MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343  Registration No. 20490918
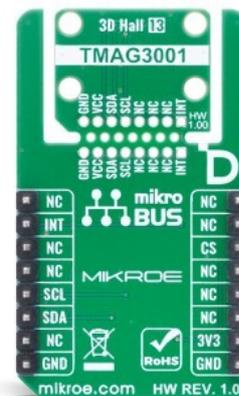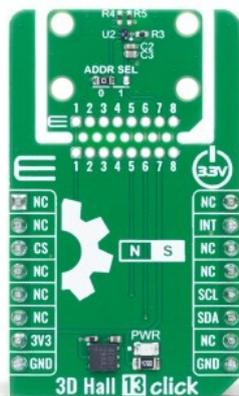Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
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# 3D Hall 13 Click

PID: MIKROE-6555

**3D Hall 13 Click** is a compact add-on board designed for contactless 3D magnetic field sensing and precise angular position measurements. It is based on the TMAG3001, a low-power 3D linear Hall-effect and angle sensor from Texas Instruments with integrated CORDIC engine and 12-bit ADC. This Click board™ supports I2C communication up to 1MHz and features three-axis magnetic sensing with a ±75mT range and high sensitivity of 885LSB/mT, along with configurable magnetic axes, temperature sensing, and low-power modes including sleep and wake-up. It introduces the unique "Click Snap" feature, allowing the sensor area to be detached and mounted separately for flexible integration. 3D Hall 13 Click is perfectly suited for applications such as smart locks, proximity sensors, robotics motor control, wearable gesture detection, and gaming controller input systems.

For more information about **3D Hall 13 Click** visit the official product page.

## How does it work?

3D Hall 13 Click is based on the TMAG3001, a 3D linear and angle Hall-effect sensor from Texas Instruments, that provides contactless magnetic field sensing in three dimensions optimized for both industrial and personal electronics applications. This sensor incorporates three independent Hall-effect sensing elements aligned along the X, Y, and Z axes, enabling precise detection of linear magnetic field variations within a ±75mT range. It delivers a high sensitivity of 885LSB/mT, with the analog signal chain and built-in 12-bit ADC ensuring accurate digital conversion of magnetic field measurements. The 3D Hall 13 Click is ideal for applications such as electronic smart locks, door and window status monitoring, magnetic proximity detection, motor control in mobile robotics, gesture control in wearable devices like smartwatches, actuator feedback, position sensing in foldable devices, and intuitive control in gaming

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joysticks and controllers.
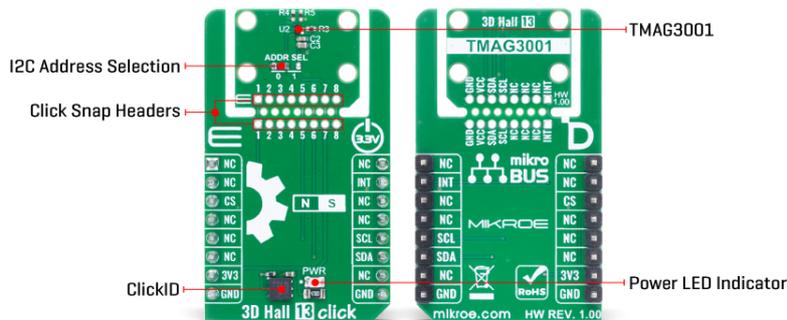


This Click board™ is designed in a unique format supporting the newly introduced MIKROE feature called "Click Snap." Unlike the standardized version of Click boards, this feature allows the main sensor area to become movable by breaking the PCB, opening up many new possibilities for implementation. Thanks to the Snap feature, the TMAG3001 can operate autonomously by accessing its signals directly on the pins marked 1-8. Additionally, the Snap part includes a specified and fixed screw hole position, enabling users to secure the Snap board in their desired location.

The 3D Hall 13 Click uses an I2C interface with clock speeds of up to 1MHz, which allows users to flexibly configure magnetic axis selection and temperature measurements, as well as power modes tailored to specific use cases. This flexibility includes options for low-power operation with sleep and wake-up modes, making the board well-suited for battery-powered and energy-efficient designs. Beyond communication pins, this board is also equipped with an interrupt (INT) pin for low power wake-up and sleep mode, and can also be used by a host MCU to trigger a new sensor conversion. The I2C address of the TMAG3001 can be easily configured via onboard jumper marked ADDR SEL in the Snap area, allowing multiple devices to coexist on the same bus.

Notably, the integrated CORDIC angle calculation engine enables precise 360° angle detection using any two axes selected by the user, supporting both on-axis and off-axis configurations. To further enhance measurement stability and system reliability, the TMAG3001 includes built-in magnetic gain and offset correction to compensate for mechanical misalignments.

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. It also comes equipped with a library containing functions and example code that can be used as a reference for further development.

## Click Snap

**Click Snap** is an innovative feature of our standardized Click add-on boards, designed to bring greater flexibility and optimize your prototypes. By simply snapping the PCB along predefined lines, you can easily detach the main sensor/IC/module area, reducing the overall size, weight, and power consumption - ideal for the final phase of prototyping. For more details about Click Snap, visit the official page dedicated to this feature.

## Specifications

| Type | Magnetic |
|---|---|
| Applications | Ideal for applications such as smart locks, proximity sensors, robotics motor control, wearable gesture detection, and gaming controller input systems |
| On-board modules | TMAG3001 - 3D linear and angle Hall-effect sensor from Texas Instruments |
| Key Features | Low-power 3D linear Hall-effect and angle sensor, integrated CORDIC engine, 12-bit ADC, I2C communication up to 1MHz, three-axis magnetic sensing, wide magnetic field range, high sensitivity, configurable magnetic axes, integrated temperature sensing, low-power modes including sleep and wake-up, detachable sensor area with Click Snap feature, and more |
| Interface | I2C |
| Feature | Click Snap,ClickID |
| Compatibility | mikroBUS™ |
| Click board size | M (42.9 x 25.4 mm) |
| Input Voltage | 3.3V |

## Pinout diagram

This table shows how the pinout on 3D Hall 13 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 | NC | |
| | NC | 2 | RST | INT | 15 | **INT** | Interrupt |
| ID COMM | **CS** | 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 | NC | |
| Ground | **GND** | 8 | GND | GND | 9 | **GND** | Ground |

## Onboard settings and indicators

| Label | Name | Default | Description |
|---|---|---|---|
| LD1 | PWR | - | Power LED Indicator |
| JP1 | ADDR SEL | Left | I2C Address Selection 0/1: Left position 0, Right position 1 |

## 3D Hall 13 Click electrical specifications

| Description | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Supply Voltage | - | 3.3 | - | V |
| Linear Magnetic Range | - | ±75 | - | mT |
| Sensitivity | - | - | 885 | LSB/mT |

## Software Support

[3D Hall 13 Click](#) demo application is developed using the [NECTO Studio](#), ensuring compatibility with [mikroSDK](#)'s open-source libraries and tools. Designed for plug-and-play implementation and testing, the demo is fully compatible with all development, starter, and mikromedia boards featuring a [mikroBUS™](#) socket.

### Example Description

This example demonstrates the use of 3D Hall 13 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.

Key Functions

- c3dhall13_cfg_setup This function initializes Click configuration structure to initial values.
- c3dhall13_init This function initializes all necessary pins and peripherals used for this Click board.
- c3dhall13_default_cfg This function executes a default configuration of 3D Hall 13 Click board.
- c3dhall13_read_data This function reads new data which consists of X, Y, and Z axis values in mT, and temperature in Celsius.

Application Init

Initializes the driver and performs the Click default configuration.

Application Task

Reads data from the sensor approximately every 100ms and displays the measurement values on the USB UART.

### Application Output

This Click board can be interfaced and monitored in two ways:

- Application Output - Use the "Application Output" window in Debug mode for real-time data monitoring. Set it up properly by following [this tutorial](#).
- UART Terminal - Monitor data via the UART Terminal using a [USB to UART converter](#). For detailed instructions, check out [this tutorial](#).

### Additional Notes and Information

The complete application code and a ready-to-use project are available through the NECTO Studio Package Manager for direct installation in the [NECTO Studio](#). The application code can also be found on the MIKROE [GitHub](#) account.

## Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

[ClickID](#)

## Downloads

[3D Hall 13 click example package](#)

[3D Hall 13 click 2D and 3D files v100](#)

[TMAG3001 datasheet](#)

[3D Hall 13 click schematic v100](#)