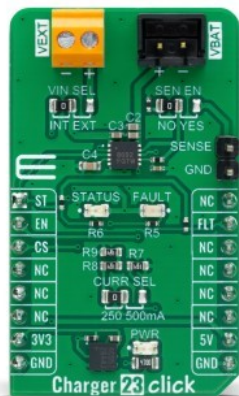


Charger 23 Click



PID: MIKROE-5573

Charger 23 Click is a compact add-on board providing a single-cell battery charging solution. This board features the [ISL78693](#), a single-cell Li-ion or Li-polymer battery charger from [Renesas](#). The ISL78693 can operate with an input voltage as low as 2.6V and works as a linear charger with the battery charged in a Constant Current/Constant Voltage (CC/CV) profile. The charge current is selectable with an external resistor between 250 and 500mA. Additional features include the preconditioning of an over-discharged battery, an NTC thermistor interface for charging the battery in a safe temperature range, automatic recharge, and more. This Click board™ is suitable as a Li-Ion/Polymer battery charger for portable devices and accessories, power tools, and more.

Charger 23 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 23 Click is based on the ISL78693, an integrated charger for single-cell Lithium chemistry batteries from Renesas. The ISL78693 functions as a traditional linear charger. As a linear charger, the ISL78693 charges a battery in the Constant Current (CC) and Constant Voltage (CV) profile. Its constant charge current is selectable via onboard jumper CURR SEL between 250 and 500mA. The charge voltage is also characterized by an accuracy of 1% over the entire recommended operating condition range. The charger automatically recharges the battery when the voltage drops below a recharge threshold of 3.3V typically. When the input supply is not present, the ISL78693 draws less than 1µA current from the battery.

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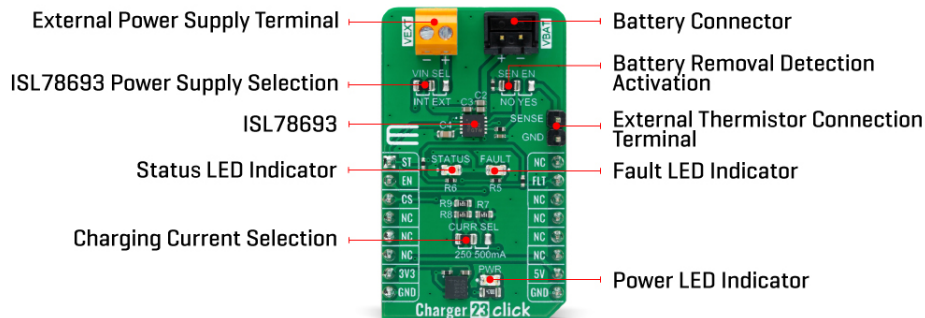
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This Click board™ communicates with the host MCU using several pins of the mikroBUS™ socket. The charger can be enabled or disabled using the EN pin of the mikroBUS™ socket, offering a switch operation to turn ON/OFF the charger. In addition, the ISL78693 also has two indication signals to indicate the charge status. The ST pin is a status open-drain that turns to a low logic state at the beginning of a charge cycle until the End-of-charge (EOC) condition is qualified. Once the EOC condition is qualified, the ST pin goes to a HIGH logic state. The fault pin (FLT) turns low when fault conditions occur, such as the external battery temperature fault, a charge time fault, or battery removal. Besides mikroBUS™ pins, there is also their visual representation via red and yellow LEDs marked with STATUS and FAULT.

An NTC function is also available to monitor the battery temperature and ensure a safe charging temperature range. Apart from monitoring, it is also possible to detect the removal of the battery. To use this function, it is necessary to switch the SEN EN jumper to the YES position and to connect an external NTC to the SENSE header pins.

This Click board™ can only be operated from a 5V logic voltage level. Therefore, the board must perform appropriate logic voltage conversion before using MCUs with different logic levels. Additionally, there is a possibility for the ISL78693 power supply selection via jumper labeled as VIN SEL to supply the ISL78693 from an external 5V power supply or with a 5V mikroBUS™ power rail. However, the Click board™ comes equipped with a library containing easy-to-use functions and an example code that can be used, as a reference, for further development.

Specifications

Type	Battery charger
Applications	Can be used as a Li-Ion/Polymer battery charger for portable devices and accessories, power tools, and more
On-board modules	ISL78693 - single-cell Li-ion or Li-polymer battery charger from Renesas
Key Features	Operates as linear charger, selectable charge current, preconditioning of an over-discharged battery, NTC thermistor interface, automatic recharge, CC/CV charge profile, battery removal detection, charge status indication

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	signals, and more
Interface	GPIO
Feature	ClickID
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V,5V

Pinout diagram

This table shows how the pinout on Charger 23 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
Charge Status	ST	1	AN	PWM	16	NC	
Enable	EN	2	RST	INT	15	FLT	Fault Indicator
	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	5V	Power Supply
Ground	GND	8	GND	GND	9	GND	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
LD2	PWR	-	Charge Status LED Indicator
LD3	FAULT	-	Fault LED Indicator
JP1	VIN SEL	Left	ISL78693 Power Supply Selection INT/EXT: Left position INT, Right position EXT
JP2	CURR SEL	Left	Charging Current Selection 250/500mA: Left position 250, Right position 500mA
JP3	SEN EN	Left	Battery Removal Detection Activation NO/YES: Left position NO, Right position YES
J2	-	Populated	External Thermistor Connection

Charger 23 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V

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Output Voltage	-	3.65	-	V
Charge Current	250	-	500	mA

Software Support

We provide a library for the Charger 23 Click as well as a demo application (example), developed using Mikroe [compilers](#). The demo can run on all the main Mikroe [development boards](#).

Package can be downloaded/installed directly from NECTO Studio Package Manager (recommended), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

Library Description

This library contains API for Charger 23 Click driver.

Key functions

- `charger23_enable_device` This function enables the device by setting the EN pin to HIGH logic state.
- `charger23_disable_device` This function disables the device by setting the EN pin to LOW logic state.
- `charger23_get_charger_state` This function returns the charger state.

Example Description

This example demonstrates the use of Charger 23 Click board™ by enabling the device and then reading and displaying the charger status.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager (recommended), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.Charger23

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. A UART terminal is available in all Mikroe [compilers](#).

mikroSDK

This Click board™ is supported by a [mikroSDK](#) - Mikroe Software Development Kit, which needs to be downloaded from the [LibStock](#) and installed for the compiler you are using to ensure

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proper operation of mikroSDK compliant Click board™ demo applications.

For more information about mikroSDK, visit the [official page](#).

Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click Boards™](#)

[ClickID](#)

Downloads

[Charger 23 click example on Libstock](#)

[ISL78693 datasheet](#)

[Charger 23 click 2D and 3D files](#)

[Charger 23 click schematic](#)

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