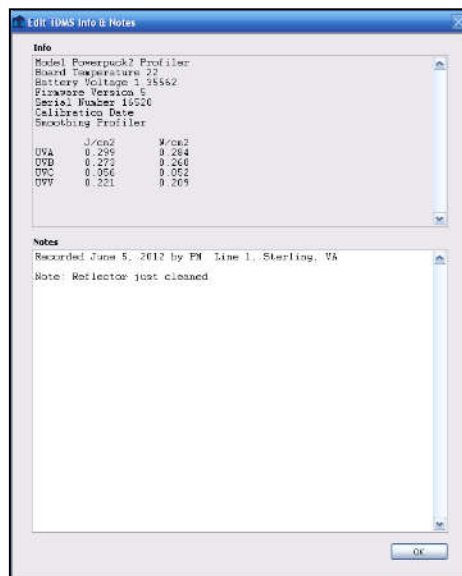
1. Right Click while the cursor is positioned within the **Information & Notes** pane.



Right click in the pane to launch the Edit Notes button

11. Advanced Editing & Navigation

2. Click on the **Edit Notes** button that appears. This will open an editing window that permits free form entry of additional information:



The Information & Notes editor screen

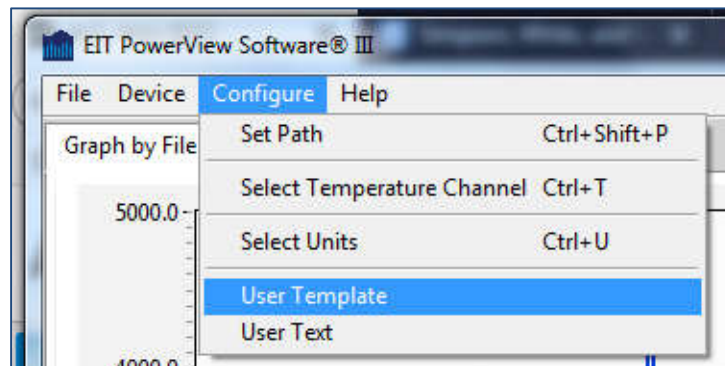
3. After editing, click **OK**



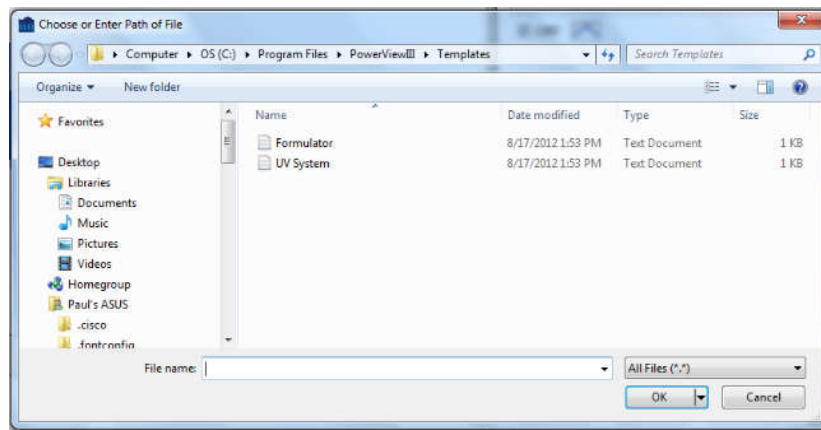
The editing window will be closed, and the Sample Information & Notes will be updated.

User Templates for Faster, More Consistent Notes

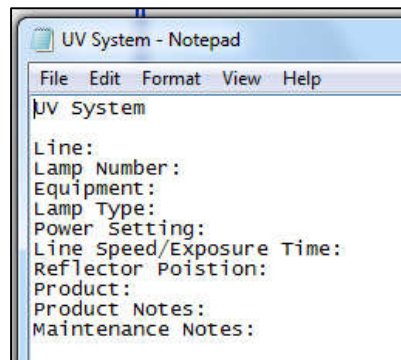
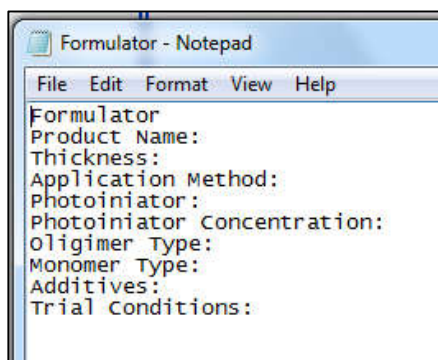
For greater uniformity of recordkeeping, and to speed up entering notes, you can recall a stored template to assist your data entry. The software is supplied with two example templates: a formulator template and a UV system template. To access these templates, from the toolbar select **Configure** → **User Template**



11. Advanced Editing & Navigation



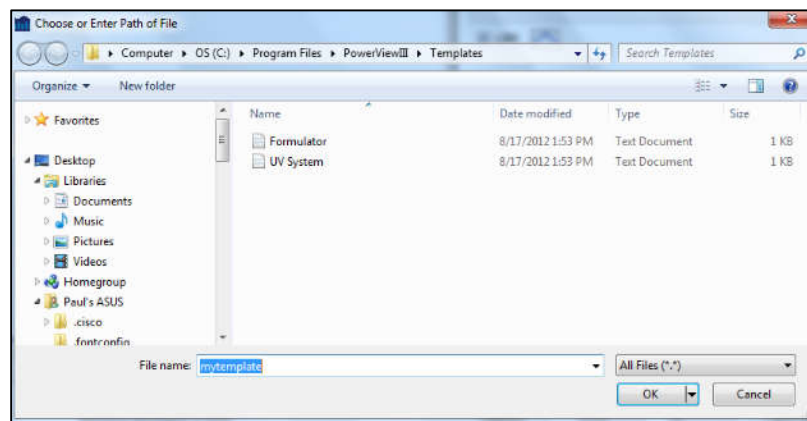
Opening a stored User Template to simplify adding notes



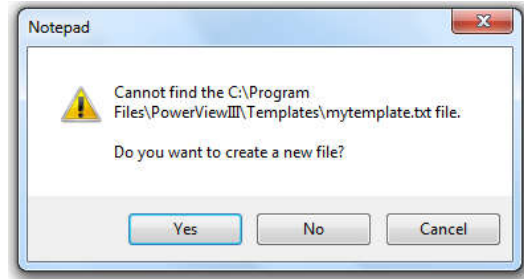
The Default Formulator and UV System templates

Creating a Custom User Template

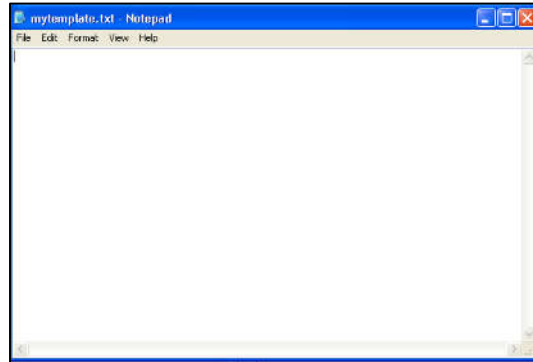
Alternatively, the EIT PowerView Software® III application makes it easy to create your own customized template by entering a new template name. You will be prompted to create a new file.



11. Advanced Editing & Navigation



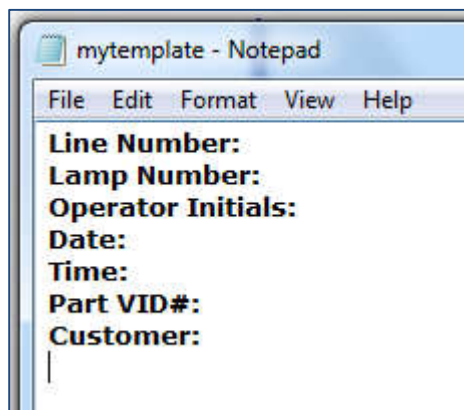
If you respond **Yes**, Windows Notepad will open your new text file for editing.



Create a custom template in Notepad

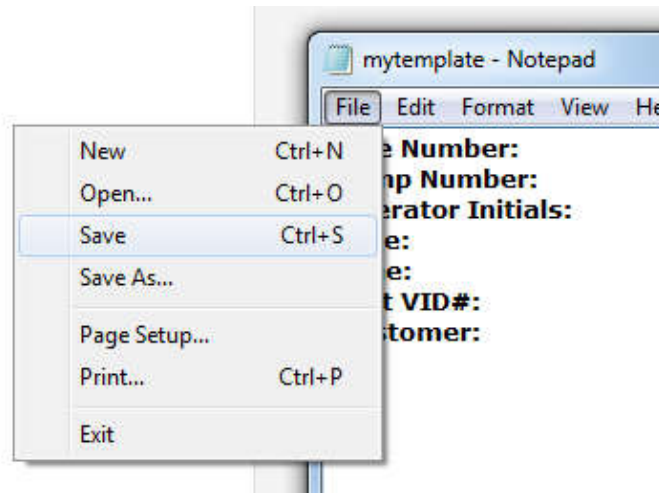
You may then use the editing and formatting tools in Windows Notepad to create a customized template that contains whatever fields you wish; in whatever format you choose.

For example:

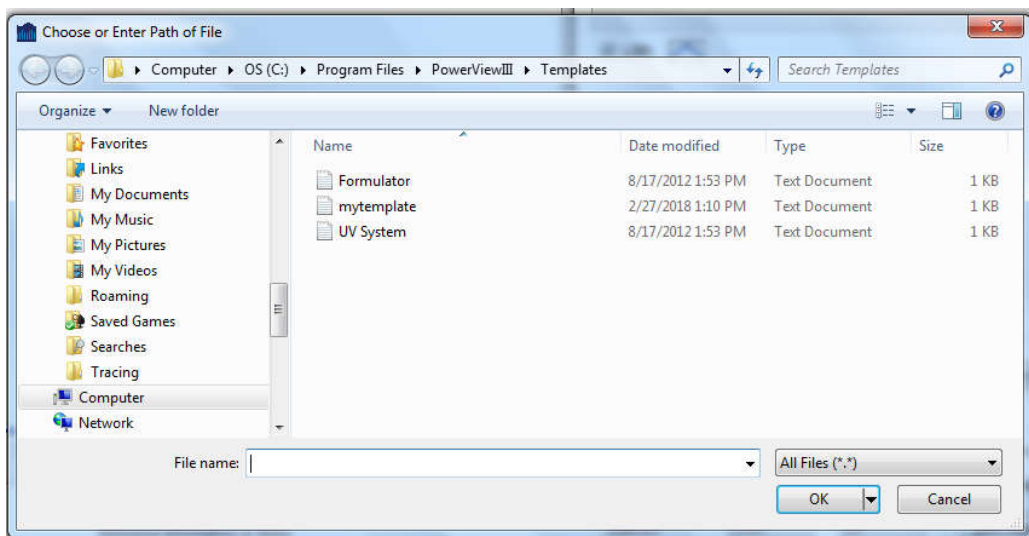


When you are satisfied with your custom template design you can save the template using **File → Save**

11. Advanced Editing & Navigation



Customized templates that you create and save will appear in the **Configure → User Template** menu



The custom Template is available for use

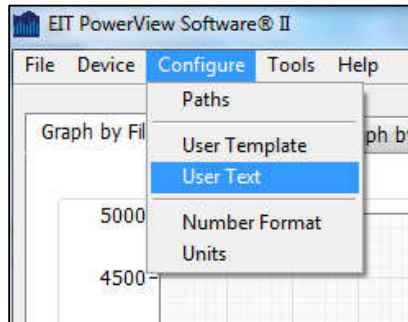
Templates are intended to standardize the data you collect and simplify text entry by allowing you to cut and paste their contents into the **Information & Notes** panels.

Custom Text Entry

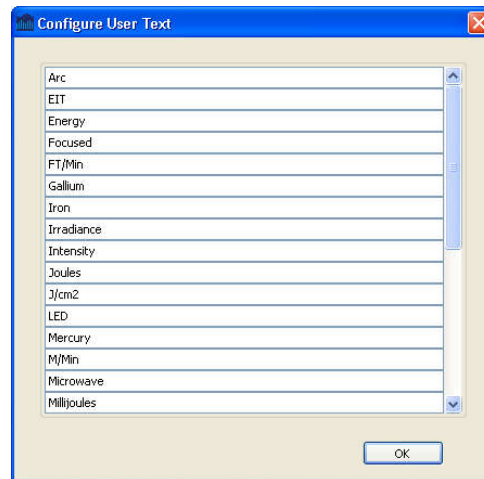
Common words, terms and abbreviations are also available for cutting and pasting. The PowerView Software® III comes with many common terms already loaded, but you can add your own terms, names, locations, and other free-form text to ease data entry and assure greater consistency.

11. Advanced Editing & Navigation

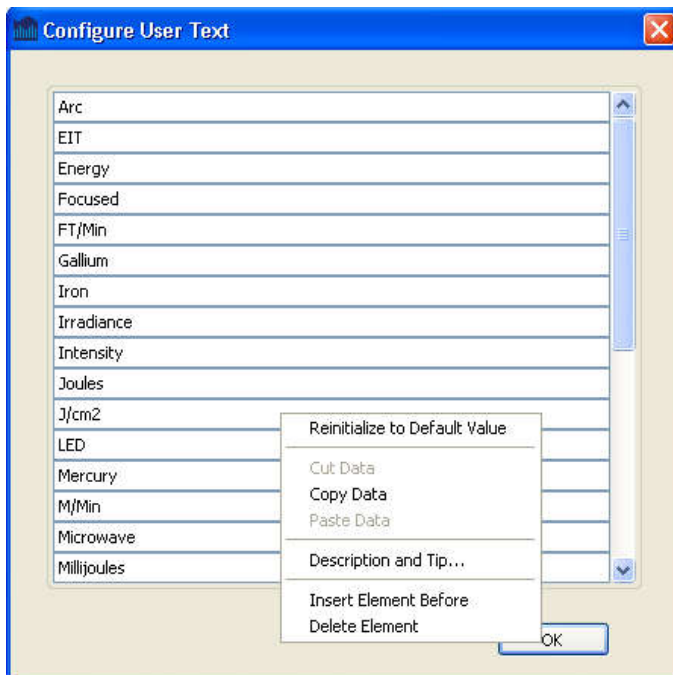
1. From the main toolbar select **Configure** → **User Text**



2. This will open a table of custom terms:



3. Right click on the table to open the editing sub menu:



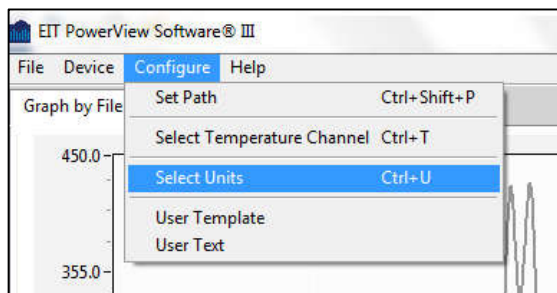
11. Advanced Editing & Navigation

The User Text sub-menu allows you to accomplish common tasks such as copying, cutting and pasting text, deleting entries, adding (inserting) new entries, and adding optional descriptions for terms.

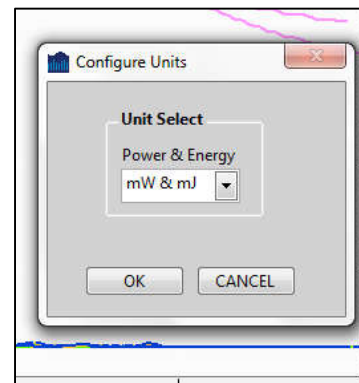
The User Text table provides a quick way to annotate your data with commonly used names, locations, conditions and other terms.

Changing Units of Measurement

From the Toolbar → **Configure** selection you may also select → Units



Opening the Units dialog box



Select the Power & Energy units

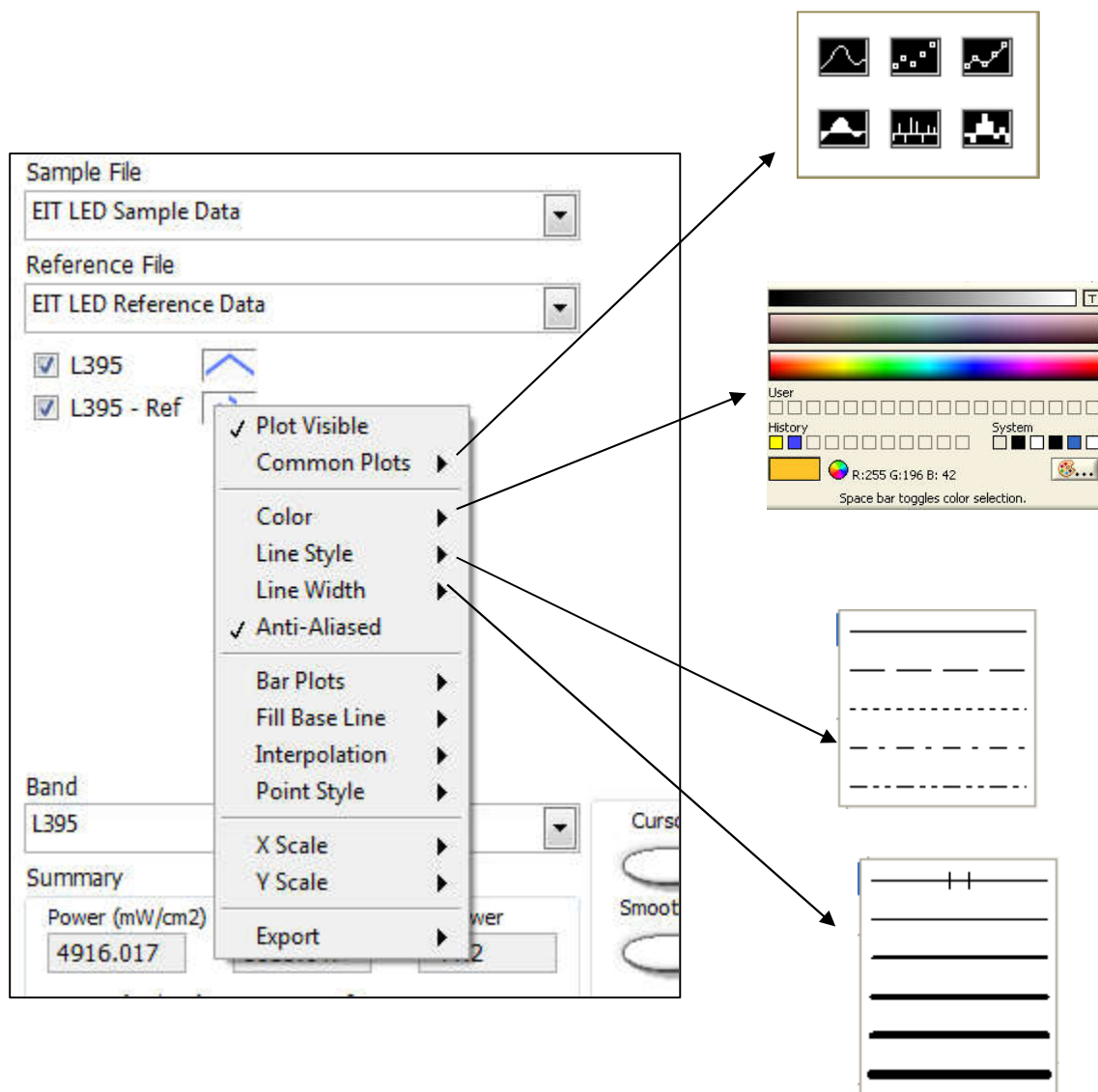
Use this dropdown menu to change the units that will be displayed for Power and Energy values. You can choose between Watts/cm² & J/cm² or mW/cm² & mJ/cm².

Advanced Formatting of Plots

Several advanced tools are available for formatting the way graphs are displayed. These tools can be accessed by right clicking when the mouse is in the small panes that show the color of the trace.

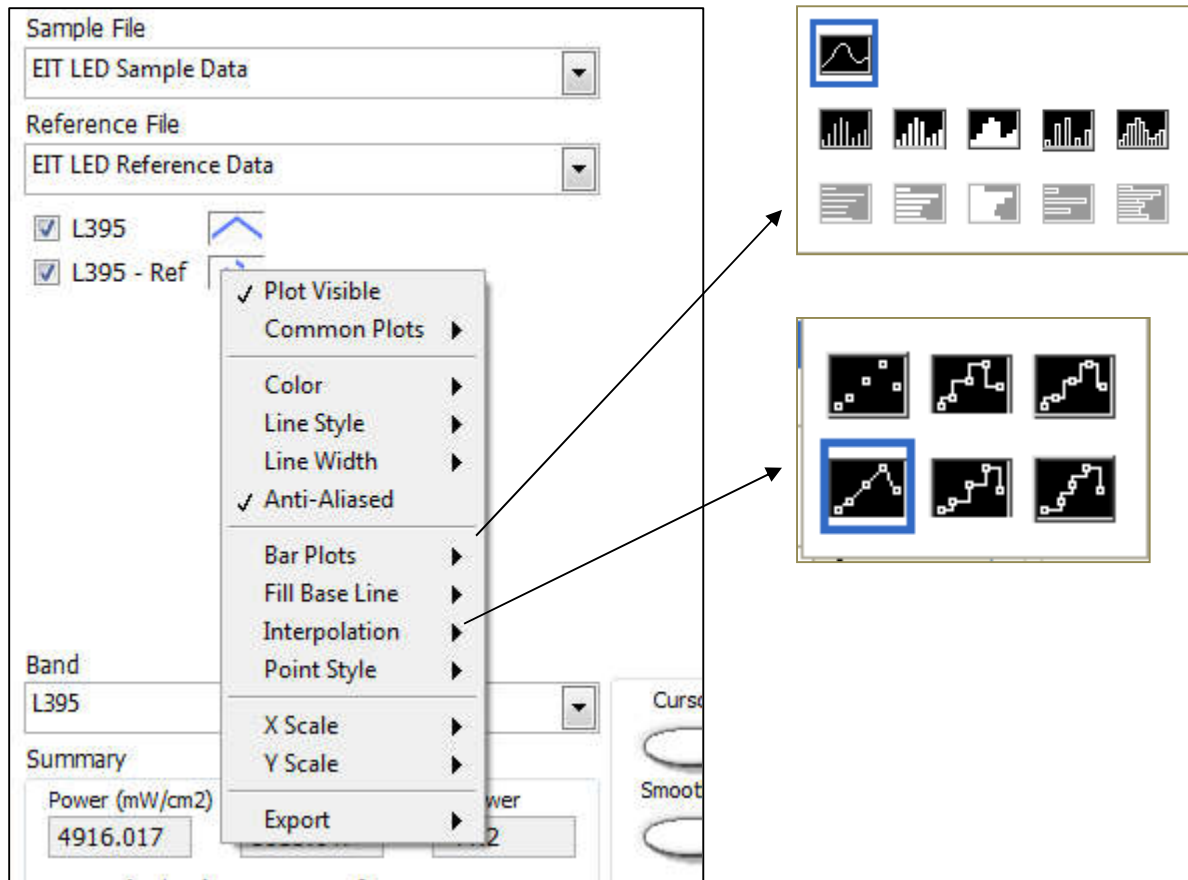
Below is the main attribute menu and the various sub-menus available for each attribute

11. Advanced Editing & Navigation



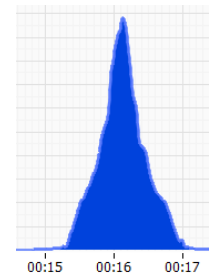
These sub-menus provide tools for setting how each curve is drawn (lines, symbols, connected symbols, bars, shaded bars) and the attributes of the plot in terms of color, line style and line width. These attributes are set for each individual curve.

11. Advanced Editing & Navigation



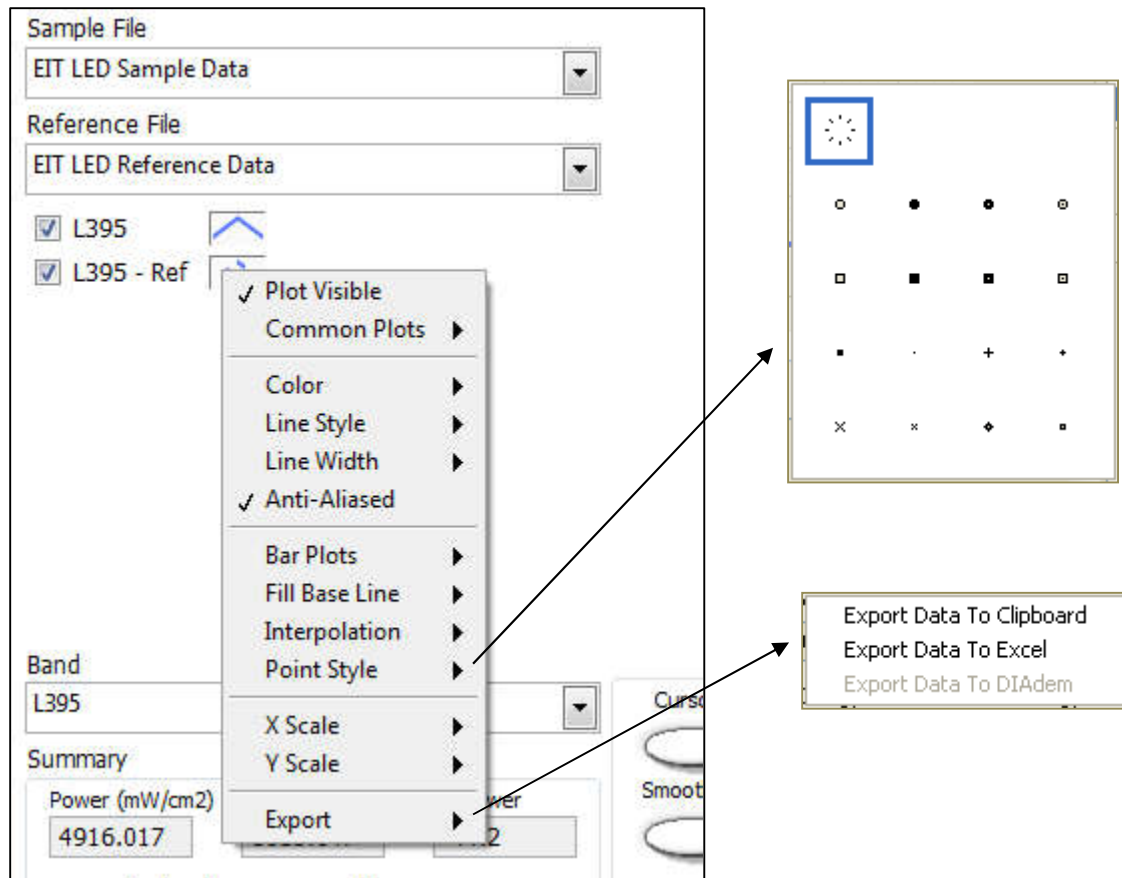
The Bar Plots menu allows you to use various bar styles to show the area under a curve.

The **Fill** command can be used to apply a solid fill either inside or outside the graph plots. This is used to highlight plots.



The Interpolation tool selects how data points are connected. Choices include no connection, straight lines, X-then-Y, Y-then-X and either vertical or horizontal averaging methods.

11. Advanced Editing & Navigation

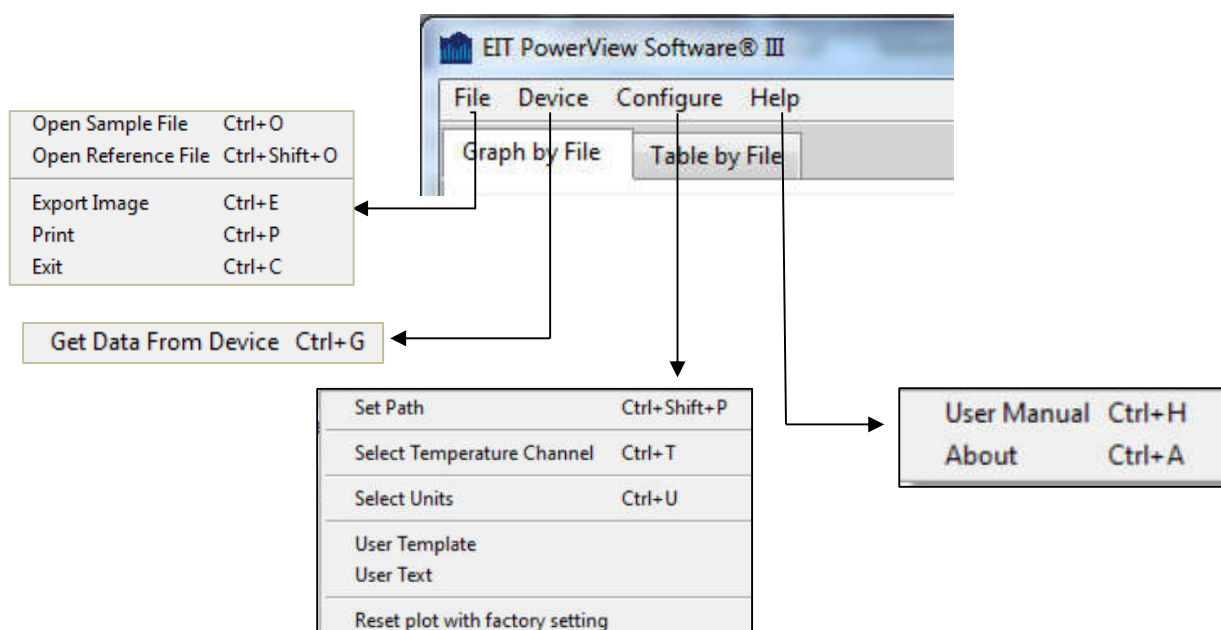


Finally, these sub-menus allow you to change the pointer style and Export the graph to either the Clipboard or a CSV data file suitable for Microsoft Excel® or other statistical analysis program.

Appendix A – Commands and Shortcuts

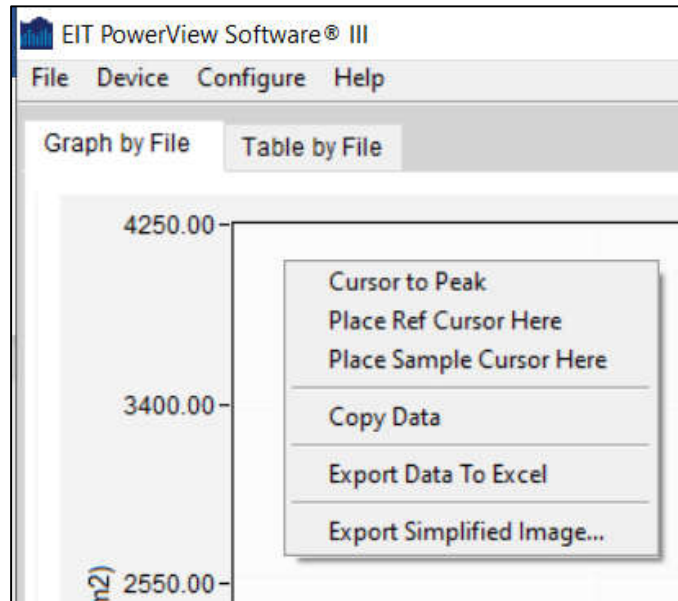
Appendix A: Commands and Shortcuts

1. The Main Toolbar Options



Appendix A – Commands and Shortcuts

2. Right-Clicking in the Main Window with Graph by File View

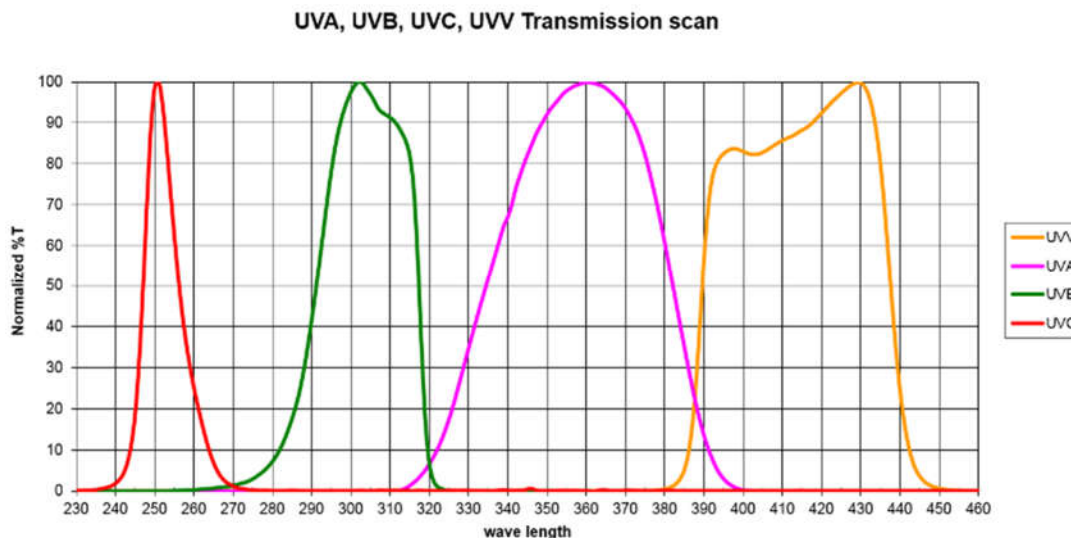


Appendix B – Bandwidth Response Curves

Appendix B: EIT UV Bandwidth Response Curves

Broadband

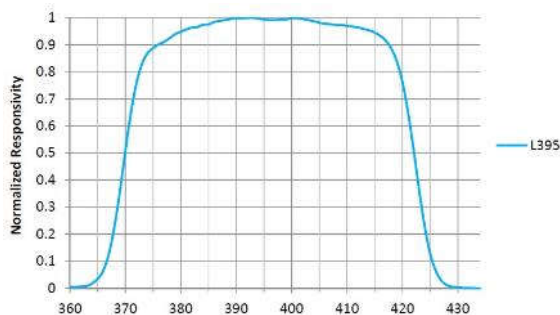
EIT's Broadband Responses are shown below. The responses depicted below are the response of the bandpass filter for each band.



UVA (320-390nm) UVB (280-320nm) UVC (250-260nm) UVV (395-445nm)

EIT UV Bandwidths-LED

The response for EIT's LEDCure L-395 band is shown below. The L-365, L-385 and L-405 bands have a similar response as shown in the text box to the right of the L395 response.



EIT L-365: 340-392 nm

EIT L-385: 360-412 nm

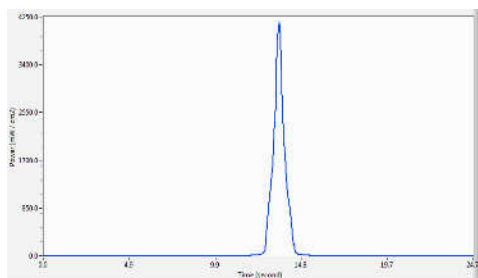
EIT L-395: 370-422 nm

EIT L-405: 380-432 nm

The response in the LEDCure instruments is a patented Total Optic Measured Response (TOMR) that includes ALL optical components of the device including the detector, bandpass filter, and various components of the optical stack (e.g. diffuser, neutral density filter, etc.)

Appendix C – Demonstration Data Files

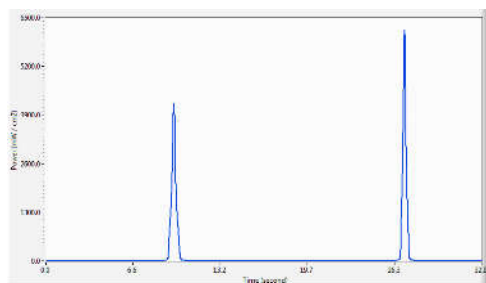
UV LED Demonstration Data Files



Sample File

20180221_1 LEDCure one pass.tdms

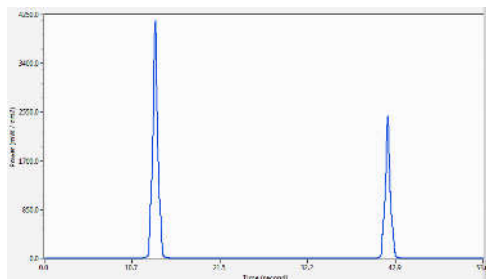
LEDCure™ Plus II Profiler



Sample File

20180221_1 LEDCure two passes different heights_1.tdms

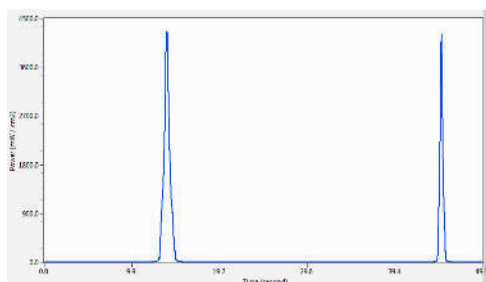
LEDCure™ Plus II Profiler



Sample File

20180221_1 LEDCure two passes different power levels.tdms

LEDCure™ Plus II Profiler



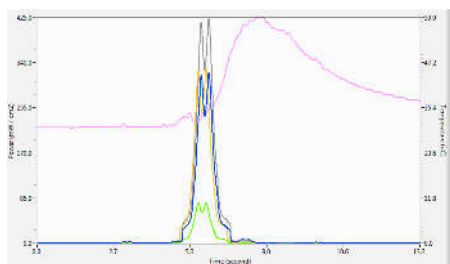
Sample File

20180221_1 LEDCure two passes different speeds.tdms

LEDCure™ Plus II Profiler

Appendix C – Demonstration Data Files

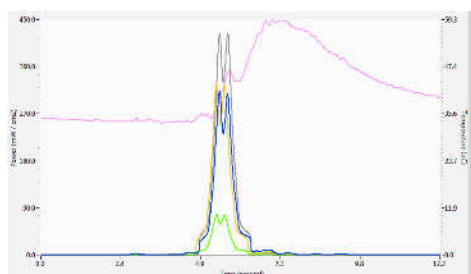
Microwave Lamp Demo Files



Sample File

20180221_1 PM II H Bulb multiple passes_1_run_1.tdms

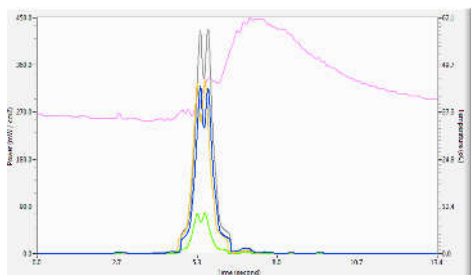
UV PowerMAP® II



Sample File

20180221_1 PM II H Bulb multiple passes_1_run_2.tdms

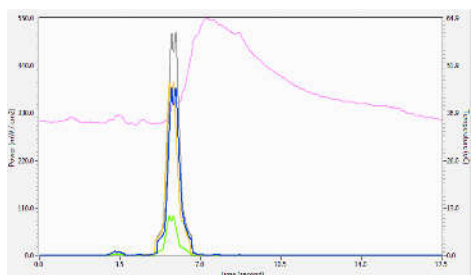
UV PowerMAP® II



Sample File

20180221_1 PM II H Bulb multiple passes_1_run_3.tdms

UV PowerMAP® II

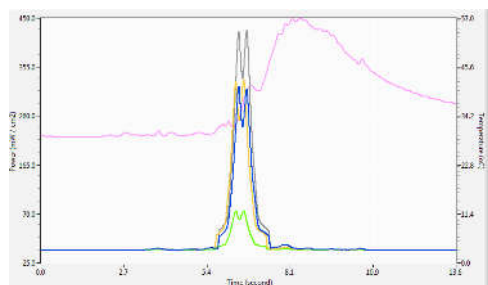


Sample File

20180221_1 PM II H Bulb multiple passes_1_run_4.tdms

UV PowerMAP® II

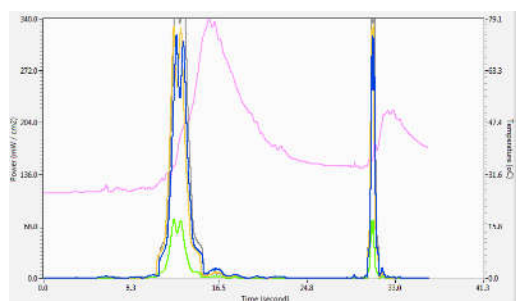
Appendix C – Demonstration Data Files



Sample File

20180221_1 PM II H Bulb one pass out of focus.tdms

UV PowerMAP® II



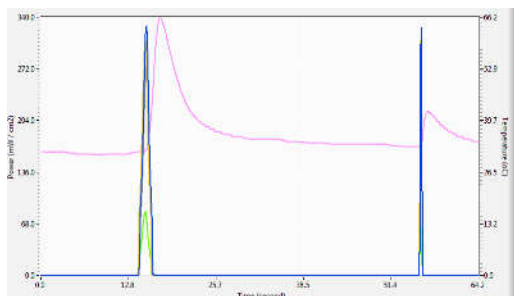
Sample File

20180221_1 PM II H bulb slow fast non focus.tdms

UV PowerMAP® II

Appendix C – Demonstration Data Files

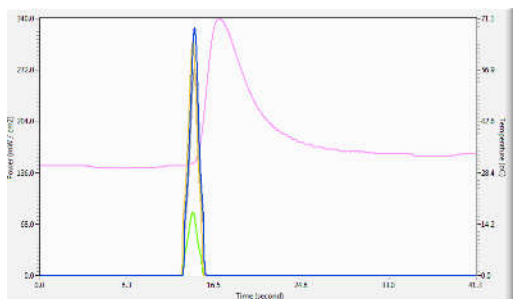
Arc Lamp Demo Files



Sample File

20180221_1 PM II Hg arc bulb two passes slow fast_1.tdms

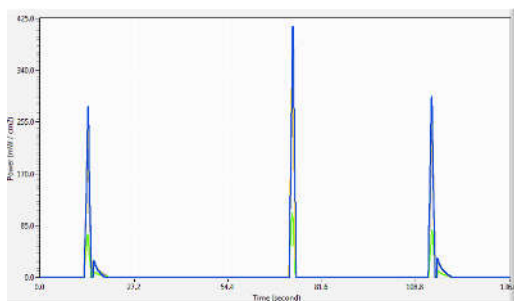
UV PowerMAP® II



Sample File

20180221_1 PM II Hg arc bulb.tdms

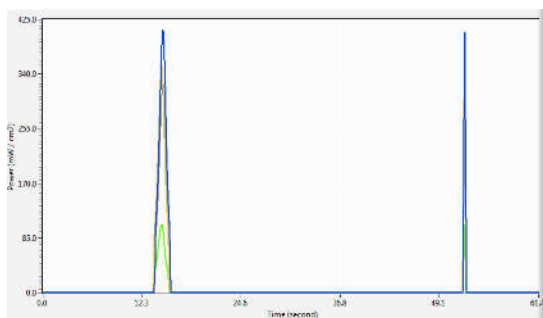
UV PowerMAP® II



Sample File

Power Puck II Arc 3 passes across Width Sample File(1).tdms

UV Power Puck® II Profiler



Sample File

Power Puck II Arc Slow Fast Sample File.tdms

UV Power Puck® II Profiler

Appendix D – Instrument Specifications

Appendix D: Broadband Instrument Specifications

Feature	PowerMAP II	Power Puck II Profiler	UviCure Plus II Profiler
Spectral Response	Four Bands: 320-390nm (UVA), 280-320nm (UVB), 250-260nm (UVC), 395-445nm (UVV)	Four Bands: 320-390nm (UVA), 280-320nm (UVB), 250-260nm (UVC), 395-445nm (UVV)	Single Band: UVA, UVB, UVC OR UVV is specified at the time of order
Dynamic Range Operating Range: High-Range (Standard)	10 W/cm ² High Range (Standard): UVA, UVB, UVV - 100mW/cm ² to 10W/cm ² UVC - 10mW/cm ² to 1W/cm ²	10 W/cm ² High Range (Standard): UVA, UVB, UVV - 100mW/cm ² to 10W/cm ² UVC - 10mW/cm ² to 1W/cm ²	10 W/cm ² High Range (Standard): UVA, UVB, UVV - 100mW/cm ² to 10W/cm ² UVC - 10mW/cm ² to 1W/cm ²
Dynamic Range Operating Range: Mid-Range	NA	1 W/cm ² Mid-Range: UVA, UVB, UVV - 10mW/cm ² to 1W/cm ² / UVC: 1mW/cm ² to 100mW /cm ²	1 W/cm ² Mid-Range: UVA, UVB, UVV - 10mW/cm ² to 1W/cm ² / UVC: 1mW/cm ² to 100mW /cm ²
Dynamic Range/ Operating Range: Low-Range	100 mW/cm ² (0.1 W/cm ²) Low Power: UVA, UVB, UVV - 1mW/cm ² to 100mW/cm ² / UVC - 1mw/cm ² to 100mW/cm ²	100 mW/cm ² (0.1 W/cm ²) Low Power: UVA, UVB, UVV - 1mW/cm ² to 100mW/cm ² / UVC - 1mw/cm ² to 100mW/cm ²	100 mW/cm ² (0.1 W/cm ²) Low Power: UVA, UVB, UVV - 1mW/cm ² to 100mW/cm ² / UVC - 1mw/cm ² to 100mW/cm ²
Spatial Response	Approximately cosine		
Accuracy	+/- 10%; plus ±0.2% of full scale Typically ±5% or better		
Repeatability	± 2-5% typical; Dependent on source and equipment (conveyor) stability, unit alone better than 2.0%		
Effective Data Filter Bandwidth	7 Hz: Effective sample rate of 25 samples/second, referred to as Smooth On 35 Hz: Effective sample rate of 128 samples/second, referred to as Smooth Profiler 700 Hz: Effective sample rate of 2048 samples/second, referred to as Smooth Off		
Sample Rate Adjustment	PowerMAP Handled through Software	Handled in Set-up mode on the Instrument	

Appendix D – Instrument Specifications

Feature	PowerMAP II	Power Puck II Profiler	UviCure Plus II Profiler
Sample Rate for Profiling	User adjustable from 128-2048 Hz	Fixed sample rate of 128 samples/second for profiling. For matching between instrument display and PowerView Software® III values, use Smooth PROFILER mode	
Memory Capacity	65 minutes of data collection time	The memory capacity is sufficient to collect data for >100 minutes	
Display	NA	Easy to Read, Yellow Text on Black Background, Display Brightness User Adjustable	
Operating Temperature	0-75°C Internal temperature; withstands high external temperatures for short periods (Audible alarm indicates when temperature has exceeded upper limit)		
Thermocouple	Supplied with J type Thermocouple, effective sample rate of 32 Hz	NA	
Time-Out Period	2 minutes from Standby Mode (Red Flashing LED) with no button activity	2 minutes in Display mode from last key activity. Will continue to collect data in Run Mode	
Battery/Battery Life	Rechargeable Smart charger provided with unit recharges in fast mode (+/- 90 minutes). Charge speed other USB ports (i.e. computer) varies on the USB port Battery life 100 minutes typical	2-user-replaceable AAA Alkaline Cells, Approximately 20 hours with display on	
Instrument Dimensions	5.5" x 2.1" x 0.55" (LWH) 13.8 x 5.3 x 1.27 (cm)	4.60" x 0.50"; 117 mm x 12.7 mm (D x H)	
Instrument Materials	Aluminum & Stainless Steel		
Instrument Weight	7.3 ounces (207 grams)	10.1 ounces (289 grams)	
Carrying Case, Ship Kit	Supplied with carrying case, cut polyurethane foam interior, scuff resistant nylon exterior cover, cable Manual and PowerView III software available at www.eit.com		
PowerView Software III	National Instruments LabVIEW based programming designed for Windows 7-10. Collected data stored in LabVIEW based *.tdms files		

Appendix D – Instrument Specifications

LED Instrument Specifications			
Feature	LEDMAP	LEDCure Profiler	LEDCure Four Band Profiler
Spectral Response	Currently Available as Single Band: L395 370-422 nm FWHM, 52 nm; Tolerance ± 2 nm); Out of Band, > 4 OD Blocking	Single Band specified at the time or order L365: 340-392 nm L385: 360-412 nm L395: 370-422 nm L405: 380-432 nm Each band: FWHM, 52 nm; Tolerance ± 2 nm); Out of Band, > 4 OD Blocking	Four Band L365: 340-392 nm L385: 360-412 nm L395: 370-422 nm L405: 380-432 nm Each band: FWHM, 52 nm; Tolerance ± 2 nm); Out of Band, > 4 OD Blocking
Dynamic Range Operating Range:	40 W/cm ² 400 mW/cm ² to 40 W/cm ²		
Spatial Response	Approximately cosine		
Accuracy	$\pm 10\%$ of reading plus $\pm 0.2\%$ of full scale Typical $\pm 5\%$ or better		
Repeatability	$\pm 1-3\%$ typical; dependent on source and equipment (conveyor) stability, unit alone better than 0.5%		
Effective Data Filter Bandwidth	7 Hz: Effective sample rate of 25 samples/second, referred to as Smooth On 35 Hz: Effective sample rate of 128 samples/second, referred to as Smooth Profiler 700 Hz: Effective sample rate of 2048 samples/second, referred to as Smooth Off		
Sample Rate Adjustment	LED MAP Handled through Software	Handled in Set-up mode on the Instrument	
Sample Rate for Profiling	User adjustable from 128-2048 Hz	Fixed sample rate of 128 samples/second for profiling. For matching between instrument display and PowerView Software® III values, use Smooth PROFILER mode	
Memory Capacity	65 minutes of data collection time	The memory capacity of the LEDCure in Profiler Mode is sufficient to collect data for >100 minutes	
Display	NA	Easy to Read, Yellow Text on Black Background, Display Brightness User Adjustable	

Appendix D – Instrument Specifications

Feature	LEDMAP	LEDCure Profiler	LEDCure Four Band Profiler
Operating Temperature	0-75°C Internal temperature; withstands high external temperatures for short periods (Audible alarm indicates when temperature has exceeded upper limit)		
Thermocouple	Supplied with J type Thermocouple, effective sample rate of 32 Hz	NA	
Time-Out Period	2 minutes from Standby Mode (Red Flashing LED) with no button activity	2 minutes in Display mode from last key activity. Will continue to collect data in Run Mode	
Battery/Battery Life	Rechargeable Smart charger provided with unit recharges in fast mode (+/- 90 minutes). Charge speed other USB ports (i.e. computer) varies on the USB port Battery life 100 minutes typical	2 -user-replaceable AAA Alkaline Cells, Approximately 20 hours with display on	
Instrument Dimensions	5.5" x 2.1" x 0.55" (LWH) 13.8 x 5.3 x 1.27 (cm)	4.60" x 0.50"; 117 mm x 12.7 mm (D x H)	
Instrument Materials	Aluminum & Stainless Steel		
Instrument Weight	7.3 ounces (207 grams)	10.1 ounces (289 grams)	
Carrying Case, Ship Kit	Supplied with carrying case, cut polyurethane foam interior, scuff resistant nylon exterior cover, cable Manual and PowerView III software available at www.eit.com		
PowerView Software III	National Instruments LabVIEW based programming designed for Windows 7-10. Collected data stored in LabVIEW based *.tdms files		

Appendix E – Instrument Care & Cleaning

Appendix E: Instrument Care & Cleaning

EIT radiometers are used to design, measure and control industrial UV applications in a wide variety of locations. The environmental conditions that our instruments are exposed to vary from pristine (medical clean room) to challenging (wood manufacturing facility). Careful cleaning of the outer optics using these guidelines will help your EIT instrument perform as designed between service intervals at EIT. The guidelines are general and specific questions should be directed to EIT (uv@eit.com). Instruments that stop functioning when accidentally dropped, get stuck in equipment or wind up covered or immersed with the product being cured need to come back to EIT for further evaluation.

General Cleaning Guidelines

1. Establish an area for cleaning with the necessary supplies.
2. Avoid cleaning the optics with anything dry or abrasive such as a cloth, towel or clothing.
3. Fingerprints, oils from your hands, lint, dust, or contamination on the optics window usually increases the UV values reported.
4. Scratches to the metallic coating on optics window also most often cause the readings to increase.
5. There are two cleaning methods (Wipes, Swabs) described on this Guide. Select the one that best suits your needs and train your staff on these techniques.
6. Further information including a link to videos showing these techniques can be found on the EIT web site at: <https://www.eit.com/uv-products/care-and-cleaning>

Steps For Cleaning with Swabs and Isopropyl Alcohol (IPA)

1. Examine the instrument to determine if it needs cleaning.
2. Carefully blow or brush loose particles away from the optics. Handheld bulbs to blow air are available from camera stores.
3. If needed, use “canned air” in very short (< 1 second) bursts from 8-10 inches or more away from the optics. Short bursts from a distance will minimize the transfer of any additives from the ‘canned air’ to the optics. If using compressed air, make sure it is oil free, “instrument grade” air.
4. Plan to use a minimum of two lint free swabs to clean the optics. The first swab, once moistened with the IPA is used to gently apply the IPA solution in a circular motion.
5. Rotate the swab between your fingers as you work your way around the optics window in a circular fashion.
6. No double dipping-do not put this swab back into the IPA. Discard it to prevent contamination of the IPA from any material picked up from the optics. Use a clean swab if additional IPA is needed.
7. Use a clean swab in a gentle circular motion to dry the IPA on the optics. Again, rotate the swab between your fingers as you gently



Appendix E – Instrument Care & Cleaning

move it over the surface. Stop when most of the IPA has been absorbed by the swab. Properly dispose of the swabs.

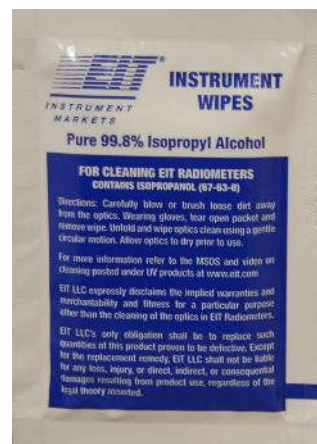
8. Repeat steps 4 and 5 if needed using new swabs.

Hints

1. Label the IPA as required & follow the Safety Data Sheet (SDS) for IPA. Consider a dedicated IPA dispenser to avoid cross contamination from other activities.
2. Do not use IPA with detergents or other additives.
3. Use lint free cotton swabs. If you see streaking, consider another brand of cotton swab.
4. If you “double dip” by inserting a used swab into your IPA, the IPA can be compromised from material transferred from the instrument optics via the swab. Glue holding the cotton to the applicator stick may also be dissolved by the IPA and transferred to the IPA.

EIT has sourced an industrial grade wipe that can be used for cleaning the optics on our UV measurement products. The Instrument Wipe contains a fast evaporating, mild solvent for cleaning EIT optics. The wipe is non-linting, non-abrasive and does not contain any detergents or surfactants that can harm the optics. Each wipe stays sealed until used to prevent contamination of the cleaning solution.

Additional information and detailed instructions about cleaning can be found on the EIT web site at: <https://www.eit.com/uv-products/care-and-cleaning> including information about purchasing EIT Instrument Wipes designed specifically for cleaning the optical window of your radiometer.



Appendix F: Regulatory Notices

Appendix F: Regulatory Notices

PowerMAP II/LED MAP

The PowerMAP II was EMC tested as a Class B device in accordance with EMC Directive 2014/30/EU.

The Product Standard for testing was: IEC 61326-1: 2012

The Specific Test Standards evaluated were:

- EN 55011: 2009/A1:2010
- Harmonic Current Emissions (EN 61000-3-2:2014)
- Voltage Fluctuations and Flicker (EN 61000-3-3: 2013)
- Electrostatic Discharge (IEC 61000-4-2: 2008)
- Radiated Immunity (IEC 61000-4-3: 2006 +A1, A2)
- Electrical Fast Transients (IEC 61000-4-4: 2012)
- Surge (IEC 61000-4-5: 2014)
- Conducted Immunity (IEC 61000-4-6: 2013)
- Magnetic Immunity (IEC 61000-4-8: 2009)
- Voltage Dips and Short Interruptions (IEC 61000-4-11:2004)



The equipment is in conformity with the above standards and therefore bears CE marking.

Power Puck II, UviCure Plus II, LEDCure

The Power Puck II was CE tested as a Class B device in accordance with Council Directive: 98/34/EEC (Technical Standards & Regulations Directive procedure for the provision of information in the field of technical regulations and rules on information society services) and EMC Directive 2004/108/EC (Electromagnetic Compatibility) with Amending Directives: 92/31/EEC, 93/68/EEC, 91/263/EEC

The Product Standard for testing was: EN 61326-1: 2005.

The Specific Test Standards evaluated were:

- Emissions (EN 55011: 2007)
- Electrostatic Discharge (EN 61000-4-2: 2009)
- Radiated Immunity (EN 61000-4-3: 2006 +A1: 2008)



This equipment is in conformity with the above standards and therefore bears CE marking.

EIT Products are Designed and manufactured in the USA.

Authorized CE representative in the European Community:

UVECO GmbH
Bruckmühler Str. 27
D-83052 Bruckmühl-Heufeld
Germany
Office: +49 (0) 8061 4958889 Email: info@uveco.de

Appendix G: LEDCure Application Notes

Appendix G: LEDCure® Four Band Profiler Application Notes

The LEDCure Four Band Profiler contains all four EIT LED L-Bands (L-365, L-385, L-395, L-405) in a single instrument. It was developed for Research & Development, Field Service Technicians, LED Source Suppliers and Formulators who routinely encounter different wavelength LEDs in a day.

The LEDCure Four Band Profiler will provide those users with a single instrument that can conveniently, accurately and repeatably measure 365, 385, 395 and 405 nm LEDs.

EIT uses a narrow band (+/- 52 nm wide) approach with each L-Band versus a wide band approach.



The EIT narrow band approach allows:

- EIT to calibrate each L-Band to the corresponding LED source
- Greater control over the flatness of each L-Band response
- EIT to use our patented Total Measured Optic Response in each L-Band in which all components in the optic stack are included in the instrument response



EIT's L-Bands have the following responses:

- L-365: 340-392 nm
- L-385: 360-412 nm
- L-395: 370-422 nm
- L-405: 380-432 nm

	mJ/CM2	mW/CM2
L365	895.611	2714.927
L385	668.434	2025.581
L395	581.015	1770.419
L405	137.809	423.565
-	-	- RUN

There is overlap in the L-bands which means that energy from an LED source will also show up in other bands other than the main band of interest from the LED.

In the example to the right, the energy from a 365 nm LED shows was measured. Values show up in all bands on the display. For a 365 nm LED source, the values from the L365 band should be used to quantify the output from the 365 nm source.

You cannot add the values together from each of the four bands to come up with a total UV value.

You should always use the values from band that matches the source wavelength.

Appendix G: LEDCure Application Notes

Most LEDs sold with a Center Wave Length (CWL) variation of +/- 5 nm. The actual selection (binning) of individual diodes will vary from manufacturer to manufacturer. If a 395 nm LED is assembled with more 400+ nm chips, the L405 value may be higher.

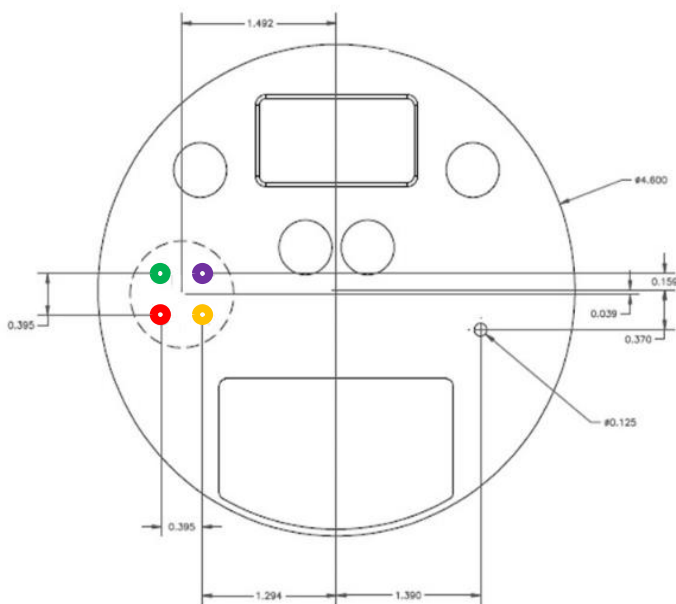
The actual location of each band is shown in the diagram below.

Optics Locations

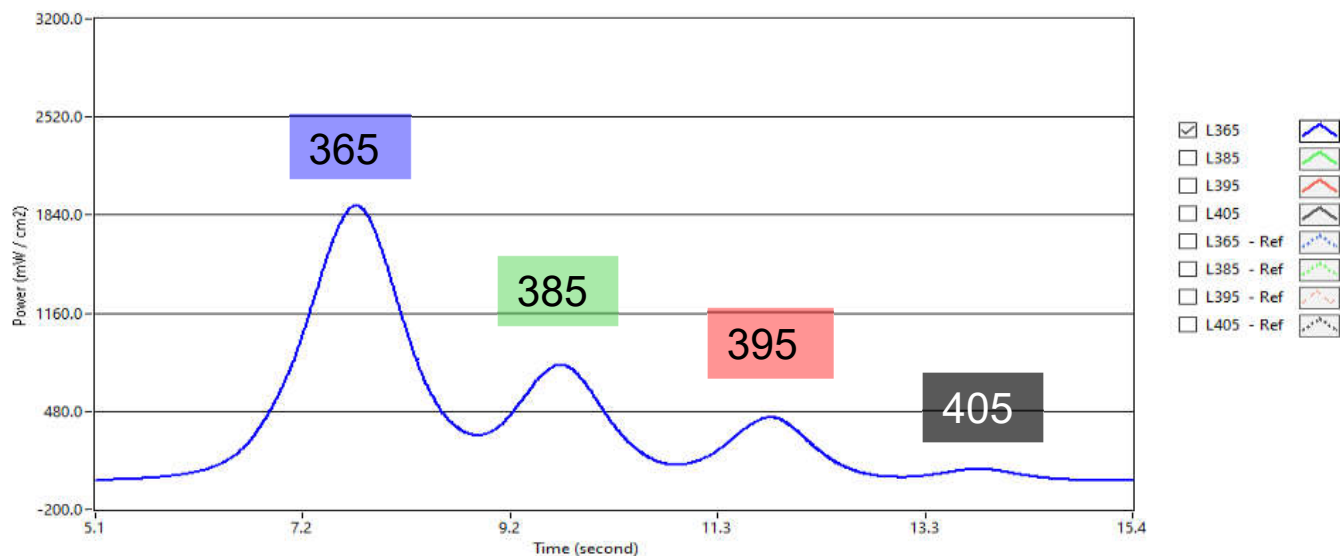
LEDCure

L365 L385

L395 L405



The LEDCure Four Band Profiler can be run under multiple LED types, with different CWL's. In the example below, the Four Band Profiler was run a 365, 385, 395 and 405 nm LED. The data transfers to a computer at a fixed rate of 128 Hz. Smoothing in the instrument should be set to Smooth Profiler so that the display values best match the values calculated by PowerView III.



Appendix H: LEDMAP Application Notes

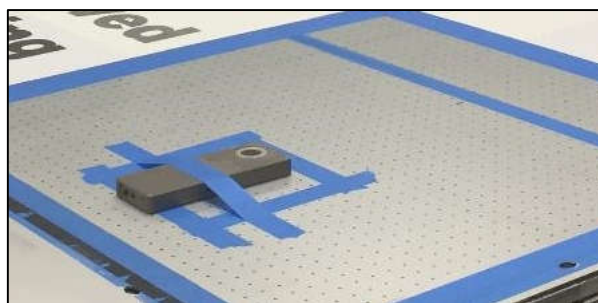
Appendix H: LEDMAP™ Application Notes

The LEDMAP is currently available as a single L-395 band instrument. Based on PowerMAP II, the LEDMAP operates the same and features a user adjustable sample rate (128-2048 Hz) and thermocouple.

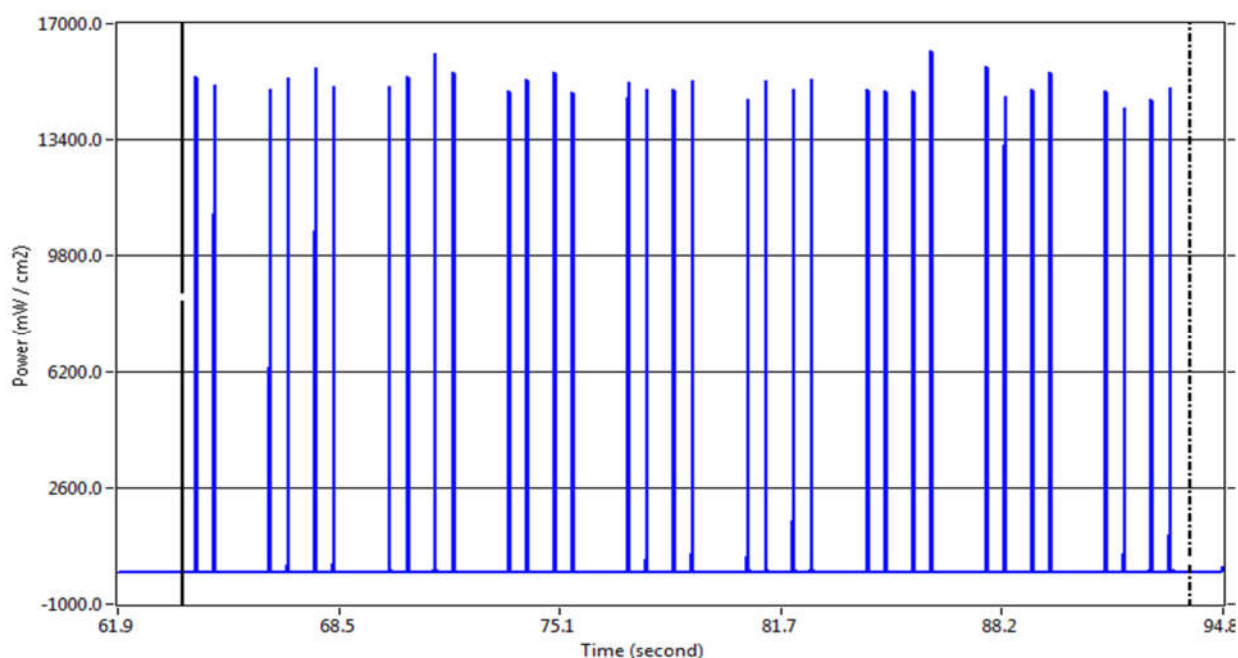


The LEDMAP was designed to support LED applications processing at fast speeds such as digital printers.

On fast moving applications such as digital printers, it is important to secure the instrument to the print bed, account for the height of the unit and make sure the print head is off. Most digital print systems have LEDs on either side of the print head. We suggest running the print head back and forth for a set number of passes and comparing the runs.

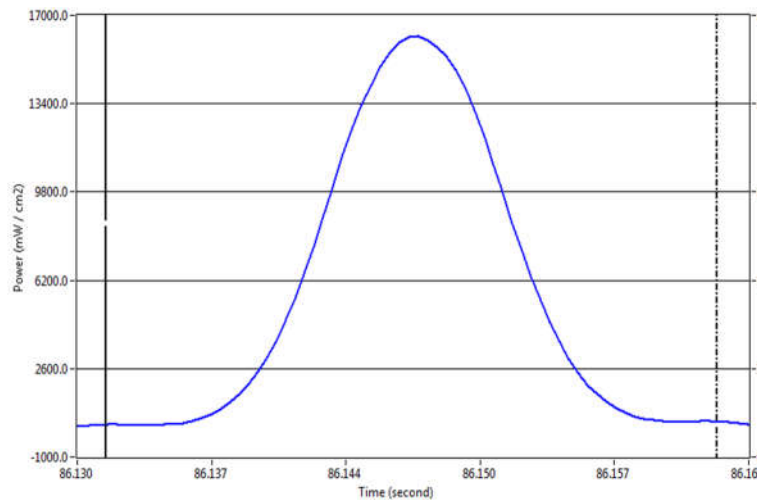


The LED optic window size and instrument sample rate will determine how many samples the LEDMAP 'sees'. The data below was collected at 400 feet per minute with the instrument sample rate set to 2048 Hz. The actual sample rate was 2130.5 Hz.

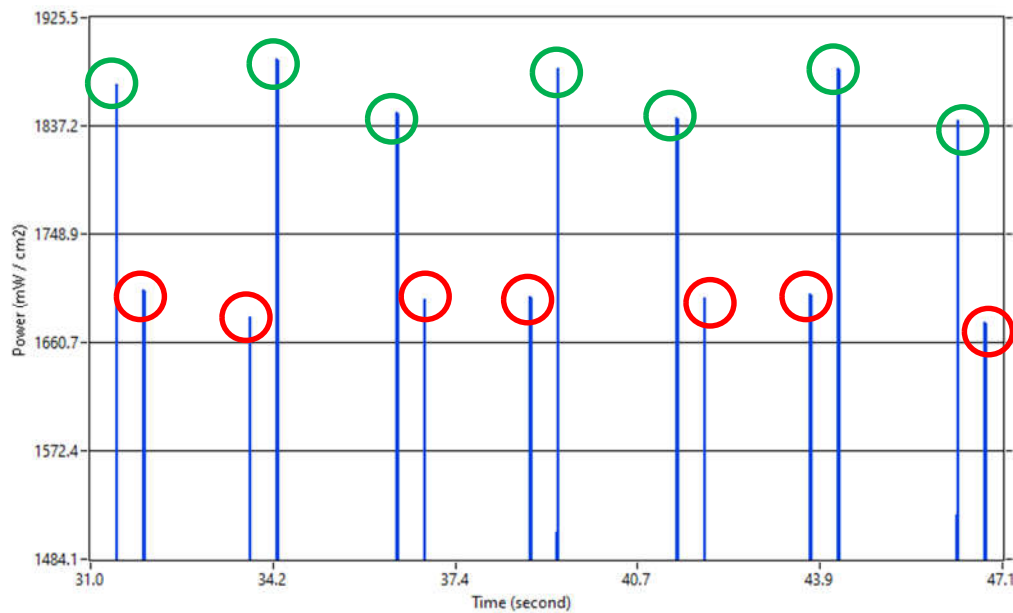


Appendix H: LEDMAP Application Notes

The graphic above shows 34 individual LED peaks collected over 30 second interval at a speed of 400 fpm at a sample rate of 2130.5 Hz. The consistency between the left and right LED in the above example is good.



PowerView III allows the user to zoom in on a single LED pass. The time between the cursors is 0.03 seconds. At a sample rate of 2130.5 Hz, this equates to 64 individual sample points on the irradiance profile.



Comparison of Left (green circles) and Right (red circles) LED sources show a difference between the two sources