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Hall Current 4 Click

PID: MIKROE-3308

The **Hall Current 4 click** is designed to measure relatively high current by using the integrated ACS70331 sensor. The current sensor is based on the GMR elements for current measurement. The Hall Current 4 can be used for current measurement in the applications designed to follow a current, such as the applications for monitoring the current in battery chargers, or for the various kinds of system power supplies.

It comes in the package which also includes the mikroSDK™ software and a library with all the functions. The Click board™ comes as a fully tested and approved prototype, making it a reliable device ready to use on the development board.

.DO NOT TOUCH THE BOARD WHILE THE EXTERNAL POWER SUPPLY IS ON!

Note: Voltage higher than 50V can be hazardous! The click is to be used by trained personnel only and attention when applying high voltage is strongly adviced.

Due to the fact that the sensor provides a solely analog voltage at its output which is linearly commensurate to the current through the load connected to the output terminal, the Hall Current 4 click also has the integrated analog-digital converter which serves to transform the output voltage from the ACS70331 to digital value. The digital value is possible to read from the I2C interface.

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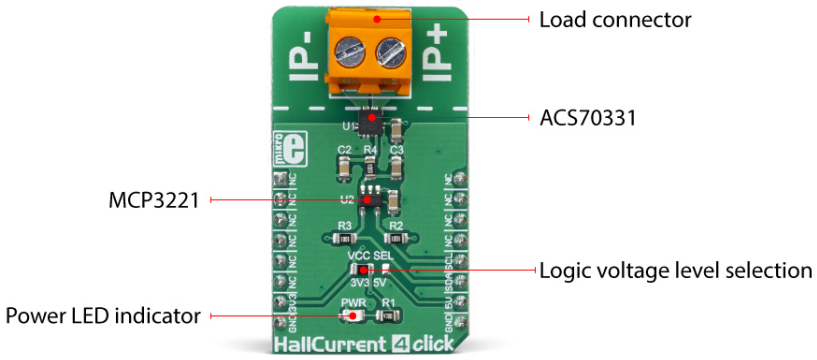
How does it work?

The Hall Current 4 click uses the ACS70331 current sensor produced by Allegro, and the 12-bit ADC marked MCP3221, produced by Microchip. The ACS70331 uses GMR elements to indirectly measure the current flowing through the primary conductor of the IC, by sensing the field produced by this current. This IC utilizes the fact that the field generated by the current passing through the primary conductor affects the voltage across the GMR sensor. The GMR sensor voltage cahnges even with a very low field strength, which makes the ACS70331 very suitable for accurate measurements of lower currents. However, the saturation happens quite soon after, making it unsuitable for higher currents. The ACS70331 has the sensitivity of 200 mV/A and can measure the current in the range range from -5A to +5A



Considering that the operative range of the ACS70331 is approximately 1 MHz, the variations of the output voltage with the load current are quite fast with no latency. The output voltage from the ACS70331 is fed to the input of the analog-digital converter (ADC) which which allows reading the conversion data via the I2C interface. The ACS70331 has a small primary conductor resistance of 1.1 mΩ, resulting in low power dissipation and consequently low temperature rise due to current flow through the sensor.

The sensor has no physical contact with the output pins on the chip as it operates exclusively by the principle of the filed generated by the current which runs through the input pins (primary conductor). The load voltage at the input pins is isolated from the rest of the chip. However, it is not safe to use at the voltages higher than 100V.

Specifications

Type	Current sensor,Measurements
Applications	Hall Current 4 click is perfect for various applications designed for current sensing, e.g. monitoring the current in battery chargers, or for the various kinds of system power supplies, etc.
On-board modules	IC ACS70331, high sensitivity GMR-based current sensor IC, by Allegro
Key Features	Very low serial resistance, measurement of relatively high voltage values – up to 5A

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	independent from the polarization, great accuracy thanks to the GSR current sensor, big range of power supply voltages to which the load can be amounted, etc.
Interface	I2C
ClickID	No
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 the **Hall Current 4 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	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	**SCL**	I2C Clock
	NC	6	MOSI	SDA	11	**SDA**	I2C Data
Power supply	**3V3**	7	3.3V	5V	10	**+5V**	Power Supply
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

Label	Name	Default	Description
VCC SEL	VCC SEL	Left	Logic voltage level selection: left position 3.3V, right position 5V
PWR	PWR	-	Power LED indicator

Hall Current 4 click electrical specifications

Description	Min	Typ	Max	Unit
Current range	-5	-	+5	A
Allowed voltage across the input terminal	0	-	100	V

Software support

We provide a library for the Hall Current 4 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.

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Library Description

This library provides basic functionality for reading the current value and controlling the click board.

Key functions:

- float hallcurrent4_getCurrent() - Reads current in mA.
- uint16_t hallcurrent4_readData() - Reads current 12bit data.

Examples description

The application is composed of the three sections :

- System Initialization - Initializes I2C module.
- Application Initialization - Initializations driver init.
- Application Task - (code snippet) - Reads Current value in mA and logs this data to USBUART 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:

- I2C
- UART

Additional notes and information

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.

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Resources

mikroBUS™

mikroSDK

Click board™ Catalog

Click Boards™

Downloads

Hall Current 4 click example on Libstock

Hall Current 4 click: 2D and 3D files

ACS70331 datasheet

Hall Current 4 click schematic