

Magnetic Rotary 6 Click



PID: MIKROE-5585

Magnetic Rotary 6 Click is a compact add-on board for accurate magnet-position sensing. This board features the [AS5247U](#), an SPI-configurable high-resolution dual rotary position sensor for fast absolute angle measurement over a full 360-degree range from [ams AG](#). The AS5047D is equipped with revolutionary integrated dynamic angle error compensation (DAEC™) with almost 0 latency and offers a robust design that suppresses the influence of any homogenous external stray magnetic field. It also comes with onboard headers reserved for incremental and commutation signals of their respective A/B/I and U/V/W signals, with a maximum resolution of 16384 steps / 4096 pulses per revolution, alongside embedded self-diagnostics features. This Click board™ has been designed to support BLDC motor commutation for the most challenging automotive and safety-critical applications.

Magnetic Rotary 6 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.

NOTE: Rotary Magnetic Holder does not come in the same package as this Click board™, but you can find it in our [shop](#).

How does it work?

Magnetic Rotary 6 Click is based on the AS5247U, a high-resolution dual rotary position sensor for fast absolute angle measurement over a full 360-degree range from ams AG. The core of the AS5247U represents a CMOS technology Hall-effect magnetic sensor that converts the magnetic field component perpendicular to the surface of the chip into a digital value. It supports high-speed applications up to 28krpm and allows a host MCU to read 14-bit absolute

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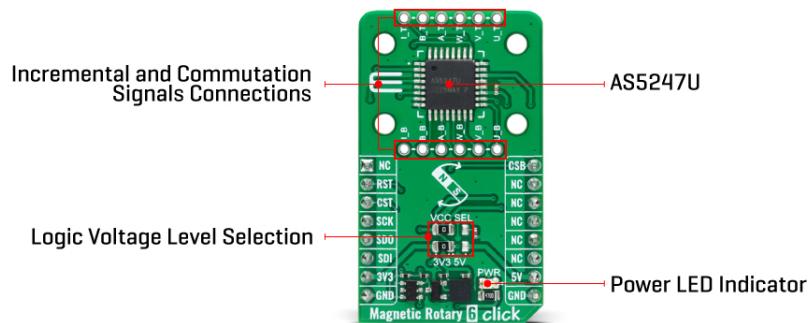


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angle position data and to program non-volatile settings without a dedicated programmer. The AS5247U is also equipped with a Dynamic Angle Error Compensation block that corrects the calculated angle regarding latency by using a linear prediction calculation algorithm.



The AS5247U communicates with MCU using a standard SPI interface. The signals from its internal Hall sensors are amplified and filtered before their conversion by the ADC and then processed by the CORDIC block to compute the angle and magnitude of the magnetic field vector. The intensity of the magnetic field is used by the automatic gain control (AGC) to adjust the amplification level to compensate for temperature and magnetic field variations. This Click board™ also comes with onboard headers reserved for incremental and commutation signals of their respective A/B/I and U/V/W signals alongside embedded self-diagnostics. Incremental movements are indicated on a set of ABI signals with a maximum resolution of 16384 steps / 4096 pulses per revolution. The resolution of the ABI signal is programmable for 10 to 14 bits.

Brushless DC (BLDC) motors are also controllable through a standard UVW commutation interface with a programmable number of pole pairs from 1 to 7. At constant rotation speed, the latency time is internally compensated by the AS5247U, reducing the dynamic angle error at the SPI, ABI, and UVW outputs. The AS5047D also allows selection between a UVW output interface and a PWM-encoded interface on the W pin, which can be seen as an absolute angle position. A unique addition to this board is a position for a rotary magnet holder designed to be used alongside a magnetic rotary position sensor allowing fast prototyping and quick measurements during development.

This Click board™ can operate with either 3.3V or 5V logic voltage levels selected via the VCC SEL jumper. All jumpers must be on the same side, or the Click board™ may become unresponsive. This way, both 3.3V and 5V capable MCUs can use the communication lines properly. However, the Click board™ comes equipped with a library containing easy-to-use functions and an example code that can be used, as a reference, for further development.

Specifications

| | |
|------------------|--|
| Type | Magnetic |
| Applications | Can be used to support BLDC motor commutation for the most challenging automotive and safety-critical applications |
| On-board modules | AS5247U - rotary position sensor for fast |

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| | |
|------------------|--|
| | absolute angle measurement over a full 360-degree range from ams AG |
| Key Features | Good resolution for motor and position control, independent output interfaces, self-diagnostics, immune to external stray field, low power consumption, highest reliability and durability, rotary magnet holder, and more |
| Interface | SPI |
| ClickID | Yes |
| Compatibility | mikroBUS™ |
| Click board size | M (42.9 x 25.4 mm) |
| Input Voltage | 3.3V or 5V |

Pinout diagram

This table shows how the pinout on Magnetic Rotary 6 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 | CSB | External sync |
| | NC | 2 | RST | INT | 15 | NC | |
| SPI Chip Select | CST | 3 | CS | RX | 14 | NC | |
| SPI Clock | SCK | 4 | SCK | TX | 13 | NC | |
| SPI Data OUT | SDO | 5 | MISO | SCL | 12 | NC | |
| SPI Data IN | SDI | 6 | MOSI | SDA | 11 | NC | |
| 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-JP2 | VCC SEL | Left | Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V |
| J1-J2 | - | Unpopulated | Incremental and Commutation Signals Connection Header |

Magnetic Rotary 6 Click electrical specifications

| Description | Min | Typ | Max | Unit |
|------------------------------------|-----|-----|--------|--------|
| Supply Voltage | 3.3 | - | 5 | V |
| Rotation Angle Range | 0 | - | 360 | ° |
| Orthogonal Magnetic Field Strength | 35 | - | 70 | mT |
| Core Resolution | - | 14 | - | bit |
| ABI Resolution | 25 | - | 4096 | pulses |
| Maximum Speed | - | - | 28.000 | RPM |

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Software Support

We provide a library for the Magnetic Rotary 6 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 Magnetic Rotary 6 Click driver.

Key functions

- `magneticrotary6_write_register` This function writes a desired data to the selected register of a desired sensor die by using SPI serial interface.
- `magneticrotary6_get_angle` This function reads the absolute position raw data of a desired sensor die and converts it to degrees (Angle).
- `magneticrotary6_set_direction` This function sets the rotation direction of a desired sensor die.

Example Description

This example demonstrates the use of Magnetic Rotary 6 Click board™ by reading and displaying the magnet's angular position in degrees measured by the bottom and top sensor dies.

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.MagneticRotary6`

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. A UART terminal is available in all Mikroe [compilers](#).

mikroSDK

This Click board™ is supported with [mikroSDK](#) - Mikroe Software Development Kit, which needs to be downloaded from the [LibStock](#) and installed for the compiler you are using to ensure

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proper operation of mikroSDK compliant Click board™ demo applications.

For more information about mikroSDK, visit the [official page](#).

Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

[ClickID](#)

Downloads

[Magnetic Rotary 6 click example on Libstock](#)

[Magnetic Rotary 6 click 2D and 3D files](#)

[AS5247U datasheet](#)

[Magnetic Rotary 6 click schematic](#)

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