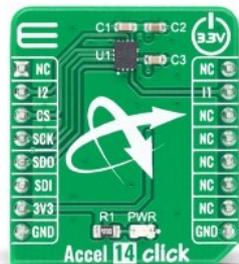


## Accel 14 Click



PID: MIKROE-4185

**Accel 14 Click** is digital acceleration and vibration sensor Click board™. It features an ultra-wide bandwidth, low-noise, 3-axis digital vibration sensor, labeled as [IIS3DWB](#), from [STMicroelectronics](#). This Click board™ allows selectable full-scale acceleration measurements in ranges of  $\pm 2$  g,  $\pm 4$  g,  $\pm 8$ , and  $\pm 16$  g in three axes, and it's capable of measuring accelerations with a bandwidth up to 6 kHz with an output data rate of 26.7 kHz. For accessing sensor registers from any host controller communication is accomplished through a standard SPI serial interface. Along with its serial interface, the sensor can use any of its two interrupt pins to report a detected event. It has many features that make it attractive for various applications such as vibration and condition monitoring, test and measurements, predictive maintenance, and more.

Accel 14 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?

Accel 14 Click uses the IIS3DWB IC, an ultra-wide bandwidth, low-noise, 3-axis digital vibration sensor from STMicroelectronics. The wide bandwidth, low noise, very stable and repeatable sensitivity, together with the capability of operating over an extended temperature range, makes this device particularly suitable for vibration monitoring in industrial applications. The IIS3DWB has a selectable full-scale acceleration range of  $\pm 2/\pm 4/\pm 8/\pm 16$  g and is capable of measuring accelerations with a bandwidth up to 6 kHz with an output data rate of 26.7 kHz. A 3 kB first-in, first-out (FIFO) buffer is integrated into the device to avoid any data loss and to limit the intervention of the host processor.

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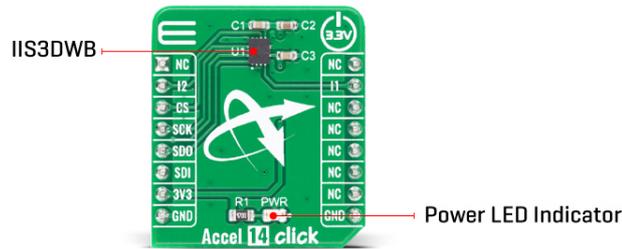
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Accel 14 Click offers two possible operating configurations: Power-Down and Normal Mode. IIS3DWB has a voltage supply range from 2.1V to 3.6V. To avoid potential conflicts, during the power-on sequence, it is recommended to set the lines connected to the device IO pins to high-impedance state on the host side. Furthermore, to guarantee the proper power-off of the device, it is recommended to maintain the duration of the VDD line to GND for at least 100  $\mu$ s. After the power supply is applied, the IIS3DWB performs a 10 ms boot procedure to load the trimming parameters.

After the boot is completed, the accelerometer is automatically configured in Power-Down mode. When the sensor is in Power-Down mode, almost all internal blocks of the device are switched off. The SPI digital interface remains active to allow communication with the device. The content of the configuration registers is preserved and the output data registers are not updated, keeping the last data sampled in memory before going into Power-Down mode.

When Accel 14 Click is set in Normal Mode, all three axes (X, Y, Z) are simultaneously active and acceleration data can be read from the sensor concurrently for the 3-axis and the sensor provides acceleration data at an output data rate of 26.667kHz.

The IIS3DWB has been specifically designed to provide a wide bandwidth with very flat frequency response in the passband and very high attenuation in the stopband so to virtually eliminate any frequency aliasing. The functionality of the device and the measured acceleration data is accessible through the SPI interface. And also functions such as the threshold and the timing of the two interrupt pins can be completely programmed by the user through the SPI digital interface.

This Click Board™ is designed to be operated only with 3.3V logic levels. A proper logic voltage level conversion should be performed before the Click board™ is used with MCUs with logic levels of 5V. More information about the IIS3DWB can be found in the attached datasheet. However, the Click board™ comes equipped with a library that contains easy to use functions and a usage example that may be used as a reference for the development.

## Specifications

Type	Acceleration, Motion, Vibration
Applications	It has many features that make it attractive for various applications such as vibration and condition monitoring, test and measurements,

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	predictive maintenance, and more.
On-board modules	IIS3DWB
Key Features	Ultra-wide bandwidth, ultra-low noise density, high stability, low power consumption, thermal readings.
Interface	GPIO,SPI
ClickID	No
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 Accel 14 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	
Interrupt 2	<b>I2</b>	2	RST	INT	15	<b>I1</b>	Interrupt 1
SPI Chip Select	<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	NC	
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

## Accel 14 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	2.1	-	3.6	V
Accelerometer current consumption	-	1.1	1.3	mA
SPI clock frequency	-	-	10	mHz
Operating Temperature Range	-40	-	+105	°C

## Software Support

We provide a library for the Accel 14 Click on our [LibStock](#) page, as well as a demo application (example), developed using MikroElektronika [compilers](#). The demo can run on all the main MikroElektronika [development boards](#).

## Library Description

The library covers all the necessary functions to control Accel 14 click board. Library performs a standard SPI interface communication.

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## Key functions:

- void accel14\_default\_config ( void ) - Set default configuration function.
- void accel14\_get\_data ( accel14\_accel\_t \*p\_accel\_data ) - Get Accel data function.
- float accel14\_get\_temperature ( void ) - Get temperature function.

## Examples description

The application is composed of three sections :

- System Initialization - Initializes SPI and start to write log.
- Application Initialization - Initialization driver enables - SPI, check device ID, sets default configuration, also write log.
- Application Task - (code snippet) This is an example which demonstrates the use of Accel 14 Click board. Measured and display Acceleration data for X-axis, Y-axis and Z-axis. Results are being sent to the Usart Terminal where you can track their changes. All data logs write on USB uart changes for every 1 sec.

The full application code, and ready to use projects can be found on our [LibStock](#) page.

Other mikroE Libraries used in the example:

- SPI
- UART
- Conversions

## 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. The terminal available in all MikroElektronika [compilers](#), or any other terminal application of your choice, can be used to read the message.

## 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™](#)

## Downloads

[IIS3DWB datasheet](#)

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[Accel 14 Click schematic](#)

[Accel 14 click 2D and 3D files](#)

[Accel 14 click example on Libstock](#)

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