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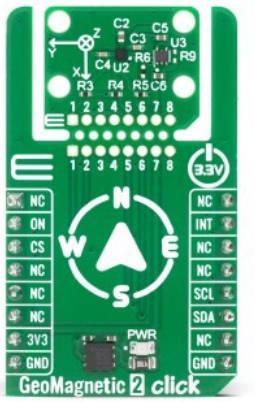
GeoMagnetic 2 Click



PID: MIKROE-6925

GeoMagnetic 2 Click is a compact add-on board designed for 3-axis geomagnetic field sensing for orientation, motion tracking, and positioning applications. It is based on the BMM350, a 16-bit 3-axis magnetometer from Bosch Sensortec. Built on Bosch's proprietary TMR technology, this sensor offers magnetic sensing across three perpendicular axes, a typical measurement range of ±2000µT on all axes, approximately 0.1µT resolution, support for both normal and forced operating modes, excellent temperature stability, I2C-compatible communication with I3C mixed bus coexistence, and MIKROE's Click Snap feature for flexible standalone implementation. This Click board is ideal for electronic compasses, navigation systems, augmented, virtual, and mixed reality devices, gaming platforms, image stabilization systems, indoor navigation, dead reckoning, and robotics applications.

For more information about **GeoMagnetic 2 Click** visit the official product page.

How does it work?

GeoMagnetic 2 Click is based on the BMM350, a 16-bit 3-axis magnetometer from Bosch Sensortec, built on Bosch's proprietary TMR technology to deliver accurate magnetic field sensing across three perpendicular axes. This sensor integrates an internal evaluation circuitry that converts the geomagnetic sensing data into digital output, which can be accessed through I2C or I3C communication interfaces. The BMM350 supports a typical magnetic field measurement range of ±2000µT on the X, Y, and Z axes, with a magnetic field resolution of approximately 0.1µT, enabling detailed and responsive field detection suitable for demanding motion-aware systems such as electronic compasses, navigation systems, augmented, virtual, and mixed reality devices, high-end gaming platforms, image stabilization systems, indoor navigation, dead reckoning, and robotics.

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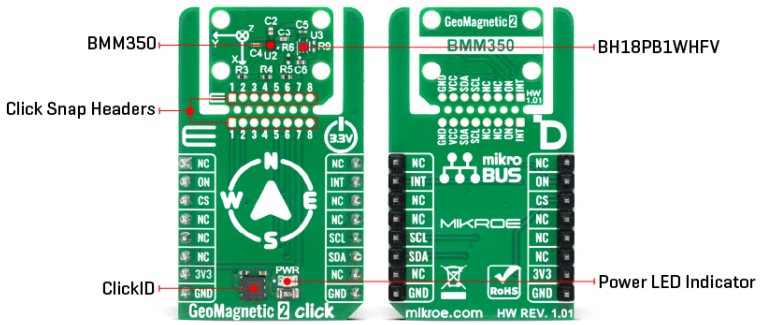

The BMM350 supports both periodic operation in normal mode and triggered operation in forced mode, allowing flexible power and performance optimization depending on the application requirements. In addition, it features excellent temperature behavior with outstandingly low temperature coefficients of offset and sensitivity, ensuring stable and dependable measurements even under varying thermal conditions.

This Click board™ is designed in a unique format supporting the newly introduced MIKROE feature called "Click Snap." Unlike the standardized version of Click boards, this feature allows the main sensor/IC/module area to become movable by breaking the PCB, opening many new possibilities for implementation. Thanks to the Snap feature, the BMM350 can operate autonomously by accessing its signals directly on the pins marked 1-8. Additionally, the Snap part includes a specified and fixed screw hole position, enabling users to secure the Snap board in their desired location.

The BMM350 communicates with the host MCU through an I2C-compatible interface with support for I3C mixed bus coexistence, operating at address of 0x14. The BMM350 does not require a specific Power-Up sequence but requires a supply voltage of 1.8V to work correctly. Therefore, a small regulating LDO, the BH18PB1WHFV, provides a 1.8V out of 3.3V mikroBUS™ power rail controlled via ON pin. Its ability to support logic levels down to 1.2V without the need for external level shifting simplifies direct interfacing with modern low-voltage MCUs.It also uses the INT pin for interrupt-signal generation when new data is available.

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. It also comes equipped with a library containing functions and example code that can be used as a reference for further development.

Click Snap

Click Snap is an innovative feature of our standardized Click add-on boards, designed to bring greater flexibility and optimize your prototypes. By simply snapping the PCB along predefined lines, you can easily detach the main sensor/IC/module area, reducing the overall size, weight, and power consumption - ideal for the final phase of prototyping. For more details about Click Snap, visit the official page dedicated to this feature.

Specifications

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Type	Magnetic,Motion
Applications	Ideal for electronic compasses, navigation systems, augmented, virtual, and mixed reality devices, gaming platforms, image stabilization systems, indoor navigation, dead reckoning, and robotics applications
On-board modules	BMM350 - 16-bit 3-axis magnetometer from Bosch Sensortec
Key Features	TMR technology, 3-axis magnetic field sensing, I2C interface, I3C mixed bus coexistence support, normal and forced operating modes, excellent temperature stability, low temperature coefficients of offset and sensitivity, Click Snap, and more
Interface	I2C,I3C
Feature	Click Snap,ClickID
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 GeoMagnetic 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	
Device Enable	**ON**	2	RST	INT	15	**INT**	Interrupt
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

GeoMagnetic 2 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Magnetic Field Range (X, Y, Z)	-2000	-	+2000	µT
Magnetic Field Resolution	-	0.1	-	µT

Software Support

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GeoMagnetic 2 Click demo application is developed using the NECTO Studio, ensuring compatibility with mikroSDK's open-source libraries and tools. Designed for plug-and-play implementation and testing, the demo is fully compatible with all development, starter, and mikromedia boards featuring a mikroBUS™ socket.

Example Description

This example demonstrates the use of the GeoMagnetic 2 Click board by reading compensated 3-axis magnetic field data and die temperature from the BMM350 sensor.

Key Functions

- geomagnetic2_cfg_setup This function initializes Click configuration structure to initial values.
- geomagnetic2_init This function initializes all necessary pins and peripherals used for this Click board.
- geomagnetic2_default_cfg This function executes a default configuration of GeoMagnetic 2 Click board.
- geomagnetic2_set_powermode This function transitions the device to the requested power mode with proper delays and state checks.
- geomagnetic2_enable_axes This function enables individual measurement axes.
- geomagnetic2_read_data This function reads raw 24-bit magnetic and temperature data via burst read and applies the full OTP compensation algorithm.

Application Init

Initializes the logger and the GeoMagnetic 2 driver, then applies the default configuration.

Application Task

Reads the compensated magnetic field data and die temperature from the BMM350 sensor when a data-ready interrupt is received on the INT pin and logs them to the UART terminal.

Application Output

This Click board can be interfaced and monitored in two ways:

- Application Output - Use the "Application Output" window in Debug mode for real-time data monitoring. Set it up properly by following this tutorial.
- UART Terminal - Monitor data via the UART Terminal using a USB to UART converter. For detailed instructions, check out this tutorial.

Additional Notes and Information

The complete application code and a ready-to-use project are available through the NECTO Studio Package Manager for direct installation in the NECTO Studio. The application code can also be found on the MIKROE GitHub account.

Resources

mikroBUS™

mikroSDK

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GeoMagnetic 2 click example package

GeoMagnetic 2 click 2D and 3D files v101

GeoMagnetic 2 click schematic v101

BMM350 datasheet