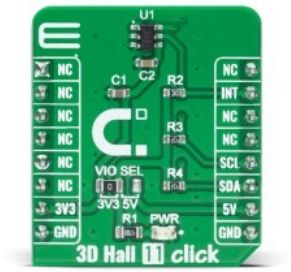
MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

3D Hall 11 Click



PID: MIKROE-5188

3D Hall 11 Click is a compact add-on board used to detect the strength of a magnetic field in all three dimensions. This board features the TMAG5273, a low-power linear 3D Hall-effect sensor from Texas Instruments. A precision analog signal chain alongside an integrated 12-bit ADC digitizes the measured analog magnetic field values and passes them via the I2C interface to the microcontroller for further processing. It can achieve ultra-high precision at speeds up to 20kSPS for faster and more accurate real-time control and has an integrated temperature sensor available for multiple system functions. This Click board™ is designed for a wide range of industrial and personal electronics applications.

3D Hall 11 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?

3D Hall 11 Click as its foundation uses the TMAG5273, a 3D linear Hall-effect sensor used to detect the strength of a magnetic field in all three dimensions (X, Y, and Z axes) in a range up to ±40mT or ±80mT from Texas Instruments. A precision analog signal chain and an integrated 12-bit ADC enable high accuracy and low drift magnetic field measurements while supporting a sampling of up to 20kSPS. It also has an integrated temperature sensor available for multiple system functions, such as thermal budget check or temperature compensation calculation for a given magnetic field. The output signals (raw X, Y, and Z magnetic data and temperature data) are accessible through the I2C interface.

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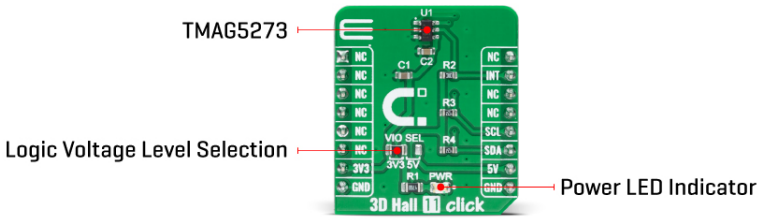

This Click board™ can be configured to various power options, including Wake-Up and Sleep mode, optimizing system power consumption. Also, an integrated angle calculation engine (CORDIC) provides complete 360° angular position information for both on-axis and off-axis angle measurement topologies, performed via two user-selected magnetic axes. It also features magnetic gain and offset correction to mitigate the impact of system mechanical error sources.

3D Hall 11 Click communicates with MCU using the standard I2C 2-Wire interface with a maximum clock frequency of 1MHz to enable any combination of magnetic axes and temperature measurements. Besides a dedicated interrupt pin, the INT pin of the mikroBUS™ socket act as a system interrupt during low power Wake-Up and Sleep mode and can also be used by an MCU to trigger a new sensor conversion.

This Click board™ can operate with both 3.3V and 5V logic voltage levels selected via the VIO SEL jumper. This way, it is allowed for both 3.3V and 5V capable MCUs to use the 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	Magnetic
Applications	Can be used for a wide range of industrial and personal electronics applications
On-board modules	TMAG5273 - linear 3D Hall-effect sensor from Texas Instruments
Key Features	Low power consumption, configurable power modes, selectable linear magnetic range at X, Y, or Z axis, interrupt signal, integrated angle CORDIC calculation with gain and offset adjustment, 20kSPS single axis conversion rate, I2C interface, built-in temperature sensor, and more
Interface	I2C
Feature	No ClickID

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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 3D Hall 11 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	**INT**	Interrupt
	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	VIO SEL	Left	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V

3D Hall 11 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Operating Magnetic Range	±40	-	±80	mT
Sample Rate	-	-	20	kSPS
Resolution	-	12	-	bit
Operating Temperature Range	-40	+25	+120	°C

Software Support

We provide a library for the 3D Hall 11 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

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This library contains API for 3D Hall 11 Click driver.

Key functions

- c3dhall11_write_register This function writes a desired data to the selected register by using I2C serial interface.
- c3dhall11_read_register This function reads data from the selected register.
- c3dhall11_read_data This function reads new data which consists of X, Y, and Z axis values in mT, and temperature in Celsius. It also reads the angle in Degrees between X and Y by default, and magnitude data as well.

Example Description

This example demonstrates the use of 3D Hall 11 Click board™ by reading the magnetic flux density from 3 axes, and the angle and magnitude between X and Y axes as well as the sensor internal temperature.

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.3DHall11

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

mikroBUS™

mikroSDK

Click board™ Catalog

Click boards™

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Downloads

3D Hall 11 click example on Libstock

3D Hall 11 click 2D and 3D files

3D Hall 11 click schematic

OSTVN03A150 datasheet

TMAG5273 datasheet