

ADC 23 Click



PID: MIKROE-5861

ADC 23 Click is a compact add-on board that converts an analog voltage into a digital representation. This board features the ADS127L11, a wide-bandwidth 24-bit delta-sigma analog-to-digital converter from [Texas Instruments](#). It is capable of data rates up to 400ksps using a wideband filter and up to 1067ksps using a low-latency filter. It also offers an excellent combination of AC performance and DC precision with low power consumption. This Click board™ makes the perfect solution for the development of data acquisition (DAQ) measurement devices, shock and vibration instruments, condition monitoring, sonars, electroencephalograms, power quality analyzers, and more.

ADC 23 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?

ADC 23 Click is based on the ADS127L11, a wide-bandwidth 24-bit delta-sigma analog-to-digital converter from Texas Instruments. The digital filter is configurable for wideband or low-latency operation, which optimizes wideband AC performance or data throughput for DC signals. It is optimized to provide high resolution with low power consumption. The delta-sigma demodulator produces low-resolution, high-frequency data, after which the noise is removed. The digital filter simultaneously decimates and filters the modulator data, thus providing the high-resolution final output data.

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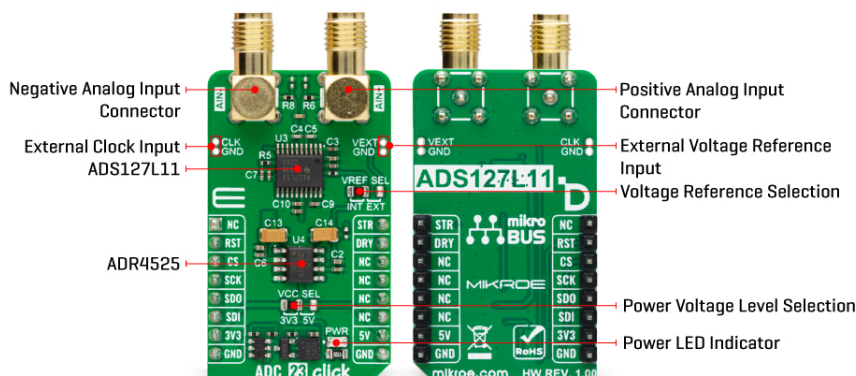
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The ADS127L11 integrates input and reference buffers to reduce signal loading. You can choose onboard [ADR4525](#), an ultralow noise high-accuracy voltage reference from Analog Devices for a reference voltage. Or you can choose an external one over the VEXT header. The selection can be made over the VREF SEL jumper. The internal voltage reference of 2.5V is set by default. The ADC can operate with an external clock or an internal oscillator. The nominal value of the clock is 25.6MHz in high-speed mode and 3.2MHz in low-speed mode. You can add an external oscillator over the CLK header.

The analog input of the ADC is differential, with the input defined as a difference voltage, and you should drive the input with a differential signal for the best performance. For this purpose, the ADC 23 Click is equipped with two SMA connectors.

ADC 23 Click uses a standard 4-Wire SPI serial interface to communicate with the host MCU, supporting SPI mode 1. The ADC can be reset over the RST pin. The start STR pin synchronizes the digital process, and if the STR pin is in a HIGH logic state, the ADC immediately begins conversions with the data-ready DRY pin pulsing for each conversion. The latency is defined as the time from synchronization to the falling edge of the DRY pin.

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	ADC
Applications	Can be used for the development of data acquisition (DAQ) measurement devices, shock and vibration instruments, condition monitoring, sonars, electroencephalograms, power quality analyzers, and more
On-board modules	ADS127L11 - wide-bandwidth 24-bit delta-sigma analog-to-digital converter from Texas Instruments
Key Features	Programmable data rate, selectable digital filter (wideband and low-latency filters), power-

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	scalable architecture, input and reference pre-charge buffers, internal or external clock, and more
Interface	SPI
ClickID	Yes
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on ADC 23 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
	NC	1	AN	PWM	16	STR	Conversion Start
Reset / ID SEL	RST	2	RST	INT	15	DRY	Data Ready
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	NC	
SPI Data IN	SDI	6	MOSI	SDA	11	NC	
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	VCC SEL	Left	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V
JP2	VREF SEL	Left	Voltage Reference Selection INT /EXT: Left position INT, Right position EXT

ADC 23 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
ADC Resolution	-	-	24	bit
Data Rate	-	-	1067	kSPS
External Oscillator Frequency	0.5	-	26.2	MHz
Internal Oscillator Frequency	3.17	-	25.8	MHz

Software Support

We provide a library for the ADC 23 Click as well as a demo application (example), developed

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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 ADC 23 Click driver.

Key functions

- `adc23_get_voltage` ADC 23 read get voltage level function.
- `adc23_read_conversion_data` ADC 23 read conversion data function.
- `adc23_start_conversion` ADC 23 start conversion function.

Example Description

This example demonstrates the use of the ADC 23 Click board™ by reading and writing data by using SPI serial interface and reading results of AD conversion.

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.ADC23

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™](#)

[mikroSDK](#)

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[Click board™ Catalog](#)

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Downloads

[ADC 23 click schematic](#)

[ADC 23 click 2D and 3D files](#)

[ADS127L11 datasheet](#)

[ADC 23 click example on Libstock](#)

[ADR4525 datasheet](#)

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