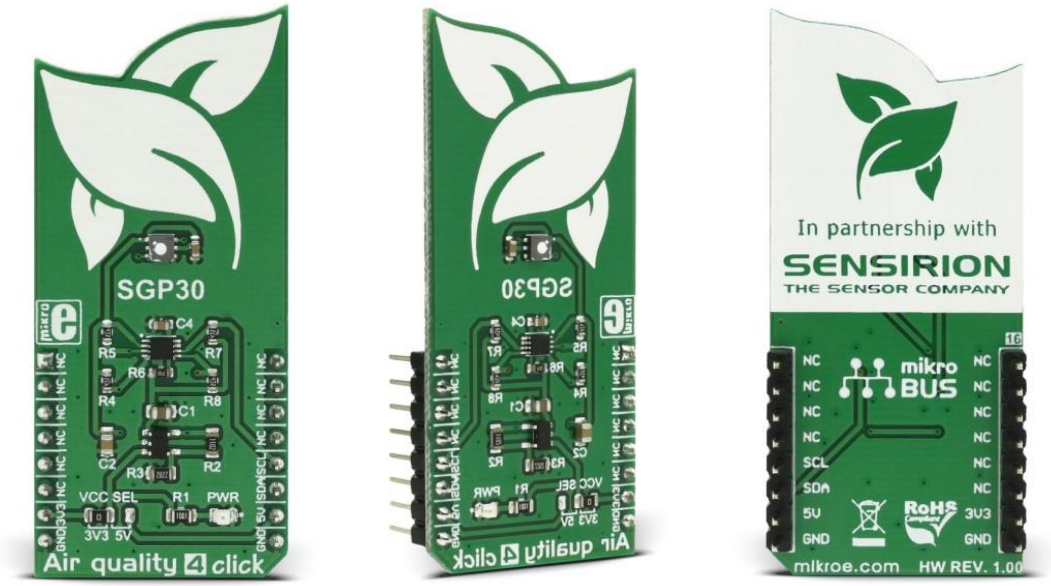
Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



Air quality 4 click

PID: MIKROE-2896

Weight: 25 g

Air quality 4 click is an advanced air quality sensing device that combines multiple metal-oxide sensing elements on a chip to provide detailed information of the air quality parameters. This click can output a TVOC value readings as well as the CO2 equivalent concentration readings in an indoor environment. Besides these compensated attributes, the click can also output raw values of H2 and Ethanol in the air, that can be used to calculate gas concentrations, relative to a reference concentration.

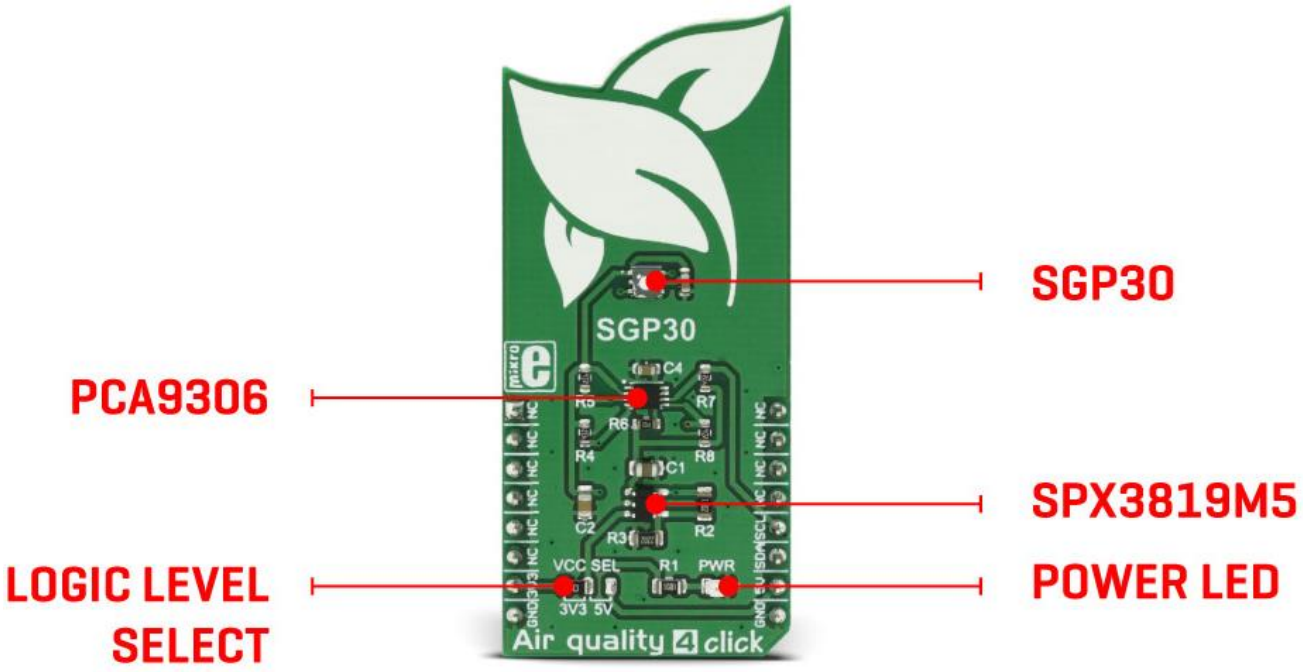
The sensor used on Air quality 4 click is actually a complete system of sensors on a chip, featuring I2C interface, a temperature controlled micro hotplate, and two compensated and processed indoor air quality signals. It is produced using the proprietary CMOSens® technology, which provides very detailed information and robustness against air contamination. These attributes make Air quality 4 click a perfect solution for various air conditioning systems, ventilation systems and other IoT applications where accurate, detailed and reliable air quality readings are required.

How does it work?

The sensor IC used on Air quality 4 click, is the SGP30 from Sensirion, a multi-pixel gas sensor for indoor applications. This sensor is actually a system of several metal-oxide sensing elements on a chip (pixels), used to measure and process readings of various gasses in the air and output them in a form of two complementary air quality readings - Total Volatile Organic Compounds (TVOC) [ppb] and CO2 equivalent signal [ppm].

The traditional metal-oxide (MOX) sensors suffer from sensitivity and responsiveness degradation, after being exposed to siloxanes over time. Siloxanes are specific compounds commonly found in the air, which negatively affect the MOX sensors. To overcome this problem, the SGP30 sensors are made by utilizing the advanced MOXSens® Technology, which provides these sensors with the unmatched robustness against siloxanes contamination. This results with unprecedented long-term stability and accuracy.

The SGP30 uses a dynamic baseline compensation algorithm and calibration parameters, to provide accurate readings of TVOC and CO2eq properties. These baseline values of the compensation algorithm can be stored externally and read back into the device with the appropriate I2C commands and can be used in an event of power down or restart. For the first 15 seconds after the I2C initialization command, the sensor is in an initialization phase of collecting sensor measurements and baseline compensation data and will return fixed values of 400 ppm CO2eq and 0 ppb TVOC, when measurement command is attempted.



The device also allows air humidity corrections over the results for both the compensated and raw values. However, an absolute humidity sensor should be used for obtaining the humidity reading. Readings from SHT click or any other similar humidity measuring device can be used for this purpose. The appropriate I2C command will store the value into the on-chip memory and perform the corrections, accordingly.

There are additional components on Air quality 4 click, that are used to provide necessary voltage levels for the SGP30 sensor IC. This sensor uses not so common voltage level of 1.8V, so to provide a proper communication with 3.3V and 5V capable MCUs, a small LDO voltage regulator has to be used, along with the level shifter, which provides required logic voltage levels. The SPX3819M5, a small 500mA LDO voltage regulator is used to provide the power supply of 1.8V for the SGP30. For the level shifting, the PCA9306 dual bidirectional I2C bus and SMBus voltage level shifter is used. This level shifter IC allows shifting (converting) the I2C signal levels to the voltage level selected by the VCC SEL onboard SMD jumper. This allows both 3.3V and 5V capable MCUs to be interfaced with the Air quality 4 click.

More detailed information about all the available I2C commands can be found in the SGP30 datasheet. However, all the functions and commands necessary to perform air quality readings, as well as functions used to calculate H2 and Ethanol concentration levels, are contained within the Air quality 4 click libraries, provided with this click board™. Their usage is demonstrated in the included example application, which can be used as a reference for a custom application design.

Specifications

Applications	A perfect solution for various air conditioning systems, ventilation systems and other IoT applications where accurate, detailed and reliable air quality readings are required.
On-board modules	SGP30 from Sensirion, a multi-pixel gas sensor, SPX3819M5, a small 500mA LDO voltage regulator from EXAR, PCA9306 dual bidirectional I2C bus and SMBus voltage level shifter from Texas Instruments
Key Features	This device combines multiple metal-oxide sensing elements on a chip to provide detailed information of the air quality parameters. SGP30 sensor is manufactured with the proprietary MOXSens® Technology that ensures unique long-term stability and accuracy.
Interface	I2C
Input Voltage	3.3V or 5V
Click board size	L (57.15 x 25.4 mm)

Pinout diagram

This table shows how the pinout on Air quality 4 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	
	NC	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

Air quality 4 click electrical specifications

Description	Min	Typ	Max	Unit
Measurement range of H2 and Ethanol	0		1000	ppm
Sampling frequency of H2 and Ethanol			40	Hz
Measurement range of TVOC	0		60000	ppb
Measurement range of CO2eq	400		60000	ppm
Sampling frequency of TVOC and CO2eq		1		Hz
I2C clock frequency	0		400	kHz

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED indicator
JP1	VCC SEL	Left	Voltage level selection, left position 3.3V, right 5V

Software support

We provide a library for Air quality 4 click on our LibStock page, as well as a demo application (example), developed using MikroElektronika compilers and mikroSDK. The provided click library is mikroSDK standard compliant. The demo application can run on all the main MikroElektronika development boards.

Library Description

Initializes and defines I2C bus driver and driver functions which perform measurements of H2, TVOC, CO2 and EthOH (Ethanol) concentration in the air. Check the documentation for more details.

Key functions

`void air_quality4_measureQuality(uint8_t *readAir)` - The function writes 6 bytes CO2 data (2 bytes) and TVOC data (2 bytes) with CRC data for each of them to a buffer, pointed by the function parameter.

`void air_quality4_getCO2AndTVOC(uint16_t *value)` - The function writes 2 bytes CO2 data and 2 bytes TVOC data without CRC data to a buffer, pointed by the function parameter.

`void air_quality4_measureSignal(uint8_t *readAir)` - The function writes 6 bytes H2 data (2 bytes) and EthOH - Ethanol data (2 bytes) with CRC data for each of them to a buffer, pointed by the function parameter.

`void air_quality4_getH2AndEthOH(uint16_t *value)` - The function writes 2 bytes of H2 data and 2 bytes of EthOH data without CRC data to a buffer, pointed by the function parameter.

Examples Description

- System Initialization - Initializes peripherals and pins. Application Initialization - Initializes click driver and gets ID data.
- Application Task - Performs measurements of air concentration for H2, EthOH(Ethanol), CO2 and TVOC data. Results of the measurement are output to the UART.

```
void applicationTask()
{
    air_quality4_getH2AndEthOH(&data_buffer[0]);

    IntToStr(data_buffer[0], text);
    mikrobus_logWrite("H2 value is: ", _LOG_TEXT);
    mikrobus_logWrite(text, _LOG_LINE);

    IntToStr(data_buffer[1], text);
    mikrobus_logWrite("EthOH value is: ", _LOG_TEXT);
    mikrobus_logWrite(text, _LOG_LINE);

    air_quality4_setBaseline();

    air_quality4_getCO2AndTVOC(&data_buffer[0]);

    IntToStr(data_buffer[0], text);
    mikrobus_logWrite("CO2 value is: ", _LOG_TEXT);
    mikrobus_logWrite(text, _LOG_LINE);

    IntToStr(data_buffer[1], text);
    mikrobus_logWrite("TVOC value is: ", _LOG_TEXT);
    mikrobus_logWrite(text, _LOG_LINE);

    Delay_ms(1000);
}
```

The full application code, and ready to use projects can be found on our LibStock page.

Additional notes and information

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. The terminal available in all MikroElektronika compilers, or any other terminal application of your choice, can be used to read the message.

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.

Downloads

mikroBUS™ standard specifications

LibStock: mikroSDK

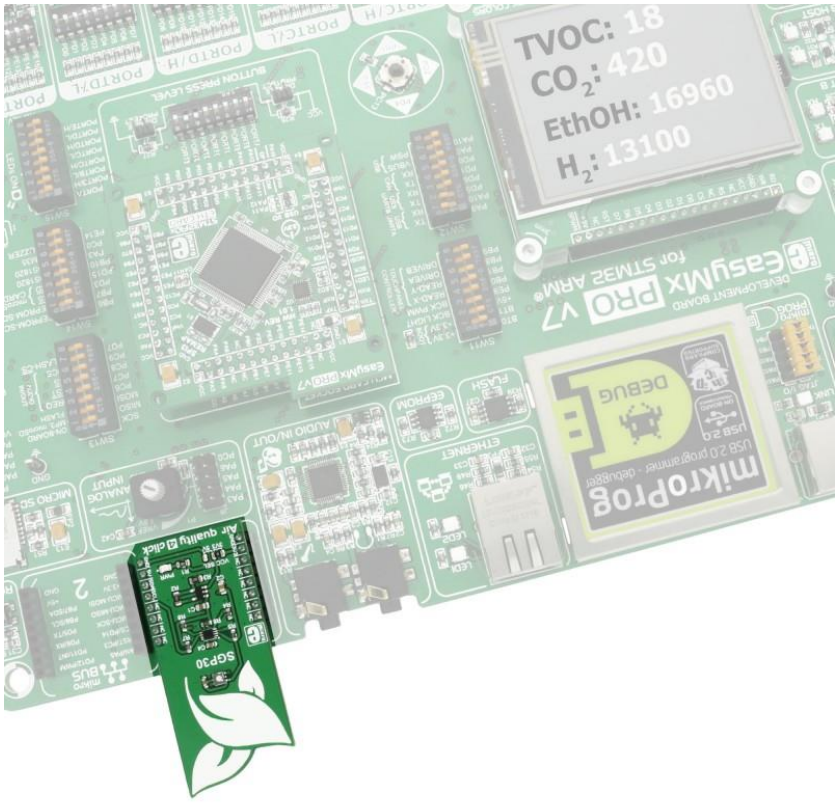
SGP30 datasheet

PCA9306 datasheet

Air quality 4 click - 2D and 3D files

LibStock: Air quality 4 click library

Air quality 4 click schematic



https://www.mikroe.com/air-quality-4-click 1-31-18