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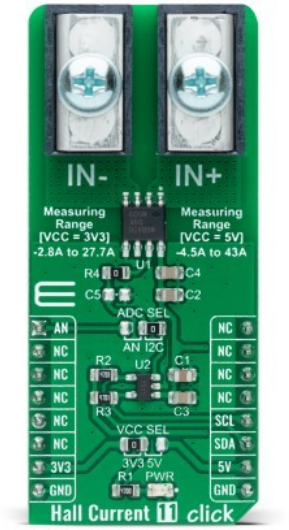
Hall Current 11 Click



PID: MIKROE-4797

Hall Current 11 Click is a compact add-on board that provides economical and precise AC or DC current sensing solutions. This board features the TMCS1108A2U, a galvanically isolated Hall-effect current sensor with high accuracy, excellent linearity, and temperature stability 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. It features a 100V functional isolation working voltage with both unidirectional and bidirectional current sensing. Based on the selected logic voltage VCC, the TMCS1108A2U allows the user to measure current in two appropriate ranges, where after that, can process the output signal in analog or digital form. This Click board™ is suitable for AC or DC current-sensing in industrial, commercial, and communications systems.

Hall Current 11 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?

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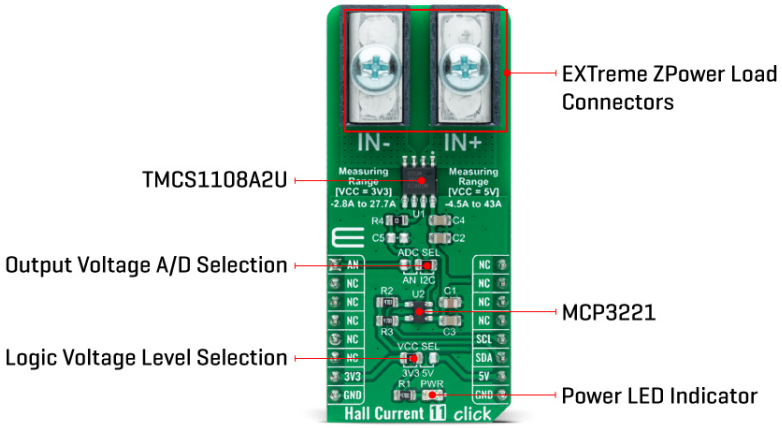
Hall Current 11 Click as its foundation uses the TMCS1108A2U, a precision Hall-effect current sensor, featuring a 100V functional isolation working voltage, <3% full-scale error across temperature, and both unidirectional and bidirectional current sensing from Texas Instruments. The input current flows through a 1.8mΩ resistance conductor between the isolated input current pins, minimizing power loss and thermal dissipation. The magnetic field generated by the input current is sensed by a Hall sensor and amplified by a precision integrated signal chain. The TMCS1108A2U can be used for both AC and DC current measurements with a bandwidth of 80kHz.



The TMCS1108A2U is optimized for high accuracy and temperature stability, with both offset and sensitivity compensated across the entire operating temperature range. Based on the selected logic voltage VCC, the TMCS1108A2U allows the user to measure current in two appropriate ranges, where after that, can process the output signal in analog or digital form. With the selected logic voltage of 3.3V, it is possible to measure the current from -2.8A to 27.7A, while with the chosen 5V, it is possible to measure it in the range from -4.5A to 43A.

The analog output signal of the TMCS1108A2U 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 jumper labeled as ADC SEL to an appropriate position marked as AN and I2C.

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.

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

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Applications	Can be used for AC or DC current-sensing in industrial, commercial, and communications systems
On-board modules	TMCS1108A2U - galvanically isolated Hall-effect current sensor with high accuracy, excellent linearity, and temperature stability from Texas Instruments
Key Features	Low power consumption, high accuracy, featuring a 100V functional isolation working voltage, bigger than 3% full-scale error across temperature, both unidirectional and bidirectional current sensing, possibility of signal processing in analog and digital form, and more
Interface	Analog,I2C
Feature	No ClickID
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 11 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS™				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
JP2	ADC SEL	Right	Output Voltage A/D Selection AN/I2C: Left position AN, Right position I2C

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Hall Current 11 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	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	+125	°C

Software Support

We provide a library for the Hall Current 11 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 11 Click driver.

Key functions

- hallcurrent11_get_adc Hall Current 11 ADC reading function.
- hallcurrent11_get_adc_voltage Hall Current 11 get ADC voltage function.
- hallcurrent11_get_current Hall Current 11 get current function.

Example Description

This library contains API for Hall Current 11 Click driver. The demo application reads ADC value and current (A).

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.HallCurrent11

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.

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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™

Downloads

Hall Current 11 click 2D and 3D files

MCP3221 datasheet

TMCS1108 datasheet

Hall Current 11 click schematic

Hall Current 11 click example on Libstock