MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

Environment 3 Click

PID: MIKROE-4893

Environment 3 Click is a compact add-on board that contains a four-in-one environmental measurement solution. This board features BME688, a first gas sensor with Artificial Intelligence (AI), and integrated high-linearity/high-accuracy pressure, humidity, and temperature sensors from Bosch Sensortec. The BME688 can detect Volatile Organic Compounds (VOCs), Volatile Sulfur Compounds (VSCs), and other gases such as carbon monoxide and hydrogen in part per billion (ppb) range. It provides absolute temperature accuracy, typical of ±1°C, and best performance when operated within the pressure, temperature, and humidity range of 300-110hPa, 0-65°C, and 10-90%RH. Also, it comes with a configurable host interface that supports both SPI and I2C serial communication. This Click board™ is suitable for indoor and outdoor air quality measurement, detection of unusual gases and smells, and various temperature and humidity-related applications.

Environment 3 Click is supported by a mikroSDK compliant library, which includes functions that simplify software development. This Click board™ comes as a fully tested product, ready to be used on a system equipped with the mikroBUS™ socket.

How does it work?

Environment 3 Click as its foundation uses the BME688, air quality MEMS sensor that combines gas, humidity, temperature, and barometric pressure sensing from Bosch Sensortec. The BME688 combines reliable high-precision sensors with wide-ranging gas detection and innovative AI capabilities, enabling users to rapidly develop various applications to improve well-being, lifestyle, and sustainability. It offers reduced power consumption, improved accuracy specifications, and a configurable host interface for the fastest data transfer. It covers extended operating pressure, humidity, and temperature ranges from 300-1100hPa, 0-100%RH

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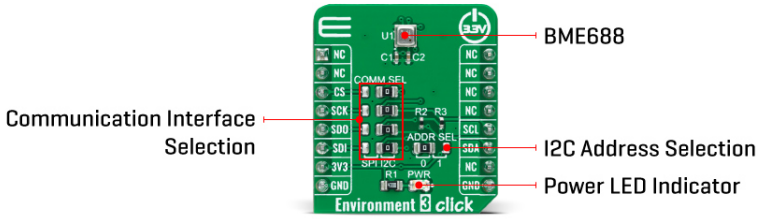
and from -40°C to +85°C with the accuracy of ±3%RH and ±0.5°C.



The BME688 supports a full suite of operational modes, which provides vast flexibility in optimizing the device for power consumption, resolution, and filter performance. Additionally, it also has a gas scanner function; it can detect Volatile Organic Compounds (VOCs), Volatile Sulfur Compounds (VSCs), and other gases such as carbon monoxide and hydrogen in part per billion (ppb) range. In standard configuration, the presence of VSCs is being detected as an indicator for, e.g., bacteria growth, where the gas scanner can be customized for sensitivity, selectivity, data rate, and power consumption.

Based on its main features listed above, this Click board is the best choice for indoor and outdoor air quality measurement applications, detection of unusual gases that might indicate leakage or fire, early detection of odors and bad smells, and other various temperature and humidity-related applications.

Environment 3 Click allows using both I2C and SPI interfaces. The selection can be made by positioning SMD jumpers labeled as COMM SEL to an appropriate position. Note that all the jumpers' positions must be on the same side, or the Click board™ may become unresponsive. While the I2C interface is selected, the BME688 allows choosing the least significant bit (LSB) of its I2C slave address using the SMD jumper labeled as ADDR SEL to an appropriate position marked as 0 or 1.

This Click board™ can be operated only with a 3.3V logic voltage level. The board must perform appropriate logic voltage level conversion before use with MCUs with different logic levels. However, the Click board™ comes equipped with a library containing functions and an example code that can be used, as a reference, for further development.

BME AI-Studio Tool

Bosch Sensortec’s tool for the BME688 sensor, such as the BME AI-Studio Software, allows users to develop, verify, and deploy custom gas classification use-cases. It enables sensor configuration, data analysis, training, and optimization of application-specific solutions. The BME688 detects gases by measuring their unique electronic fingerprint and therefore distinguish different gas compositions, enabling a broad spectrum of new applications. Thus, the BME AI-Studio tool allows customers to train the BME688 gas scanner feature on their specific applications, like home appliances, IoT, or Smart Home solutions.

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For all additional information, the users can visit the official Bosch Sensortec BME688 Software page.

Specifications

Type	Environmental
Applications	Can be used for indoor and outdoor air quality measurement, detection of unusual gases and smells, and various temperature and humidity-related applications
On-board modules	BME688 - air quality MEMS sensor that combines gas, humidity, temperature, and barometric pressure sensing from Bosch Sensortech
Key Features	Four-in-one environmental measurement solution, wide-ranging gas detection, high-linearity, high-accuracy and precision, low power consumption, configurable host interface, and more
Interface	I2C,SPI
Feature	No ClickID
Compatibility	mikroBUS™
Click board size	S (28.6 x 25.4 mm)
Input Voltage	1.8V,3.3V

Pinout diagram

This table shows how the pinout on Environment 3 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS™				Pin	Notes
	NC	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	NC	
SPI Chip Select	**CS**	3	CS	RX	14	NC	
SPI Clock	**SCK**	4	SCK	TX	13	NC	
SPI Data OUT	**SDO**	5	MISO	SCL	12	**SCL**	I2C Clock
SPI Data IN	**SDI**	6	MOSI	SDA	11	**SDA**	I2C Data
Power Supply (3.3V/1.8V)	**3.3V**	7	3.3V	5V	10	NC	
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1-JP4	COMM SEL	Right	Communication

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			Interface Selection SPI/I2C: Left position SPI, Right position I2C
JP5	ADDR SEL	Left	I2C Address Selection 0/1: Left position 0, Right position 1

Environment 3 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	1.8	-	3.3	V
Operating Gas Range	0	-	500	IAQ Index
Operating Pressure Range	300	-	1100	hPa
Pressure Accuracy	-	±0.6	-	hPa
Humidity Accuracy	0	-	100	%RH
Operating Temperature Range	-	±3	-	%RH
Temperature Accuracy	-40	+25	+85	°C
Receiver inputs voltage range	-	±0.5	-	°C

Software Support

We provide a library for the Environment 3 Click as well as a demo application (example), developed using MikroElektronika compilers. The demo can run on all the main MikroElektronika development boards.

Package can be downloaded/installed directly from NECTO Studio Package Manager(recommended way), downloaded from our LibStock™ or found on Mikroe github account.

Library Description

This library contains API for Environment 3 Click driver.

Key functions

- environment3_get_all_data This function reads the temperature, humidity, pressure, and gas resistance data from the sensor.
- environment3_enable_heater This function enables or disables the gas sensor heater.
- environment3_soft_reset This function soft-resets the sensor.

Example Description

This example demonstrates the use of Environment 3 Click board™.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager(recommended way), downloaded from our LibStock™ or found on Mikroe github account.

Other Mikroe Libraries used in the example:

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- MikroSDK.Board
- MikroSDK.Log
- Click.Environment3

Additional notes and informations

Depending on the development board you are using, you may need USB UART click, USB UART 2 Click or RS232 Click to connect to your PC, for development systems with no UART to USB interface available on the board. UART terminal is available in all MikroElektronika compilers.

Note: The BME688 gas sensor can detect Volatile Organic Compounds (VOCs) and provides ready-made data that are processed more accurately compensated. We must emphasize that our library does not allow the calculation of the VOC.

The users can visit the official Bosch Sensortec BME688 Software page for all additional information about the VOC libraries.

mikroSDK

This Click board™ is supported with mikroSDK - MikroElektronika Software Development Kit. To ensure proper operation of mikroSDK compliant Click board™ demo applications, mikroSDK should be downloaded from the LibStock and installed for the compiler you are using.

For more information about mikroSDK, visit the official page.

Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click Boards™

Downloads

Environment 3 click example on Libstock

Environment 3 click schematic v101

BME688 datasheet

Environment 3 click 2D and 3D files v101

Environment 3 click - 1.8V schematic v101

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