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# 6DOF IMU 21 Click



PID: MIKROE-6037

**6DOF IMU 21 Click** is a compact add-on board perfect for applications requiring accurate orientation and movement detection. This board features the WSEN-ISDS (2536030320001) sensor from Würth Elektronik, which integrates 3-axis acceleration and gyroscope sensors using advanced MEMS-based capacitive sensing technology. It offers a fully calibrated 16-bit digital output, with acceleration ranges from ±2g to ±16g and gyroscope ranges from ±125dps to ±2000dps, alongside a high output data rate of up to 6.6kHz for seamless movement tracking. Additionally, an embedded temperature sensor provides environmental monitoring capabilities. This board supports both I2C and SPI digital communication interfaces for flexible connectivity. It is ideally suited for enhancing the performance of projects in localization and navigation, industrial tool and equipment optimization, and the development of innovative solutions in robotics, drones, and automation systems.

6DOF IMU 21 Click 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?

6DOF IMU 21 Click is based on the WSEN-ISDS (2536030320001), 3-axis acceleration, and gyroscope sensor from Würth Elektronik. This sensor embodies the MEMS-based capacitive sensing technology, which is crucial for accurately monitoring motion and orientation. It's specially made to accommodate a variety of application-specific functionalities, such as detecting free-fall events, responding to wake-up signals, recognizing tap gestures, and

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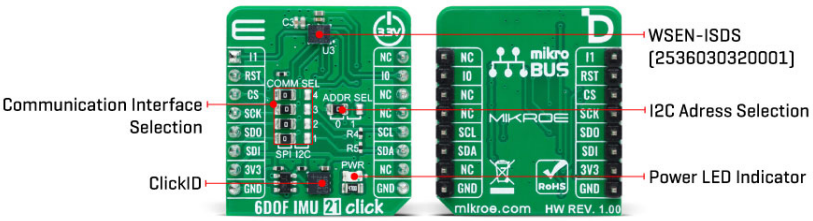
identifying different states of activity and motion. Additionally, it's capable of tilt and orientation detection, which is crucial for dynamic positioning tasks. The sensor provides this wealth of information through a fully calibrated 16-bit digital output, ensuring high precision and reliability in data capture.




This sensor supports acceleration ranges from ±2g to ±16g, and gyroscope ranges from ±125dps to ±2000dps. This allows for application in a wide range of motion-sensitive tasks. Furthermore, the sensor has an impressive output data rate of up to 6.6kHz, enabling it to track rapid movements seamlessly. An embedded temperature sensor adds another utility layer, offering environmental monitoring alongside motion tracking. With support for both I2C and SPI digital communication interfaces, the Click board offers flexible connectivity options, making it an excellent choice for projects in localization and navigation, industrial tool and equipment optimization, antenna and platform stabilization, industrial IoT innovations, as well as robotics, drones, and automation systems.

As mentioned, the 6DOF IMU 21 Click supports both I2C and SPI interfaces. Users can select the desired communication protocol by placing SMD jumpers on the COMM SEL section, ensuring all jumpers align on the same side to avoid potential issues. For I2C usage, the device allows the adjustment of its I2C slave address's least significant bit via an SMD jumper marked as ADDR SEL. This Click board™ also possesses two interrupt pins routed to the I0 and I1 pins on the mikroBUS™ socket. These interrupt pins signal MCU that an event has been sensed, entirely programmed by the user through the I2C/SPI interface.

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. Also, it comes equipped with a library containing functions and an example code that can be used as a reference for further development.

## Specifications

| Type | Motion |
|---|---|
| Applications | Ideal for localization and navigation, industrial tool and equipment optimization, and the development of innovative solutions in robotics, drones, and automation systems |
| On-board modules | WSEN-ISDS (2536030320001) - 3-axis |

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| | |
|---|---|
| | acceleration and gyroscope sensor from Würth Elektronik |
| Key Features | MEMS-based capacitive sensing technology, fully calibrated 16-bit digital output, broad acceleratuion and gyroscope range, embedded temperature sensor, additional features as free-fall, wake-up, tap, activity, motion, tilt, and orientation detection, selectable communication, programmable interrupts, adjustable I2C address, and more |
| Interface | I2C,SPI |
| ClickID | Yes |
| 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 6DOF IMU 21 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

| Notes | Pin | mikroBUS | | | | Pin | Notes |
|---|---|---|---|---|---|---|---|
| Interrupt 1 | **I1** | 1 | AN | PWM | 16 | NC | |
| ID SEL | **RST** | 2 | RST | INT | 15 | **I0** | Interrupt 0 |
| SPI Select / ID COMM | **CS** | 3 | CS | RX | 14 | NC | |
| SPI Clock | **SCK** | 4 | SCK | TX | 13 | NC | |
| SPI Data OUT | **SDO** | 5 | MISO | SCL | 12 | **SCL** | I2C Clock |
| SPI Data IN | **SDI** | 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 |
| - | COMM SEL | Left | Communication Interface Selection SPI/I2C: Left position SPI, Right position I2C |
| - | ADDR SEL | Left | I2C Address Selection 0/1: Left position 0, Right position 1 |

## 6DOF IMU 21 Click electrical specifications

| Description | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Supply Voltage | - | 3.3 | - | V |
| Acceleration Range | ±2 | - | ±6 | g |
| Gyroscope Range | ±125 | - | ±2000 | dps |

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| | | | | |
|---|---|---|---|---|
| Resolution | - | 16 | - | bit |

## Software Support

We provide a library for the 6DOF IMU 21 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

This library contains API for 6DOF IMU 21 Click driver.

Key functions

- c6dofimu21_software_reset This function performs the device software reset.
- c6dofimu21_read_accel_data This function reads the accelerometer of X, Y, and Z axis relative to standard gravity (mg).
- c6dofimu21_read_gyro_data This function reads the angular rate of X, Y, and Z axis in degrees per second (mdps).

### Example Description

This example demonstrates the use of 6DOF IMU 21 click board by reading and displaying the accelerometer and gyroscope data (X, Y, and Z axis).

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.C6DOFIMU21

### 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.

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For more information about mikroSDK, visit the official page.

## Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click boards™

## Downloads

6DOF IMU 21 click example on Libstock

6DOF IMU 21 click 2D and 3D files v100

WSEN-ISDS (2536030320001) datasheet

6DOF IMU 21 Click schematic v100