

L METER CLICK

PID: MIKROE-3505

Weight: 20 g

L meter click is a compact and accurate Click board™, capable of measuring and monitoring the inductance of the external component. The board can be used to measure a wide range of inductance. The design is based on a single high-speed voltage comparator LM311 by which the frequency of the oscillating LC circuit is measured and, based on the known value of capacitance, measures the unknown inductance value. L meter click can be used to measure inductance as well as to check the accuracy and precision of the coil.

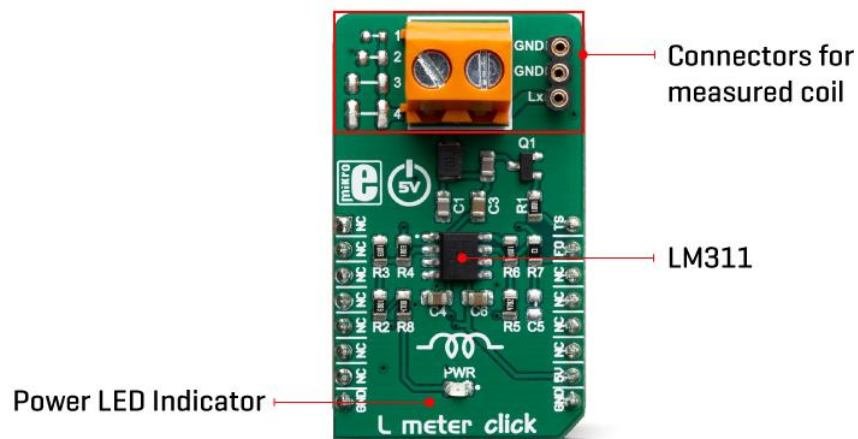
L meter click is supported by a mikroSDK compliant library, which includes functions that simplify software development. This Click board™ comes as a fully tested product, ready to be used on a system equipped with the mikroBUS™ socket.

Click board™ contains all the necessary components needed for a reliable measuring of coil inductance L , which in combination with host MCU makes it ideal in all applications where accurate inductance measuring is needed. Featuring four standard different SMD footprint size and two universal connectors for through hole components, it's universal tool for any development.

HOW DOES IT WORK?

The principle how L meter click works is very simple. In series with the measured coil is C1 capacitor, thus forming the LC circuit when the coil is present. The reference value on a high-speed voltage comparator LM311 is a half of the power supply voltage 2.5V. When the coil is added to the comparator input, the transistor briefly drops the coil to the ground, which is at on the half of the power voltage. The coil and the capacitor then start oscillating a resonant frequency that depends on the capacitor and the value of the coils. Since the capacitor has the fixed capacitance, the only variable is the inductance of the coil which can be calculated by:

$$2 * \pi * F = 1 / \text{sqrt} (L * C)$$



This Click board™ is designed to use only next mikroBUS™ pins: PWM output as a Trigger signal and INT – Hardware Interrupt that receive a square wave frequency output from Click board™. Pins PWM and INT and are labeled as TS and FO, respectively. The board has two type of terminals for a coil connection: TB1 screws terminals and TS2 female header terminals. L meter click also have four blank SMD places, to allow soldering different SMD coils for measuring directly onboard .


SPECIFICATIONS

Type	Measurements
Applications	It can be used to measure inductance as well as to check the accuracy and precision of the coil.

On-board modules	LM311D, a high-speed voltage comparator from Texas Instruments
Key Features	Low power consumption, high level of integration, simple use
Interface	GPIO
Input Voltage	5V
Click board size	M (42.9 x 25.4 mm)

PINOUT DIAGRAM

This table shows how the pinout on L meter click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
	NC	1	AN	PWM	16	TS	Trigger switch
	NC	2	RST	INT	15	FO	Frequency out
	NC	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	NC	
	NC	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
TB1	Lx-IN	-	Inductor connector
TS2	Lx-IN	-	Inductor connector

SOFTWARE SUPPORT

We provide a library for the L meter 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

Library contains all the necessary functions for successfully reading Frequency and Inductance on the indicator.

Key functions:

- `uint32_t lmeter_getFrequency()` - Frequency reading function.
- `float lmeter_getCoilInductance()` - Inductances reading function.
- `void lmeter_tick()` - Timer Tick functions.

Examples description

The application is composed of the three sections :

- System Initialization - Sets PWM pin as OUTPUT and INT pin as INPUT.
- Application Initialization - Initialization driver init and Timer init.
- Application Task - Reads the frequency and induction on the inductor in [uH] and this data logs to USBUART. - Waits for valid user input and executes functions based on set of valid commands.
- Commands :
 - 'F' - For calculating and logging frequencies
 - 'L' - For calculating and logging inductances
 - 'T' - Enabling and disabling additional C2 capacitors

```

void applicationTask()
{
    uint8_t dataReady_;
    char receivedData_;

    dataReady_ = UART_Rdy_Ptr( );

    if (dataReady_ != 0)
    {
        receivedData_ = UART_Rd_Ptr( );

        switch (receivedData_)
        {
            case 'F' :
            {
                mikrobus_logWrite(" --- PLEASE WAIT FOR THE CALCULATION PROCESS TO COMPLETE --
-", _LOG_LINE);
                lmeter_setTimer();
                _Frequency = lmeter_getFrequency();
                if (_Frequency < _LMETER_MIN_INDUCTANCE_RANGE)
                {
                    mikrobus_logWrite(" Frequency is out of range !!! ", _LOG_LINE);
                    mikrobus_logWrite(" ", _LOG_LINE);
                }
                else
                {
                    FloatToStr(_Frequency, demoText);
                    mikrobus_logWrite(" Frequency = ", _LOG_TEXT);
                    mikrobus_logWrite(demoText, _LOG_TEXT);
                    mikrobus_logWrite(" kHz ", _LOG_LINE);
                    mikrobus_logWrite(" ", _LOG_LINE);
                }
                break;
            }
            case 'L' :
            {
                mikrobus_logWrite(" --- PLEASE WAIT FOR THE CALCULATION PROCESS TO COMPLETE --
-", _LOG_LINE);

```

```

lmeter_setTimer();
_Frequency = lmeter_getFrequency();

if (_Frequency < _LMETER_MIN_INDUCTANCE_RANGE)
{
    mikrobus_logWrite(" Frequency is out of range !!! ", _LOG_LINE);
    mikrobus_logWrite(" ", _LOG_LINE);
}
else
{
    _Inductance = lmeter_getCoilInductance(_Frequency);

    FloatToStr(_Inductance, demoText);
    mikrobus_logWrite(" Inductance = ", _LOG_TEXT);
    mikrobus_logWrite(demoText, _LOG_TEXT);
    mikrobus_logWrite(" uH ", _LOG_LINE);
    mikrobus_logWrite(" ", _LOG_LINE);
}
break;
}
case 'T' :
{
    if (T_SW == _LMETER_T_SW_ENABLE)
    {
        T_SW = _LMETER_T_SW_DISABLE;
        lmeter_setTSpin( _LMETER_T_SW_DISABLE );
        mikrobus_logWrite(" --- NEW SETTINGS - DISABLE [C2] CAPACITOR --- ", _LOG
_LINE);
        mikrobus_logWrite("* The sum of all the capacitors is 1000pF ", _LOG_LINE)
;
        mikrobus_logWrite("* Disabled capacitor [C2]", _LOG_LINE);
    }
    else
    {
        T_SW = _LMETER_T_SW_ENABLE;
        lmeter_setTSpin( _LMETER_T_SW_ENABLE );
        mikrobus_logWrite(" --- NEW SETTINGS - ENABLE [C2] CAPACITOR --- ", _LOG_
LINE);
        mikrobus_logWrite("* The sum of all the capacitors is 500pF ", _LOG_LINE);

```

```
        mikrobus_logWrite("* Active new capacitor [C2]", _LOG_LINE);
    }
    break;
}
}
}
}
```

The full application code, and ready to use projects can be found on our LibStock page. Other mikroE Libraries used in the example:

- Conversions Library

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.

DOWNLOADS

mikroBUS™ Standard specification

LibStock: mikroSDK

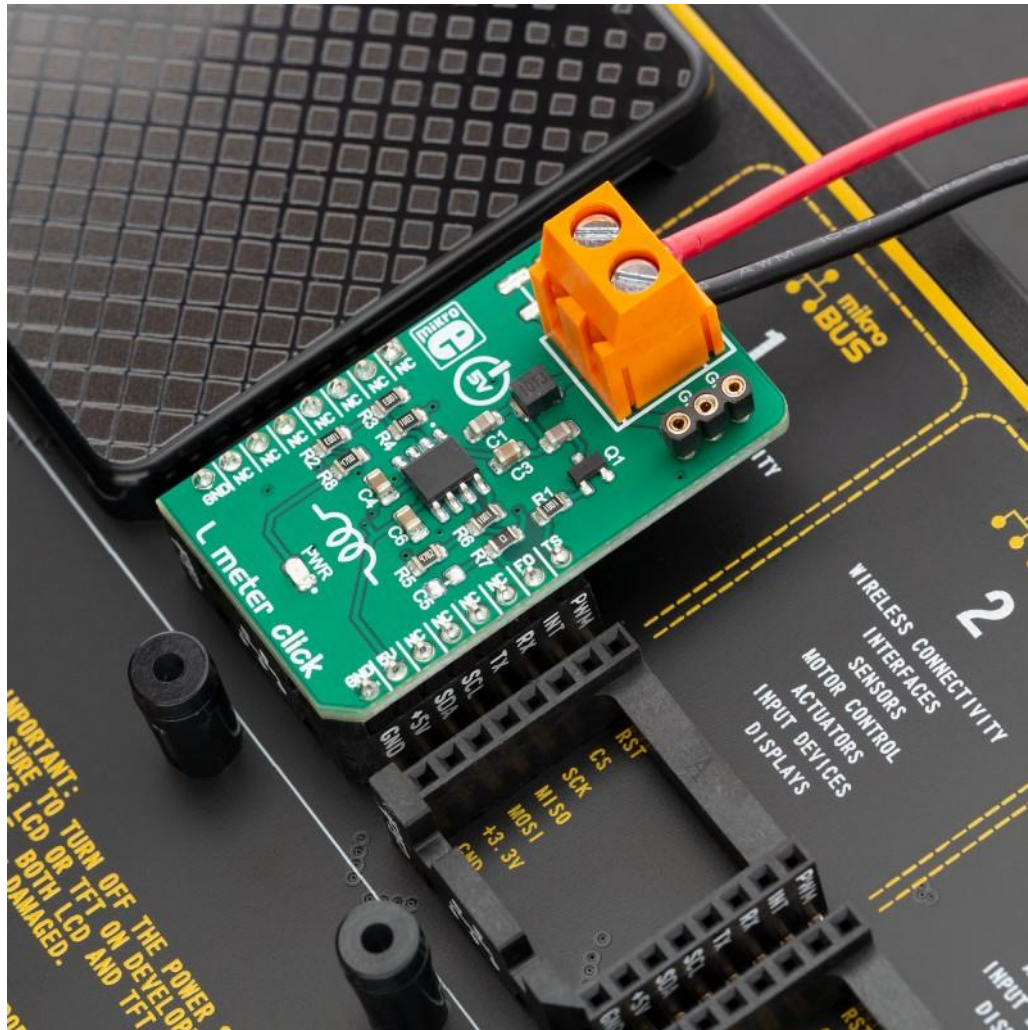
Click board catalog

L Meter click Libstock

L Meter click 2D and 3D files

SLCS007K Datasheet

L Meter click schematic



<https://www.mikroe.com/l-meter-click/7-3-19>