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Version No.：V1.0

Lithium battery protection board

（EK-B60011-1）

Product Datasheet

Shenzhen Enerkey BMS Power Technology Co., LTD

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Product Name	Lithium battery protection board
Product Model	EK-B60011-1
Version	V1.0
Adapt Battery String	6S
Adapt Battery Type	Ternary lithium （NCM）
Function	Overcharge protection, over-discharge protection, over-current protection, over-temperature protection, short-circuit protection
Effective date	20th.Aug.2024

Product change history			
Version	Date	Change point description	Approve
V1.0	2024-08-20	Initial version	

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Contents

1. Overview

①. This series of lithium battery protection boards is a power management system (BMS) tailored for ternary lithium batteries.

②. This series of lithium battery protection boards uses automotive-grade MOS, 2oz thickened copper foil and copper strips for current sharing, making the protection board highly precise, with ultra-low internal resistance and ultra-low heat generation.

③. On the basis of basic protection board functions such as overcharge protection, over-discharge protection, over-current protection, over-temperature protection, short-circuit protection, etc., a balancing function, reset function, electrostatic protection, dust-proof protection and moisture protection are added.

④. It is mostly used in the battery packs of electric scooters, drone, electric bicycles, power tools, car washers, small household appliances, model aircraft and other products. Mainly plays the role of protecting the battery pack.

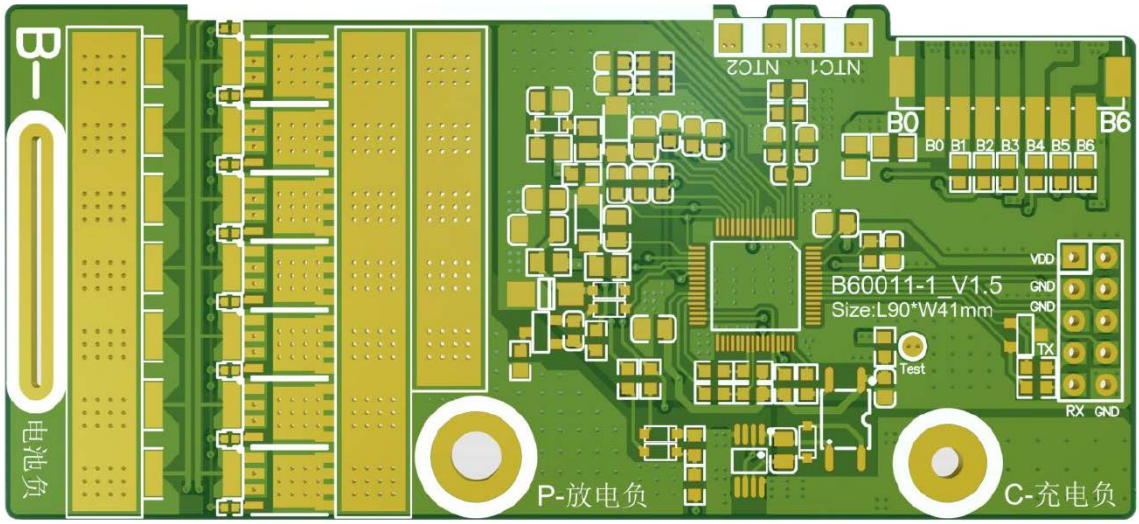
2. Technical Parameters

No.	Item		Min value	Typical value	Max value	Unit
1	Parameter overview	Rated working voltage B+B-			30	V
		Rated discharge current		150		A
		Peak starting current			150	A
2	Overcharge protection	P+P- input withstand voltage			40	V
		Charging overcurrent protection		20		A
		Charging overcurrent delay time		1		S
		Charge detection voltage	4.200	4.225	4.250	V
		Charge detection delay time	0.8	1	1.2	S
		Overcharge release voltage		4.15		V
3	Over discharge protection	Discharge detection voltage	2.750	2.800	2.850	V
		Discharge detection delay time		60		S
		Discharge release voltage	2.9	3.0	3.05	V
		Over discharge protection release conditions	Charging self-recovery/delay 1S self-recovery			
		Conditions for lifting protection	When the battery voltage is below 2.8V, it has entered the undervoltage state. If the continuous discharge current is detected to be greater than 1A, the protection board will not perform low voltage protection. If the battery discharge current is lower than 1A and lasts for 60S, the low voltage protection will be performed normally. At this time, it will delay 60S to enter the sleep state. The conditions for activating the protection board in the sleep state are: plug in the charger			
4	Overcurrent	Overcurrent detection voltage		0.1		V

	protection	Overcurrent protection current		200	300	A
		Overcurrent protection time		1	0.5	S
		Overcurrent protection release conditions	Charging self-recovery/delay 1S self-recovery			
5	**Short circuit protection**	Short circuit protection current		700		A
		Detection delay time		500		μS
		Short circuit protection release conditions	Disconnect external load or charge automatically			
		Short circuit description: If the short circuit current is less than the minimum value or higher than the maximum value, the short circuit protection may fail. If the short circuit current exceeds 2000A, short circuit protection is not guaranteed and short circuit protection testing is not recommended.				
6	**Internal resistance**	Main circuit on-state resistance		1.7	2	mΩ
7	**Current consumption**	Normal working current consumption		10	15	μA
8	**Quiescent Current**	Current consumption during sleep			2.5	μA
9	**Charging high temperature protection**	Temperature protection value		65		℃
		Temperature protection release value		60		℃
10	**Charging low temperature protection**	Temperature protection value		-20		℃
		Temperature protection release value		-15		℃
11	**Discharging high temperature protection**	Temperature protection value		85		℃
		Temperature protection release value		80		℃
12	**Discharging low temperature protection**	Temperature protection value		-40		℃
		Temperature protection release value		-35		℃
13		All temperature protection delays		2		S
14		All temperature protection recovery delay		2		S
15	**Equalization function**	When charging, the cell is greater than 4.2V or the voltage difference is greater than 20mV, and it is turned on and off after charging is completed.				
16	**Operating temperature**	-	-40	25	85	℃

3. Product Photo

1) Product Appearance

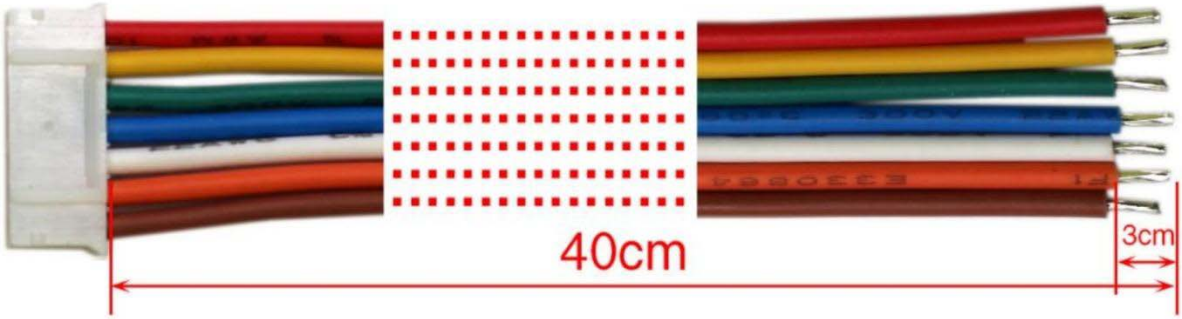


Special Note:

② . All shipped products are coated with conformal anti-paint.

②. The bottom view of the product shows the version without NTC.

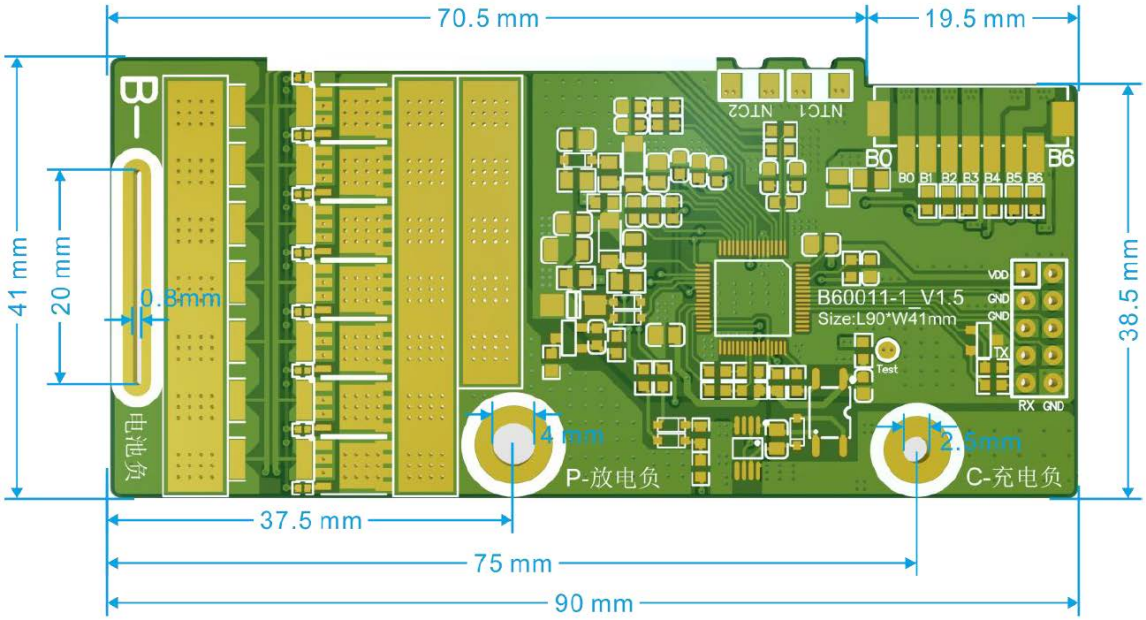
2) Accessories



Accessories specifications					
Terminal specifications	Material	Line number	Line length	Stripping length	Quantity
PH2.0mm_7Pin	Cu	22AWG	40cm	3cm	1

4. Product Drawing

(No tolerance noted：±0.15， Unit: mm)



PCB Specifications			
Material	FR-4	Layer	2 layer
PCB thickness	1.6±0.10	Copper(CU) thickness	2.0 oz
Pads plating	Lead-free spray tin	Plate thickness	
Solder	Black	Silkscreen	White

5. Product wiring diagram

1). 6S wiring diagram

EK-B60011-1 supports 6-string battery pack. The wiring method is shown in "Figure 5.1.1".

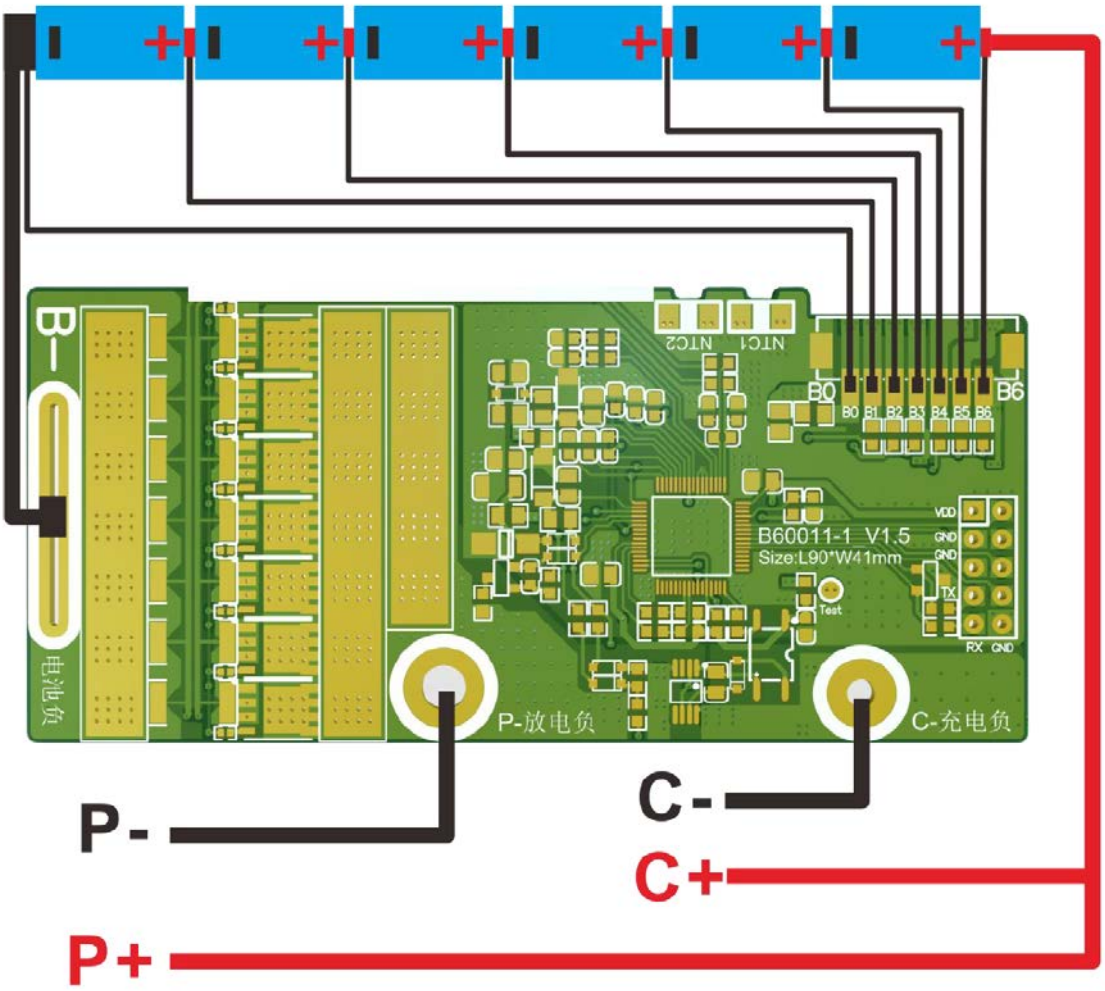


Figure 5.1.1

2). Precautions for wiring

①. Installing the protective board requires a certain amount of technical electronic knowledge.

②. When wiring, first connect the B- line at the soldering pad position to the total negative terminal of the battery (the B- line should be soldered to a short and thick wire).

And first solder the wired terminals to the battery pack, and then insert the protective plate.

③. The connection between the battery terminal B- and the protection board terminal B- should be short and thick, otherwise it will cause the protection board to charge and discharge in advance and malfunction.

You need to use thick wires when wiring P+/P-. Wires that are too thin and too long will burn the board!

④. After connecting the battery, please pay attention to the insulation protection of the product to avoid short circuit when the power is on;

6. Frequently Asked Questions

Phenomenon	Solution

After the protective board is installed, No output or wrong output voltage	① Activate the protection board: Connect the charger to power on or short-circuit P- and B- for 2-3 seconds, and then measure whether the output voltage is normal; ② The wiring order is wrong: measure whether the voltage of each battery string is normal.
After the protective board is installed, After using it for a while, the power was cut off.	Check whether the installation position of the NTC probe is normal,It should be installed close to the battery and not placed on the protective board.

7. Environmental substance requirements

Each battery corresponds to an LED indicator, and you can clearly observe whether each cell is balanced.

Harmful Substance	Limit standard (mg/kg)
Lead (Pb)	1000
Cadmium (Cd)	100
Mercury (Hg)	1000
Hexavalent chromium (Cr6+)	1000
Polybrominated biphenyls (PBB)	1000
Polybrominated diphenyl ethers (PBDE)	1000

8. Safety protection measures, transportation and storage

1) Safety protection measures

①. There is no high voltage in the balancing board itself, and it will not cause electric shock damage to the body.

②. Do not repair the balancing board while the power is on. All repairs should be performed by qualified service personnel.

If the working voltage set by the factory is changed, the safety certificate no longer applies.

③. When using, please pay attention to the insulation treatment of the product to avoid short circuit.

④. Pay attention to ESD protection when using this product.

⑤. This product complies with the company's thrust standards: 0402 components ≥1.0KgF; 0603 components ≥1.5KgF; IC and MOS tubes ≥2.0KgF.

2) Packaging and shipping

①. Separate and package PCBA with anti-static bubble bags.

②. The packed products can be transported by ordinary means of transportation when they are not directly affected by rain, snow or violent collisions and bumps.

It is not allowed to be placed together with corrosive substances such as acids and alkalis during transportation.

3) Storage

Packaged products should be stored in a permanent warehouse with a temperature of 0℃~35℃ and a relative humidity of no more than 80%.

The warehouse should be free of acid, alkali and corrosive gases, strong mechanical vibration and impact, and no strong magnetic field.