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Mag&Accel Click

PID: MIKROE-6027

Mag&Accel Click is a compact add-on board representing a moving object and magnetic switch as a single solution. This board features the NMH1000, a Hall-effect magnetic field switch, and the FXLS8974CF, a 3-axis low-g accelerometer, both from NXP Semiconductor. These two sensors are high-performance, low-power devices covering all of Earth's surface elevations. By combining the magnetic field and acceleration data, you can easily determine your application's moving and magnetic field sensing. This Click board™ makes the perfect solution for the development of various industrial and home applications where magnetic field detection and the acceleration of the object are the essence.

Mag&Accel Click is fully compatible with the mikroBUS™ socket and can be used on any host system supporting the mikroBUS™ standard. It comes with the mikroSDK open-source libraries, offering unparalleled flexibility for evaluation and customization. What sets this Click board™ apart is the groundbreaking ClickID feature, enabling your host system to seamlessly and automatically detect and identify this add-on board.

How does it work?

Mag&Accel Click is based on the NMH1000, a Hall-effect magnetic field switch, and the FXLS8974CF, a 3-axis low-g accelerometer, both from NXP Semiconductor. The switch processes its input over the functional blocks that consist of a configurable state machine, an analog-to-voltage conversion of the input, and a comparison to generate the bi-state output. The output is arranged in a linear succession. The NMH1000 has a transducer that generates a small charge proportional to the proximal magnetic flux density. The Hall-effect charge is converted to voltage and compared with the pre-defined threshold voltage. This determines the state of the switch's output.

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The FXLS8974CF accelerometer has a ±2/4/8/16 g user-selectable, full-scale measurement range with a 12-bit acceleration data output. It can work in several modes, such as active, hibernate, standby, and more. The integrated FIFO/LIFO buffer of 144 bytes can store 32 12-bit X/Y/Z/ data triplets. The sensor also has flexible data change detection, such as motion, freefall, and other inertial events.

Mag&Accel Click uses a standard 2-wire I2C interface to allow the host MCU to communicate with the accelerometer. The FXLS8974CF uses a motion MOT pin to interrupt the host MCU if the motion is detected, with an accompanying Motion LED for a visual presentation. The NMH1000 is set in a standalone mode. The output of the magnetic switch, according to the pre-defined threshold, is available over the output OUT pin and, in addition, over the Field LED for visual presentation. The threshold itself can be set over the THR SEL jumper between high, medium, and low thresholds (±230, ±160, ±100G). You can also set the sampling rate over the ODR SEL jumper between high, medium, and low (10, 1, 0.1Hz).

In addition, there is an LP Cut jumper at the bottom of the Mag&Accel Click board™, with which a low power consumption feature can be achieved.

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. Also, it comes equipped with a library containing functions and an example code that can be used as a reference for further development.

Specifications

Type	Acceleration,Magnetic,Motion
Applications	Can be used for the development of various industrial and home applications where the magnetic field detection and the acceleration of the object is an essence
On-board modules	NMH1000 - Hall-effect magnetic field switch from NXP Semiconductor FXLS8974CF - 3-axis low-g accelerometer both from NXP Semiconductor
Key Features	Selectable threshold, selectable sample rate, output indicates of absence of a magnetic field

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	as compared to an internally set threshold, consists of a state machine, analog-to-voltage conversion, generation of a bi-state output, arranged in linear succession, user-selectable, full-scale measurement ranges, high precision, FIFO buffers, flexible sensor data change detection function, and more
Interface	Analog,I2C
ClickID	Yes
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 Mag&Accel Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin		mikro™ BUS			Pin	Notes
Magnetic Field Output	**FLD**	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	**MOT**	Motion Output
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	NC	
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
LD2	Motion	-	Motion Detection LED Indicator
LD3	Field	-	Magnetic Field LED Indicator
JP1	LP Cut	Connected	Low Power Selection
-	THR SEL	Left	Threshold Selection H/L: Left position H, Right position L
-	ODR SEL	Left	Sampling Rate Selection H/L: Left position H, Right position L

Mag&Accel Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V

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Magnetic Field Threshold	±100	-	±230	G
Sensitivity	-	1.75	-	G/LSB
Acceleration Measurement Range	±2	-	±16	g

Software Support

We provide a library for the MagAccel 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 MagAccel Click driver.

Key functions

- magaccel_get_axes_data This function reads the accelerometer sensor axes data.

- magaccel_set_op_mode This function sets the desired operating mode of the sensor.

- magaccel_check_mag_field This function checks the magnetic field y by reading the states of the FLD (AN) pin.

Example Description

This library contains API for the Mag&Accel Click driver. The library initializes and defines the I2C drivers to write and read data from registers, as well as the default configuration for reading accelerator data.

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.

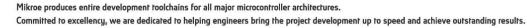Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.MagAccel

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

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downloaded from the LibStock and installed for the compiler you are using.

For more information about mikroSDK, visit the official page.

Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click boards™

Downloads

FXLS8974CF datasheet

NMH1000 datasheet

Mag&Accel click schematic

Mag&Accel click 2D and 3D files

Mag&Accel click example on Libstock