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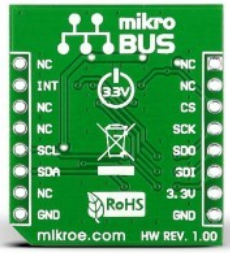
Accel Click



PID: MIKROE-1194

Accel Click is a compact add-on board that contains an acceleration sensor. This board features the ADXL345, an ultra-low power, 3-axis accelerometer with high resolution (13-bit) measurements from Analog Devices. It allows selectable full-scale acceleration measurements in ranges of ±2g, ±4g, ±8g, or ±16g in three axes with a configurable host interface that supports both SPI and I2C serial communication. Several special sensing functions are also provided (presence or lack of motion detection, tap, and free-ball sense) alongside a low-power mode that enables intelligent motion-based power management. This Click board™ is suitable for various applications such as motion-activated functions, measurement of inclination changes, and tilt-sensing applications.

How does it work?

Accel Click is based on the ADXL345, a complete 3-axis acceleration measurement system that operates at low power consumption levels from Analog Devices. It measures both dynamic accelerations, resulting from motion or shock, and static acceleration, such as gravity, and allows selectable full-scale acceleration measurements in ranges of ±2g, ±4g, ±8g, or ±16g with a resolution of 4mg/LSB on the ±2g range. Acceleration is reported digitally, communicating via the SPI or the I2C protocol and providing 16-bit output resolution. Its high resolution also enables the measurement of inclination changes less than 1.0°.

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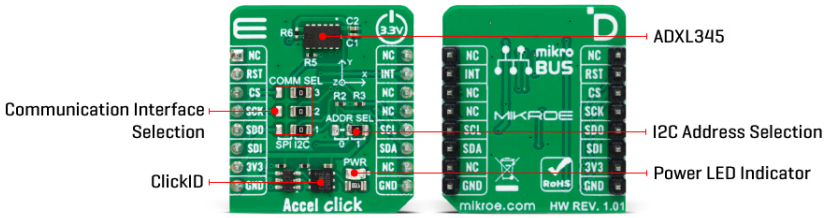

The ADXL345 supports several special sensing functions. Activity and inactivity sensing detect the presence or lack of motion by comparing the acceleration on any axis with user-set thresholds, while tap sensing detects single and double taps in any direction. Besides, a free-fall sensing feature detects if the device is falling. All these functions can be mapped to the interrupt pin routed on the INT pin of the mikroBUS™ socket.

Accel Click allows using both I2C and SPI interfaces. The selection can be made by positioning SMD jumpers labeled as COMM SEL in 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 ADXL345 allows choosing the least significant bit (LSB) of its I2C slave address using the SMD jumper labeled ADDR SEL.

An integrated memory management system with a 32-level first in, first out (FIFO) buffer can be used to store data to minimize host processor activity and lower overall system power consumption. Low power modes enable intelligent motion-based power management with threshold sensing and active acceleration measurement at low power dissipation.

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.

Tutorials

[MEMS Sensors: Conversion of the Physical World to the Digital World - MIKROE Learn]

MEMS sensors or Micro-Electro-Mechanical Systems are the sensors and actuators at the bare metal of embedded systems. MEMS are used for airbag systems, automatic door locks, security systems , earthquake detection, inkjet printers, kitchen appliances, and of course computer peripherals. In this blog we will explore the different ways you can use MEMS sensors.

Specifications

Type	Motion
Applications	Can be used for various applications such as motion-activated functions, measurement of

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	inclination changes, and tilt-sensing applications
On-board modules	ADXL345 - complete 3-axis acceleration measurement system from Analog Devices
Key Features	Low power consumption, high-performance, high resolution, several sensing function, embedded memory management system with FIFO technology, interrupt, and more
Interface	I2C,SPI
Feature	ClickID Manifest,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 Accel 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	
ID SEL	**RST**	2	RST	INT	15	**INT**	Interrupt
SPI Select / ID COMM	**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	NC	
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1-JP3	COMM SEL	Right	Communication Interface Selection SPI/I2C: Left position SPI, Right position I2C
JP4	ADDR SEL	Right	I2C Address Selection 0/1: Left position 0, Right position 1

Accel Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Acceleration Range	±2	-	±16	g
Full Resolution	-	13	-	bits

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Sensitivity (Full Resolution)	230	256	282	LSB/g

Software Support

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

Key functions

- Function raw read X axis
- Function raw read Y axis
- Function raw read Z axis

Example Description

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.Accel

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

Accel click example on Libstock

Accel Click User Manual

ADXL345 datasheet

Accel click schematic

Accel click 2D and 3D files