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Pressure 19 Click

PID: MIKROE-5089

Pressure 19 Click is a compact add-on board that contains a board-mount pressure sensor. This board features the MLX90817, a factory-calibrated absolute pressure sensor delivering ratiometric analog output from Melexis Technologies. The MLX90817 comes with a configurable host interface that supports I2C serial communication and configurable signal processing (the user is allowed to process the output signal in analog or digital form). It measures pressure from 0.2 up to 3bar with a pressure accuracy of ±33mbar. Its DSP-based architecture using a 16bit microcontroller provides outstanding performance in terms of initial accuracy and assures operation in a temperature range of -40°C to +120°C, ensuring stable operation under extreme conditions. This Click board™ is suitable for automotive, industrial, and consumer pressure measurements.

Pressure 19 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?

Pressure 19 Click as its foundation uses the MLX90817, a factory-calibrated absolute pressure sensor delivering ratiometric analog output from Melexis Technologies. The MLX90817 absolute pressure sensor includes a sensing element, analog to digital converter, signal processing part, and digital interface that sends the digital pressure data to the host controller. It measures pressure from 0.2 up to 3bar with pressure accuracy of ±33mbar over a wide operating temperature range at the industry’s lowest power.

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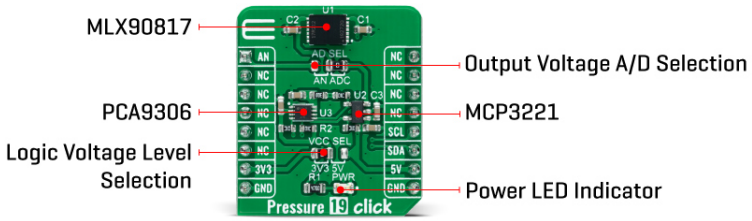

The MLX90817 contains a pressure sensing element that consists of a diaphragm, which reacts to a change in absolute pressure, realized in the silicon chip by wafer bonding on an etched cavity with a built-in reference vacuum. The internal strain increases, in particular at the border of the diaphragm, where piezo-resistive elements have been implanted into the silicon diaphragm forming a Wheatstone bridge, which acts as a transducer. The front end amplifies the signal from the bridge and performs a coarse offset compensation and an ADC conversion. Then, the DSP executes the compensations over temperature. Furthermore, the digital circuit provides some filtering, the possibility to linearize the pressure signal, and also implements the clamping function, delivering an analog output proportional to the pressure.

The analog output voltage of the MLX90817 can be converted to a digital value using MCP3221, a successive approximation A/D converter from Microchip, using a 2-wire I2C compatible interface, or can be sent directly to an analog pin of the mikroBUS™ socket labeled as AN. Selection can be performed by onboard SMD jumper labeled as AD SEL to an appropriate position marked as AN and ADC. Using MCP3221 and I2C interface, data transfers at rates of up to 100kbit/s in the Standard and 400kbit/s in the Fast Mode.

Since the sensor for operation requires a 5V logic voltage level only, this Click board™ also features the PCA9306 voltage-level translator from Texas Instruments. The I2C interface bus lines are routed to the dual bidirectional voltage-level translator, allowing this Click board™ to work with both 3.3V and 5V MCUs properly.

This Click board™ can operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. This way, it is allowed for both 3.3V and 5V capable MCUs to use the communication lines properly. However, the 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	Can be used for automotive, industrial, and consumer pressure measurements
On-board modules	MLX90817 - absolute pressure sensor from Melexis Technologies
Key Features	Low power consumption, high accuracy,

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	piezoresistive sensing principle, built-in temperature compensation function, allow to process the output signal in analog or digital form, system in package, factory calibrated, and more
Interface	Analog,I2C
Feature	No ClickID
Compatibility	mikroBUS™
Click board size	S (28.6 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on Pressure 19 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS™				Pin	Notes
Analog Signal	**AN**	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

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1	VCC SEL	Left	Logic Level Voltage 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

Pressure 19 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Operating Pressure Range	0.2	-	3	bar
Pressure Accuracy	-33	-	+33	mbar
Resolution	-	16	-	bits
Operating Temperature Range	-40	+25	+120	°C

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Software Support

We provide a library for the Pressure 19 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 Pressure 19 Click driver.

Key functions

- pressure19_get_pressure This function reads the output voltage and converts it to pressure in mBar.
- pressure19_read_voltage This function reads raw ADC value and converts it to proportional voltage level.
- pressure19_set_vref This function sets the voltage reference for Pressure 19 click driver.

Example Description

This example demonstrates the use of Pressure 19 Click board™ by reading and displaying the absolute pressure value in mBar.

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.Pressure19

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.

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For more information about mikroSDK, visit the official page.

Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click Boards™

Downloads

Pressure 19 click example on Libstock

MLX90817 datasheet

Pressure 19 click 2D and 3D files

Pressure 19 click schematic

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