

# 6DOF IMU 23 Click



PID: MIKROE-5999

6DOF IMU 23 Click is a compact add-on board for precise motion tracking and measurement. This board features the IIM-20670, a high-performance 6-axis MotionTracking device from TDK InvenSense that integrates a 3-axis gyroscope and a 3-axis accelerometer. The gyroscope offers a full-scale range of up to  $\pm 1966$  dps with high accuracy, while the accelerometer provides a range of  $\pm 2g$  to  $\pm 65g$ . Key features also include a 10MHz SPI interface, shock tolerance up to 10,000 g, on-chip 16-bit ADCs, and low current consumption. This Click board supports 3.3V and 5V logic voltage levels, making it compatible with various MCUs. It is ideal for industrial applications such as navigation, platform stabilization, asset tracking, robotics, and smart transportation.

## How does it work?

6DOF IMU 23 Click is based on the IIM-20670, a high-performance SmartIndustrial™ 6-axis MotionTracking device from TDK InvenSense that combines a 3-axis gyroscope and a 3-axis accelerometer in a compact plastic package. Using InvenSense's patented CMOS-MEMS fabrication platform, this component provides exceptional integration and performance within a small form factor. The gyroscope features a user-programmable full-scale range of up to  $\pm 1966$  dps, with guaranteed accuracy up to  $\pm 300$  dps, while the accelerometer offers a user-programmable full-scale range of  $\pm 2g$  to  $\pm 65g$ , with accuracy guaranteed up to  $\pm 36g$ .

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Key features of the IIM-20670 also include a 10MHz SPI interface, a shock-tolerant structure capable of withstanding up to 10,000 g, and minimal offset and sensitivity variation across temperature changes. Additionally, the IIM-20670 boasts on-chip 16-bit ADCs, programmable digital filters, a selectable power supply, and a current consumption below 10mA in all operating conditions. This robust feature set makes it ideal for various industrial applications, including navigation, platform stabilization, asset tracking, robotics, industrial automation, smart transportation, and machinery for agriculture and construction.

As mentioned, the 6DOF IMU 23 Click communicates with the host MCU through a robust and efficient 4-wire SPI interface, which supports a maximum clock frequency of 10MHz, ensuring fast and reliable data transfer. This interface is critical for enabling precise and synchronized communication between the sensor and the host MCU. In addition to the standard communication pins, this Click board™ features a dedicated RST pin, which performs the resetting of the IIM-20670, allowing for quick reinitialization and troubleshooting. Furthermore, it also includes an ODR (Output Data Ready) pin that plays a vital role in providing synchronous sensor data readings by signaling when new data is available, thereby ensuring that the host MCU can promptly and accurately read sensor data without unnecessary delays.

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	Ideal for industrial applications such as navigation, platform stabilization, asset tracking, robotics, and smart transportation
On-board modules	IIM-20670 - SmartIndustrial™ 6-axis MotionTracking device from TDK InvenSense
Key Features	High-performance, 3-axis gyroscope and accelerometer, user-programmable full-scale ranges, 10MHz SPI interface, shock-tolerant structure, on-chip 16-bit ADCs, programmable digital filters, selectable power supply, low

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	power consumption below 10mA, signals for quick reinitialization and synchronous data readings, and more
Interface	SPI
Feature	ClickID
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 6DOF IMU 23 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	
Reset / ID SEL	<b>RST</b>	2	RST	INT	15	<b>ODR</b>	Output Data Ready
SPI Select / ID COMM	<b>CS</b>	3	CS	RX	14	NC	
SPI Clock	<b>SCK</b>	4	SCK	TX	13	NC	
SPI Data OUT	<b>SDO</b>	5	MISO	SCL	12	NC	
SPI Data IN	<b>SDI</b>	6	MOSI	SDA	11	NC	
Power Supply	<b>3.3V</b>	7	3.3V	5V	10	<b>5V</b>	Power Supply
Ground	<b>GND</b>	8	GND	GND	9	<b>GND</b>	Ground

## Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1	VCC SEL	Left	Power Voltage Level Selection 3V3/5V: Left position 3V3, Right position 5V

## 6DOF IMU 23 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Gyroscope Full-Scale Range	±41	-	±1966	dps
Gyroscope Accuracy	-	±300	-	dps
Accelerometer Full-Scale Range	±2	-	±65	g
Accelerometer Accuracy	-	±36	-	g
Resolution	-	16	-	bit

## Software Support

We provide a library for the 6DOF IMU 23 Click as well as a demo application (example), developed using MIKROE [compilers](#). The demo can run on all the main MIKROE [development boards](#).

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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 23 Click driver.

Key functions

- `c6dofimu23_get_accel_data` This function reads the accelerometer sensor axes measurement data.
- `c6dofimu23_get_gyro_data` This function reads the gyroscope sensor axes measurement data.
- `c6dofimu23_get_temperature` This function reads the internal temperature measurement data.

## Example Description

This library contains API for 6DOF IMU 23 Click driver. The library initializes and defines the SPI bus drivers to write and read data. The library also includes a function for reading accelerometer and gyroscope X-axis, Y-axis, and Z-axis data as well as the internal temperature data.

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.6DOFIMU23

## 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™](#)

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[mikroSDK](#)[Click board™ Catalog](#)[Click boards™](#)[ClickID](#)

## Downloads

[6DOF IMU 23 click example on Libstock](#)[6DOF IMU 23 click 2D and 3D files v100](#)[6DOF IMU 23 click schematic v100](#)[IIM-20670 datasheet](#)

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