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Compass 5 Click

PID: MIKROE-4366

Compass 5 Click is a compact add-on board that contains a 3-axis magnetometer device suitable for compass application. This board features the AK09918C, a 3-axis electronic compass with high sensitive Hall sensor technology from AKM Semiconductor. This Click board™, an I2C configurable compass, incorporates magnetic sensors for detecting terrestrial magnetism in the X, Y, and Z-axis, its equipped with a magnetic overflow monitor function, a sensor driving circuit, signal amplifier chain, self-test function, and an arithmetic circuit for processing the signal from the sensor. This Click board™ is suitable for map heading-up purposes to realize the pedestrian navigation function.

Compass 5 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 5 Click is based on the AK09918C, a 3-axis electronic compass with high sensitive Hall sensor technology from AKM Semiconductor. This I2C configurable electronic compass incorporates magnetic sensors for detecting terrestrial magnetism in the X, Y, and Z-axis. It has built-in ADC with 16-bit output data for each 3-axis magnetic component, a built-in magnetic sensitivity adjustment circuit and overflow monitor function, and several operating modes with a typical sensitivity of 0.15µT/LSB. It also has the limitation for the measurement range that the sum of absolute values of each axis should be smaller than 4912 µT. When the magnetic field exceeded this limitation, data stored at measurement data are not correct, which is called Magnetic Sensor Overflow.

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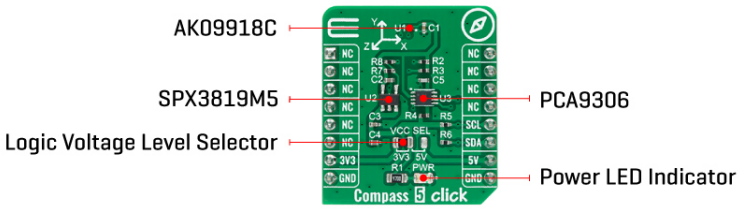

This Click board™ includes a low-noise LDO voltage regulator SPX3819 from MaxLinear to provide the 1.8V supply voltage for the AK09918C and possesses several operating modes: Power-Down, Single Measurement, Continuous Measurement, and Self-Test Mode. When power is turned ON, an AK09918C is in a Power-Down Mode. When a specified value is set in a MODE register, the AK09918C transits to the specified mode and starts operation. When a user wants to change Operation Mode, transit to Power-Down mode first and then transit to other Modes. After Power-Down Mode is set, a period of at least 100µs is needed before setting another Mode is possible.

Compass 5 Click communicates with MCU using the standard I2C 2-Wire interface with a frequency up to 100kHz in the Standard Mode, and up to 400kHz in the Fast Mode. Since the sensor is supplied with 1.8V logic voltage level only, also featured on this Click board™ is a PCA9306 voltage-level translator from Texas Instruments. The I2C interface bus lines are routed to the dual bidirectional voltage-level translator that allows this Click board™ to be interfaced with both 3.3V and 5V MCUs.

This Click board™ is designed to be operated with both 3.3V and 5V logic voltage levels that can be selected via VCC SEL jumper. This allows for both 3.3V and 5V capable MCUs to use the I2C communication lines properly. However, the Click board™ comes equipped with a library that contains easy to use functions and an example code that can be used as a reference for further development.

Specifications

Type	Compass,Magnetic
Applications	Can be used for map heading-up purposes to realize the pedestrian navigation function.
On-board modules	Compass 5 Click is based on the AK09918C, a 3-axis electronic compass with high sensitive Hall sensor technology from AKM Semiconductor.
Key Features	Built-in ADC with 16-bit output data for each 3-axis magnetic component, a built-in magnetic sensitivity adjustment circuit and overflow monitor function, and several operating modes with a typical sensitivity of

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	0.15µT/LSB, and more.
Interface	I2C
ClickID	No
Compatibility	mikroBUS™
Click board size	S (28.6 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on Compass 5 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	NC	
	NC	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	**5V**	Power Supply
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1	VCC SEL	Left	Power Supply Voltage Selection 3V3/5V: Left position 3V3, Right position 5V

Compass 5 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-0.3	-	6	V
Measurement Range	±4670	±4912	±5160	µT
Sensitivity	0.1425	0.15	0.1575	µT/LSB
Current Consumption	-	1.1	-	mA
Operating Temperature Range	-30	-	+85	°C

Software Support

We provide a library for the Compass 5 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.

Library Description

The library contains a basic functions for using Compass 5 Click.

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Key functions:

- void compass5_get_id (uint8_t *company_id, uint8_t *device_id); - Function for get ID.
- uint8_t compass5_set_operation_mode (uint8_t op_mode); - Function for set operation mode.
- void compass5_get_mag_data (int16_t *axis_x, int16_t *axis_y, int16_t *axis_z); - Full measurement axis.

Examples description

The application is composed of three sections :

- System Initialization - Initializes I2C and start to write log.
- Application Initialization - Initialization driver enables - I2C, performed power down mode, sets continuous measurement mode and start measurement, also write log.
- Application Task - (code snippet) - This is an example which demonstrates the use of Compass 5 Click board™. Measured and display sensor Magnetic data for X-axis, Y-axis and Z-axis. Results are being sent to the Usart Terminal where you can track their changes. All data logs write on USB uart changes for every 2 sec.

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
- UART 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

Click boards™

Downloads

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[PCA9306 datasheet]

[AK09918C datasheet]

[SPX3819 datasheet]

[Compass 5 click 2D and 3D files]

[Compass 5 click example on Libstock]

[Compass 5 click schematic]