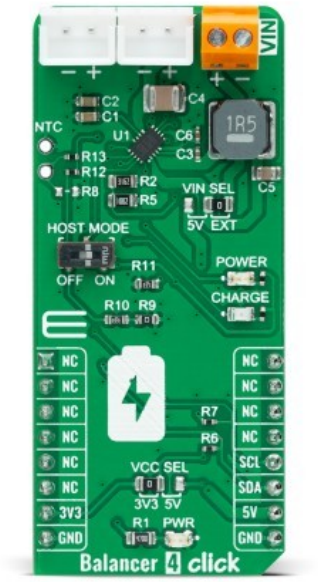
MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

Balancer 4 Click



PID: MIKROE-5271

Balancer 4 Click is a compact add-on board optimized for overvoltage protection balancing the voltage of serially connected batteries. This board features the MP2672A, a highly integrated, flexible switch-mode battery charger for Lithium-Ion batteries with two cells in series from Monolithic Power Systems (MPS). The MP2672A has a narrow voltage DC (NVDC) power structure and monitors the voltage across each cell, equalizing the cell's voltages if the difference between the two cells exceeds the mismatch threshold. It also has two selective operating modes with configurable output current up to 2A via register setting via I2C serial interface, alongside selectable MP2672A power supply, LED indication, and protection features allowing a reliable operation. This Click board™ is applicable for a wide range of portable applications, Point-of-Sale (POS) machines, general two-cell applications, and more.

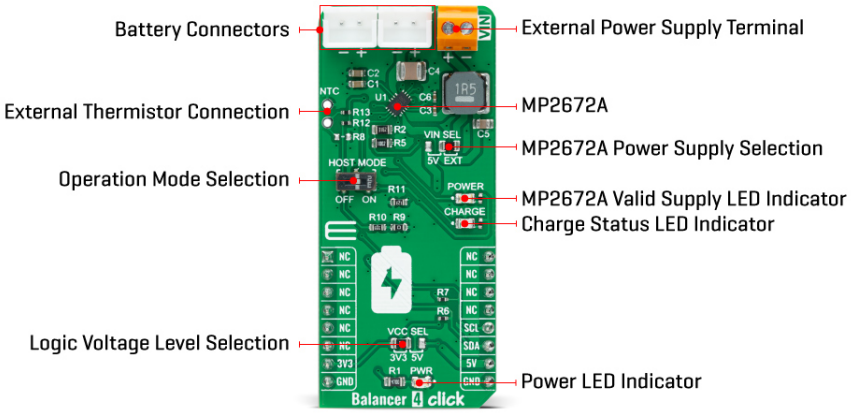
Balancer 4 Click is supported by a mikroSDK compliant library, which includes functions that simplify software development. This Click board™ comes as a fully tested product, ready to be used on a system equipped with the mikroBUS™ socket.

How does it work?

Balancer 4 Click as its foundation uses the MP2672A, a highly integrated and flexible switch-mode battery charger for two-cell Lithium-Ion batteries in series from Monolithic Power Systems (MPS). The MP2672A features a cell balance function that monitors the voltage across each cell and equalizes them if the difference exceeds the mismatch threshold. It features up to 2A of programmable charge current for batteries with two cells in series, alongside protections like battery temperature monitoring, programmable charging safety timer protection, JEITA-compliant battery NTC monitoring, cell over-voltage protection (OVP), thermal

MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

regulation, and thermal shutdown.



The MP2672A has a narrow voltage DC (NVDC) power structure. It automatically detects the battery voltage and charges it in three phases: pre-charge, constant current, and voltage charge. With a deeply discharged battery, the MP2672A regulates the system output to a minimum voltage level, which powers the system instantly while simultaneously charging the battery via integrated FET. It also offers flexible new charging cycle initiation compatible with Standalone mode and Host-control mode of operation selectable through an onboard switch labeled as HOST SEL.

Diverse and robust protections include a thermal regulation loop to decrease the charge current in case the junction temperature exceeds the thermal loop threshold and battery temperature protection compliant with JEITA standards. Other safety features include input over-voltage protection (OVP), battery OVP, thermal shutdown, battery temperature monitoring, and a configurable backup timer to prevent prolonged charging of a dead battery.

Balancer 4 Click communicates with MCU using the standard I2C 2-Wire interface to read data and configure settings, supporting a Standard Mode operation up to 100kHz. It also has two LED indicators, red and green, marked with CHARGE and POWER, which can visually show the existence of a valid power supply to the MP2672A and the active status of the battery charging process. Also, an NTC function is available for temperature-qualified charging, where the MP2672A continuously monitors the battery’s temperature by measuring the voltage on the onboard NTC header pins.

This Click board™ can operate with both 3.3V and 5V logic voltage levels selected via the VCC SEL jumper. It allows both 3.3V and 5V capable MCUs to use the communication lines properly. Additionally, there is a possibility for the MP2672A power supply selection via jumper labeled as VIN SEL to supply the MP2672A from an external power supply terminal in the range from 4V to 5.75V or with 5V voltage level from 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 for portable applications, Point-of-Sale (POS) machines, general two-cell

MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

	applications, and more
On-board modules	MP2672A - highly integrated and flexible switch-mode battery charger from Monolithic Power Systems (MPS)
Key Features	Two-cell Lithium-Ion batteries in series, up to 2A configurable charge current, compatible with Host-control or Standalone mode, NVDC power path management, integrated cell-balancing circuit for mismatched cells, status indicators, I2C interface, NTC, and more
Interface	I2C
Feature	No ClickID
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V or 5V,External

Pinout diagram

This table shows how the pinout on Balancer 4 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	NC	
	NC	2	RST	INT	15	NC	
	NC	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	**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	POWER	-	MP2672A Valid Supply LED Indicator
LD3	CHARGE	-	Charge Status LED Indicator
JP1	VCC SEL	Left	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V
JP2	VIN SEL	Right	MP2672A Power Supply Selection 5V/EXT: Left position 5V, Right position EXT

MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

J1	NTC	Unpopulated	External Thermistor Connection Header
SW1	HOST MODE	Right	Operation Mode Selection

Balancer 4 Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
External Supply Voltage VIN	4	-	5.75	V
Battery Pack Voltage	-	-	9	V
Output Current	-	-	2	A
Operating Temperature Range	-40	+25	+120	°C

Software Support

We provide a library for the Balancer 4 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 Balancer 4 Click driver.

Key functions

- balancer4_write_register This function writes a desired data byte to the selected register by using I2C serial interface.
- balancer4_write_and_verify_register This function writes a desired data byte to the selected register and verifies if is is written correctly by reading it.
- balancer4_read_register This function reads a data byte from the selected register by using I2C serial interface.

Example Description

This example demonstrates the use of Balancer 4 Click board™ by configuring the click board for charging and then reading the status and fault registers.

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

MIKROELEKTRONIKA D.O.O, Batajnički drum 23, 11000 Belgrade, Serbia
VAT: SR105917343 Registration No. 20490918
Phone: + 381 11 78 57 600 Fax: + 381 11 63 09 644 E-mail: office@mikroe.com
www.mikroe.com

- Click.Balancer4

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. UART terminal is available in all MikroElektronika compilers.

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

Balancer 4 click example on Libstock

MP2672A datasheet

Balancer 4 click 2D and 3D files

Balancer 4 click schematic