Hardware Documentation

SolderCoreBBHD – Battery Adapter
ADP-SC8ULP-BAT
for HW Revision 1.20

preliminary

Version 002
(2024-06-11)

Elektronik Systeme

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About This Document

This document describes how to use the SolderCoreBBHD – Battery Adapter (further named as battery adapter) with mechanical and electrical information. The latest version of this document can be found at: http://www.fs-net.de.

This document is written for the variants of the battery adapter, listed in the table below.

Related Boards
SolderCoreBBHD – Battery Adapter Rev.1.20

ESD Requirements

All F&S hardware products are ESD (electrostatic sensitive devices). All products are handled and packaged according to ESD guidelines. Please do not handle or store ESD-sensitive material in ESD-unsafe environments. Negligent handling will harm the product and warranty claims become void.

History

Date	V	Platform	A,M,R	Chapter	Description	Au
20.12.23	001	-	-	All	Initial Version	SM
18.06.24	002	-	A,M,R	All	New HW Revision	SM

V	Version
A, M, R	Added, Modified, Removed
Au	Author

Table of Contents

1 Additional Documentation

Due to the fact, that the battery adapter is designed to be directly connected to the SolderCoreBBHD (further called baseboard), it is recommended to read the baseboard documentation previously.

2 Overview

The battery adapter gives the possibility to fully supply the baseboard over a Li Ion battery cell.

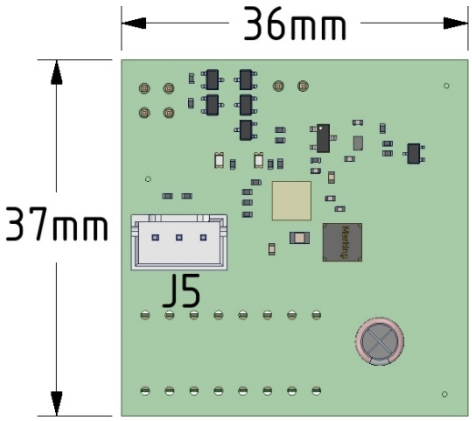


Figure 1: Top side

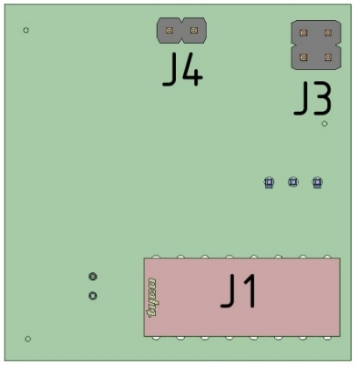
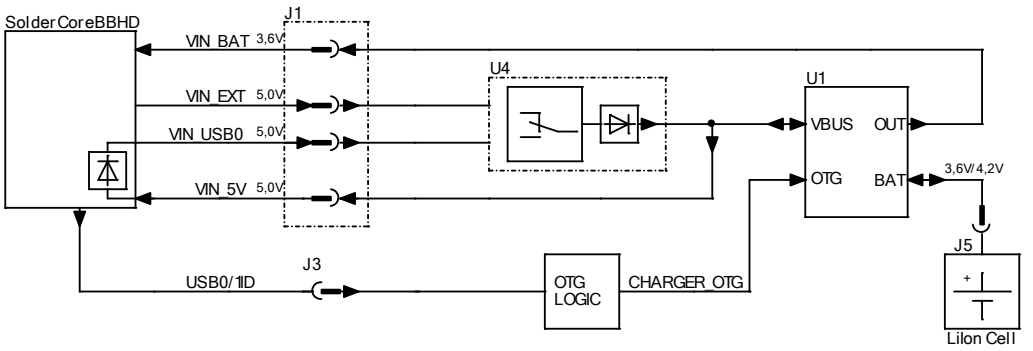


Figure 2: Bottom side



U1 States	VBUS	OUT	BAT
Battery charging (OTG: HIGH/LOW, ext. source)	5V	3,6V	4,2V
Battery supplies OUT only (OTG: LOW, no ext. source)	0V	3,6V	3,6V
Battery supplies OUT & VBUS (OTG: HIGH, no ext. source)	5V	3,6V	3,6V

Figure 3: Block diagram

Ref.	Description	I/O	No. of Pins	Connector Type
J1	Board-to-board connection	PWR	16	Socket 90° (2.54 mm)
J3	USB ID in	I/O	4	Pin Header (2.54 mm)
J4	USB data in	I/O	2	Pin Header (2.54 mm)
J5	Battery	PWR	3	JST-XH 2.50mm

Table 1: Connector overview

3 Detailed Description

3.1 Connection

3.1.1 Baseboard

The battery adapter is mounted on baseboard connector J28, as shown in figure 2.

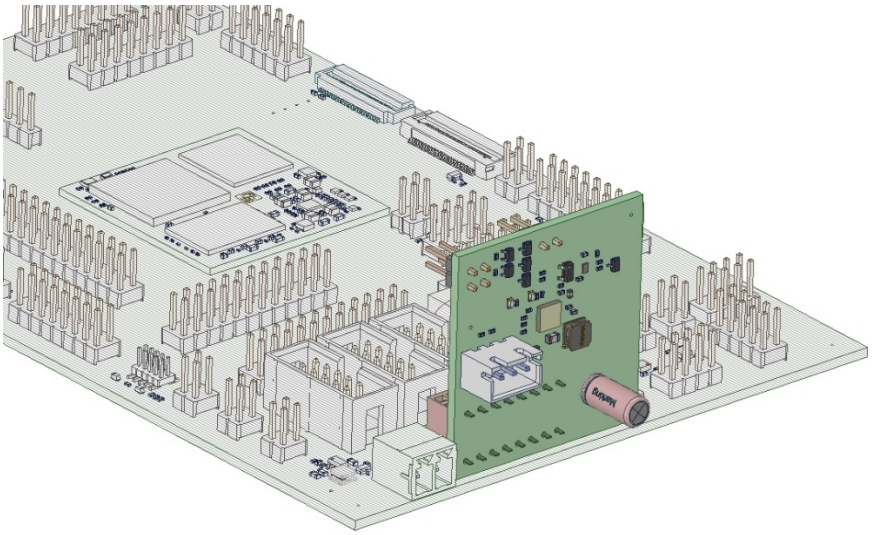


Figure 4: Battery adapter mounting position on baseboard

3.1.2 Battery

J5 is the connection for a LiIon Battery. The charging current is limited to 1A.
It is highly recommended to use a battery with a 10kΩ NTC and its own protection circuit, to prevent harm!

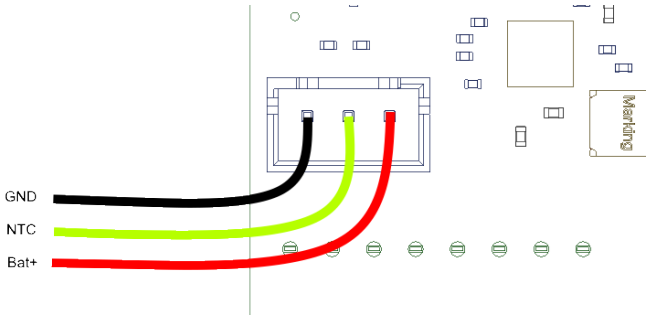


Figure 5: Battery wiring

Color	Signal	Description
black	GND	
yellow	NTC	10kΩ Thermistor
red	Bat+	Battery cathode

Table 2: Battery wiring

3.2 Functionality

The charging functionality is handled by the BQ25616.

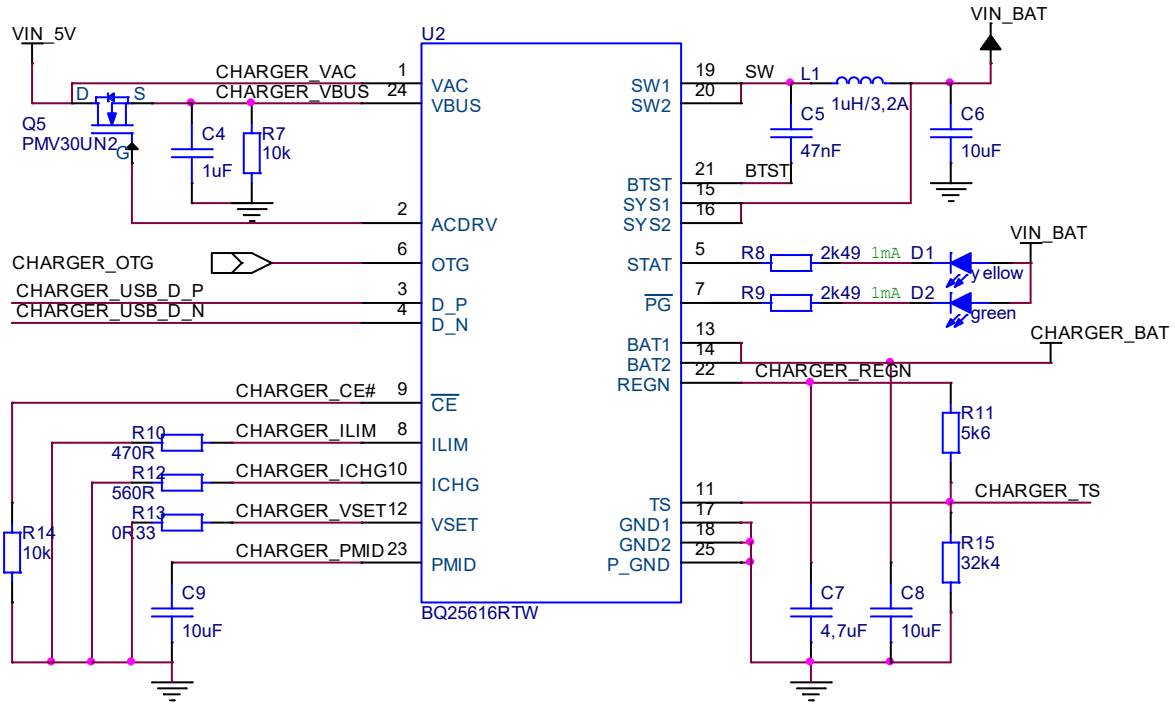


Figure 6: Schematic charging IC

3.2.1 Charging Inputs

Charging is possible via external input or USB0 of the baseboard. The external input has priority. A charging adapter with at least 1A output should be used.

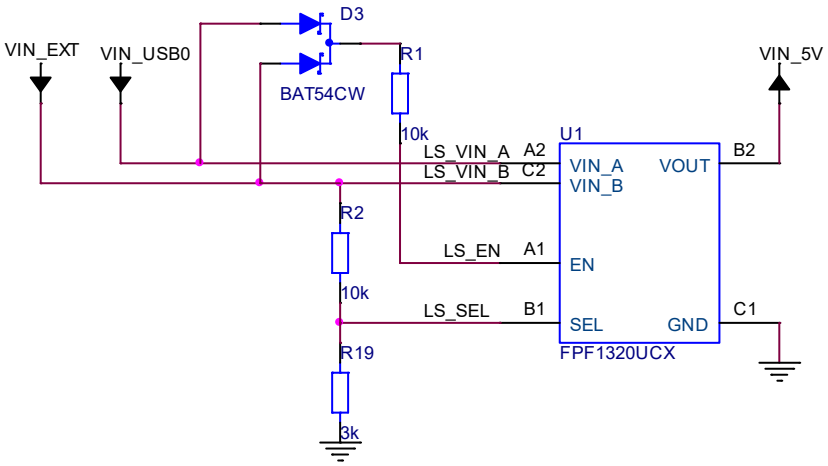


Figure 7: Schematic input selection

3.2.2 Status LEDs

The LEDs on the battery adapter show the charging and input voltage status.

Ref.	Signal	Color	Description
D1	Status	yellow	On: charging Off: charging done/sleep Blink (1Hz): error
D2	Power Good	green	On: input voltage good, Off: bad input voltage

Table 3: LED states

3.3 USB

3.3.1 ID connection

To charge the battery over USB0, the ID signals and VIN_BAT (as pull up reference) should be connected to the adapter.
If you don't want to charge over USB you must bridge the USBx_ID pins with VIN_BAT on J3.

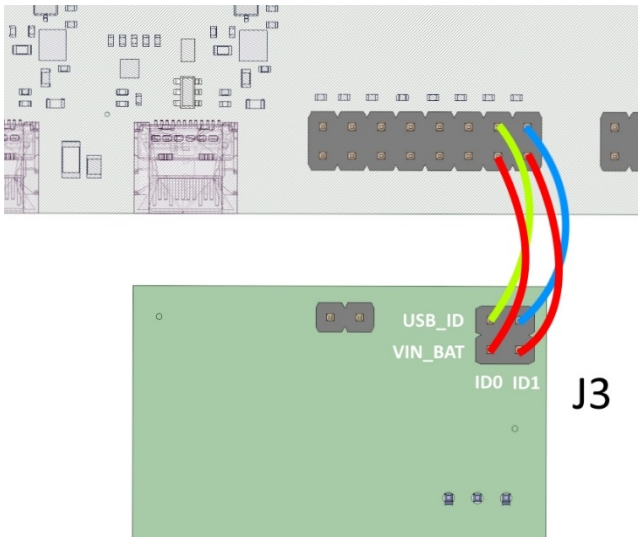


Figure 8: USB ID wiring

Pin	Signal Name	I/O	Voltage	Description	Wire Color
1	USB0_ID	I/O	3.3V	USB0 ID signal, high active	Blue
2	USB1_ID	I/O	3.3V	USB0 ID signal, high active	Yellow
3	VIN_BAT				Red
4					

Table 4: Connector J3

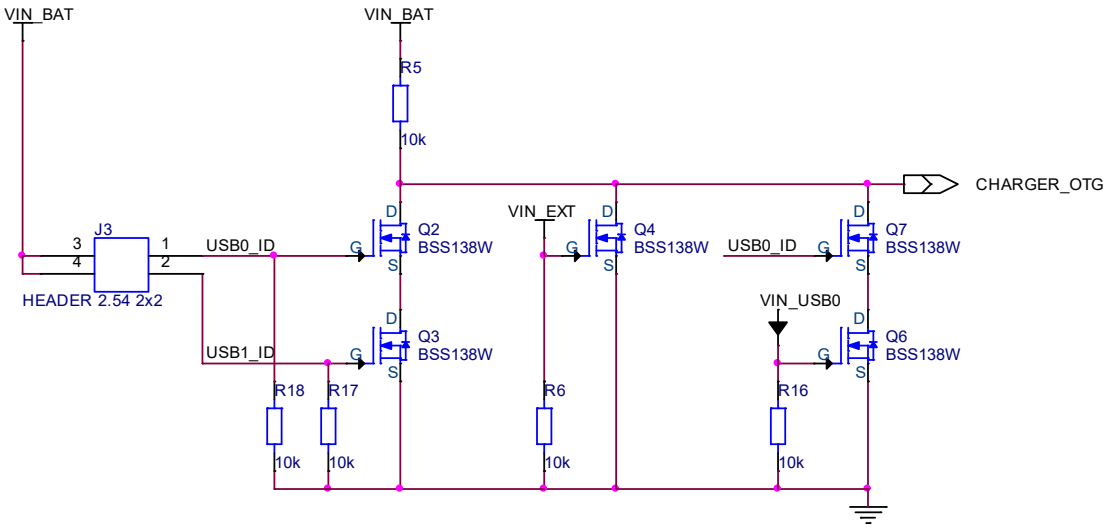
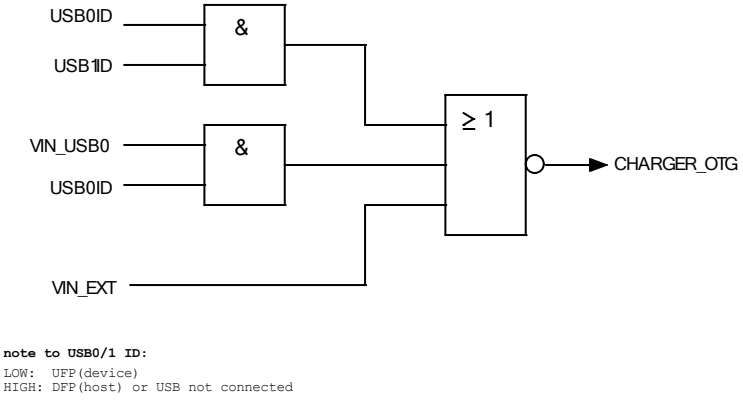


Figure 9: Schematic ID detection



VIN_EXT	VIN_USB0	USB0ID	USB1ID	CHARGER_OTG
0	0	0	0	1
0	0	1	0	1
0	0	0	1	1
0	1	1	1	0
-	1	1	-	0
-	-	1	1	0
1	-	-	-	0

note to USB0/1 ID:
LOW: UFP(device)
HIGH: DFP(host) or USB not connected

Figure 10: Logic of ID detection

3.3.2 Adapter detection

The charging IC supports the communication with the USB charging adapter.

Note: As this functionality isn't implemented on the baseboard, the signals are routed to J4 for development purposes only.

Pin	Signal Name	I/O	Description
1	D-	I/O	USB 2.0 differential pair, negative -
2	D+	I/O	USB 2.0 differential pair, positive +

Table 5: Connector J4

4 Electrical Characteristics

As the battery adapter is an expansion of the SolderCoreBBHD, please also see the SolderCoreBBHD documentation for the electrical characteristics.

4.1 Absolute Maximum Ratings

Parameter.	Description	Min	Max	Unit
Bat+	Battery voltage	-0.30	7.00	V
D-, D+	USB data signals	-0.30	7.00	V

Table 6: Absolute Maximum Ratings

4.2 Recommended Operating Conditions

Parameter.	Description	Min	Typ.	Max	Unit
Bat+	Battery charging voltage		4.20		V
	Battery voltage			4.35	V

Table 7: Recommended Operation Conditions

5 ESD and EMI Implementation

The connectors do not have any ESD protection. We highly recommend using the adapter board with wires as short as possible.

A helpful guide is available from TI; just search for slva680 at ti.com.

6 Second source rules

F&S qualifies their second sources for parts autonomously, if this does not touch the technical characteristics of the product. This is necessary to guarantee delivery times and product life. A setup of release samples with released second sources is not possible.

F&S does not use broker components without the consent of the customer.

7 Storage conditions

Maximum storage on room temperature with non-condensing humidity:	6 months
Maximum storage on controlled conditions 25 ±5 °C, max. 60% humidity:	12 months

For longer storage, we recommend vacuum dry packs.

8 ROHS and REACH statement

All F&S designs are created from lead-free components and are completely ROHS compliant.

The products we supply do not contain any substance on the latest candidate list published by the European Chemicals Agency according to Article 59(1,10) of Regulation (EC) 1907/2006 (REACH) in a concentration above 0.1 mass %.
Consequently, the obligations in No. 1 and 2 paragraphs in Annex are not relevant here.
Please understand that F&S is not performing any chemical analysis on its products to testify REACH compliance and is therefore not able to fill out any detailed inquiry forms.

9 Packaging

All F&S ESD-sensitive products will be shipped either in trays or in bags.

10 Matrix Code Sticker

All F&S hardware will ship with a matrix code sticker including the serial number. Enter your serial number here https://www.fs-net.de/en/support/serial-number-info-and-rma/ to get information on shipping date and type of board.

Figure 11: Matrix Code Sticker

11 Appendix

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12 Content