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ISO ADC Click

PID: MIKROE-4088

The **ISO ADC Click** is add-on board current-shunt measurement device with isolated delta-sigma modulator. This Click board™ is based on AMC1204BDWR provide a single-chip solution for measuring the small signal of a shunt resistor across an isolated barrier from Texas Instruments. ISO ADC Click contains shunt resistor, these types of resistors are typically used to sense currents in motor control inverters, green energy generation systems, and other industrial applications.

ISO ADC 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?

The ISO ADC Click is current sensing system, which includes isolated delta-sigma modulator. The main IC on the ISO ADC click is AMC1204BDWR, from Texas Instruments.The current-sensing shunt resistor is designed as a 4 wire connected resistor that enables accurate measurements through a force-sense connection. The AMC1204BDWR differential inputs easily connect to the shunt resistor, An internal reference eliminates the need for external components.

The Click board™ communicates with the target microcontroller over SPI interface on the mikroBUS™ line. The analog input range is tailored to directly accommodate the voltage drop across a shunt resistor used for current sensing. The SiO2 -based capacitive isolation barrier supports a high level of magnetic field immunity as described in the Digital Isolator Magnetic-Field Immunity application report. The external clock input simplifies the synchronization of

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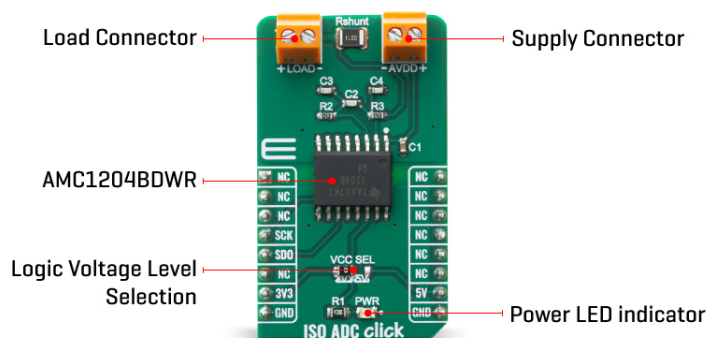
ISO 27001: 2013 certification of informational security management system.
ISO 14001: 2015 certification of environmental management system.
OHSAS 18001: 2008 certification of occupational health and safety management system.

ISO 9001: 2015 certification of quality management system (QMS).

Time-saving embedded tools

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multiple current sense channels on system level. The extended frequency range of up to 20 MHz and is provided externally at the CLKIN pin. The data are synchronously provided at 20 MHz at the DATA output pin. The data are changing at the falling edge of CLKIN.

The ISO ADC Click perform current measurement on LOAD connector, the AMC1204BDWR measure the differential input signal VIN = (VINP – VINN) on two ends of the shunt resistor,against the internal reference of 2.5 V using internal capacitors that are continuously charged and discharged.The current measurement can't be possible without external power supply on AVDD connector.

The voltage level of the logic section can be selected via VCC SEL jumper, between 3.3V and 5V. This allows for both 3.3V and 5V capable MCUs to use the SPI communication lines properly.

Specifications

Type	ADC,Isolators
Applications	ISO ADC click can be used to sense currents in motor control inverters, green energy generation systems, and other industrial applications.
On-board modules	AMC1204BDWR, Isolated Delta-Sigma Modulator for Current-Shunt Measurement, from Texas Instruments.
Key Features	±250-mV input voltage range optimized for shunt resistors, High electromagnetic field immunity, External clock input for easier synchronization
Interface	SPI
ClickID	No
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V

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Pinout diagram

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

Notes	Pin	mikroBUS			Pin	Notes
	NC	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	NC	
	NC	3	CS	RX	14	NC	
SPI Clock	**SCK**	4	SCK	TX	13	NC	
SPI Data OUT	**SDO**	5	MISO	SCL	12	NC	
		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 voltage level selection: left position 3.3V, right position 5V

ISO ADC Click electrical specifications

Description	Min	Typ	Max	Unit
Voltage supply (AVDD)	4.5	5	5.5	V
Current (LOAD)	-	-	3	A
CLKIN	0	-	20	MHz

Software Support

We provide a library for the ISO ADC 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

Library provides function for reading ADC data from device and converting that data to power draw of connected device.

Key functions:

- uint16_t isoadc_read_adc (void) - Function for reading ADC data
- void isoadc_get_rshunt (uint16_t adc_data, isoadc_rshunt_t *rshunt_param) - Function for converting ADC to power supply and current on rshunt
- float isoadc_get_power (isoadc_rshunt_t *rshunt_param) - Function for reading power draw

Examples description

The application is composed of three sections :

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- System Initialization - Initialization of SPI module
- Application Initialization - Timer interrupt initialization, and sets vext
- Application Task - Reads ADC data from device and avarages it

Additional Functions :

- void InitTimer2() - Function for interrupt initialization
- void Timer2_interrupt ( ) iv IVT_INT_TIM2 - Funcion when interrupt occurred writes converted values

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

Other mikroE Libraries used in the example:

- SPI
- Conversions
- UART

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

ISO ADC click 2D and 3D files

AMC1204BDWR datasheet

ISO ADC click schematic

ISO ADC click example on Libstock