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Load Cell 3 Click

PID: MIKROE-4658

Load Cell 3 Click is a compact add-on board that represents a weigh scale solution. This board features the PGA302, a low-drift, low-noise, programmable signal-conditioner device designed for various resistive bridge-sensing applications from Texas Instruments. It creates 2.5V of bridge excitation and a current output source with programmable current output up to 1mA. Two identical analog front-end (AFE) channels followed by a 16-bit Sigma-Delta ADC are available at the input, where each AFE channel has a dedicated programmable gain amplifier with gain up to 200V/V. It also comes with an on-chip temperature sensor and integrated EEPROM memory for device configuration, calibration, and user data. This Click board™ has many features that make it a perfect solution for weight scale and force-sensing applications that use strain gauge load cells and other general resistive bridge signal-conditioning applications.

Load Cell 3 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?

Load Cell 3 Click as its foundation uses the PGA302, a high accuracy, low drift, low noise, low power, and versatile signal conditioner automotive grade-qualified device for resistive bridge pressure and temperature-sensing applications from Texas Instruments. The PGA302 provides bridge excitation voltages of 2.5V. The PGA302 conditions sensing and temperature signals by amplifying and digitizing through the analog front end chain and performing linearization and temperature compensation. The conditioned signals can be output in analog form, and, besides that, the signal data can be accessed by an I2C digital interface.

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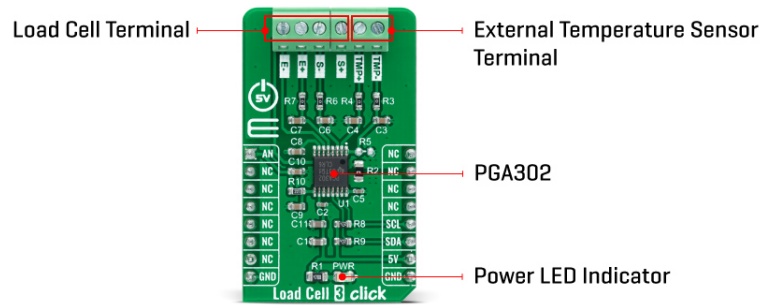
The PGA302 contains two separated analog-front end (AFE) chains with their gain amplifiers for resistive bridge and temperature sensing inputs. The resistive bridge input AFE chain consists of a programmable gain with eight steps from 1.33V/V to 200V/V. For the temperature-sensing input AFE chain, the PGA302 provides a current source that can source up to 1mA for the optional external temperature sensing available on the on-board terminal labeled with TMP+ and TMP-.

After the ADC decimation filters, the digitalized signals are sent to the linearization and compensation calculation digital signal logic. All required parameters for the linearization algorithm and other user data are stored in the integrated EEPROM memory. At the device's output, a 14-bit DAC is followed by a ratiometric-voltage supply output buffer with a gain of 4 V/V allowing a 0-5V ratiometric voltage system output available on the AN pin on the mikroBUS™ socket.

This Click board™ operates only with a 5V logic voltage level. The board must perform appropriate logic voltage level conversion before use with MCUs with different logic levels. However, the Click board™ comes equipped with a library containing functions and an example code that can be used, as a reference, for further development.

Specifications

Type	Force
Applications	Can be used for weight scale and force-sensing applications that use strain gauge load cells and other general resistive bridge signal-conditioning applications.
On-board modules	PGA302 - programmable signal-conditioner device designed for various resistive bridge-sensing applications from Texas Instruments
Key Features	Dual channel analog front-end, 16-bit Sigma-Delta ADC, programmable gain up to 200V/V, on-chip temperature sensor, EEPROM memory for device configuration, calibration and user data, and more.
Interface	Analog,I2C

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Feature	No ClickID
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	5V

Pinout diagram

This table shows how the pinout on Load Cell 3 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
	NC	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

Load Cell 3 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	5	-	V
ADC Resolution	-	16	-	bits
Operating Temperature Range	-40	+25	+150	°C

Software Support

We provide a library for the Load Cell 3 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 Load Cell 3 Click driver.

Key functions:

- loadcell3_cfg_setup - Config Object Initialization function.

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- loadcell3_init - Initialization function.
- loadcell3_default_cfg - Click Default Configuration function.

Examples description

This library contains API for the Load Cell 3 click driver. The library also includes a function for tare and calibration and weight measurement. This demo application shows an example of weight measurement.

The demo application is composed of two sections :

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.LoadCell3

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

PGA302 datasheet

Load Cell 3 click 2D and 3D files

Load Cell 3 click schematic

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[Load Cell 3 click example on Libstock](#)

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