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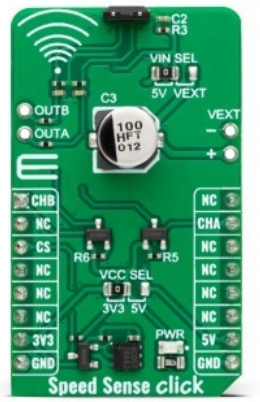
Speed Sense Click



PID: MIKROE-5977

Speed Sense Click is a compact add-on board that allows you to measure the speed and rotation of a spinning object. This board features the A17501, a dual output differential speed and direction sensor from Allegro Microsystems. It has a high-speed switching bandwidth of up to 40kHz for two different signals. The sensor has two independent output channels with options for high-resolution XOR speed, pulse, and direction protocol. This Click board™ makes the perfect solution for the development of rotational position-sensing devices based on a ring magnet target design, which is common in automotive and industrial electric motor applications.

Speed Sens Click (EU) is fully compatible with the mikroBUS™ socket and can be used on any host system supporting the mikroBUS™ standard. It comes with the mikroSDK open-source libraries, offering unparalleled flexibility for evaluation and customization. What sets this Click board™ apart is the groundbreaking ClickID feature, enabling your host system to seamlessly and automatically detect and identify this add-on board.

How does it work?

Speed Sense Click is based on the A17501, a dual output differential speed and direction sensor from Allegro Microsystems. The sensor consists of three Hall elements incorporated in such a way as to create two independent differential channels. The differential signals are used to produce a highly accurate speed output and, if desired, provide information on the direction of rotation. The advanced self-calibration technique with the digital tracking of the signal results in accurate switch points over the air gap, speed, and temperature. The sensor is immune to common external magnetic disturbance and is ideally suited for asynchronous electric motor applications.

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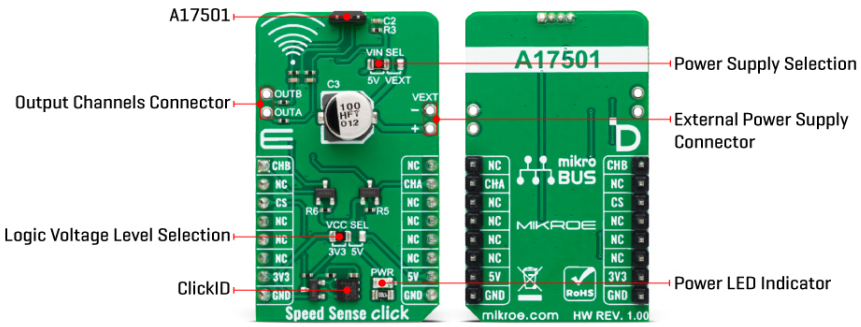

When properly back-biased, the sensor is intended for use with ring magnets or ferromagnetic targets. It poses a temperature-compensated amplifier, as well as a full-range ADC. Besides operating on 5V from the mikroBUS™ socket power rail, you can also add an external power supply over the VEXT connector from 4 up to 24V. The selection can be made over the VIN SEL.

Speed Sense Click uses general-purpose IOs to interrupt the host MCU when detecting the magnet on a spinning wheel. The output channel pins are labeled CHA and CHB. There is also an external header with these channels for connecting an external device (relay, LED, and more).

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. Also, this 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	Motion
Applications	Can be used for the development of rotational position-sensing devices based on a ring magnet target design which is common in automotive and industrial electric motor applications
On-board modules	A17501 - dual output differential speed and direction sensor from Allegro Microsystems
Key Features	A high-speed switching bandwidth, two independent output channels, immune to common external magnetic disturbance, ideally suited for asynchronous electric motor applications, integrated EEPROM enables factory traceability throughout the product life cycle and more
Interface	GPIO
ClickID	Yes
Compatibility	mikroBUS™

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Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V,External

Pinout diagram

This table shows how the pinout on Speed Sense Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS				Pin	Notes
Channel B Output	**CHB**	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	**CHA**	Channel A Output
ID COMM	**CS**	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	NC	
	NC	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	VCC SEL	Left	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V
JP2	VIN SEL	Left	Power Supply Selection 5V/VEXT: Left position 5V, Right position VEXT

Speed Sense Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
External Power Supply	4	-	24	V
Operating Frequency	0	-	40	kHz
Operating Magnetic Input Peak	-1150	-	1150	G

Software Support

We provide a library for the Speed Sense 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

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This library contains API for Speed Sense Click driver.

Key functions

- speedsense_get_speed This function reads the state of the CHA pin used for speed output protocols.
- speedsense_get_direction This function reads the state of the CHB pin used for direction output protocols.

Example Description

This library contains the API for the Speed Sense Click driver for the speed and direction signal state detection for every magnetic pole pair.

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.SpeedSense

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 MIKROE compilers.

mikroSDK

This Click board™ is supported with mikroSDK - MIKROE 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

ClickID

Downloads

Speed Sense click example on Libstock

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Speed Sense click 2D and 3D files

Speed Sense click schematic

A17501 datasheet