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LDC 2 Click

PID: MIKROE-4783

LDC 2 Click is a compact add-on board that measures inductance change which a conductive target causes when it moves into the inductor's AC magnetic field. This board features the LDC1041, inductance-to-digital converter (LDC) for inductive sensing solutions from Texas Instruments. This Click board™ is easy-to-use, requiring only the sensor frequency within 5kHz and 5MHz to begin sensing, and demonstrates the use of inductive sensing technology to sense and measure a conductive target object's presence, position, or composition. It comes with an example of a PCB sensor coil designed to provide the user with maximum flexibility. This Click board™ is suitable for contactless, short-range sensing that enables high-resolution and low-cost position sensing of conductive targets, even in harsh environments.

LDC 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?

LDC 2 Click as its foundation uses the LDC1041, an inductance-to-digital converter that simultaneously measures an LC resonator's impedance and resonant frequency from Texas Instruments. This Click board™ is easy-to-use, requiring only the sensor frequency within 5kHz and 5MHz to begin sensing, and demonstrates the use of inductive sensing technology to sense and measure a conductive target object's presence, position, or composition. In addition, the LDC1041 also measures the oscillation frequency of the LC circuit, used to determine the inductance of the LC circuit. The device then outputs a digital value that is inversely proportional to frequency.

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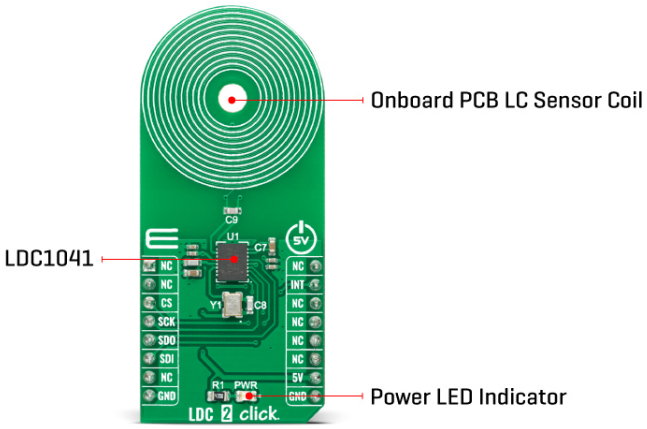

The LDC measures the inductance change that a conductive target causes when it moves into the inductor's AC magnetic field to provide information about the target's position over a sensor coil. The inductance shift is caused by eddy currents (circulating currents) generated in the target due to the sensor's magnetic field. These eddy currents generate a secondary magnetic field that opposes the sensor field, causing a shift in the observed inductance, used for precise positioning of the target as it moves laterally over the sensor coil.

Also, the LDC1041 has two power modes: Active and Standby Mode. In Active Mode, the proximity data and frequency data conversion are enabled, while Standby mode represents the default mode on devices' Power-Up sequence. In Standby Mode, the conversion process is disabled. This Click board™ comes with an example of a PCB sensor coil designed to provide the user with maximum flexibility.

The LDC1041 communicates with MCU using the standard SPI serial interface with a maximum frequency of 4MHz. In addition to this serial interface, one GPIO pin connected to the mikroBUS™ socket is also used. The configurable interrupt pin, routed to the INT pin of the mikroBUS™ socket, may be configured in three different ways by programming the interrupt Terminal mode register with SPI. An interrupt pin provides the ability to act as a proximity switch, as a wake-up feature, or as a data-ready pin indicating a valid condition for new data availability.

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	Inductance
Applications	Can be used for contactless, short-range sensing that enables high-resolution and low-cost position sensing of conductive targets, even in harsh environments.
On-board modules	LDC1041 - inductance-to-digital converter that simultaneously measures an LC resonator's impedance and resonant frequency from

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	Texas Instruments
Key Features	Low power consumption, short-range sensing technology, high durability, high flexibility, supports wide frequency range from 5kHz to 5MHz, high performance, reliability, and more
Interface	SPI
ClickID	No
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	5V

Pinout diagram

This table shows how the pinout on LDC 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	**INT**	Interrupt
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	
SPI Data IN	**SDI**	6	MOSI	SDA	11	NC	
	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

LDC 2 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	5	-	V
Sensor Frequency	5	-	5000	kHz
Inductance Measurement Resolution	-	24	-	bits
Operating Temperature Range	-40	+25	+125	°C

Software Support

We provide a library for the LDC 2 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.

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Library Description

This library contains API for LDC 2 Click driver.

Key functions:

- ldc2_cfg_setup - Config Object Initialization function.
- ldc2_init - Initialization function.
- ldc2_default_cfg - Click Default Configuration function.

Example description

This example demonstrates the use of LDC 2 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.LDC2

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

LDC 2 click 2D and 3D files

LDC1041 datasheet

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LDC 2 Click schematic