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Load Cell 2 Click

PID: MIKROE-4047

Load cell 2 Click is a weight measurement click which utilizes a load cell element, in order to precisely measure the weight of an object. The Load Cell 2 Click can be used with the strain gauge type of load cells with external differential reference voltage range from 0.1V to 5V. The strain gauge load cell is typically a circuit made of four strain gauges, connected in the Wheatstone bridge configuration. Very small voltage changes need to be accurately detected and converted into a digital form. The Load Cell 2 Click is based around the NAU7802, which is a 24-bit analog-to-digital converter, operated via a simple I2C command, from Nuvoton. This sensor has many features that make it a perfect solution for small designs. One of these features is certainly its high level of integration that allows a minimal number of external components.

Load Cell 2 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?

The NAU7802 is a precision low-power 24-bit analog-to-digital converter (ADC), with an onboard low-noise programmable gain amplifier (PGA), onboard RC or Crystal oscillator, and a precision 24-bit sigma-delta (Σ-Δ) analog to digital converter (ADC). The NAU7802 device is capable of up to 23-bit ENOB (Effective Number Of Bits) performance. This device provides a complete front-end solution for bridge/sensor measurement such as in weigh scales, strain gauges, and many other high resolution, low sample rate applications.

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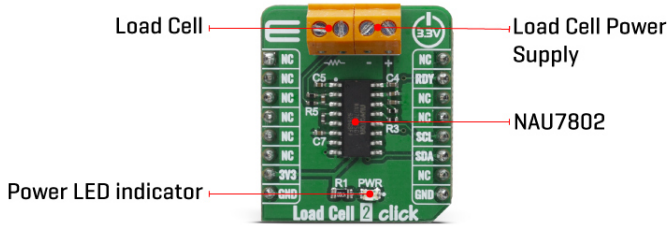

The NAU7802 have many built-in features, which enable high performance applications with very low external parts count. Additionally, both operating current and standby current are very low, and many power management features are included. These enable powering only those elements of the chip that are needed, and also, to operate at greatly reduced power if the full 23-bit ENOB performance is not required.

The Programmable Gain Amplifier (PGA) provides selectable gains from 1 to 128. The A/D conversion is performed with a Sigma-Delta modulator and programmable FIR filter that provides a simultaneous 50Hz and 60Hz notch filter to effectively improve interference immunity. Also, this device provides a standard 2-wire interface compatible with I2C protocol for simple and straightforward connection to and interoperation with a wide range of possible host processors.

Calibration is not required for low accuracy applications, but may be needed in sensitive applications. When calibration is used the system designer has three options (details in NAU7802 datasheet).

The power supply is 3.3V and this allows only 3.3V MCUs to be interfaced with the Click boards™ directly.

Specifications

Type	Force
Applications	NAU7802 provides a complete front-end solution for bridge/sensor measurement such as in weigh scales, strain gauges, and many other high resolution, low sample rate applications.
On-board modules	NAU7802 24-Bit Dual-Channel ADC For Bridge Sensors
Key Features	NAU7802 is a precision low-power 24-bit analog-to-digital converter (ADC), with an onboard low-noise programmable gain amplifier (PGA), onboard RC or Crystal oscillator, and a precision 24-bit sigma-delta (Σ-Δ) analog to digital converter (ADC)

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Interface	I2C
Feature	No ClickID
Compatibility	mikroBUS™
Click board size	S (28.6 x 25.4 mm)
Input Voltage	3.3V

Pinout diagram

This table shows how the pinout on Load Cell 2 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	**RDY**	Data Ready
	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	NC	
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator

Software Support

We provide a library for the Load Cell 2 Click on our LibStock page, as well as a demo application (example), developed using MikroElektronika compilers. The demo can run on all the main MikroElektronika development boards.

Library Description

The library covers all the necessary functions to control Load Cell 2 click board. Library performs a standard I2C interface communication.

Key functions:

- float loadcell2_get_weight (loadcell2_data_t *cell_data) - Get weight function.
- uint32_t loadcell2_get_result (void) - Get results function.
- void loadcell2_set_default_config (void) - Set default sensor configuration function.

Examples description

The application is composed of three sections :

- System Initialization - Initializes I2C, set INT pin as input and stert to write log.

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- Application Initialization - Initializes I2C driver and performs the device reset, set power on and default configuration. Sets tare the scale, calibrate scale and start measurements.
- Application Task - (code snippet) - This is an example which demonstrates the use of Load Cell 2 Click board. Display the measurement of scales in grams [g]. Results are being sent to the Usart Terminal where you can track their changes. All data logs write on USB uart changes for every 1 sec.

Additional Functions :

- void log_display (float display_val) - Function displays readings as floating point value with two decimal places.

The full application code, and ready to use projects can be found on our LibStock page.

Other mikroE Libraries used in the example:

- I2C
- UART
- Conversions

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. The terminal available in all MikroElektronika compilers, or any other terminal application of your choice, can be used to read the message.

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

Load Cell 2 click example on Libstock

Load Cell 2 click 2D and 3D files

NAU7802 datasheet

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Load Cell 2 click schematic

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