

Charger 6 Click



PID: MIKROE-4576

Charger 6 Click is a compact add-on board that represents a single-cell battery charger. This board features the [BQ25601](#), an I2C controlled battery charger for high input voltage and narrow voltage DC power path management from [Texas Instruments](#). This buck charger supports USB, and it's optimized for USB voltage input. The low impedance power path optimizes switch-mode operation efficiency, reduces battery charging time, and extends battery life during discharge. It also has a programmable current limiting, allowing it to use an external power supply rated up to 13.5V. This Click board™ is suitable as a Li-Ion and Li-polymer battery charger for portable devices and accessories, power tools, and more.

Charger 6 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?

Charger 6 Click as its foundation uses the BQ25601, a fast-charging solution for single-cell Li-Ion and Li-polymer battery with high input voltage suitable for a wide range of smartphones, tablets, and portable devices from Texas Instruments. The low impedance power path optimizes switch-mode operation efficiency, reduces battery charging time, and extends battery life during discharge. It is optimized for USB 5V voltage input, has a programmable current limiting based on the built-in USB interface, and allows the use of an external power supply from 3.9 to 13.5V. The BQ25601 also meets USB On-the-Go (OTG) operation power rating specification by supplying 5.15 V on the VBUS line with a constant current limit of up to 1.2A. The device provides automatic power path selection on the SYS line from the VBUS input source, battery, or both.

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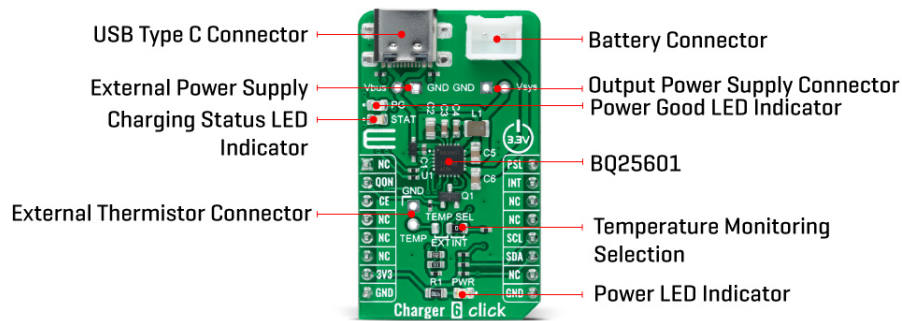
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The power path management regulates the system slightly above battery voltage but does not drop below 3.5 V minimum system voltage. With this feature, the system maintains operation even when the battery is completely removed. When the input current limit or voltage limit is reached, the power path management automatically reduces the charge current to zero. As the system load increases, the power path discharges the battery until the system power requirement is met.

Charger 6 Click communicates with MCU using the standard I2C 2-Wire interface and supports both Standard and Fast Mode with a transfer rate of 100 and 400kbit/s. The I2C serial interface with charging and system settings makes this Click board™ a truly flexible solution. Also, it uses several GPIO pins, one of which is an interrupt pin, the INT pin of the mikroBUS™ socket, used as a 'fault' indicator. This pin sets immediately notifies the host when a fault occurs.

This Click board™ also uses two LED indicators, labeled as PG and STAT, used as power good and charging status indicator. PG indicates a good input source if the input voltage is above the SLEEP mode threshold and the current limit is above 30mA, while STAT reports the charging status and any fault conditions. CE pin routed to the CS pin on the mikroBUS™ socket enables battery charging process by setting this pin into a low logic state. PSEL pin routed to the PWM pin on the mikroBUS™ socket is used as a power source selection input and sets 500mA input current limit by pulling this pin high, otherwise set 2.4A input current limit by pulling this pin low. The BQ25601 also provides a QON pin, routed to the RST pin on the mikroBUS™ socket, for BATFET enable and reset control, to exit low-power mode or whole system reset function.

The charger provides a temperature monitoring feature selectable via jumper labeled as TEMP SEL, where the user can choose between external or internal mode of monitoring. For external mode, a single thermistor input for the battery temperature monitor is provided.

This Click board™ can be operated only with a 3.3V 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	Battery charger
Applications	Can be used for a Li-Ion and Li-polymer battery charger for portable devices and

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	accessories, power tools, and more.
On-board modules	BQ25601 - fast-charging solution for single-cell Li-Ion and Li-polymer battery with high input voltage suitable for a wide range of smartphones, tablets, and portable devices from Texas Instruments
Key Features	High efficiency, USB On-The-Go feature, high battery discharge efficiency, accuracy, programmable input current limit, and more.
Interface	I2C
ClickID	No
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V, External

Pinout diagram

This table shows how the pinout on Charger 6 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	PSL	Power Source Selection
Reset Control	QON	2	RST	INT	15	INT	Interrupt
Charging Process Enable	CS	3	CS	RX	14	NC	
	NC	4	SCK	TX	13	NC	
	NC	5	MISO	SCL	12	SCL	I2C Clock
	NC	6	MOSI	SDA	11	SDA	I2C Data
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
LD2	STAT	-	Charging Status LED Indicator
LD3	PG	-	Power Good LED Indicator
JP1	TEMP SEL	Left	Temperature Monitoring Selection EXT/INT: Left position EXT, Right position INT
CN2	VBUS	Unpopulated	External Power Supply Connector
CN3	VSYS	Unpopulated	Converters Output Voltage Connector
CN4	TEMP	Unpopulated	External Thermistor Connector

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Charger 6 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage VCC	-	3.3	-	V
Supply Voltage VBAT	3.9	-	13.5	V
Output Voltage VSYS	3.68	-	4.45	V
Battery Charging Voltage	3.856	-	4.624	V
Battery Charging Output Current	0	-	3	A
Operating Temperature Range	-40	+25	+85	°C

Software Support

We provide a library for the Charger 6 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](#).

Library Description

This library contains API for Charger 6 Click driver.

Key functions:

- charger6_cfg_setup - Config Object Initialization function.
- charger6_init - Initialization function.
- charger6_default_cfg - Click Default Configuration function.

Examples description

This library contains API for the Charger 6 Click driver. The library contains drivers to enable/disable battery charging, set current limit, set system min voltage, set fast charge current, set charge voltage, etc.

The application is composed of three sections :

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.Charger6

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

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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

[Charger 6 click 2D and 3D files](#)

[BQ25601 datasheet](#)

[Charger 6 click schematic](#)

[Charger 6 click example on Libstock](#)

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