



UV Measurement and Process Control Instruments

EIT 2.0 900 Sycolin Rd Suite 130, Leesburg, VA 20175 USA

Phone: (571) 578-3075 Email: uv@eit20.com Web: www.eit20.com

Subject: Profiling Radiometer Advantages

Standard versions of EIT 2.0 Radiometers (Power Puck® II, UviCure® Plus II & LEDCure™) provide the Energy Density (J/cm²) and Irradiance (W/cm²) values on the display. Instruments that contain one or four bands are available. The display from a Power Puck II with UVA, UVB, UVC and UVV is shown in Figure One.



Figure One: Display showing Energy Density and Irradiance values in four bands

The Energy Density (J/cm²) value on the display for each band is the total energy or sum of the energy from all sources that the radiometer was exposed to or passed under.

The Irradiance (W/cm²) value is the highest single peak intensity value from all lamps that the radiometer was exposed to or passed under.



Figure Two: Energy Density and Irradiance values from a single lamp

The display on EIT 2.0's "Pucks" can be set to "Graph" mode in the Set-Up menu. This will allow you to see how many sources the radiometer has passed under. The Energy Density and Irradiance values are much easier to interpret when the radiometer is passed under a single UV source as shown in Figure Two.

When passed under three sources, the intensity of each source may be similar Figure Three or vastly different as shown in Figure Four.



Figure Three: Exposure to three sources with similar intensity values

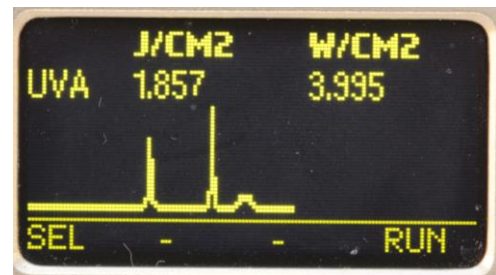


Figure Four: Exposure to three sources with vastly different intensity values

A single Energy Density value and single Irradiance value for multiple sources makes it challenging to monitor, analyze and maintain the sources. Identifying subtle changes in the sources and/or process conditions is hard to do on multiple sources with just the two values. Turning sources on one at a time, waiting for each source to warm up and stabilize prior to measurement is not always practical or efficient.

EIT 2.0 Profiling radiometers provide numerical Energy Density and Irradiance values **and** the irradiance profile (Watts/cm² as a function of time) for analysis with EIT 2.0's UV PowerView Software® III Program.

EIT 2.0 "Puck Profilers" which include the Power Puck II Profiler, UviCure Plus II Profiler and LEDCure Profiler (Figure Five) provide the Energy Density and Irradiance values on the display and download the irradiance profile to EIT 2.0's UV PowerView Software® III. Data is collected and transferred at an effective sample rate of 128 Hz (samples per second).



Figure Five: Power Puck II Profiler (Left) and LEDCure Profiler (Right)

EIT 2.0 "Map Profilers" which include the PowerMAP® II and LEDMAP™ download the numerical values and irradiance profile to EIT 2.0's UV PowerView Software® III. Data is collected and transferred at a user adjustable effective sample rate of 128-2048 Hz (samples per second). "MAP Profilers" have an optional external thermocouple to also measure and generate temperature profiles at 32 Hz.



Figure Six: PowerMAP II (Left) and LEDMAP (Right)

EIT 2.0 Profiling Radiometers, working with PowerView Software III quickly and easily:

1. Track each source to determine the number of sources, sources 'on' and/or number of passes
2. Calculate the Energy Density and Irradiance values from each source or pass
3. Establish the focus conditions and any changes over time to the focus conditions for each source from previous collected data
4. Look at the uniformity across width of the source for any changes over
5. Identify any process speed and/or exposure time variations
6. Identify the bulb type and any changes with the PowerMAP II or Power Puck II Profiler
7. Change process variables and see how it impacts the delivered amount of UV energy
8. Drive maintenance needs with a targeted approach versus a shotgun approach
9. Easily overlay and synch files to compare conditions from different runs
10. Evaluate and compare different source types or brands
11. PowerMAP II collecting data allows for broadband power supply analysis when data is collected at 2048 Hz
12. Easily transfer profiles and tables into reports & other programs
13. Export the .tdms file into Excel for further analysis
14. Add information and notes to each file

The following graphics illustrate some of the features and things that can be identified with a Profiling Radiometer. PowerView III and demo files are available for download on the EIT 2.0 website (www.eit20.com)

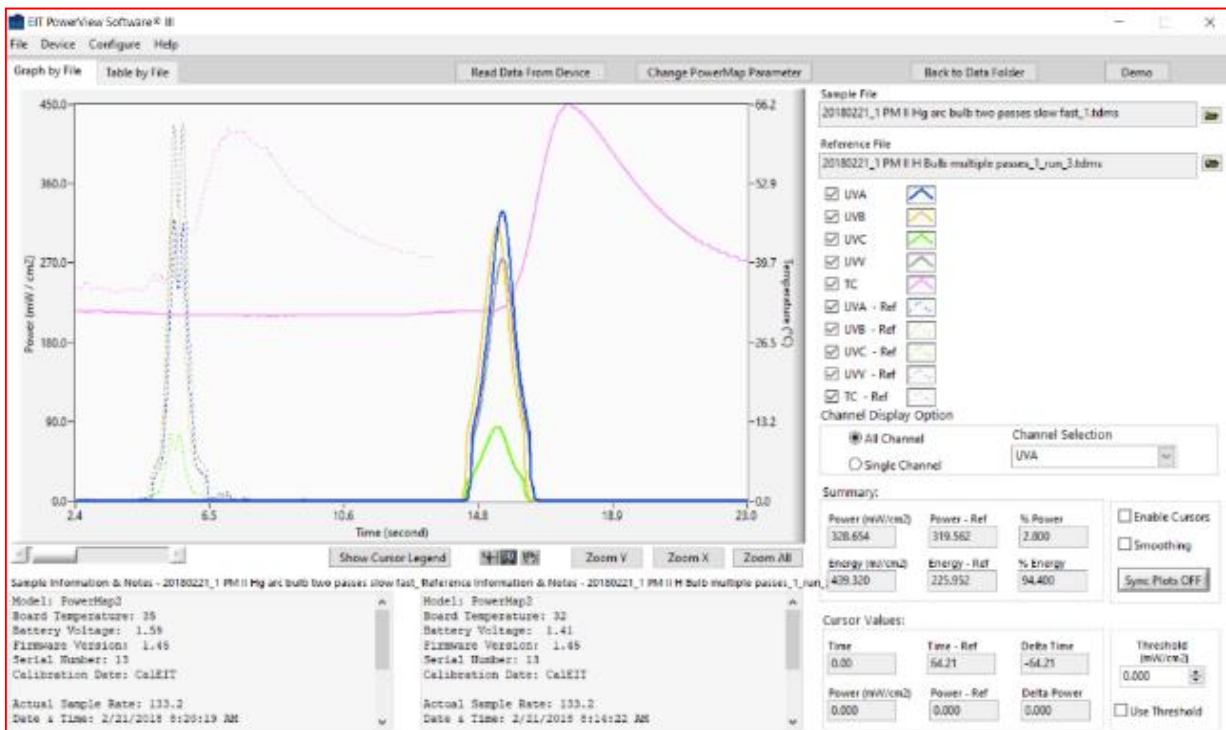


Figure Seven: PowerView III Graph by File screen view of two single lamps showing UV and temperature profiles. Each The lamp on the left is a mercury-gallium non-focused source. The lamp on the right is a focused mercury lamp. Instrument information is below the graph.

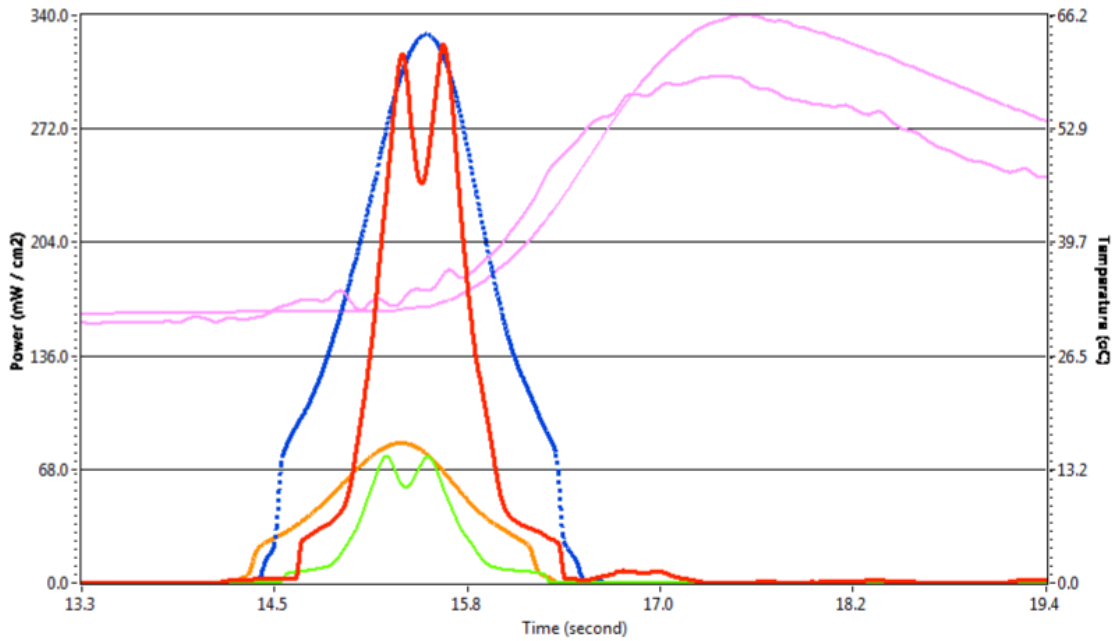


Figure Eight: Closeup of two files superimposed over each other with the use of PowerView III cursors. Only two bands are shown from each file for clarity. The Red-Green traces show a non-focused source while the Blue-Orange traces show a focused lamp. Peak Irradiance values are similar between the two files. The Blue-Orange focused lamps have more area under each profile curve which translates to higher Energy Densities for that source.

Summary By Table				
	Sample File	Reference File	Difference	%
UVA- Power (mW/cm2)	3266.950	2837.660	429.291	15.1
UVB- Power (mW/cm2)	2271.329	2419.520	-148.191	-6.1
UVC- Power (mW/cm2)	651.502	720.282	-68.780	-9.5
UVV- Power (mW/cm2)	2592.923	1835.324	757.599	41.3
TC_Peak(oC)	57.100	63.600	-6.500	-10.2
UVA- Energy (mJ/cm2)	836.688	1465.192	-628.503	-42.9
UVB- Energy (mJ/cm2)	563.862	1344.463	-780.601	-58.1
UVC- Energy (mJ/cm2)	147.622	310.246	-162.624	-52.4
UVV- Energy (mJ/cm2)	701.967	1106.244	-404.277	-36.5
TC_Mean(oC)	31.202	34.050	-2.848	-8.4
Enable cursors	OFF			
Time	0.00			
Time - Ref	28.84			

Figure Nine: Summary of Data for each band presented in table view. The Data in this example is organized by the parameters of Irradiance (Power) and Energy (Energy Density). The data can also be arranged by UV Bands.

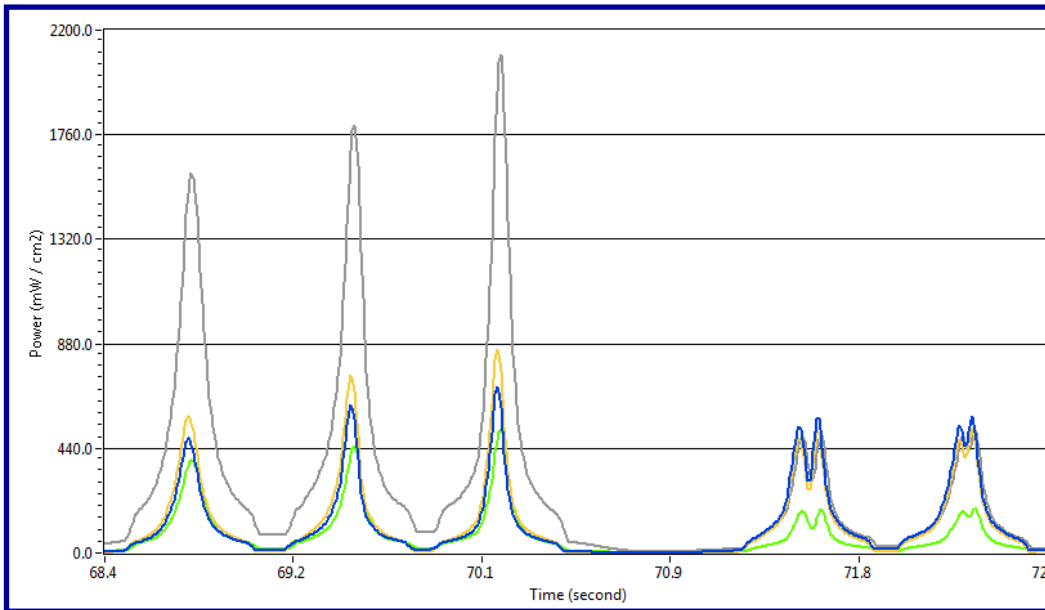


Figure Ten: Five lamps out of a multi-lamp system. Lamps 1-3 are different output value focused Hg-Gallium while lamps 4-5 are non-focused mercury lamps.

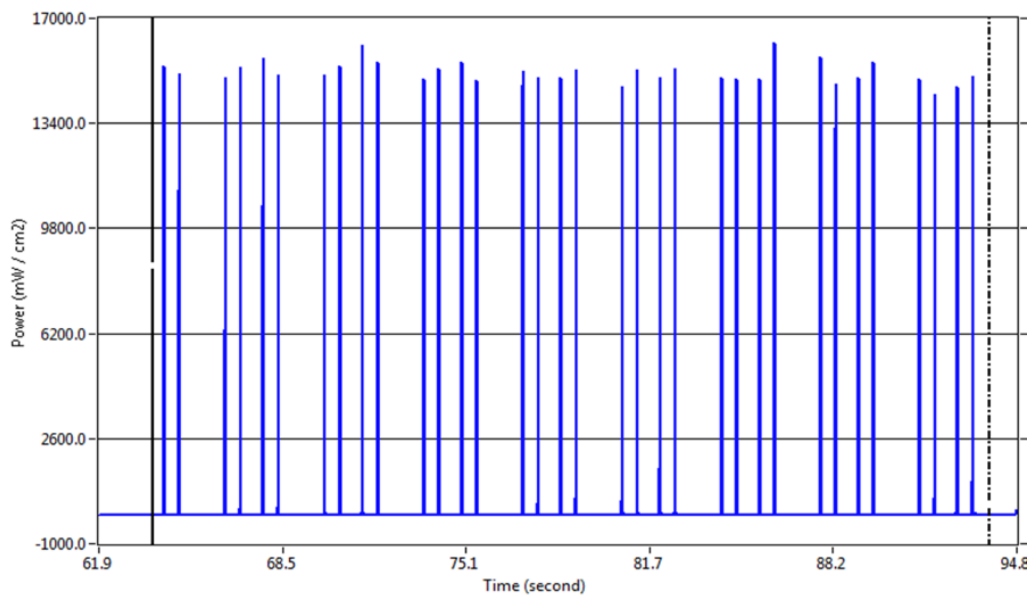


Figure Eleven: Multiple passes (34) collected with the LEDMAP at 2048 Hz on a high-speed digital printer with an LED source on either side of the printhead. Cursors can be used to isolate any single pass.