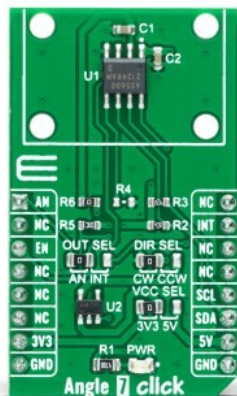


Angle 7 Click



PID: MIKROE-5196

Angle 7 Click is a compact add-on board that detects the absolute angular position of a permanent magnet. This board features the AS5600, a programmable Hall-based rotary magnetic position sensor with a high-resolution 12-bit analog or PWM output from ams AG. Based on planar Hall technology, this sensor measures the orthogonal component of the flux density (Bz) from an external magnet while rejecting stray magnetic fields. The default range of the output is from 18 to 360 degrees, where the full resolution of the device can be applied to a smaller range by programming a zero angle (start position) and a maximum angle (Stop position) through the I2C interface used for configuration and user programming of non-volatile parameters. This Click board™ is suitable for contactless potentiometers, contactless knobs, RC servos, and other angular position measurement solutions.

Angle 7 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?

Angle 7 Click is based on the AS5600, an easy to program magnetic rotary position sensor with a high-resolution 12-bit analog or PWM output from AMS AG. The AS5600 is a Hall-based rotary magnetic position sensor using planar sensors that convert the magnetic field component perpendicular to the surface of the chip into a voltage. It measures the absolute angle of a diametric-magnetized on-axis magnet while at the same time rejecting stray magnetic fields.

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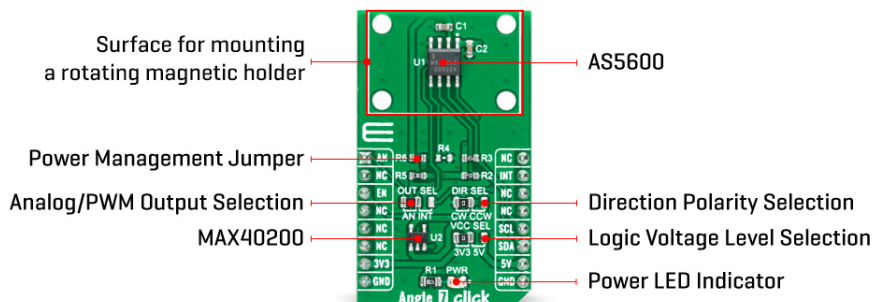


ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.



ISO 9001: 2015 certification of quality management system (QMS).

By default, the output represents a range from 18 to 360 degrees. It is also possible to define a smaller range to the output by programming a zero angle (start position) and a maximum angle (stop position).



The signals coming from internal Hall sensors are first amplified and filtered before their conversion by the ADC and then processed by the hardwired 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. After that, the output stage uses the angle value provided by the CORDIC algorithm. The user can choose between an analog output representing the angle as a ratiometric linear absolute value and a digital PWM-encoded output representing the angle as the pulse width. The selection can be made by positioning the SMD jumper labeled as OUT SEL in an appropriate position marked as AN or INT.

Angle 7 Click communicates with MCU using the standard I2C 2-Wire interface with a maximum clock frequency of 1MHz, fully adjustable through software registers. Also, the DIR SEL jumper allows users to select the polarity of the output relative to rotation direction by positioning the SMD jumper in an appropriate position marked as CW or CCW allowing clockwise or counterclockwise rotation. 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. This way, both 3.3V and 5V capable MCUs can use the communication lines properly. Both mikroBUS™ power rails have protection in the form of diode [MAX40200](#), controllable through an EN pin on the mikroBUS™ socket to prevent any unwanted back voltage. 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.

NOTE: In the case of using a logic level of 5V, it is necessary first to remove the resistor R6 and then switch the VCC jumper to the 5V position.

Specifications

Type	Magnetic
Applications	Can be used for contactless potentiometers, contactless knobs, RC servos, and other

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	angular position measurement solutions
On-board modules	AS5600 - rotary magnetic position sensor from ams AG
Key Features	Contactless angle measurement, highest reliability and durability, simple user-programmable start and stop positions over the I2C Interface, high-resolution output signal, great flexibility on angular excursion, selectable output, and more
Interface	Analog,I2C,PWM
Feature	No ClickID
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 Angle 7 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
Analog Signal	AN	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	INT	PWM Signal
Enable	EN	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	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V
JP2	OUT SEL	Left	Analog/PWM Output Selection AN/INT: Left position AN, Right position INT
JP3	DIR SEL	Left	Direction Polarity Selection CW/CCW: Left position CW, Right position CCW
R6	R6	Populated	Power Management

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Angle 7 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Angle Measurement Range	18	-	360	deg
Resolution	-	12	-	bit
Operating Temperature Range	-40	+25	+120	°C

Software Support

We provide a library for the Angle 7 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 7 Click driver.

Key functions

- angle7_get_status This function reads the status data.
- angle7_get_angle This function reads the calculated angle in degrees.
- angle7_get_magnitude This function reads the magnitude data.

Example Description

This example demonstrates the use of Angle 7 click board by reading and displaying the magnet's angular position in degrees and analog voltage output as well as the magnet's status and magnitude.

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.Angle7

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

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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

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

Downloads

[Angle 7 click example on Libstock](#)

[MAX40200 datasheet](#)

[AS5600 datasheet](#)

[Angle 7 click 2D and 3D files](#)

[Angle 7 click schematic](#)

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