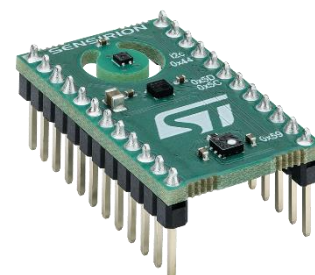


# Technical Description SENSEVAL-SCB4XV1

## Evaluation board for Humidity, Temperature, Volatile Organic Compounds and Pressure

- Evaluation board with SHT40 (Humidity/Temperature), SGP40 (Volatile Organic Compounds) and LPS22DF (Barometric Pressure)
- Compatible with the STMicroelectronics DIL 24 socket
- Supported by the STEVAL-MKI109V3 Motherboard
- Compatible with STM32Nucleo and STM32Cube Software
- 1.7 V to 3.6 V supply voltage range



### Product Summary

The evaluation kit for the Sensirion SHT40 (relative humidity and temperature), Sensirion's SGP40 (Volatile Organic Compounds) and STMicroelectronics LPS22DF (Barometric pressure) enables easy sensor evaluation and facilitated prototyping.

This Evaluation Board is compatible with the STMicroelectronics DIL 24 socket and is supported by the STEVAL-MKI109V3 motherboard. The Evaluation Board is also compatible with the STM32Nucleo boards from STMicroelectronics.

This technical description is limited to the SENSEVAL-SCB4XV1 evaluation board. For more information on the individual sensor specifications, please consult the datasheets linked from the [product page](#).

The combination of sensors on this evaluation board allows to evaluate ideas requiring relative humidity, temperature, volatile organic compounds and barometric pressure. It can serve both as a platform for evaluating the individual sensors and to prototype ideas using one or multiple of these sensors.

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# 1 Hardware Interface Specification

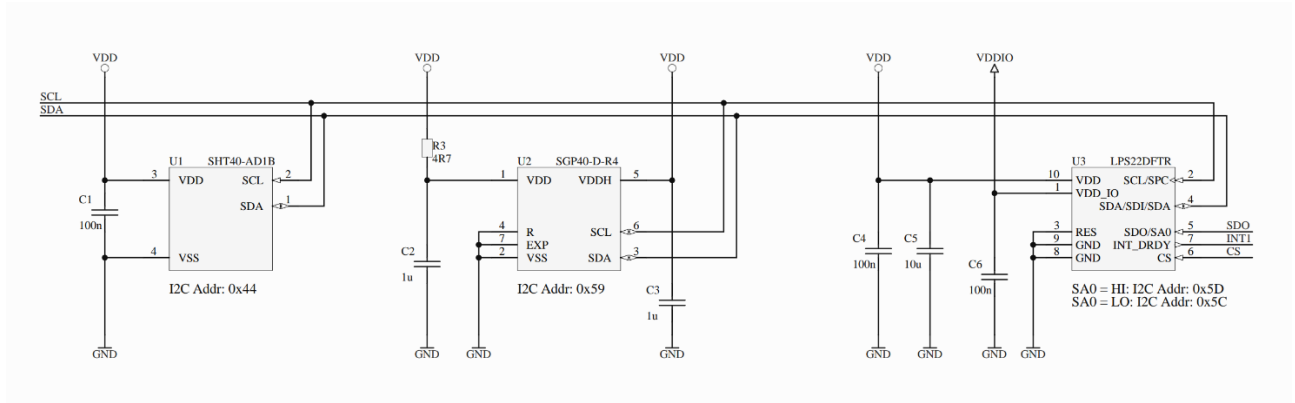


Figure 1: Schematic Diagram of the SENSEVAL-SCB4XV1

## 1.1 DIL24 Pinout

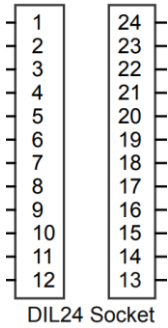


Figure 2: DIL24 Socket Circuit Diagram

Pin	Name	Comment
1	VDD	Power supply (positive supply)
2	VDDIO	Power supply for I/O pins (LPS22DF)
13	GND	Ground (negative supply)
14	INT1	Interrupt/Data ready (LPS22DF)
20	SCL	I2C serial clock input
21	SDA	I2C serial data input / output
22	SA0	LPS22DF I2C address select; HI: 0x5D; LO: 0x5C

Table 2: DIL 24 pin assignment. Unused pins are omitted from the table

## 2 Evaluation using the Professional MEMS Motherboard MKI109V3

The SENSEVAL-SCB4XV1 is compatible with the ST MEMS Motherboard MKI109V3 through the DIL24 connector.

SENSEVAL needs to be connected so that the Sensirion and ST logos on the evaluation board are in the same direction as the ST logo on the MKI109V3.

The STEVAL-MKI109V3 firmware needs to be compatible with Unico GUI version 9.14 and above.

To update the firmware on STEVAL-MKI109V3:

1. Download and install the [latest Unico GUI](#) from the ST Website
2. Locate the downloaded file, navigate to the FIRMWARE folder and then to ProfiMEMSTool board and locate the .bin file. You will need this for the firmware update
3. Download and install the [STM32CubeProgrammer software](#)
4. Make the MKI109V3 boot in DFU mode by following the instructions in chapter 2.2 of the [MKI109V3 user manual](#)
5. Upgrade the firmware using the .bin file from step 2 and the instructions in chapter 2.2.2 2 of the [MKI109V3 user manual](#)

As soon as the MKI109V3 is updated with the latest firmware you can launch the Unico GUI. Select the **SENSEVAL-SCB4XV1 (SHT4x + SGP40 + LPS22DF)** from the environmental sensors tab and click on Select Device.

The GUI should look like the figure below:



Figure 2. Unico GUI

To start measuring navigate to the Options tab and click on Easy Configuration (1) and then on Start (2) at the top of Unico GUI.

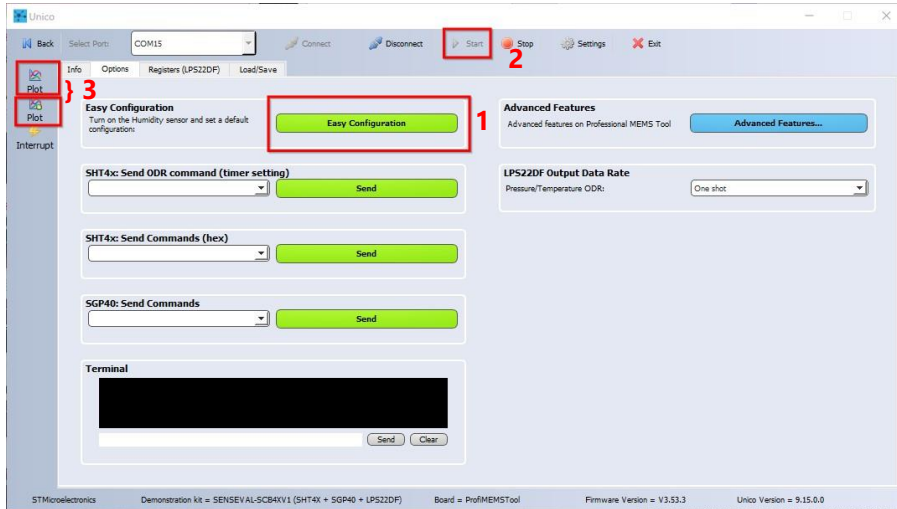


Figure 3: Unico GUI, Options tab

You can see the measurements by clicking the two plot buttons on the right of the application (3):



Figure 4: Unico GUI Plot windows

Unico GUI, allows the measurements to be saved in a file, to save the data:

1. Navigate to the Load/Save tab at Unico GUI,
2. Browse the folder and name the log file according to your liking,
3. Select the data you would like saved,
4. Start logging
5. Start the measurement of the sensor

### 3 Evaluation using a Nucleo Board and a Nucleo Expansion Board

#### 3.1 Hardware Setup

“STMicroelectronics with the latest release of X-CUBE-MEMS-1 functional package (Version 10.0.0) support the three sensors provided on the SENSEVAL board.”

Users can quickly evaluate the performance of the sensor via the use of Unicleo-GUI provided by STMicroelectronics (Version 1.23.0).

The support is currently limited to the NUCLEO-F401RE board and the X-NUCLEO-IKS01A3 expansion board.

To get started with the evaluation make sure you have the correct hardware as mentioned above and connect the expansion board on the X-NUCLEO-F401RE. Afterwards, connect the SENSEVAL-SCB4XV1 on the expansion board using the DIL24 socket.

**Make sure that the Sensirion and ST logo on the SENSEVAL-SCB4XV1 is facing the same direction as the ST logo on the X-NUCLEO-IKS01A3 expansion board.**

The setup should look like the picture below:

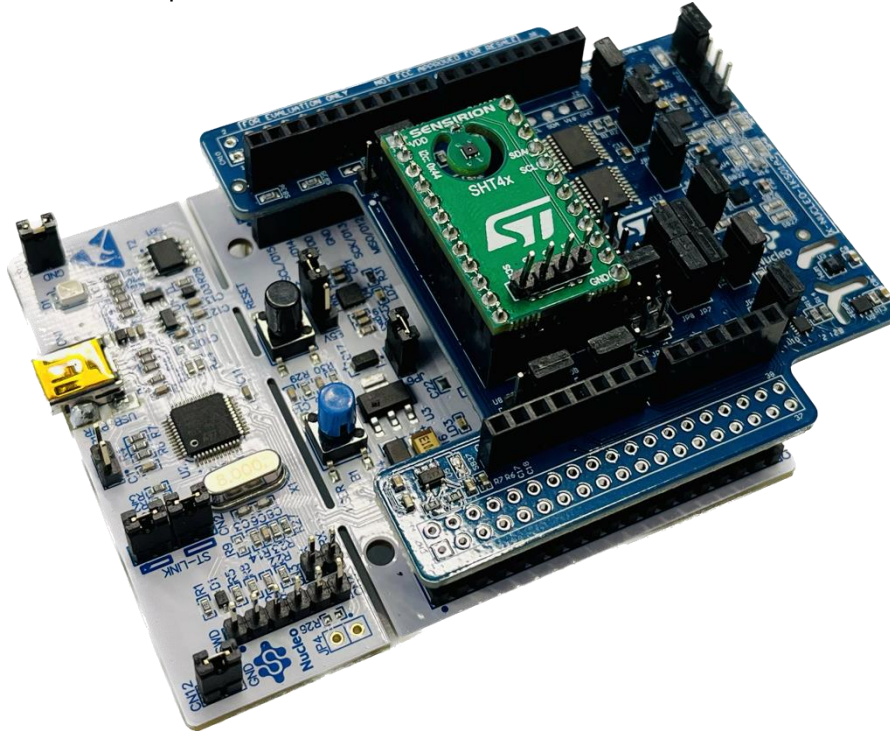


Figure 5: the evaluation board mounted on the X-NUCLEO-IKS01A3 expansion board with the Nucleo F401RE board (Note: this picture is showing the predecessor of the SENSEVAL-SCB4XV1, the SENSEVAL-SHT4XV1)

### 3.2 Firmware update

The firmware on the Nucleo F401RE board needs to be flashed so that it can work with UNICLEO GUI. STMicroelectronics provides an example to get things started with the X-CUBE-MEMS-1 functional package.

To update the firmware you can use STM32cubeProgrammer and load the ready-made example by navigating to the folder of the X-CUBE-MEMS-1 functional package:

`"en.x-cube-mems1\Projects\NUCLEO-F401RE\Examples\IKS01A3\DataLogExtended\Binary\DataLogExtended.bin"`

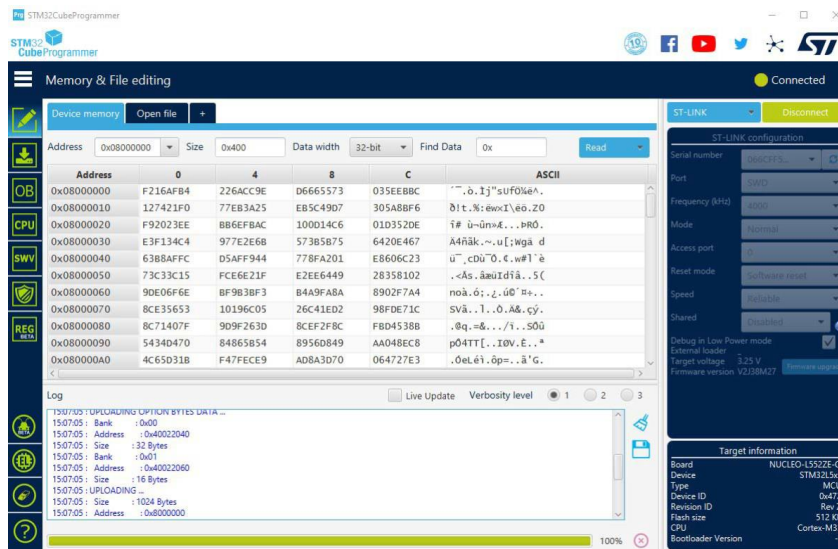


Figure 6: STM32CubeProgrammer User Interface

To load the .bin file please follow the steps below:

1. Open the STM32CubeProgrammer
2. Select the Nucleo board from the dropdown menu on the right of the screen and click Connect
3. Click on the "Open File" tab and navigate to the location of the .bin file shown above
4. As soon as you open the .bin file the light blue button will change from Read to Download
5. Click on Download and wait for the firmware to be downloaded into your Nucleo Board
6. Disconnect the board

### 3.3 Unicleo GUI

Now we are ready to launch Unicleo GUI. Please follow the steps below:

1. Download and install Unicleo GUI
2. Open the Unicleo GUI
3. Connect the Nucleo F401RE board with your computer via the supplied USB cable
4. Unicleo GUI will automatically detect the COM port where the Nucleo F401RE board is connected
5. Click Connect
6. Select the correct sensors from the drop-down menus. For Humidity and Temperature select SHT40.

For Detailed information on how to use the Unicleo GUI please refer to the Unicleo GUI Getting Started Guide:

[https://www.st.com/resource/en/user\\_manual/um2128-getting-started-with-unicleogui-for-motion-mems-and-environmental-sensor-software-expansion-for-stm32cube-stmicroelectronics.pdf](https://www.st.com/resource/en/user_manual/um2128-getting-started-with-unicleogui-for-motion-mems-and-environmental-sensor-software-expansion-for-stm32cube-stmicroelectronics.pdf)



## 4 Prototyping with Sensirion Nucleo I<sup>2</sup>C SHT4X and SGP40 Driver

### 4.1 Example I<sup>2</sup>C SHT4X Driver

An example of the I<sup>2</sup>C SHT4X Driver for the STM32 Nucleo Cube can be found on Sensirion's GitHub repository: [Sensirion/nucleo-i2c-sht4x: SHT4x driver for STs Nucleo F103RB board with the X-NUCLEO-IKS02A1 shield \(github.com\)](https://github.com/Sensirion/nucleo-i2c-sht4x)

### 4.2 Example I2C SGP40 Driver

You can find an example of the SGP40 Driver for the STM32 Nucleo Cube on STMicroelectronics' Github page: [https://github.com/STMicroelectronics/X-CUBE-MEMS1/tree/main/Projects/NUCLEO-L152RE/Applications/CUSTOM/AirQuality\\_SGP40](https://github.com/STMicroelectronics/X-CUBE-MEMS1/tree/main/Projects/NUCLEO-L152RE/Applications/CUSTOM/AirQuality_SGP40)

### 4.3 Using the SENSEVAL-SCB4XV1 with a DIL24 compatible STM32NUCLEO expansion board

The following STM32Nucleo expansion boards are compatible with the SENSEVAL-SCB4XV1:

- X-NUCLEO-IKS01A2
- X-NUCLEO-IKS01A3
- X-NUCLEO-IKS02A1
- X-NUCLEO-IKS4A1

## 5 Revision History

Date	Version	Page(s)	Changes
March 7, 2024	1	All	Initial version

## Important Notices

### Warning, Personal Injury

Do not use this product as safety or emergency stop devices or in any other application where failure of the product could result in personal injury. Do not use this product for applications other than its intended and authorized use. Before installing, handling, using or servicing this product, please consult the data sheet and application notes. Failure to comply with these instructions could result in death or serious injury.

If the Buyer shall purchase or use SENSIRION products for any unintended or unauthorized application, Buyer shall defend, indemnify and hold harmless SENSIRION and its officers, employees, subsidiaries, affiliates and distributors against all claims, costs, damages and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if SENSIRION shall be allegedly negligent with respect to the design or the manufacture of the product.

### ESD Precautions

The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take customary and statutory ESD precautions when handling this product.

See application note "ESD, Latchup and EMC" for more information.

### Warranty

SENSIRION warrants solely to the original purchaser of this product for a period of 12 months (one year) from the date of delivery that this product shall be of the quality, material and workmanship defined in SENSIRION's published specifications of the product. Within such period, if proven to be defective, SENSIRION shall repair and/or replace this product, in SENSIRION's discretion, free of charge to the Buyer, provided that:

- notice in writing describing the defects shall be given to SENSIRION within fourteen (14) days after their appearance;
- such defects shall be found, to SENSIRION's reasonable satisfaction, to have arisen from SENSIRION's faulty design, material, or workmanship;

- the defective product shall be returned to SENSIRION's factory at the Buyer's expense; and
- the warranty period for any repaired or replaced product shall be limited to the unexpired portion of the original period.

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## Headquarters and Subsidiaries

SENSIRION AG  
Laubisruestr. 50  
CH-8712 Staefa ZH  
Switzerland

phone: +41 44 306 40 00  
fax: +41 44 306 40 30  
[info@sensirion.com](mailto:info@sensirion.com)  
[www.sensirion.com](http://www.sensirion.com)

Sensirion Taiwan Co. Ltd.  
phone: +41 44 306 40 00  
[info@sensirion.com](mailto:info@sensirion.com)

Sensirion Inc. USA  
phone: +1 312 690 5858  
[info-us@sensirion.com](mailto:info-us@sensirion.com)  
[www.sensirion.com](http://www.sensirion.com)

Sensirion Japan Co. Ltd.  
phone: +81 3 3444 4940  
[info-jp@sensirion.com](mailto:info-jp@sensirion.com)  
[www.sensirion.co.jp](http://www.sensirion.co.jp)

To find your local representative, please visit [www.sensirion.com/contact](http://www.sensirion.com/contact)

Sensirion Korea Co. Ltd.  
phone: +82 31 337 7700~3  
[info-kr@sensirion.com](mailto:info-kr@sensirion.com)  
[www.sensirion.co.kr](http://www.sensirion.co.kr)

Sensirion China Co. Ltd.  
phone: +86 755 8252 1501  
[info-cn@sensirion.com](mailto:info-cn@sensirion.com)  
[www.sensirion.com.cn/](http://www.sensirion.com.cn/)