

Product Document

AS7050 Evaluation Kit

Quick Start Guide

07/03/2022

AS7050 Evaluation Kit Quick Start Guide

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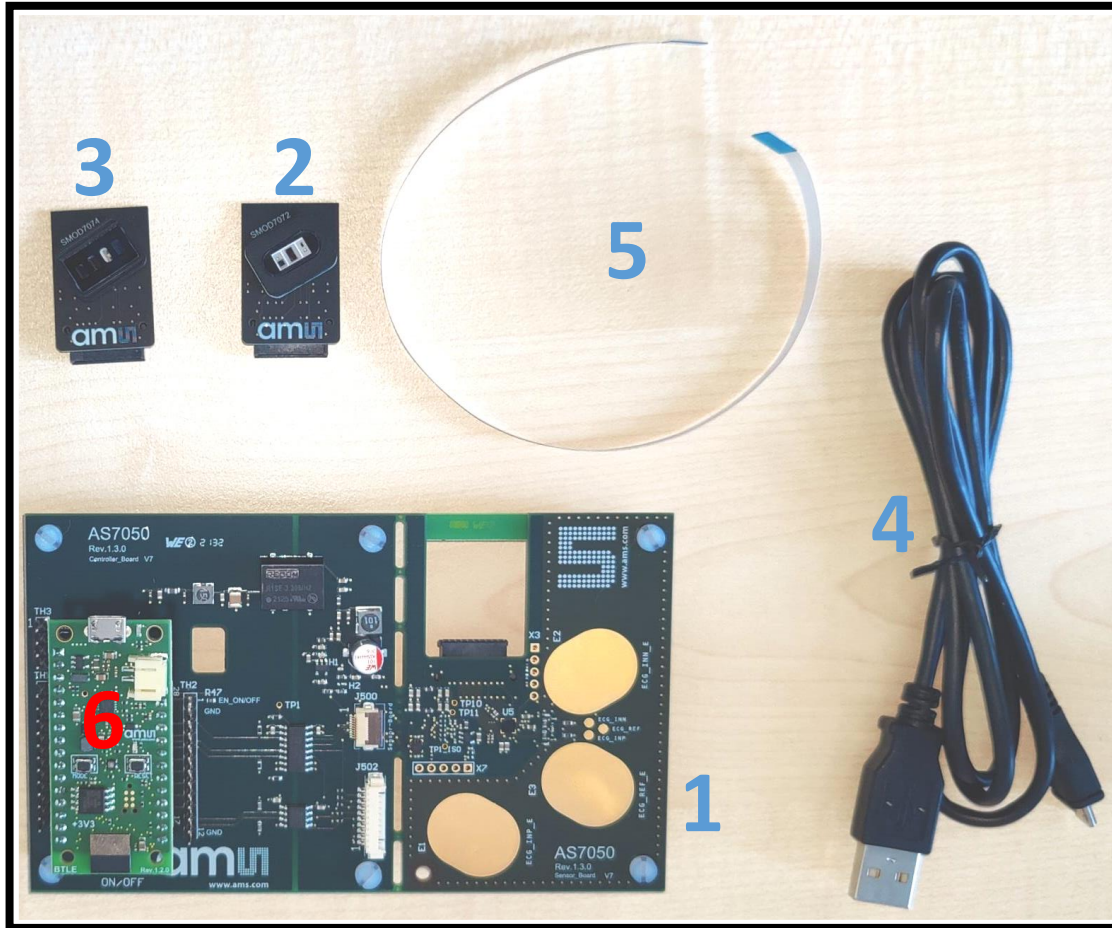
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Contents of the AS7050 Evaluation kit

AS7050 Evaluation kit parts



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

Fig. 1: AS7050 Evaluation Kit out of the box

Contents of the AS7050 Evaluation kit

Evaluation kits main parts

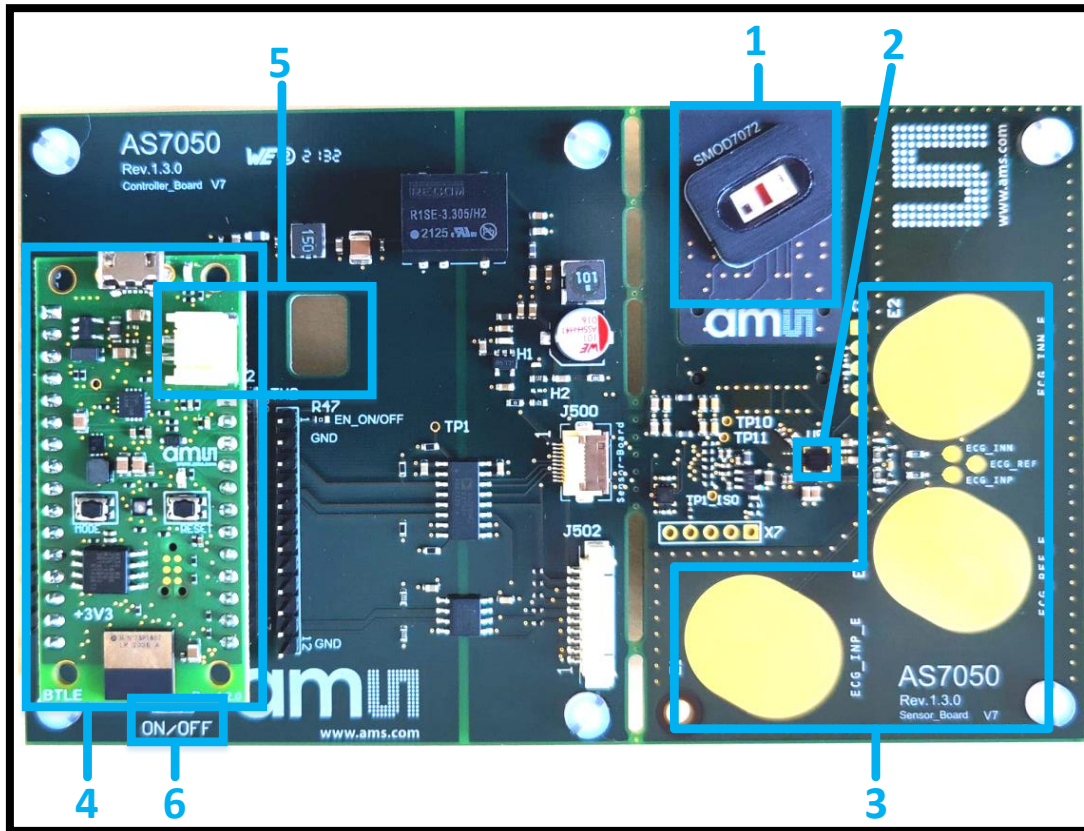


Fig. 2: AS7050 Evaluation Kit top view

• 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

AS7050 PC Software

Installation

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

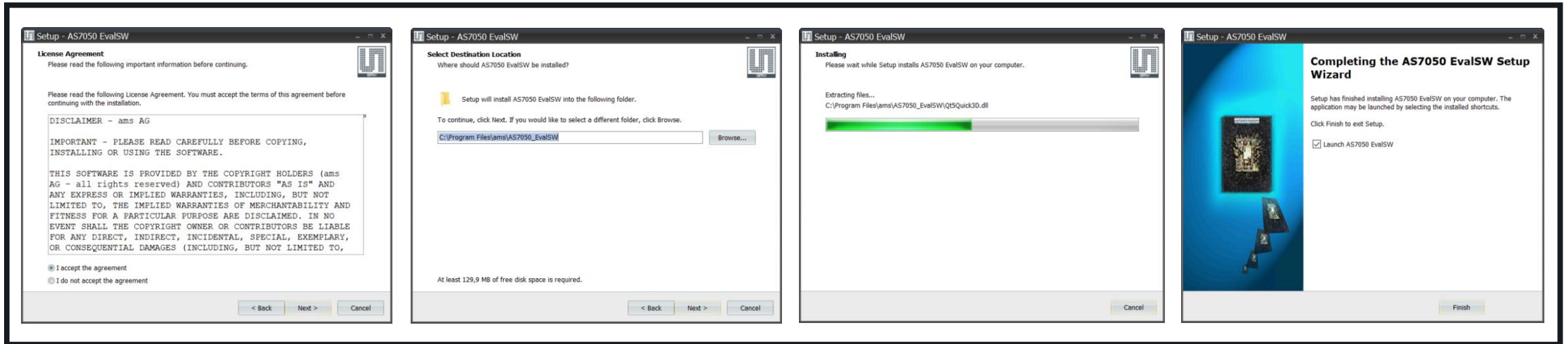
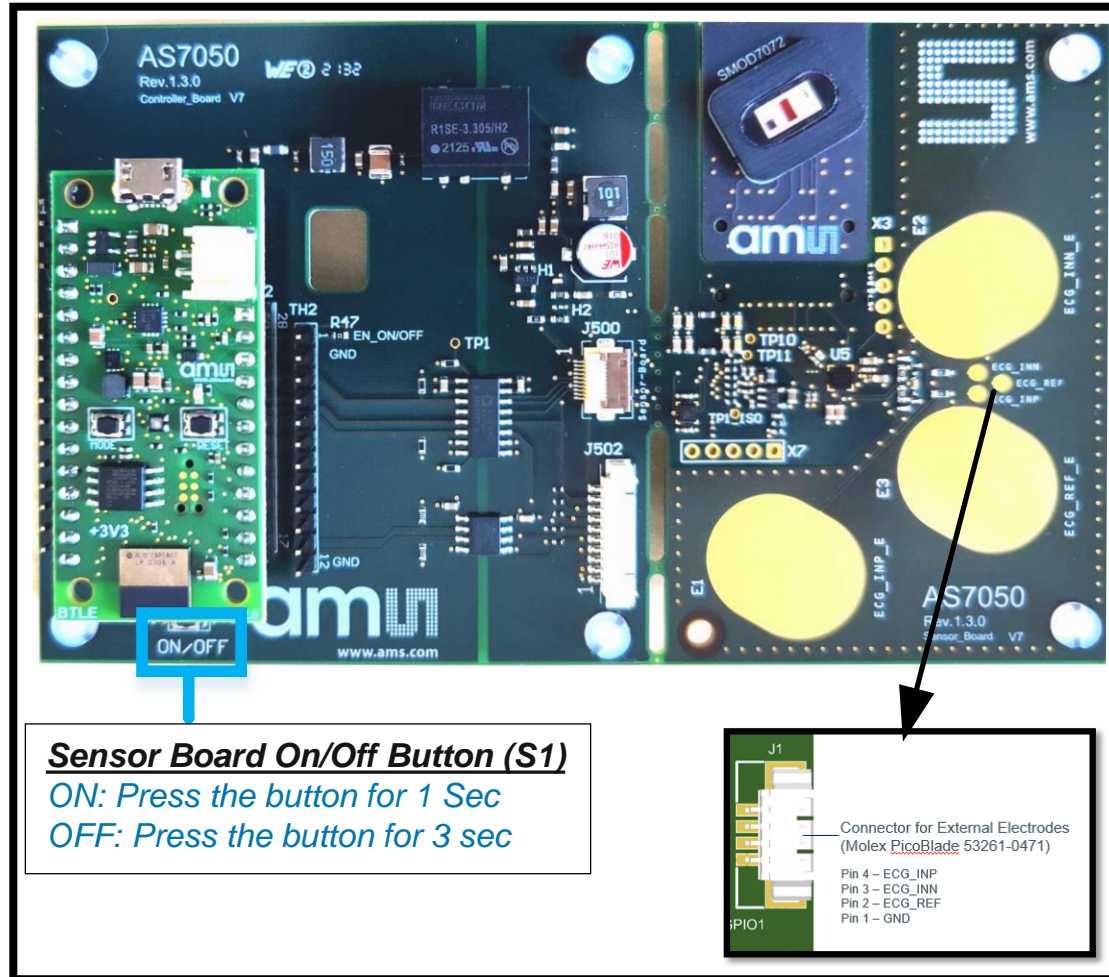


Fig. 3: AS7050 Software Installation steps

- Note:** The EVK software is available for download [here](#).

Setup

Getting Started

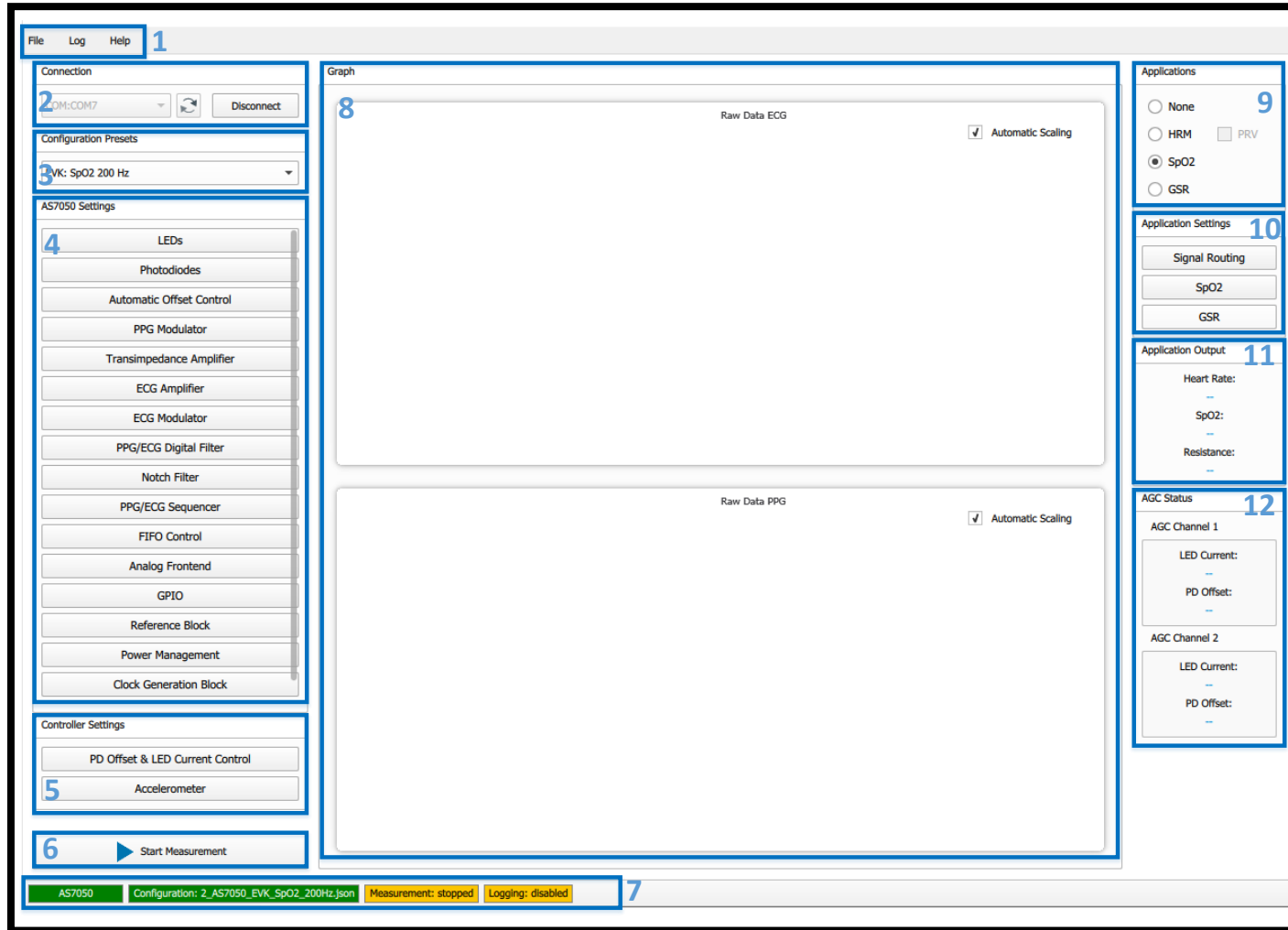


1. Optionally, connect electrodes to the connector on the back of the external electrodes.
2. Connect the micro USB cable to the board and plug it into your computer.
3. Afterwards, press the S1 button for one second to turn on the sensor board.
4. The green LED on the Bluetooth Microcontroller module 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.

Fig. 4: AS7050 Evaluation Kit power ON

AS7050 PC Software

Overview of 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

Fig. 5: Overview of SW GUI

AS7050 EVK

Finger Positioning on the Optical Stack & ECG Electrodes

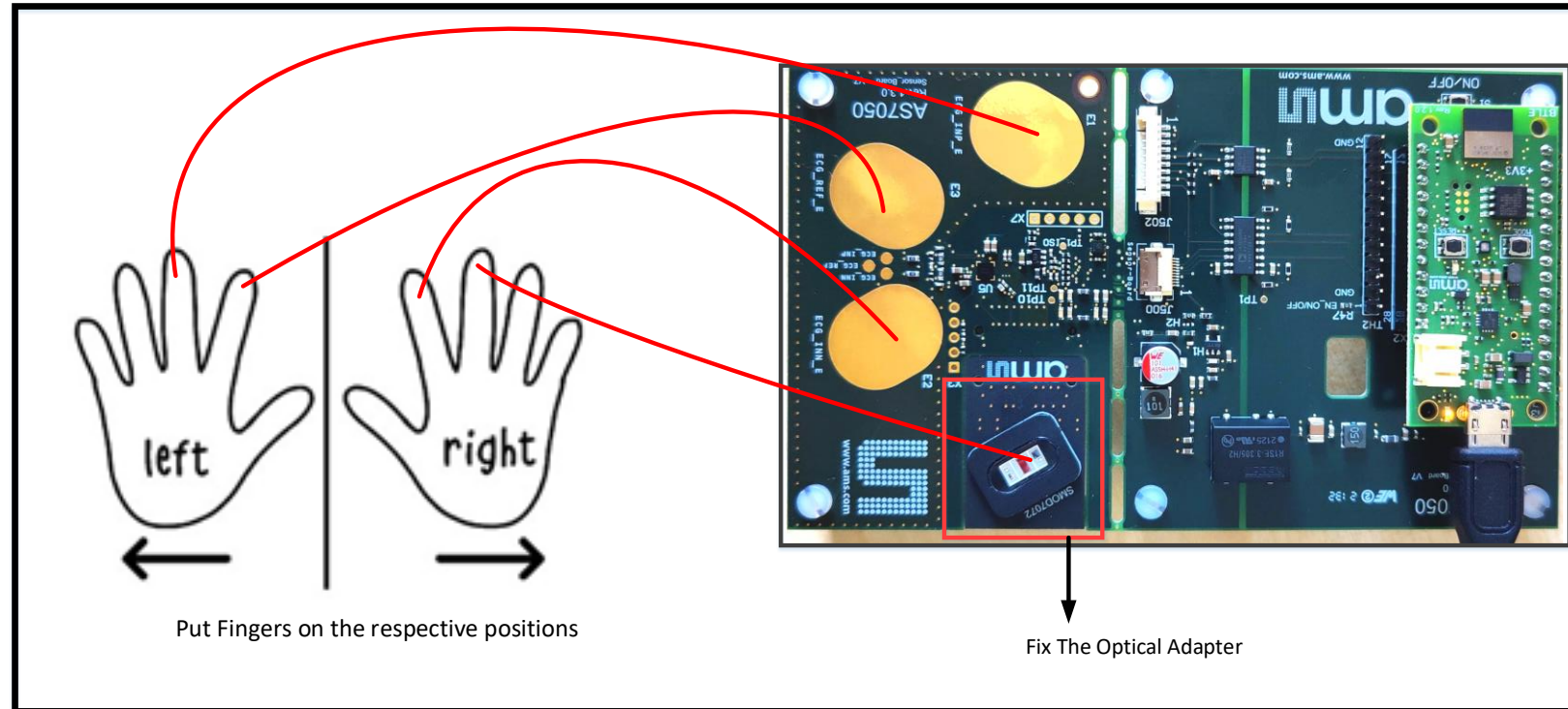


Fig. 6: Finger positioning for PPG & ECG on the AS7050

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.

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: $4 \times 64 \times 1 = 256$ High pass filter cutoff frequency (f_c) = 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

AS7050 PC Software

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

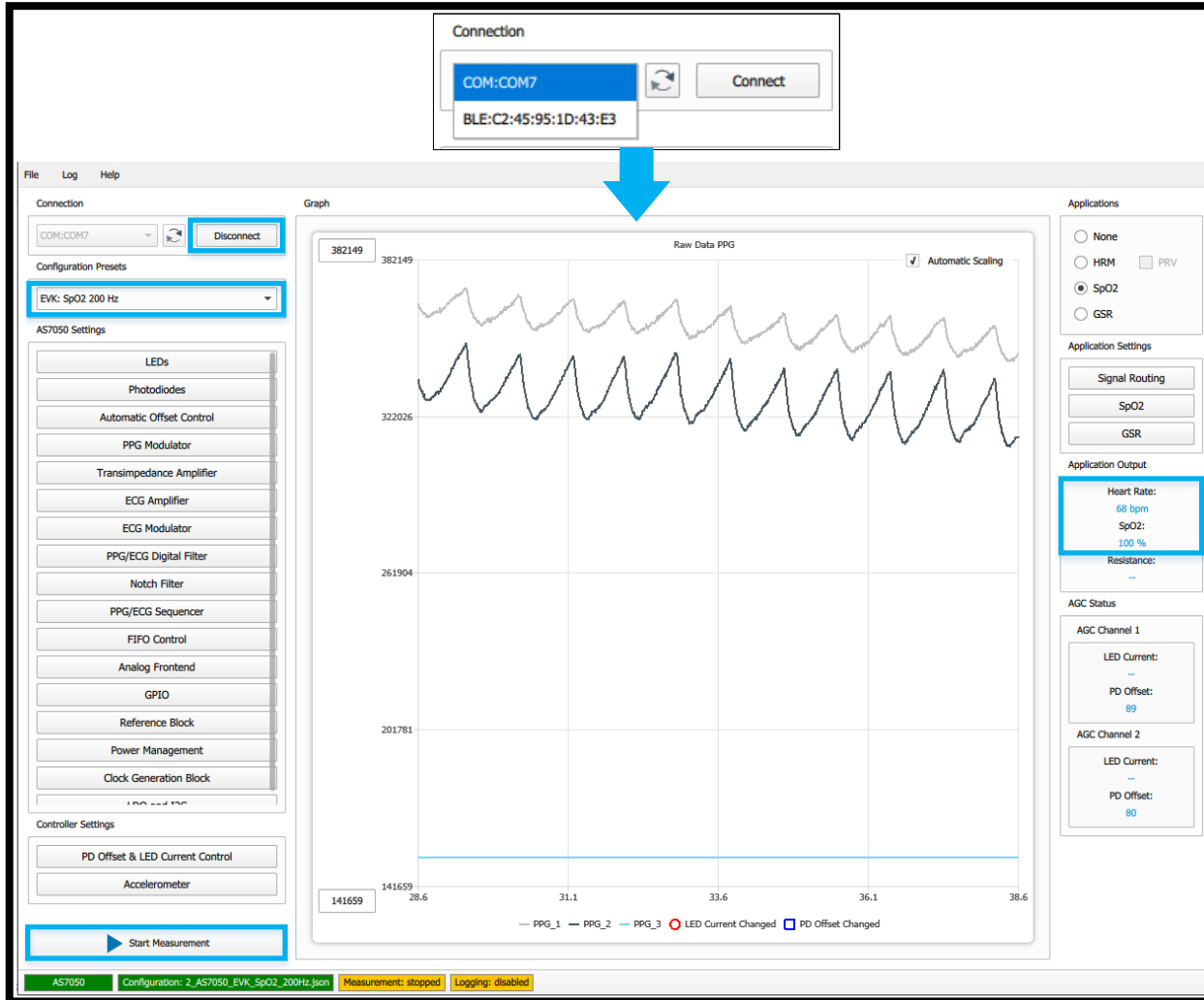


Fig. 9: Overview of the GUI (SpO2 measurement)

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.

AS7050 PC Software

Starting a ECG Raw Data measurement

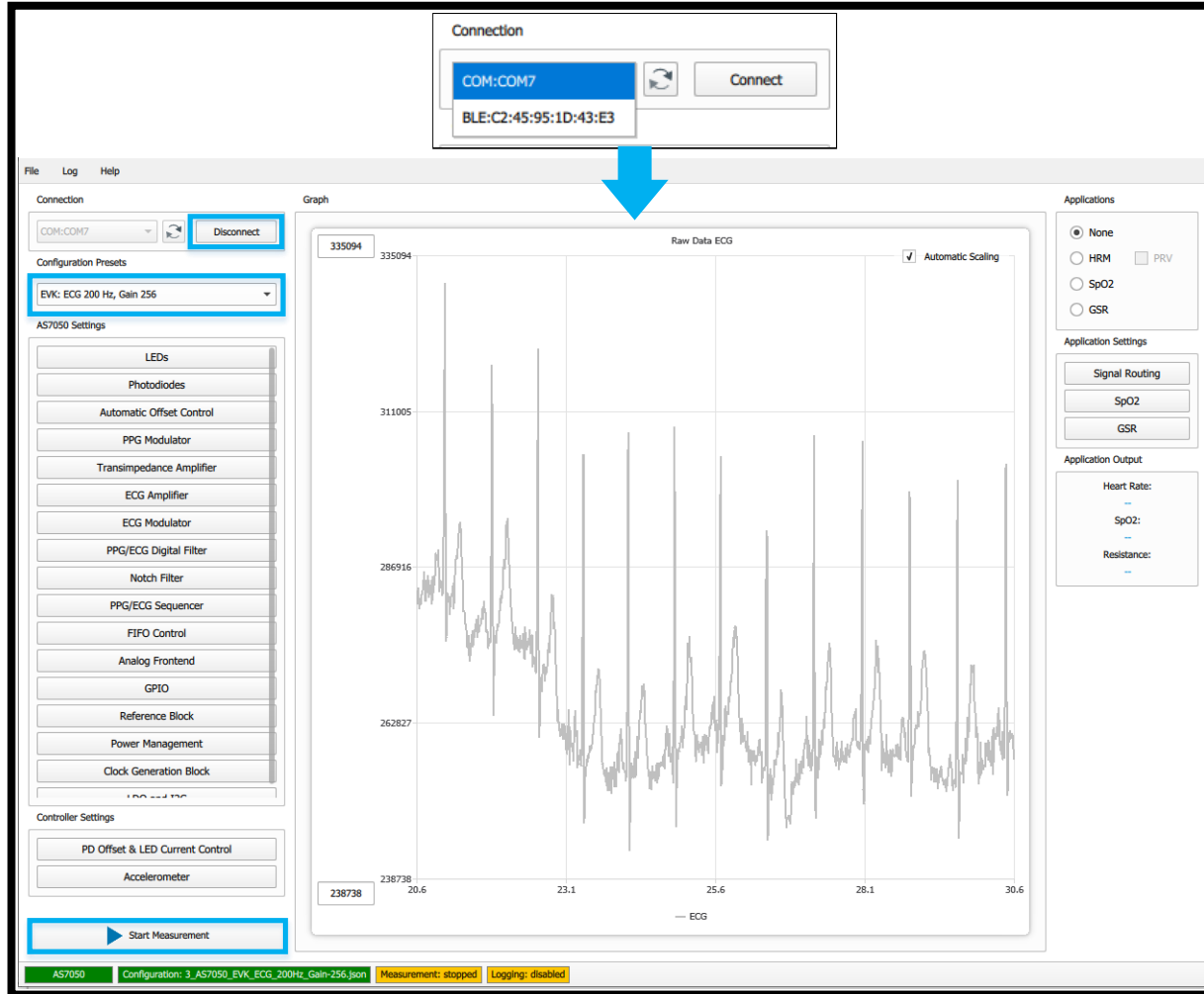


Fig. 10: Overview of the GUI (EVK measurement)

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.

AS7050 PC Software

Starting a HRM & ECG raw data measurement

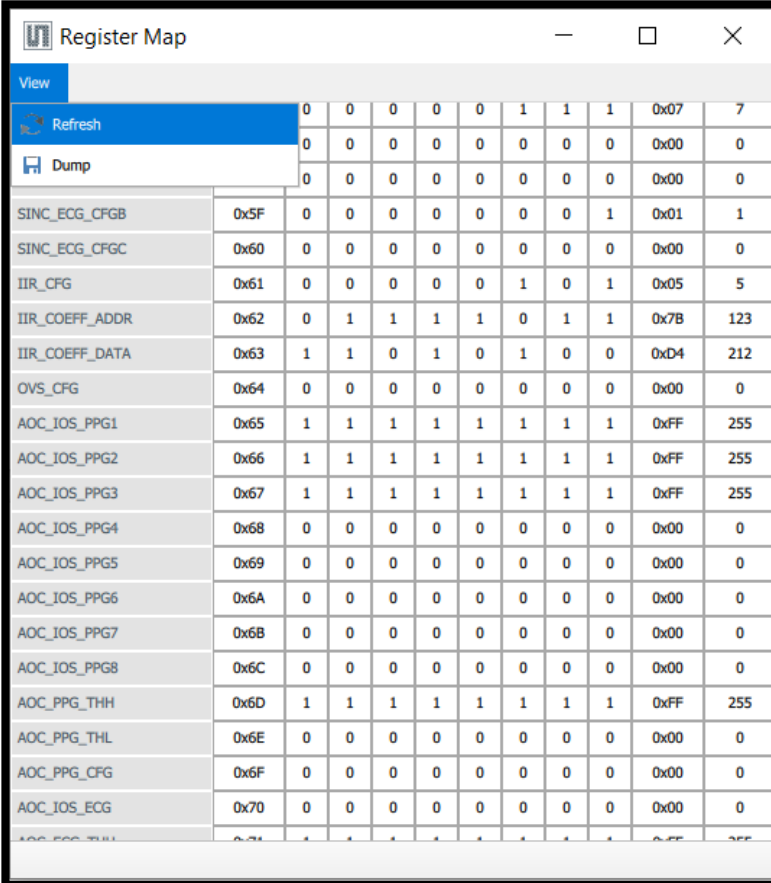


1. Firstly, press the sensor button "S1" for 1 second to power on the sensor.
2. Afterward, select the correct **COM port number** or **BLE number** from the drop-down menu.
3. Then, click the **Connect** button.
4. When it is successfully connected, the button on the left-hand side of the status bar (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.

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

AS7050 Register Map

Register Map Configuration



Register Name	Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Value (Hex)	Value (Dec)
		0	0	0	0	0	1	1	1	0x07	7
		0	0	0	0	0	0	0	0	0x00	0
		0	0	0	0	0	0	0	0	0x00	0
SINC_ECG_CFGB	0x5F	0	0	0	0	0	0	0	1	0x01	1
SINC_ECG_CFGC	0x60	0	0	0	0	0	0	0	0	0x00	0
IIR_CFG	0x61	0	0	0	0	0	1	0	1	0x05	5
IIR_COEFF_ADDR	0x62	0	1	1	1	1	0	1	1	0x7B	123
IIR_COEFF_DATA	0x63	1	1	0	1	0	1	0	0	0xD4	212
OVS_CFG	0x64	0	0	0	0	0	0	0	0	0x00	0
AOC_IOS_PPG1	0x65	1	1	1	1	1	1	1	1	0xFF	255
AOC_IOS_PPG2	0x66	1	1	1	1	1	1	1	1	0xFF	255
AOC_IOS_PPG3	0x67	1	1	1	1	1	1	1	1	0xFF	255
AOC_IOS_PPG4	0x68	0	0	0	0	0	0	0	0	0x00	0
AOC_IOS_PPG5	0x69	0	0	0	0	0	0	0	0	0x00	0
AOC_IOS_PPG6	0x6A	0	0	0	0	0	0	0	0	0x00	0
AOC_IOS_PPG7	0x6B	0	0	0	0	0	0	0	0	0x00	0
AOC_IOS_PPG8	0x6C	0	0	0	0	0	0	0	0	0x00	0
AOC_PPG_THH	0x6D	1	1	1	1	1	1	1	1	0xFF	255
AOC_PPG_THL	0x6E	0	0	0	0	0	0	0	0	0x00	0
AOC_PPG_CFG	0x6F	0	0	0	0	0	0	0	0	0x00	0
AOC_IOS_ECG	0x70	0	0	0	0	0	0	0	0	0x00	0

- 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.

Fig. 12: Register Map

AS7050 PC Software

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**.

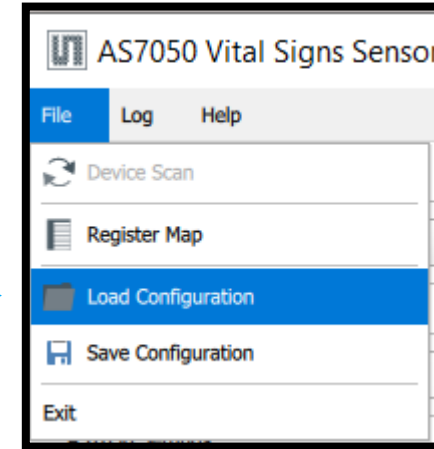


Fig. 13: Loading a Configuration File

- 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.

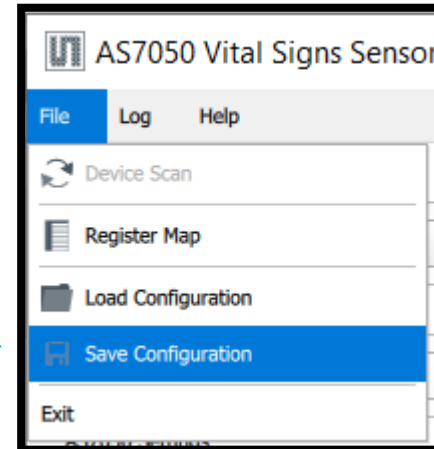


Fig. 14: Saving a Configuration File

AS7050 PC Software

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.

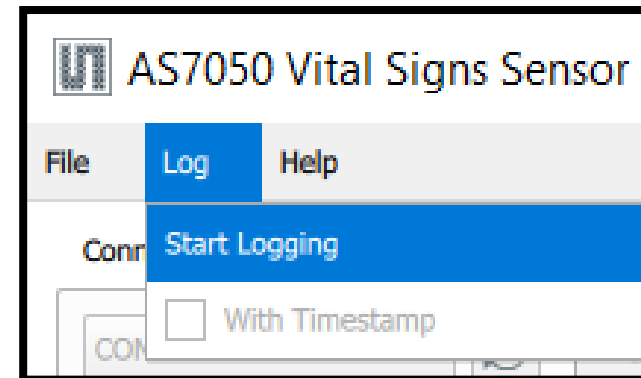


Fig. 15: Logging of raw data

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.

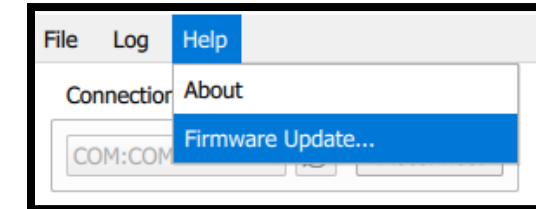


Fig. 16: Update Firmware via the GUI

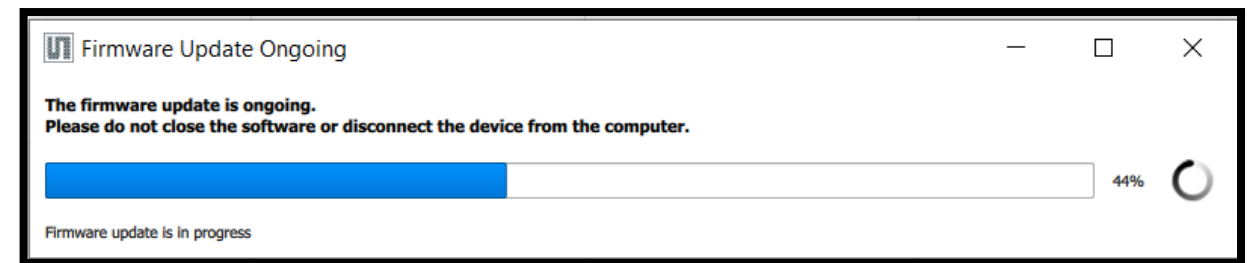


Fig. 17: Firmware update in progress

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

Sensing is life

