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

Air quality 9 Click





PID: MIKROE-5060

Air quality 9 Click is a compact add-on board containing a best-in-class air-quality sensing solution. This board features the ENS160, a digital multi-gas sensor solution based on metal oxide (MOX) technology with four MOx sensor elements from ScioSense. Each sensor element has independent hotplate control to detect a wide range of gases. The ENS160 series features TrueVOC™ air quality detection and supports intelligent algorithms, which calculate CO2 equivalents, TVOC, air quality index (AQI), and perform humidity and temperature compensation. This Click board™ is interface-configurable and characterized by outstanding long-term stability and lifetime. This Click board™ makes an excellent choice for detecting unhealthy air conditions, such as personal air-quality monitors, HVAC, smart thermostats, and other air quality-related applications.

Air quality 9 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.

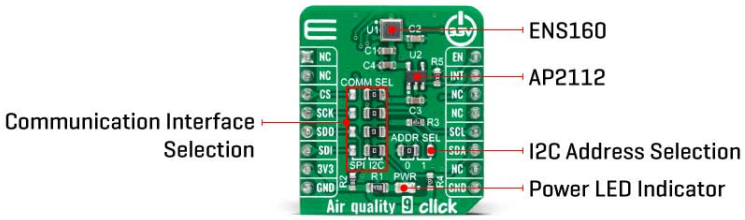
How does it work?

Air quality 9 Click as its foundation uses the ENS160, an indoor air quality sensor based on metal oxide (MOX) technology with four MOx sensor elements from ScioSense. This sensor comes with sophisticated sensor fusion algorithms to produce measurement outputs that are better tuned to the natural response of human occupants. The multi-element TrueVOC™ technology, on which the ENS160 is based, is sensitive to oxidizing gases such as ozone which affect the quality of indoor air, as well as to a wide range of volatile organic compounds (VOCs) such as ethanol, toluene, as well as hydrogen and nitrogen dioxide with superior selectivity and accuracy. The ENS160 complies with worldwide Indoor Air quality (IAQ) signal standards and is

Mikroe produces entire development toolchains for all major microcontroller architectures.
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.
ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.
ISO 9001: 2015 certification of quality management system (QMS).

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

designed for high volume and reliability.



For best performance, the sensor needs to be operated in normal indoor air in the range -5 to 60°C (typical: 25°C), while relative humidity ranges from 20 to 80%RH (typical: 50%RH), non-condensing with no aggressive or poisonous gases present. Prolonged exposure to environments outside these conditions can affect the performance and lifetime of the sensor.

This Click board™ allows using both I2C and SPI interfaces with a maximum frequency of 1MHz for I2C and 10MHz for SPI communication. 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 ENS160 allows choosing the least significant bit (LSB) of its I2C slave address using the SMD jumper labeled ADDR SEL. This Click board™ also possesses an additional interrupt signal, routed on the INT pin of the mikroBUS™ socket labeled as INT, indicating the status of the measurement process itself.

The ENS160 also requires a supply voltage of 1.8V to work regularly. Therefore, a small LDO regulator, AP2112 from Diodes Incorporated, provides a 1.8V out of mikroBUS™ 3V3 power rail. This LDO can be enabled or disabled through the EN pin routed to the PWM pin of the mikroBUS™ socket; hence, offering a switch operation to turn ON/OFF power delivery to the ENS160.

This Click board™ can be operated only with a 3.3V logic voltage level. The board must perform appropriate logic voltage level conversion before using 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.

Specifications

Type	Air Quality,Environmental,Gas
Applications	Can be used for detecting unhealthy air conditions, such as personal air-quality monitors, HVAC, smart thermostats, and other air quality-related applications
On-board modules	ENS160 - indoor air quality sensor based on metal oxide (MOX) technology from ScioSense

Mikroe produces entire development toolchains for all major microcontroller architectures.
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.
ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.
ISO 9001: 2015 certification of quality management system (QMS).

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

Key Features	Low power consumption, support for up to 4 independent MOX gas sensors, integrated sensor measurement and heater drive control, multiple IAQ outputs (TVOC, eCO2, AQI), selectable interface, immunity to humidity and ozone, and more
Interface	I2C,SPI
Feature	No ClickID
Compatibility	mikroBUS™
Click board size	S (28.6 x 25.4 mm)
Input Voltage	3.3V

Pinout diagram

This table shows how the pinout on Air quality 9 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	**INT**	Interrupt
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**	7	3.3V	5V	10	**5V**	Power Supply
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 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

Air quality 9 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
TVOC	0	-	65.000	ppb
eCO_2	400	-	65.000	ppm CO_2
Operating Humidity Range	-5	50	85	%RH
Operating Temperature Range	-40	+25	+85	°C

Mikroe produces entire development toolchains for all major microcontroller architectures.
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.

ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.

ISO 9001: 2015 certification of quality management system (QMS).

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

Software Support

We provide a library for the Air quality 9 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 Air quality 9 Click driver.

Key functions

- airquality9_read_aqi_uba This function reads the Air quality Index per UBA (AQI-UBA).
- airquality9_read_tvoc This function reads the calculated Total Volatile Organic Compounds (TVOC) concentration per ppb.
- airquality9_read_eco2 This function reads the calculated Equivalent CO2 (eCO2) concentration per ppm.

Example Description

This example demonstrates the use of Air quality 9 Click board™ by reading and displaying outputs such as eCO2, TVOC and AQI in compliance with worldwide IAQ standards.

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:

- MikroSDK.Board
- MikroSDK.Log
- Click.AirQuality9

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.

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.

Mikroe produces entire development toolchains for all major microcontroller architectures.
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.

ISOQAR REGISTERED
UKAS MANAGEMENT SYSTEMS
ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.

TÜV SÜD ISO 9001
ISO 9001: 2015 certification of quality management system (QMS).

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

For more information about mikroSDK, visit the official page.

Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click boards™

Downloads

Air quality 9 click example on Libstock

ENS160 datasheet

AP2112 datasheet

Air quality 9 click 2D and 3D files

Air quality 9 click schematic

Mikroe produces entire development toolchains for all major microcontroller architectures.
Committed to excellency, we are dedicated to helping engineers bring the project development up to speed and achieve outstanding results.

ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.

ISO 9001: 2015 certification of quality management system (QMS).