

HVAC 2 Click



PID: MIKROE-6951

HVAC 2 Click is a compact add-on board designed for indoor air quality monitoring and smart HVAC control applications. This board is based on the [SCD43-D-R2](#), a CO₂ sensor for indoor air quality from [Sensirion](#). It features photoacoustic NDIR CO₂ sensing with Sensirion's PASens® and CMOSens® technologies, a 400ppm to 5000ppm specified CO₂ measurement range, $\pm 30.0\text{ppm} \pm 3.0\%$ m.v. accuracy, integrated SHT4x-based humidity and temperature compensation, and I2C communication. It also supports the Click Snap feature for flexible sensor placement and includes an additional header for connecting [SEN5x](#) or [SEN6x](#) modules, enabling extended air quality sensing with particulate matter, VOC, NO_x, and other environmental parameters. This Click board is suitable for IAQ monitors, smart ventilation controllers, HVAC optimization systems, connected building sensors, occupancy-based air quality systems, and environmental monitoring devices.

For more information about **HVAC 2 Click** visit the official [product page](#).

How does it work?

HVAC 2 Click is based on the SCD43-D-R2, a CO₂ sensor for indoor air quality (IAQ) from Sensirion. This sensor delivers a best-in-class accuracy specification of $\pm 30.0\text{ppm} \pm 3.0\%$ m.v. and is designed to support compatibility with demanding building and ventilation standards, including ANSI/ASHRAE 62.1-2022 Draft Addendum d, California Title 24, RESET® Grade B, and WELL Building Standard™ (WELL v2). The SCD43-D-R2 belongs to Sensirion's second generation series of optical CO₂ sensors and is built on the photoacoustic NDIR sensing principle, combining Sensirion's patented PASens® and CMOSens® technologies for reliable CO₂ measurement. It provides a specified CO₂ measurement range from 400ppm to 5000ppm, making it suitable for detecting and monitoring CO₂ concentration levels in indoor spaces such

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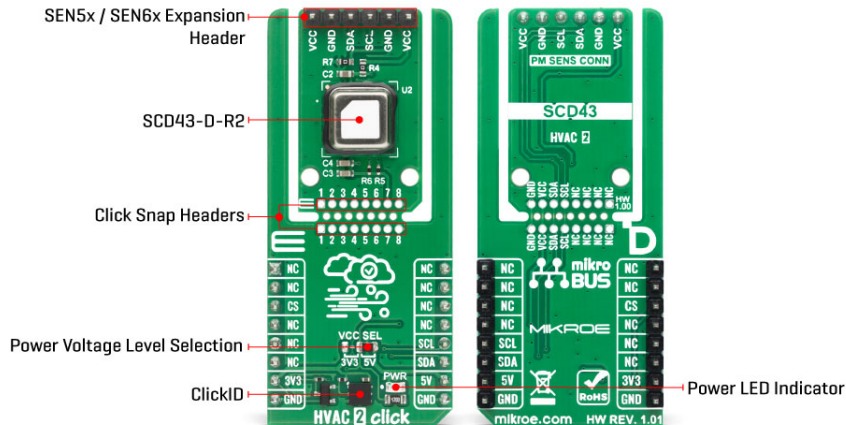


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as offices, schools, commercial buildings, smart homes, and HVAC-controlled environments.



HVAC 2 Click communicates with the host MCU through a standard I2C interface with operation up to 400kHz. In addition to CO₂ measurement, the sensor includes an integrated SHT4x humidity and temperature sensor used for on-chip signal compensation, allowing the system to provide more accurate measurements across changing environmental conditions. Since carbon dioxide is one of the key indicators of indoor air quality, this Click board can be used to support smart ventilation regulation, helping maintain healthier indoor environments while improving energy efficiency and user comfort. High CO₂ concentrations can negatively affect cognitive performance, well-being, and productivity, so HVAC 2 Click is especially suitable for IAQ monitors, smart ventilation controllers, HVAC optimization systems, connected building sensors, occupancy-based air quality systems, and environmental monitoring devices.

This Click board™ is designed in a unique format supporting the newly introduced MIKROE feature called "Click Snap." Unlike the standardized version of Click boards, this feature allows the main sensor/IC/module area to become movable by breaking the PCB, opening many new possibilities for implementation. Thanks to the Snap feature, the SCD43-D-R2 can operate autonomously by accessing its signals directly on the pins marked 1-8. Additionally, the Snap part includes a specified and fixed screw hole position, enabling users to secure the Snap board in their desired location.

The board also features an additional header placed on the Click Snap section, where the I2C lines from the SCD43-D-R2 sensor are made available together with power and ground pins. This header is intended for connecting Sensirion SEN5x or SEN6x sensor modules, allowing HVAC 2 Click to be expanded into a broader air quality sensing platform. In such a configuration, the SCD43-D-R2 can provide CO₂, temperature, and humidity measurements, while the additional SEN5x or SEN6x module can add particulate matter, VOC, NOx, and other environmental sensing capabilities depending on the selected sensor model.

This Click board™ can operate with either 3.3V or 5V logic voltage levels selected via the VCC SEL jumper. This way, both 3.3V and 5V capable MCUs can use the communication lines properly. Also, this Click board™ comes equipped with a library containing easy-to-use functions and an example code that can be used as a reference for further development.

Click Snap

Click Snap is an innovative feature of our standardized Click add-on boards, designed to bring

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greater flexibility and optimize your prototypes. By simply snapping the PCB along predefined lines, you can easily detach the main sensor/IC/module area, reducing the overall size, weight, and power consumption - ideal for the final phase of prototyping. For more details about Click Snap, visit the [official page](#) dedicated to this feature.

Specifications

Type	Environmental
Applications	Ideal for IAQ monitors, smart ventilation controllers, HVAC optimization systems, connected building sensors, occupancy-based air quality systems, and environmental monitoring devices
On-board modules	SCD43-D-R2 - CO ₂ sensor for indoor air quality (IAQ) from Sensirion
Key Features	High-accuracy indoor air quality monitoring, photoacoustic NDIR sensing principle, PASens® and CMOSens® technologies, integrated SHT4x humidity and temperature sensor for on-chip signal compensation, I2C interface up to 400kHz, compatibility with demanding building and ventilation standards, Click Snap, extended air quality sensing support for particulate matter, VOC, NOx, and other environmental parameters, and more
Interface	I2C
Feature	Click Snap, ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on HVAC 2 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
	NC	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	NC	
ID COMM	CS	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	SCL	I2C Clock
	NC	6	MOSI	SDA	11	SDA	I2C Data
Power Supply	3.3V	7	3.3V	5V	10	5V	Power Supply
Ground	GND	8	GND	GND	9	GND	Ground

Onboard settings and indicators

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Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1	VCC SEL	Left	Power Voltage Level Selection 3V3/5V: Left position 3V3, Right position 5V

HVAC 2 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
CO ₂ Measurement Range	400	-	5000	ppm
CO ₂ Accuracy	-	±30	-	ppm

Software Support

[HVAC 2 Click](#) demo application is developed using the [NECTO Studio](#), ensuring compatibility with [mikroSDK](#)'s open-source libraries and tools. Designed for plug-and-play implementation and testing, the demo is fully compatible with all development, starter, and mikromedia boards featuring a [mikroBUS™](#) socket.

Example Description

This example demonstrates the use of HVAC 2 Click board by reading the measurement results of SCD43 (CO₂, temperature, humidity) and optionally SEN5x or SEN65 (PM mass concentration, relative humidity, temperature, VOC and NO_x indexes) sensors.

Key Functions

- `hvac2_cfg_setup` Config Object Initialization function.
- `hvac2_init` Initialization function.
- `hvac2_scd43_get_serial_num` This function reads the SCD43 48-bit unique serial number in form of 3 data words.
- `hvac2_scd43_start_measurement` This function starts a periodic measurement of SCD43 device by issuing a desired command for it.
- `hvac2_scd43_read_measurement` This function checks if the SCD43 data is ready and then reads the CO₂, temperature, and humidity measurements.

Application Init

Initializes the driver and after that performs the initialization of SCD43 and external sensors (SEN5x or SEN65). The SEN5x or SEN65 sensors are optional, see the macro definition at the beginning of the `main.c` file.

Application Task

Reads the measurement results from SCD43 (CO₂, temperature, humidity) and optionally from SEN5x or SEN65 sensors (PM mass concentration, relative humidity, temperature, VOC and NO_x indexes). The results are being displayed on the USB UART every 5 seconds approximately.

Application Output

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This Click board can be interfaced and monitored in two ways:

- Application Output - Use the "Application Output" window in Debug mode for real-time data monitoring. Set it up properly by following [this tutorial](#).
- UART Terminal - Monitor data via the UART Terminal using a [USB to UART converter](#). For detailed instructions, check out [this tutorial](#).

Additional Notes and Information

The complete application code and a ready-to-use project are available through the NECTO Studio Package Manager for direct installation in the [NECTO Studio](#). The application code can also be found on the MIKROE [GitHub](#) account.

Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

[ClickID](#)

Downloads

[HVAC 2 click example package](#)

[HVAC 2 click 2D and 3D files v101](#)

[HVAC 2 click schematic v101](#)

[SCD4x datasheet](#)

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