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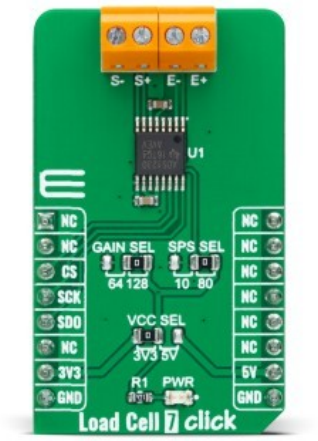
Load Cell 7 Click



PID: MIKROE-5276

Load Cell 7 Click is a compact add-on board representing a weigh scale solution. This board features the ADS1230, a high-precision 20-bit delta-sigma analog-to-digital converter (ADC) with an outstanding noise performance from Texas Instruments. This SPI-configurable ADC (read-only) offers selectable gain and data rate values, supporting a full-scale differential input of ±39mV/±19.5mV and 10SPS/80SPS, respectively. It comes with an onboard low-noise programmable gain amplifier (PGA) and onboard oscillator providing a complete front-end solution. This Click board™ has many features that make it a perfect fit for bridge sensor applications, including industrial process control, weigh scales, and strain gauges.

Load Cell 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?

Load Cell 7 Click as its foundation uses the ADS1230, a high accuracy, low noise, and low power 20-bit ΣΔ ADC with an outstanding noise performance from Texas Instruments. It includes a low-noise PGA, internal oscillator, third-order delta-sigma (ΔΣ) modulator, and fourth-order digital filter, thus providing a complete front-end solution for bridge sensor applications. The ADS1230 is easy to configure, and all digital control is accomplished through dedicated pins; there are no registers to program. The conversions from the ADS1230 are sent to the MCU through SPI serial interface, with the digital information converted to weight.

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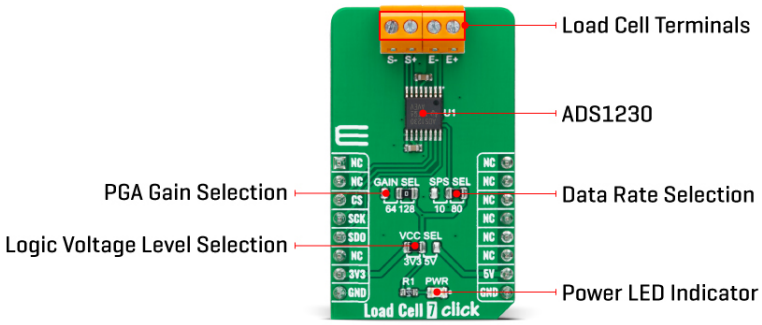

The low-noise PGA has a selectable gain, performed by an onboard SMD jumper labeled as GAIN SEL to an appropriate position marked as 64 and 128, supporting a full-scale differential input of ±39mV or ±19.5mV, respectively. Besides, data can be output at 10SPS for excellent 50Hz and 60Hz rejection or at 80SPS when higher speeds are needed. The onboard SMD jumper labeled SPS SEL can select this feature, placing it in an appropriate position marked as 10 and 80. The ADS1230 can be put in a low-power standby mode or shut off completely in power-down mode.

This Click board™ uses the 4-wire load cell configuration, with two sense pins and two output connections. The load cell differential S lines connected to the AD7780 reference inputs create a ratiometric configuration immune to low-frequency changes in the power supply excitation voltage. Those sense pins are connected to the high and low sides of the Wheatstone bridge, where voltage can be accurately measured, regardless of the voltage drop due to the wiring resistance.

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	Force
Applications	Can be used for bridge sensor applications, including industrial process control, weigh scales, and strain gauges
On-board modules	ADS1230 - 20-bit delta-sigma analog-to-digital converter (ADC) from Texas Instruments
Key Features	High precision, outstanding noise performance, selectable gain and data rate, complete front-end for bridge sensor, low power consumption, and more
Interface	SPI
Feature	No ClickID

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Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V

Pinout diagram

This table shows how the pinout on Load Cell 7 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	NC	
SPI Chip Select	**CS**	3	CS	RX	14	NC	
SPI Clock	**SCK**	4	SCK	TX	13	NC	
SPI Data OUT	**SDO**	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	
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	SPS SEL	Right	Data Rate Selection 10/80: Left position 10, Right position 80
JP3	GAIN SEL	Right	PGA Gain Selection 64/128: Left position 64, Right position 128

Load Cell 7 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
Common-Mode Input Range	1.5	-	3.5	V
Resolution	20	-	-	bit
Operating Temperature Range	-40	+25	+85	°C

Software Support

We provide a library for the Load Cell 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

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Manager(recommended way), downloaded from our LibStock™ or found on Mikroe github account.

Library Description

This library contains API for Load Cell 7 Click driver.

Key functions

- loadcell7_tare_scale This function calculates the @b ctx->tare_scale which is the raw ADC readings of the empty container.
- loadcell7_calibrate_weight This function calibrates the weight by calculating the @b ctx->weight_scale for the input calibration weight.
- loadcell7_get_weight This function calculates the weight of the goods in grams.

Example Description

This example demonstrates the use of Load Cell 7 click by measuring the weight in grams of the goods from the load cell sensor connected to the Click board™.

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.LoadCell7

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

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

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Click boards™

Downloads

Load Cell 7 click example on Libstock

ADS1230 datasheet

Load Cell 7 click 2D and 3D files

Load Cell 7 click schematic