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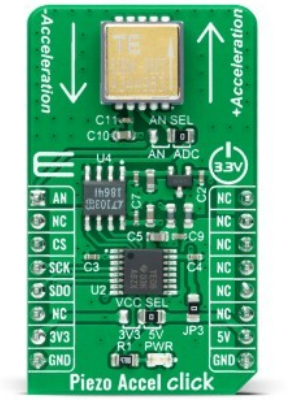
Piezo Accel Click



PID: MIKROE-4559

Piezo Accel Click is a compact add-on board containing an acceleration sensor based on PE technology. This board features the 820M1-0025, a piezoelectric accelerometer designed for embedded monitoring and preventive maintenance applications from TE Connectivity Measurement Specialties. This accelerometer features a stable piezoceramic crystal sealed in a fully hermetic LCC package available in a range from ±25g with a flat frequency response up to >6kHz. The piezoelectric technology used by this accelerometer has a proven track record for offering the reliable and long-term stable output required for condition monitoring applications where this Click board™ can be used.

Piezo Accel 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?

Piezo Accel Click, as its foundation, uses the 820M1-0025, a piezoelectric accelerometer designed for embedded condition monitoring and preventive maintenance applications from TE Connectivity. The 820M1-0025 accelerometer is available in the range of ±25g and features a flat frequency response up to >15kHz. Featuring stable piezoceramic crystals in shear mode sealed in a fully hermetic LCC package, the accelerometer incorporates an amplified ±1.25V output with optimum measurement resolution. This Click board™ is suitable for machine health monitoring and has superior resolution, dynamic range, and bandwidth to MEMS devices.

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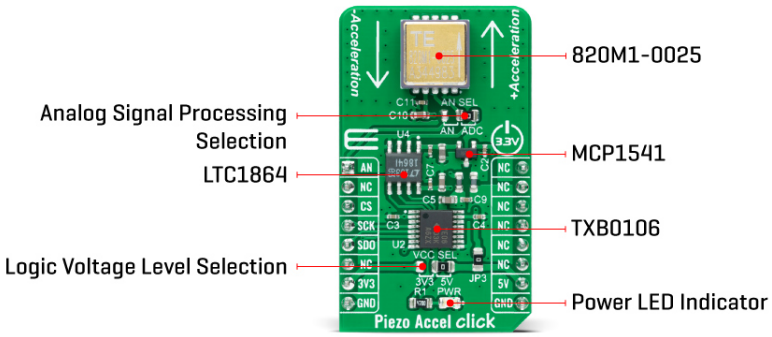

The piezoelectric technology incorporated in the 820M1-0025 accelerometer has a proven track record for offering the reliable and long-term stable output required for condition monitoring applications. This output signal can be processed in two ways, as an analog value or converted to a digital using the LTC1864, a successive approximation A/D converter with a 16-bit resolution from Analog Devices. This ADC includes a sample-and-hold feature and has a differential analog input with an adjustable reference pin used as the reference input resulting in accuracy and stability the 4.096V reference voltage level provided by the MCP1541 from Microchip.

Piezo Accel Click communicates with MCU using the 3-Wire SPI serial interface through an earlier mentioned AD converter, the LTC1864. The 5V logic level provides a needed reference voltage for one side of the TXB0106, a 6-bit bidirectional level shifting, and a voltage translator with automatic direction sensing from Texas Instruments. On another side of the level shifter, the reference voltage is taken from the 3.3V pin from the mikroBUS™.

In addition to the AD converter, the output of the 820M1-0025 can be also sent directly to an analog pin of the mikroBUS ™ socket labeled as AN. An output signal processing can be performed by placing an onboard SMD jumper labeled as AN SEL to an appropriate position marked as AN and ADC.

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 properly use the SPI communication lines. 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	Motion
Applications	Can be used for condition monitoring applications.
On-board modules	820M1-0025 - piezoelectric accelerometer designed for embedded monitoring and preventive maintenance applications from TE Connectivity
Key Features	Piezoelectric accelerometer, wide bandwidth,

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	superior resolution to MEMS devices, low power consumption, and more.
Interface	Analog,SPI
Feature	No ClickID
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 Piezo Accel 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	
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	NC	
	NC	6	MOSI	SDA	11	NC	
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	Right	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V
JP2	AN SEL	Right	Analog Signal Processing Selection AN/ADC: Left position AN, Right position ADC

Piezo Accel Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Acceleration Range	-	±25	-	g
Sensitivity	-	50	-	mV/g
Bandwidth	-	-	10	kHz
Operating Temperature Range	-40	+25	+125	°C

Software Support

We provide a library for the Piezo Accel Click as well as a demo application (example),

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developed using MIKROE compilers. The demo can run on all the main MIKROE development boards.

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

Library Description

This library contains API for Piezo Accel Click driver.

Key functions

- piezoaccel_adc_raw_read Piezo Accel read raw adc function.
- piezoaccel_adc_voltage_read Piezo Accel read adc converted to voltage function.
- piezoaccel_g_unit_read Piezo Accel read force of acceleration function.

Example Description

This application demonstrates the performance of Piezo Accel Click.

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

Other MIKROE Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.PiezoAccel

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 MIKROE compilers.

mikroSDK

This Click board™ is supported with mikroSDK - MIKROE 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

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Click board™ Catalog

Click boards™

Downloads

Piezo Accel click 2D and 3D files

Piezo Accel click schematic

LTC1864 datasheet

820M1 datasheet

Piezo Accel click example on Libstock

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