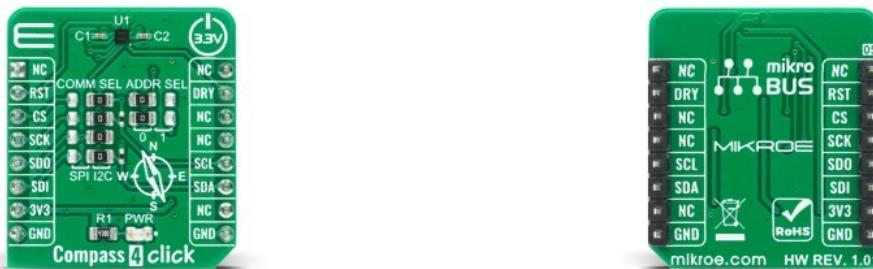


Compass 4 Click



PID: MIKROE-4231

Compass 4 Click is a compact add-on board that can measure the three-axis magnetic field that is perfect for implementation in applications such as electric compasses. This board features [AK09915](#), a complete 3-axis magnetic sensor with signal processing from [AKM](#). For obtaining the sensor measurement data of the magnetic field, an I2C or SPI protocol can be used. The main feature of the sensor is the capability to measure magnetic fields within the full-scale range of $\pm 4912 \mu\text{T}$, with a sensitivity of $0.15 \mu\text{T}$ per LSB, resolution at 16bits, and built-in Noise Suppression Filter (NSF), enabling high measurement accuracy for electronic compass applications. This Click board™ is suitable for applications such as an electrical compass, position sensing, general magnetic field measurement, and more.

Compass 4 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?

Compass 4 Click is based on the AK09915, a complete 3-axis magnetic sensor with signal processing from AKM. The AK09915 incorporates magnetic sensors for detecting terrestrial magnetism in the X-axis, Y-axis, and Z-axis, a sensor driving circuit, signal amplifier chain, and an arithmetic circuit for processing the signal from each sensor. The output signal of each axis sensor is multiplexed, pre-amplified processed, and digitized by a 16-bit A/D converter (ADC). A three-axis magnetometer can be programmed to measure the magnetic component for each axis, within the full-scale range of $\pm 4912 \mu\text{T}$ and sensitivity of $0.15 \mu\text{T}$ per LSB.

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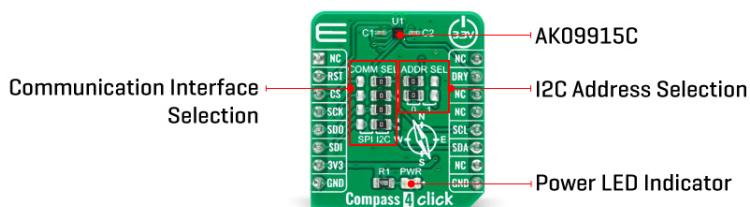
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The AK09915 has an analog circuit, digital logic, and interface block integrated on a chip. It also supports nine different Operation Modes that can be chosen by setting the appropriate registers. When the Single Measurement Mode is set, the magnetic sensor measurement starts. After magnetic sensor measurement and signal processing is finished, measured magnetic data is stored in measurement data registers, and then the AK09915 transits to Power-Down Mode automatically. On transition to Power-Down Mode, Data Ready (DRDY) bit turns to "1". When any of the measurement data registers are read, the DRDY bit turns to "0". It remains "1" on the transition from Power-Down Mode to another Mode. Data Ready output pin of the AK09915 labeled as the DRY is routed to the INT pin of the mikroBUS™ socket. Besides Data Ready pin, this Click board™ also has the Reset pin (RST), routed to the appropriate position on the mikroBUS™.

Compass 4 Click provides the possibility of using both I2C and SPI interfaces with a maximum frequency of 2.5MHz for I2C and 4MHz for SPI communication. The selection can be performed by positioning SMD jumpers labeled as COMM SEL to an appropriate position. Note that all the jumpers must be placed to the same side, or else the Click board™ may become unresponsive. While the I2C interface is selected, the AK09915 allows the choice of the last two significant bits (LSB) of its I2C slave address. This can be done by using the SMD jumper labeled as ADDR SEL. Depending on the positions of each of the ADDR SEL jumpers, four different addresses can be set.

This Click Board™ is designed to be operated only with a 3.3V logic level. A proper logic voltage level conversion should be performed before the Click board™ is used with MCUs with different logic levels.

Specifications

Type	Compass, Magnetic
Applications	Suitable for applications such as electrical compass, position sensing, general magnetic field measurement and more.
On-board modules	Compass 4 Click is based on the AK09915, a complete 3-axis magnetic sensor with signal processing from AKM
Key Features	Full scale range of $\pm 4912 \mu\text{T}$, sensitivity of $0.15 \mu\text{T}$ per LSB, resolution at 16bits, Noise

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	Suppression Filter (NSF)
Interface	I2C,SPI
ClickID	No
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 Compass 4 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikro™ BUS				Pin	Notes
	NC	1	AN	PWM	16	NC	
Reset	RST	2	RST	INT	15	DRY	Data Ready Output
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-JP4	COMM SEL	Left	Communication Interface Selection: Left position SPI, Right position I2C
JP5-JP6	ADDR SEL	Left	I2C Address Selection: Left position 0, Right position 1

Compass 4 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-0.3	3.3	3.6	V
Sensitivity	-	0.15	-	µT/LSB
Full scale measurement range	-	±4912	-	µT
Resolution	-	16	-	bit
Operating Temperature Range	-30	-	+85	°C

Software Support

We provide a library for the Compass 4 Click on our [LibStock](#) page, as well as a demo application (example), developed using MikroElektronika [compilers](#). The demo can run on all the main MikroElektronika [development boards](#).

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Library Description

The library contains a basic functions for using Compass 4 click.

Key functions:

- void compass4_configuration (uint8_t cfg1, uint8_t cfg2) - Configuration function
- uint8_t compass4_get_axis (compass4_axis_t *axis) - Gets XYZ Axis value
- uint8_t compass4_get_magnetic_flux (compass4_flux_t *flux) - Gets magnetic flux of XYZ axis value

Examples description

The application is composed of three sections :

- System Initialization - Initializes I2C or SPI module and all necessary GPIO pins
- Application Initialization - Initializes driver init, reset module, configuration module for measurement and checks communication with the module.
- Application Task - Reads magnetic flux or x, y, z-axis, and logs data to USB UART every 1 second.
- Note - SPI communication only works when the jumpers for the slave address are at GND.

The full application code, and ready to use projects can be found on our [LibStock](#) page.

Other mikroE Libraries used in the example:

- I2C Library
- SPI Library
- Conversions library

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. The terminal available in all MikroElektronika [compilers](#), or any other terminal application of your choice, can be used to read the message.

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

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

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[Click boards™](#)

Downloads

[Compass 4 click 2D and 3D files](#)[AK09915 datasheet](#)[Compass 4 click schematic](#)[Compass 4 click example on Libstock](#)

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