

## PowerBank Click



PID: MIKROE-4082

**PowerBank Click** is a USB charging expansion board which can be used for creating power bank devices or adding charging option to your device. For battery charging management this board uses [MP2632B](#) a highly integrated 3A Lu-ion and Li-polymer battery charger from [Microchip](#). In addition to battery charger PowerBank Click also has a [MCP3221](#) analog to digital converter, which is serving for monitoring battery voltage over I2C interface. Beside battery charging and monitoring feature, this board also has an operation section button, notification LEDs for operational mode selection and battery status. Power banks are popular for charging USB charged devices and can be used as a power supply for various USB powered devices such as lights and small fans.

PowerBank 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?

PowerBank Click can supply power from the connected battery through a USB port as well as charge the battery. The MP2632B can operate in both charge mode and boost mode to allow for full-system and battery-power management. It has an integrated VIN-to-SYS pass-through path to pass the input voltage to the system. The pass-through path has built-in over-voltage (OVP) and over-current protection (OCP) and a higher priority over the charging path.

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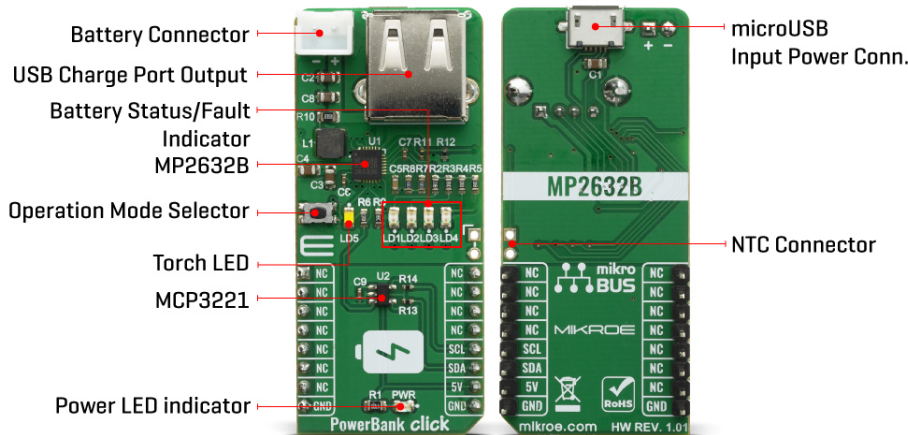
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This board can also re-charge connected battery from microUSB connector on the bottom side by providing input power. When the input power is present, the MP2632B operates in charge mode. The MP2632B detects the battery voltage automatically and charges the battery in three phases: trickle current, constant current, and constant voltage. Other features include charge termination and auto-recharge. The MP2632B also integrates both input current limit and input voltage regulation to manage the input power and prioritize the system load.

In the absence of an input source, the MP2632B switches to boost mode through PB to power SYS from the battery. In boost mode, the OLIM pin programs the output current limit, and the MP2632B turns off at light load automatically. The MP2632B also allows for output short-circuit protection (SCP) to disconnect the battery completely from the load in the event of a short-circuit fault. Normal operation resumes once the short-circuit fault is removed.

The operational mode selector button on the PowerBank Click has few purposes. If the button is pressed for more than 1.5ms, the boost is enabled and latched if V<sub>IN</sub> is not available. LEDs 1-4 are ON for five seconds whenever the button is pressed for more than 1.5ms. If the button is pressed for more than 1.5ms twice within one second, it serves as a torch light ON/OFF switch. If the button is held pressed for more than 2.5 seconds, this is defined as a long push, and boost is shut down manually.

A 4-LED driver is integrated for voltage-based fuel gauge indication. Together with torch-light control, the MP2632B provides an all-in-one solution for power banks and similar applications without an external microcontroller.

The PowerBank Click is also equipped with a MCP3221, a successive approximation A/D converter (ADC) with a 12-bit resolution to monitor battery voltage over I2C bus over mikroBUS™ socket.

This Click Board™ is designed to be operated only with 5V logic level. A proper logic voltage level conversion should be performed before the Click board™ is used with MCUs with logic levels of 3V3.

## Specifications

Type	Battery charger
Applications	Battery Charger Applications, Power-Bank Applications for Smartphones, Tablets and

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	Other Portable Devices
On-board modules	MP2632B switch-mode battery charger
Key Features	Switch-mode battery charger with system power-path management designed for single-cell Li-ion or Li-polymer batteries
Interface	I2C
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 PowerBank 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	NC	
	NC	2	RST	INT	15	NC	
	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
	NC	7	3.3V	5V	10	<b>5V</b>	Power Supply
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
LD1-4	LD1-4	-	Battery Status LEDs / Fault Indicator
LD5	LD5	-	Operation Mode Indicator
T1	-	-	Operation Mode Selector
CN1	-	-	USB Power/Communication Port
CN2	-	-	USB Charge Port

## Software Support

We provide a library for the PowerBank 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](#).

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## Library Description

The library covers all the necessary functions that enables the usage of the PowerBank click board. It offers reading from output register and calculations that result in relatively accurate measurement of connected batteries voltage.

Key functions:

- `uint16_t powerbank_read_data ( );` - Function is used to read raw data from MCP3221.
- `uint16_t powerbank_read_voltage ( uint16_t v_ref );` - Function is used to calculate voltage of the connected battery.

## Examples description

The application is composed of three sections :

- System Initialization - Initializes I2C module and LOG structure.
- Application Initialization - Initializes I2C driver and makes an initial log.
- Application Task - (code snippet) This example shows the capabilities of the PowerBank click by measuring voltage of the connected battery. In order to get correct calculations user should change "v\_ref" value to his own power supply voltage.

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

Other mikroE Libraries used in the example:

- I2C
- Conversions
- 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](#).

## Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

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[Click Boards™](#)

## Downloads

[PowerBank click 2D and 3D files](#)

[MCP3221 datasheet](#)

[MP2632B datasheet](#)

[PowerBank click example on Libstock](#)

[PowerBank click schematic](#)

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