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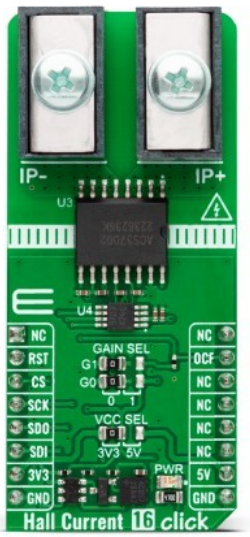
Hall Current 16 Click



PID: MIKROE-5784

Hall Current 16 Click is a compact add-on board that contains a precise solution for AC/DC current sensing. This board features the ACS37002, a 400kHz high-accuracy current sensor from Allegro Microsystems. This sensor features pin-selectable gains that can be used to configure the device to one of the four defined sensitivities and corresponding current ranges, increasing design flexibility. In addition, an adjustable overcurrent fast fault provides short-circuit detection. This Click board™ makes the perfect solution for the development of applications requiring a combination of high-current monitoring and high isolation voltage between the primary high-current and low-voltage sides.

Hall Current 16 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.

DO NOT TOUCH THE BOARD WHILE THE LOAD IS CONNECTED!

Note: This Click board™ needs to be used by trained personnel only while applying high voltages. Special care should be taken when working with hazardous voltage levels.

How does it work?

Hall Current 16 Click is based on the ACS37002, a 400kHz high-accuracy current sensor from

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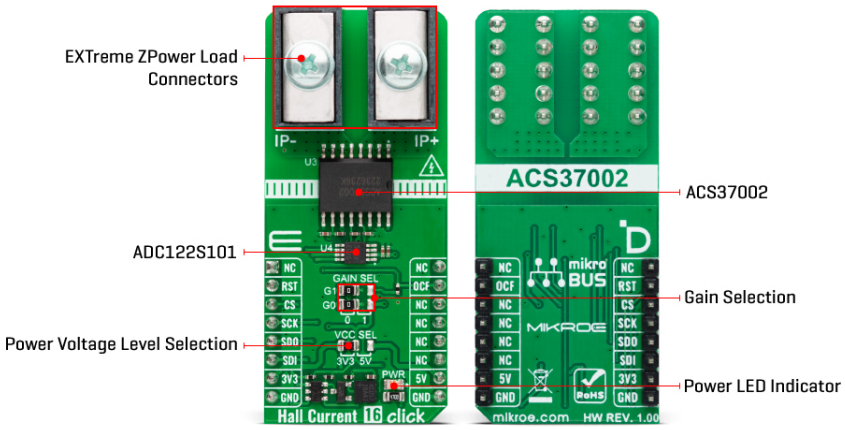
Allegro Microsystems. It is a fully integrated Hall-effect current sensor, factory trimmed to provide high accuracy over the entire operating range without user programming. The current is sensed differentially by two Hall plates that subtract out interfering external common mode magnetic fields. The Hall sensor has no physical connection to the integrated current conductor, as the ACS37002 provides high isolation by magnetically coupling the field generated by the current in the conductor.



The current sensor features overvoltage detection, overcurrent fault, temperature compensation, and more. The ACS37002 is rated to withstand 3125VRMS of dielectric voltage. The IP+ and IP- terminals are fused internally and allow connecting the load over the load connectors. Depending on the position of the two GAIN SEL jumpers, the gain can be set as high as 66.7A for IP as a maximum. By default, the gain is set to 0 position on both jumpers, which results in a 50A bidirectional gain. The sensitivity can range from 19.8 to 39.6mV/A depending on the chosen gain.

The current sensor on the Hall Current 16 Click sends its output along with the zero current voltage reference to the ADC122S101, a two-channel 12-bit A/D converter from Texas Instruments. This ADC is fully specified over a sample rate range of 500ksps to 1Msps. It is based on a successive/approximation register architecture with an internal track-an-hold circuit.

Hall Current 16 Click uses a standard 4-Wire SPI serial interface of the ADC122S101 to communicate with the host MCU. If the sensed current exceeds the comparator threshold, the overcurrent fault (OCF) pin will trigger with an active LOW flag. The threshold can be set in percentage of full-scale output swing. You can turn off the overcurrent fault functionality.

This Click board™ can operate with either 3.3V or 5V logic voltage levels selected via the PWR SEL jumper. This way, both 3.3V and 5V capable MCUs can use the communication lines properly. 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	Current sensor,Measurements
Applications	Can be used for the development of applications requiring a combination of high-current monitoring and high isolation voltage

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	between the primary high-current and low-voltage sides
On-board modules	ACS37002 - 400KHz high-accuracy current sensor from Allegro Microsystems ADC122S101 - 12-bit A/D converter from Texas Instruments
Key Features	Externally configurable gain settings, adjustable fast overcurrent fault, differential sensing for high immunity to external magnetic fields, high accuracy, high operating bandwidth for fast control loops, low internal primary conductor resistance, highly isolated device, and more
Interface	SPI
ClickID	Yes
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on Hall Current 16 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	**OCF**	Overcurrent Fault
SPI Chip Select	**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	Power/Logic Voltage Level Selection 3V3/5V: Left position 3V3, Right position 5V
JP2-JP3	GAIN SEL	Left	Gain Selection 0/1: Left position 0, Right position 1

Hall Current 16 Click electrical specifications

Description	Min	Typ	Max	Unit

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Supply Voltage	3.3	-	5	V
Current Sensing Range	33.3	-	66.7	A
Sensitivity	19.8	-	39.6	mV/A
ADC Sampling Rate	500	-	1000	ksps

Software Support

We provide a library for the Hall Current 16 Click as well as a demo application (example), developed 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 Hall Current 16 Click driver.

Key functions

- hallcurrent16_get_current Hall Current 16 get current function.
- hallcurrent16_get_voltage Hall Current 16 get voltage function.
- hallcurrent16_get_ovc_fault Hall Current 16 get overcurrent fault function.

Example Description

This example demonstrates the use of Hall Current 16 click board™ by reading and displaying the current measurements.

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.HallCurrent16

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

Click board™ Catalog

Click Boards™

ClickID

Downloads

Hall Current 16 click example on Libstock

ACS37002 datasheet

ADC122S101 datasheet

Hall Current 16 click 2D and 3D files

Hall Current 16 click schematic