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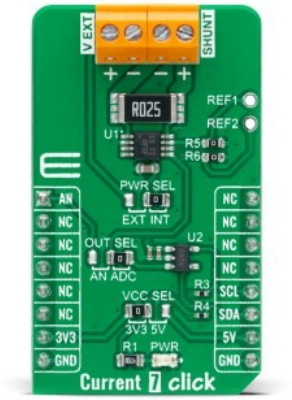
Current 7 Click



PID: MIKROE-4976

Current 7 Click is a compact add-on board providing a precise and accurate current sensing solution. This board features the INA282, a wide common-mode range, bidirectional, high-accuracy current shunt monitor from Texas Instruments. The INA282 represents a voltage output current shunt monitor that can sense drops across shunts at common-mode voltages from –14 V to +80 V, independent of the supply voltage, which operates in a range from 2.7V up to 18V supply. The zero-drift topology enables high-precision measurements with maximum input offset voltages as low as 70µV. Also, the user is allowed to process the output signal in analog or digital form. This Click board™ delivers higher performance to industrial control and automation applications, load and power supplies monitoring, telecom equipment, and many more.

Current 7 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?

Current 7 Click as its foundation uses the INA381, a high-accuracy current-sensing amplifier from Texas Instruments. This voltage output current-sensing amplifier accurately measures voltages developed across the current-sensing resistor (also known as a current-shunt resistor) at a common-mode range that extends 14V below the negative supply rail as up to 80V, allowing for either low-side or high-side current sensing. The zero-drift topology enables high-precision measurements with maximum input offset voltages as low as 70µV over the entire temperature range of –40°C to +120°C.

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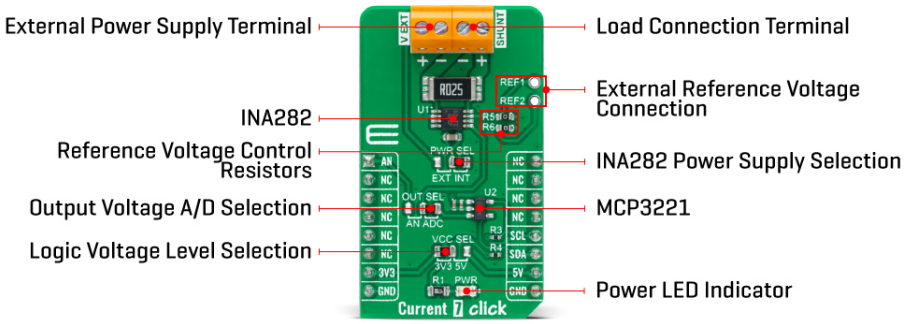

This Click board™ possesses two ways to communicate with the MCU. The analog output signal of the INA282 can be converted to a digital value using MCP3221, a successive approximation A/D converter with a 12-bit resolution from Microchip using a 2-wire I2C compatible interface, or can be sent directly to an analog pin of the mikroBUS™ socket labeled as AN. 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. Selection can be performed by onboard SMD jumper labeled as OUT SEL, setting it to an appropriate position marked as AN and ADC.

The INA282 also allows a connection of external voltage signals on the onboard headers labeled as REF1 and REF2 for the device's reference voltage. This reference voltage determines how the output responds to certain input conditions. The configurable settings of the reference voltage control resistors, R5 and R6, allow the INA282 to be used in unidirectional and bi-directional applications. More information about these operational modes can be found in the attached datasheet.

This Click board™ can operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. It allows for both 3.3V and 5V capable MCUs to use the communication lines properly. Additionally, there is a possibility for the INA282 power supply selection via jumper labeled as PWR SEL to supply the INA282 from an external power supply terminal in the range from 2.7V to 18V or with mikroBUS™ power rails. 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 industrial control and automation applications, load and power supplies monitoring, telecom equipment, and many more
On-board modules	INA381 - current-sensing amplifier from Texas Instruments
Key Features	Wide input common-mode range, low power consumption, bidirectional and unidirectional

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	current sensing, high accuracy and precision, possibility of signal processing in analog and digital form, and more
Interface	Analog,I2C
Feature	No ClickID
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V,External

Pinout diagram

This table shows how the pinout on Current 7 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS				Pin	Notes
Analog Output	**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	PWR SEL	Right	INA282 Power Supply Selection EXT/INT: Left position EXT, Right position INT
JP3	OUT SEL	Right	Output Voltage A/D Selection AN/ADC: Left position AN, Right position ADC
R5-R6	R5-R6	Populated	Reference Voltage Control Resistors
J1-J2	REF1-REF2	Unpopulated	External Reference Voltage Headers

Current 7 Click electrical specifications

Description	Min	Typ	Max	Unit

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Supply Voltage VCC	3.3	-	5	V
External Supply Voltage VEXT	2.7	-	18	V
Common-Mode Voltage Range	-14	-	+80	V
Gain	-	50	-	V/V
Operating Temperature Range	-40	+25	+120	°C

Software Support

We provide a library for the Current 7 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 Current 7 Click driver.

Key functions

- current7_get_adc Current 7 get ADC function.
- current7_get_adc_voltage Current 7 get ADC voltage function.
- current7_get_current Current 7 get current function.

Example Description

This library contains API for Current 7 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 way), downloaded from our LibStock™ or found on Mikroe github account.

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.Current7

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

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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

Current 7 click example on Libstock

Current 7 click 2D and 3D files

MCP3221 datasheet

INA282 datasheet

Current 7 click schematic

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MIKROE-4976