



Technical Report No.: 64.280.25.60663.01

Dated: 2025-12-26

Client: Shenzhen Kstar New Energy Company Limited
The 9th Floor, R&D Building, Kstar Industrial Park, Guangming Hi-tech Industrial Zone, 518107 Shenzhen, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA

Manufacturer: Shenzhen Kstar New Energy Company Limited
The 9th Floor, R&D Building, Kstar Industrial Park, Guangming Hi-tech Industrial Zone, 518107 Shenzhen, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA

Factory: Shenzhen KSTAR Science & Technology Co., Ltd. Guangming Branch
Kstar Tech-Industrial Park, 7th Road, Western Area, Hi-Tech Industrial Zone, Tianliao Community, Yutang Street, Guangming District, 518107 Shenzhen City, Guangdong Province, PEOPLE'S REPUBLIC OF CHINA

Test object: Product: Rechargeable Li-ion Battery System
Model: BP48100PF1A-G2, BP48100P1A-G2, BP48100PF2A-G2, BP48100P2A-G2, BP48100PF1A-G2-2P, BP48100P1A-G2-2P, BP48100PF2A-G2-2P, BP48100P2A-G2-2P, BP48100PF1A-G2-3P, BP48100P1A-G2-3P, BP48100PF2A-G2-3P, BP48100P2A-G2-3P, BP48100PF1A-G2-4P, BP48100P1A-G2-4P, BP48100PF2A-G2-4P, BP48100P2A-G2-4P, BP48100PF1A-G2-5P, BP48100P1A-G2-5P, BP48100PF2A-G2-5P, BP48100P2A-G2-5P, BP48100PF1A-G2-6P, BP48100P1A-G2-6P, BP48100PF2A-G2-6P, BP48100P2A-G2-6P, BP48100PF1A-G2-7P, BP48100P1A-G2-7P, BP48100PF2A-G2-7P, BP48100P2A-G2-7P, BP48100PF1A-G2-8P, BP48100P1A-G2-8P, BP48100PF2A-G2-8P, BP48100P2A-G2-8P

Trade mark: KSTAR

Test specification: Annex H of IEC 60730-1:2022 (Class B control)

Purpose of examination: Testing and evaluation according to the test specification

Test result: The test results show that the presented product is in compliance with the above listed test specifications.

Any use for advertising purposes must be granted in writing. This technical report may only be quoted in full. This report is the result of a single examination of the object in question. It does not imply a general statement regarding the quality of products from regular production. For further details please see Testing, Certification, Validation and Verification Regulations, chapter A-3.3.

1. Description of the test subject

1.1 Picture(s)

BP48100PF1A-G2, BP48100P1A-G2, BP48100PF2A-G2, BP48100P2A-G2



Remark:

Rechargeable Li-ion Battery System, model no.: BP48100PF1A-G2, BP48100P1A-G2, BP48100PF2A-G2, BP48100P2A-G2 are identical in appearance.

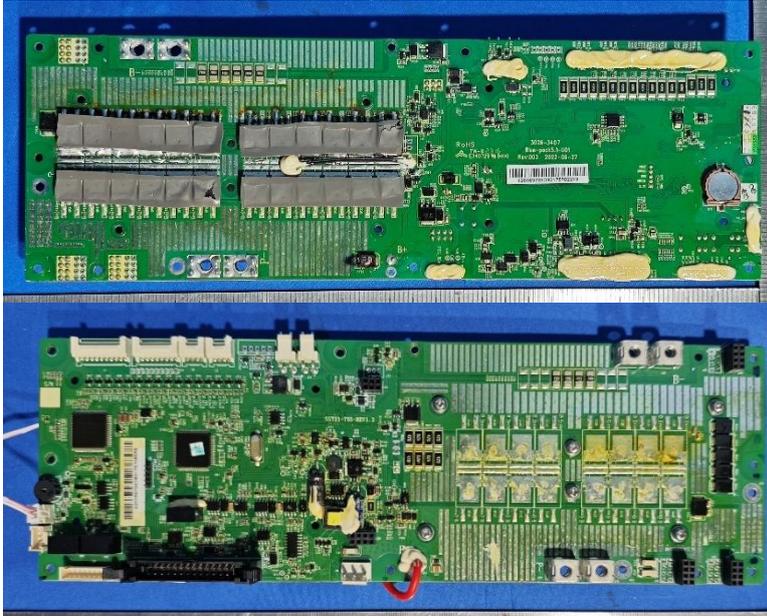
BP48100PF1A-G2-8P, BP48100P1A-G2-8P, BP48100PF2A-G2-8P, BP48100P2A-G2-8P



Remark:

1. Rechargeable Li-ion Battery System, model no.: BP48100PF1A-G2-8P, BP48100P1A-G2-8P, BP48100PF2A-G2-8P, BP48100P2A-G2-8P are identical in appearance.
2. BP48100PF1A-G2-2P, BP48100PF1A-G2-3P, BP48100PF1A-G2-4P, BP48100PF1A-G2-5P, BP48100PF1A-G2-6P, BP48100PF1A-G2-7P respectively consist of 2-7pcs battery systems with model no.: BP48100PF1A-G2 connected in parallel. BP48100P1A-G2-2P, BP48100P1A-G2-3P, BP48100P1A-G2-4P, BP48100P1A-G2-5P, BP48100P1A-G2-6P, BP48100P1A-G2-7P respectively consist of 2-7pcs battery systems with model no.: BP48100P1A-G2 connected in parallel.
3. BP48100PF2A-G2-2P, BP48100PF2A-G2-3P, BP48100PF2A-G2-4P, BP48100PF2A-G2-5P, BP48100PF2A-G2-6P, BP48100PF2A-G2-7P respectively consist of 2-7pcs battery systems with model no.: BP48100PF2A-G2 connected in parallel. BP48100P2A-G2-2P, BP48100P2A-G2-3P, BP48100P2A-G2-4P, BP48100P2A-G2-5P, BP48100P2A-G2-6P, BP48100P2A-G2-7P respectively consist of 2-7pcs battery systems with model no.: BP48100P2A-G2 connected in parallel.

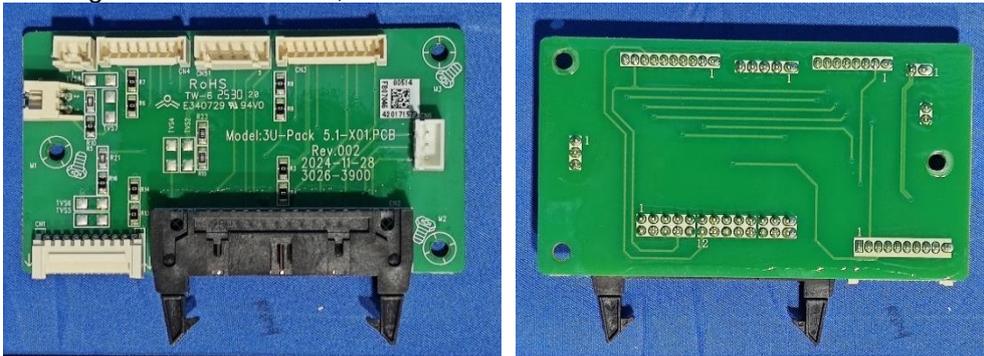
BMS main board, model: Blue-pack5.1-U01



BMS current-limited board, model: Blue-pack5.1-M01



BMS signal transform board, model: 3U-Pack 5.1-X01 board



1.2 Function

Manufacturer's specification for intended use:

- according to the user manual or installation instructions.



1.3 Consideration of the foreseeable use

- Not applicable
- Covered through the applied standard
- Covered by the following comment
- Covered by attached risk analysis

1.4 Technical Data

1.1 Rechargeable Li-ion Battery Systems, model no.: BP48100PF1A-G2, BP48100P1A-G2, BP48100PF1A-G2-2P, BP48100P1A-G2-2P, BP48100PF1A-G2-3P, BP48100P1A-G2-3P, BP48100PF1A-G2-4P, BP48100P1A-G2-4P, BP48100PF1A-G2-5P, BP48100P1A-G2-5P, BP48100PF1A-G2-6P, BP48100P1A-G2-6P, BP48100PF1A-G2-7P, BP48100P1A-G2-7P, BP48100PF1A-G2-8P, BP48100P1A-G2-8P are used in industrial applications.

1.2 BP48100PF1A-G2-2P, BP48100PF1A-G2-3P, BP48100PF1A-G2-4P, BP48100PF1A-G2-5P, BP48100PF1A-G2-6P, BP48100PF1A-G2-7P, BP48100PF1A-G2-8P respectively consist of 2-8pcs battery systems with model no.: BP48100PF1A-G2 connected in parallel. BP48100P1A-G2-2P, BP48100P1A-G2-3P, BP48100P1A-G2-4P, BP48100P1A-G2-5P, BP48100P1A-G2-6P, BP48100P1A-G2-7P, BP48100P1A-G2-8P respectively consist of 2-8pcs battery systems with model no.: BP48100P1A-G2 connected in parallel.

1.3 Both model no.: BP48100PF1A-G2 and model no.: BP48100P1A-G2 consist of 16 pcs approved cells model no.: LF100LA connected in series, and they are identical except BP48100PF1A-G2 with the heating film inside.

1.4 The external communication model for Rechargeable Li-ion Battery Systems is wired CAN bus. Data is stored in local.

Additionally, details information of the battery and its component cell are shown in following table:

Item	Specification	
Product name	Rechargeable Li-ion Cell	Rechargeable Li-ion Battery System
Type/model	LF100LA	BP48100PF1A-G2, BP48100P1A-G2, BP48100PF1A-G2-2P, BP48100P1A-G2-2P, BP48100PF1A-G2-3P, BP48100P1A-G2-3P, BP48100PF1A-G2-4P, BP48100P1A-G2-4P, BP48100PF1A-G2-5P, BP48100P1A-G2-5P, BP48100PF1A-G2-6P, BP48100P1A-G2-6P, BP48100PF1A-G2-7P, BP48100P1A-G2-7P, BP48100PF1A-G2-8P, BP48100P1A-G2-8P
Nominal voltage	3.2 Vd.c.	51.2 Vd.c.
Rated capacity	102 Ah	BP48100PF1A-G2, BP48100P1A-G2: 100 Ah BP48100PF1A-G2-2P, BP48100P1A-G2-2P: 200 Ah BP48100PF1A-G2-3P, BP48100P1A-G2-3P: 300 Ah BP48100PF1A-G2-4P, BP48100P1A-G2-4P: 400 Ah BP48100PF1A-G2-5P, BP48100P1A-G2-5P: 500 Ah BP48100PF1A-G2-6P, BP48100P1A-G2-6P: 600 Ah BP48100PF1A-G2-7P, BP48100P1A-G2-7P: 700 Ah BP48100PF1A-G2-8P, BP48100P1A-G2-8P: 800 Ah



Charging voltage declared by manufacturer	3.65 V	57.6 V
Upper limit charging voltage	3.9 V	-
Charging current declared by manufacturer	50 A	BP48100PF1A-G2, BP48100P1A-G2: 80 A, BP48100PF1A-G2-2P, BP48100P1A-G2-2P: 160A, BP48100PF1A-G2-3P, BP48100P1A-G2-3P, BP48100PF1A-G2-4P, BP48100P1A-G2-4P, BP48100PF1A-G2-5P, BP48100P1A-G2-5P, BP48100PF1A-G2-6P, BP48100P1A-G2-6P, BP48100PF1A-G2-7P, BP48100P1A-G2-7P, BP48100PF1A-G2-8P, BP48100P1A-G2-8P: 240 A
Maximum continuous charging current	100 A	BP48100PF1A-G2, BP48100P1A-G2: 80 A, BP48100PF1A-G2-2P, BP48100P1A-G2-2P: 160A, BP48100PF1A-G2-3P, BP48100P1A-G2-3P, BP48100PF1A-G2-4P, BP48100P1A-G2-4P, BP48100PF1A-G2-5P, BP48100P1A-G2-5P, BP48100PF1A-G2-6P, BP48100P1A-G2-6P, BP48100PF1A-G2-7P, BP48100P1A-G2-7P, BP48100PF1A-G2-8P, BP48100P1A-G2-8P: 240 A
Discharging current declared by manufacturer	50 A	BP48100PF1A-G2, BP48100P1A-G2: 80 A, BP48100PF1A-G2-2P, BP48100P1A-G2-2P: 160A, BP48100PF1A-G2-3P, BP48100P1A-G2-3P, BP48100PF1A-G2-4P, BP48100P1A-G2-4P, BP48100PF1A-G2-5P, BP48100P1A-G2-5P, BP48100PF1A-G2-6P, BP48100P1A-G2-6P, BP48100PF1A-G2-7P, BP48100P1A-G2-7P, BP48100PF1A-G2-8P, BP48100P1A-G2-8P: 240 A
Maximum continuous discharging current	250 A	BP48100PF1A-G2, BP48100P1A-G2: 80 A, BP48100PF1A-G2-2P, BP48100P1A-G2-2P: 160A, BP48100PF1A-G2-3P, BP48100P1A-G2-3P, BP48100PF1A-G2-4P, BP48100P1A-G2-4P, BP48100PF1A-G2-5P, BP48100P1A-G2-5P, BP48100PF1A-G2-6P, BP48100P1A-G2-6P, BP48100PF1A-G2-7P, BP48100P1A-G2-7P, BP48100PF1A-G2-8P, BP48100P1A-G2-8P: 240 A
End-of-discharge voltage	2.0 V	44.8 V or any cell reaches 2.80 V
Lower limit discharging voltage	1.9 V	-
Standard temperature range for charging	-20 °C to 65 °C	-



Standard temperature range for discharging	-30 °C to 65 °C	-
Standard charging method by manufacturer	Charge at constant current 50 A until voltage reaches 3.65 V, then charge at 3.65 V till charge current is 0.05 <i>I</i> A (5.1 A).	BP48100PF1A-G2, BP48100P1A-G2: Charging at the constant current 80 A until voltage to 57.6 V or any cell reaches 3.6 V, then constant voltage 57.6 V until charging current reduces to 5 A. BP48100PF1A-G2-2P, BP48100P1A-G2-2P: Charging at the constant current 160 A until voltage to 57.6 V or any cell reaches 3.6 V, then constant voltage 57.6 V until charging current reduces to 10 A. BP48100PF1A-G2-3P, BP48100P1A-G2-3P, BP48100PF1A-G2-4P, BP48100P1A-G2-4P, BP48100PF1A-G2-5P, BP48100P1A-G2-5P, BP48100PF1A-G2-6P, BP48100P1A-G2-6P, BP48100PF1A-G2-7P, BP48100P1A-G2-7P, BP48100PF1A-G2-8P, BP48100P1A-G2-8P: Charging at the constant current 240 A until voltage to 57.6 V or any cell reaches 3.6 V, then constant voltage 57.6 V until charging current reduces to 15 A.
Dimension	T*W*H: (49.9±1.0) mm*(160±1.0) mm* (118.5±1.0) mm	W*D*H: BP48100PF1A-G2, BP48100P1A-G2: 725 mm*245 mm*465.5 mm BP48100PF1A-G2-2P, BP48100P1A-G2-2P: 725 mm*245 mm*835.5 mm BP48100PF1A-G2-3P, BP48100P1A-G2-3P: 725 mm*245 mm*1205.5 mm BP48100PF1A-G2-4P, BP48100P1A-G2-4P: 725 mm*245 mm*1575.5 mm BP48100PF1A-G2-5P, BP48100P1A-G2-5P: 1450 mm*245 mm*1727 mm BP48100PF1A-G2-6P, BP48100P1A-G2-6P: 1450 mm*245 mm*1727 mm BP48100PF1A-G2-7P, BP48100P1A-G2-7P: 1450 mm*245 mm*1727 mm BP48100PF1A-G2-8P, BP48100P1A-G2-8P: 1450 mm*245 mm*1727 mm
Weight	(1.98±0.1) kg	BP48100PF1A-G2, BP48100P1A-G2: Approx. (51±2) kg, BP48100PF1A-G2-2P, BP48100P1A-G2-2P: Approx. (102±4) kg, BP48100PF1A-G2-3P, BP48100P1A-G2-3P: Approx. (153±6) kg, BP48100PF1A-G2-4P, BP48100P1A-G2-4P: Approx. (204±8) kg, BP48100PF1A-G2-5P, BP48100P1A-G2-5P: Approx. (255±10) kg, BP48100PF1A-G2-6P, BP48100P1A-G2-6P: Approx. (306±12) kg, BP48100PF1A-G2-7P, BP48100P1A-G2-7P: Approx. (357±14) kg,

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		BP48100PF1A-G2-8P, BP48100P1A-G2-8P: Approx. (408±16) kg
Configuration	-	BP48100PF1A-G2, BP48100P1A-G2: 16S BP48100PF1A-G2-2P, BP48100P1A-G2-2P: (16S)2P BP48100PF1A-G2-3P, BP48100P1A-G2-3P: (16S)3P BP48100PF1A-G2-4P, BP48100P1A-G2-4P: (16S)4P BP48100PF1A-G2-5P, BP48100P1A-G2-5P: (16S)5P BP48100PF1A-G2-6P, BP48100P1A-G2-6P: (16S)6P BP48100PF1A-G2-7P, BP48100P1A-G2-7P: (16S)7P BP48100PF1A-G2-8P, BP48100P1A-G2-8P: (16S)8P

2.1 Rechargeable Li-ion Battery Systems, model no.: BP48100PF2A-G2, BP48100P2A-G2, BP48100PF2A-G2-2P, BP48100P2A-G2-2P, BP48100PF2A-G2-3P, BP48100P2A-G2-3P, BP48100PF2A-G2-4P, BP48100P2A-G2-4P, BP48100PF2A-G2-5P, BP48100P2A-G2-5P, BP48100PF2A-G2-6P, BP48100P2A-G2-6P, BP48100PF2A-G2-7P, BP48100P2A-G2-7P, BP48100PF2A-G2-8P, BP48100P2A-G2-8P are used in industrial applications.

2.2 BP48100PF2A-G2-2P, BP48100PF2A-G2-3P, BP48100PF2A-G2-4P, BP48100PF2A-G2-5P, BP48100PF2A-G2-6P, BP48100PF2A-G2-7P, BP48100PF2A-G2-8P respectively consist of 2-8pcs battery systems with model no.: BP48100PF2A-G2 connected in parallel. BP48100P2A-G2-2P, BP48100P2A-G2-3P, BP48100P2A-G2-4P, BP48100P2A-G2-5P, BP48100P2A-G2-6P, BP48100P2A-G2-7P, BP48100P2A-G2-8P respectively consist of 2-8pcs battery systems with model no.: BP48100P2A-G2 connected in parallel respectively.

2.3 Both model no.: BP48100PF2A-G2 and model no.: BP48100P2A-G2 consist of 16 pcs approved cells model no.: 001CB0Y0 connected in series, and they are identical except BP48100PF2A-G2 with the heating film inside.

2.4 The external communication model for Rechargeable Li-ion Battery Systems is wired CAN bus. Data is stored in local.

Additionally, details information of the battery and its component cell are shown in following table:

Item	Specification	
Product name	Rechargeable Li-ion Cell	Rechargeable Li-ion Battery System
Type/model	001CB0Y0	BP48100PF2A-G2, BP48100P2A-G2, BP48100PF2A-G2-2P, BP48100P2A-G2-2P, BP48100PF2A-G2-3P, BP48100P2A-G2-3P, BP48100PF2A-G2-4P, BP48100P2A-G2-4P, BP48100PF2A-G2-5P, BP48100P2A-G2-5P, BP48100PF2A-G2-6P, BP48100P2A-G2-6P, BP48100PF2A-G2-7P, BP48100P2A-G2-7P, BP48100PF2A-G2-8P, BP48100P2A-G2-8P
Nominal voltage	3.2 Vd.c.	51.2 Vd.c.
Rated capacity	100 Ah	BP48100PF2A-G2, BP48100P2A-G2: 100 Ah BP48100PF2A-G2-2P, BP48100P2A-G2-2P: 200 Ah BP48100PF2A-G2-3P, BP48100P2A-G2-3P: 300 Ah BP48100PF2A-G2-4P, BP48100P2A-G2-4P: 400 Ah



		BP48100PF2A-G2-5P, BP48100P2A-G2-5P: 500 Ah BP48100PF2A-G2-6P, BP48100P2A-G2-6P: 600 Ah BP48100PF2A-G2-7P, BP48100P2A-G2-7P: 700 Ah BP48100PF2A-G2-8P, BP48100P2A-G2-8P: 800 Ah
Charging voltage declared by manufacturer	3.65 V	57.6 V
Upper limit charging voltage	3.65 V	-
Charging current declared by manufacturer	50 A	BP48100PF2A-G2, BP48100P2A-G2: 80 A, BP48100PF2A-G2-2P, BP48100P2A-G2-2P: 160 A, BP48100PF2A-G2-3P, BP48100P2A-G2-3P, BP48100PF2A-G2-4P, BP48100P2A-G2-4P, BP48100PF2A-G2-5P, BP48100P2A-G2-5P, BP48100PF2A-G2-6P, BP48100P2A-G2-6P, BP48100PF2A-G2-7P, BP48100P2A-G2-7P, BP48100PF2A-G2-8P, BP48100P2A-G2-8P: 240 A
Maximum continuous charging current	100 A	BP48100PF2A-G2, BP48100P2A-G2: 80 A, BP48100PF2A-G2-2P, BP48100P2A-G2-2P: 160 A, BP48100PF2A-G2-3P, BP48100P2A-G2-3P, BP48100PF2A-G2-4P, BP48100P2A-G2-4P, BP48100PF2A-G2-5P, BP48100P2A-G2-5P, BP48100PF2A-G2-6P, BP48100P2A-G2-6P, BP48100PF2A-G2-7P, BP48100P2A-G2-7P, BP48100PF2A-G2-8P, BP48100P2A-G2-8P: 240 A
Discharging current declared by manufacturer	50 A	BP48100PF2A-G2, BP48100P2A-G2: 80 A, BP48100PF2A-G2-2P, BP48100P2A-G2-2P: 160 A, BP48100PF2A-G2-3P, BP48100P2A-G2-3P, BP48100PF2A-G2-4P, BP48100P2A-G2-4P, BP48100PF2A-G2-5P, BP48100P2A-G2-5P, BP48100PF2A-G2-6P, BP48100P2A-G2-6P, BP48100PF2A-G2-7P, BP48100P2A-G2-7P, BP48100PF2A-G2-8P, BP48100P2A-G2-8P: 240 A
Maximum continuous discharging current	100 A	BP48100PF2A-G2, BP48100P2A-G2: 80 A, BP48100PF2A-G2-2P, BP48100P2A-G2-2P: 160 A, BP48100PF2A-G2-3P, BP48100P2A-G2-3P, BP48100PF2A-G2-4P, BP48100P2A-G2-4P, BP48100PF2A-G2-5P, BP48100P2A-G2-5P, BP48100PF2A-G2-6P, BP48100P2A-G2-6P, BP48100PF2A-G2-7P, BP48100P2A-G2-7P, BP48100PF2A-G2-8P, BP48100P2A-G2-8P: 240 A



End-of-discharge voltage	2.5 V	44.8 V or any cell reaches 2.80 V
Standard temperature range for charging	0 °C to 65 °C	-
Standard temperature range for discharging	-30 °C to 65 °C	-
Standard charging method by manufacturer	Charge at constant current 50 A until voltage reaches 3.65 V, then charge at 3.65 V till charge current is $0.05I_n$ A (5 A).	BP48100PF2A-G2, BP48100P2A-G2: Charging at the constant current 80 A until voltage to 57.6 V or any cell reaches 3.6 V, then constant voltage 57.6 V until charging current reduces to 5 A. BP48100PF2A-G2-2P, BP48100P2A-G2-2P: Charging at the constant current 160 A until voltage to 57.6 V or any cell reaches 3.6 V, then constant voltage 57.6 V until charging current reduces to 10 A. BP48100PF2A-G2-3P, BP48100P2A-G2-3P, BP48100PF2A-G2-4P, BP48100P2A-G2-4P, BP48100PF2A-G2-5P, BP48100P2A-G2-5P, BP48100PF2A-G2-6P, BP48100P2A-G2-6P, BP48100PF2A-G2-7P, BP48100P2A-G2-7P, BP48100PF2A-G2-8P, BP48100P2A-G2-8P: Charging at the constant current 240 A until voltage to 57.6 V or any cell reaches 3.6 V, then constant voltage 57.6 V until charging current reduces to 15 A.
Dimension	T*W*H: (49.91±0.50) mm* (160.8±0.50) mm* (118.8±0.50) mm	W*D*H: BP48100PF2A-G2, BP48100P2A-G2: 725 mm*245 mm*465.5 mm BP48100PF2A-G2-2P, BP48100P2A-G2-2P: 725 mm*245 mm*835.5 mm BP48100PF2A-G2-3P, BP48100P2A-G2-3P: 725 mm*245 mm*1205.5 mm BP48100PF2A-G2-4P, BP48100P2A-G2-4P: 725 mm*245 mm*1575.5 mm BP48100PF2A-G2-5P, BP48100P2A-G2-5P: 1450 mm*245 mm*1727 mm BP48100PF2A-G2-6P, BP48100P2A-G2-6P: 1450 mm*245 mm*1727 mm BP48100PF2A-G2-7P, BP48100P2A-G2-7P: 1450 mm*245 mm*1727 mm BP48100PF2A-G2-8P, BP48100P2A-G2-8P: 1450 mm*245 mm*1727 mm
Weight	(1960±150) g	BP48100PF2A-G2, BP48100P2A-G2: Approx. (51±2) kg, BP48100PF2A-G2-2P, BP48100P2A-G2-2P: Approx. (102±4) kg, BP48100PF2A-G2-3P, BP48100P2A-G2-3P: Approx. (153±6) kg, BP48100PF2A-G2-4P, BP48100P2A-G2-4P: Approx. (204±8) kg,

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		BP48100PF2A-G2-5P, BP48100P2A-G2-5P: Approx. (255±10) kg, BP48100PF2A-G2-6P, BP48100P2A-G2-6P: Approx. (306±12) kg, BP48100PF2A-G2-7P, BP48100P2A-G2-7P: Approx. (357±14) kg, BP48100PF2A-G2-8P, BP48100P2A-G2-8P: Approx. (408±16) kg
Configuration	-	BP48100PF2A-G2, BP48100P2A-G2: 16S BP48100PF2A-G2-2P, BP48100P2A-G2-2P: (16S)2P BP48100PF2A-G2-3P, BP48100P2A-G2-3P: (16S)3P BP48100PF2A-G2-4P, BP48100P2A-G2-4P: (16S)4P BP48100PF2A-G2-5P, BP48100P2A-G2-5P: (16S)5P BP48100PF2A-G2-6P, BP48100P2A-G2-6P: (16S)6P BP48100PF2A-G2-7P, BP48100P2A-G2-7P: (16S)7P BP48100PF2A-G2-8P, BP48100P2A-G2-8P: (16S)8P

1.5 The information for BMS system

Battery model no.	BMS model no.	BMS manufacturer	HW version	SW version	MCU information
BP48100PF1A-G2, BP48100P1A-G2, BP48100PF2A-G2, BP48100P2A-G2, BP48100PF1A-G2-2P, BP48100P1A-G2-2P, BP48100PF2A-G2-2P, BP48100P2A-G2-2P, BP48100PF1A-G2-3P, BP48100P1A-G2-3P, BP48100PF2A-G2-3P, BP48100P2A-G2-3P, BP48100PF1A-G2-4P, BP48100P1A-G2-4P, BP48100PF2A-G2-4P, BP48100P2A-G2-4P, BP48100PF1A-G2-5P, BP48100P1A-G2-5P, BP48100PF2A-G2-5P, BP48100P2A-G2-5P,	BMS main board: Blue-pack5.1-U01	Shenzhen Kstar New Energy Company Limited	SST21-755-REV1.31	Software model: 3305-4760, Software version: V000B000D000	STM32F072 VBT6 (UM1, ST)
	Current-limited board: Blue-pack5.1-M01		SST21-511-REV1.21	-	-

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BP48100PF1A-G2-6P, BP48100P1A-G2-6P, BP48100PF2A-G2-6P, BP48100P2A-G2-6P, BP48100PF1A-G2-7P, BP48100P1A-G2-7P, BP48100PF2A-G2-7P, BP48100P2A-G2-7P, BP48100PF1A-G2-8P, BP48100P1A-G2-8P, BP48100PF2A-G2-8P, BP48100P2A-G2-8P	Signal transform board: 3U-Pack 5.1-X01 board		Rev. 002	-	-
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2. Order

2.1 Date of Purchase Order, Customer’s Reference

2025-09-30

2.2 Test Sample(s)

- Reception date(s): 2024-11-22, 2025-10-27, 2025-11-04, 2025-12-10
- Location(s) of reception: PS: Battery department, Guangzhou
- Condition of test sample(s): Engineering samples

2.3 Testing

- Testing date(s): 2024-12-10 to 2024-12-11, 2025-10-29 to 2025-12-25
- Location(s) of testing: TÜV SÜD New Energy Testing and Certification (Guangdong) Co., Ltd. North-1/F, 2/F & Unit 301-3/F, TUV SUD Testing Center, D1, No. 63 Chuangqi Road, Shilou Town, Panyu District, Guangzhou, Guangdong, China

3. Test Results

- “Decision rule according to ILAC-G8:09/2019 clause 4.2.1 Binary statement for simple acceptance rule or IEC Guide 115:2023, clause 4.3.3 Simple acceptance was applied.”

3.1 Test Object

According to the hazard analysis and risk assessment and IEC 62619:2022, the battery management system (BMS) should comply with the functional safety requirements of Annex H of IEC 60730-1:2022.

The safety functions in the BMS system including:

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Safety function	Class of control function	Parameters
Voltage protection	Class B	1. Over-voltage protection value: (3.60±0.003) V/cell, 2 s; 2. Under-voltage protection value: (2.50±0.003) V/cell, 5 s
Current protection	Class B	1. Charge overcurrent protection value: (97±2) A, 12 s; 2. Discharge overcurrent protection value: (97±2) A, 12 s
Temperature protection	Class B	1. Charge mode: Over temperature protection value: (57±2) °C, 2 s; Under temperature protection value: (0±2) °C, 2 s; 2. Discharge mode: Over temperature protection value: (57±2) °C, 2 s; Under temperature protection value: (-20±2) °C, 2 s

3.2 Scope

Scope of this report is the evaluation of the safety functions listed in Test object. All of them fulfil the class B control requirements of Annex H of IEC 60730-1:2022.

3.3 Results

3.3.1 Functional Safety Management and Lifecycle Audit

Shenzhen Kstar New Energy Company Limited describes the project, the planned activities and responsibilities for managing the functional safety by a safety plan. The safety plan covers the measures to avoid failures during hardware and software development.

Result:

The specified measures to avoid systematic failures were reviewed during the project. The measures to avoid systematic failures are suitable for a Class B control development according to Annex H of IEC 60730-1.

3.3.2 Architecture

BMS architecture is shown in Figure 1.

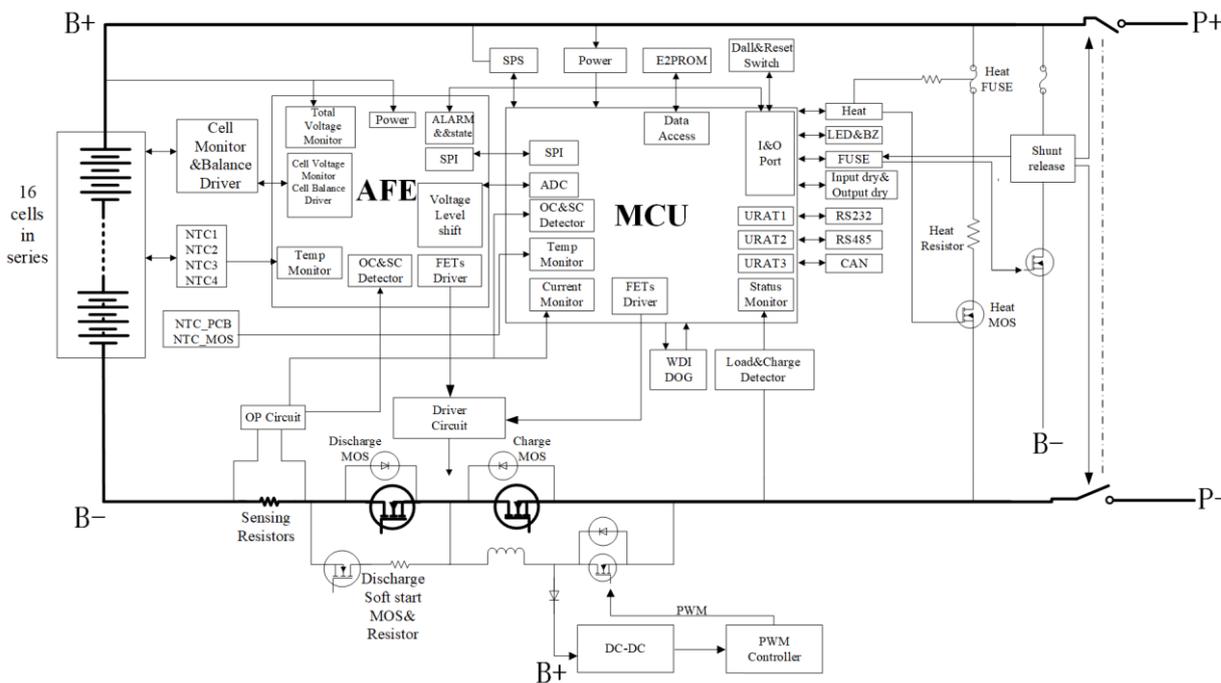


Figure 1 BMS architecture

1. Cell overvoltage and undervoltage protection:

The safety function is implemented by disconnection of MOSFET and circuit breaker with shunt release. The 16 cells' voltages are measured by AFE(U7) → MCU(UM1) and if MCU find it is overvoltage or undervoltage, it will disconnect the charge MOSFET or discharge MOSFET (depends on whether the battery is charging or discharging when the fault occurs). In case of the charge MOSFET or discharge MOSFET is in fault, MCU will disconnect the circuit breaker with shunt release. See Figure 2 block diagram.

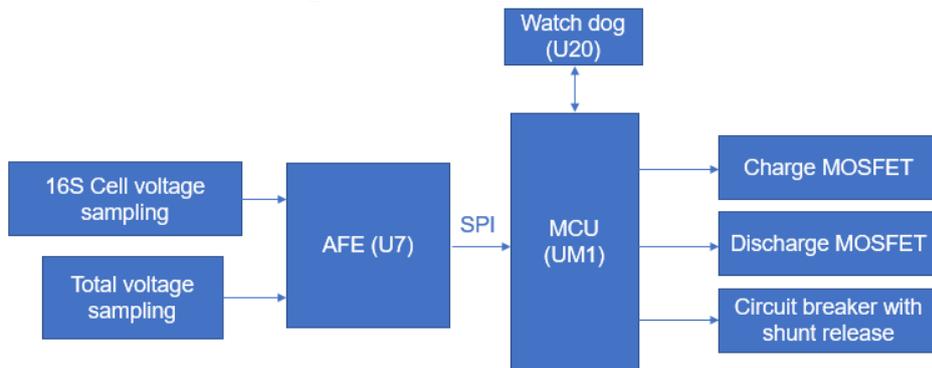


Figure 2 Cell overvoltage and undervoltage protection block diagram

The safety function is realized by a single channel with periodic self-test structure. The total voltage of battery was also sampled by AFE(U7) → MCU(UM1). The fault diagnostic of cells' voltages sampling is realised by comparing the sum of 16 cells' voltage and the total voltage of battery by MCU. If the deviation is more than 2 V, MCU will control to disconnect the charge MOSFET or discharge MOSFET (depends on whether the battery is charging or discharging when the fault occurs). AFE and MCU will communicate by SPI.

2. Cell overcurrent protection:

The safety function is implemented by disconnection of MOSFET and circuit breaker with shunt release. The battery system current is measured by current sampling resistor (RS3, RS4, RS5, RS6, RS7, RS8, RS14, RS15, RS16, RS17) → AFE(U7) → MCU(UM1).

If MCU find it is charging or discharging overcurrent, MCU will disconnect the charge MOSFET or discharge MOSFET (depends on whether the battery is charging or discharging when the fault occurs).

In case of the charge MOSFET or discharge MOSFET is in fault, MCU will disconnect the circuit breaker with shunt release. See Figure 3 block diagram.

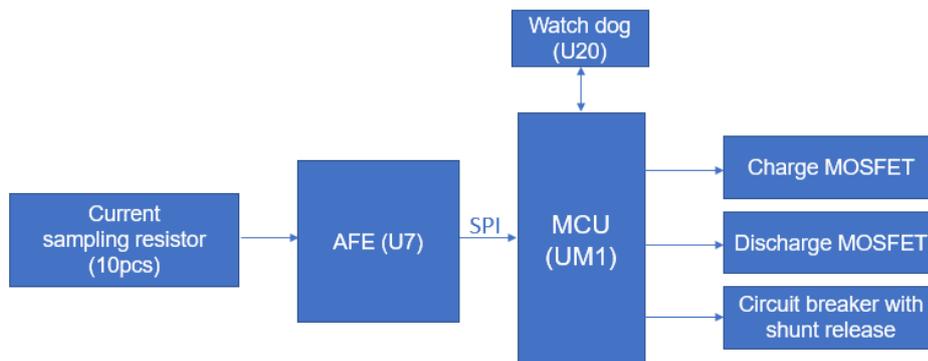


Figure 3 Cell overcurrent charge and discharge protection block diagram

The safety function is realized by a single channel with periodic self-test structure. The MCU will use the average cell voltage and the resistance value of the cell to calculate the current value. The fault diagnostic of current sampling is realised by comparing the actual sample value and the calculated value. If MCU finds that the deviation is more than 10 A, it will find the current sampling in fault and disconnect charge MOSFET or discharge MOSFET (depends on whether the battery is charging or discharging when the fault occurs).

AFE and MCU will communicate by SPI.

3. Cell over and under temperature protection:

The safety function is implemented by disconnection of MOSFET and circuit breaker with shunt release. The cells' temperatures are measured by total 4 NTCs → AFE(U7) → MCU(UM1) and if MCU find it is over temperature or under temperature, MCU will disconnect charge MOSFET or discharge MOSFET (depends on whether the battery is charging or discharging when the fault occurs).

In case of the charge MOSFET or discharge MOSFET is in fault, MCU will disconnect the circuit breaker with shunt release. See Figure 4 block diagram.

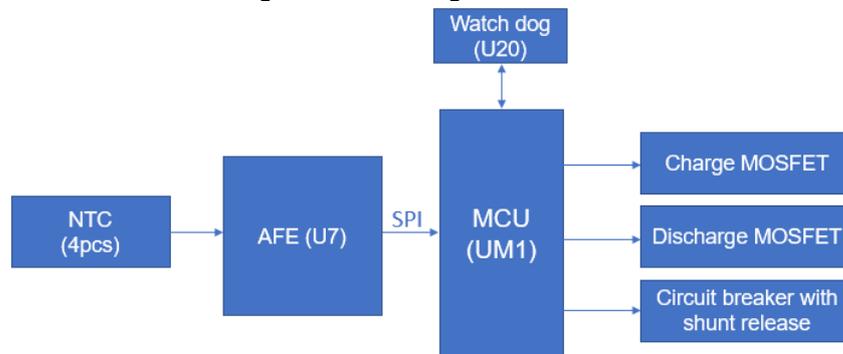


Figure 4 Cell over and under temperature protection block diagram

The safety function is realized by a single channel with periodic self-test structure. The fault diagnostic of temperature sampling is realised by comparing the temperatures from 4 NTCs by



MCU. If the temperature difference exceeds 10 °C, MCU will control to disconnect the charge MOSFET or discharge MOSFET (depends on whether the battery is charging or discharging when the fault occurs).

AFE and MCU will communicate by SPI.

Result:

The architecture described above is suitable for realization of the safety functions overvoltage, undervoltage, overcurrent, overtemperature and under-temperature for Class B control of IEC 60730-1 Annex H.

3.3.3 Software

The software implemented is responsible for the execution of the safety function and support of diagnostics.

Result:

The reliability of the safety function and the effective of diagnostics above were tested during fault injection test. The tests were performed without objections.

3.3.4 Fault Injection Test

Shenzhen Kstar New Energy Company Limited performed a fault injection test which simulated the typical faults according to fault modes defined by Annex H of IEC 60730-1. The test also covered the diagnostic software to check the effectiveness of the implemented measures.

Result:

The tests have passed without objections and are documented by test reports.

3.3.5 Safety and environmental testing

The battery safety was tested in accordance with IEC 62619:2022 and the regulations related to the standard. The battery was also tested for environmental testing.

Result:

The tests have passed without objections and are documented by test reports.

3.3.6 EMC testing

The strength of the design versus electromagnetic immunity was tested.

Result:

The tests are passed without objections and are documented by test reports.

3.3.7 Manual

The product manual includes the necessary information for system integrators.

4. Test history

Project no.	Revision	Date	Author	Modification / Description
64.280.25.60663.01	00	2025-12-26	Ava Deng	Initial

5. Documentation

No.	Title	Document number / ID	Rev.	Date
[D1]	Hazard analysis and risk assessment	S2K-QP-02B05A	V0	2024-03-01



No.	Title	Document number / ID	Rev.	Date
[D2]	Safety Requirement Specification	SZK-QP-08B03A	V0	2024-03-18
[D3]	Safety Plan	SZK-QP-08B04A	V0	2024-04-03
[D4]	Verification & Validation Plan	SZK-QP-08B16A	V0	2024-04-17
[D5]	System safety design	SZK-QP-08B20A	V0	2024-05-16
[D6]	System software design	SZK-QP-08B27A	A/0	2024-06-10
[D7]	Component FMEA	SZK-QP-02B24A	A/0	2024-06-21
[D8]	User manual	INSTALLATION, OPERATION & MAINTENANCE MANUAL	1.0	2025-11-01

6 Summary

The safety functions of BMS in battery model BP48100PF1A-G2, BP48100P1A-G2, BP48100PF2A-G2, BP48100P2A-G2, BP48100PF1A-G2-2P, BP48100P1A-G2-2P, BP48100PF2A-G2-2P, BP48100P2A-G2-2P, BP48100PF1A-G2-3P, BP48100P1A-G2-3P, BP48100PF2A-G2-3P, BP48100P2A-G2-3P, BP48100PF1A-G2-4P, BP48100P1A-G2-4P, BP48100PF2A-G2-4P, BP48100P2A-G2-4P, BP48100PF1A-G2-5P, BP48100P1A-G2-5P, BP48100PF2A-G2-5P, BP48100P2A-G2-5P, BP48100PF1A-G2-6P, BP48100P1A-G2-6P, BP48100PF2A-G2-6P, BP48100P2A-G2-6P, BP48100PF1A-G2-7P, BP48100P1A-G2-7P, BP48100PF2A-G2-7P, BP48100P2A-G2-7P, BP48100PF1A-G2-8P, BP48100P1A-G2-8P, BP48100PF2A-G2-8P and BP48100P2A-G2-8P are suitable for Class B control according to Annex H of IEC 60730-1:2022.

TÜV SÜD New Energy Testing and Certification (Guangdong) Co., Ltd.

Tested by: Ava Deng / Project Handler
printed name, function & signature

Approved by: Zoe Zhu / Designated Reviewer
printed name, function & signature



--- End of Report ---