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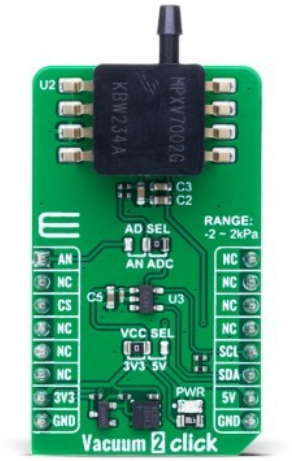
Vacuum 2 Click



PID: MIKROE-6528

Vacuum 2 Click is a compact add-on board designed for precise pressure measurement in industrial and medical applications. This board features the MPXV7002, an integrated on-chip pressure sensor from NXP, ensuring high accuracy and reliability. This Click board™ operates within a pressure range of -2kPa to 2kPa with a sensitivity of 1V/kPa and supports both analog and digital output via the MCP3221 ADC. It features a selectable logic voltage of 3.3V or 5V, making it compatible with a wide range of MCUs. Vacuum 2 Click is ideal for HVAC systems, respiratory monitoring, and industrial process control, where precise pressure sensing is essential for optimal performance and safety.

For more information about **Vacuum 2 Click** visit the official product page.

How does it work?

Vacuum 2 Click is based on the MPXV7002, an integrated on-chip signal-conditioned, temperature-compensated, and calibrated silicon pressure sensor from NXP. It provides precise pressure measurement capabilities, making it an excellent choice for various industrial and medical applications. At the core of Vacuum 2 Click, the MPXV7002 functions as a piezoresistive transducer built on monolithic silicon technology. It integrates cutting-edge micromachining techniques, thin-film metallization, and bipolar processing to achieve a high-level analog output signal directly proportional to the applied pressure. As a single-port gauge pressure sensor, it employs a patented silicon shear stress strain gauge configuration, enabling precise pressure measurements.

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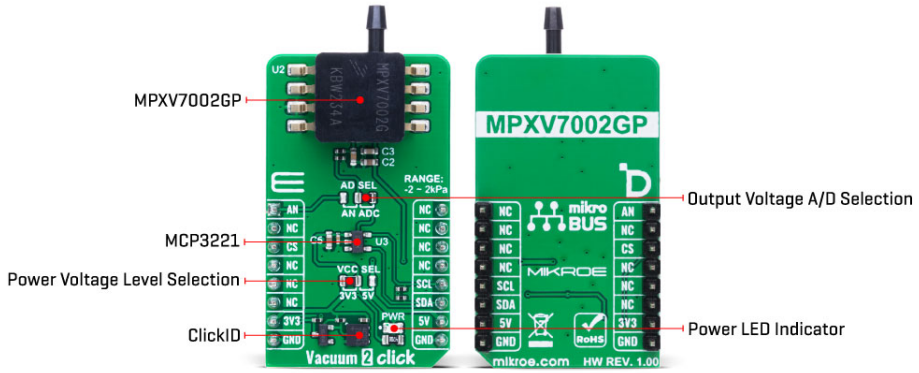

Designed to operate efficiently within a temperature range of +10°C to +60°C, the MPXV7002 ensures stable performance across varying environmental conditions. It offers a pressure measurement range from -2kPa to 2kPa, with a typical sensitivity of 1V/kPa, making it highly suitable for applications that require fine pressure adjustments and monitoring. Common use cases include HVAC systems, respiratory monitoring equipment, and industrial process control, where accurate pressure sensing plays a crucial role in optimizing performance and safety.

The MPXV7002's analog output can also be converted to a digital value using MCP3221, a successive approximation A/D converter with a 12-bit resolution from Microchip, using a 2-wire I2C compatible interface, or sent, as mentioned, directly to an analog output pin of the mikroBUS™ socket labeled as AN. Selection can be performed via an onboard SMD jumper labeled AD SEL, placing it in an appropriate position marked as AN and ADC.

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.

Specifications

Type	Pressure
Applications	Ideal for HVAC systems, respiratory monitoring, and industrial process control
On-board modules	MPXV7002 - integrated on-chip signal-conditioned, temperature-compensated, and calibrated silicon pressure sensor from NXP
Key Features	Wide pressure measurement range, high sensitivity, temperature compensation for stable performance, supports both analog and digital output, selectable logic voltage levels, mikroBUS™ compatibility, provided example code and library for easy integration, and more
Interface	Analog,I2C
Feature	ClickID

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Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

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

Notes	Pin	mikroBUS				Pin	Notes
Analog Output	**AN**	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

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
JP2	AD SEL	Right	Output Voltage A/D Selection AN/ADC: Left position AN, Right position ADC

Vacuum 2 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Pressure Range	-2	-	+2	kPa
Sensitivity	-	1	-	V/kPa

Software Support

Vacuum 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 the Vacuum 2 Click board. It showcases how to initialize the device, perform zero-pressure offset calibration, and measure pressure in Pascals (Pa).

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Key Functions

- vacuum2_cfg_setup Config Object Initialization function.
- vacuum2_init Initialization function.
- vacuum2_calib_offset This function calibrates the zero current offset value.
- vacuum2_read_vout_avg This function reads a desired number of sensor voltage output samples and averages it.
- vacuum2_read_pressure This function reads the pressure measurement.

Application Init

Initializes the logger and the Vacuum 2 Click driver. The application then performs zero-pressure offset calibration to ensure accurate pressure measurements. During the calibration, it is crucial to avoid applying pressure to the sensor.

Application Task

Continuously reads the pressure from the sensor and logs the values in Pascals (Pa).

Application Output

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

Vacuum 2 click example package

Vacuum 2 click 2D and 3D files v100

Vacuum 2 click schematic v100

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MPXV7002 datasheet