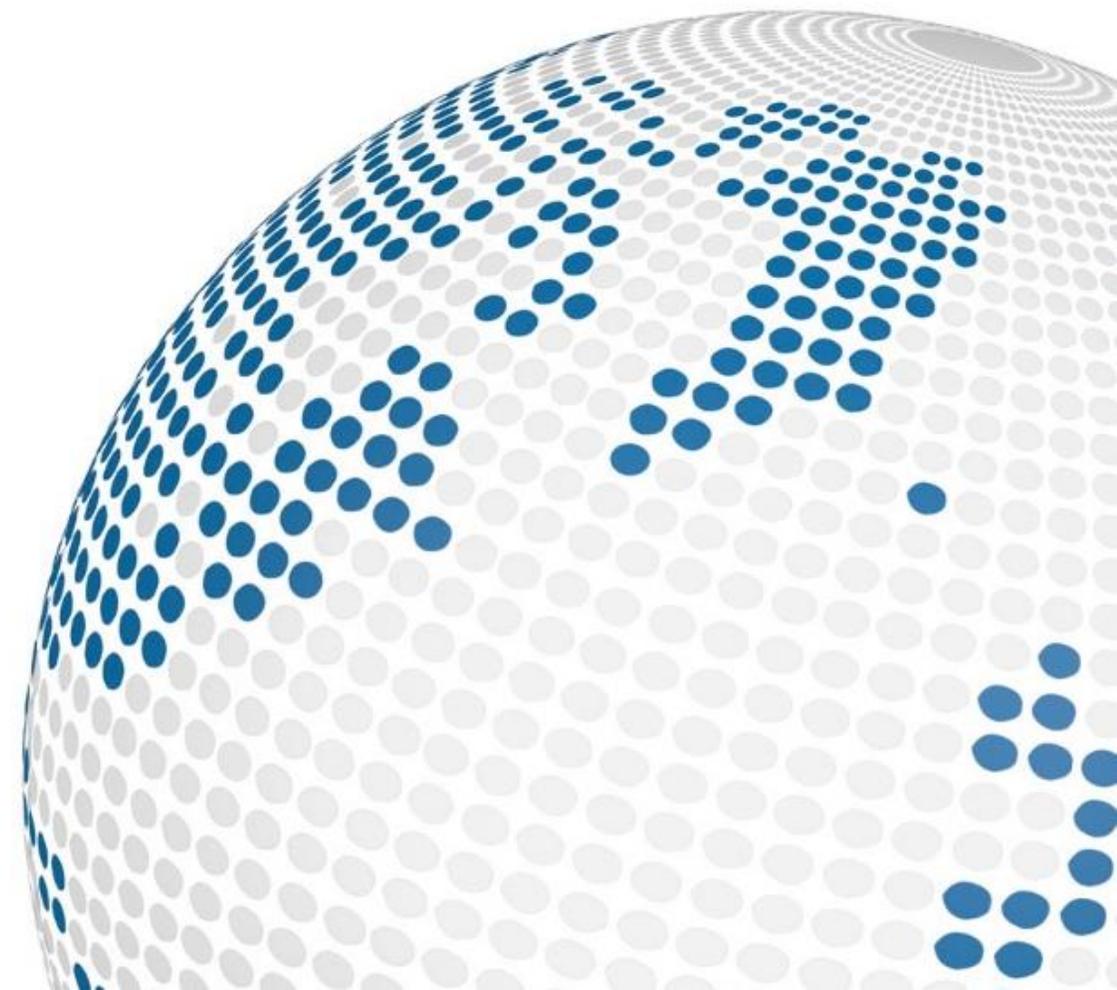


ams

Shaping the world with sensor solutions

Kumud Dey
June 2020



AS7030B Evalkit

User Guide

Contents

How to use

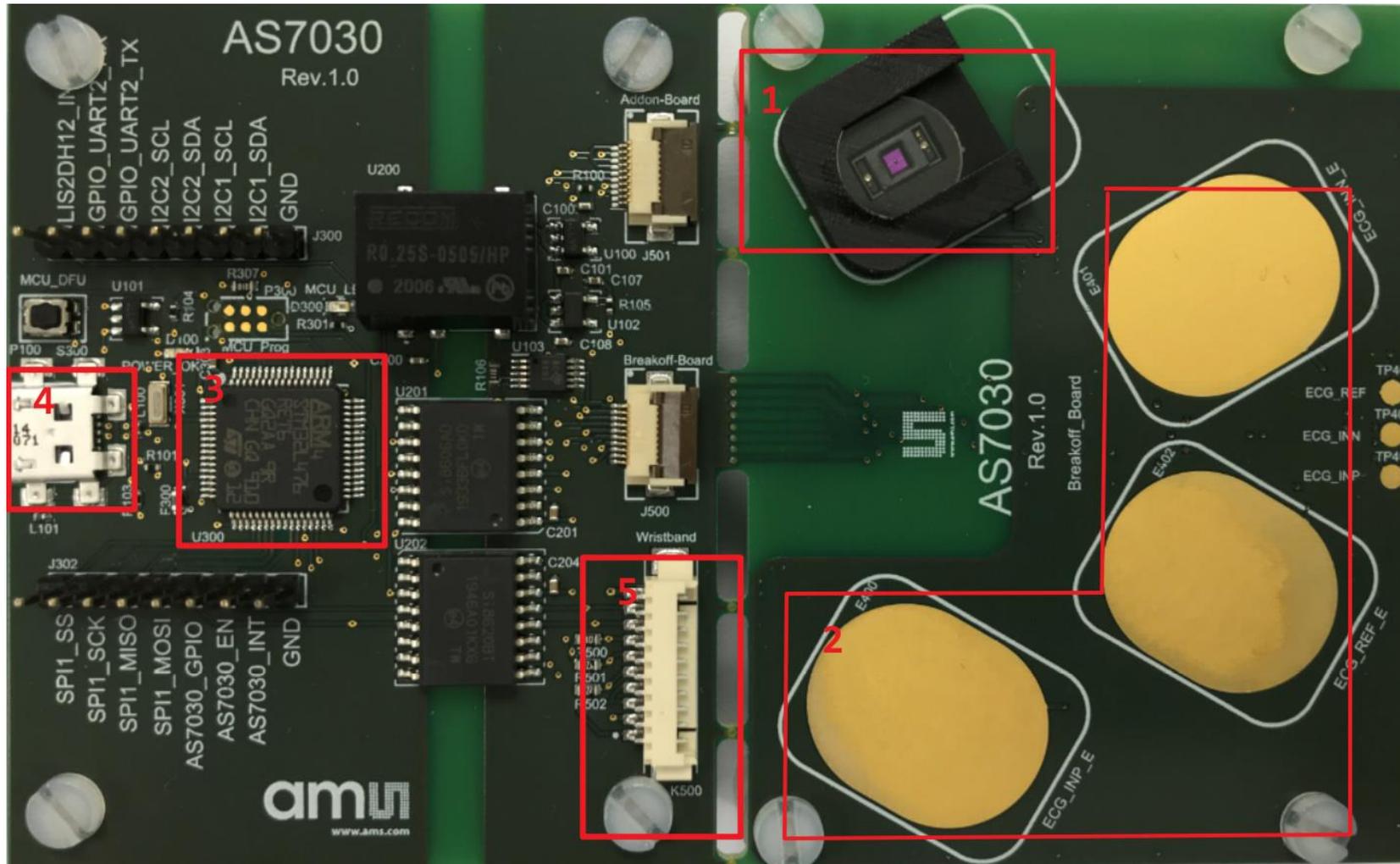
AS703X PC Software

Safety Requirements

FW Upgrade over USB

Contents of the AS7030B Evaluation kit

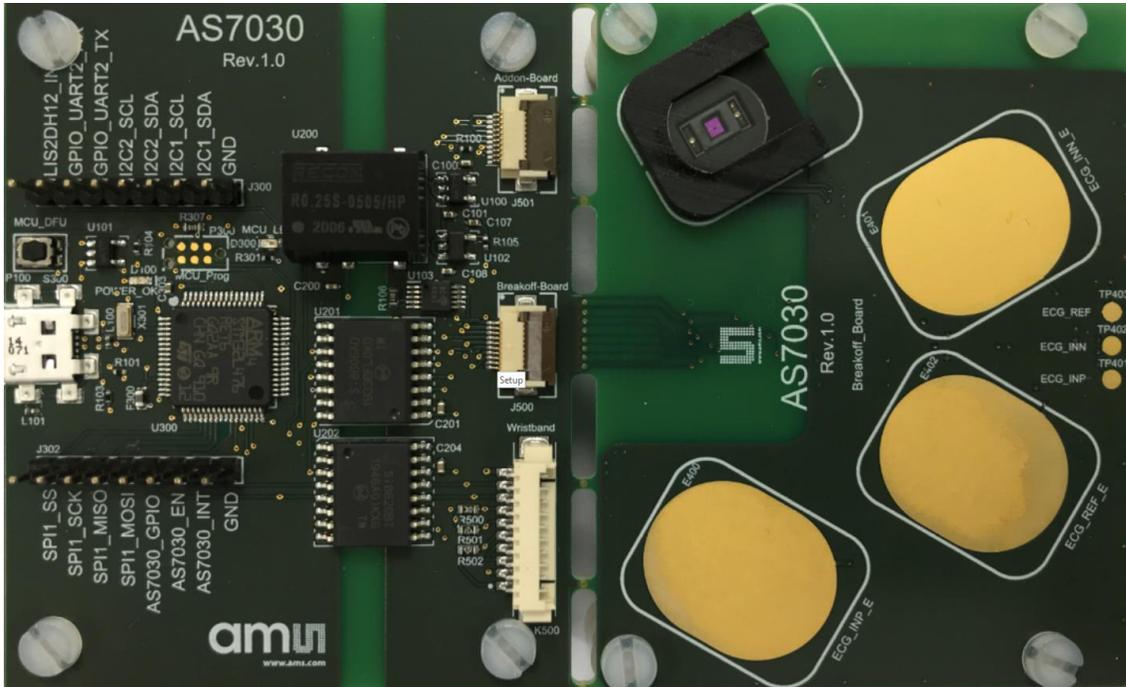
Evaluation kits main parts



1. AS7030B Sensor
2. ECG electrodes pads
3. Microcontroller
4. USB connector
5. Connector to optional AS7030B Wristband

Setup

Getting Started



1. Download the Evalkit Software from <https://ams.com/AS7030B#tab/tools> or copy from the USB stick
2. Install the Evalkit Software
3. Optionally connect electrodes to the external electrodes connection
4. Connect the micro USB to USB cable to the board and plug it into your computer
5. The yellow LED will turn ON as soon as the board is powered
6. Start the client software

Note: For external ECG functionality customer needs to build their own cabling harness
The pinout of the electrode connection is as follows



Connector for External Electrodes
(Molex PicoBlade 53261-0471)

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

AS703x PC Software

Starting a PPG measurement

The screenshot displays the AS703x Vital Signs Sensor software interface. The window title is "AS703x Vital Signs Sensor". The interface is divided into several sections:

- Configuration presets:** A dropdown menu shows "2 AS7030_PPG_OFE_finger".
- AS703x settings:** A list of settings including LEDs, Photodiodes, TIA, OFE, Sequencer, ADC, Interrupts, ECG amplifier, Electrical Analog Frontend, Light to frequency, and GPIOs. The "LEDs" setting is highlighted with a blue box and the number 3.
- Application settings:** Includes Signal Routing and SpO2.
- Controller settings:** A dropdown menu shows "4 PD offset & LED current control".
- Logging:** A checkbox for "SpO2 Data Logging" is present.
- Buttons:** A "Stop" button is highlighted with a blue box and the number 5.
- Graphs:** Two graphs are displayed. The top graph, labeled "6", is titled "PPG - OFE1 ADC channel" and shows a PPG waveform with ADC Counts on the y-axis (0 to 15000) and Time (s) on the x-axis (10 to 20). The bottom graph, labeled "7", is titled "ECG - ECG Output ADC channel" and shows an ECG waveform with ADC Counts on the y-axis (0 to 15000) and Time (s) on the x-axis (0 to 10).
- Application output:** A panel on the right shows checkboxes for HRM (checked), HRV, and SpO2. The SpO2 value is "8".
- Heart Rate and Variability:** A panel below the application output shows "Heart Rate 65 (0)" and "Heart Rate Variability -".
- SpO2:** A panel below the heart rate shows "SpO2 -" and "9".
- Controller info:** A panel at the bottom right shows "Current consumption 0.94mA" and "Temperature 10".
- PD offset LED ON/OFF:** A panel below the controller info shows "PD offset LED ON 576 nA", "PD offset LED OFF 0 nA", "LED A current 11", "LED B current 1.08 mA", and "LED B current 786 uA".
- Status bar:** The bottom status bar shows "AS7030 : PPG finger configuration (Normal power mode)", "12", "FW 2.1.0.12", and "AS7030".

- Select the appropriate COM port name from the drop down box (1)
- Click the connect button 
- Connect button will change its icon to  upon successful connection
- The two status boxes on the bottom right side will turn green and show the FW number currently flashed on the board (13)
- Select **AS7030_PPG_OFE_Finger** from the built in configuration presets (2)
- Optionally check and change AS703x settings
- Start the measurement with a click on the **Start** button(5)
- Put the index finger on the AS7030B to measure the PPG signal
- The PPG waveform will be displayed in the PPG window of the GUI (6)
- The Heart Rate (HRM) will be displayed on the right hand side of the window (9)
- The numbers in curly brackets show how many seconds have passed since the last result was reported

*** SpO2 is not applied for AS7030B Eval Kit*

AS703x PC Software

Starting a combined PPG/ECG finger measurement

The screenshot displays the AS703x Vital Signs Sensor software interface. The window title is "AS703x Vital Signs Sensor" and it includes a menu bar with "File", "View", "Settings", and "Help". The interface is divided into several sections:

- Configuration presets:** A dropdown menu shows "2 AS7030_PPG_ECG_finger".
- AS703x settings:** A list of settings including LEDs (3), Photodiodes, TIA, OFE, Sequencer, ADC, Interrupts, ECG amplifier, Electrical Analog Frontend, Light to frequency, and GPIOs.
- Application settings:** Includes "4 Signal Routing" and "SpO2".
- Controller settings:** Includes "5 PD offset & LED current control".
- Logging:** A checkbox for "SpO2 Data Logging".
- Stop button:** A large grey button at the bottom left.
- Graph:** Two real-time plots. The top plot, "6 PPG - OFE1 ADC channel", shows a periodic waveform with ADC counts on the y-axis (5000 to 8000) and Time (s) on the x-axis (12 to 20). The bottom plot, "ECG - ECG Output ADC channel", shows a similar waveform with ADC counts on the y-axis (6000 to 11000) and Time (s) on the x-axis (10 to 20).
- Application output:** A panel on the right showing "7" with checkboxes for HRM (checked), HRV, and SpO2. It displays "Heart Rate 66 (0)" and "Heart Rate Variability --".
- Controller info:** A panel on the right showing "8" with "Current consumption 1.44mA" and "Temperature --".
- LED status:** A panel on the right showing "9" with "PD offset LED ON 450 nA", "PD offset LED OFF 0 nA", "LED A current 1.08 mA", and "LED B current 786 uA".
- Status bar:** At the bottom, it shows "12 AS7030 : ECG and PPG configuration", "FW 2.1.0.12", and "AS7030".

- Select the appropriate COM port name from the drop down box (1).
- Click the connect button .
- Connect button will change its icon to  upon successful connection.
- The two status boxes on the bottom right side will turn green and shows the FW version and current board's part number (11).
- Connect ECG electrodes to the electrode connection if applied.
- Select **AS7030_PPG_ECG_finger** from the built in configuration presets (2).
- Optionally check and change AS703X settings(3).
- Start the measurement with a click on the **Start** button(12).
- The green AS7030B LEDs will turn on, Start button's caption will change to **Stop**.
- Put the index finger on the AS7030B and on-board electrode.
- The PPG waveform will be displayed in the PPG window of the GUI. (6)
- The ECG waveform will be displayed in the ECG window of the GUI. (6)

AS703x Signal optimization

Two settings have a major impact on signal strength and quality:

- LED current
- OFE gain
- TIA gain

LED current has a direct impact on signal strength with minimal impact on noise.

OFE gain will increase overall signal strength but also increase noise.

We recommend the following settings to begin with and start experimenting from there:

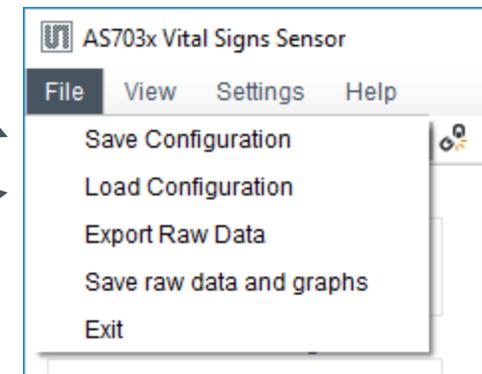
Use case	LED current [mA]	OFE gain	TIA gain
Finger	0.768	4-8	2M-3M
Light skin wrist	2	8	7M
Dark skin wrist	5	16	7M

AS703x PC Software

Saving and loading configuration

To save the current configuration settings, click on the **File** → **Save Configuration** menu. This will open the **Save Configuration File** dialog box. Enter file name and choose the file location, then click **Save**.

To load a previously exported configuration, click on the **File** → **Load Configuration** menu. This will open the **Select Configuration File** dialog box. Select the configuration file from which to load settings and click **Open**.



AS703x PC Software

Raw data logging and exporting

By default, during measurement the raw data from the AS703x is logged in memory. When a measurement is stopped, this data can be exported to a .csv file by clicking on the **File** → **Export Raw Data** menu and selecting the file location and file name in the **Save File** dialog box.

Raw data file format:

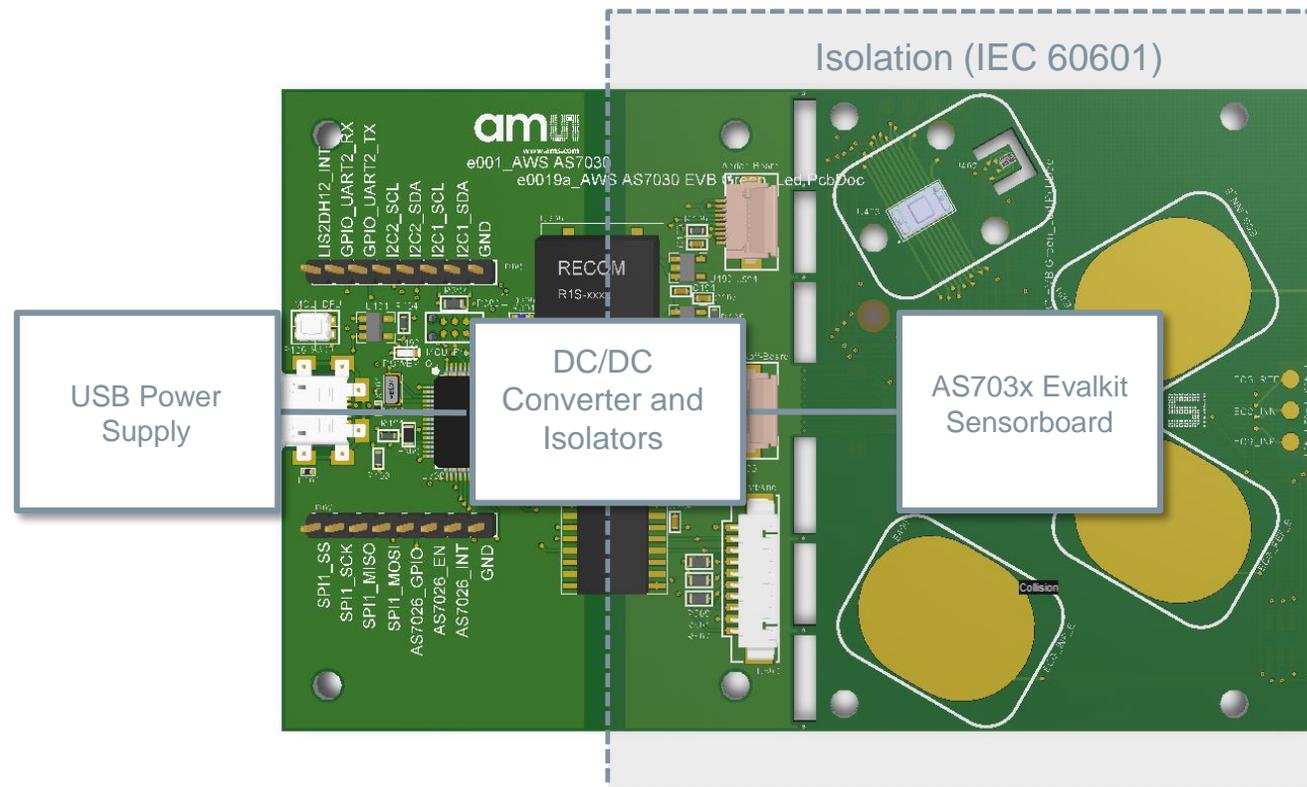
- First row has the column captions
- First column has the timestamp in **milliseconds**
- The rest of the columns contain the data from the enabled ADC channels

The screenshot shows the AS703x Vital Signs Sensor software interface. The 'File' menu is open, displaying options: Save Configuration, Load Configuration, Export Raw Data, Save raw data and graphs, and Exit. Below the menu, a 'Table data log' window is visible, containing a 'Parsed data log' table and an empty 'FFO data log' table. The 'Parsed data log' table has columns for Timestamp, TIA, TIA2, TIA3, OFE1, SD1, OFE2, and SD2. The 'FFO data log' table has columns for Timestamp, Value, LSB, and MSB. At the bottom right of the window, there are 'Save', 'Discard', and 'Close' buttons.

	Timestamp	TIA	TIA2	TIA3	OFE1	SD1	OFE2	SD2
1	0.00000	15673	15305		5189			
2	4.98000	11730	12709		258			
3	9.96000	15707	15224		255			
4	14.94000	11590	12836		254			
5	19.92000	15731	15128		254			
6	24.90000	11662	12768		255			
7	29.88000	15609	15174		257			
8	34.86000	11671	12988		251			
9	39.84000	15668	15133		255			
10	44.82000	11706	12925		256			
11	49.80000	15699	15037		258			
12	54.78000	11756	12922		253			
13	59.76000	15570	15129		256			
14	64.74000	11727	12921		257			
15	69.72000	15521	15176		255			
16	74.70000	11810	12919		255			
17	79.68000	15594	14998		255			
18	84.66000	11844	12945		257			
19	89.64000	15545	15163		255			
20	94.62000	11748	13000		255			
21	99.60000	15480	12404		260			

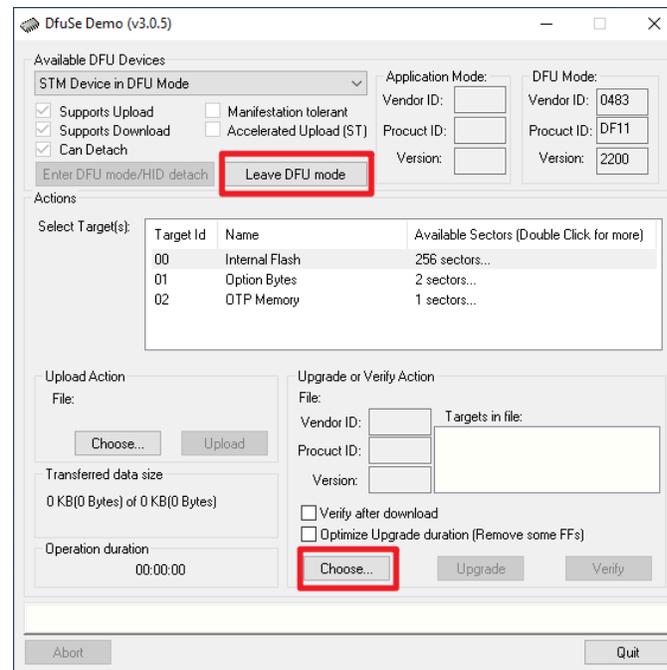
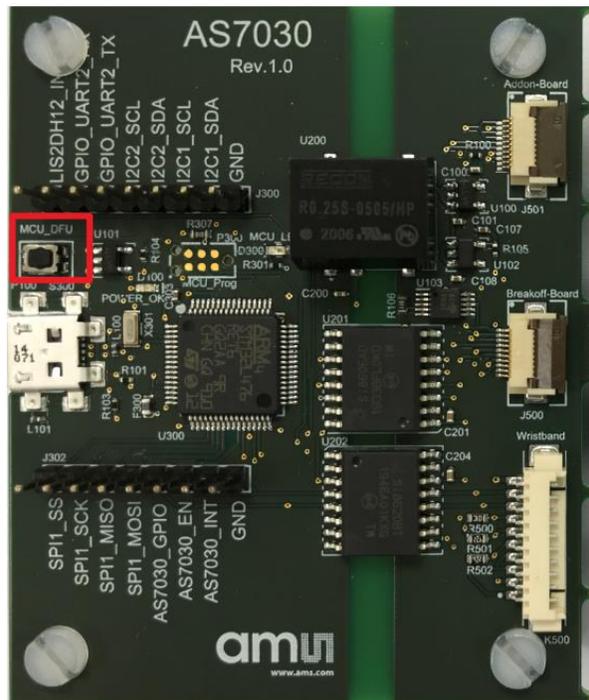
Safety compliance

The AS7030B Eval Kit is supplied by USB connection to the PC. In order to avoid a direct connection from the electrodes to the power grid, an IEC 60601-1 compliant RECOM DCDC converter (R0.25S-0505/H or R0.25S-0505/HP) is assembled on the board as well as isolator ICs for any other signals, which means that there is no physical connection between the break out part of the board and the power grid.



AS703x Firmware upgrade

Optional FW upgrade over USB



- Press and hold DFU taster on the board (next to the USB connector)
- Connect USB cable -> release DFU taster (The board is now in DFU mode)
- Start [DfuSeDemo.exe](#) from the folder \your SW install \ams\AS703x Vital Signs Sensor\extras\DFU
- In “Upgrade or Verify Action” ,Click on [Choose...](#), a window will pop-up
- Find the folder with the new firmware, select the FW and click [Open](#)
- Click [Upgrade](#)
- After FW upgrade, quit the DFU software by disconnecting the USB cable from the board or click “[Leave DFU mode](#)” button.
- Connect USB cable again, start the GUI. In the right bottom corner of the GUI, the new FW version will be shown.



Thank you!

Please visit our website
www.ams.com

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[ams OSRAM:](#)

[AS7030B_EVALKIT_BT](#) [AS703X_EVALKIT_BT](#)