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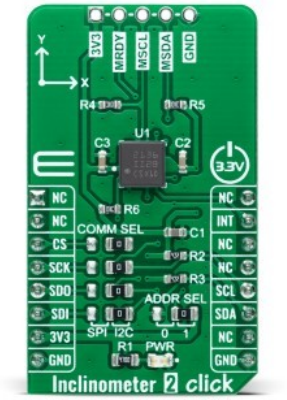
Inclinometer 2 Click



PID: MIKROE-5156

Inclinometer 2 Click is a compact add-on board that measures the orientation angle of an object with respect to the force of gravity. This board features the IIS2ICLX, high accuracy, and resolution two-axis inclinometer from STMicroelectronics. It allows selectable full-scale measurements in ranges of ±0.5/±1/±2/±3g in two axes with a configurable host interface that supports both SPI and I2C serial communication. The sensing element is manufactured using a dedicated micromachining process developed by STMicroelectronics to produce inertial sensors and actuators on silicon wafers. Its high accuracy, stability over temperature, and repeatability make this Click board™ particularly suitable for inclination measurement applications such as precision inclinometers, equipment installation/monitoring, robotics, industrial automation, and more.

Inclinometer 2 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?

Inclinometer 2 Click as its foundation uses the IIS2ICLX, a high-accuracy (ultra-low noise, high stability, and repeatability) and low-power two-axis linear accelerometer with digital output from STMicroelectronics. The IIS2ICLX has a selectable full scale of ±0.5/±1/±2/±3 g and is capable of providing the measured accelerations to the application over a selectable digital interface. Its high accuracy, stability over temperature, and repeatability make IIS2ICLX particularly suitable for inclination measurement applications.

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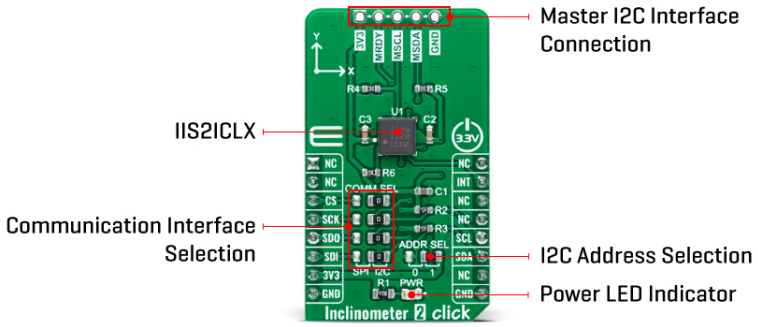

The IIS2ICLX has an unmatched set of embedded features (programmable FSM, Machine Learning Core, sensor hub, FIFO, event decoding, and interrupts) and delivers high accuracy and performance at low power. The sensing element is manufactured using a dedicated micromachining process developed by STMicroelectronics to produce inertial sensors and actuators on silicon wafers.

This Click board™ allows using both I2C and SPI interfaces with a maximum frequency of 400kHz for I2C and 10MHz for SPI communication. 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 IIS2ICLX allows choosing the least significant bit (LSB) of its I2C slave address using the SMD jumper labeled ADDR SEL. This Click board™ also possesses an additional interrupt signal, routed on the INT pin of the mikroBUS™ socket labeled as INT, indicating the status of the measurement process itself.

The hardware flexibility of this Click board™ allows connecting the pins with different mode connections to external sensors to expand functionalities such as adding a sensor hub. When sensor hub mode (Mode 2) is enabled, the I²C master interface for connecting external sensors is available on an onboard header reserved for the Master I2C interface, which is unpopulated by default.

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.

Specifications

Type	Motion
Applications	Can be used suitable for inclination measurement applications such as precision inclinometers, equipment installation/monitoring, robotics, industrial automation, and more
On-board modules	IIS2ICLX - two-axis inclinometer with digital output from STMicroelectronics

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Key Features	Low power consumption, selectable full scale, low noise performance, high stability and repeatability, selectable interface, I2C Master interface, high accuracy, and more
Interface	I2C,SPI
ClickID	No
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V

Pinout diagram

This table shows how the pinout on Inclinometer 2 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	**INT**	Interrupt
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	**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	ADDR SEL	Right	I2C Address Selection 0/1: Left position 0, Right position 1
JP2-JP5	COMMSEL	Right	Communication Interface Selection SPI/I2C: Left position SPI, Right position I2C
J1	-	Unpopulated	Master I2C Interface Connection Header

Inclinometer 2 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Measurement Range	±0.5	-	±3.0	g
Sensitivity	0.015	-	0.122	mg/LSB
Operating Temperature Range	-40	+25	+105	°C

Software Support

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We provide a library for the Inclinometer 2 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 Inclinometer 2 Click driver.

Key functions

- inclinometer2_get_int_pin This function returns the INT pin logic state.
- inclinometer2_get_accel This function checks if the accel data is ready and than reads the accel X and Y axis in mg.
- inclinometer2_get_temperature This function checks if the temperature data is ready and than reads the temperature in Celsius.

Example Description

This example demonstrates the use of Inclinometer 2 Click board™ by reading and displaying the Accel X and Y axis data (mg) and the temperature (degC) on the USB UART.

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.Inclinometer2

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.

For more information about mikroSDK, visit the official page.

Resources

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Downloads

Inclinometer 2 click example on Libstock

Inclinometer 2 click 2D and 3D files

IIS2ICLX datasheet

Inclinometer 2 click schematic