Sensing is life

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AS7050 Evaluation Kit

Quick Start Guide

07/03/2022

AS7050 Evaluation Kit Quick Start Guide

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Contents of the AS7050 Evaluation kit

AS7050 Evaluation kit parts

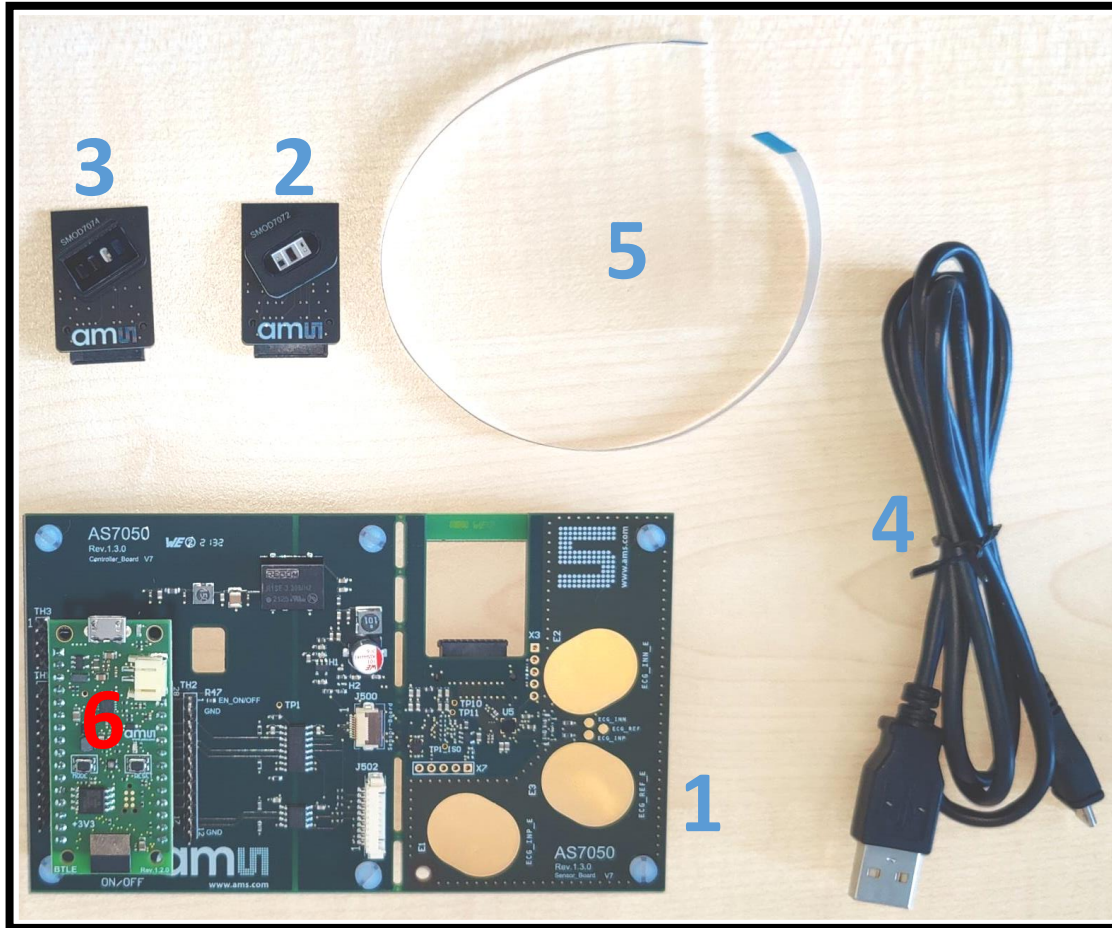*Fig. 1: AS7050 Evaluation Kit out of the box*

Out of the Box
- **1** – AS7050 EVK Mainboard
- **2** – SMOD board SFH7072 with Optical stack
- **3** – SMOD board SFH7074 with Optical stack
- **4** – Micro USB cable
- **5** – FPC Cable
- **6** – Generic Bluetooth Board

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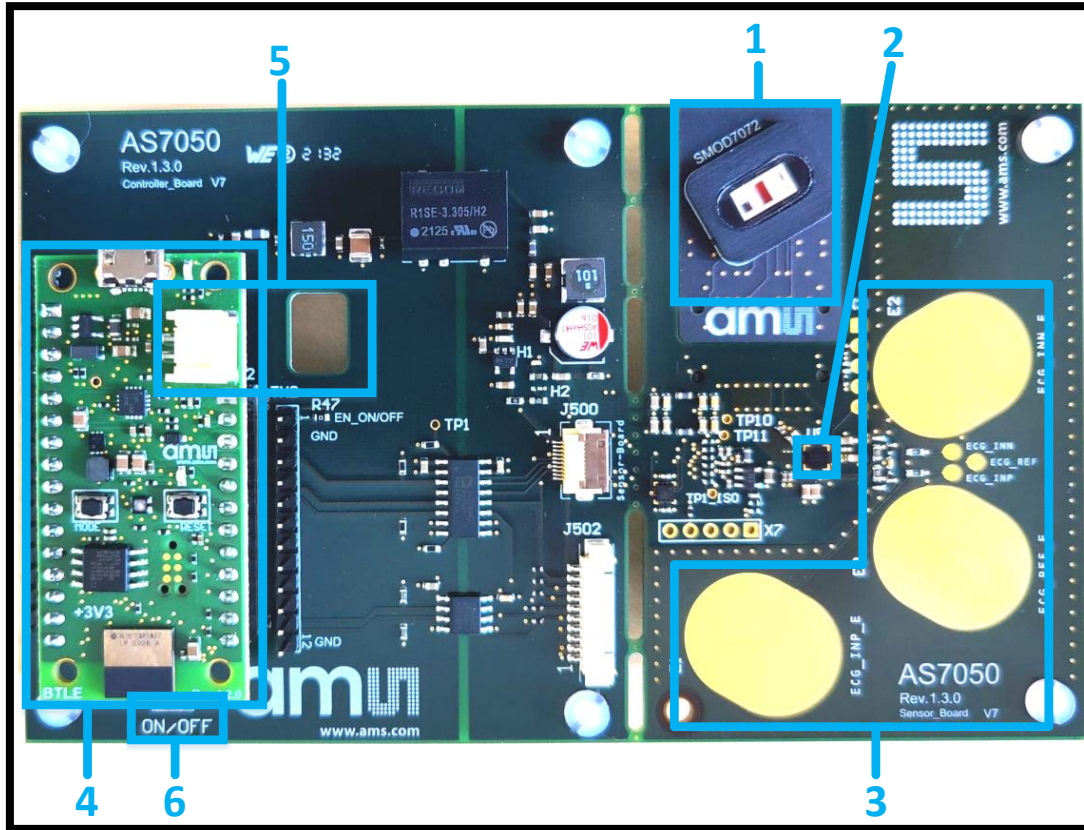# Contents of the AS7050 Evaluation kit

Evaluation kits main parts

Fig. 2: AS7050 Evaluation Kit top view

- **Key**

- **1** - OSRAM SFH 7072 LED/PD module
- **2** - AS7050 Sensor
- **3** - Three ECG Electrodes
- **4** - Bluetooth Microcontroller module and USB connector
- **5** - Battery Connection
- **6** – sensor board on/off switch

- **Note:**

1. It is recommended to unplug the battery connection when the EVK is turned off.
2. For independent functions, use the battery e.g. Bluetooth connection

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AS7050 PC Software

Installation

- To install, start the installer executable and follow the instructions as shown in *Fig. 3* below (from left to right).
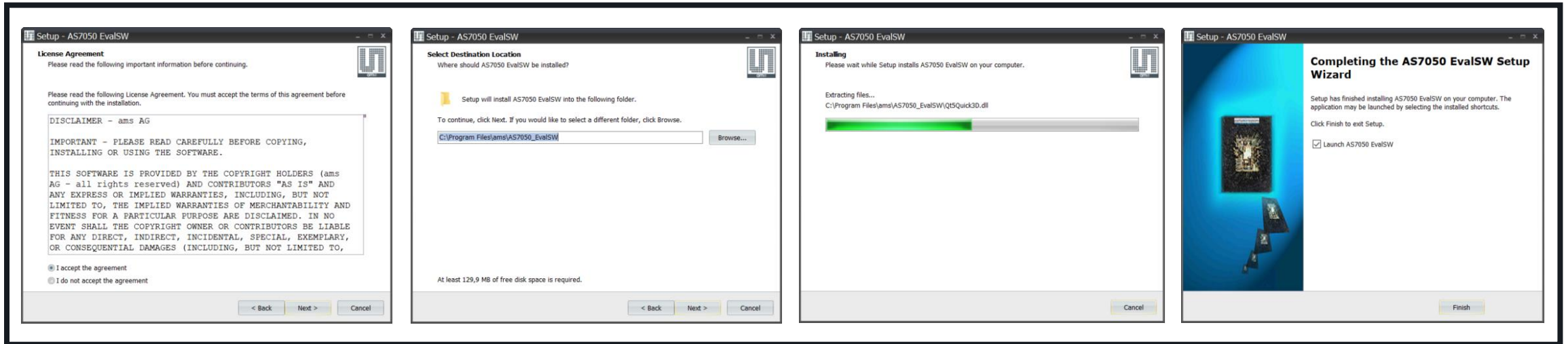

Fig. 3: AS7050 Software Installation steps

- **Note:** The EVK software is available for download here.

Setup

Getting Started

Sensor Board On/Off Button (S1)
ON: Press the button for 1 Sec
OFF: Press the button for 3 sec

Connector for External Electrodes
(Molex PicoBlade 53261-0471)

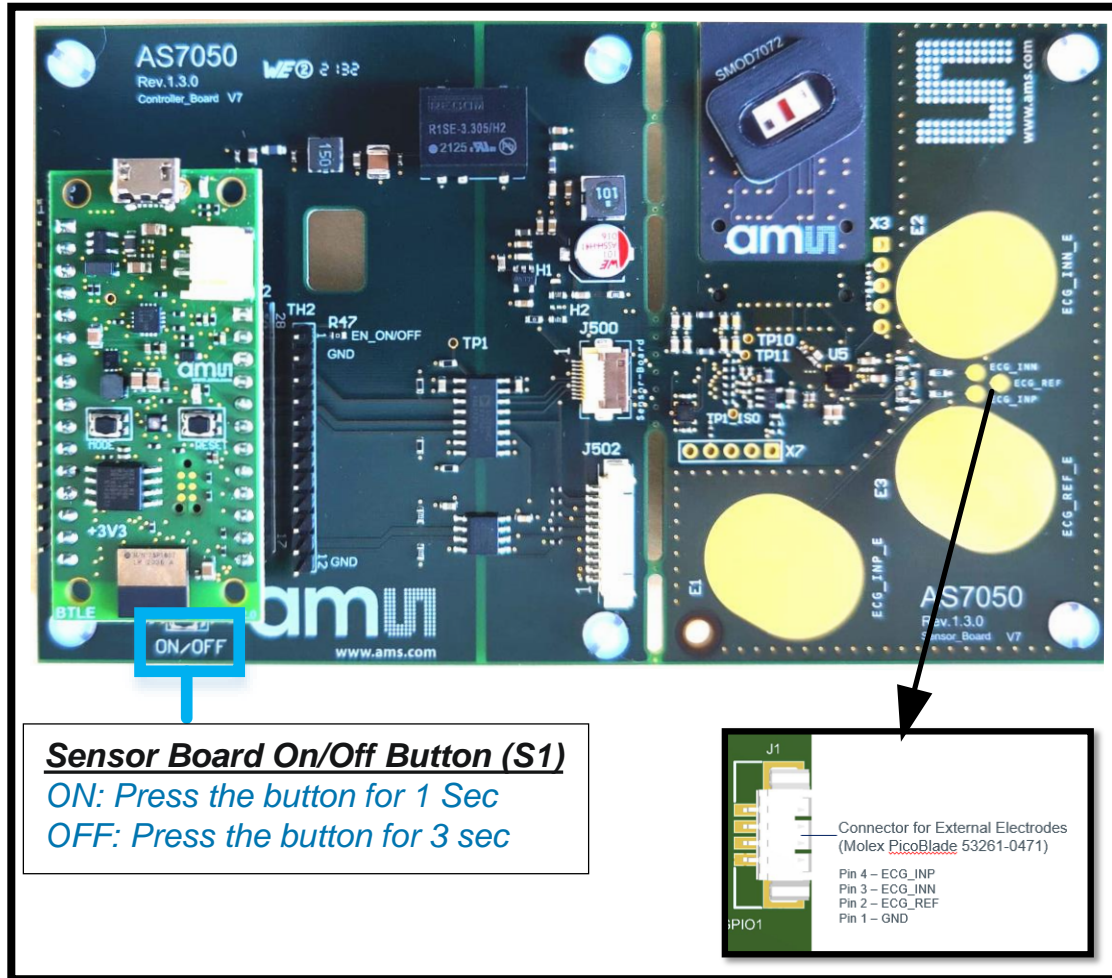Pin 4 – ECG_INP
Pin 3 – ECG_INN
Pin 2 – ECG_REF
Pin 1 – GND

Fig. 4: AS7050 Evaluation Kit power ON

1. Optionally, connect electrodes to the connector on the back of the external electrodes.
2. Connect the micro USB cable to the board and plug it into your computer.
3. Afterwards, press the S1 button for one second to turn on the sensor board.
4. The green LED on the Bluetooth Microcontroller module and the USB connector board will light up as soon as the board is powered.
5. The yellow LEDs, H1 and H2, on the mainboard will also light up as soon as the board is powered.
6. Afterward, start the EVK GUI software.

AS7050 PC Software

Overview of GUI

Fig. 5: Overview of SW GUI
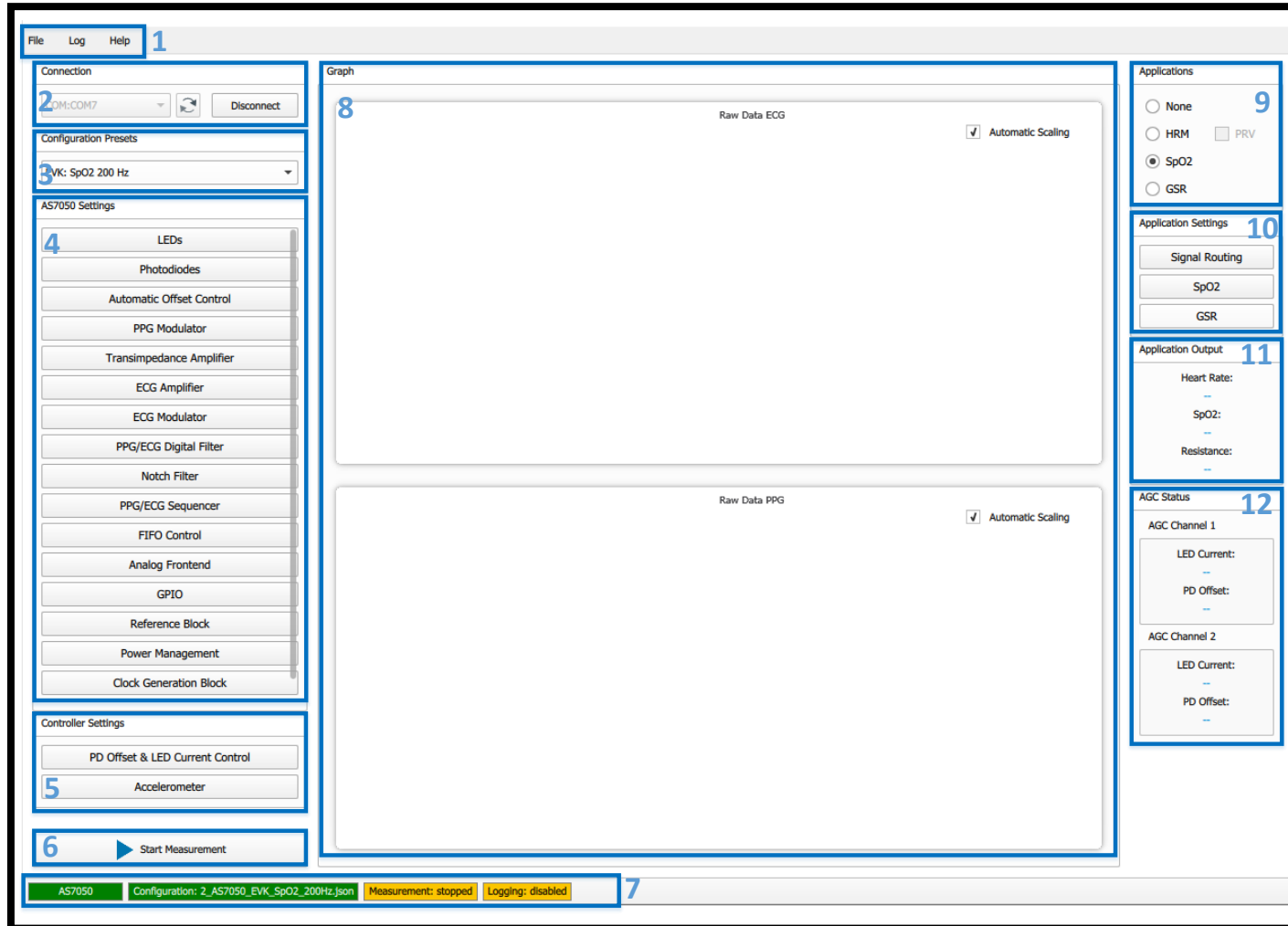
Key

1 - Main menu

2 - Connection window

3 - Configuration Presets

4 - Settings window

5 - PD&LED(AGC) configuration

6 - Start Measurements

7 - Status window

8 - Raw data of PPG/ECG signal

9 – Measurement Type

10 – Application settings

11 – Application outputs

12 – AGC status

AS7050 EVK

Finger Positioning on the Optical Stack & ECG Electrodes

Put Fingers on the respective positions
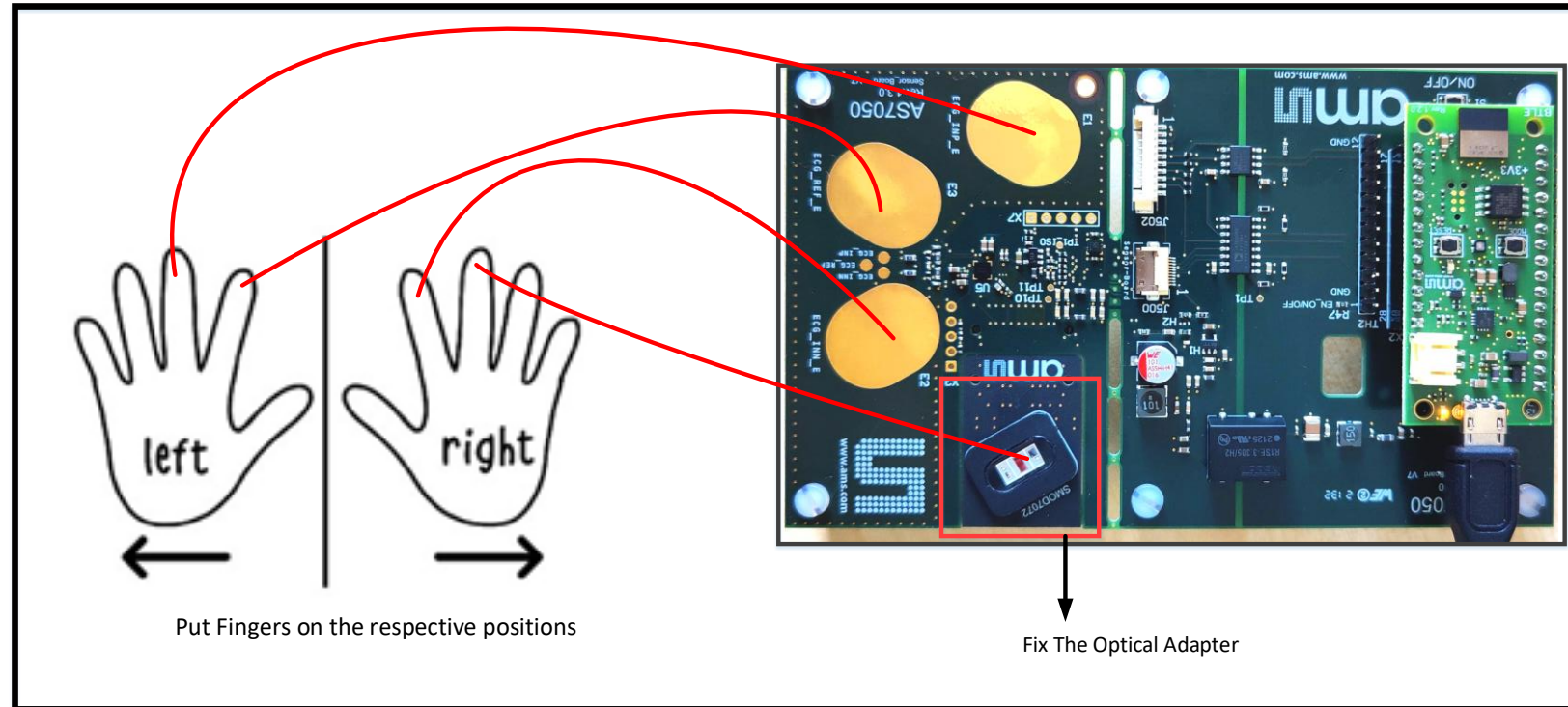
Fix The Optical Adapter

Fig. 6: Finger positioning for PPG & ECG on the AS7050

Measurement Conditions ➡

- ✓ Place the EVK 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 & ECG Electrodes – no need to squeeze or press down too firmly.
- ✓ Abrupt movement/vibration during measurement should be avoided.

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AS7050 SW Preset Configuration Files

Features of Configuration files for EVK

No.	Name of Configuration File	Features
1	ECG 200 Hz, Gain 256	This is an optimized configuration preset for measuring ECG. Sampling Frequency: 200 Hz Total ECG gain: 4*64*1 = 256 High pass filter cutoff frequency (fc) = 0.33 Hz Low Pass filter: Bypassed
2	HRM 20 Hz	In this configuration, the software-based AGC algorithm controls the PD-offset values and LED current to get an optimum PPG signal on the finger. The HRM algorithm, that estimates the heart rate, is activated and the values are displayed in the GUI.
3	SpO2 200 Hz	Configuration for SpO2 measurements on the finger. The PPG sample rate is 200 Hz. Note: This SpO2 configuration is uncalibrated.
4	ECG 200 Hz, 1x PPG 100 Hz, AOC	In this configuration, the two measurement channels, i.e. the ECG channel and the PPG channel, are active at the same time. It allows the user to acquire the PPG and the ECG signals simultaneously. Automatic offset control (AOC) is activated in the PPG channel to keep the ADC values in the defined range.
5	PPG 200 Hz, ECG ADC, AGC	This is a configuration for acquiring the PPG signal using the ECG channel by choosing TIA as the source of the ECG signal. The AGC algorithm is activated to keep the ADC values in the defined range.
6	6x PPG 0-IR-0-R-0-G 100 Hz, AOC	This is a configuration for acquiring six PPG sub-samples. Broadband PD is used as the detector in all the measurements. As is apparent from the naming, in the odd-numbered sample (PPG1, PPG3, and PPG5), the LEDs are switched OFF. For the even-numbered sub-samples (PPG2, PPG4, and PPG6), the IR, Red, and Green LEDs are switched ON, respectively. The automatic offset control (AOC) is activated for each sub-sample to keep the ADC values in the defined range.
7	GSR Measurement	This is a test configuration for measuring the external resistance using the analog frontend.

Fig. 7: Features of the configuration files

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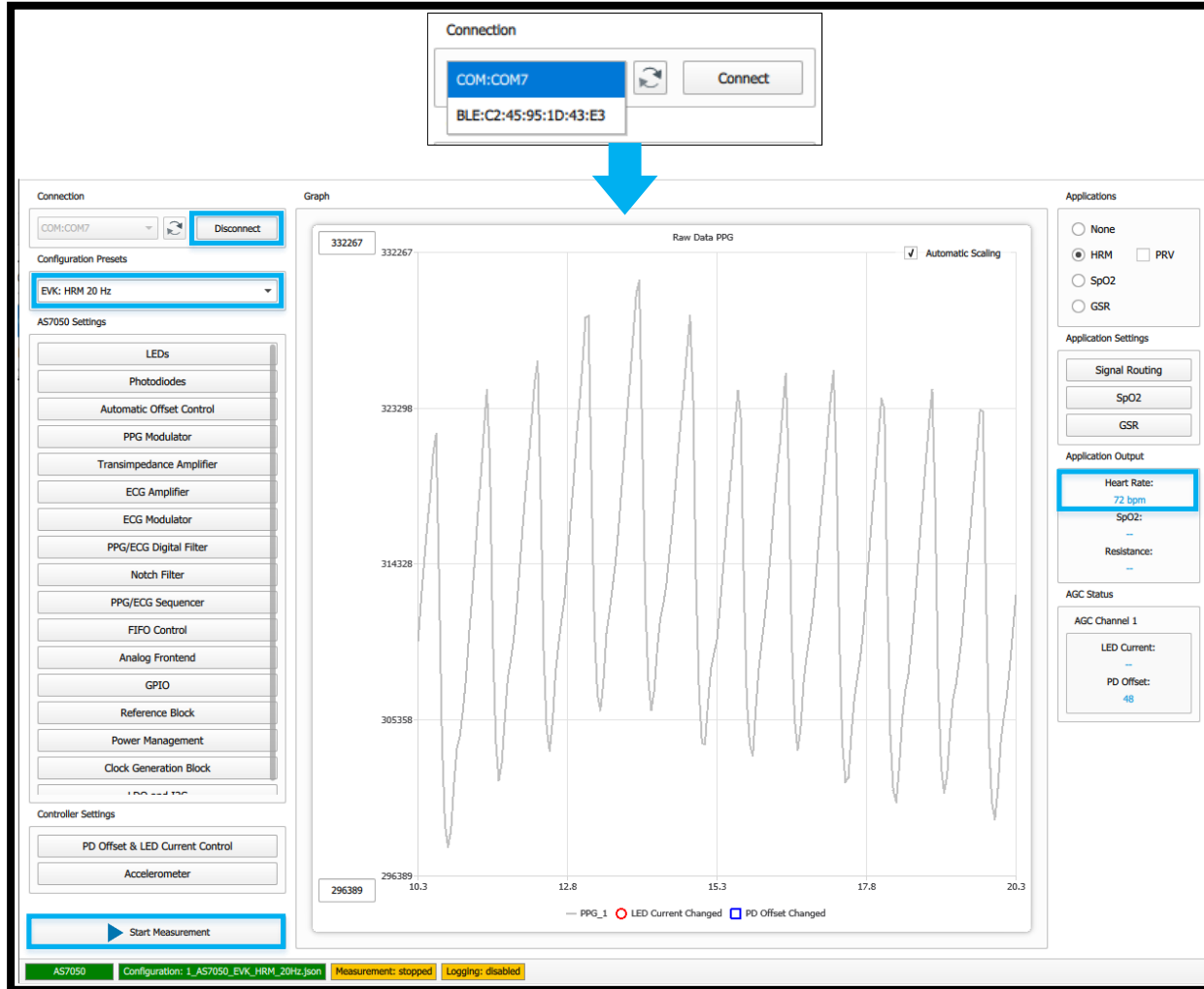
Starting a HRM measurement

Fig. 8: Overview of the GUI (HRM measurement)

1. Firstly, press the sensor button "S1" for 1 second to power on the sensor.

2. Afterward, select the correct COM port number or BLE MAC address from the drop-down menu.

3. Then, click the Connect button.

4. When it is successfully connected, button on the left-hand side of the status bar (AS7050) will change color to green (COM connection) and blue (BLE connection).

5. The green LED on the Bluetooth module will start blinking as soon as the board connects with the GUI. In the case of a BLE connection, the LED will blink blue instead.

6. After connecting, select the correct configuration file from the configuration presets provided (EVK: HRM 20 Hz using PPG signal) in the configuration tab.

7. Then, click the Start Measurement button.

8. Finally, place a finger on the SFH7072 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.

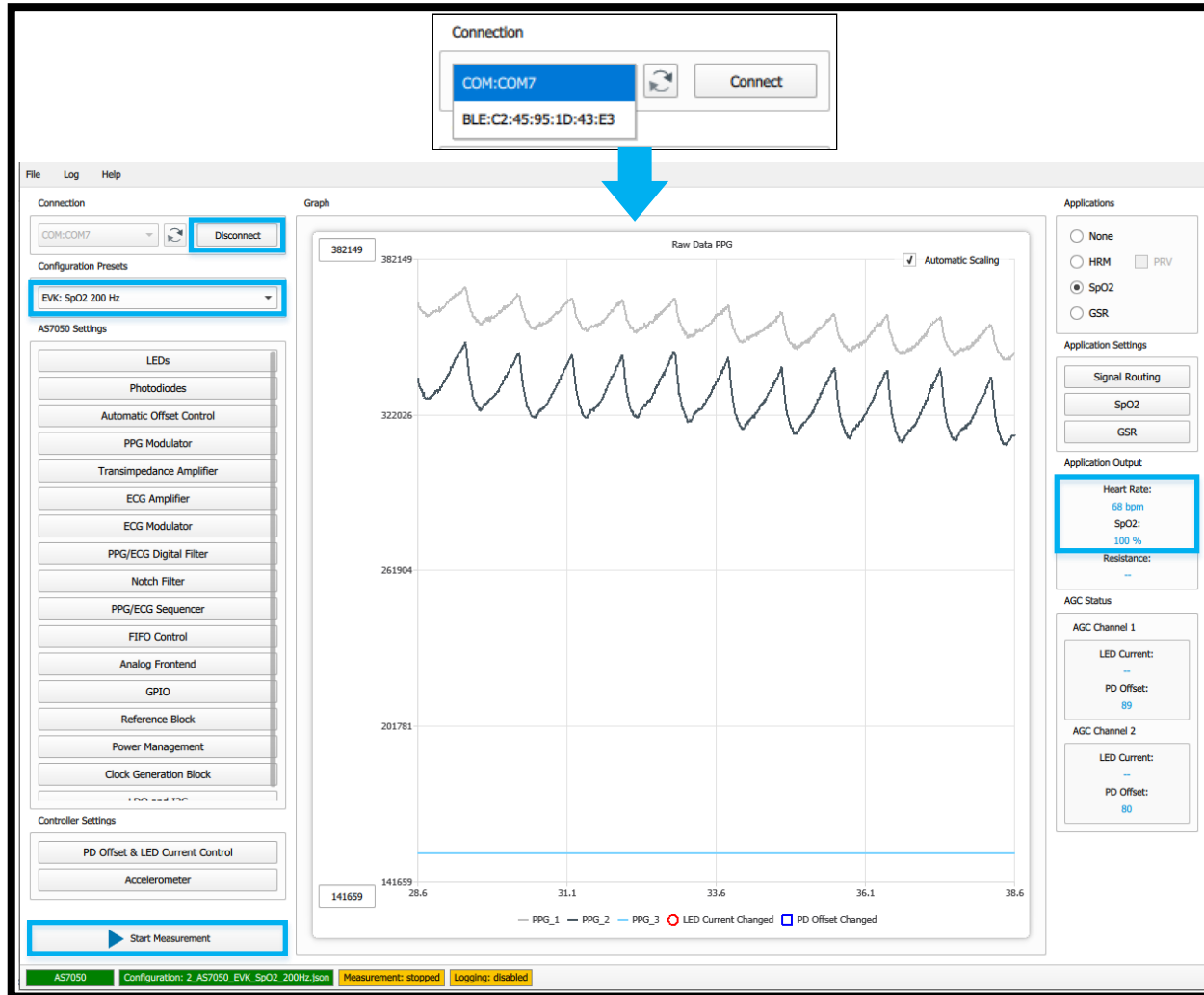# AS7050 PC Software

Starting a SpO2 measurement

Fig. 9: Overview of the GUI (SpO2 measurement)

1. Firstly, press the sensor button "S1" for 1 second to power on the sensor.

2. Afterward, select the correct COM port number or BLE MAC address from the drop-down menu.

3. Then, click the Connect button.

4. When it is successfully connected, the button on the left-hand side of the status bar (AS7050) will change color to green (COM connection) and blue (BLE connection).

5. The green LED on the Bluetooth module will start blinking as soon as the board connects with the GUI. In the case of a BLE connection, the LED will blink blue instead.

6. After connecting, select the correct configuration file from the configuration presets provided (EVK: SpO2 200 Hz using PPG signal) in the configuration tab.

7. Then, click the Start Measurement button.

8. Finally, place a finger on the SFH7072 LED/PD module, and subsequently, you will see the PPG raw data plot in the Graph window and the heart rate & SpO2 percentage in the application output window.

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Starting a ECG Raw Data measurement
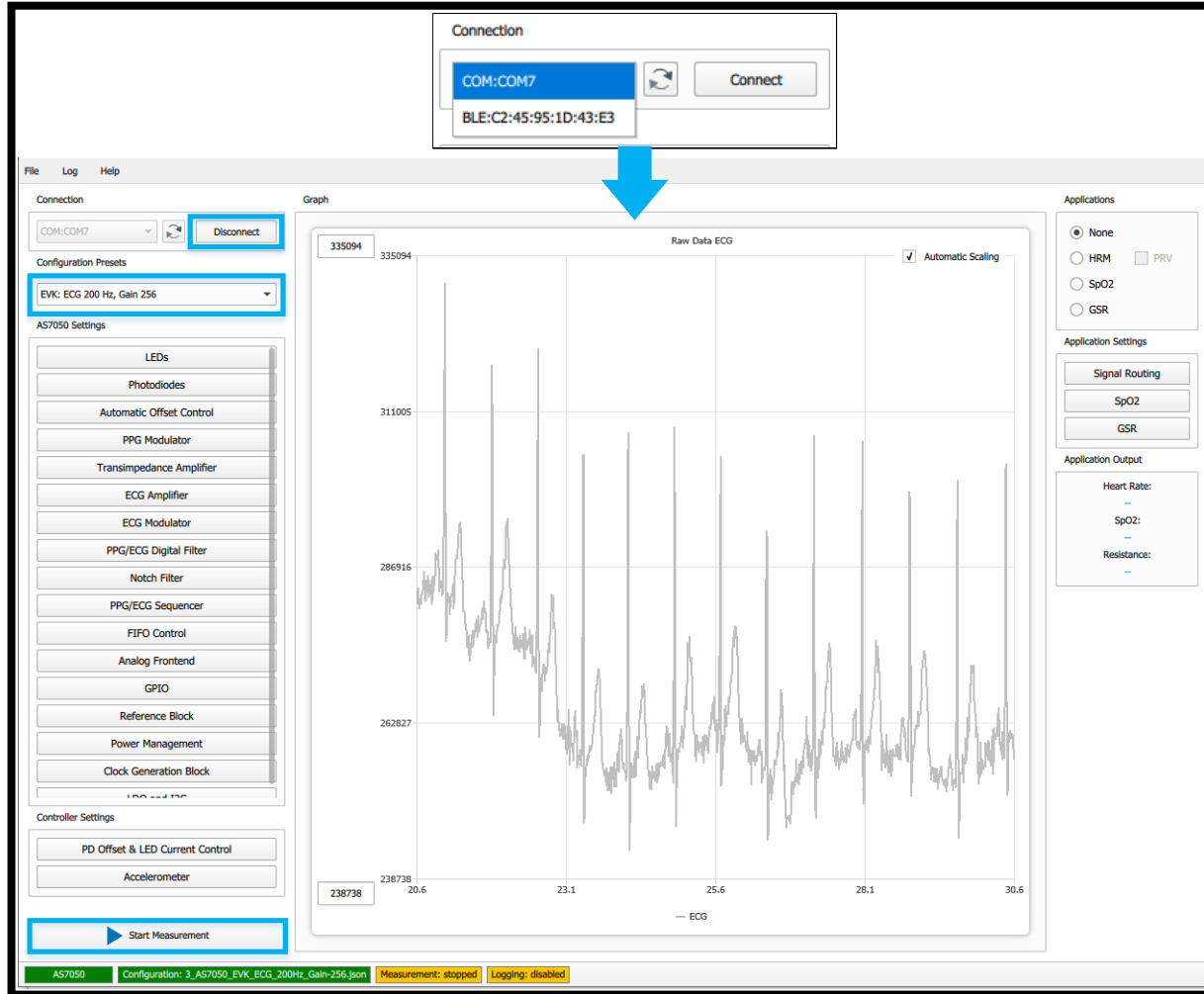
Fig. 10: Overview of the GUI (EVK measurement)
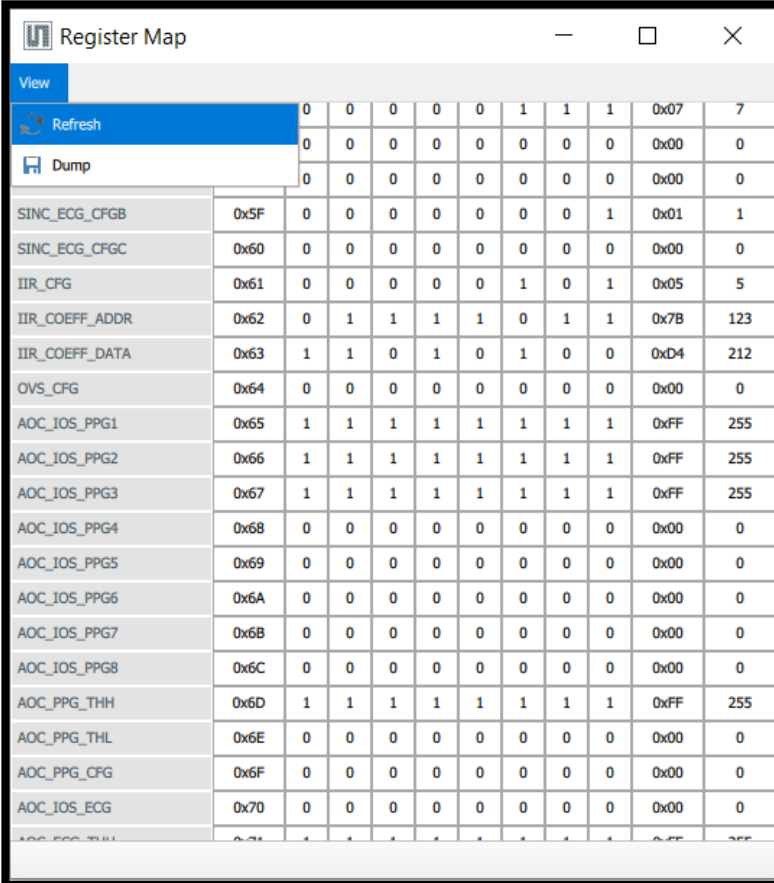
1. Firstly, press the sensor button "S1" for 1 second to power on the sensor.

2. Afterward, select the correct COM port number or BLE MAC address from the drop-down menu.

3. Then, click the Connect button.

4. When it is successfully connected, the button on the left-hand side of the status bar (AS7050) will change color to green (COM connection) and blue (BLE connection).

5. The green LED on the Bluetooth module will start blinking as soon as the board connects with the GUI. In the case of a BLE connection, the LED will blink blue instead.

6. After connecting, select the correct configuration file from the configuration presets provided (EVK: ECG 200 Hz, Gain 256 using Electrodes) in the configuration tab.

7. Then, click the Start Measurement button.

8. Finally, place three fingers on the ECG electrodes, and subsequently, you will see the ECG raw data plot in the Graph window.

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Starting a HRM & ECG raw data measurement

Fig. 11: Overview of the GUI (EVK measurement with PPG)

1. Firstly, press the sensor button "S1" for 1 second to power on the sensor.

2. Afterward, select the correct COM port number or BLE number from the drop-down menu.

3. Then, click the Connect button.

4. When it is successfully connected, the button on the left-hand side of the status bar (AS7050) will change color to green (COM connection) and blue (BLE connection).

5. The green LED on the Bluetooth module will start to blink as soon as the board connects with the GUI. In the case of a BLE connection, the LED will blink blue instead.

6. After connecting, select the correct configuration file from the configuration presets provided (EVK: ECG 200 Hz, 1x PPG 100 Hz, AOC using PPG signal & ECG electrodes) in the configuration tab.

7. Then, click the Start Measurement button.

8. Finally, place three fingers on the ECG electrodes & a finger on the SFH7072 LED/PD module, and subsequently, you will see the ECG & PPG raw data plot in the Graph window and the heart rate in the application output window.

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AS7050 Register Map

Register Map Configuration

Fig. 12: Register Map

- To check the current register Map, click on the tab File → Register Map

- 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.

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Saving and Loading Configuration

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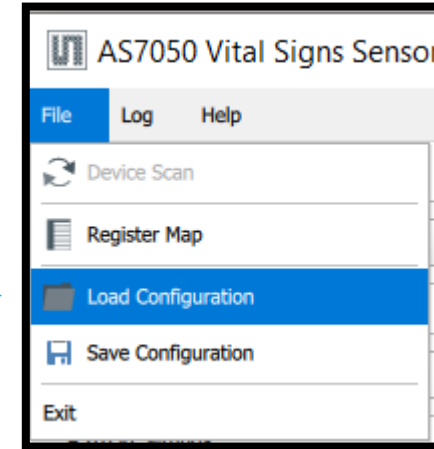

Fig. 13: Loading a Configuration File

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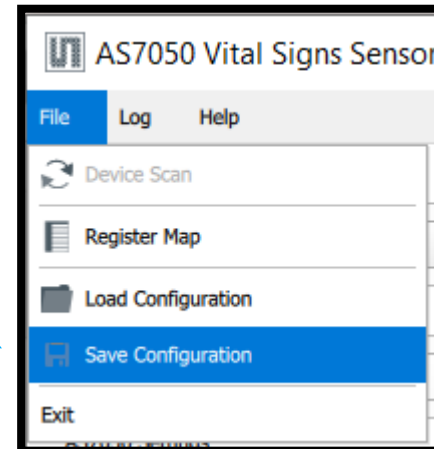

Fig. 14: Saving a Configuration File

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Raw data logging and exporting

- To save the measurement data, select Start Logging under the Log tab. The GUI prompts the user to select a file name and the data is saved in CSV format. Optionally, the logging with a timestamp can be selected. This enables automatic saving to subsequent measurement results with file names that have a timestamp.
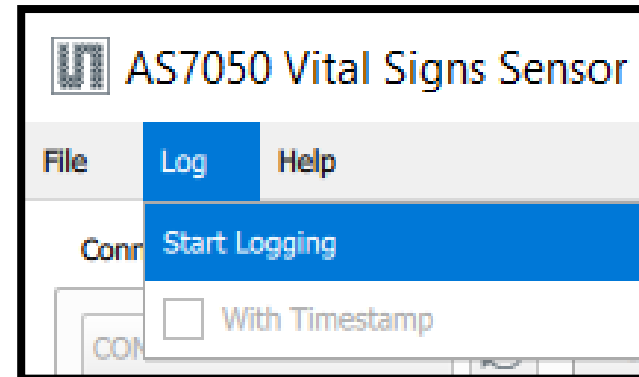

Fig. 15: Logging of raw data

AS7050 Firmware upgrade

Optional FW upgrade over USB

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 red.

4. After a successful update, the red LED will turn green again.

Note: If the firmware update fails, wait 10 seconds and restart the board by pressing the S1 button.
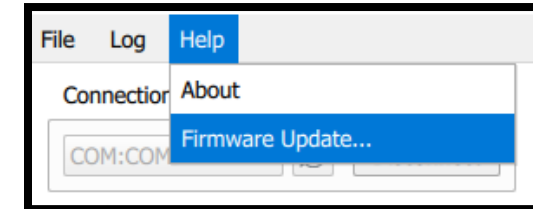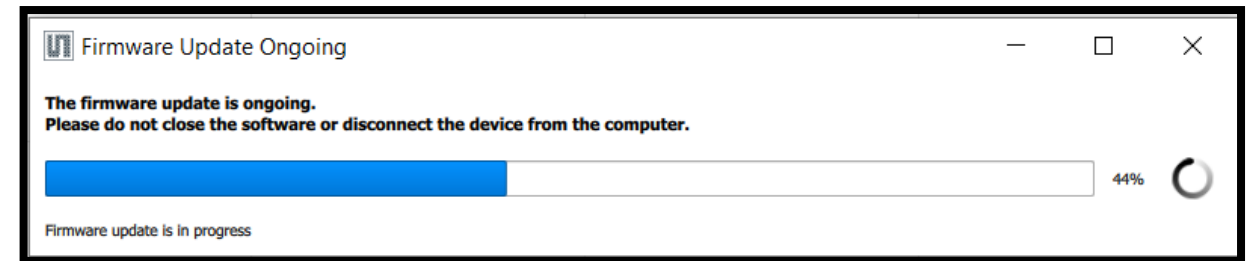

Fig. 16: Update Firmware via the GUI

Fig. 17: 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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