

MK350

MK350S and MK350N

uSpectrum PC Software



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Introduction

uSpectrum Software

1

PC Software for Windows PCs/Laptops

1 uSpectrum Software Intro

This guide takes you through the installation, features and operations for the MK350 device uSpectrum PC Software (MK350S/MK350N), which allows you to control the MK350 device using a Windows based PC/laptop with a USB connection.

Larger screens on these devices provide a much more convenient viewing environment for comparing, sorting and analyzing data.



Software

Installation

2

- Register PC Software License**
- Download/Install PC Software**
- PC to MK350 Connections**
- Getting Started**

2 Software Installation

This section describes how to setup your PC or Laptop to control your MK350 device over a USB cable using the uSpectrum PC Software.

What you will need:

- Windows based PC or laptop with an Internet connection (see Appendix I for PC requirements)
- MK350 device LED Meter (MK350S, MK350N)
- WiFi SD Card Packaging (containing Serial Numbers)
- USB Cable (supplied with the MK350 device)
- An SD card

Basic Installation Steps

Step 1 - Register your PC Software license for the MK350 device

Step 2 - Download/Install PC Software to your PC

Step 3 - Start your PC software on PC and connect to the MK350

Step 4 - Getting Started Overview

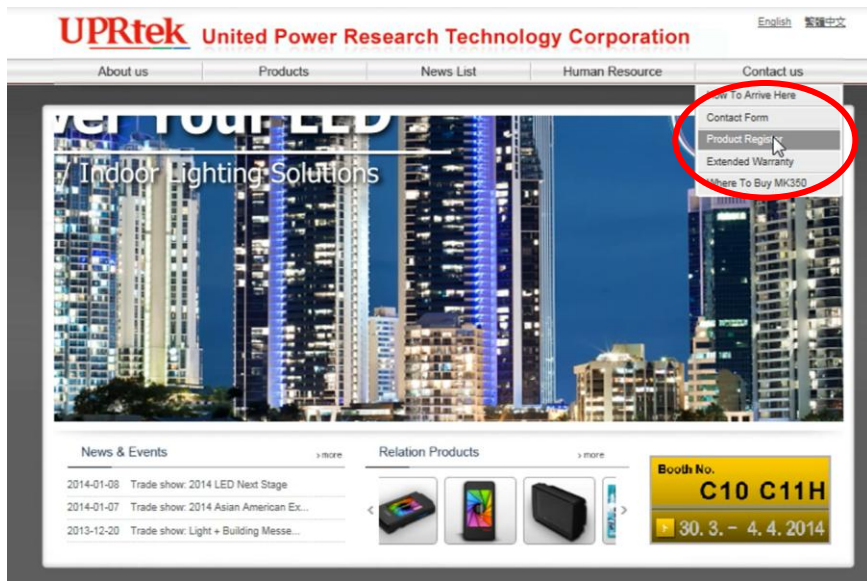


Note

This document assumes that you have already read through the “Setup” and “Getting Started” guides in the MK350 user manuals. Also note that MK350S will be used in the examples but we will note when MK350N differs.

Step 1 - Register your PC Software License

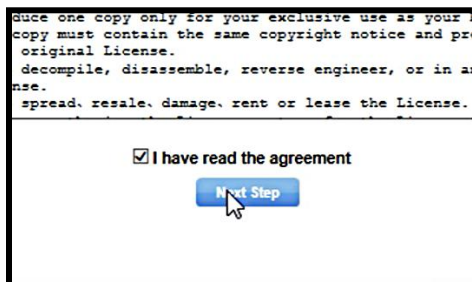
1. To register your PC software license for the MK350 device, use your laptop to visit the UPRtek website (www.uprtek.com) and then go the “Contact us” tool bar item and select “Product Register”.



2. On the next web page, click on the the PC software image.



3. On the “Terms and Agreement” page, read the terms and then check the “I have read ...” box and click on “Next Step”.



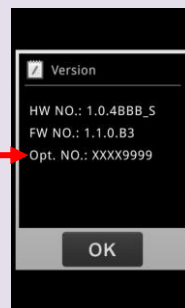
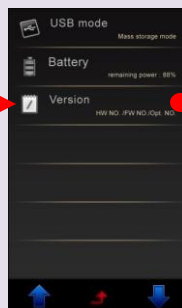
4. On the Registration Form page, in addition to other required information, you will have to supply three serial numbers.

A screenshot of a Registration Form page. At the top, there is a dropdown menu for 'Product Type' with 'Select...' as the current selection. Below this are three rows of input fields, each with a 'find your' button to its right. The first row is for 'PC SW SN', the second for 'Product SN', and the third for 'Optical SN'. A dashed red box encloses the three input fields. At the bottom, there is a field for 'Authorized Dealer:'.

MK350S



The **Product Serial Number** can be accessed by lifting off the back cover (remember to lift off cover by starting with the notch at the top end and working your way around the edges).



The **Optical No Serial Number** can be accessed from the Main MK350S screen, page 2 – tap the “OPTION” item. On the next screen, arrow down, locate and tap on the “Version” item.

The **PC Software Serial Number** is located on one of the inside flaps of the packaging material for the WiFi SD Card.



PC Software SN
WiFi Adapter Packaging

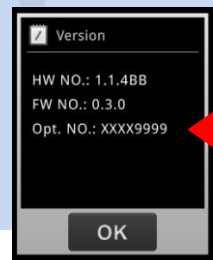


MK350N

Product SN
Bottom of MK350N



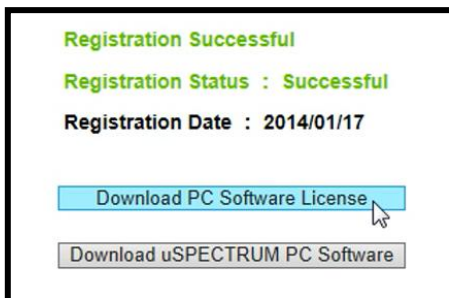
Optical SN
MK350N Version Screen



5. Press the Send Button



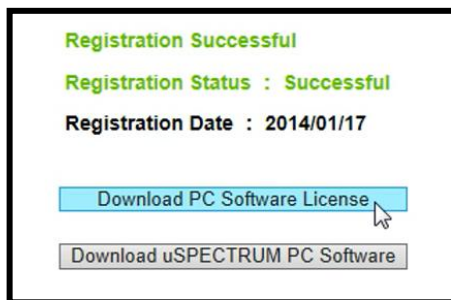
6. After a successful registration, you'll see this message with two buttons (but don't press any buttons just yet). If not successful, re-check all Serial Numbers.



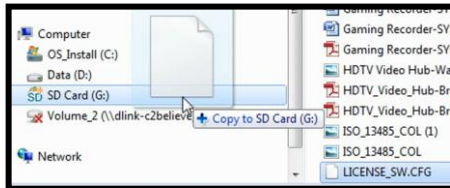
7. First insert an SD card into your PC.



8. Now you can press the “Download PC Software License” button.



9. The downloaded file will be “LICENSE_SW.CFG”. Save the license file onto the SD Card (root directory).



10. Turn on your MK350 device and let it startup.



11. Take the SD card from the PC/laptop and place it into the MK350 device.



The MK350 device will automatically upload the license. A message will appear on the MK350 screen indicating that you have successfully applied the PC software license. The MK350 device will then reboot.

Update SW function.

The activation is successful.

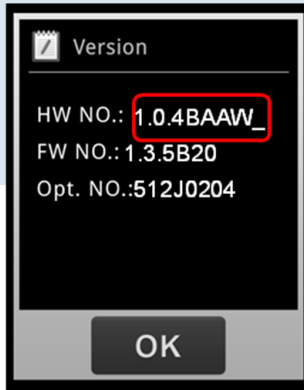
Please wait 20s to reboot.

You have just activated the license on the MK350 device!

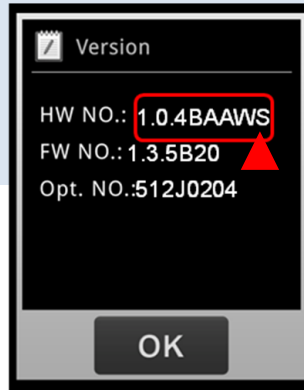
Note

Note that the MK350 device will reflect a successful license application by placing an “S” at the end of the HW No. on the Version screen.

Before Activation



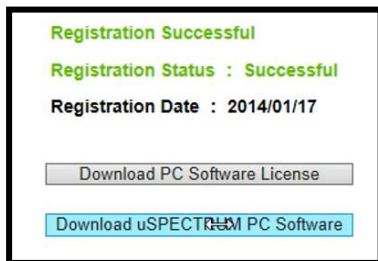
After Activation

**Note**

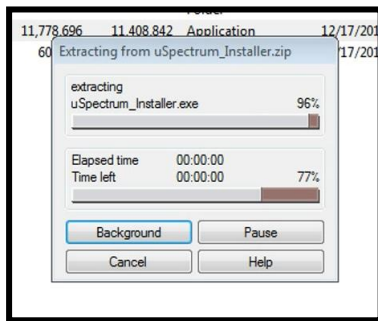
It is possible to use the PC Software without a license, but you will be limited to reading data only – you will not be able to capture any measurements from the PC Software if you don't have a license.

Step 2 – Download PC Software to PC

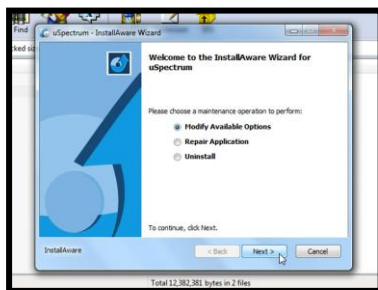
1. On your PC, return to the Download page. Tap the **“Download the uSpectrum PC Software”** button (Note: if you have lost this page, see note at the end of this section).



2. Extract the uSpectrum_Installer.exe from the compressed (zip) file that you just downloaded.

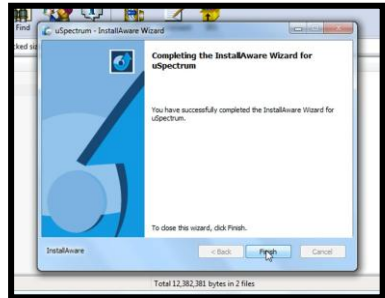


3. Start the uSpectrum_Installer.exe program and click Next. The installation may take a few moments.



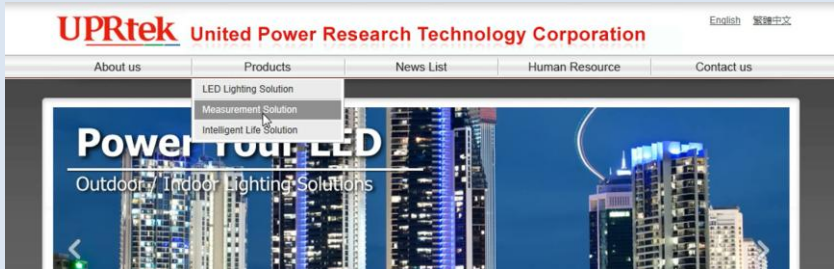
4. When the installation is complete, press “Finish”.

Congratulations, you have completed the PC software install.



Note

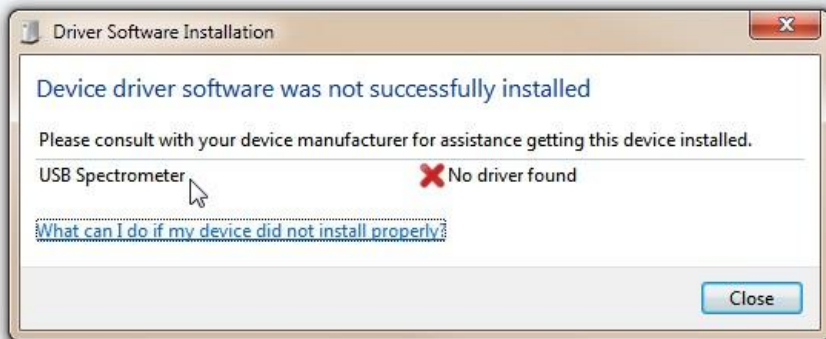
You can always find the Download PC Software Icon by accessing www.uprtek.com and going to Products > Measurement Solution > Advanced MK350S (click on image) > Accessory > Download File.



PC Software Fails to Install Properly

Note

Because of the many flavors of the Windows Operating Systems and versions, there is a chance that the PC Software may fail to install properly. In this case you may need to install our Drivers manually – See **Appendix III**

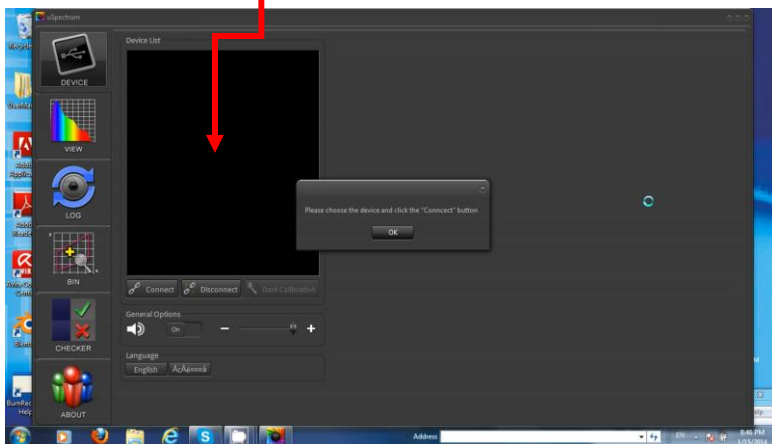


Step 3 – PC to MK350 Connections

1. After software installation onto your PC, you will find a “uSpectrum” icon on your desktop. Click on it.



A splash screen will briefly appear, followed by the initial PC Software screen. Note that the Device List Box will be empty.



2. At this point, use the USB cable supplied in the packaging and connect it to the MK350 device and turn on the device.

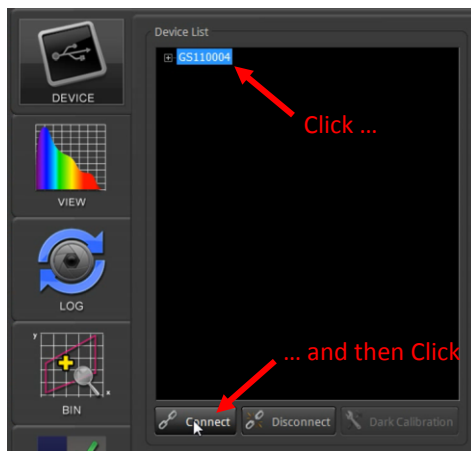


The MK350S device will display a USB connection screen. The MK350N will show a similar screen.



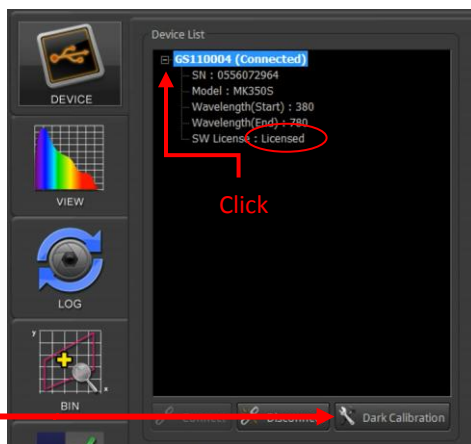
3. Your MK350 device will show up in the Device List box.

Click on the Device to highlight it and then click on the “Connect” button below.



4. Click on the leading +/- sign to reveal your MK350 ID information. Note that it is now licensed and ready for use.

Also, may want to perform a dark calibration from this window.



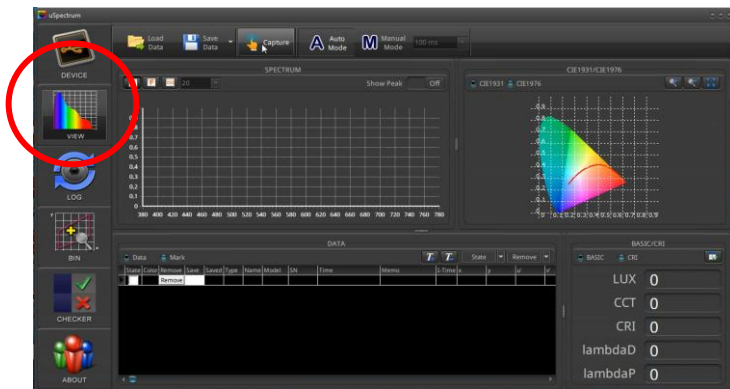
Note

It is possible to connect more than one MK350 device displaying in the Device List. However, only one can be accessed at a time.

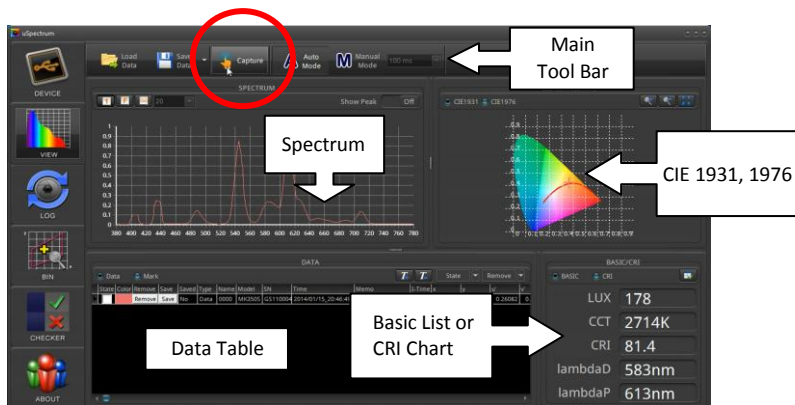


Step 4 – Getting Started

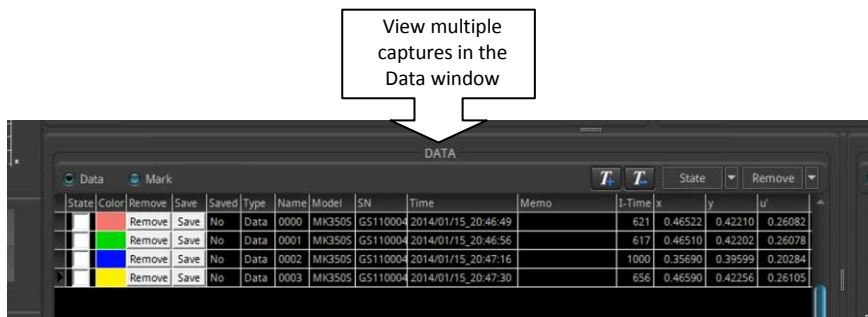
1. Click on the “View” button to see the full data view.



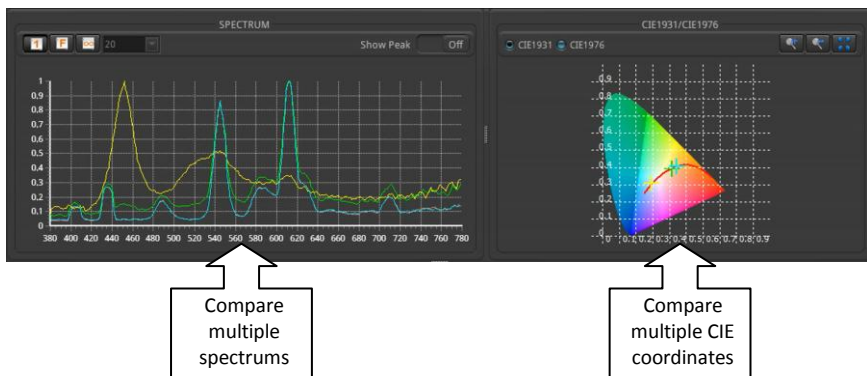
2. Click on the “Capture” button to instruct the MK350 device to measure a light source. The capture data will fill the screen.



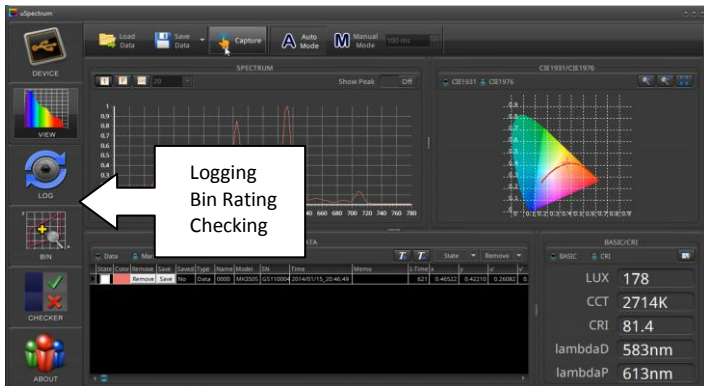
3. Take multiple captures and view them all in the Data Window.



4. Compare and Contrast data in Spectrum and CRI charts from as many data captures as you want.



5. You have access to all of the functionality of the MK350 devices.

**Note**

→ If you have an MK350N, some of the PC software features may not exist because of the limitations of these devices. These differences will be explained later in this manual.

Software

Operations

3

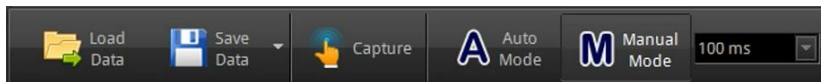
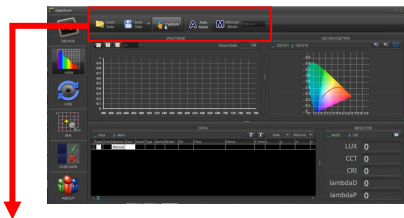
- Main Tool Bar**
- Spectrum Window**
- CIE Chart Window**
- Data Window**
- Mark Function**
- Data Window Tools**
- Basic / CRI Window**
- Log Feature**
- The BIN Feature**
- Checker Feature**

3 Software Operations

This section explains the details of using the uSpectrum PC Software

3.1 Main Tool Bar

The Top Menu Bar contains convenient functions and settings.



| Function | Description |
|----------------------|---|
| Load Data | Loads historical data that is on your PC |
| Save Data | Saves data onto your PC |
| Capture | Instructs MK350 to take a light measurement |
| Auto Mode | Exposure is set automatically |
| Manual Mode | Exposure is set manually using the “Exposure Time” (next item below). |
| Exposure Time | Manually selected Exposure Time |

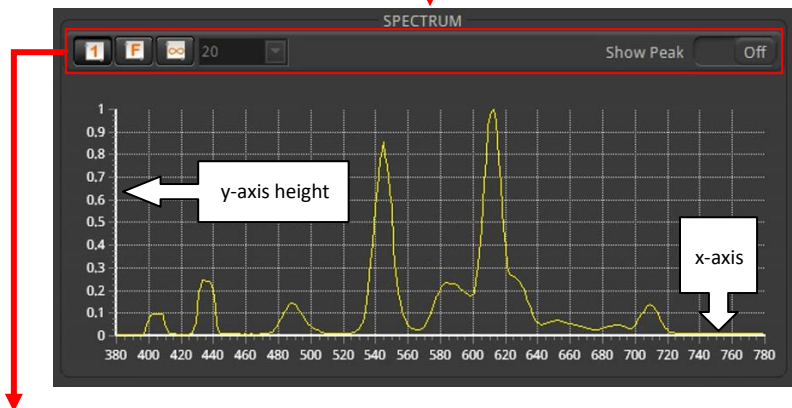
3.2 Spectrum Window

The Spectrum Window displays the wavelength spectrum for a light measurement. Several captures can be presented at the same time (see Data Window) The x-axis = wavelength, y-axis = intensity.

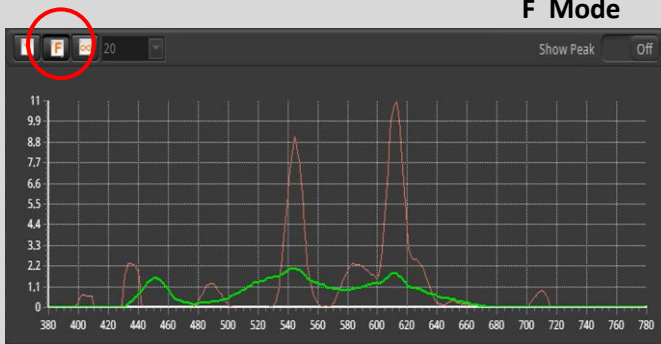
View Mode



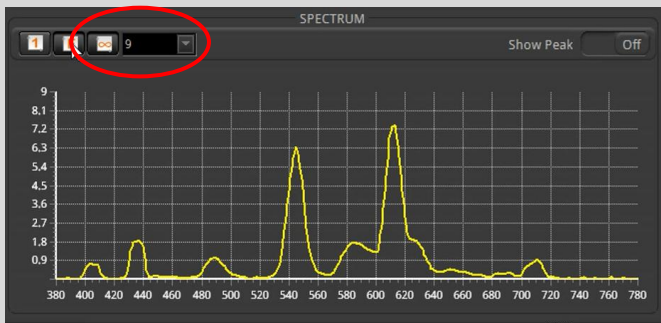
1 Mode



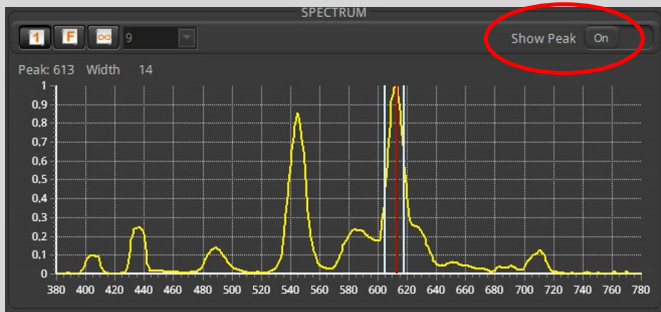
| Function | Description |
|------------------|--|
| 1 mode | Displays the high peak wave (λ_p) at 100% of the y-axis height (for each spectrum displayed) |
| F mode | When displaying several spectra at once, all are displayed with their “relative” intensities. |
| ∞ mode | Y-axis height is fixed, based on drop-down box |
| Show Peak | When turned “On”, the high peak (λ_p) and its half bandwidth are both marked |

F Mode

∞ button with 9 units

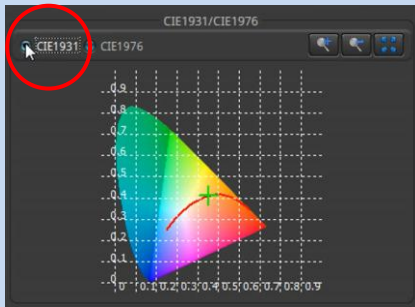
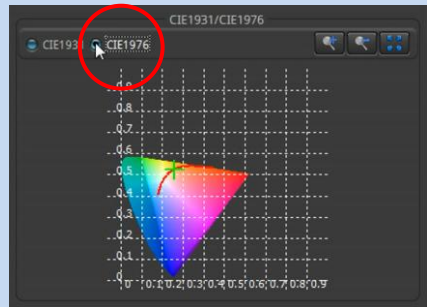
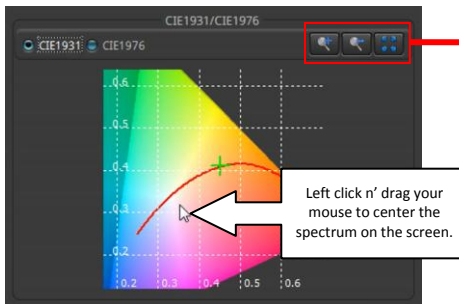


1 button & Show Peak



3.3 CIE Chart Window

The CIE Chart window can display either CIE 1931 or CIE 1976. You can display as many data as are selected in the “Data” window.

**CIE 1931****CIE 1976****Zoom Control**

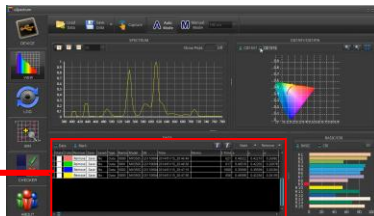
Magnify

Minimize

Normalize

3.4 Data Window

In the Data Window view, you can see a complete history of all of your captured light data in an organized table. Furthermore, this screen provides features to allow you to sort, organize and administrate easily and efficiently.



Select items to display in Spectrum and CIE charts

Sort on any column - click on col. title

Highlight item in charts

Data saved or not yet saved

Delete item

To customize color, double Click

Make notes, exception reporting.

Scroll for more Data

Color Picker

Note

Data values that are zero indicate that the measurement was originally taken by the MK350N, which does not supply some of the information.

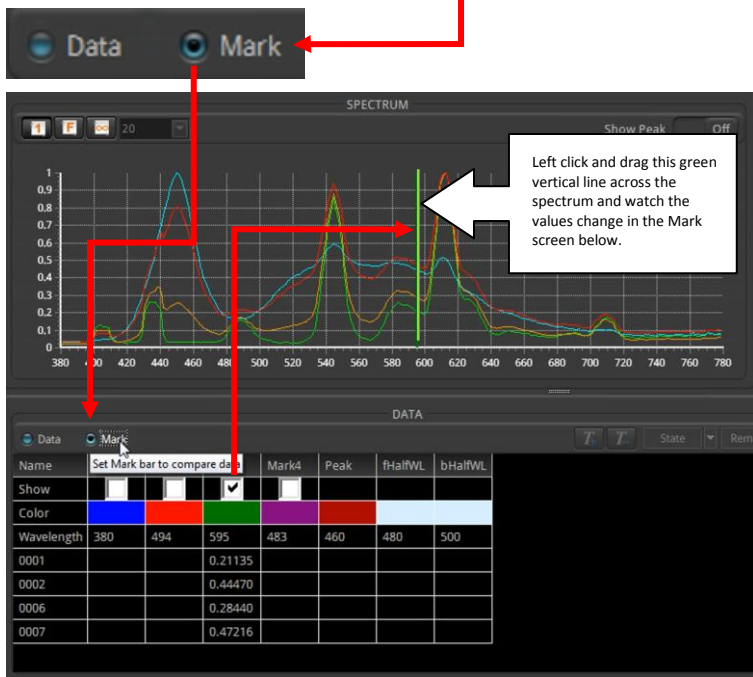
| State | Color | Remove | Save | Saved | Type | Name | Model | SN | Time | Memo | I-Time | x | y | u' | v' |
|-------|--------|--------|------|-------|------|------|--------|----------|---------------------|------------------|--------|---------|---------|---------|---------|
| ✓ | Green | Remove | Save | No | Data | 0001 | MK350S | GS110004 | 2014/01/21_11:15:18 | Flourescent 1B | 100 | 0.45166 | 0.41086 | 0.25710 | 0.52627 |
| ✓ | Blue | Remove | Save | No | Data | 0002 | MK350S | GS110004 | 2014/01/21_12:54:17 | LED 3D-1 | 100 | 0.31862 | 0.31725 | 0.20657 | 0.46276 |
| ✓ | Orange | Remove | Save | No | Data | 0006 | MK350S | GS110004 | 2014/01/21_13:30:37 | Flourescent 1X-1 | 921 | 0.40333 | 0.38063 | 0.23863 | 0.50666 |
| ✓ | Red | Remove | Save | No | Data | 0007 | MK350S | GS110004 | 2014/01/21_13:30:45 | Flourescent 1X-1 | 1000 | 0.35150 | 0.34168 | 0.21979 | 0.48070 |

The first 12 columns in the Data window are explained below.

| Column | Description |
|---------------|---|
| State | Selects the data row to be displayed in the charts |
| Color | Color of Chart markers for a row of data |
| Remove | Click to delete data row |
| Save | Click to save data (in row) to PC |
| Saved | Data saved (Yes) or not yet saved (No) |
| Type | “Data” means the data was captured by the MK350 device. “File” means that the data was retrieved from the PC (previously saved data). |
| Name | If the data was retrieved from the PC, this will be the name of the file and location. Otherwise, it will be the Serial Number of the MK350 device. |
| Model | Model of the MK350 device that took the original measurement – MK350S, MK350N |
| SN | Serial number of the MK350 device that took the measurement. This can help when multiple MK350 devices are concurrently in use. |
| Time | The date/time that the measurement was taken |
| Memo | Enter notes, memos, reminders, environment conditions. |
| I-Time | The Integration Time (exposure time) at the time the measurement was taken |

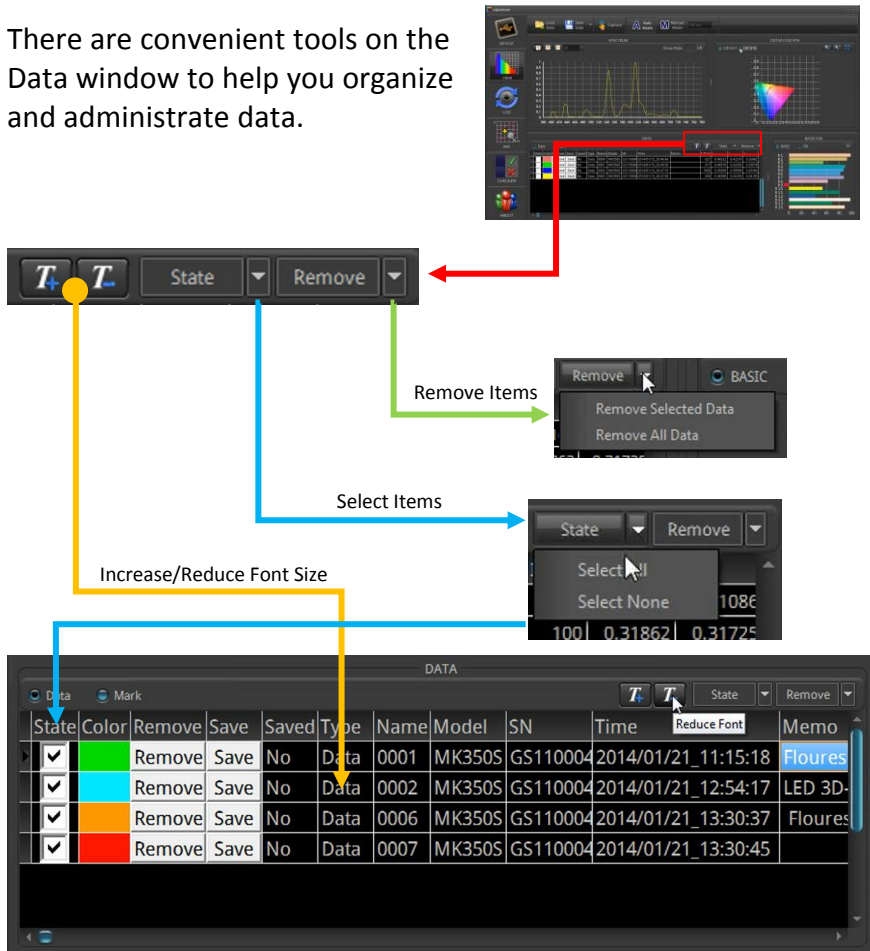
3.5 Mark Function

Selecting the “Mark” radial button on the Data Window allows you to view numerical data for all measurements across a vertical cross section of the spectrum.



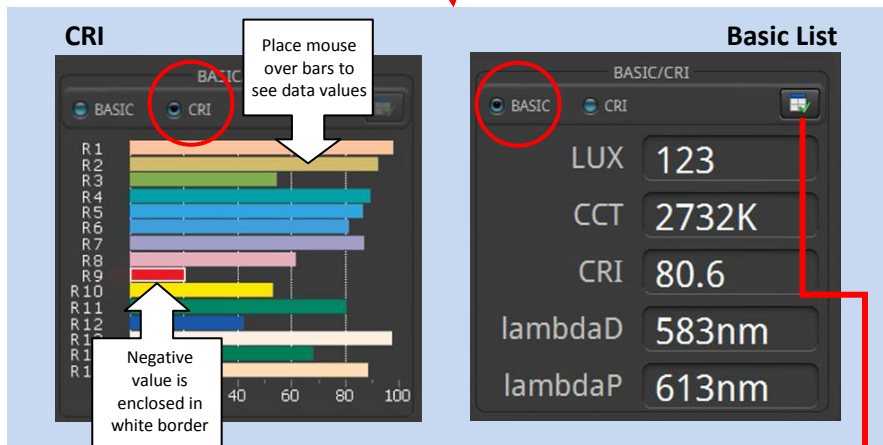
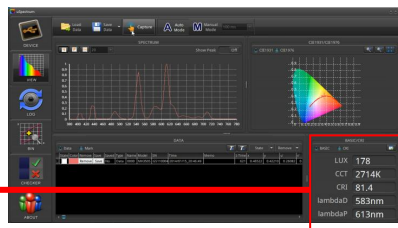
3.6 Data Window Tools

There are convenient tools on the Data window to help you organize and administrate data.



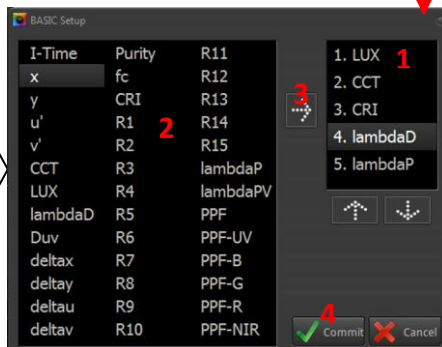
3.7 Basic / CRI Window

You can choose to display either the Basic List or CRI chart in the lower right corner window.



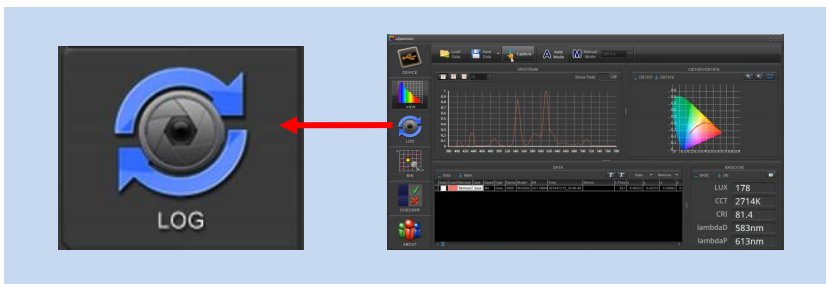
The Basic List has 5 items - you can replace any of the items using the setup screen.

- 1 Select an item to be replaced
- 2 Select the new item
- 3 Press the right-arrow
- 4 Press the Commit Button

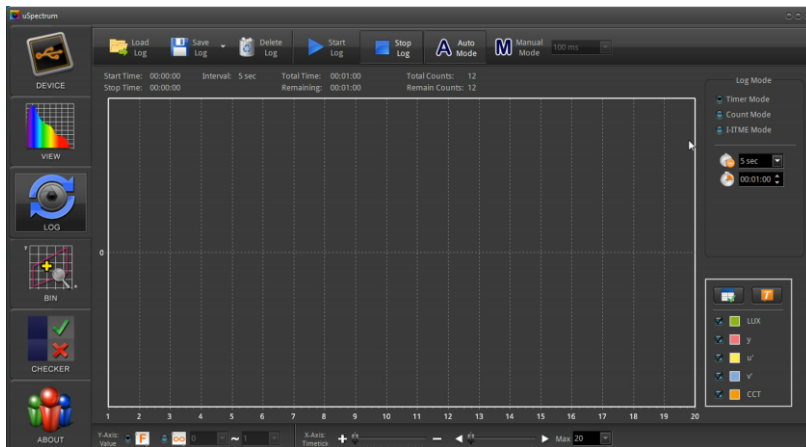


3.8 Log Feature

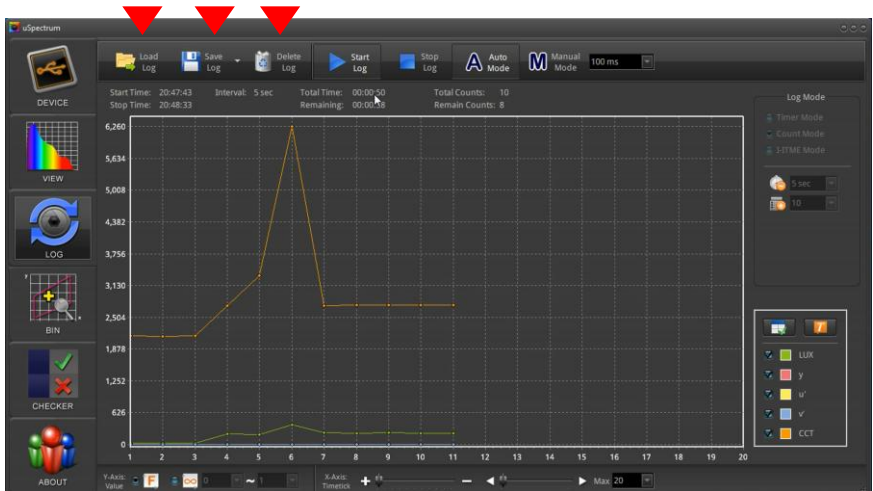
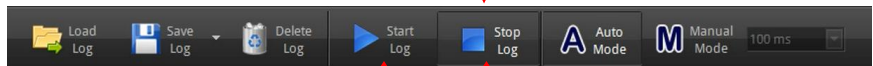
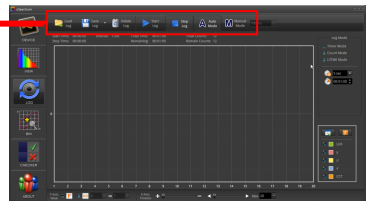
The Log Feature functions like the MK350S device log function, but with the PC Software, you can now also use this feature with the MK350N – it automatically captures and logs light measurement at certain intervals. The data can be saved to the PC/laptop and recalled later.



After you press the log button, log screen appears (below).

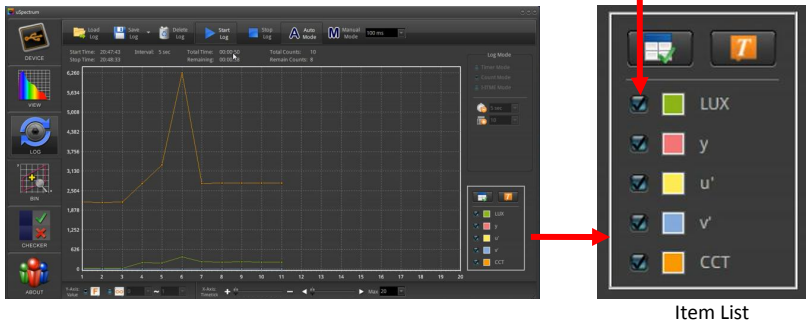


The top of the screen has a tool bar. You can start a log session by pressing the Start Log button. Captured data is posted on the screen in time intervals. Use the Stop Log button to stop logging.

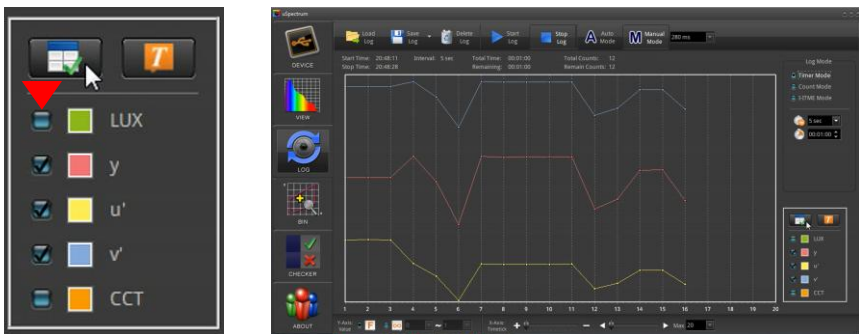


Use the tool bar to Delete log data or Save log data to your PC. Saved log data can later be re-Loaded and reviewed on the screen at a later time.

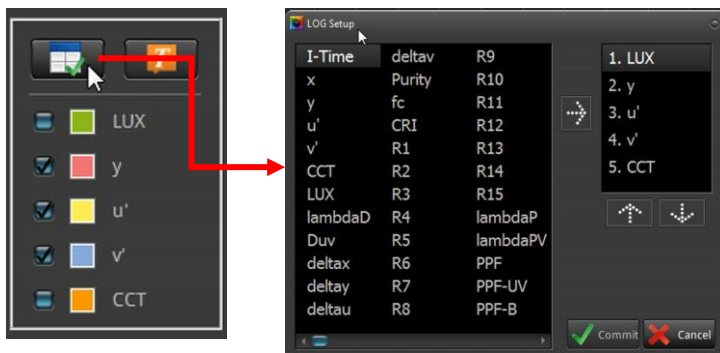
The Log screen has an item list window – you can determine which of the items in the list are displayed on the graph by marking the check boxes.



In the graph above, the y, u', v' are actually displaying on the graph, but the values are so small, they are compressed towards the bottom. If you deselect the proportionately larger LUX and CCT values, the y, u', and v' values become visible (below).



You can also change the items on the list with the Setup button which brings up the Setup screen (see the Basic List).



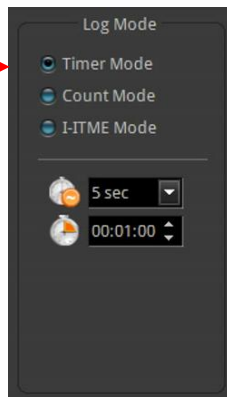
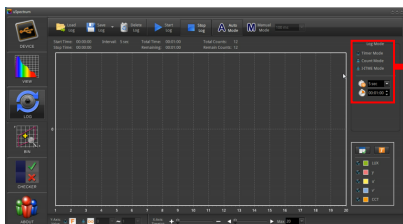
You can also use the display numerical values button to display numerical values for each point on the graphs.



You can also change the color of the graph lines by double clicking in the colored box next to the measurement symbol (e.g. γ , u') and then selecting from the color picker screen.

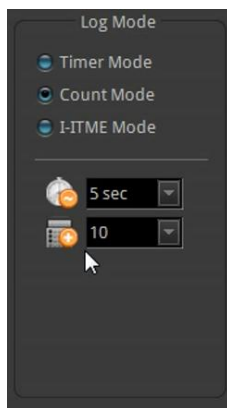


The Log Mode setup determines the intervals for automatic continuous captures. There are 3 modes – Timer, Count and I-Time. The parameters for each mode will change as you select its radial button.

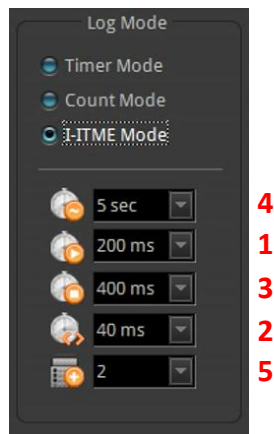


Timer Mode – Uses Interval and Total Time as parameters. In the example above, the MK350 captures data every 5 seconds ¹ until it reaches 1 minute ².

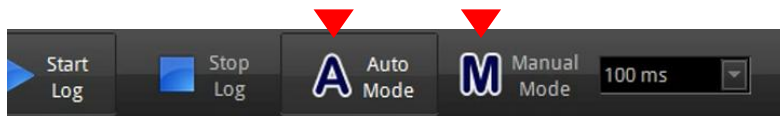
Counter Mode – Uses Interval and Total Number of Captures. In the example (right), the MK350 will capture data every 5 seconds ¹ until it reaches 10 captures ².



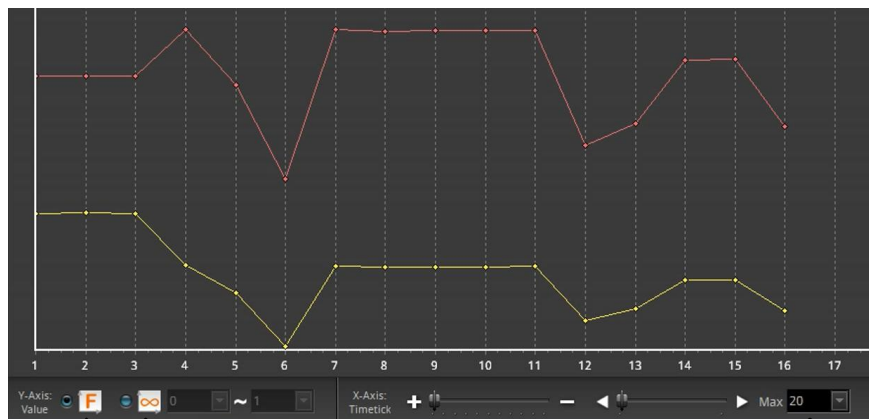
I-Time Mode – This logging mode is based on increasing Integration times (exposure time). In the example to the right, the first capture uses an I-Time of 200 ms¹ and increases the I-Time by 40 ms² for each subsequent interval until it reaches an I-Time of 400 ms³. The time interval is 5 seconds⁴, and the MK350 takes 2 captures⁵ at each interval.

**Note**

The I-Time (exposure time) for the Timer Mode and Count Mode stays constant during logging and is Automatically or Manually set on the Tool bar at the top of the Log screen.



At the bottom of the Log screen is another tool bar which adjusts the y-axis, x-axis dimensions of the graph to allow you to see more or less data on the screen.



The F (Fit) mode adjusts the y-axis so that it can "fit" all values in the graph.

The ∞ mode allows you to manually set the y-axis "min to max" values (use drop down boxes next to the radial button).

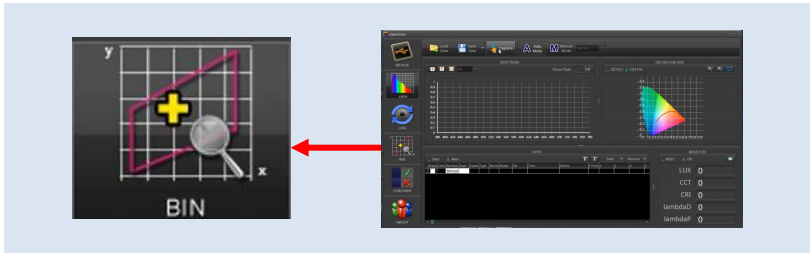
This slide bar adjusts the x-axis width.

Scrolls left or right if x-axis is greater than screen width.

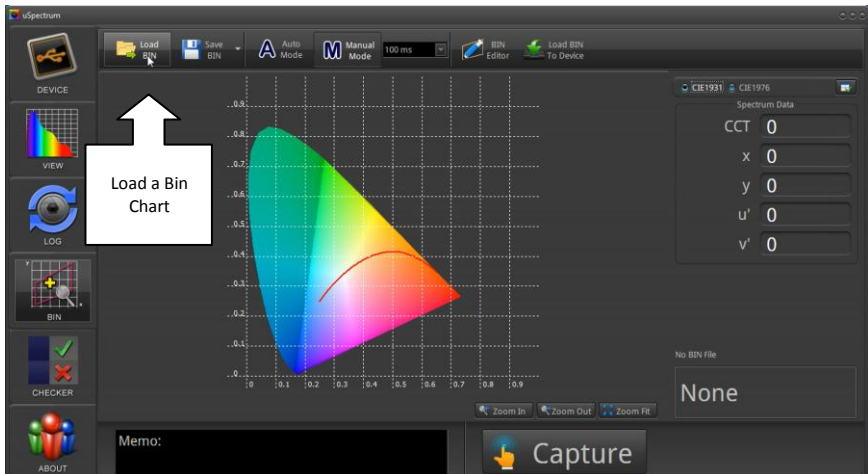
Maximum x-axis width

3.9 The BIN Feature

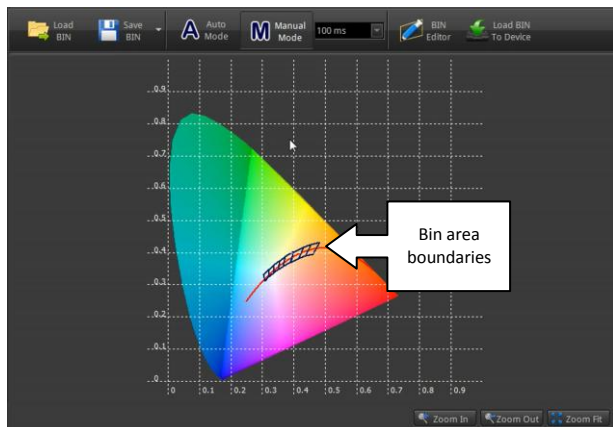
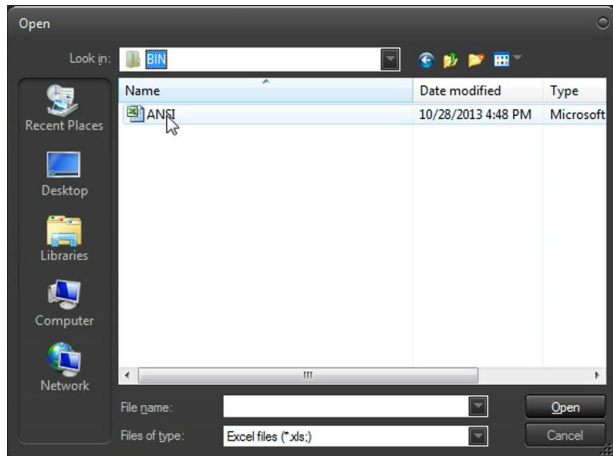
The BIN Feature is used to classify a light measurement within a given range of boundaries as mapped on the CIE charts.



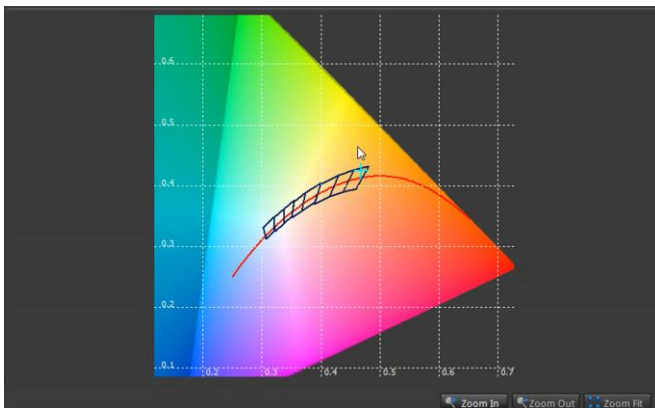
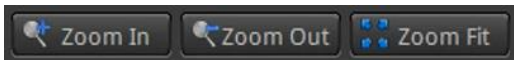
First, Load a BIN Chart by pressing “Load BIN”



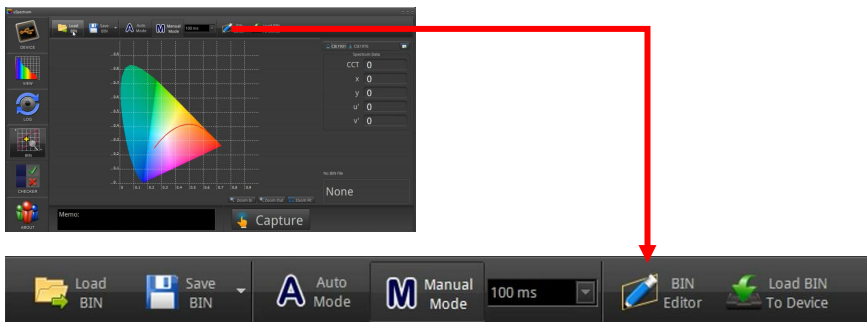
You can find the the Energy Star ANSI BIN C78.377 file where the uSpectrum files were installed – usually installed in:
c:/Program Files/uSpectrum/Examples/BIN



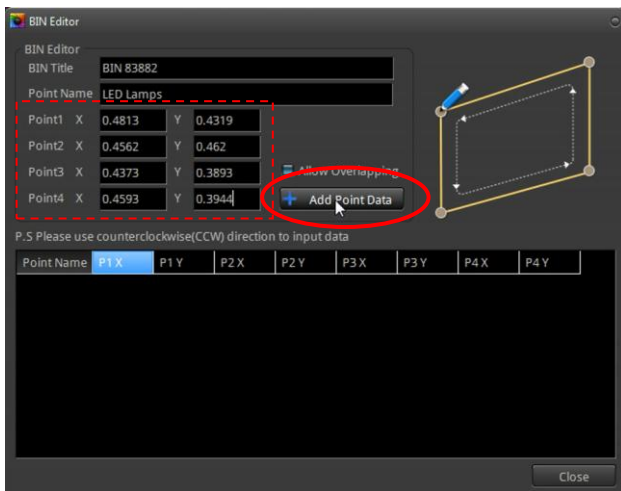
If you take a measurement, you can see if the light data is within the acceptable boundaries for the Energy Star standards. You can use the Zoom tool to enlarge the screen.



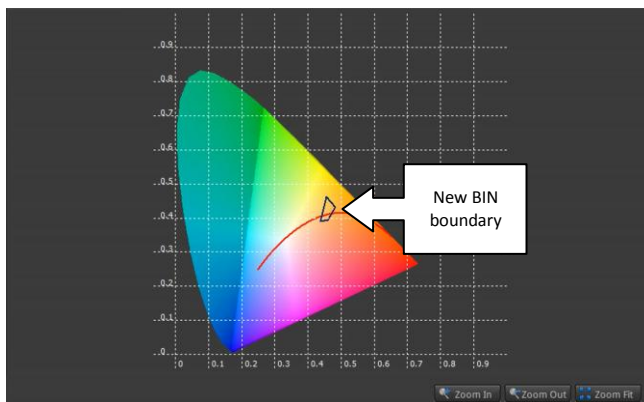
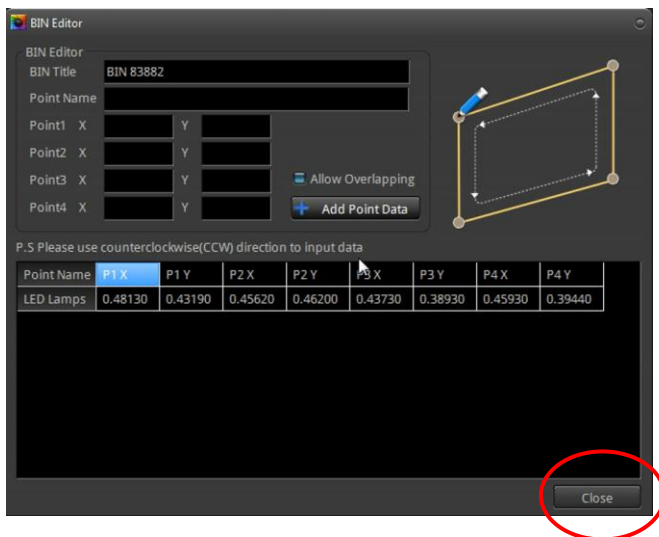
You can also create your own BIN chart by using the BIN Editor.



Enter in 4 sets of x,y coordinates for one BIN boundary and hit “Add Point Data”. Note that you need to precede each point with a leading zero and decimal point (0.4813) for numbers less than 1. Also, Point 1 should represent the upper left corner of the boundary. Points 2, 3, 4 should continue in counter clockwise order.



After you add the point, a new line appears in the data view - press the “Close” button and the new boundary will appear.



Finally, you need to Save your new BIN chart and load the chart into the MK350 device.



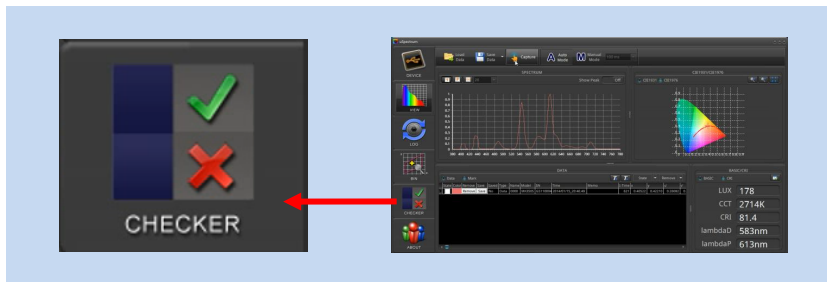
The new chart will appear as follows when opened in Excel.

A screenshot of the Microsoft Excel interface. The title bar says 'bin chart.txt - Microsoft'. The ribbon shows '常用', '插入', '版面配置', '公式', '資料', '校閱', and '檢視'. The '常用' ribbon is active, showing font settings (Calibri, size 12), paragraph settings, and a '通用格式' (General) section. The data table is as follows:

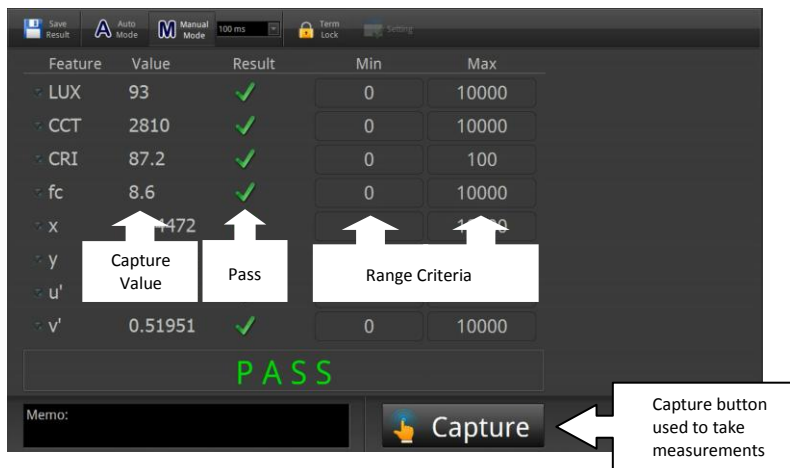
| | A | B | C | D | E | F | G |
|---|-----------|--------|---|---|---|---|---|
| 1 | BIN 83882 | | | | | | |
| 2 | LED Lamps | | | | | | |
| 3 | 0.4813 | 0.4319 | | | | | |
| 4 | 0.4562 | 0.426 | | | | | |
| 5 | 0.4373 | 0.3893 | | | | | |
| 6 | 0.4593 | 0.3944 | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |

3.10 Checker Feature

The Checker screen is used to validate a light measurement against ranges of configurable criteria (e.g. CRI 90-100) and determine whether the light meets or fails the required criteria.



In the Checker screen, use the Capture button to take a measurement – Pass Condition shown below.



Checker Screen – Fail Condition

The screenshot shows the Checker Screen with a table of features and their values. The CRI feature has a value of 87.1, which is below the minimum range criteria of 90, resulting in a 'Fail' status. Annotations highlight the 'Capture Value' for CRI and the 'Range Criteria' for CRI. A large red 'FAIL' message is displayed at the bottom of the table. The bottom bar includes a 'Memo' field and a 'Capture' button.

| Feature | Value | Result | Min | Max |
|---------|---------|--------|-----|-------|
| LUX | 93 | ✓ | 0 | 10000 |
| CCT | 2803 | ✓ | 0 | 10000 |
| CRI | 87.1 | ✗ | 90 | 100 |
| fc | 8 | ✓ | 0 | 100 |
| x | 0.39610 | ✓ | 0 | 10000 |
| y | 0.25935 | ✓ | 0 | 10000 |
| u' | 0.51942 | ✓ | 0 | 10000 |
| v' | | ✓ | 0 | 10000 |

FAIL

Memo:

Capture

You can change the Min-Max criteria by first clicking on “Term Lock” at the top of the Checker screen.



In “unlocked” mode, you can change the Min/Max values directly in their input boxes. You can also click the Setting icon to change the list on the screen (e.g. LUX, CCT, CRI etc.).

The screenshot displays the main interface of the MK350N software. At the top, there are buttons for 'Save Result', 'Auto Mode', 'Manual Mode', a '100 ms' timer, a 'Term Lock' icon, and a 'Setting' icon. Below these is a table of measurement results:

| Feature | Value | Result | Min | Max |
|---------|---------|--------|------|-------|
| LUX | 93 | ✓ | 0 | 10000 |
| CCT | 2810 | ✓ | 0 | 10000 |
| CRI | 87.2 | ✓ | 90 I | 100 |
| fc | 8.6 | ✓ | | 10000 |
| x | 0.44472 | ✓ | | 10000 |
| y | 0.39643 | ✓ | | 10000 |
| u' | 0.25902 | ✓ | | |
| v' | 0.51951 | ✓ | | |

A large green 'PASS' label is centered below the table. A red arrow points from the 'Setting' icon to a 'CHECKER Setup' dialog box. A white arrow points from a text box to the 'fc' row in the table. Another white arrow points from a text box to the 'x' row in the table. A third white arrow points from a text box to the 'CHECKER Setup' dialog box.

Text boxes:

- Enter in new values directly into range box
- This check box temporarily disregard criteria check
- The MK350N and MK350D pick list will contain fewer options than the MK350S.

CHECKER Setup Dialog:

| I-Time | Purity | R11 | R12 | R13 | R14 | R15 |
|---------|--------|---------|----------|---------|---------|---------|
| x | fc | R11 | R12 | R13 | R14 | R15 |
| y | CRI | R11 | R12 | R13 | R14 | R15 |
| u' | R1 | R11 | R12 | R13 | R14 | R15 |
| v' | R2 | R11 | R12 | R13 | R14 | R15 |
| CCT | R3 | lambdaP | lambdaPV | PPF | PPF-B | PPF-G |
| LUX | R4 | lambdaP | lambdaPV | PPF | PPF-B | PPF-G |
| lambdaD | R5 | PPF | PPF-B | PPF-G | PPF-R | PPF-NIR |
| Duv | R6 | PPF-UV | PPF-B | PPF-G | PPF-R | PPF-NIR |
| deltax | R7 | PPF-B | PPF-G | PPF-R | PPF-NIR | |
| deltay | R8 | PPF-G | PPF-R | PPF-NIR | | |
| deltau | R9 | PPF-R | PPF-NIR | | | |
| deltav | R10 | PPF-NIR | | | | |

At the bottom of the dialog, there are 'Commit' and 'Cancel' buttons.

See Basic List for usage

Note

You must Lock the “Term Lock” icon again before being able to capture another light measurement.

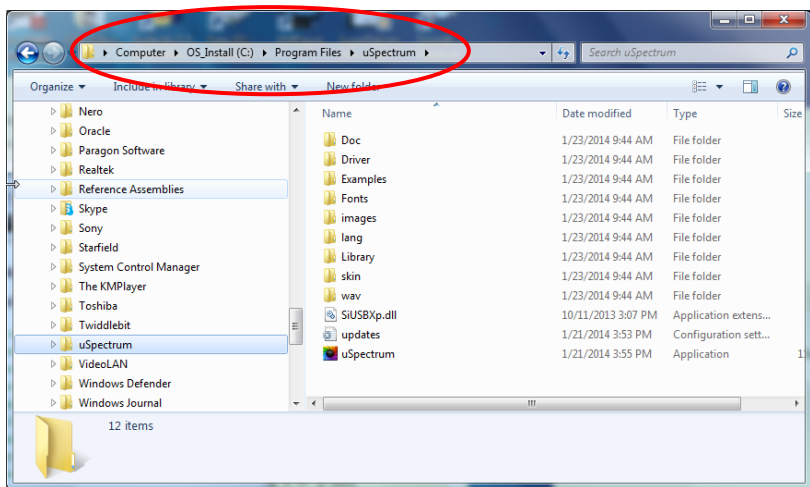
Appendix I – PC Requirements

| Item | Description |
|--------------------|--|
| Monitor resolution | 1024 X 768 or higher |
| Ram | 1.0 GB or higher |
| Color Depth | 16-bit Color Depth or higher |
| Processor | Intel Core II Duo @ 1.4 GHz or higher |
| | Intel Core Duo @ 2.0 GHz or higher |
| | AMD Athlon Neo X2 @ 1.6 GHz or higher |
| | Intel Atom @ 2.13 GHz or higher |
| | AMD Athlon 64 x2 @ 1.7 GHz or higher |
| | Note: Most processors produced in 2010 or later should work properly. |
| HD Space | 300 MB free space |
| Operating System | Windows XP |
| | Windows 7 |
| | Windows 8 (not officially tested) |

Appendix II – MK350 Custom Programming

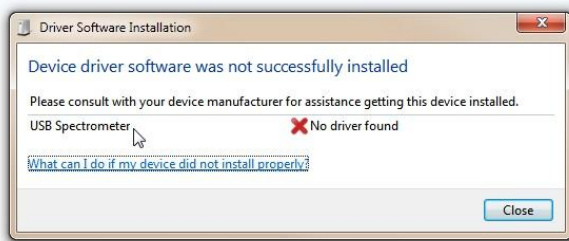
UPRtek provides .dll libraries for users wishing to custom program Windows based applications for the MK350 device. These .dll functions perform basic MK350 device control and data access/retrieval functions.


The MK350 Developer's Kit is loaded onto your PC when you install the PC Software. The .dll libraries, documentation and example code are all provided in the install directory, typically located in the directory shown below. But it may be different depending on where you originally installed the PC Software files.

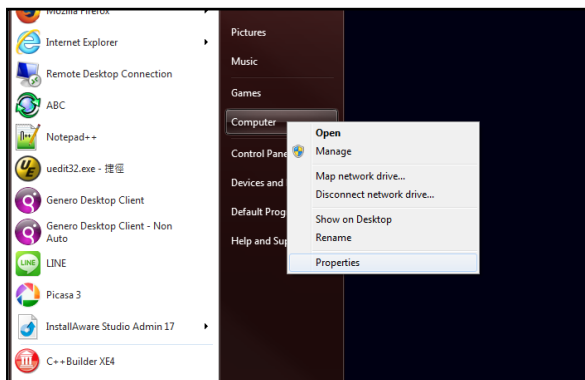


Appendix III – Manual Driver Download

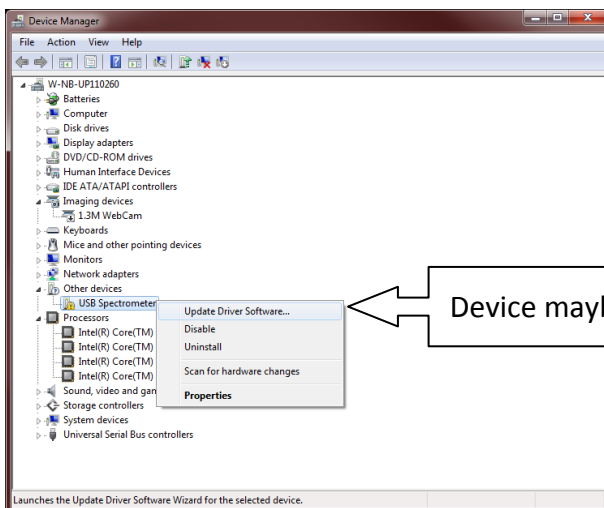
These procedures are performed when an error message shows that the uSpectrum driver has not installed properly.

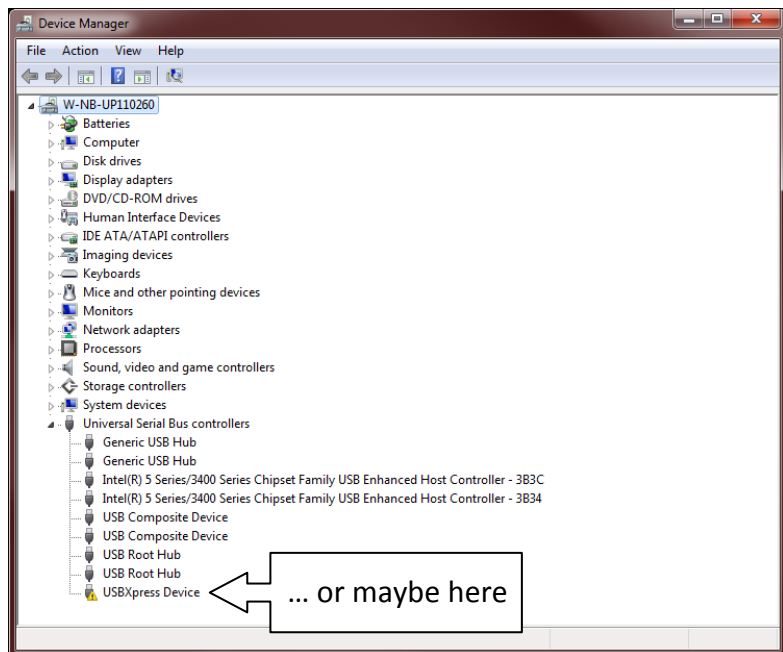


Step 1 On your Windows PC, click the **Start Menu Icon** (usually in lower left hand corner) . The screen below will display. Right Click “Computer” and select “Properties”.

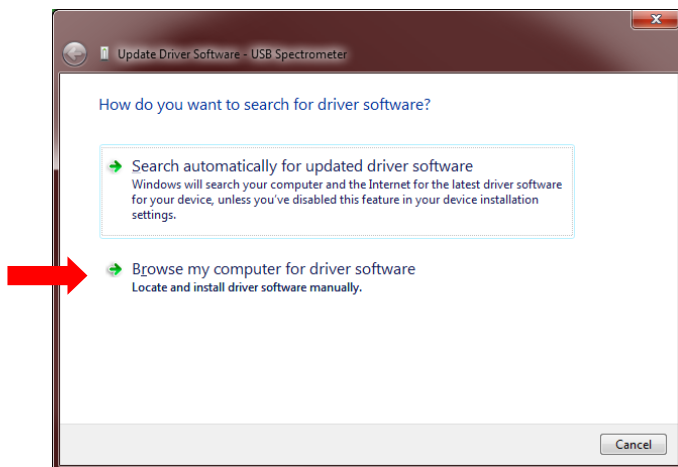


Step 2 Select “Device Manager”. Then, in the second screen, find the Device with an exclamation warning. It may be under “Other Devices”, “USBXpress Device” or “Universal Serial Bus Controllers”. Right click and select “Update Driver Software”.

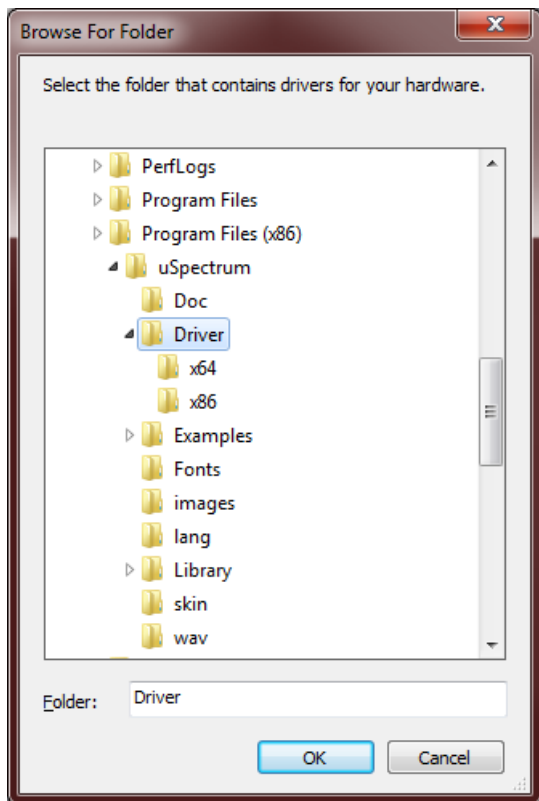




Step 3 Select “Browse my computer for driver software”. And then click the “Browse” button on the next screen.



- Step 4** Browse to the uSpectrum Driver folder. It is typically in c:/Program Files/uSpectrum/Driver, where the installation files were placed. Click OK.



Step 5 Hit Next. The driver should install correctly and you should be able to bring up your uSpectrum software.

