



Quick Start Guide

QG000122

Horticulture

Spectral Measurement of LEDs

AS7265x Application

v1-00 • 2018-Sep-06

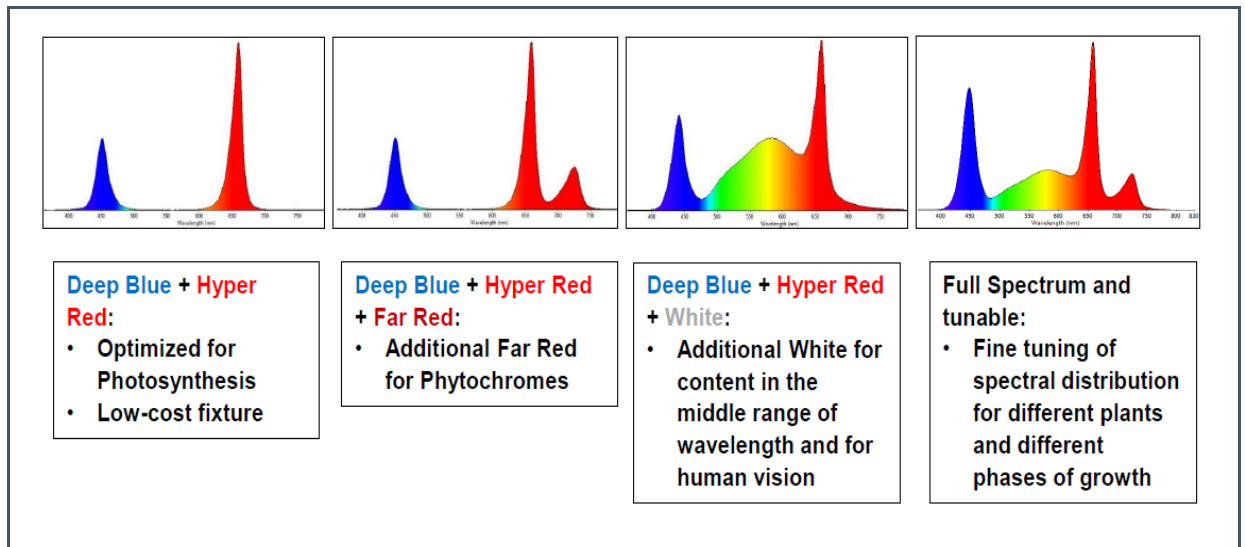
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1 Basics

The role of light in plant growth is an important factor that needs to consider. Plants respond in various ways to the intensity and duration of light. The following figures show the light effects on plant growth.

Figure 1:
Effect of Light on Plants



Therefore, light control is very necessary to optimized spectral wavelength and used energy in horticulture. In this case, an AS7265x Moonlight multi-spectral sensor is required to measure accurate light waves in the VIS and NIR ranges. The AS7265x Moonlight Multispectral Chipset has total 18 channels for spectral identification from 400nm to 1000nm with FWHM of 20nm. Therefore, the sensor is able to measure quasi spectral.

Figure 2:
AS7265x Moonlight Multi-Spectral Sensor



AS7265x Multispectral Chipset consists of AS72651, AS72652, and AS72653 devices and each device has six optical filters so that AS7265x sensor board has total 18 channels. For more details, please look into the data sheet AS7265x.

2 How to Build the Setup

To build a setup, the following key things are necessary.

- A tent
- A AS7265x Moonlight Board with a USB cable
- A small black plastic case with diffuser
- Tunable light source , LED box inside tent, e.g. LED control box outside tent
- A plant

Figure 3:
Horticulture Setup in Tent



Note:

- AS7265x Multispectral Sensor (Figure 2) will be in the black plastic case with diffuser
- AS7265x Multispectral Sensor should face to the light source.
- To build the tent, please follow the tent manual

In the Evaluation Kit, please find the following items:

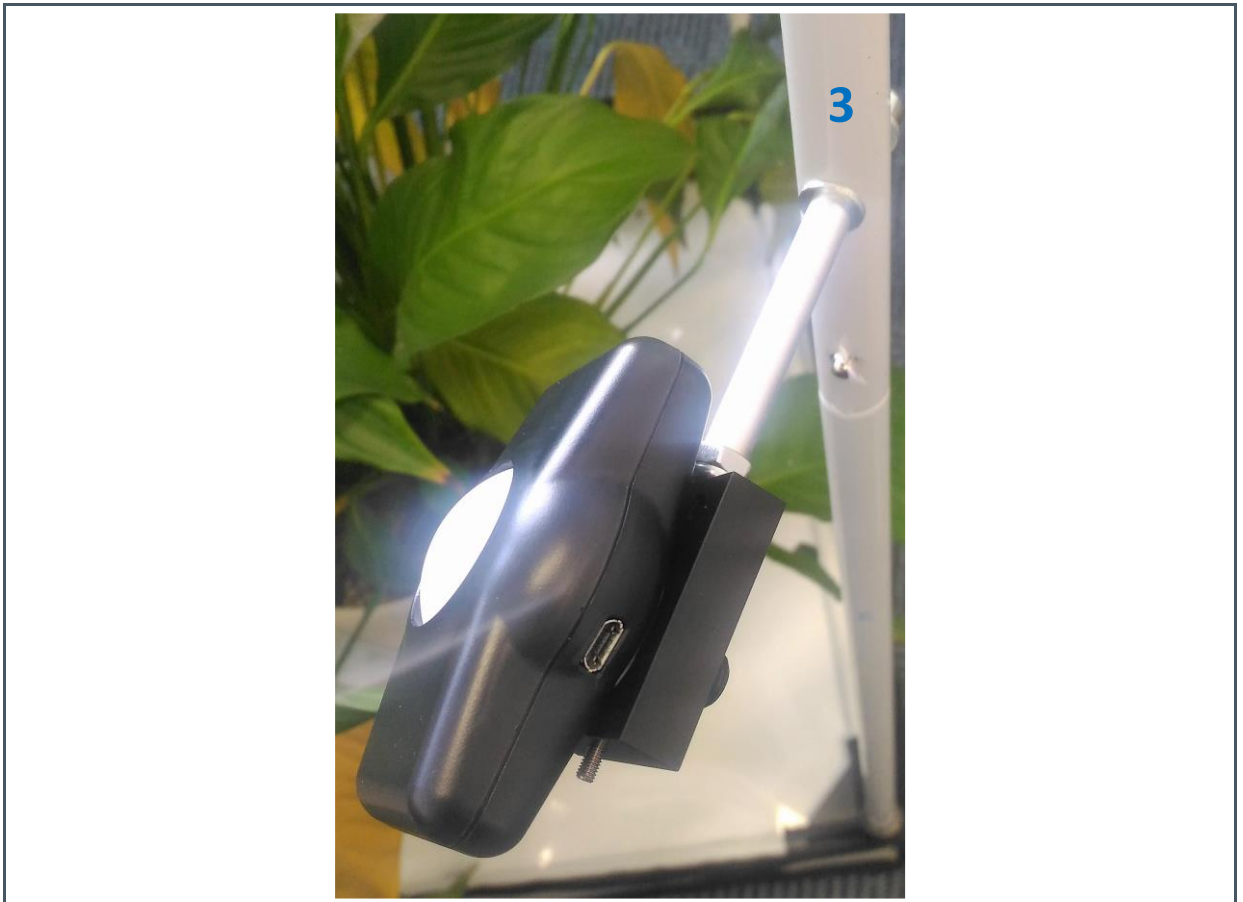
- AS7265x Moonlight Multispectral Sensor
- Black plastic case
- A small black frame (to hold the case)
- One small rod with some nuts
- USB – UART cable
- USB memory stick

Please, make the following steps to fix the black plastic case in the tent.

- Fit the small frame with the small rod.
- One of the number 3 rod has a hole. Use that to place the small rod.
- Then, fix the black plastic case in the frame.

Please, see the figure below for better understanding.

Figure 4:
Fixed Black Plastic Case



3 Software Installation and Operation

Items included in the USB memory stick:

- ActiveState TCL Run-Time Setup - ActiveState Tcl Community Revision
- Dashboard Software - Demo Kit GUI
- FTDI Virtual COM Port Driver Setup - Driver for FTDI USB – UART Cable
- AS7265x Multispectral Chipset Documentation Set – Data sheets, User Guides, Application notes, Multispectral Chipset Design Considerations

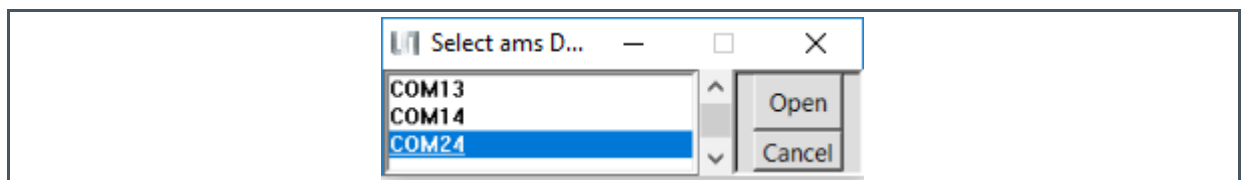
3.1 Installation Procedure

- Insert the provided USB stick into the computer before connecting Serial (demo board UART) cable to PC. Copy the ams_AS7265x_Main folder on the USB stick into the PC working directory of your preference.
- If not already installed on the computer, install USB serial port com drivers. Right click on the “CDM v2.12.00 WHQL Certified.exe” located in the FTDI Virtual COM Port Driver Setup folder on the USB stick and install as an administrator.
- If not already installed on the computer, install ActiveState TCL Run-Time software. Right click on the “ActiveTcl8.6.1.0.297577-win32-xxxx_xx-threaded.exe” located in the ActiveState TCL Run-Time Setup folder on the USB stick and install as an administrator.
- Connect the serial cable to AS7265x Multispectral Chipset board and USB end into PC.

3.2 Operation

After the installation, click “ams_Spectral_Sensor_Dashboard_x.x.xx.tbc” file provided with the kit to launch the Dashboard software. The x.x.x x is the revision number of the software.

Figure 5:
Dashboard Display After Startup



As shown above (Figure 5) the PC COMM Port select window will appear first after Dashboard launch (and after connection the hardware to the USB port).

To find which (if more than one showing) COMM Port to select:

- Open Windows Device Manager
- Click on “Ports (COM & LPT)”
- Find the “USB Serial Port (COMxx)”, and use that to select the correct COMxx.

Once COM Port is selected and opened the “18-Channel Sensor Dashboard” page will open.

3.2.1 18-Channel Sensor Page

The 18-Channel Sensor page allows you to read 18 channels raw data from AS72651, AS72652, and AS72653 devices. It also provide controls for the Update Mode, LED Current, and Status.

- Clicking the “Sample” button will update the displayed metrics once with the most current data. Selecting “Continuous”, the “Sample” button will change to the “Start” button. Click the button to enable a display of continuously update metrics. If “Stop After” is not used, which is the sample limit, sampling will not stop.
- The “LED0” control sets AS72651 indicator LED current to on (1mA) or off as desired. It cannot be set once continuous sampling is set so should be setup prior. In addition, the indicator LED flashes during AS72651 firmware updates regardless of the “LED0” control setting.
- The “LED1” control sets AS72651 onboard LEDs current to 12.5mA, 25mA, 50mA, 100mA or OFF as desired. It cannot be set once continuous sampling is set so should be setup prior. The “LED2” and “LED3” controls set AS72652 and AS72653 onboard LEDs current. By default, onboard LEDs are not installed. The LED should installed based on the application.
- The “Status” control give you the time of last sample and display the number of samples read in the “Samples” control.
- The 18-Channel Sensor value displays the current raw data in two ways. It displays according to Channel or Wavelength.
- Selecting the “Spectrum” option, the display will show the Gaussian Wave of the 18-channel sensor’s raw data. In normal condition, y-axis is varied according to the most current value of the sensor. The highest and lowest values of the y-axis are based on the highest and lowest value of the 18-channel sensor’s raw data. Clicking the “Lock” option, most current value will be the y-axis minimum and maximum value; it cannot be changed from next measurement. Clicking the “Spline” option, the spectrum will be smooth (should be used for demos).

Figure 6:
18-Channel Sensor Page

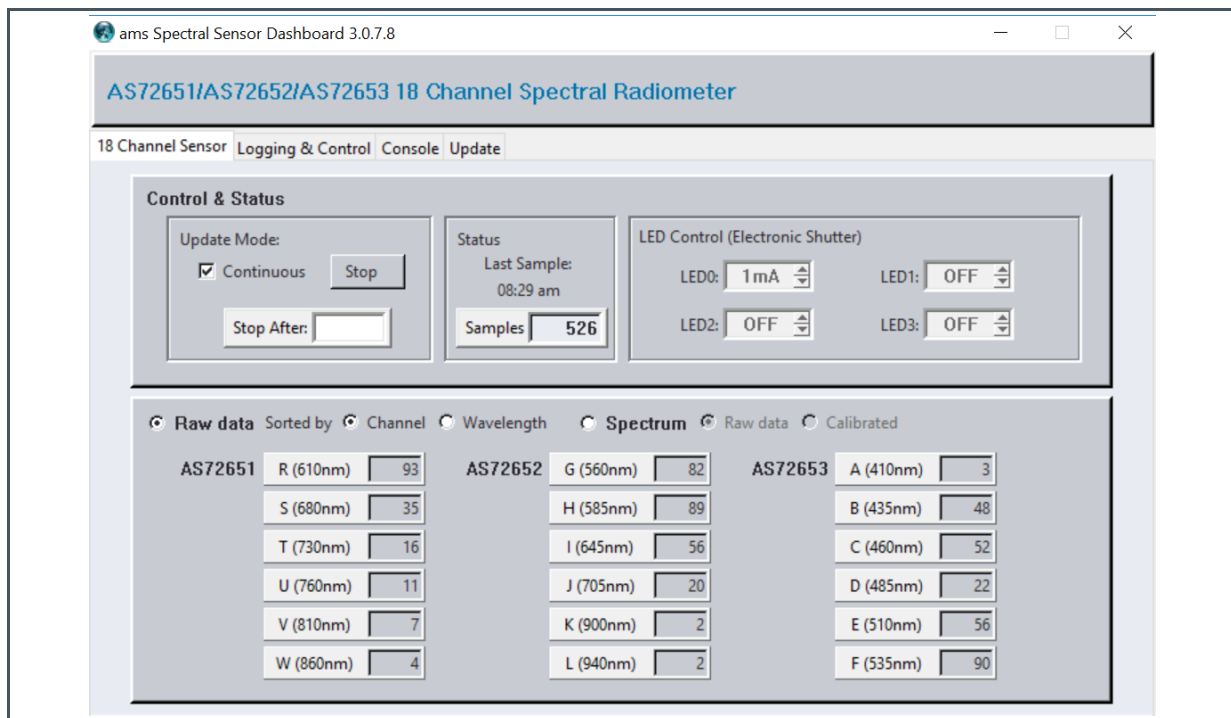
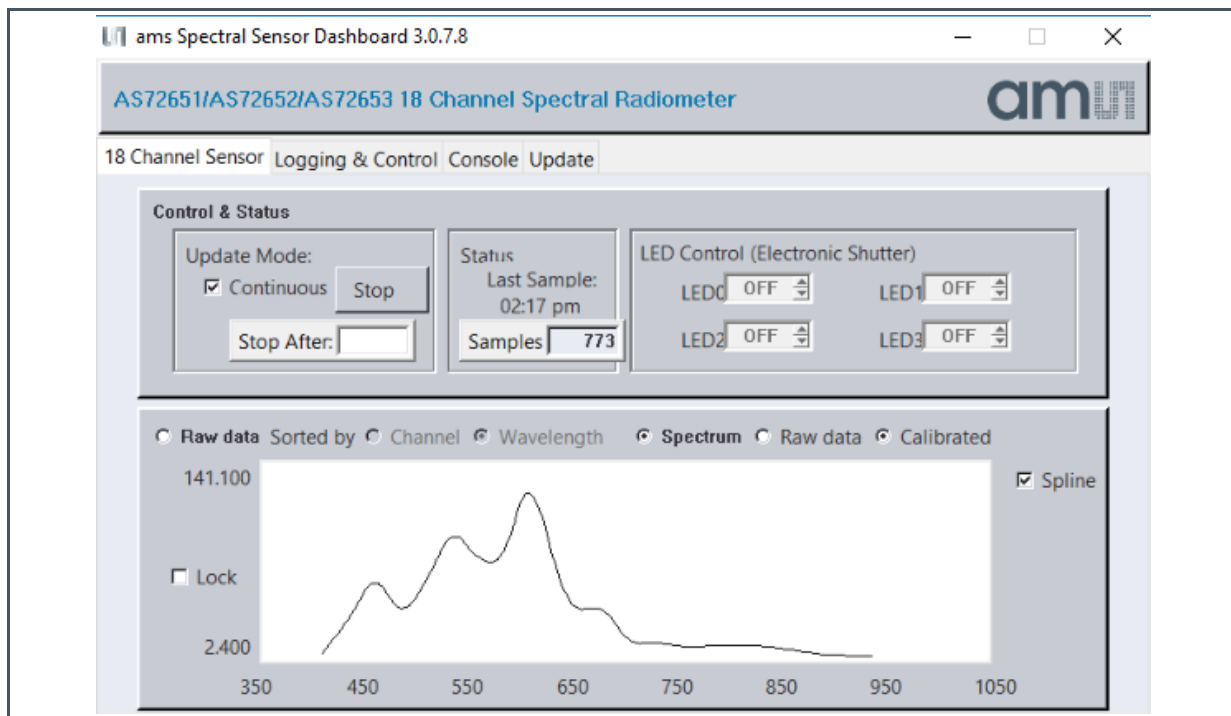


Figure 7:
18-Channel Sensor Page (Selecting Spectrum option)

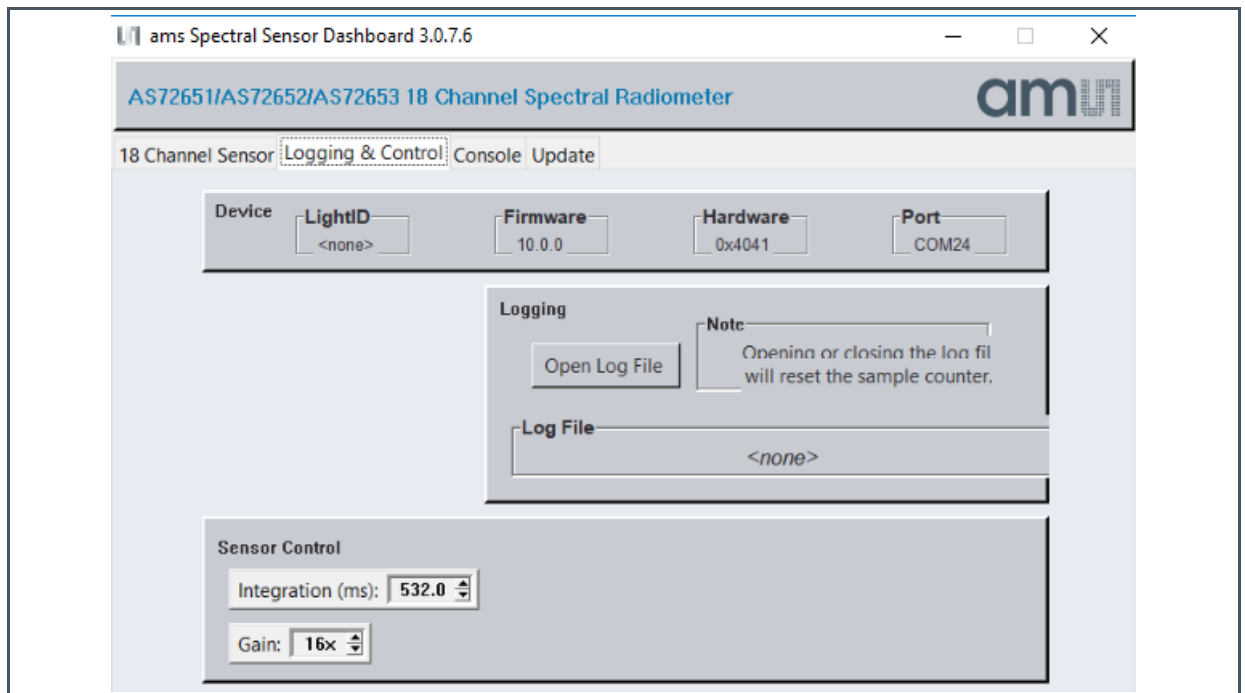


3.2.2 Logging & Control Page

The “Logging & Control” page give you more information about AS7265x Multispectral Chipset as well as more controls. It includes “Logging” and “Sensor Control”.

- If desired, click the “Open Log File” to store AS7265x Multispectral Chipset data (Excel CSV format). When the sampling is done, close the log file to store the data or set the number in the “Stop After” control on previous page and that will automatically store the data.
- Modify the “Sensor Control” for Integration Time and Gain as needed. Note that in order to change sensor controls, “Continuous” sampling must be off on the “18 Channel Sensor” page. Once set, continuous sampling can be turned on as needed.
- The “Device” control provide more information about AS7265x Multispectral Chipset

Figure 8:
Logging & Control Page

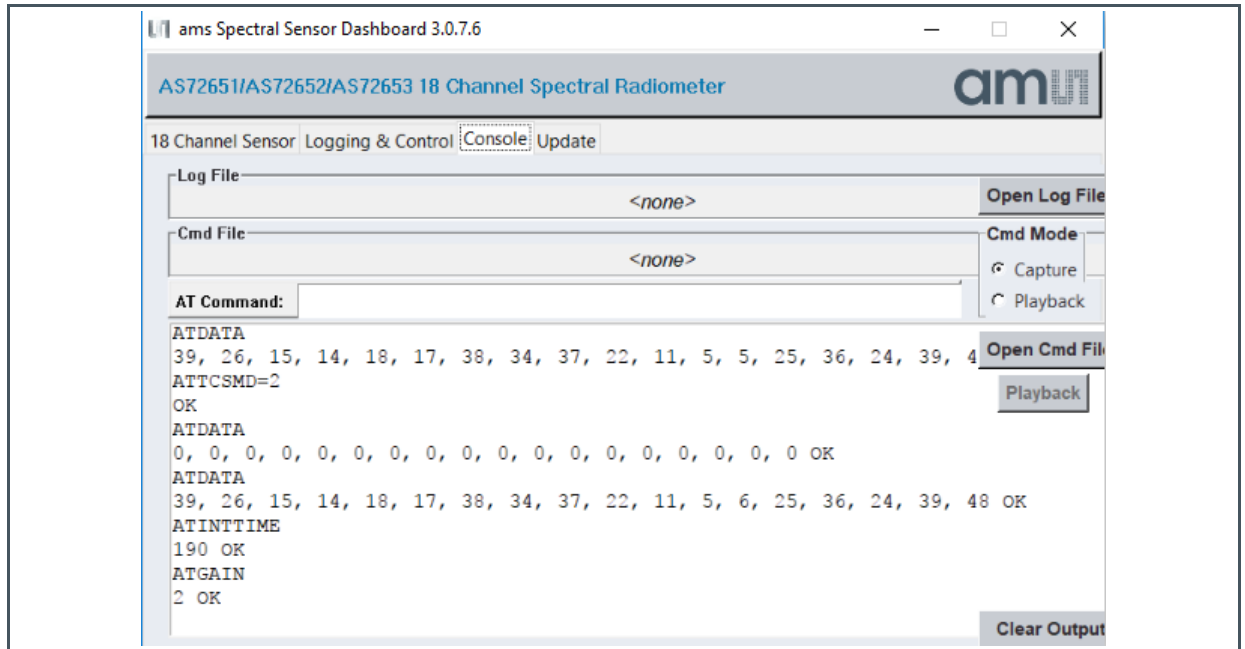


3.2.3 Console Page

AT commands could be observed and entered both on the “Console” page.

- After a control is changed or data is sampled the resulting AT Commands can be observed on this page and optionally captured on the computer running Dashboard.
- If desired commands can be entered on this page, in the AT Command line at the top of the page or via the Playback of previously captured commands.
- Use “Open Cmd File”, then “Close Cmd File” to Capture. Moreover “Open Cmd File”, then “Playback”, to execute the stored commands.

Figure 9:
Console Page

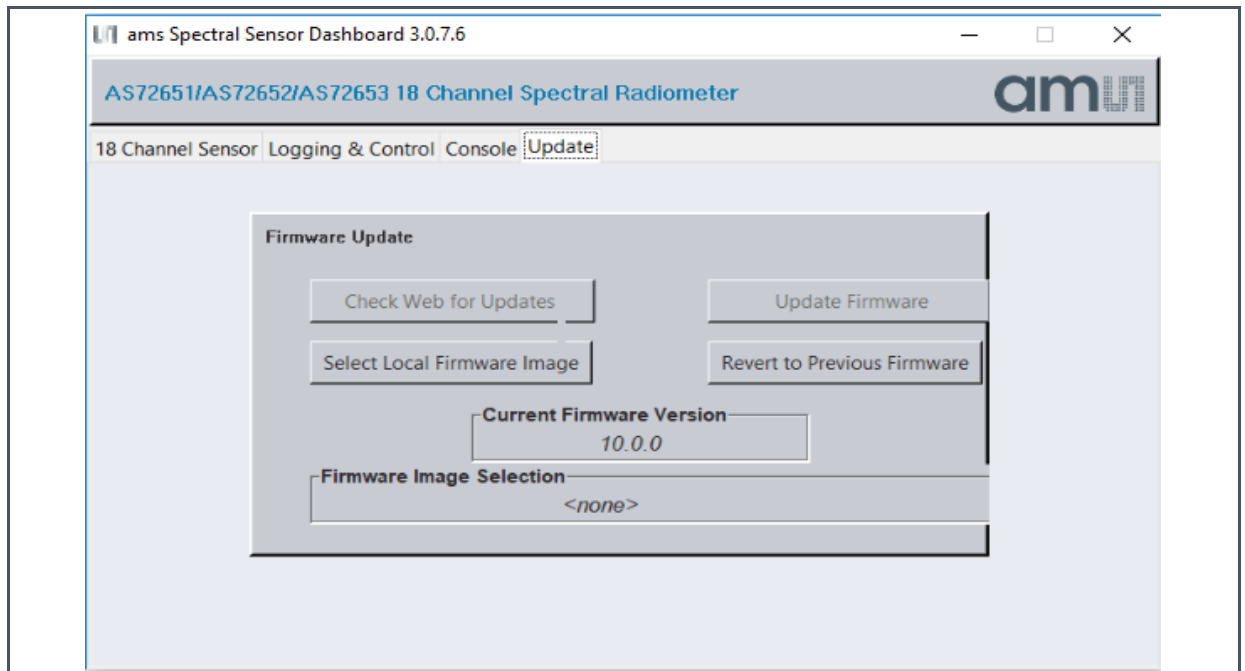


3.2.4 Update Page

As shown below on the Update page, AS7265x Multispectral Chipset firmware can be updated from the Dashboard (do not use this function for demo Horticulture):

- Obtain the latest “*.bin” AS7265x Multispectral Chipset firmware file
- Store the “*.bin” file on the computer.
- Use the “Select Local Firmware Image” button as shown above to navigate to the “*.bin” file.
- Next, select the “Update Firmware” button to start the update procedure.
- After Firmware, update is complete close the Dashboard software, cycle power on the hardware by unplugging and re-plugging the USB connection and then re-launch Dashboard.

Figure 10:
Update Page



3.2.5 Important Note

In case of the main windows of the GUI are shown not fully or parts of the Windows are displaced, a problem with the screen resolution exists. To avoid this resolution problem, do the following steps:

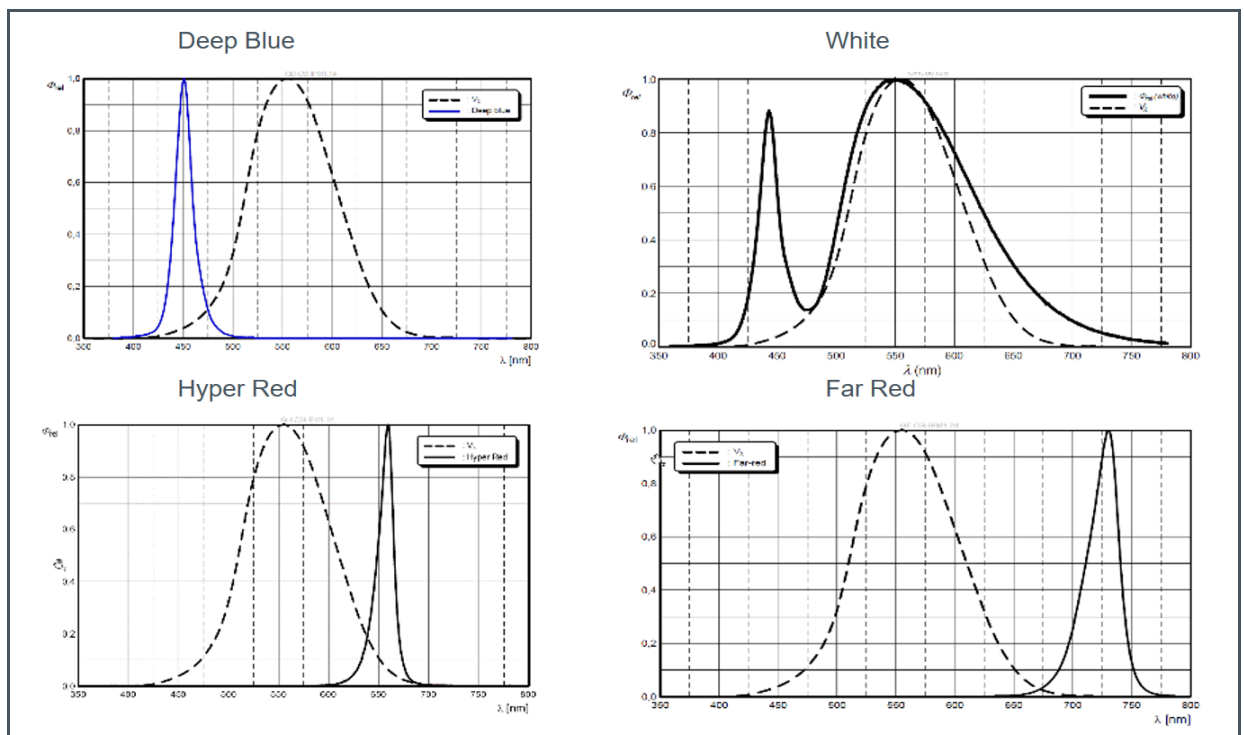
- Search "wish86.exe" file.
- Select -> Right click on Mouse -> Click "Properties".
- Select "Compatibility".
- Click "Override high DPI scaling behavior"
- Select Scaling performed by: "System".

4 Examples

Figure 11:
Channel Description

Channel	Color	Wavelength
Channel 1	Deep Blue	460nm
Channel 2	Hyper Red	650nm
Channel 3	Far Red	750nm
Channel 4	White Light	400nm – 700nm

Figure 12:
Horticulture - Spectral Sensor Data of the Single LEDs



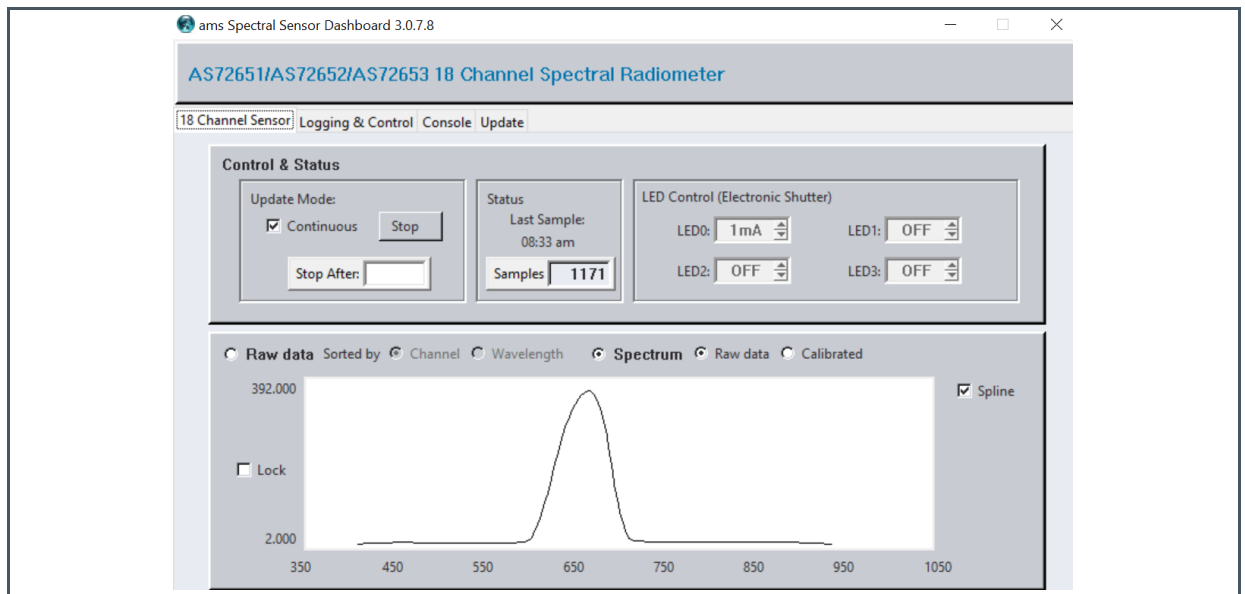
4.1 Example 1 - Hyper Red

Before starting the measurements, switch on the luminary Hyper Red and set the following parameters (in Logging & Control):

- Gain = 3.7
- Integration Time = 182
- Channel 1 = 100% on and others off

Then start continuous measurements, switch on “Spectrum” and “Spline” to see the spectral data.

Figure 13:
Channel 1 = 100% & Others Off



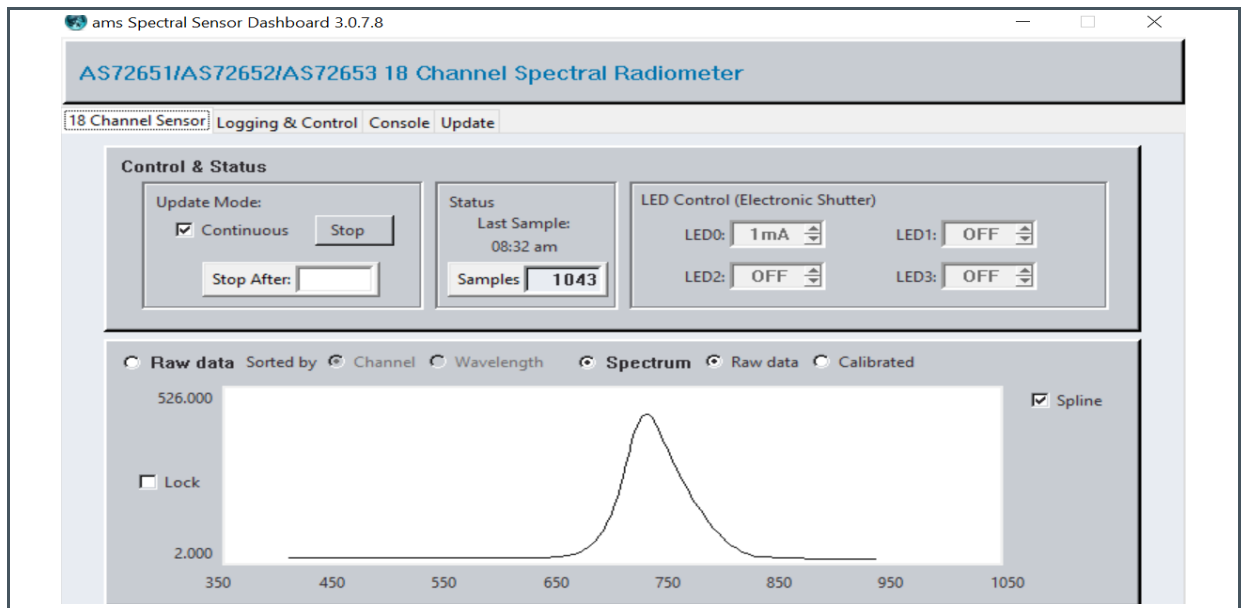
4.2 Example 2 - Far Red

Before starting the measurements, switch on the luminary Far Red and set the following parameters (in Logging & Control):

- Gain = 3.7
- Integration Time = 182
- Channel 2 = 100% on and others off

Then start continuous measurements, switch on “Spectrum” and “Spline” to see the spectral data.

Figure 14:
Channel 2 = 100% & Others Off



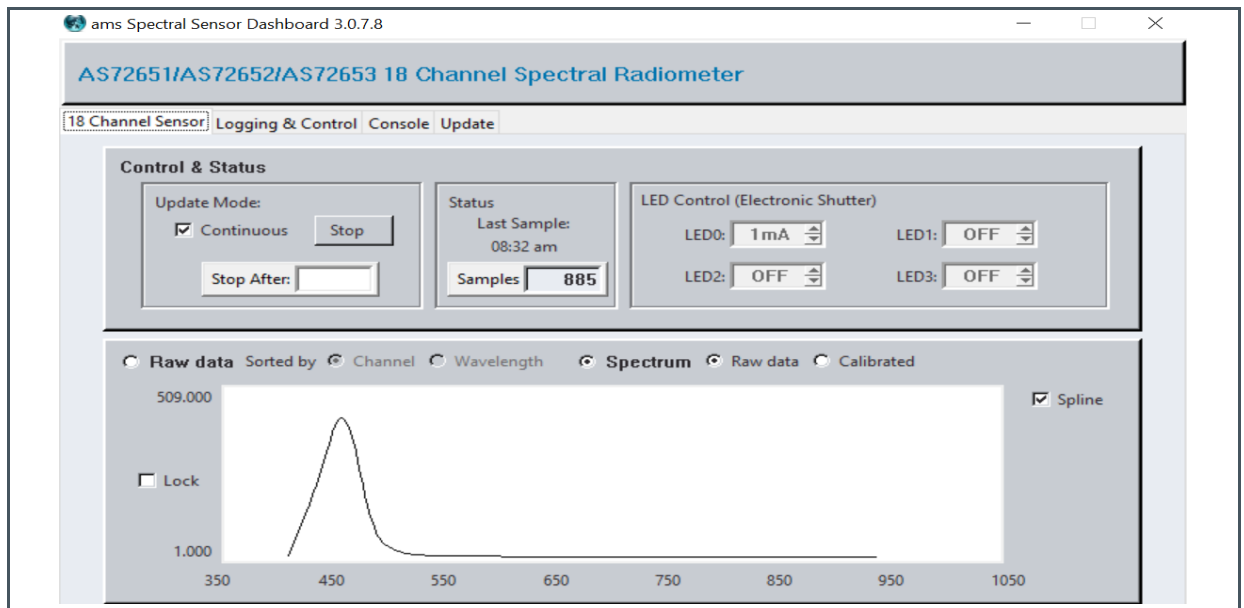
4.3 Example 3 – Deep Blue

Before starting the measurements, switch on the luminary Deep Blue and set the following parameters (in Logging & Control):

- Gain = 3.7
- Integration Time = 182
- Channel 3 = 100% on and others off

Then start continuous measurements, switch on “Spectrum” and “Spline” to see the spectral data.

Figure 15:
Channel 3 = 100% & Others Off



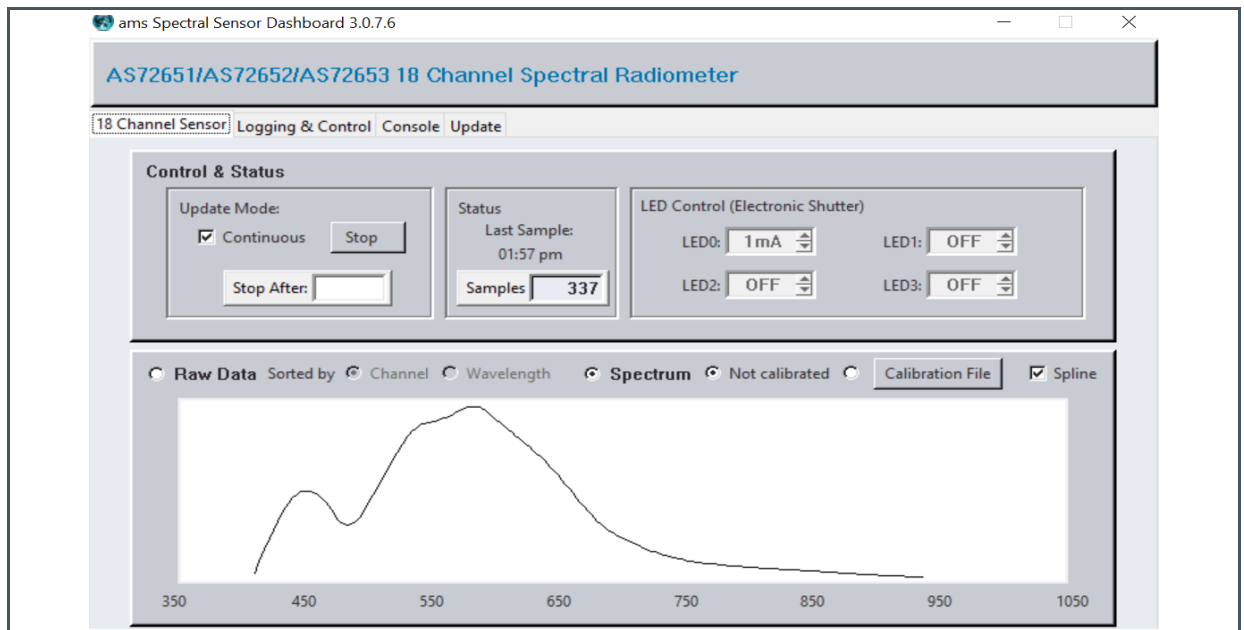
4.4 Example 4 – White Light

Before starting the measurements, switch on the luminary White Light and set the following parameters (in Logging & Control):

- Gain = 3.7
- Integration Time = 182
- Channel 4 = 100% on and others off

Then start continuous measurements, switch on “Spectrum” and “Spline” to see the spectral data.

Figure 16:
Channel 4 = 100% & Others Off



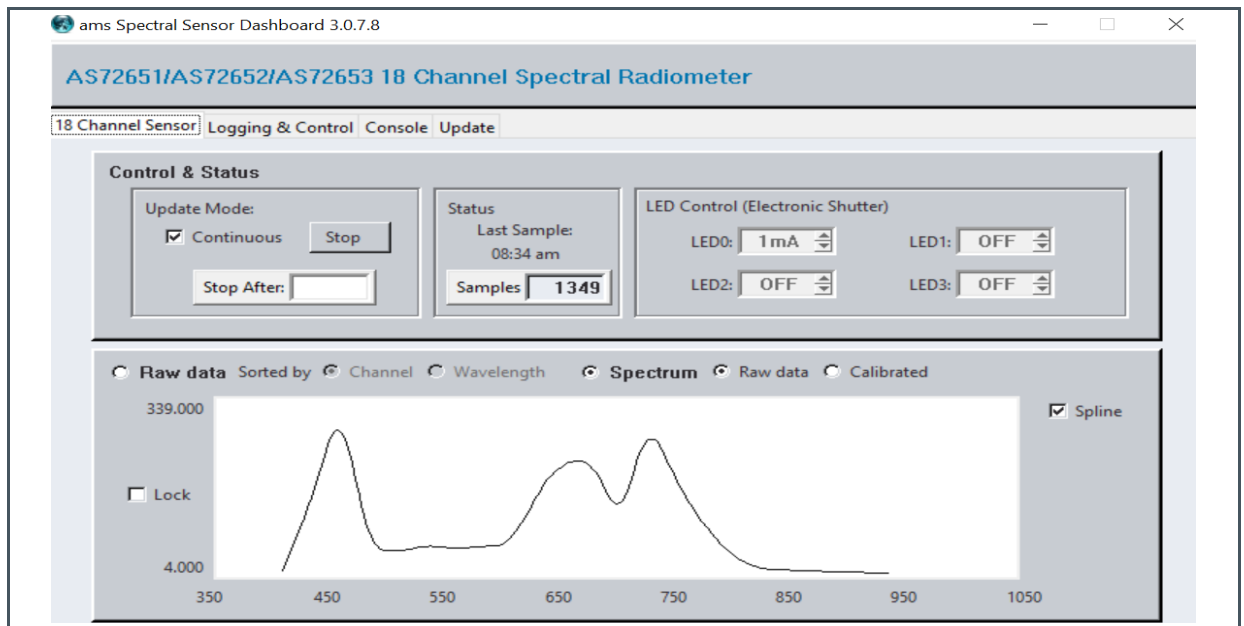
4.5 Example 5 – Mix of 4 LEDs

Before starting the measurements, switch on all LEDs (50%) and set the following parameters (in Logging & Control):

- Gain = 3.7
- Integration Time = 182
- Channel 1...4 = 50% on

Then start continuous measurements, switch on “Spectrum” and “Spline” to see the spectral data.

Figure 17:
Channel 1 = 50%, Channel 2 = 50%, Channel 3 = 50%, Channel 4 = 50%



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