ModusToolbox™ EZ-PD™ Battery Charger Configurator user guide

EZ-PD™ Battery Charger Configurator version 1.0.0

About this document

Scope and purpose

The EZ-PD™ Battery Charger Configurator (Battery Charger Configurator herein) is a standalone desktop application and also can be called from ModusToolbox™. The Configurator is shipped within the technology pack.

The Configurator is a GUI tool that allows you to configure parameters of the pmg-battery-charger middleware. It supports generation of configuration structures for the PMG1-B1 and PMG1-B2 series of devices.

Intended audience

This document helps application developers understand how to use the Battery Charger Configurator as part of creating a ModusToolbox™ application.

Document conventions

Convention	Explanation
Bold	Emphasizes heading levels, column headings, menus and sub-menus
Italics	Denotes file names and paths.
`Courier New`	Denotes APIs, functions, interrupt handlers, events, data types, error handlers, file/folder names, directories, command line inputs, code snippets
File > Open	Indicates that a cascading sub-menu opens when you select a menu item

Abbreviations and definitions

The following define the abbreviations and terms used in this document:

- CLI – command line interface
- Configurator – A GUI-based tool used to configure a resource.
- EZ-PD – EZ (ease of use) USB (universal serial bus) power delivery
- GUI – graphical user interface
- NTC – negative temperature coefficient
- OCP – overcurrent protection
- OTP – overtemperature protection
- OVP – overvoltage protection
- PMG – power delivery microcontroller generation
- UVP – undervoltage protection
- VBUS – voltage bus

About this document

Reference documents

Refer to the following documents for more information as needed:

- ModusToolbox™ tools package user guide
- Eclipse IDE for ModusToolbox™ user guide
- VS Code for ModusToolbox™ user guide
- Device Configurator user guide

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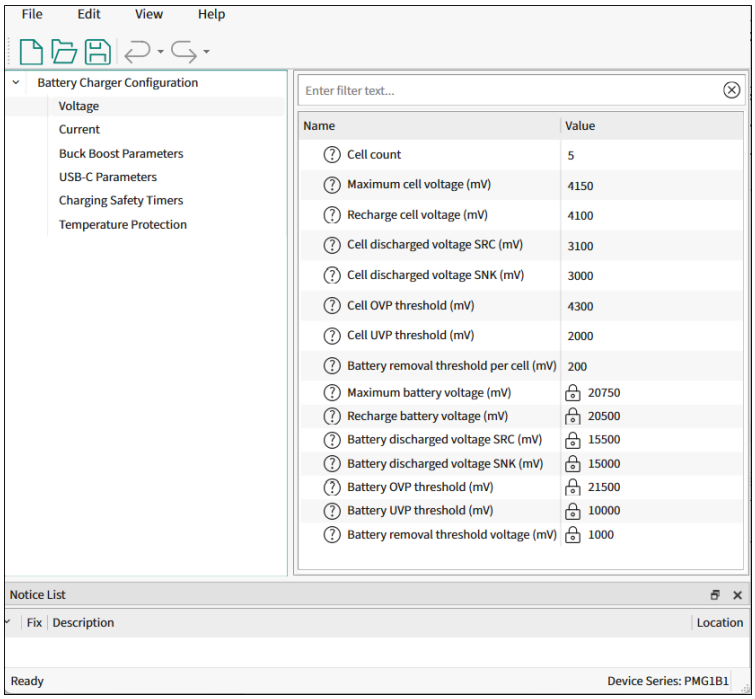
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1 Overview

The Battery Charger Configurator does not directly interact with Infineon hardware. The configuration is validated and generated for the PMG1 family devices, specifically, for series PMG1-B1 or PMG1-B2.

The Battery Charger Configurator interface is provided in the two main parts:



- Battery Charger Configuration panel
- Parameters input panel

1.1 Supported middleware

The Battery Charger middleware uses configuration setups developed in the Battery Charger Configurator GUI or with external applications.

Name	Version	Link
Battery Charger Middleware (`pmg-battery-charger`)	1.0	https://github.com/Infineon/pmg-battery-charger

2 Launch the Battery Charger Configurator

There are several ways to launch the Battery Charger Configurator, and those ways depend on the application, and how you use the various tools.

2.1 make command

As described in the ModusToolbox™ tools package user guide "ModusToolbox™ build system" chapter, you can run numerous `make` commands in the application directory, such as launching the Battery Charger Configurator. Create a ModusToolbox™ application, navigate to the application directory, and type the following command in the terminal:

```
make ez-pd-battery-charger-configurator
```

This command opens the Battery Charger Configurator GUI for the specific application in which you are working.

2.2 VS Code and Eclipse

VS Code and Eclipse have tools to launch the Battery Charger Configurator from within an open application. Refer to the applicable user guide for more details:

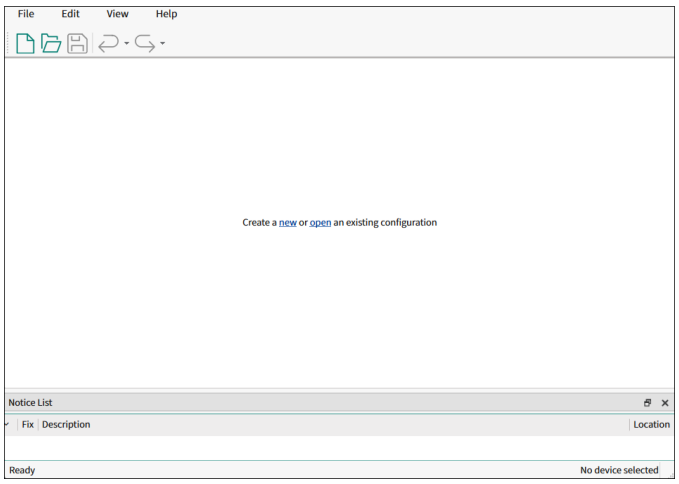
- VS Code for ModusToolbox™ user guide
- Eclipse IDE for ModusToolbox™ user guide

2.3 Standalone executable

You can launch the Battery Charger Configurator by running its executable as appropriate for your operating system (for example, double-click it or select it using the Windows **Start** menu). By default, the Configurator is installed here:

<install_dir>/Infineon/Tools/<pack_dir>/tools/ez-pd-battery-charger-configurator

When launched this way, the Battery Charger Configurator opens blank. Open an existing **.mtbezpdbc* file or select the required target device series and create new configuration.



See Menus for more information.

3 Quick start

This section provides a simple workflow for how to use the Battery Charger Configurator.

1. Create a project for a device of PMG1-B1 or PMG1-B2 device series using the Project Creator.
2. If the `pmg-battery-charger` library is not present in the project, use the Library Manager to add it.
3. Launch the Battery Charger Configurator.
4. Configure the parameters as required.
5. Save the configuration. See Code generation.
6. Use generated structure *cy_stc_battery_charger_cfg_t* declared in *mtbcfg_ezpdbc.h* and defined in the *mtbcfg_ezpdbc.c* file to set the battery charger settings in your application.

4 Code generation

The Configurator generates code automatically. The Battery Charger configuration structure will appear in the *mtbcfg_ezpdbc.h*, *mtbcfg_ezpdbc.c* files. The generated files are located in the *GeneratedSource* folder next to the **.mtbezpdbc* file, which contains the user configuration.

5 GUI description

The GUI description section provides an overview of the graphical user interface of the Battery Charger Configurator. It is designed to help the user navigate the various menus, toolbars and additional interface elements, enabling the efficient use of the Configurator's functionality.

5.1 Menus

5.1.1 File

- **New** – Opens the device series selection dialog. After the PMG1-B1 or PMG1-B2 target is selected, creates new configuration initialized with the default values.
- **Open…** – Opens a specified **.mtbezpdbc* configuration file. The current file, if any, will be closed. You will be prompted to save any unsaved changes.
- **Close** – Closes the current file. If there are pending changes, you will be prompted to save the file.
- **Save** – Applies the changes to the current configuration file and generates code for the related application. If the configuration has not yet been saved, works as **Save As…**. If there are validation errors, an error dialog displays and the configuration will not be saved.
- **Save As…** – Saves the current configuration in a new file if there are no validation errors, and generates middleware configuration files.
- **Open in System Explorer** – Opens your computer's file explorer tool to the folder that contains the **.mtbezpdbc* file.
- Recent files – Shows up to nine recent files that you can open directly.
- **Exit** – Closes the Configurator. You will be prompted to save any pending changes.

5.1.2 Edit

- **Undo** – Undoes the last action or sequence of actions.
- **Redo** – Redoes the last undone action or sequence of undone actions.

5.1.3 View

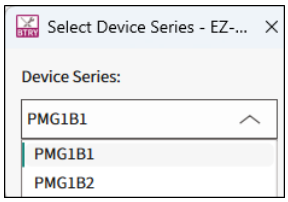
- **Notice List** – Shows/hides Notice List.
- **Toolbar** – Shows/hides the toolbar.
- **Reset View** – Resets the view to the default.

5.1.4 Help

- **View Help** – Opens this document.
- **About EZ-PD™ Battery Charger Configurator** – Opens the **About** box for version information, with links to open https://www.infineon.com and the current session log file.

5.2 Select Device Series

To create new configuration, click **New**, and in the dialog box, select PMG1-B1 or PMG1-B2 as the target device series.



Automatic target device series recognition

When the configuration is located inside a ModusToolbox™ application directory, the Configurator automatically determines the target device series from the application. This applies regardless of how the configuration is created or opened.

Note: The automatic target device series recognition for configuration inside a ModusToolbox™ application directory requires the ModusToolbox™ tools be installed.

5.3 Toolbar



The **Toolbar** (see View) contains common commands from the File and Edit menus.

5.4 Notice List

The **Notice List** pane combines notices (errors, warnings, tasks, and infos) from many places in your design into a centralized list. If a notice shows a location, you can double-click that entry to navigate to the error or warning.

For more information, refer to the Device Configurator user guide.

5.5 Status bar

The **Status bar** displays the status of operations, as well as numeric input field ranges, etc. The right side displays the target device series of the current configuration.



5.6 Logging

The Configurator automatically generates a log for each session. The file location differs for each operating system and can be found in the **About** dialog.

6 Battery Charger Configuration

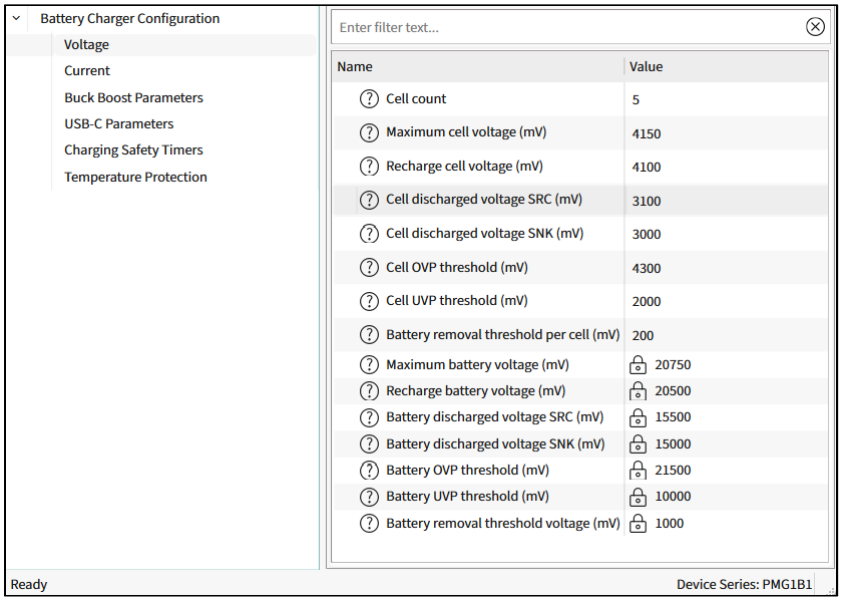
The Battery Charger Configurator displays two panels. Configurable parameters are grouped and arranged in a tree on the left panel – **Battery Charger Configuration**. Select the appropriate group to view the respective parameter values on the right panel. The Configurator performs validity checks on the values entered through the filter text box.

For B1 and B2, the **Voltage**, **Buck Boost Parameters,** and **USB-C Parameters** groups display the same parameters. In the **Current**, **Charging Safety Timers**, and **Temperature Protection** groups, some configurable and visible parameters differ.

6.1 Voltage

The **Voltage** information node consists of the following parameters:

The **Battery removal threshold per cell** parameter is used to calculate the **Battery removal threshold voltage** but does not have a corresponding individual value in the generated source file.



Battery Charger Configuration

Field name	Value range	Description	Visibility (B1/B2)
Cell count	2 to 5 for PMG1-B1 1 to 12 for PMG1-B2	The total number of battery cells connected in series	B1/B2
Maximum cell voltage (mV)	1000 - 4300	The maximum allowed cell voltage.	B1/B2
Recharge cell voltage (mV)	1000 - 4300	The battery recharge voltage per cell. The threshold used to resume charging if the battery voltage falls after a charge cycle completes.	B1/B2
Cell discharge voltage SRC (mV)	1000 - 4300	**USB-C** is in Source mode: the completely discharged cell voltage. The battery cannot source power below this voltage.	B1/B2
Cell discharge voltage SNK (mV)	1000 - 4300	**USB-C** is in Sink mode: the discharged cell voltage. Pre-charging is done below this voltage.	B1/B2
Cell OVP threshold (mV)	1000 - 4300	The threshold to detect the cell overvoltage condition.	B1/B2
Cell UVP threshold (mV)	1000 - 4300	The cell undervoltage threshold: • below – the battery is not charged and deemed damaged.	B1/B2
Battery removal threshold per cell (mV)	200 - 4300	The battery removal threshold per cell: • below – the battery is not detected.	B1/B2

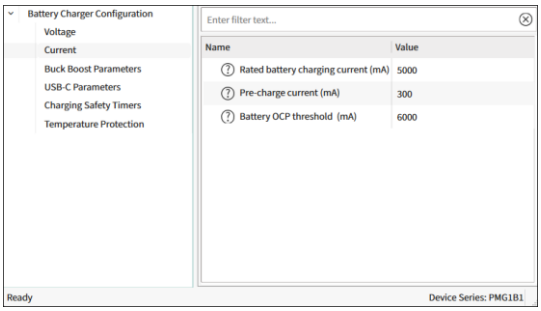
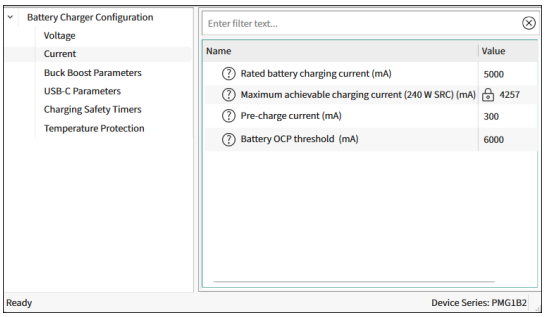
Battery Charger Configuration

Maximum battery voltage (mV)	$(Maximum\ cell\ voltage) \times (Cell\ count)$	The maximum battery voltage corresponding to the full charge.	B1/B2
Recharge battery voltage (mV)	$(Recharge\ cell\ voltage) \times (Cell\ count)$	The battery voltage threshold to resume charging if the battery voltage falls after a charge cycle completes.	B1/B2
Battery discharge voltage SRC (mV)	$(Cell\ discharged\ voltage\ SRC) \times (Cell\ count)$	**USB-C** is in Source mode: the completely discharged battery voltage. The battery cannot source power below this voltage.	B1/B2
Battery discharge voltage SNK (mV)	$(Cell\ discharged\ voltage\ SNK) \times (Cell\ count)$	**USB-C** is in Sink mode: the discharged battery voltage. Pre-charging is done below this voltage.	B1/B2
Battery OVP threshold (mV)	$(Cell\ OVP\ threshold) \times (Cell\ count)$	The battery overvoltage protection threshold.	B1/B2
Battery UVP threshold (mV)	$(Cell\ UVP\ threshold) \times (Cell\ count)$	The battery undervoltage detection threshold: • below – the battery is not charged.	B1/B2
Battery removal threshold voltage (mV)	$(Battery\ removal\ threshold\ per\ cell) \times (Cell\ count)$	The battery removal threshold: • below – the battery is not detected.	B1/B2

6.2 Current

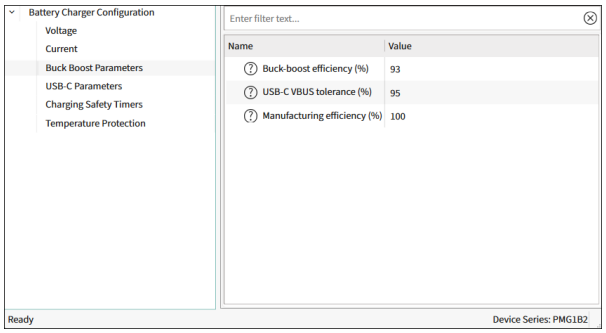
The **Maximum achievable charging current** parameter does not have a corresponding individual value in the generated source file. The parameter's value is calculated using the equation:

$$\text{(Maximum achievable charging current)} = \frac{240 \times 1000 \times \frac{\text{(Buck-Boost efficiency)}}{100} \times \frac{\text{(USB-C VBUS tolerance)}}{100} \times \frac{\text{(Manufacturing efficiency)}}{100}}{\text{(Maximum cell voltage)} \times \text{(Cell count)}} \times 1000$$

B1	B2
	

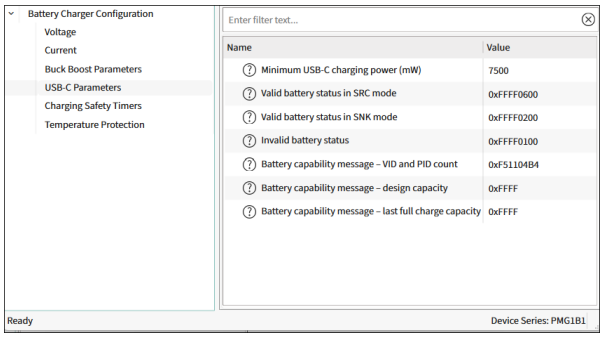
Field name	Value range	Description	Visibility (B1/B2)
Rated battery charging current (mA)	150 - 10000	The maximum rated charging current limit for the battery. Set this as per battery specification.	B1/B2
Maximum achievable charging current (240 W SRC) (mA)	Formula ↑	The maximum charging current that can be achieved with the 240 W **USB-C** Source power. This value depends on the source power, battery cell count, and system efficiency.	B2
Pre-charge current (mA)	150 - 500	The low charging current limit used for the pre-charge and top-off charge.	B1/B2
Battery OCP threshold (mA)	150 - 12000	The overcurrent protection threshold for the battery.	B1/B2

6.3 Buck Boost Parameters



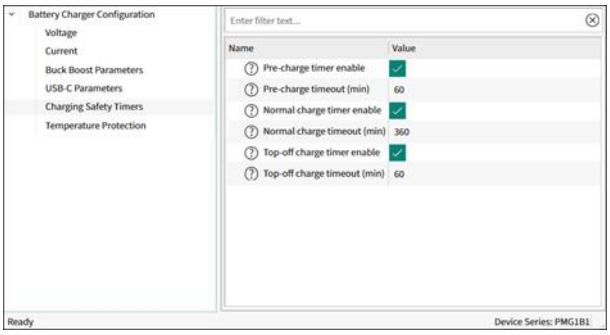
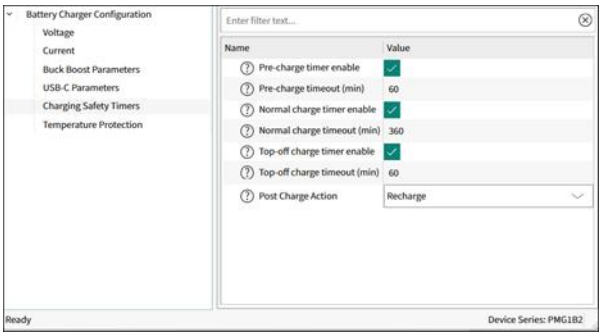
Field name	Value range	Description	Visibility (B1/B2)
Buck-boost efficiency (%)	1 - 100	The buck-boost power-stage efficiency.	B1/B2
USB-C VBUS tolerance (%)	1 - 100	The USB-C voltage bus tolerance.	B1/B2
Manufacturing efficiency (%)	1 - 100	The manufacturing efficiency to cover the tolerance and any additional power loss in the system.	B1/B2

6.4 USB-C Parameters



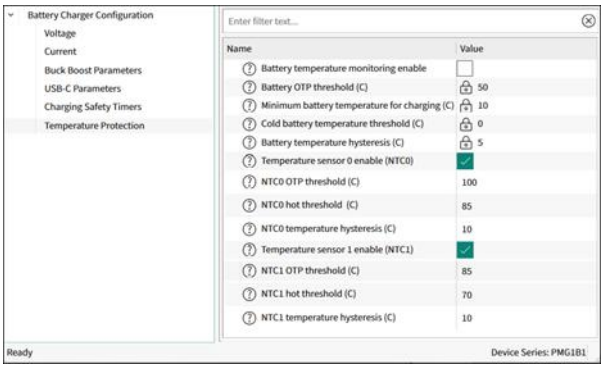
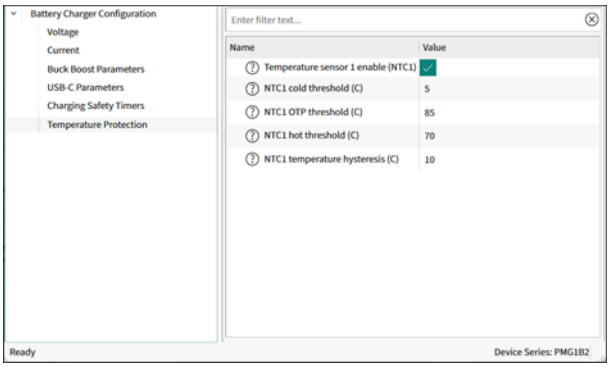
Field name	Value range	Description	Visibility (B1/B2)
Minimum USB-C charging power (mW)	4500 - 240000	The minimum power from **USB-C** port required for charging the battery.	B1/B2
Valid battery status in SRC mode	0x0 - 0xFFFFFFFF	The valid battery status response in **USB-C** Source mode.	B1/B2
Valid battery status in SNK mode	0x0 - 0xFFFFFFFF	The valid battery status response in **USB-C** Sink mode.	B1/B2
Invalid battery status	0x0 - 0xFFFFFFFF	The invalid battery status response.	B1/B2
Battery capability message – VID and PID count	0x0 - 0xFFFFFFFF	The battery capability message – VID and PID count.	B1/B2
Battery capability message – design capacity	0x0 - 0xFFFF	The battery capability message for the design capacity.	B1/B2
Battery capability message – last full charge capacity	0x0 - 0xFFFF	The battery capability message for the last full charge capacity.	B1/B2

6.5 Charging Safety Timers

B1	B2
	

Field name	Value range	Description	Visibility (B1/B2)
Pre-charge timer enable	Check box	Enables the pre-charge timer.	B1/B2
Pre-charge timeout (min)	1 - 300	The pre-charge timeout duration.	B1/B2
Normal charge timer enable	Check box	Enables the normal charge timer.	B1/B2
Normal charge timer timeout (min)	1 - 1000	The normal charge timeout duration.	B1/B2
Top-off charge timer enable	Check box	Enables the top-off-charge timer.	B1/B2
Top-off charge timeout (min)	1 - 300	The top-off charge timeout duration.	B1/B2
Post charge action	0 - 2	The system action after a full charge: • Recharge • Shutdown • Top-off	B2

6.6 Temperature Protection

B1	B2
	

Battery Charger Configuration

Field name	Value range	Description	Visibility (B1/B2)
Battery temperature monitoring enable	Check box	Enables the monitoring of the battery temperature.	B1
Battery OTP threshold (C)	40 - 70	The threshold of the battery overtemperature protection: • above – charging is cut off.	B1
Minimum battery temperature for charging (C)	5 - 50	The minimum battery temperature required for charging with the maximum current: • below – the charging current drops to 1A.	B1
Cold battery temperature threshold (C)	-40 - 20	The battery temperature threshold: • below – the battery charging is cut off • above – the battery charging is limited to 1A or less.	B1
Battery temperature hysteresis (C)	0 - 15	The battery temperature hysteresis value for various thresholds detection.	B1
Temperature sensor 0 enable (NTC0)	Check box	Enables the monitoring of the board temperature by NTC0.	B1
NTC0 OTP threshold (C)	25 - 120	The threshold of the board overtemperature (OTP): • above – the charging is cut off.	B1
NTC0 hot threshold (C)	5 - 100	The threshold of the board temperature: • above – the charging current reduces by half and becomes less than 2A.	B1
NTC0 temperature hysteresis (C)	0 - 20	The temperature hysteresis value for NTC0-based threshold detection.	B1
Temperature sensor 1 enable (NTC1)	Check box	Enables the monitoring of the board temperature by NTC1.	B1/B2
NTC1 cold threshold (C)	-40 - 20	The board temperature threshold: • below – the battery charging is cut off.	B2
NTC1 OTP threshold (C)	25 - 120	The threshold of the board overtemperature: • above – the charging is cut off.	B1/B2
NTC1 hot threshold (C)	5 - 100	The threshold of the board temperature: • above – the charging current reduces by half and becomes less than 2A.	B1/B2
NTC1 temperature hysteresis (C)	0 - 20	The temperature hysteresis value for NTC1-based threshold detection.	B1/B2

7 Version changes

This section lists and describes the changes for each version of this tool.

Version	Change descriptions
1.0	New tool.

Revision history

Revision	Date	Description
**	2026-09-28	New document.

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