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ISO ADC 3 Click

PID: MIKROE-4383

ISO ADC 3 Click is a compact add-on board that contains a single-channel precision isolation amplifier. This board features the AMC1100, a precision isolation amplifier with an output separated from the input circuitry by a silicon dioxide barrier that is highly resistant to magnetic interference from Texas Instruments. This barrier is certified to provide galvanic isolation of up to 4250Vpeak. The AMC1100 offers several features as linearity, high input common-mode rejection, and low DC errors and drift. These features make the AMC1100 a high-performance isolation amplifier suitable for accurate current and voltage measurement in energy-metering applications and for industrial applications where users and subsystems must be protected from high voltage potentials.

ISO ADC 3 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?

ISO ADC 3 Click is based on the AMC1100, a precision isolation amplifier with an output separated from the input circuitry by a silicon dioxide barrier that is highly resistant to magnetic interference from Texas Instruments. The AMC1100 can be used in conjunction with isolated power supplies to prevent noise currents on a high common-mode voltage line from entering the local ground and interfering with or damaging sensitive circuitry. It offers features as linearity, high input common-mode rejection, and low DC errors and drift, which makes it a high-performance isolation amplifier for industrial applications where users and subsystems must be protected from high voltage potentials.
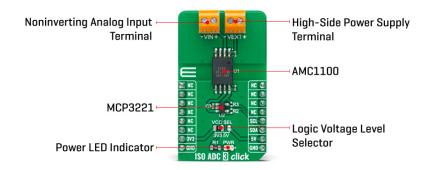
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The AMC1100 consists of a delta-sigma modulator input stage, including an internal reference and clock generator. The output of the modulator and clock signal are differentially transmitted over the integrated capacitive isolation barrier that separates the high-voltage and low-voltage domains. The silicon-dioxide based capacitive isolation barrier supports a high level of magnetic field immunity. These isolators transfer data signals differentially across the isolation barrier through two capacitors formed with a metal top plate and conductive silicon bottom plate on each side of a silicon dioxide dielectric. The received bitstream and clock signals are synchronized and processed by a third-order analog filter with a nominal gain of 8 on the low-side and presented as a differential output.

An analog signal from the AMC1100 can be applied directly to the MCP3221, a successive approximation A/D converter with a 12-bit resolution from Microchip, which ISO ADC 3 Click uses to communicates with MCU through a 2-wire I2C compatible interface. This device provides one single-ended input with very low-power consumption, a low maximum conversion current, and a Standby current of 250 µA and 1 µA. Data can be transferred at rates of up to 100 kbit/s in the Standard and up to 400 kbit/s in the Fast Mode. Also, maximum sample rates of 22.3 kSPS with the MCP3221 are possible in a Continuous-Conversion Mode with a clock rate of 400 kHz.

It also possesses two input terminals labeled as VIN and VEXT. VEXT represents the high-side power supply of the amplifier, while the other represents the noninverting analog input of the AMC1100. Both input terminals allow Normal operation with values of applied input voltage up to 5.5V maximum.

This Click board™ is designed to operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. It allows for both 3.3V and 5V capable MCUs to use the I2C communication lines properly. However, the Click board™ comes equipped with a library that contains easy to use functions and an example code that can be used, as a reference, for further development.

Specifications

Type	ADC,Isolators
Applications	Can be used for accurate current and voltage measurement in energy-metering applications and for industrial applications where users and subsystems must be protected from high

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	voltage potentials.
On-board modules	ISO ADC 3 Click is based on the AMC1100, a precision isolation amplifier with an output separated from the input circuitry by a silicon dioxide barrier that is highly resistant to magnetic interference from Texas Instruments.
Key Features	Fully-differential isolation amplifier, very low nonlinearity, low offset error and noise, highly resistant to magnetic interference, high accuracy, and more.
Interface	I2C
Feature	No ClickID
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 ISO ADC 3 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	NC	
	NC	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	**5V**	Power Supply
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

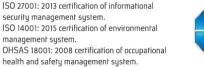| Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1	VCC SEL	Left	Power Supply Voltage Selection 3V3/5V: Left position 3V3, Right position 5V

ISO ADC 3 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage VCC	-0.5	-	6	V
Supply Voltage VEXT	4.5	5	5.5	V
Supply Voltage VIN	0	5	5.5	V

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Isolation Voltage	-	-	5.1	kVrms
Operating Temperature Range	-40	-	+105	°C

Software Support

We provide a library for the ISO ADC 3 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 that enables the usage of the ISO ADC 3 Click board™. It offers reading raw data from output register and calculations that result in relatively accurate measurement of the ADC's voltage level.

Key functions:

- uint16_t isoadc3_read_data ( ); - Function is used to read raw data from MCP3221.
- uint16_t isoadc3_read_voltage (uint16_t v_ref); - Function is used to calculate the ADC's voltage level.

Examples description

The application is composed of three sections :

- System Initialization - Initializes I2C module and LOG structure.
- Application Initialization - Initalizes I2C driver and makes an initial log.
- Application Task - This example shows the capabilities of the ISO ADC 3 Click board™ by measuring ADC voltage level. In order to get correct calculations user should change "v_ref" value to his own power supply voltage.

The full application code, and ready to use projects can be found on our LibStock page.

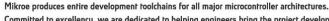Other mikroE Libraries used in the example:
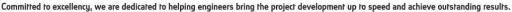
- I2C
- UART
- Conversions

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.

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For more information about mikroSDK, visit the [official page](#).

Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click boards™](#)

Downloads

[ISO ADC 3 click example on Libstock](#)

[MCP3221 datasheet](#)

[AMC1100 datasheet](#)

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

[ISO ADC 3 click schematic](#)

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