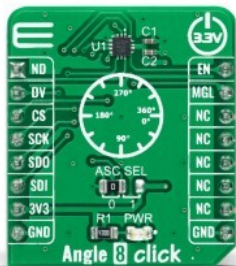


## Angle 8 Click



PID: MIKROE-4971

Angle 8 Click is a compact add-on board that detects the absolute angular position of a permanent magnet. This board features the MA782GGU, a low-power angle sensor with integrated wake-up angle detection from Monolithic Power Systems. With its power cycling ability, the MA782GGU can be optimized for applications that require low average power. It supports a wide range of magnetic field strengths and spatial configurations, with both end-of-shaft and off-axis (side-shaft mounting), supported configurations. Fast data acquisition and processing provides accurate angle measurement at an applied magnetic field of 60mT, alongside magnetic field strength detection with programmable thresholds. This Click board™ is suitable for general-purpose angle measurements, in embedded motion control applications, as a power/speed control trigger solution, and more.

Angle 8 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?

Angle 8 Click as its foundation uses the MA782GGU, a low-power angle sensor with integrated wake-up angle detection from Monolithic Power Systems. It allows users to read angle position information and detect the speed or direction of magnet rotation. With its power cycling ability, the MA782GGU can be optimized for applications that require low average power. Fast data acquisition and processing provides accurate angle measurement at an applied magnetic field of 60mT. It supports a wide range of magnetic field strengths and spatial configurations, with both end-of-shaft and off-axis (side-shaft mounting), supported configurations.

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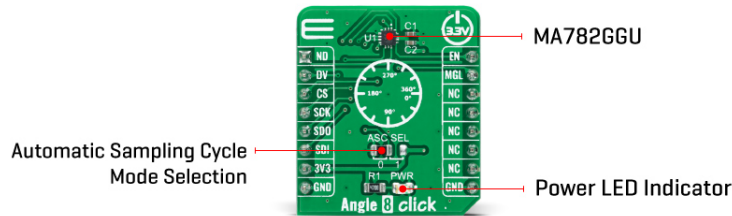
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The MA782GGU features magnetic field strength detection with configurable thresholds to sense the magnet position relative to the sensor for certain functions (e.g. sensing the axial movements or for diagnostics). On-chip non-volatile memory stores configuration parameters, including the reference zero angle position, the power cycling parameters, the filter window affecting the output resolution, and magnetic field detection thresholds.

The Angle 8 Click communicates with MCU using the standard SPI serial interface for angle reading and register programming, which supports SPI Mode 0 and 3 and operates at clock rates up to 25 MHz. This Click board™ uses the Enable pin labeled as EN and routed to the CS pin of the mikroBUS™ socket to optimize power consumption, used for its power ON/OFF purposes. It has three power modes: Active, Idle, and Automatic sampling cycle (ASC). By combining these three power modes, the MA782GGU can be operated in different ways. In ASC mode, the MA782GGU switches between Active and Idle mode. The selection can be made by positioning SMD jumper labeled as ASC SEL to an appropriate position marked as 0 or 1.

Besides this pins, it also uses two indicators, new data and data valid indicators labeled as ND and DV routed to the AN and RST pins of the mikroBUS™ socket. In ASC mode, the ND signal indicates when new data is ready to be read, or if the displacement exceeds the defined threshold, while the DV signal indicates the stabilization of the digital filter. It also has the magnetic flag used to indicate when the sensor position's magnetic field is out of range, defined by the lower magnetic field thresholds, routed on the INT pin of the mikroBUS™ socket labeled as MGL.

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. However, the Click board™ comes equipped with a library containing functions and an example code that can be used, as a reference, for further development.

## Specifications

Type	Magnetic
Applications	Can be used for general-purpose angle measurements, in embedded motion control applications, as a power/speed control trigger solution, and more
On-board modules	MA782GGU - low-power angle sensor with

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	integrated wake-up angle detection from Monolithic Power Systems
Key Features	Fast data acquisition, SPI serial interface, magnetic field strength detection, angle detection interrupt to wake-up the system, supported both end-of-shaft and off-axis, and many more
Interface	SPI
Feature	No ClickID
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 Angle 8 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
New Data Indication	<b>ND</b>	1	AN	PWM	16	<b>EN</b>	Enable
Data Valid Indication	<b>DV</b>	2	RST	INT	15	<b>MGL</b>	Magnetic Field Strength Detection (LOW)
SPI Chip Select	<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	NC	
SPI Data IN	<b>SDI</b>	6	MOSI	SDA	11	NC	
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	ASC SEL	Left	Automatic Sampling Cycle Mode Selection 0/1: Left position 0, Right position 1

## Angle 8 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Magnetic Field Detection Range	30	60	-	mT
Magnetic Field Detection Accuracy	-	5	-	mT
Resolution	8	-	12	bit
Operating Temperature Range	-40	+25	+125	°C

## Software Support

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We provide a library for the Angle 8 Click as well as a demo application (example), developed using MikroElektronika [compilers](#). The demo can run on all the main MikroElektronika [development boards](#).

Package can be downloaded/installed directly from NECTO Studio Package Manager (recommended way), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

## Library Description

This library contains API for Angle 8 Click driver.

Key functions

- `angle8_get_nd_pin` This function returns the new data ready (ND) pin logic state.
- `angle8_set_cycle_time` This function sets the sensor cycle time (measurement rate) in milliseconds.
- `angle8_read_angle` This function reads raw angle data and converts it to degrees.

## Example Description

This example demonstrates the use of Angle 8 Click board™ by reading and displaying the magnet's angular position in degrees.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager (recommended way), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.Angle8

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

## 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

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[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click Boards™](#)

## Downloads

[MA782GGU datasheet](#)

[Angle 8 click 2D and 3D files](#)

[Angle 8 click schematic](#)

[Angle 8 click example on Libstock](#)

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