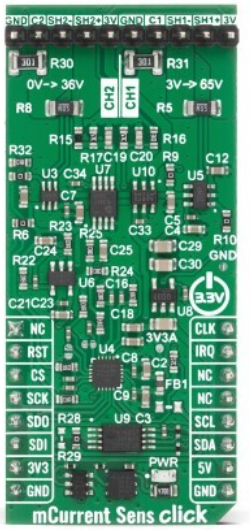
MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

mCurrent Sens Click





PID: MIKROE-6985

mCurrent Sens Click is a compact add-on board designed for dual-channel current and bus voltage monitoring in power analysis and data acquisition applications. This board is based on the MCP3564R, an 8-channel 24-bit delta-sigma ADC from Microchip. Key features include two independent high-side measurement channels, bidirectional current sensing, 0.05Ω shunt resistors, buffered voltage divider stages for bus voltage monitoring, and fixed-gain 50V/V zero-drift current sense amplifiers: MCP6C02 for CH1 and MCP6C26 for CH2. The board supports CH1 bus voltage measurements from 3V to 65V and CH2 measurements from 0V to 36V, while an onboard 3.0V precision reference, calibration resistors, EEPROM storage, SPI communication, and configurable ADC oversampling support accurate and flexible measurements. It is suitable for power analysis, battery monitoring, consumption profiling, load testing, power rail diagnostics, and measurement applications.

For more information about **mCurrent Sens Click** visit the official product page.

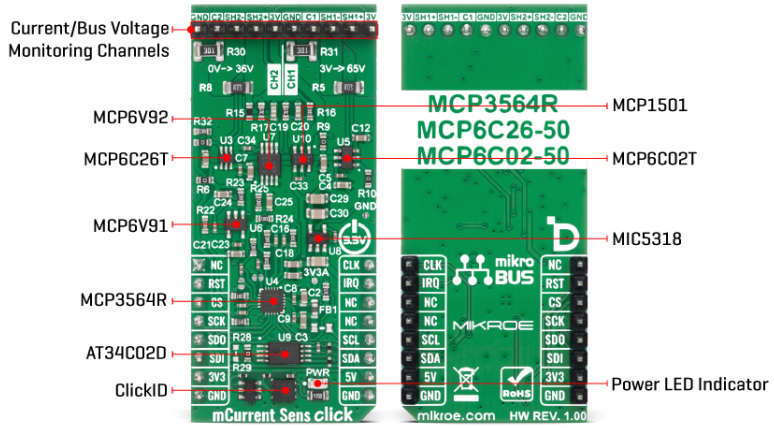
How does it work?

mCurrent Sens Click is based on the MCP3564R, an 8-channel 24-bit delta-sigma ADC from Microchip, combined with a zero-drift high-side current sensing front-end for power analysis and data acquisition applications. The analog front-end uses two fixed-gain 50V/V current sense amplifiers: the MCP6C02T-050E/CHY for channel CH1 and the MCP6C26T-050E/LTY for channel CH2. Each channel includes a 0.05Ω shunt resistor for current measurement, while the corresponding bus voltage is routed to the ADC through buffered voltage divider stages, allowing the system to simultaneously acquire current and voltage information from both measurement paths. The board is designed as a dual-channel high-side measurement solution, with CH1 intended for bus voltage monitoring from 3V to 65V and CH2 intended for operation

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from 0V to 36V. This combination allows the Click board™ to cover a wider range of power-monitoring scenarios, such as power analysis, battery monitoring, consumption profiling, load testing, power rail diagnostics, and other measurement applications.



Both current sensing channels are configured for bidirectional measurement, with the amplifier outputs biased around a reference level derived from half of the ADC reference voltage, enabling the ADC to detect both positive and negative current flow. The MCP3564R ADC receives the complete set of measurement signals through its analog inputs, including CH1_CURR+, CH1_CURR-, CH1_V+, CH1_V-, CH2_V+, CH2_V-, CH2_CURR+, and CH2_CURR-, providing a complete acquisition path for current and voltage monitoring on both channels. The board communicates with the host MCU primarily through the SPI interface, using CS, SCK, SDO, and SDI lines for ADC communication, while the CLK pin is used as the MCLK input for the ADC and the INT pin carries the IRQ/MDAT interrupt output.

In addition to the SPI interface, mCurrent Sens Click also uses the mikroBUS™ I2C lines, SCL and SDA, to access the onboard AT34C02D EEPROM, which can be used for storing calibration parameters. To support accurate measurements, the board includes an MCP1501T-30E precision 3.0V reference and 0.1% 300Ω calibration resistors, with the calibration flow supported through the J1 external connector and external jumper configuration. The MCP3564R ADC also allows oversampling ratio configuration, enabling a trade-off between conversion speed and measurement precision; higher OSR settings are recommended when measuring very small currents to improve stability and effective resolution.

The board operates with 3.3V digital logic, while the 5V mikroBUS™ supply is used by the onboard MIC5318 regulator to generate the 3.3V analog rail required by the sensitive analog circuitry. Since the CH1 measurement path uses the MCP6C02 current sense amplifier, it requires an appropriate common-mode voltage for correct operation and is not intended for bus voltages close to 0V; for low-side or near-ground bus voltage measurements, the CH2 path with the MCP6C26 front-end should be used instead. This board comes equipped with a library containing functions and example code that can be used as a reference for further development.

Specifications

Type	Measurements
Applications	Ideal for power analysis, battery monitoring, consumption profiling, load testing, power rail

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	diagnostics, and other measurement applications
On-board modules	MCP3564R - 8-channel 24-bit delta-sigma ADC from Microchip | MCP6C02T-050E - zero-drift 65V high-side current sense amplifier from Microchip | MCP6C26T-050E - zero-drift 36V current sense amplifier from Microchip
Key Features	8-channel 24-bit delta-sigma ADC, dual-channel high-side current and bus voltage monitoring, zero-drift current sensing front-end, fixed 50V/V current sense amplifier gain, bidirectional current measurement, buffered voltage divider stages for bus voltage acquisition, SPI communication interface, onboard AT34C02D EEPROM for calibration parameter storage, and more
Interface	I2C,SPI
Feature	ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V,5V

Pinout diagram

This table shows how the pinout on mCurrent Sens 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	**CLK**	ADC MCLK
Reset / ID SEL	**RST**	2	RST	INT	15	**IRQ**	Interrupt
Device Enable / ID COMM	**CS**	3	CS	RX	14	NC	
SPI Clock	**SCK**	4	SCK	TX	13	NC	
SPI Data OUT	**SDO**	5	MISO	SCL	12	**SCL**	I2C Clock
SPI Data IN	**SDI**	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

mCurrent Sens Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
Voltage Measurement range (CH1)	3	-	65	V
Voltage Measurement range (CH2)	0	-	36	V

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ADC Resolution	-	24	-	bit

Software Support

mCurrent Sens Click demo application is developed using the NECTO Studio, ensuring compatibility with mikroSDK's open-source libraries and tools. Designed for plug-and-play implementation and testing, the demo is fully compatible with all development, starter, and mikromedia boards featuring a mikroBUS™ socket.

Example Description

This example demonstrates the use of mCurrent Sens Click for measuring voltage, current, and temperature on two independent channels.

Key Functions

- mcurrentsens_cfg_setup This function initializes Click configuration structure to initial values.
- mcurrentsens_init This function initializes all necessary pins and peripherals used for this Click board.
- mcurrentsens_default_cfg This function executes a default configuration of mCurrent Sens Click board.
- mcurrentsens_fetch_calib This function reads calibration values from external EEPROM.
- mcurrentsens_read_ch1_current This function reads channel 1 current measurement in mA.
- mcurrentsens_read_ch1_voltage This function reads channel 1 voltage measurement in mV.

Application Init

Initializes communication, configures the device, optionally performs calibration, and loads calibration data from EEPROM. ADC oversampling ratio is set for faster runtime measurements.

Application Task

Reads and logs voltage, current, and temperature values continuously.

Application Output

This Click board can be interfaced and monitored in two ways:

- Application Output - Use the "Application Output" window in Debug mode for real-time data monitoring. Set it up properly by following this tutorial.
- UART Terminal - Monitor data via the UART Terminal using a USB to UART converter. For detailed instructions, check out this tutorial.

Additional Notes and Information

The complete application code and a ready-to-use project are available through the NECTO Studio Package Manager for direct installation in the NECTO Studio. The application code can also be found on the MIKROE GitHub account.

Resources

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mikroBUS™

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Downloads

mCurrent Sens Click example package

mCurrent Sens Click 2D and 3D files v100

MCP3564R datasheet

MCP6C02 datasheet

MCP6C26 datasheet

mCurrent Sens Click schematic v100

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