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ams OSRAM

AS7056/57 Evaluation Kit

Quick Start Guide

08/02/2022

AS7056/57 Evaluation Kit

Quick Start Guide

AS7056/57 EVK

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FW Upgrade

Contents of the AS705x Evaluation kit

AS705x Evaluation kit parts

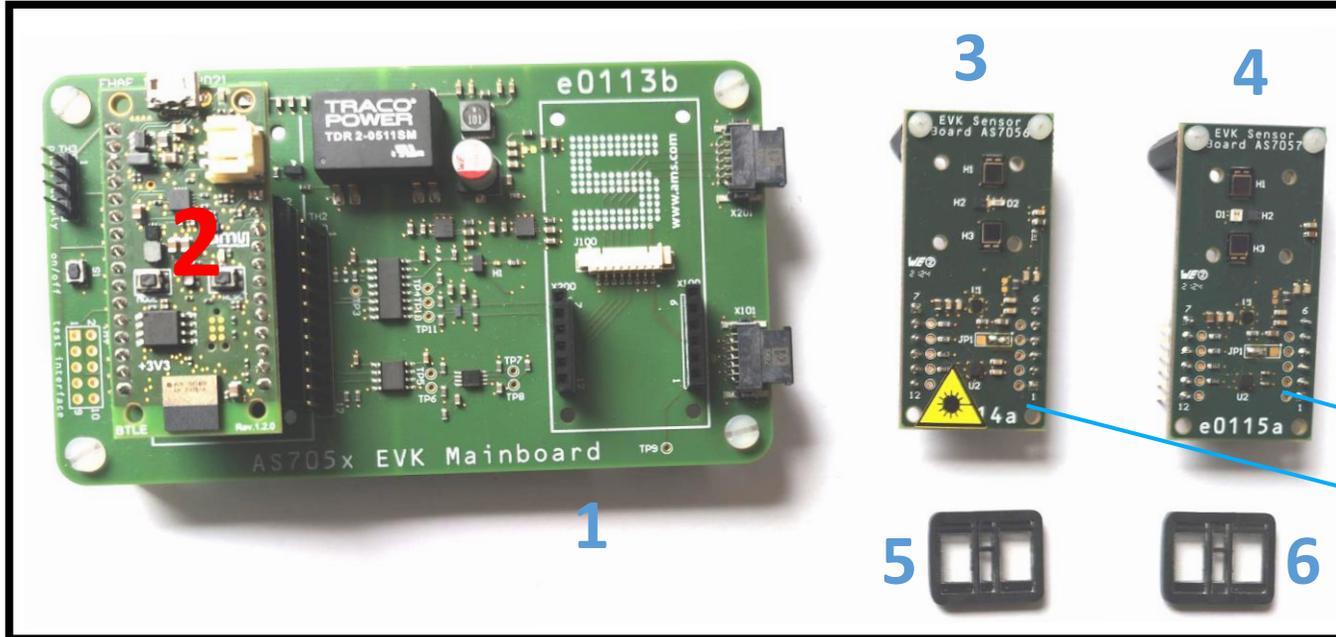


Fig. 1: AS705x Evaluation Kit out of the box

Out of the Box

- 1 – AS705x EVK Mainboard
- 2 – Generic Bluetooth Board
- 3 – AS7056 Sensor board
- 4 – AS7057 Sensor board
- 5 – Optical Barrier & Cover Glass
- 6 – Optical Barrier & Cover Glass
- 7 – Micro USB cable included in the box

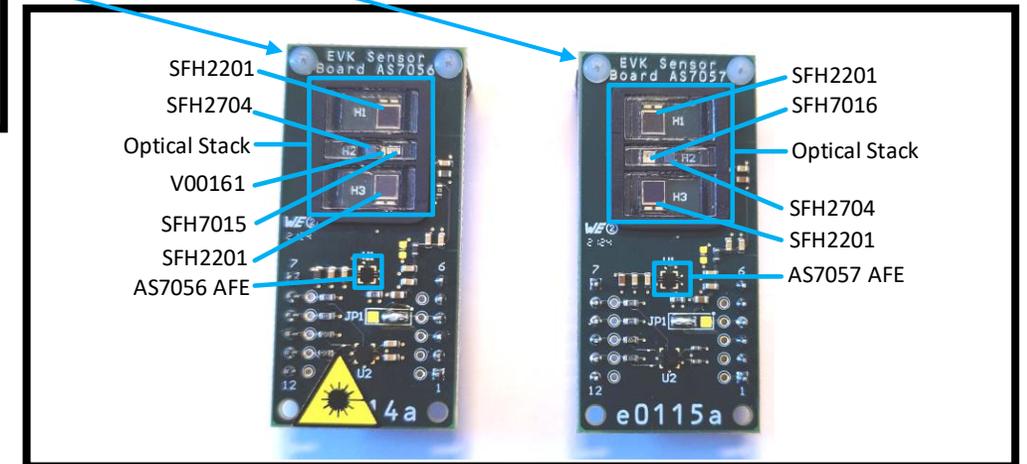


Fig. 2: AS7056 & AS7057 Sensor Boards

Contents of the AS7056 Evaluation kit

Evaluation kits main parts

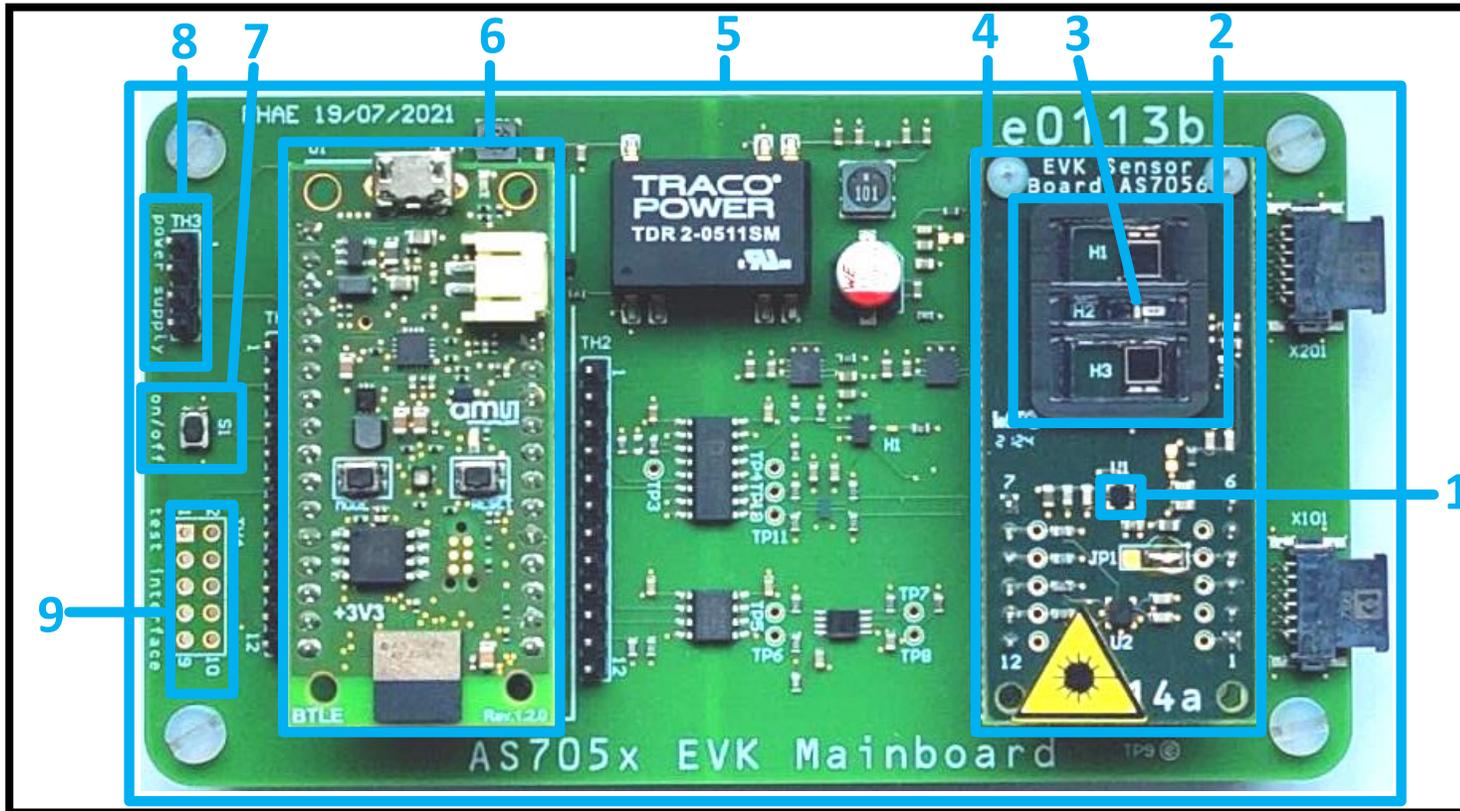


Fig. 3: AS7056 Evaluation Kit top view

Key

- 1 – AS7056 AFE
- 2 – Optical Module
- 3 – VCSEL laser diode
- 4 – AS7056 Sensor board with Optical Module
- 5 – AS705x EVK Mainboard
- 6 – BLE Controller Board
- 7 – EVK power supply On/Off button
- 8 – Power Supply Test Interface
- 9 – Power supply & I2C Connection / Test Interface

AS7056/57 PC Software

Installation

❑ To install, start the installer executable and follow the instructions as shown in *Fig. 4* below (left to right).

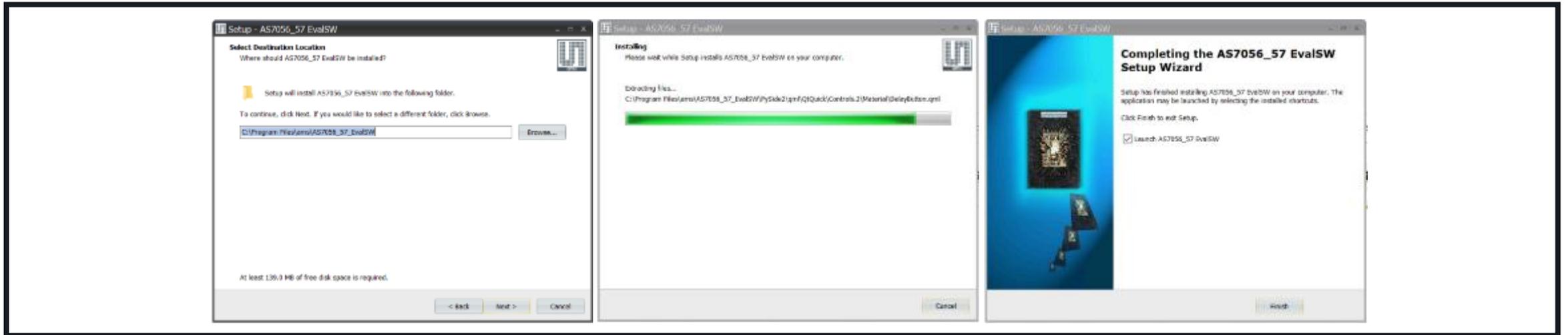


Fig. 4: AS7056/57 Software Installation steps

- Note: The EVK software is available for download (please contact the ams OSRAM support team (support_aws@ams-osram.com) for the download link)

Setup

Getting Started

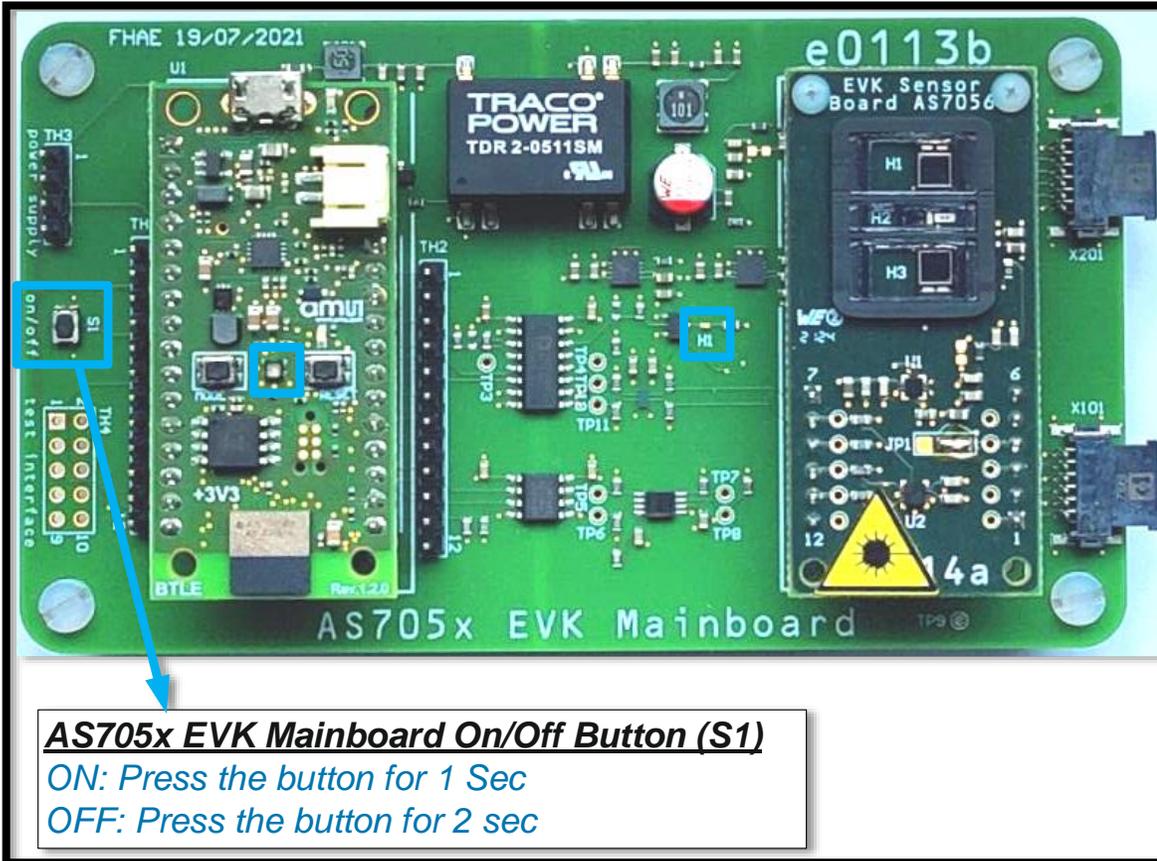
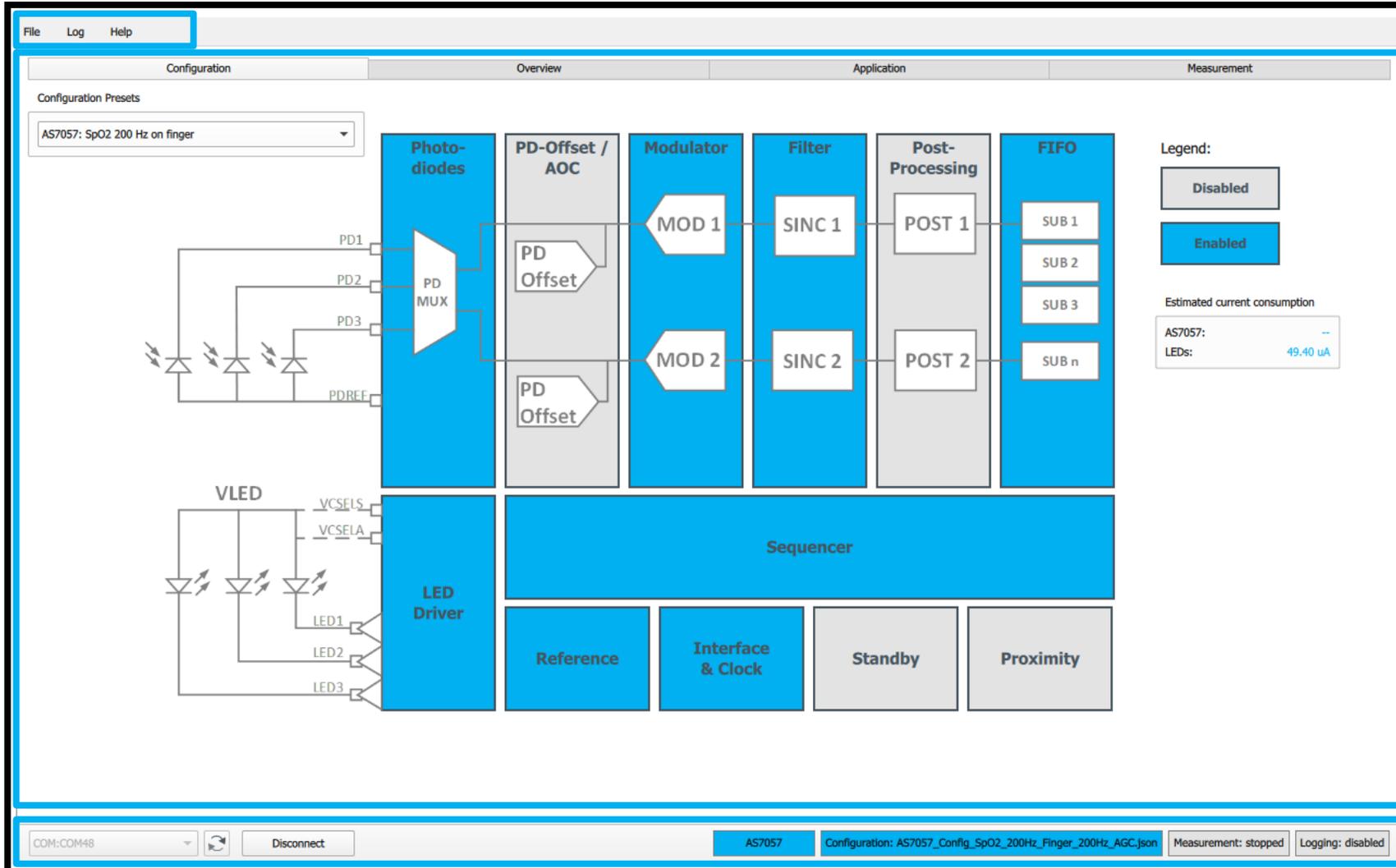


Fig. 5: AS7056 Evaluation Kit power ON

1. Connect the micro USB to USB cable to the board and plug it into your computer.
2. Afterwards, press the S1 button for 1 sec to turn on the sensor board.
3. The green LED on the Bluetooth Microcontroller module and USB connector board will light up as soon as the board is powered.
4. The green LED (H1) on the mainboard will light up as soon as the board is powered.
5. Start the EVK GUI software.

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Overview of GUI



The GUI consists of three main segments highlighted with the three rectangles.

- The one on the top has the register map list option, load and save configuration file, save the log file with the timestamp, enable moving average filter (if needed) and update the firmware.
- The one in the middle has control functions with three tabs -> Configuration, Overview, Application and Measurement
- The status bar at the bottom is connection information, configuration file information, measurement condition and logging status.

Fig. 6: Overview of SW GUI

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Overview of GUI – Configuration Tab

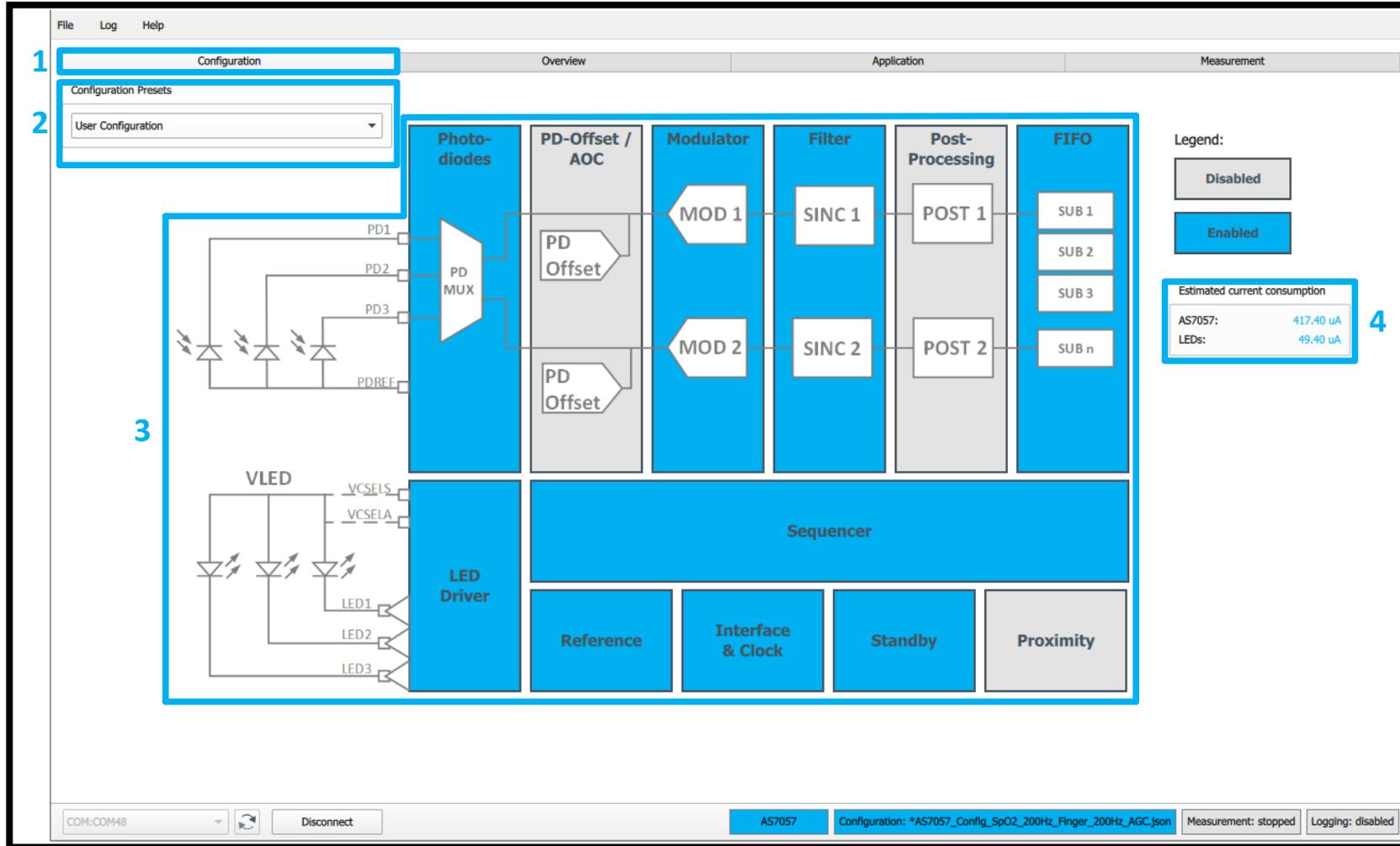
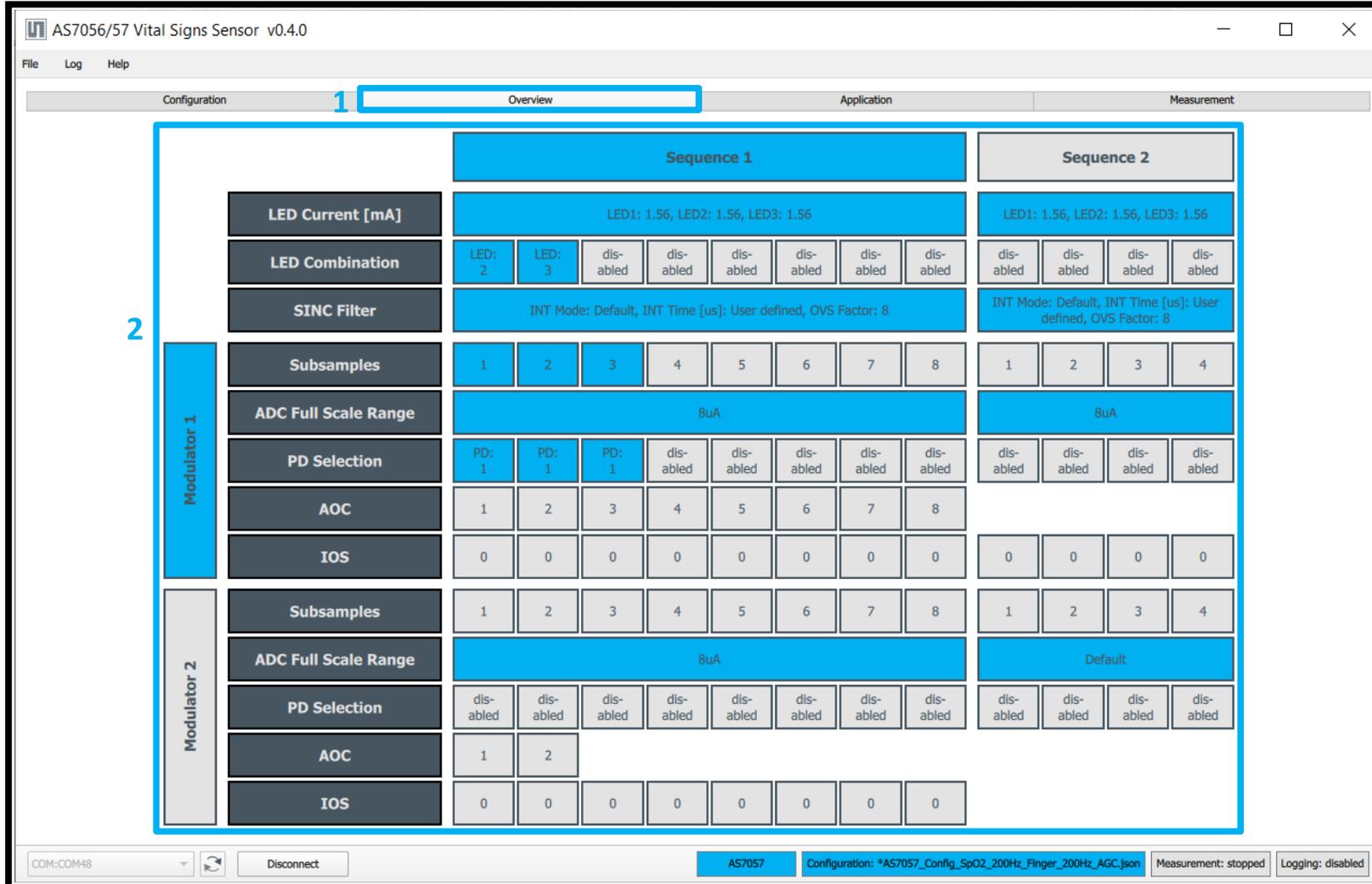


Fig. 7: Overview of SW GUI – Configuration Tab

1. After launching the EVK GUI, the “Configuration” tab is displayed.
2. A few configuration presets are provided for the user to quickly start using the device. These can be chosen from the 'Configuration Presets' Tab. Each file comes with a description which lets the user know which measurements could be done using these.
3. Block diagram of the AS7056/57. Blue color shows which sub-blocks are enabled and grey color shows which sub-blocks are disabled in a particular configuration file. Each sub-block can be accessed by clicking on it.
4. The estimated current consumption of the AS7056/57 and LEDs during measurement are displayed. Standby mode is activated to put the analog blocks to sleep after the end of the measurement.

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Overview of GUI – Overview Tab



1. A quick overview of the device parameters and provides general information about the setting configurations, which can be found in the "Overview" tab.
2. Which parameter value is set for a specific measurement configuration can be seen in each parameter block. For example – LED current, LED combination, modulator, sequencer parameters, SINC filter, etc.

Fig. 8: Overview of SW GUI – Overview Tab

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Overview of GUI – Application Tab

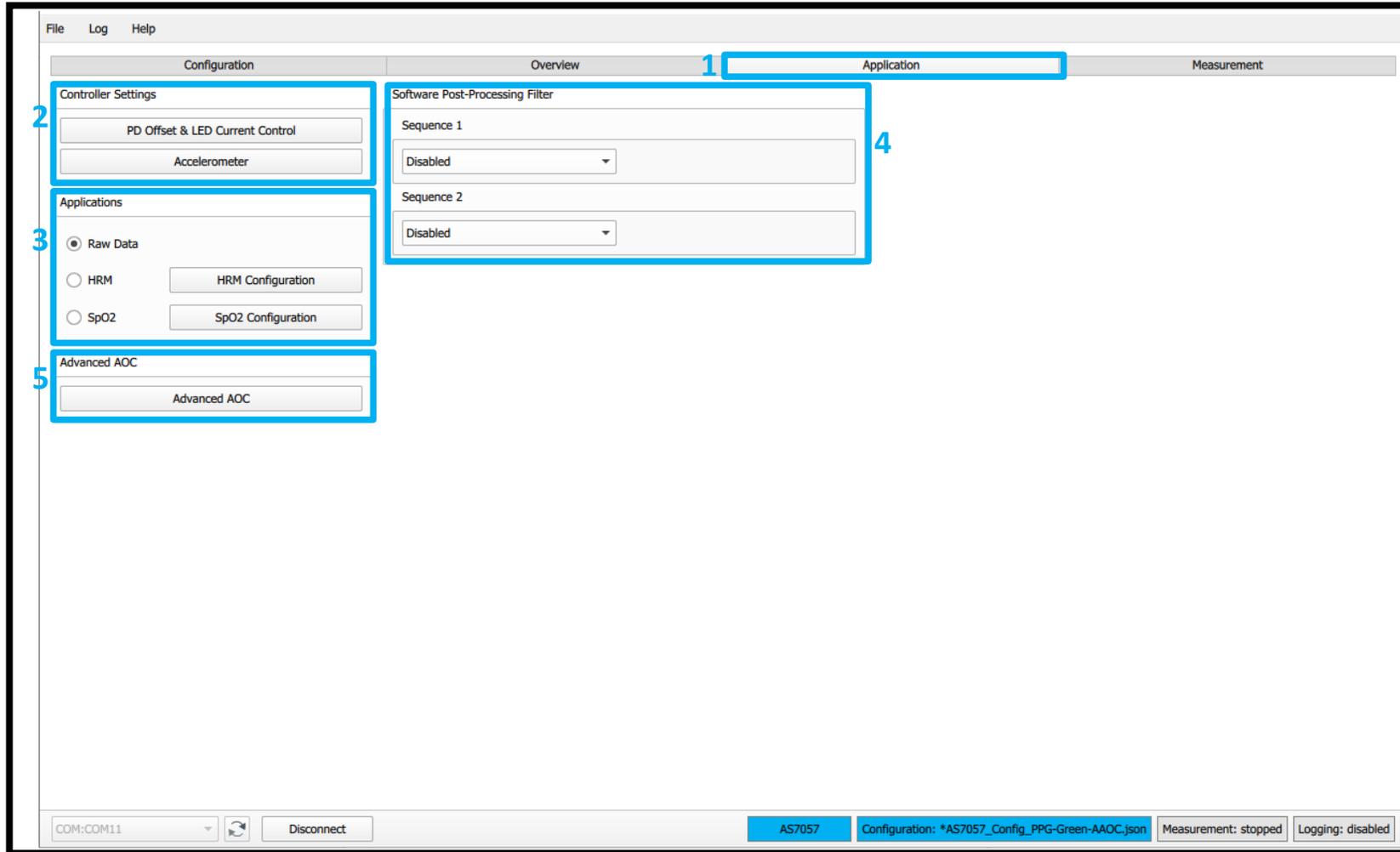


Fig. 9: Overview of SW GUI – Application Tab

1. Software and vital signs application related parameters can be found under the 'Application' tab. Click the “Application” tab to operate the “PD Offset & LED Current Control”, “Application” and “Software Post-Processing Filter” sections.
2. In the Controller settings, there is AGC Configuration that controls the PD-offset and LED current and algorithms like HRM and SpO2. The parameters related to HRM & SpO2 applications can be individually reviewed and adjusted on this tab by enabling or disabling the Accelerometer along with the different frequency.
3. Various applications such as Raw Data, HRM or SpO2 can be activated.
4. Different SW post-processing filters have been implemented to improve the quality of the output signal. The plot area displays the post-processing filter.
5. Advanced Automatic Offset Control (AAOC)

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Overview of GUI – Measurement Tab



Fig. 10: Overview of SW GUI – Measurement Tab

1. The measurement can be started after setting the parameter for a specific application. Click on the “Start Measurement” tab to run the sensor module and observe the “Chip Events”, “Application Output”, “AGC Status”.
2. “Start Measurement” button
3. Proximity, VCSEL, MOD1&2, Sequence runtime conditions can be observed
4. Heart Rate & SpO2 values will be displayed
5. AGC status for LED current and PD offset can be observed
6. Set the signal calculation or enter own formula
7. The PPG ADC count can also be displayed on the graph

AS7056/57 EVK

Finger Positioning on the Optical Stack

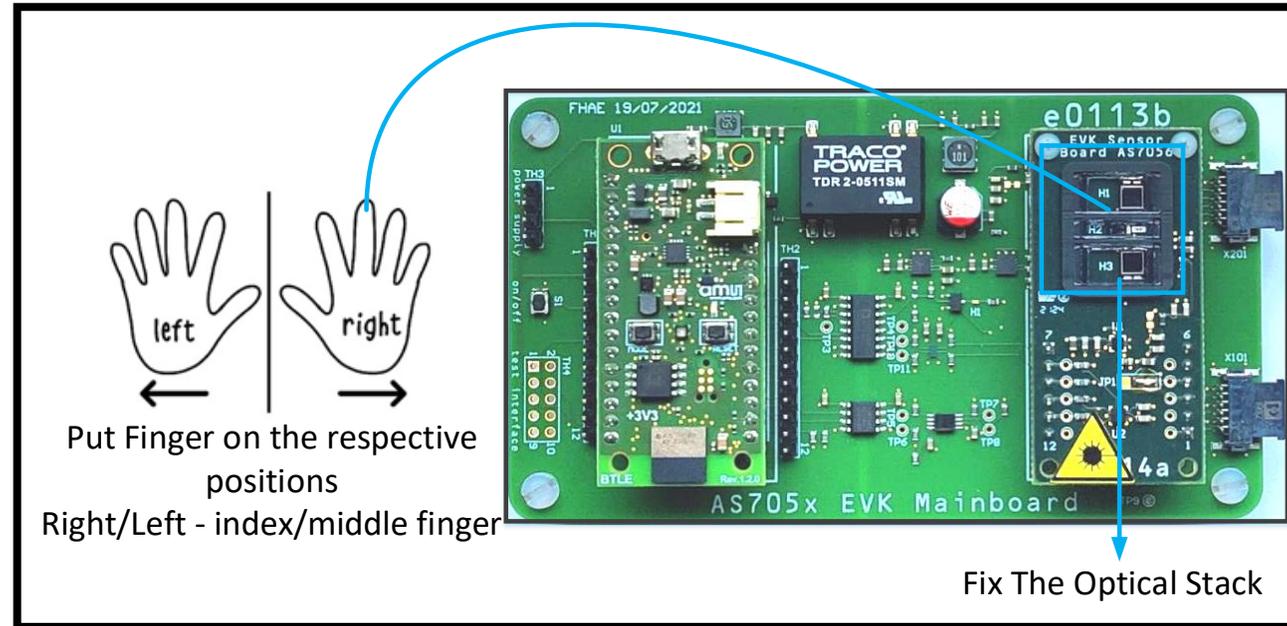


Fig. 11: Finger positioning for PPG on AS7056

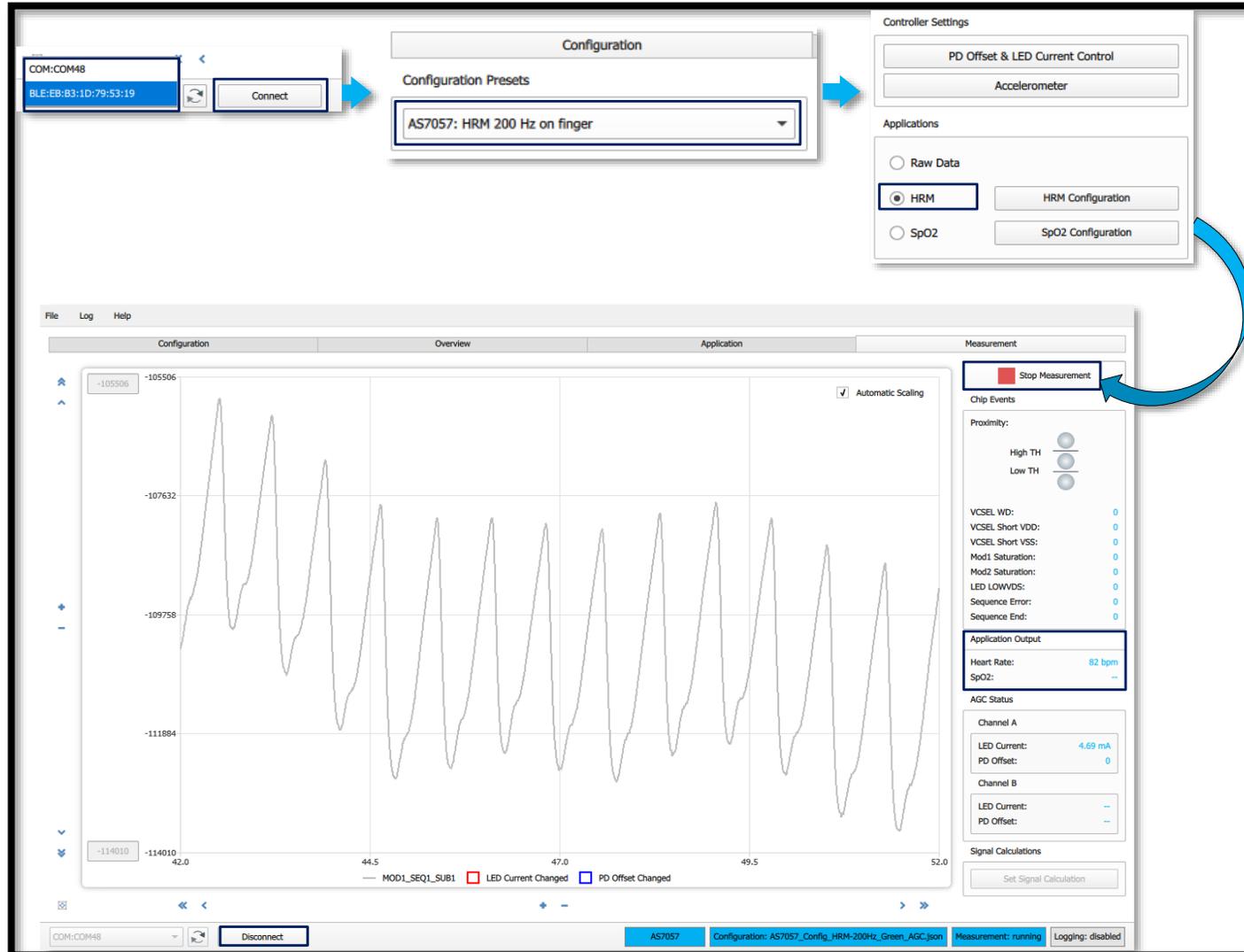
Measurement Conditions



- ✓ Place the EvalKit on the table/flat surface.
- ✓ Rest forearms and hands on the table and let the finger tips rest.
- ✓ Keep a light touch on the optical adapter – no need to squeeze or press down too firmly.
- ✓ Abrupt movement/vibration during measurement should be avoided.

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Starting a PPG/finger measurement for HRM

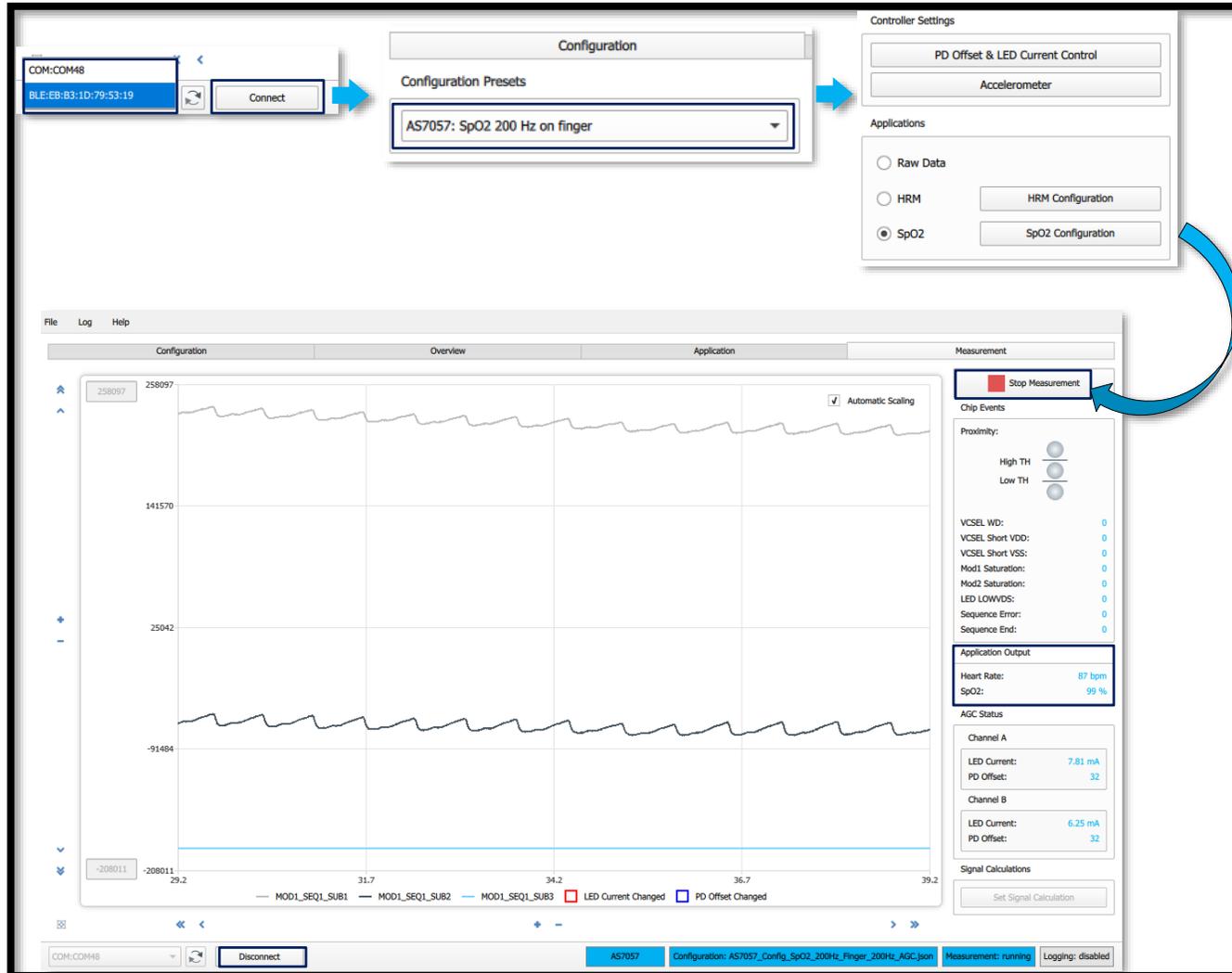


1. Firstly, press the sensor button "S1" for 1 second to power-on the sensor.
2. Select the right **COM port number** or **BLE number** from the drop-down menu.
3. Click the **Connect** button
4. When it is successfully connected, the right side button of the status bar (AS7057) will change color to blue.
5. The green LED on the Bluetooth module will start to blink as soon as the board connects with the GUI.
6. After connecting, Select the right configuration file from the provided configuration presets (**AS7057: HRM 200 Hz on finger** using PPG signal) in the configuration tab.
7. In the Application tab, HRM algorithm has been activated
8. Click the measurement tab, Click the **Start Measurement** button.
9. Place a finger on the LED/PD module, and subsequently, you will see the PPG raw data plot in the Graph window and the heart rate in the application output window.

Fig. 12: Selection of PPG with proximity configuration file

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Starting a PPG/finger measurement for SpO2



1. Firstly, press the sensor button "S1" for 1 second to power-on the sensor.
2. Select the right **COM port number** or **BLE number** from the drop-down menu.
3. Click the **Connect** button
4. When it is successfully connected, the right side button of the status bar (AS7057) will change color to blue.
5. The green LED on the Bluetooth module will start to blink as soon as the board connects with the GUI.
6. After connecting, Select the right configuration file from the provided configuration presets (**AS7057: SpO2 200 Hz on finger** using PPG signal) in the configuration tab.
7. In the Application tab, SpO2 algorithm has been activated
8. Click the measurement tab, Click the **Start Measurement** button.
9. Place a finger on the LED/PD module, and subsequently, you will see the PPG raw data plot in the Graph window and the heart rate & SpO2 in the application output window.

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Starting a PPG/finger measurement with Proximity

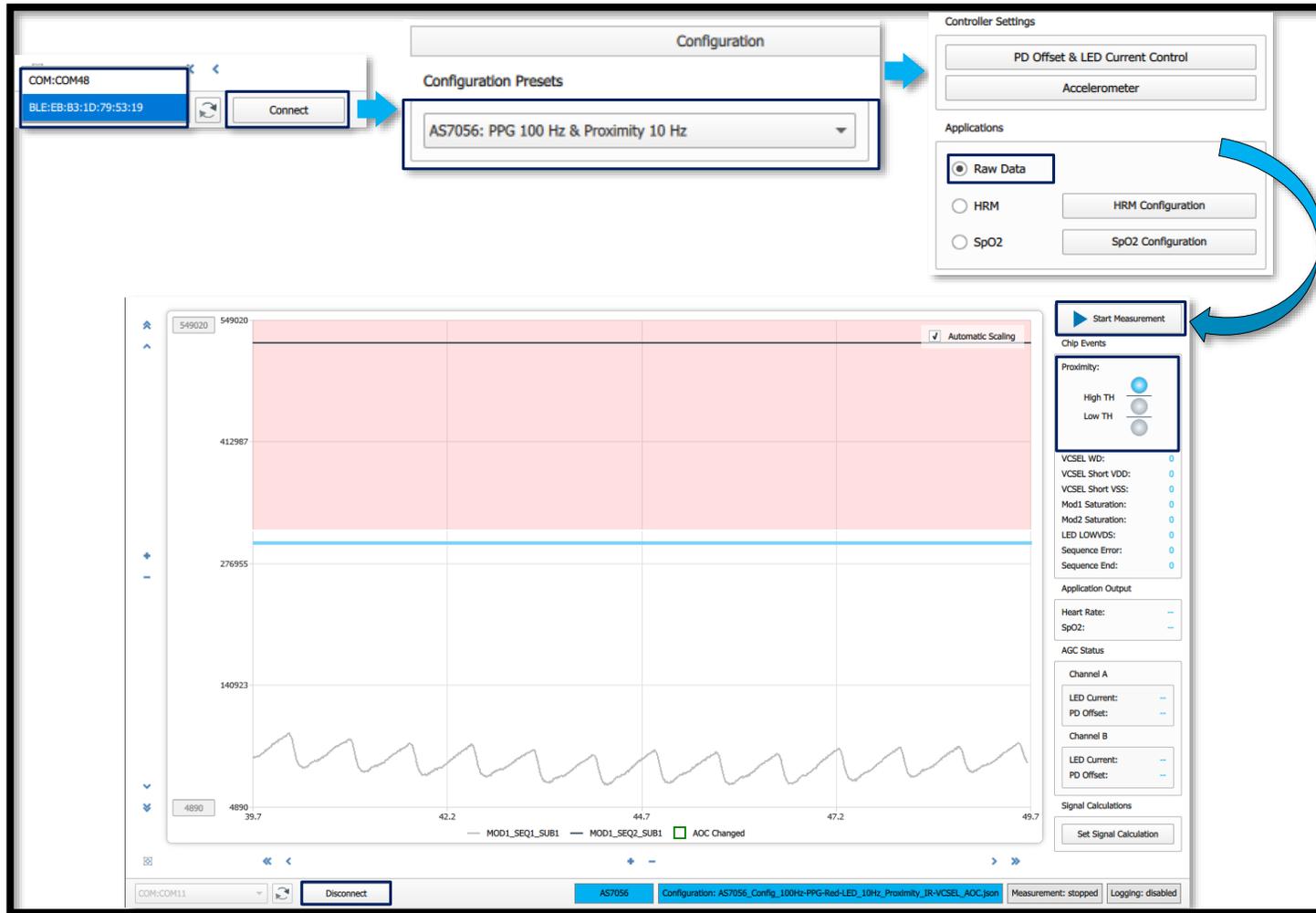


Fig. 14: Selection of PPG with proximity configuration file

1. Firstly, press the sensor button "S1" for 1 second to power-on the sensor.
2. Select the right **COM port number** or **BLE number** from the drop-down menu.
3. Click the **Connect** button
4. When it is successfully connected, the right side button of the status bar (AS7056) will change color to blue.
5. The green LED on the Bluetooth module will start to blink as soon as the board connects with the GUI.
6. After connecting, Select the right configuration file from the provided configuration presets (**AS7056: PPG 100 Hz & Proximity 10 Hz** for PPG signal using sequencer 1 with the sequencer 1 and proximity is using sequencer 2 in this case) in the configuration tab.
7. In the Application tab, raw data output has been activated
8. Click the measurement tab, Click the **Start Measurement** button.
9. Place a finger on the LED/PD module, and subsequently, you will see the PPG raw data plot in the Graph window and proximity condition in the Chip Events.

AS7056/57 PC Software

Starting a 2xPPG/finger measurement with Ambient Light

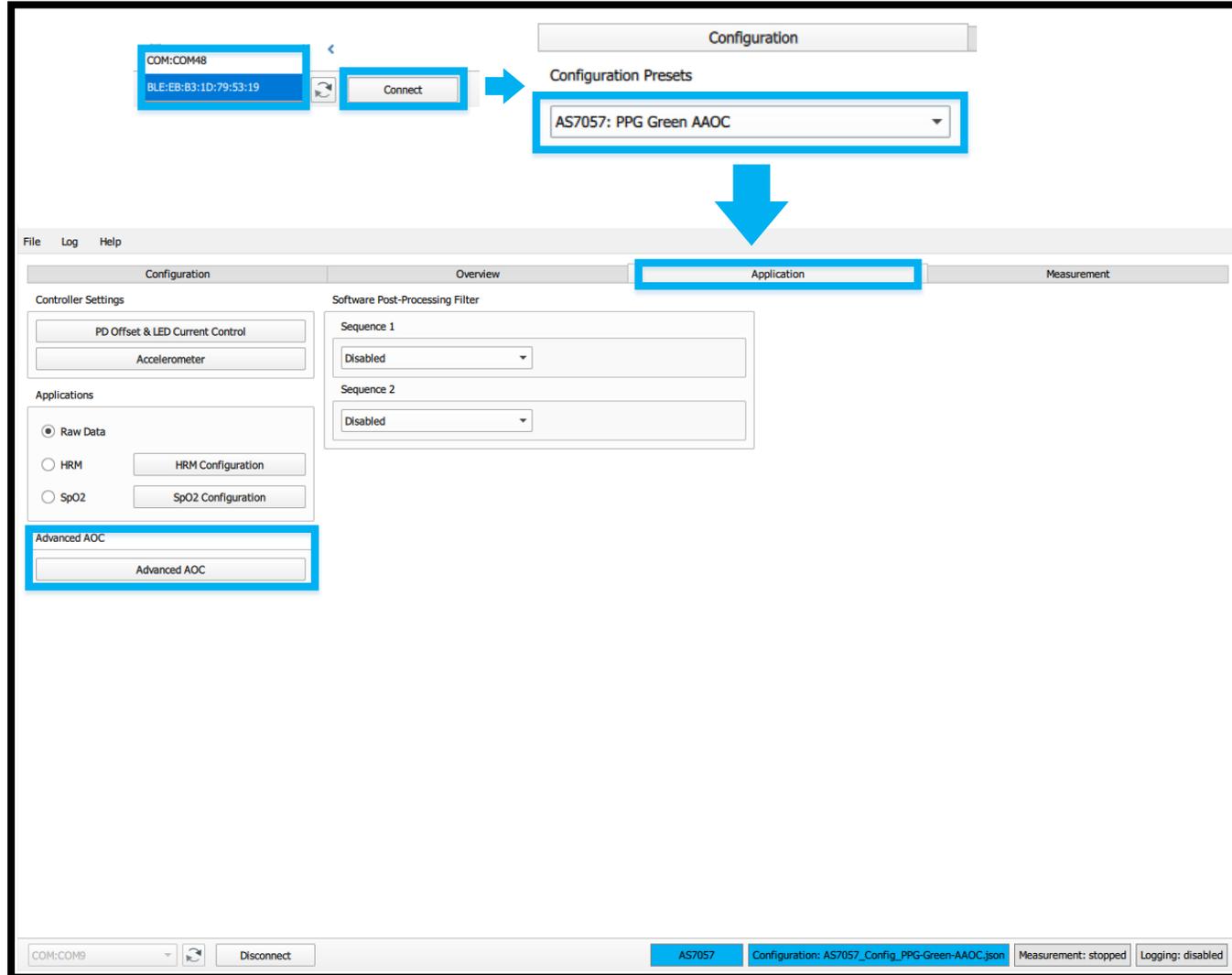


1. Firstly, press the sensor button "S1" for 1 second to power-on the sensor.
2. Select the right COM port number or BLE number from the drop-down menu.
3. Click the Connect button
4. When it is successfully connected, the right side button of the status bar (AS7056) will change color to blue.
5. The green LED on the Bluetooth module will start to blink as soon as the board connects with the GUI.
6. After connecting, Select the right configuration file from the provided configuration presets (AS7056/57: PPG 100Hz with MOD1 SUB1-3 for 3-channel PPG configuration using the Red, IR LEDs and ambient light in this case) in the configuration tab.
7. In the Application tab, raw data output has been activated
8. Click the measurement tab, Click the Start Measurement button.
9. Place a finger on the LED/PD module, and subsequently, you will see the 2xPPG and ambient light raw data plot in the Graph window.

Fig. 15: Selection of 2xPPG with Ambient light configuration file

AS7056/57 Advanced Automatic Offset Control (AAOC)

How to do the AAOC calibration



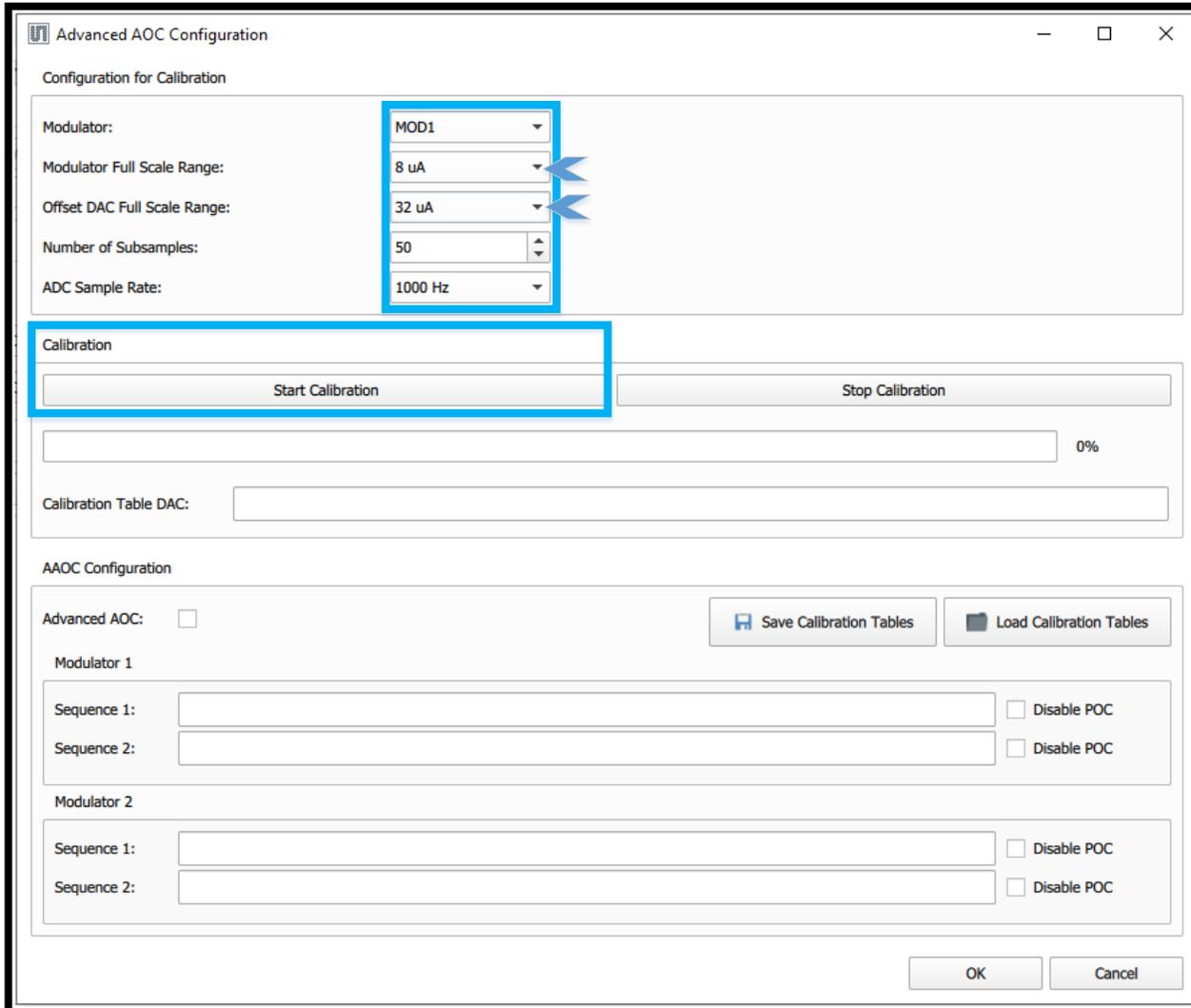
It is important to perform the AAOC calibration at the beginning of the measurement in order to use the AAOC function.

1. After connecting, Select the right configuration file from the provided configuration presets ([AS7057: PPG Green AAOC](#) to use the AAOC feature) in the configuration tab.
2. Switch to the “[Application](#)” Tab and press the “[Advanced AOC](#)” to access the calibration process.

Fig. 16: AAOC Calibration

AS7056/57 AAOC

How to do the AAOC calibration



- The present configuration uses Modulator1, an 8uA modulator ADC FSR and a 32μA DAC FSR. These used parameters must also be used for the calibration process. If there is a change in the parameters, these changes must be used here. The calibration is always performed only for one combination of different available ADC and DAC FSRs.
- The number of subsamples used for calibration should be higher than 10, and in this example 50 samples are used for each calibration step.
- The sampling frequency is set to 1000 Hz to keep the calibration process time as short as possible.
- Please note that the integration time also influence the quality of the calibration process, which is the same as with normal measurements. An integration time below 64 μs is not recommended for calibration. The integration time used in the example is set to 128 μs.

AS7056/57 AAOC

How to do the AAOC calibration

The screenshot shows the 'Advanced AOC Configuration' dialog box. It is divided into three main sections: 'Configuration for Calibration', 'Calibration', and 'AAOC Configuration'.
1. 'Configuration for Calibration':

- Modulator: MOD1
- Modulator Full Scale Range: 8 uA
- Offset DAC Full Scale Range: 32 uA
- Number of Subsamples: 50
- ADC Sample Rate: 1000 Hz

- 'Calibration':
- Buttons: 'Start Calibration' and 'Stop Calibration'
- Progress bar: A blue bar is filled to 100%.
- Calibration Table DAC: 135330, 270125, 403677, 535653, 668810, 802560, 935441, 1063426, 1196241, 1329806, 1462484, 1593800, 1726637, 1860025, 1992601
- 'AAOC Configuration':
- Advanced AOC:
- Buttons: 'Save Calibration Tables' and 'Load Calibration Tables'
- Modulator 1:
 - Sequence 1: Disable POC
 - Sequence 2: Disable POC
- Modulator 2:
 - Sequence 1: Disable POC
 - Sequence 2: Disable POC

- After pressing the “Start Calibration” button, the calibration process starts and the progress is displayed in the status bar. Depending on the settings used, the calibration can only take a few seconds. The result of the calibration is a table of 15 values that are used to reconstruct the AAOC sample value in the software.

AS7056/57 AAOC

How to do the AAOC calibration

Advanced AOC Configuration

Configuration for Calibration

Modulator: MOD1

Modulator Full Scale Range: 8 uA

Offset DAC Full Scale Range: 32 uA

Number of Subsamples: 50

ADC Sample Rate: 1000 Hz

Calibration

Start Calibration Stop Calibration

100%

Calibration Table DAC: 135330, 270125, 403677, 535653, 668810, 802560, 935441, 1063426, 1196241, 1329806, 1462484, 1593800, 1726637, 1860025, 1992601

AAOC Configuration

Advanced AOC:

Save Calibration Tables Load Calibration Tables

Modulator 1

Sequence 1: 135330, 270125, 403677, 535653, 668810, 802560, 935441, 1063426, 1196241, 1329806, 1462484, 1593800, 1726637, 18 Disable POC

Sequence 2: Disable POC

Modulator 2

Sequence 1: Disable POC

Sequence 2: Disable POC

OK Cancel

- Right-clicking in the calibration table opens the copy dialog and the calibration table for DAC can be copied into the Modulator 1 Sequence 1 text field.
- To enable AAOC signal reconstruction, the “Advanced AOC” checkbox must be checked.
- In addition, the table could be saved and loaded.

AS7056/57 Plotting

Select Plot Area

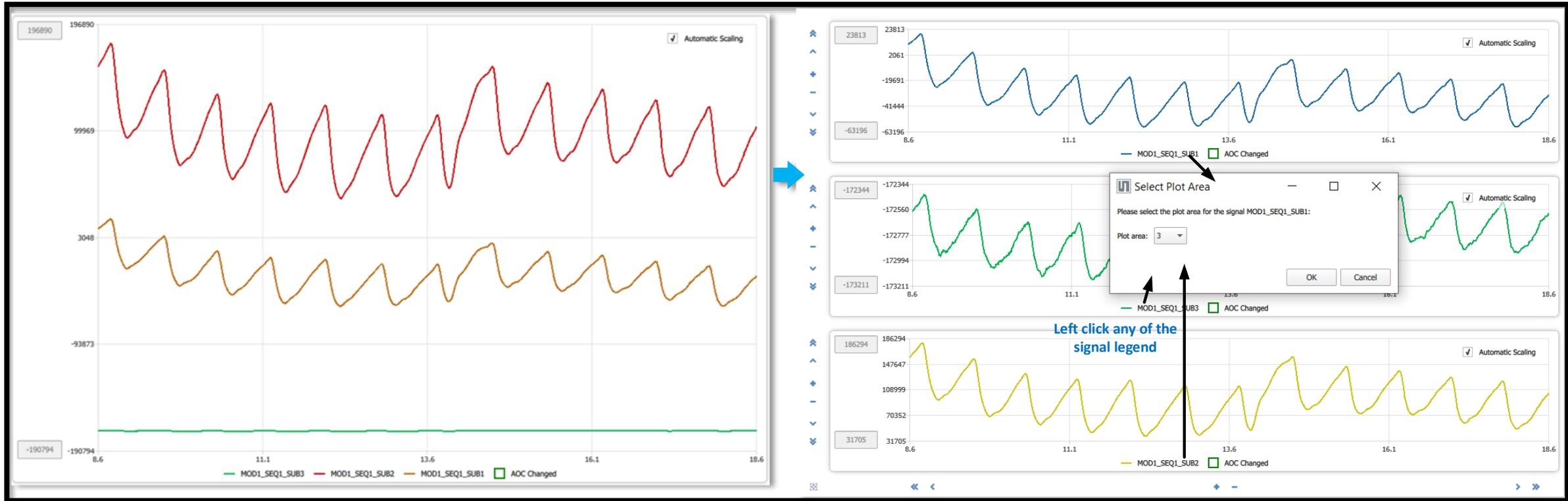


Fig. 20: Plotting

- When “Automatic Scaling” is enabled, the minimum and maximum of the y-axis are set automatically.
- The display area can plot a maximum of three plots. By default, the plot area displays all the signals into one plot.
- Left-clicking on the channel name in the legend opens a dialog window to display the signal in a different plot area. The plot area includes automatic scaling, manual scaling, and zooming functions.

AS7056/57 Register Map

Register Map Configuration

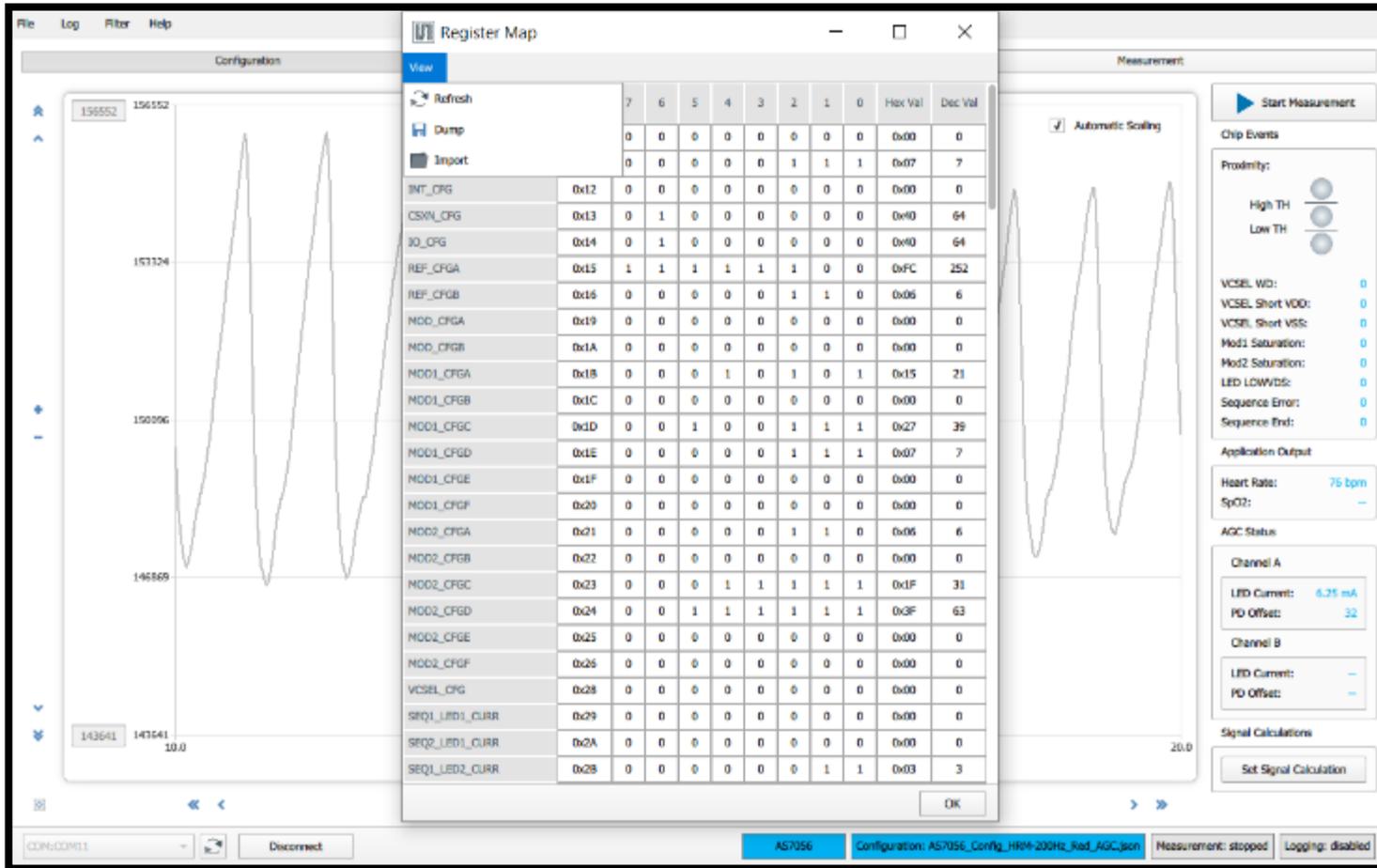


Fig. 21: Register Map

- To check the current register Map, click on the tab File → Register Map (Fig. 21)
- In the Register Map window,
 - The register values can be updated.
 - New register values can be entered.
 - New register values can be saved with a name. Choose the file location, and then click save.

AS7056/57 PC Software

Saving and Loading Configuration

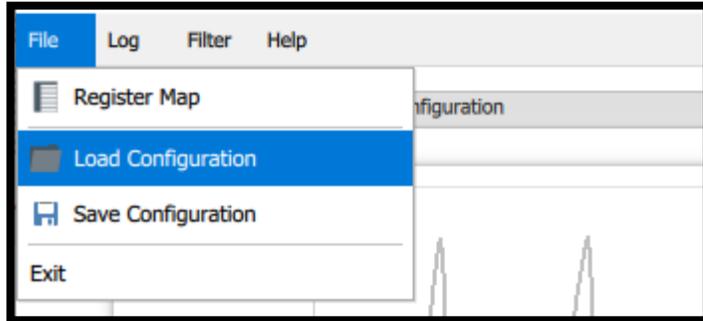


Fig. 22: Loading a Configuration File

- To load a configuration (.json file), click on the tab File → Load Configuration (Fig. 22). This will open the Select Configuration File dialog box. Select the '.json' configuration file you want to load, and click Open.

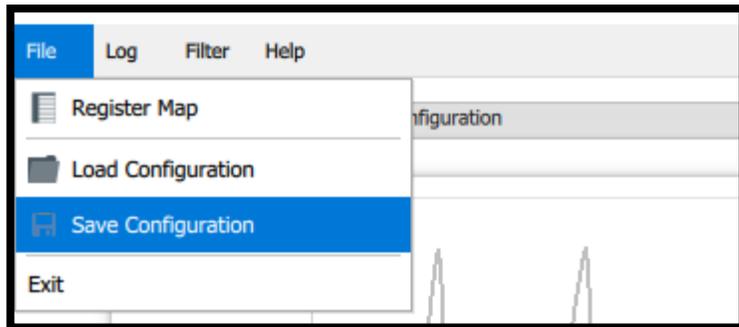


Fig. 23: Saving a Configuration File

- To save the current configuration settings, click on the tab File → Save Configuration (Fig. 23). This will open the Save Configuration File dialog box. Enter a file name, choose the file location, and save it as a '.json file'. Click Save to save the file.

AS7056/57 PC Software

Raw data logging and exporting

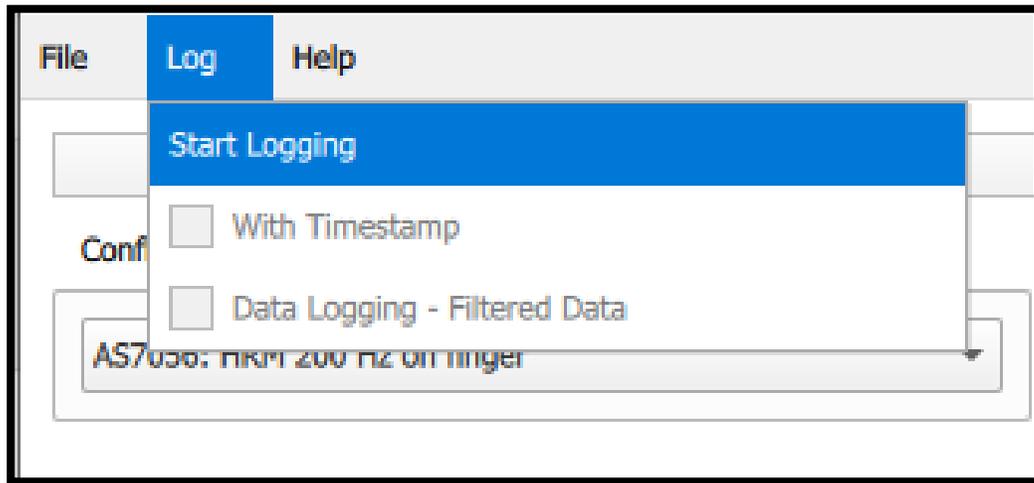


Fig. 24: Logging of raw data

- To save the measurement data select 'Start Logging' under 'Log' tab. The GUI prompts the user to select a file name and the data is saved in .csv format. Optionally the logging with timestamp can be selected. This enables the saving to subsequent measurements results automatically with file names that has timestamp in it.
- If SW post processing is enabled under Application settings, the filtered data can also be saved by checking the 'Data Logging – Filtered Data' checkbox.

AS7056/57 Firmware upgrade

Optional FW upgrade over USB

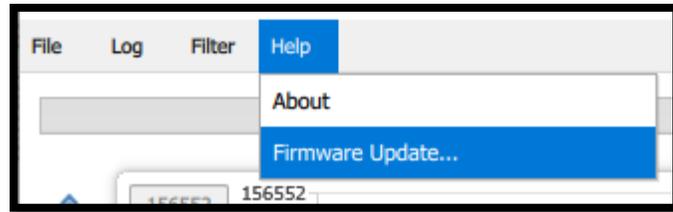


Fig. 25: Update Firmware via the GUI

1. Obtain the latest “*.dfu” firmware file from ams OSRAM.
2. Click on the tab **Help** → **Firmware Update...** to navigate to the “*.dfu” file (latest firmware file).
3. During the update process, the green LED on the Bluetooth module will turn to red.
4. After a successful update, the red LED will turn green again (Fig. 26).

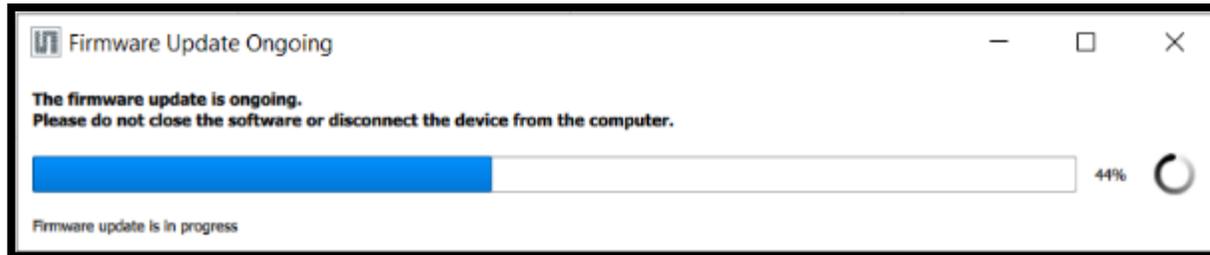


Fig. 26: Firmware update in progress

- Note: The latest firmware is available for download (please contact the ams OSRAM support team (support_aws@ams-osram.com) for the download link)

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