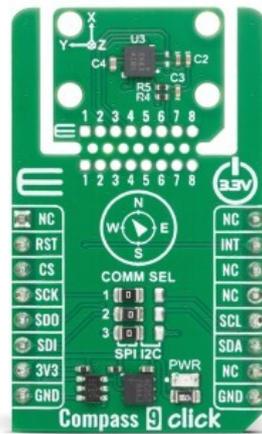


## Compass 9 Click



PID: MIKROE-6575

**Compass 9 Click** is a compact add-on board that provides 3-axis magnetic field measurement for navigation, orientation tracking, and electronic compass applications. It is based on the [MMC5983MA](#), an AEC-Q100 qualified magnetic sensor from [MEMSIC](#) with integrated signal processing and support for both SPI and I2C communication. This board offers a full-scale range of  $\pm 8$  Gauss with up to 18-bit resolution, low RMS noise, and a built-in SET/RESET function that ensures long-term stability by eliminating temperature-drift errors and residual magnetic polarization. Its unique Click Snap design allows the main sensing module to be detached for flexible placement. It is ideal for automotive navigation systems, robotics, smart compasses, and general-purpose magnetic sensing applications.

For more information about **Compass 9 Click** visit the official [product page](#).

### How does it work?

Compass 9 Click is based on the MMC5983MA, an AEC-Q100 qualified 3-axis magnetic sensor from MEMSIC that provides 3-axis magnetic field measurement for high-performance navigation, orientation tracking, and electronic compass applications. This sensor integrates on-chip signal processing and supports both I2C and SPI communication, allowing interfacing with a wide range of MCUs without requiring external A/D converters or additional timing resources. The MMC5983MA delivers accurate magnetic field measurement within a full-scale range of  $\pm 8$  Gauss, offering 0.25mG or 0.0625mG per LSB resolution depending on the selected 16-bit or 18-bit operation mode, while maintaining an exceptionally low total RMS noise level of 0.4mG, which enables heading accuracy of approximately  $\pm 0.5^\circ$  in demanding electronic compass applications.

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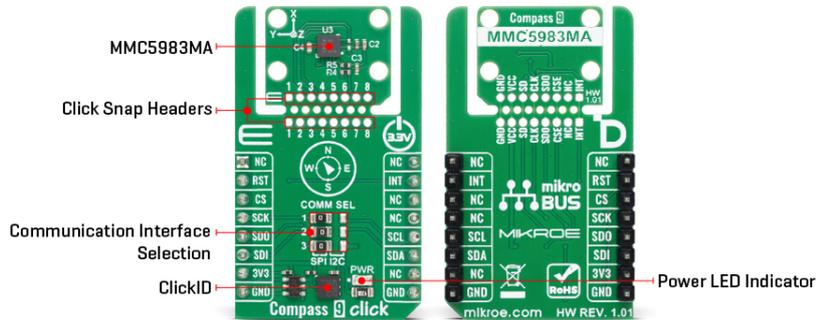
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This Click board™ is designed in a unique format supporting the newly introduced MIKROE feature called "Click Snap." Unlike the standardized version of Click boards, this feature allows the main sensor/IC/module area to become movable by breaking the PCB, opening many new possibilities for implementation. Thanks to the Snap feature, the MMC5983MA 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.

As mentioned, this board supports communication with the host MCU through either SPI (maximum clock frequency of 10MHz) or I2C (maximum clock frequency of 400kHz) interfaces, with SPI being the default option. The communication interface is selected by adjusting the COMM SEL jumpers to the desired position. To ensure proper functionality, all COMM jumpers must be set to the same interface. Beyond communication pins, this board is also equipped with data-ready interrupt pin (INT) that signals the host MCU when a specific condition is met, such as when measurement event of magnetic field or temperature is completed. This allows the system to respond immediately to changes without constantly polling the sensor, thereby saving processing power and energy.

Its integrated SET/RESET function plays a crucial role in maintaining long-term measurement stability by eliminating errors caused by changes in the null-field output due to temperature drift. This function can be executed continuously, periodically, or triggered automatically when the temperature changes by a predefined threshold, making it adaptable to different system requirements. Additionally, the SET/RESET mechanism removes residual magnetic polarization that may accumulate after exposure to strong external magnetic fields, preserving sensor linearity and reliability. Temperature data from the integrated temperature sensor is also available through the digital interface.

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,

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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

Type	Magnetic
Applications	Ideal for automotive navigation systems, robotics, smart compasses, and general-purpose magnetic sensing applications
On-board modules	MMC5983MA - $\pm 8$ Gauss 3-axis magnetic sensor from MEMSIC
Key Features	3-axis magnetic field measurement, high-resolution output, exceptionally low 0.4mG RMS noise, integrated function for temperature-drift compensation and removal of residual magnetic polarization, support for both SPI and I2C communication interfaces, a data-ready interrupt, an integrated temperature sensor, the Click Snap feature, and more
Interface	I2C, SPI
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 Compass 9 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
	NC	1	AN	PWM	16	NC	
ID SEL	<b>RST</b>	2	RST	INT	15	<b>INT</b>	Data-Ready Interrupt
SPI Select / ID COMM	<b>CS</b>	3	CS	RX	14	NC	
SPI Clock	<b>SCK</b>	4	SCK	TX	13	NC	
SPI Data OUT	<b>SDO</b>	5	MISO	SCL	12	<b>SCL</b>	I2C Clock
SPI Data IN	<b>SDI</b>	6	MOSI	SDA	11	<b>SDA</b>	I2C Data
Power Supply	<b>3.3V</b>	7	3.3V	5V	10	NC	
Ground	<b>GND</b>	8	GND	GND	9	<b>GND</b>	Ground

## Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1-JP3	COMM SEL	Left	Communication Interface Selection SPI/I2C: Left position

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SPI , Right position I2C

## Compass 9 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Magnetic Field Measurement Range	-8	-	+8	G
Resolution (16/18 bit)	-	0.25/0.0625	-	mG
Total RMS Noise	-	0.4	-	mG
Heading Accuracy	-	±0.5°	-	°C

## Software Support

[Compass 9 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 Compass 9 Click board. It periodically measures and logs the magnetic flux density on the X, Y, and Z axes, as well as the ambient temperature values.

## Key Functions

- `compass9_cfg_setup` This function initializes Click configuration structure to initial values.
- `compass9_init` This function initializes all necessary pins and peripherals used for this Click board.
- `compass9_default_cfg` This function executes a default configuration of Compass 9 Click board.
- `compass9_start_measurement` This function starts a measurement in a selected operating mode.
- `compass9_get_magnetic_flux` This function reads magnetic flux density values (X, Y, Z axes).
- `compass9_get_temperature` This function reads the device temperature value in Celsius.

## Application Init

Initializes the driver, checks communication, and applies the default configuration.

## Application Task

Reads and logs the magnetic flux density for all 3 axes in Gauss and the temperature in degrees Celsius every 200 ms.

## Application Output

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

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- 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](#)

[Click board™ Catalog](#)

[Click boards™](#)

[ClickID](#)

## Downloads

[Compass 9 click example package](#)

[Compass 9 click 2D and 3D files v101](#)

[Compass 9 click schematic v101](#)

[MMC5983MA datasheet](#)

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