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Hall Current 13 Click

PID: MIKROE-5066

Hall Current 13 Click is a compact add-on board that provides economical and precise AC or DC current sensing solutions. This board features the TMCS1107-Q1, a galvanically isolated Hall-effect current sensor capable of DC or AC current measurement with high accuracy, excellent linearity, and temperature stability from Texas Instruments. It enables the lowest drift, <3% full-scale error, and highest accuracy over time and temperature. It also provides a reliable 420V lifetime working voltage and 3kVRMS isolation between the current path and circuitry with uni/bidirectional current sensing. Besides, the user is allowed to process the output signal in analog or digital form. This Click board™ is suitable for AC or DC current-sensing in industrial and commercial systems, motor and load control, power factor correction, overcurrent protection, and many more.

Hall Current 13 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.
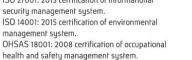
.DO NOT TOUCH THE BOARD WHILE THE EXTERNAL POWER SUPPLY IS ON!

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 13 Click as its foundation uses the TMCS1107-Q1, a precise Hall-effect current sensor, featuring a 420V isolation working voltage, <3% full-scale error across temperature, and device options providing both unidirectional and bidirectional current sensing from Texas Instruments. The input current flows through an internal 1.8mΩ conductor that generates a magnetic field measured by an integrated Hall-effect sensor and amplified by a precision signal chain. The device has a bandwidth of 80kHz and can be used for AC and DC current measurements. It is optimized for high accuracy and temperature stability, with offset and sensitivity compensated across the operating temperature range.

This Click board™ possesses two ways to communicate with the MCU. The analog output signal of the TMCS1107-Q1 can be converted to a digital value using MCP3221, a successive approximation A/D converter with a 12-bit resolution from Microchip using a 2-wire I2C compatible interface, or can be sent directly to an analog pin of the mikroBUS™ socket labeled as AN. Selection can be performed by onboard SMD switch labeled as VOUT SEL, setting it to an appropriate position marked as AN and ADC.

The MCP3221 provides one single-ended input with low power consumption, a low maximum conversion current, and a Standby current of 250μA and 1μA, respectively. Data can be transferred at rates of up to 100kbit/s in the Standard and 400kbit/s in the Fast Mode. Also, maximum sample rates of 22.3kSPS with the MCP3221 are possible in a Continuous-Conversion Mode with a clock rate of 400kHz.

Also, this Click board™ should be connected in series with the load. The current is measured by two onboard terminal connectors, one terminal block for the positive and the other for the negative current input.

This Click board™ can operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. This way, it is allowed for both 3.3V and 5V capable MCUs to use the communication lines properly. However, the 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

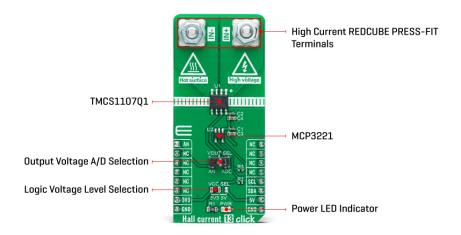| Type	Current sensor,Measurements
Applications	Can be used for AC or DC current-sensing in industrial and commercial systems, motor and

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Time-saving embedded tools

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	load control, power factor correction, overcurrent protection, and many more
On-board modules	TMCS1107-Q1 - galvanically isolated Hall-effect current sensor capable of DC or AC current measurement with high accuracy, excellent linearity, and temperature stability from Texas Instruments
Key Features	High accuracy and precision, excellent linearity, and temperature stability, 3kVRMS isolation rating, robust 420V lifetime working voltage, bidirectional and unidirectional current sensing, and more
Interface	Analog,I2C
ClickID	No
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 13 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikro BUS			Pin	Notes
Analog Signal	**AN**	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

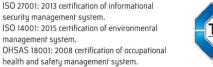| Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1	VCC SEL	Left	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V
SW1	VOUT SEL	Right	Output Voltage A/D Selection AN/ADC: Left position AN, Right position ADC

Hall Current 13 Click electrical specifications

Description	Min	Typ	Max	Unit

Supply Voltage	3.8	-	5	V
Measurement Range @ VCC=3.3V	-2.8	-	27.7	A
Measurement Range @ VCC=5V	-4.5	-	43	A
Sensitivity	-	100	-	mV/A
Operating Temperature Range	-40	+25	+120	°C

Software Support

We provide a library for the Hall Current 13 Click as well as a demo application (example), developed using MikroElektronika compilers. The demo can run on all the main MikroElektronika development boards.

Package can be downloaded/installed directly from NECTO Studio Package Manager(recommended way), downloaded from our LibStock™ or found on Mikroe github account.

Library Description

This library contains API for Hall Current 13 Click driver.

Key functions

- hallcurrent13_read_current This function reads the input current level [A] based on HALLCURRENT13_NUM_CONVERSIONS of voltage measurements.

- hallcurrent13_read_voltage This function reads raw ADC value and converts it to proportional voltage level.

- hallcurrent13_set_vref This function sets the voltage reference for Hall Current 13 click driver.

Example Description

This example demonstrates the use of Hall Current 13 Click board™ by reading and displaying the input current measurements.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager(recommended way), downloaded from our LibStock™ or found on Mikroe github account.

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.HallCurrent13

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 MikroElektronika compilers.

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

Hall Current 13 click example on Libstock

Hall Current 13 click 2D and 3D files

MCP3221 datasheet

TMCS1107-Q1 datasheet

Hall Current 13 click schematic