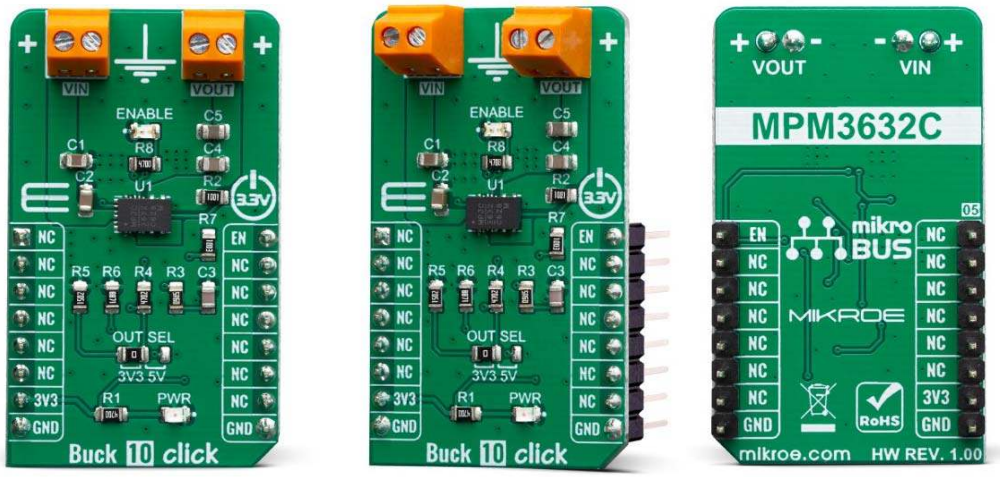


BUCK 10 CLICK

PID: MIKROE-3569
Weight: 20 g

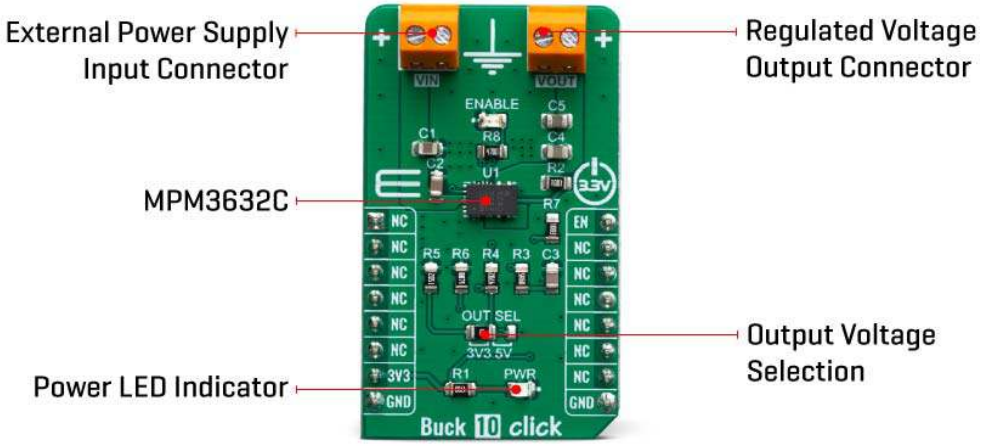
Buck 10 Click is a high-efficiency step-down converter which provides a highly regulated output voltage derived from the connected power source, rated from 4V to 18V. The regulated output voltage can be selected between two values: 3.3V and 5V. These are voltage values that are most commonly used in many embedded designs. This click is based around an integrated DC-DC converter, labeled as MPM3632C. Due to its high efficiency, MPM3632C allows the Click board™ to easily deliver up to 3A of current. The MPM3632C is very reliable, offering over-current and over-voltage protection, as well as a thermal shutdown.

Buck 10 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.

This click offers very compact buck solution that requires only input and output capacitors on MPM3632C to achieve 3A of continuous output current. The MPM3632C operates at a fixed 3MHz switching frequency and constant-on-time (COT) control, and provide full protection features like OVP, OCP and thermal shutdown.

HOW DOES IT WORK?

The step down DC-DC regulator used on this click board™ is the MPM3632C, a 18V 3A ultra-low profile DC-to-DC power module by Monolithic Power Systems (MPS). This IC is a valley current mode controlled power module, meaning that it has a faster response than the traditional peak current mode control, therefore it has better response to transients. This IC requires a minimal number of external components, which makes the whole device pretty robust and easy to work with.



The output voltage is determined by the feedback voltage on the FB pin. Buck 10 click is equipped with a voltage divider and an SMD jumper, labeled as OUT SEL. This jumper can be used to connect one of two available voltage divider resistors, allowing the output to be set to either 3.3V or 5V. These two voltages are the most commonly used in embedded development.

The over-current protection is based on cycle-by-cycle limiting of the inductor current. If the output voltage starts to drop during the current limiting interval, causing the FB voltage to drop under 84% of the internal reference, the device enters the hiccup mode, shutting down the output. After a fixed period, the device will try to re-enable the output. If the short-circuit condition still exists, it will shut down the output again, repeating the whole process, until the short-circuit condition disappears. The hiccup mode greatly reduces the short-circuit current, protecting the device when the output is shorted to ground.

Thanks to its ability to work with the high duty cycle of the internal switching PWM signal, the MPM3632C requires the input voltage to be only about 0.7V above the output voltage, in order to maintain the regulation. However, if the input voltage drops under 3.1V, the device will not be able to operate properly. Therefore, the under-voltage protection shuts down the device, as a protection measure. The under-voltage protection is disabled once the input voltage exceeds 3.6V. This small hysteresis of 0.5V prevents erratic behavior in border-cases.

The MPM3632C operates at very high switching frequency of 3 MHz, which allows a good compromise between the efficiency and the size of the device with no external coil needed and minimal number of other external components.

As mentioned before, the voltage of the power supply at the input terminal should stay within the range between 4V and 18V. However, if the output voltage is set to 5V, the voltage at the input should be approximately 5.7V to 6V at least, in order to provide a good regulation at the output.

SPECIFICATIONS

Type	Buck
Applications	A perfect choice for step-down applications for embedded electronic devices, servers, routers, data storage devices, low power ICs, etc
On-board modules	MPM3632C, 3A ultra-low profile DC-to-DC power module by Monolithic Power Systems (MPS)
Key Features	Buck 10 click features a wide range of input voltages, pin configurable working parameters, internal soft start, thermal shutdown, hiccup mode short-circuit protection and high switching efficiency
Interface	GPIO
Input Voltage	3.3V
Click board size	M (42.9 x 25.4 mm)

PINOUT DIAGRAM

This table shows how the pinout on **Buck 10 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	EN	Enable input
	NC	2	RST	INT	15	NC	
	NC	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	NC	
	NC	6	MOSI	SDA	11	NC	
Power supply	+3.3V	7	3.3V	5V	10	NC	
Ground	GND	8	GND	GND	9	GND	Ground

ONBOARD SETTINGS AND INDICATORS

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1	OUT SEL	Left	Output voltage source selection: Left position – 3.3V, Right position – 5V
TB1	VIN-EXT	-	Screw terminal for connecting an external voltage source
TB2	VOUT	-	Screw terminal for connecting the load

BUCK 10 CLICK ELECTRICAL SPECIFICATIONS

Description	Min	Typ	Max	Unit
Input voltage range	4	5	18	V
Output voltage range	3.3		5	V
Output current	0		3	A

SOFTWARE SUPPORT

We provide a library for the **Buck 10 Click** board 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

This library allows user to perform a control of the Buck 10 Click board. User can drive the control pin (EN) to turn ON/OFF the device and output voltage. For more details check documentation.

Key functions:

- `void buck10_gpioDriverInit(T_BUCK10_P gpioObj)` - Convert ADC value to Pressure data in mBar.
- `T_BUCK10_RETVAL buck10_enable( T_BUCK10_STATE pwr_state )` - This function allows user to enable or disable the device.

Examples description

The application is composed of three sections :

- System Initialization - Initializes PWM control pin as output and USBUART A port for logging.
- Application Initialization - Initializes GPIO driver.
- Application Task - (code snippet) - Turns ON the Buck 10 for 10 seconds and after that turns OFF the device and output for 10 seconds, and then repeats the all operation. Also when a device state was changed, a message will be sent to the uart terminal. Note: Input voltage recommended range - from 4V to 18V Low-side valley current limit - from 3A to 3.9A Low-side negative current limit - (-2.5A) Output voltage - 3.3V or 5V

```
void applicationTask()

{

    buck10_enable( _BUCK10_ENABLE );
```

```
    mikrobus_logWrite( "** Buck 10 is enabled **", _LOG_LINE );
    Delay_ms( 10000 );

    buck10_enable( _BUCK10_DISABLE );
    mikrobus_logWrite( "** Buck 10 is disabled **", _LOG_LINE );
    Delay_ms( 10000 );
}
```

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

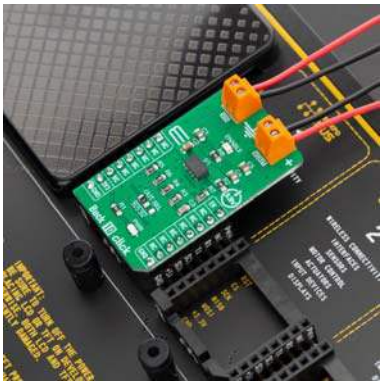
- UART

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/buck-10-click/6-28-19