



## RTC 7 CLICK

PID: MIKROE-2976

Weight: 20 g

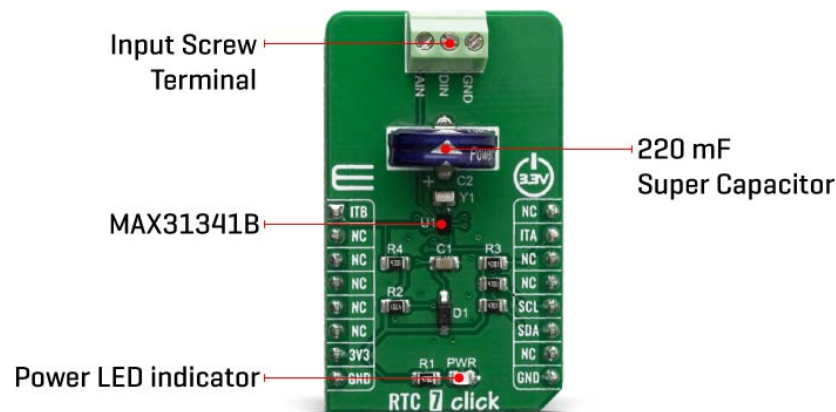
**RTC 7 Click** is a real time clock module which has an extremely low power consumption, allowing it to be used with a single button cell battery or a super capacitor, for an extended period of time. The MAX31341B IC built on the RTC 7 click is able to output the time in the binary coded decimal (BCD) format. Integrated, factory calibrated XTAL operating at 32.768 kHz ensures a very low time deviation. However, the RTC 7 click has the onboard external, more precise crystal oscillator too. An advanced interrupt feature allows many different uses such as alarm function, countdown timer function, external event detection function, using an analog and the digital inputs and much more.

RTC 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.

Features such as the ability to be powered over the super capacitor, external event capture pin, BCD time output format, and above all – an extremely low power consumption, make RTC 7 click a perfect solution for the development of the IoT, wearable and portable applications, logging devices, industrial and health-related time metering applications, and all the other applications that require an accurate RTC for their operation.

## HOW DOES IT WORK?

RTC 7 click is based on the [MAX31341B](#), a low-current Real-Time Clock with I2C interface and power management from [Maxim Integrated](#). Thanks to its high integration level, this module provides high time accuracy, with a very low count of external components required. It has a full RTC function, offering programmable counters, alarms, and an interrupt engine with selectable event reporting sources. The small dimension of the MAX31341B module itself, allow it to be used in very space-constrained applications, including wearables, medical equipment, and similar.



In addition to the MAX31341B, RTC 7 click is equipped with the 220mF super capacitor. By utilizing an automatic backup switch, the IC is able to use an external battery power source when there is no power supply on its main power terminals, thus allowing for uninterrupted operation. Draining as low as 180nA of current, it can be operated with the mentioned supercapacitor almost indefinitely. In addition, a trickle charge system will replenish the super capacitor while the MAX31341B is powered over the main power terminals (VDD, VSS). The voltage of the main power supply can range between 1.6V up to 3.6V.

The MAX31341B uses the I2C communication protocol for the communication with the host MCU. Besides the I2C bus lines, two additional pins are also available on the MAX31341B, INTA and INTB, allowing an interrupt to be reported to the host MCU, but also to capture an external event and marking it with an automatic timestamp. The two mentioned interrupt pins are routed to INT and AN pins of the mikroBUS™ socket,

respectively. The user is able to set up standard clock and calendar functions (including seconds, minutes, hours, weekdays, date, months, years with leap year correction), as well as the interrupt functions for the periodic countdown timer, periodic time update, alarm, external event, automatic backup switchover and power on reset (POR) events. All these features are available when the module is operated over the backup power supply (battery).

Besides other functions, RTC 7 click have one analog and one digital external input, labeled AIN and DIN. These universal inputs can be wired to any kind of external trigger, which needs to trigger one of the interrupts. The digital input can be configured to detect rising or falling edge, while the analog input, besides the edge detection, supports the programmable threshold too. For detailed information on interrupts and external triggers, refer to the MAX31341B datasheet.

The Click board™ is designed to work with 3.3V only. When using it with MCUs that use 5V levels for their communication, a proper level translation circuit should be used.

## SPECIFICATIONS

<b>Type</b>	RTC
<b>Applications</b>	RTC 7 click is a perfect solution for the development of the IoT, wearable and portable devices, logging devices, industrial and health-related time metering applications, and all the other applications that require an accurate time-base for various purposes
<b>On-board modules</b>	RTC 7 click is based on the MAX31341B, a low-current Real-Time Clock with I2C interface and power management from Maxim Integrated
<b>Key Features</b>	Ability to be powered over the super capacitor, external event capture pin, BCD time output format, low power consumption, and more
<b>Interface</b>	GPIO,I2C
<b>Click board size</b>	M (42.9 x 25.4 mm)
<b>Input Voltage</b>	3.3V

## PINOUT DIAGRAM

This table shows how the pinout on RTC 7 click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
Interrupt B OUT	<b>ITB</b>	1	AN	PWM	16	NC	
	NC	2	RST	INT	15	<b>ITA</b>	Interrupt A OUT
	NC	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	<b>SCL</b>	I2C Clock
	NC	6	MOSI	SDA	11	<b>SDA</b>	I2C Data
Power Supply	<b>3.3V</b>	7	3.3V	5V	10	NC	
Ground	<b>GND</b>	8	GND	GND	9	<b>GND</b>	Ground

## ONBOARD SETTINGS AND INDICATORS

Label	Name	Default	Description
PWR	PWR	-	Power LED Indicator

## SOFTWARE SUPPORT

We provide a library for the RTC 7 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 is used to get gmt time and local time by calculating data from data registers. Library communicates with the device via I2C driver and driver functions. Library offers a choice to get time data in two formats, 12 hours format and 24 hours format. For more details check documentation.

Key functions:

- `uint8_t rtc7_writeReg( uint8_t register_address, uint8_t transfer_data )` - Function writes one byte data to the register.
- `uint8_t rtc7_readReg( uint8_t register_address, uint8_t nBytes, uint8_t *dataOut )` - Function reads the desired number of bytes from the register/s.
- `void rtc7_getGmtTime( rtc7_time_t *gmt_time )` - Function gets the gmt time data in both time formats.
- `void rtc7_getLocalTime( rtc7_time_t *local_time )` - Function gets the local time data including the determined time zone in calculations.

### Examples description

The application is composed of three sections :

- System Initialization - Initializes peripherals and pins.
- Application Initialization - Initializes I2C driver and after the reset function configures the device to work in 12 hours time format with desired input and output frequency. After that allows the timer and the oscillator to be enabled.
- Application Task - (code snippet) - Waits until device be stable and logs time after each second.

```
void applicationTask()
{
    rtc7_getLocalTime( &timeDate );

    if (checkYear == 0)
    {
        mikrobus_logWrite( "Wait...", _LOG_LINE );
        while ((timeDate.year != timeSet.year) && (timeDate.year != (timeSet.year + 1)) && (timeDate.year != (timeSet.year - 1)))
        {
            rtc7_getLocalTime( &timeDate );
        }
    }
}
```

```

    }
    mikrobus_logWrite( "", _LOG_LINE );
    checkYear = 1;
}

if (checkChange != timeDate.seconds)
{
    rtc7_displayResults();
    checkChange = timeDate.seconds;
}
}

```

Additional Functions :

- void rtc7\_displayResults() - Logs time results in the appropriate format on UART.

The full application code, and ready to use projects can be found on our [LibStock](#) page.

Other mikroE Libraries used in the example:

- Conversions
- I2C
- UART

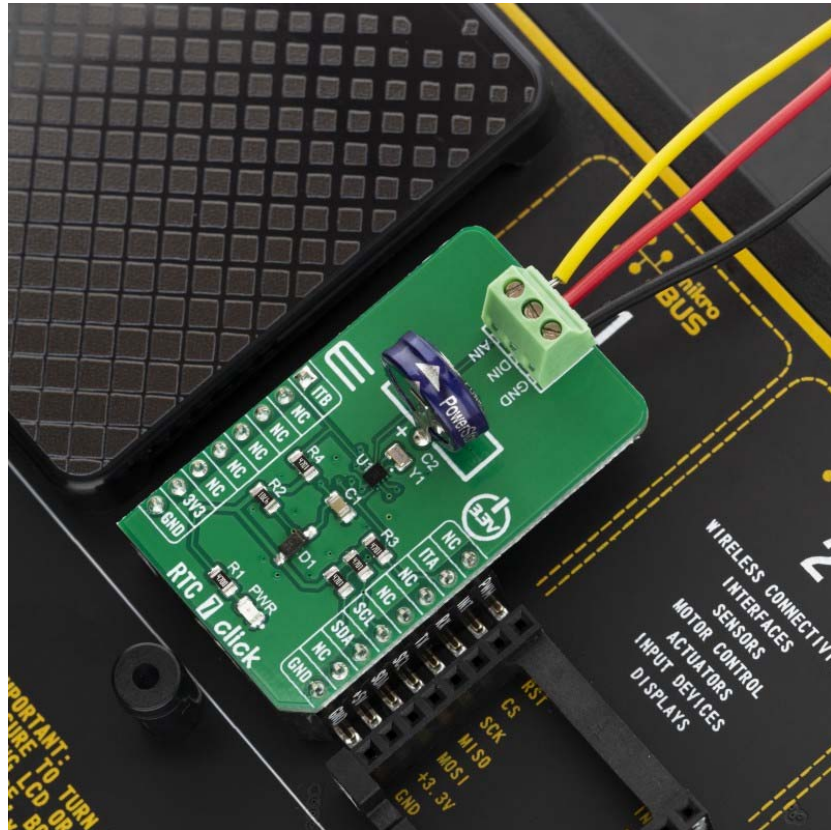
### Additional notes and informations

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](#).



<https://www.mikroe.com/rtc-7-click/9-10-19>