HT-678L Series
Battery Management System
User Manual

1. Product Introduction

This device is an intelligent balancing protection board designed specifically for 6S/7S/8S series lithium batteries, supporting ternary lithium/lithium iron phosphate batteries. Main advantages:
Protect the battery from overcharging, over-discharging, over-current, over-temperature, short circuit protection, balanced charging, achieve long-term maintenance of the battery through voltage balancing, and extend the service life of the battery pack.
Suitable for series connected lithium battery packs. Once the individual cell voltage reaches the equilibrium turn-on voltage, the high voltage battery will be balanced until the equilibrium release voltage is reached.

2. Product Model Selection

Number of strings	6S	7S	8S
Current	160A/200A/300A/350A		
Applicable battery	NCM		LFP

*The currently available models are listed in the table above. If you have any other requirements, please contact us and we support customization of 6-8S series

3. Parameters

3.1. Lithium iron phosphate:

Test conditions: room temperature 25 ℃
The over-current value and internal resistance of the protection board are dynamic parameters
The voltage of each battery cell needs to be ≥ 3.25 V during testing

Project	Symbol	Detailed Content	Standard
Serial number	S	Number of battery strings	8S
Curent	A	Current that the shield can withstand	160A/200A/300A/350A
Battery type		Ternary lithium / lithium iron phosphate	lithium iron phosphate
Overcharge protection	V_{DET1}	Overcharge detection voltage	3.65V±0.035V
	tV_{DET1}	Overcharge detection delay time	1.3s（MAX）
	V_{REL1}	Overcharge relieve voltage	3.55V±0.025V

Overdrive protection	V_{DET2}	Over discharge test voltage	2.350V±0.025V
	tV_{DET2}	Delay time for over discharge detection	1.5s（MAX）
	V_{REL2}	Over discharge relieve voltage	2.55V±0.025V relieve
Discharge Over-current Protection	V_{DET3}	Discharge over-current detection voltage	100mV±25mV
	I_{DP}	The theoretical value of the instantaneous single pulse current that can be tolerated (battery voltage = 3.6V) is MOSFET temperature between 20℃ and 45℃	500A/1000A
	I_{DP}	actually withstand instantaneous multi-pulse current	300A/600A
		Duration	1s
		Protection release condition	Break short circuit
short-circuit protection		Protection conditions	External load circuit short circuit
	T_{SHORT}	Detection delay time	300US（MAX）
		Protection release conditions	Break short circuit
internal resistance	R_{DS}	Main circuit on state resistance (battery voltage=4.2V)	B- to P- R_{DS}≤0.3mΩ
Consume current	I_{DD}	Internal consumption of the circuit during operation	MIN：0.3μA MAX：100μA
Battery balance	V_{BU}	Electricity balance detection voltage	3.405V±0.035V
	tV_{BU}	Balance startup delay time	1.6S（MAX）
	V_{BL}	Battery balance release voltage	3.4V±0.035V
	I_B	4.2V battery balance current	100mA±5mA
Over-temperature protection	Charging optional	Low temperature -0 ℃± 5 ℃	No
	Discharge optional	High temperature 70 ℃± 5 ℃	No
MAX continuous working current	Charge	The rated current of the charger when charging the battery pack	160A/200A/300A/350A
	Discharge	The rated current of the battery pack when discharging the load	160A/200A/300A/350A

Charger selection		Voltage=Number of strings × 4.2 ± 0.05V	160A/200A/300A/350A
Charging MOS MAX withstand voltage	V_{DS}	Charging MOS MAX withstand voltage	DC 85V

3.2. Ternary lithium:

Test conditions: room temperature 25℃

The over-current value and internal resistance of the protection board are dynamic parameters

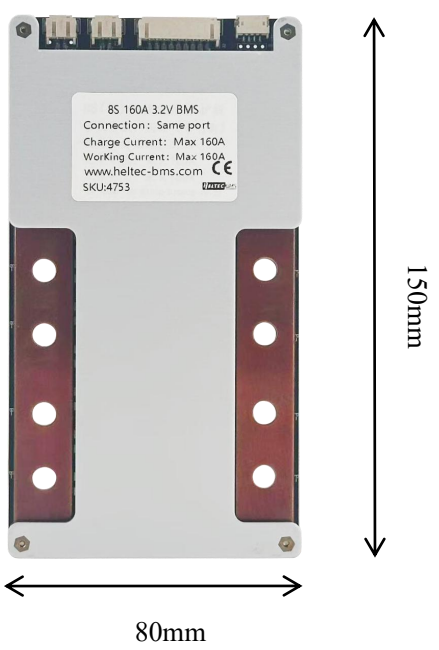
The voltage of each battery cell needs to be ≥ 3.6 V during testing:

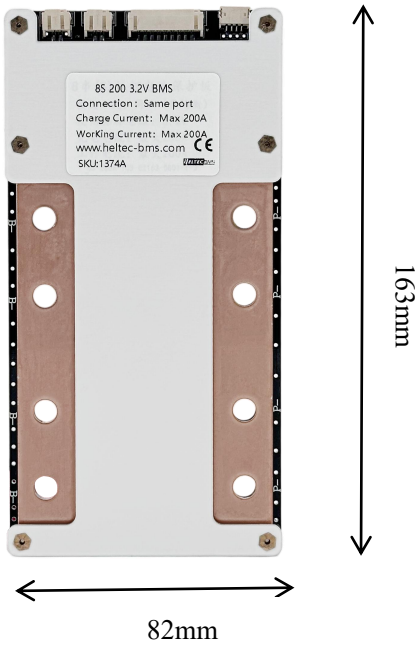
Project	Symbol	Detailed Content	Standard	
Serial number	S	Number of battery strings	6S/7S	
Current	A	Max continuous current	160A/200A/300A/350A	
Battery type		Ternary lithium / lithium iron phosphate	Ternary lithium	
Overcharge protection	V_{DET1}	Overcharge detection voltage	4.25V±0.035V	
	tV_{DET1}	Overcharge detection delay time	1.3s（MAX）	
	V_{REL1}	Overcharge relieve voltage	4.19V±0.025V	
Overdrive protection	V_{DET2}	Over discharge test voltage	2.8V±0.025V	
	tV_{DET2}	Delay time for over discharge detection	1.5s（MAX）	
	V_{REL2}	Over discharge relieve voltage	3.0V±0.025V relieve	
Over-current discharge	V_{DET3}	Discharge over-current detection voltage	100mV±5mV	
	I_{DP}	The theoretical value of the instantaneous single pulse current that can be tolerated (battery voltage = 3.6V) is MOSFET temperature between 20°C and 45°C	500A	1000A
	I_{DP}	actually withstand instantaneous multi-pulse current	300A	600A
		Duration	1s	

		Protection release condition	Break short circuit
short-circuit protection		Protection conditions	External load circuit short circuit
	T_{SHORT}	Detect latency	300US（MAX）
		Protection release conditions	Break short circuit
internal resistance	R_{DS}	Main circuit on state resistance (battery voltage=3.4V)	B-~P-: R_{DS}≤0.3mΩ
Consume current	I_{DD}	Internal consumption of the circuit during operation	MIN：0.3μA　MAX：100μA
Battery balance	V_{BU}	Electricity balance detection voltage	4.2V±0.035V
	tV_{BU}	Balance startup delay time	1.6S（MAX）
	V_{BL}	Battery balance release voltage	4.19V±0.035V
	I_B	3.59V battery balance current	100mA±5mA
Over-temperature protection	Charging optional	Low temperature -0 ℃± 5 ℃	No
	Discharge optional	High temperature 70 ℃± 5 ℃	No
The most continuous large working current	Charge	The rated current of the charger when charging the battery pack	160A/200A/300A/350A
	Discharge	The rated current of the battery pack when discharging the load	160A/200A/300A/350A
Charger selection		Voltage=Number of strings × 3.65V ± 0.05V	160A/200A/300A/350A
Charging MOS MAX withstand voltage	V_{DS}	MAX voltage value that the charger can withstand when the charging port is connected	DC 85V

4. Size

The length and width of the 6-8S series protection board are consistent, and the thickness is distinguished according to the current.

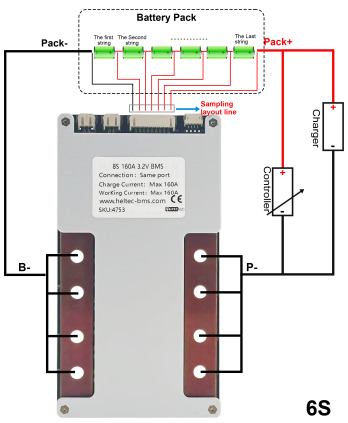


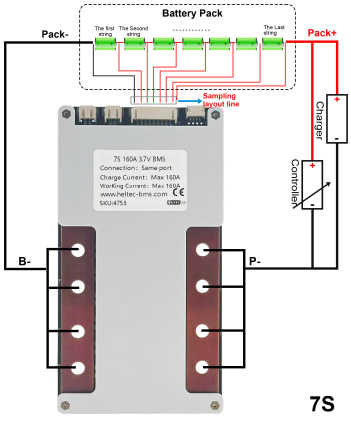


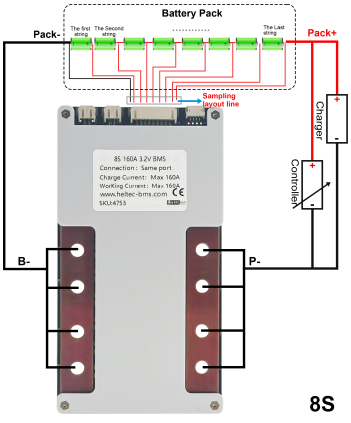
Current	160A	300A
Thickness (MM)	8	12

Current	200A	350A
Thickness (MM)	8	12

5. Wiring Diagram







6. Protection Function

Type	Overcharge single string detection voltage	Overcharge single string release voltage	Over-discharge single string detection voltage	Over-discharge single string release voltage	Single string balanced charging start
NCM	4.25V±0.035V	4.19V±0.025V	2.8V±0.025V	3.0V±0.025V	4.2V±0.035V
LFP	3.65V±0.035V	3.55V±0.025V	2.35V±0.025V	2.55V±0.025V	3.44V±0.035V

7. Fault Handling

Fault phenomenon	**Fault inspection and cause**	**Processing method**
Can't discharge	First,connect the circuit to activate the protection board for charging,and then measure the voltage of each battery separately.If the voltage of any battery is lower than 3.0V±0.025V(NCM)/2.35V±0.025V(LFP), the protection board will start over-discharge protection	If the battery is lower than 3.0v, please charge the battery to 3.7V(NCM)/3.25V(LFP)and balance it before combining. Do not mix good batteries with poor batteries(if you cannot solve this problem,please contact after-sales service)
Can't charge	Measure the voltage of each battery section.If any battery voltageis higher than 4.215V(NCM)/3.615(LFP)or so, the protection board willstart overcharge protection	If the battery is higher than 4.215v(NCM)/3.615V(LFP),please discharge the battery to about 3.7Vuntil it is balanced before combining.Do not mix good batteries with poor batteries (if you cannot solve this problem, please contact after-sales)

Charging/discharge failure	B-,B1,B2,B3,……B+ Wrong wiring	Redraw the wiring or operate under the guidance of customer service
Overcharge/discharge protection is invalid	B-,B1,B2,B3,……B+ Wrong wiring	Redraw the wiring or operate under the guidance of customer service
Discharge protection	Check whether the current value of the load starting power supply exceeds the over-current protection current of the protection board	Replace the protection board with a larger current(if not solved,please contact after-sales)
Componentis welded loosely	One of the components has a pin that is not connected to the PCB pad	You can repair the welding by yourself (if it still cannot be solved,please contact after-sales)
Component welding	There is a short circuit between two or more pins of the element	Remove the component and re-weld (if not,please contact after-sales)
Electrostatic breakdown	When the MOS tube is not powered.the forward and reverse resistance of any two pins of the G,D and S terminals are 0	You can remove and replace the mos tube by yourself (if it still cannot be solved,please contact after-sales)
Our company guarantees that each productis shipped after being tested by professional protection board testing instruments,because the combination battery of the protection board may be damaged by static electricity and current,and it is normal to have defective productsin use.		

Warranty Regulations

Warranty service period is 1 year.

The warranty service is limited to normal use: man-made damage, self-disassembly, modification and repair, use not in accordance with the instructions, and damage caused by external force majeure factors are not within the scope of free warranty.

Accessories such as test fixtures are consumables without warranty.

When you need warranty service, please contact your dealer for processing. If you cannot contact the dealer, you can contact our company by email or phone.

There are no after-sales service stations in other countries except China. If you need warranty service, please send the product to us for free repair, but you need to pay the freight for the round trip.