规格承认书/Specification

拓达通编码/TDT code：			
品牌/Brand：	TDTBMS®		
产品型号/Model：	动力板 TDT-6045-8S-100A 铁锂 Power BMS TDT-6045-8S-100A LFP		
销售厂商/Sales:			
制造厂商/Manufacturer:	深圳市拓达通电子有限公司/Shenzhen Tuodatong Electronics Co.,Ltd		
承认原因/Reason:	☐新供应商/New supplier	☐新物料/New material	☐工程变更/ECN ☐其他/Other
确认状况/Confirm the status			
尺寸/Size:	☐通过/Pass	☐拒收/Refuse	☐其他/Other
外观/Appearance:	☐通过/Pass	☐拒收/Refuse	☐其他/Other
性能/Function:	☐通过/Pass	☐拒收/Refuse	☐其他/Other
材质/Material:	☐通过/Pass	☐拒收/Refuse	☐其他/Other
ROHS:	☐通过/Pass	☐拒收/Refuse	☐其他/Other
可靠性/Reliability:	☐通过/Pass	☐拒收/Refuse	☐其他/Other
认证标准/Certificate standard:	☐UL	☐CE	☐其他/Other
检验结果/Test result:	☐合格/Pass	☐不合格/Fail	☐其他/Other
改善要求: Improvement requirement：			
备注/Note：			
地址： Address:	深圳市光明区白花社区兴华雄科技园A9栋4楼 4 / F, Building A9, Xinghuaxiong Science Park, Baihua Community, Guangming District, Shenzhen		

(客户Customer) 承认Confirm			(供应商Supplier) 承认Confirm		
品质/QC	工程师/Engineer	经理/Manager	品质/QC	开发工程师/R&D engineer	业务/Sales
				杨钰钧 **YU JUN YANG**	
核准日期： Approved date：			核准日期： Approved date：	2024 . 07 . 30	

注意（**Notice**）：

1.收到样机确认好后请及时回签，7 天内没有回签及问题反馈，我司默认客户测试合格；规格书中的图片为通用机型图片，可能与送样样机有差异，此规格书拓达通保留最终解释权. **After receiving the sample and confirming it, please sign back in time. If there is no sign back and problem feedback within 7 days, our company defaults that the sample test is qualified. The picture in the specification is a general model picture, which may be different from the sample. TDT BMS reserves the right of final interpretation of this specification.**

2.客户批量前，请在规格书中签字回传，并说明详细功能，我司才安排批量.**Before mass production, please sign the specification and return it, and explain the detailed function, and our company will arrange the mass production.**

配件清单 Parts list

	序号 No	客户料号 Customer Part NO	名称 Name	型号 Model	数量 Quantity	选配 optional
标配清单 List of standard parts	1		保护板 BMS	TDT-6045	1 块 PCS	
	2		采集线 Cables	☐HY2.0-4P 3S ☐HY2.0-5P 4S ☐HY2.0-6P 5S ☐HY2.0-7P 6S ☐HY2.0-8P 7S ☑HY2.0-9P 8S ☐HY2.0-10P 9S ☐HY2.0-11P 10S	1 条 PCS	
	3		NTC	10K 3435 +1% 28 号线 400MM GH1.25 8P 端子 带套管 4 路 NTC 10K 3435 +1% Line 28 400MM GH1.25 8P terminal with cover 4 NTCs	1 条 PCS	
	4		485 通讯线束 485 communication cable	HY2.0-2P_2P_500mm_UL1007_22#带扣 黑红色 With buckle black red cable	1 条 PCS	
	5		弱电开关线束 On/off switch cable	线材 反向 GH1.25 4P 线长 500mm UL1007 28# 弱电开关线 1 红 1 黑两黄 Wire reverse GH1.25 4P wire length 500mm UL1007 28# On/off switch wire 1 red 1black 2yellow	1 条 PCS	
	6		螺丝 Screw	M5*10 十字外内脚三组合螺丝，碳钢镀镍 Cross outer and inner foot three-combination screw, nickel plated carbon steel	4 颗 PCS	
选配清单 List of optional parts	7		蓝牙＋蓝牙线束 Bluetooth ＋ Bluetooth cable	TDT-B40B-BT＋HY2.0-5P（模块自带 with cable）		☐
	8		库伦屏+线束 Coulomb meter screen+cable	XDZN-6031-LCD-V2.0＋HY2.0-4P+PH2.0-4P_500mm_UL1007_24#		☐
	9		主动均衡板＋线束 Active balancer+cable	TDT-9132A-C4S＋GH1.25 2P 线长(cable length) 500mm		☐
	10					☐
	11					☐

修改记录 Correction record

Revision 修改	Description 描述	Date 日期	Approver 批准
A	New released	2023-10-31	

目录 Table of contents

1. 产品简介(Product introduction)

TDT-6045是一款带蓝牙以及智能通讯的新时代/新标准/通过各项检测的针对100A电流设计智能BMS，具有过充、过放、过流、短路、温度保护（1路环境温度，1路MOS温度，4路电芯温度）、预放电功能、历史存储记录，同时具有超凡的散热结构，可外接主动均衡器，BMS+主动均衡器才是真正的“电池管理系统”，以其优异的性能大幅度提升锂电池组的稳定性和安全性，实现锂电池的智能管理。

TDT-6045 is a new era/new standard intelligent BMS with Bluetooth and intelligent communication/through various tests for 10A-100A current, with overcharge, over-discharge, over-current, short circuit, temperature protection (1 NTC for environment, 1 NTC for MOS, 4 NTCs for battery cell), pre-discharge function, historical storage and record. At the same time, it has an extraordinary heat dissipation structure. It can be connected to active balancer externally. BMS and active balancer together can be better "battery management system", which greatly improve the stability and safety of the lithium battery pack with its excellent performance, and realize the intelligent management of the lithium battery.

2. 功能(Function)

2.1. 功能配置(Function Configuration)

历史存储记录 (History storage record)	☑ 无(without) ☐ 存储 400 条(store 400 data)	均衡功能 (Balance Function)	☑ 被动均衡(passive balance) 50 mA ☐ 主动均衡(active balance)_____mA
温控数量 (Number of NTC)	4 路电芯(4NTCs for battery pack) 1 路环境(1 NTC for environment) 1 路 MOS(1 NTC for MOS)	升级方式 (Upgrade way)	☑ UART ☑ RS485
充放电端口 (Charge and discharge port)	☑ 同口 Common port ☐ 分口 Separate port	预放电功能 (Pre-discharge function)	☐ 无 N ☑ 有 Y
条码/标签/纸箱 (Barcode/Label/Carton)	☑拓达通 TDT ☐中性 ☐定制 ____	支持语言 (Language support)	☑ 简体中文 Simplified Chinese ☑ 英文 English ☐ 定制 Customization
通信接口 (Communication interface)	☐ RS232 ☑ UART ☑ RS485 ☑ 蓝牙(Bluetooth)		
通信协议 (Communication protocol)	☐ RS232 通信协议 (TDT-RS232-0.1) ☑ RS485 通信协议 (TDT-RS485-0.1)		
Note：			

2.2. 功能选配（Function Options）

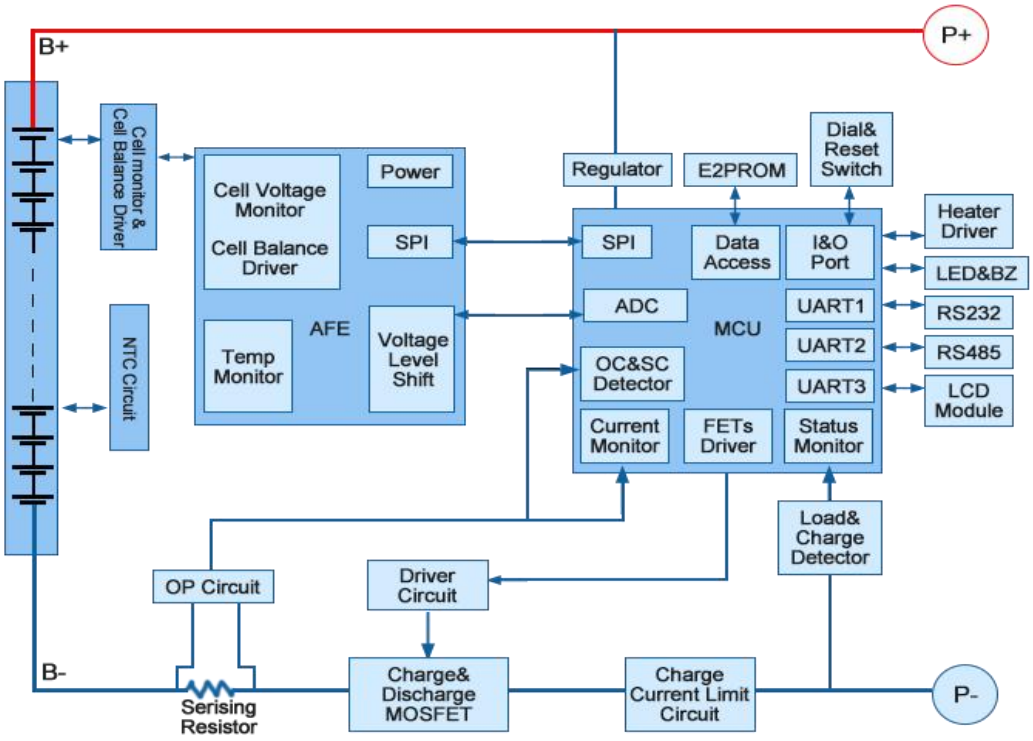
LCD 显示屏 (LCD screen)	☐ 无 N ☐ 库仑计显示屏 Coulombmeter screen ☑ 选配 Optional	主动均衡板 (Active balance)	☐ 无 N ☑ 选配 Optional
弱电开关 (On/off switch)	☐ 无 N ☑ 有 Y ☐ 选配 Optional		

2.3. 功能特性(Functional Features)

高集成模拟前端 (High integration simulation front end)	可调过流保护 (Adjustable over-current Protection)
隔离电源电路 (Isolation power supply circuit)	多种休眠及唤醒方式 (Multiple ways of sleep and arousal)
集成串口 IC (Integrated serial IC)	低功耗 (Low power consumption)
高电压精度 (High voltage accuracy)	参数可调设置 (Adjustable parameters settings)

高电流精度 (High current accuracy)	具有充电均衡功能 (Charging balance function)
4 路电池温度检测 (4 NTCs to detect temperature)	RS485 通信 (RS485 communication)
SOC 估算功能 (SOC estimation function)	UART 通信 (UART communication)
SOH 估算功能 (SOH estimation function)	蓝牙通信 (Bluetooth communication)
短路保护功能 (Short-circuit protection)	

2.4. 功能示意框图(Schematic Diagram of Function)



3. 参数设置(Parameters Setting)

3.1. 基本参数(Basic parameters)

电芯规格 (Cell specification)	磷酸铁锂LFP
接口类型 (Interface type)	充放电同口(Charging and discharging common port)
充电电压 (Charging voltage)	3.65V*串数(3.65V*strings)
单体电压范围 (Battery cell voltage range)	2.20~3.65V
持续充电电流 (Continuous charging current)	100A
持续放电电流 (Continuous discharging current)	100A
运行功耗 (Consumption of running)	≤20mA (带显示屏with screen) /≤10mA (不带显示屏without screen)
休眠功耗 (Consumption of sleep)	≤200uA (带蓝牙with bluetooth)/≤150uA (不带蓝牙without bluetooth)
休眠条件 (Sleep conditions)	休眠电压Sleep voltage2800±50mV 时间Time: 5min 可以设置adjustable
回路内阻 (Circuit inner resistance)	≤10mR
工作温度 (Operating temperature)	-20℃~75℃
电芯失效(Cell malfunction)	压差Voltage difference>1V(不允许充放电Can not charge and discharge)

3.2. 主要参数(Main parameter)

	项目(Project)	规格(Specification)			单位 (Unit)	是否可设 (Set or not)
		最小值 (MIN)	典型值 (TYP)	最大值 (MAX)		
过充保护 (Overcharge protection)	过充保护警告电压(Overcharge protection alarm voltage)	3.560	3.600	3.640	V	可设Y
	过充保护电压(Overcharge protection voltage)	3.610	3.650	3.690	V	可设Y
	过充保护延时(Overcharge protection delay)	0.5	1	2	S	可设Y
	过充保护释放(Overcharge protection release)	3.310	3.350	3.390	V	可设Y
	总体过充告警电压(Overall overcharge alarm voltage)	3.560*S	3.600*S	3.640*S	V	可设Y
	总体过充保护电压(Overall overcharge alarm voltage)	3.610*S	3.650*S	3.690*S	V	可设Y
	总体过充保护延时(Overall overcharge protection delay)	0.5	1	2	S	可设Y
	总体过充保护解除电压(Overall overcharge protection release voltage)	3.310*S	3.350*S	3.390*S	V	可设Y
	放电解除(Discharge release)	放电电流 Discharge current > 2A				
过放保护 (Over-discharge protection)	过放保护警告电压(Over-discharge alarm voltage)	2.760	2.800	2.840	V	可设Y
	过放保护电压(Over-discharge protection voltage)	2.460	2.500	2.540	V	可设Y
	过放保护延时(Over-discharge protection delay)	0.5	1	2	S	可设Y
	过放保护释放(Over-discharge protection release)	2.910	2.950	2.990	V	可设Y
	总体过放告警电压(Overall over-discharge alarm voltage)	2.760*S	2.800*S	2.840*S	V	可设Y
	总体过放保护电压(Overall over-discharge protection voltage)	2.460*S	2.500*S	2.540*S	V	可设Y
	总体过放保护延时(Overall over-discharge protection delay)	0.5	1	2	S	可设Y
	总体过放保护解除电压(Overall over-discharge protection released voltage)	2.910*S	2.950*S	2.990*S	V	可设Y
	有充电时解除(Release when charging)	接入充电器可激活Can be activated by plugging in a charger				
过流保护 (Over-current protection)	充电过流释放条件 (Over-current Charge release conditions)	放电电流Discharge current > 5A				
	过放保护释放条件 (Over-discharge protection release conditions)	接入充电器可激活Can be activated by plugging in a charger				
	充电过流保护值 (Charge over-current protection value)	见下面过流保护值配置表（Refer to configuration table of over-current protection value below）				可设Y
	充电过流延时 (Charge over-current delay)	0.4	1.2	2.0	S	可设Y
	一级放电过流保护值 (1th discharge over-current value)	见下面过流保护值配置表（Refer to configuration table of over-current protection value below）				可设Y
	一级放电过流保护延迟 (1th discharge over-current delay)	9.0	10.0	12.0	S	可设Y
	二级放电过流保护电流值 (2th discharge over-current value)	见下面过流保护值配置表（Refer to configuration table of over-current protection value below）				可设Y
	二级放电过流 2 保护延迟 (2th discharge over-current 2	0.7	1.0	2.0	S	可设Y

	protection delay)					
	放电过流保护恢复条件 (Discharge over-current protection recovery conditions)	延时 32S 后自动恢复 (Automatic recover after a delay of 32S)				
短路保护 (Short circuit protection)	短路保护电流 (Short circuit protection current value)	见下面过流保护值配置表（Refer to configuration table of over-current protectionvalue below ）				
	短路保护延迟时间 (Short circuit protection delay time)			500	uS	
	短路保护恢复 (Short circuit protection recovery)	有充电时，短路保护解除Short circuit protection release while charging 负载移除后，将自动解除After the load is removed, it automatically release.				
短路说明：短路电流小于最小值或高于最大值可能会造成短路保护失效，短路电流超过**950A**，不保证有短路保护，也不建议做短路保护测试。 (Short-circuit description: The short-circuit current is less than the minimum value or higher than the maximum value, which may cause the short-circuit protection to fail. And if the short-circuit current exceeds **950A**, short-circuit protection is not guaranteed, and short-circuit protection testing is not recommended.)						
温度保护 (Temperature protection)	充电高温保护警告值(Charge high temperature protection alarm value)	45	50	55	℃	可设Y
	充电高温保护值(Charge high temperature protection value)	50	55	60	℃	可设Y
	充电高温保护释放值(Charge high temperature protection release value)	45	50	55	℃	可设Y
	充电低温保护警告值(Charge low temperature protection value)	-5	0	5	℃	可设Y
	充电低温保护值(Charge low temperature protection value)	-10	-5	0	℃	可设Y
	充电低温保护释放值(Charge low temperature protection release value)	-5	0	5	℃	可设Y
	放电高温保护警告值(Discharge high temperature protection value)	50	55	60	℃	可设Y
	放电高温保护值(Discharge high temperature protection value)	55	60	65	℃	可设Y
	放电高温保护释放值(Discharge high temperature protection release value)	50	55	60	℃	可设Y
	放电低温保护警告值(Discharge low temperature protection alarm value)	-20	-15	-10	℃	可设Y
	放电低温保护值(Discharge low temperature protection value)	-25	-20	-15	℃	可设Y
	放电低温保护释放值(Discharge low temperature protection release value)	-20	-15	-10	℃	可设Y
	环境低温保护警告值(Environment low temperature protection alarm value)	-20	-15	-10	℃	可设Y
	环境低温保护值(Environment low temperature protection value)	-25	-20	-15	℃	可设Y
	环境低温保护释放值(Environment low temperature protection release value)	-20	-15	-10	℃	可设Y
	环境高温保护警告值(Environment high temperature protection alarm value)	60	65	70	℃	可设Y
	环境高温保护值(Environment high temperature protection value)	65	70	75	℃	可设Y

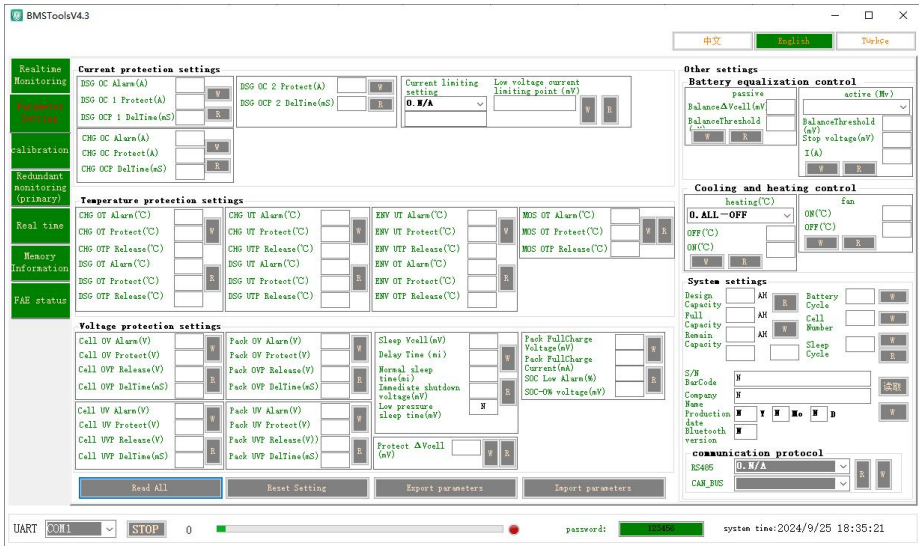
	环境高温保护释放值(Environment high temperature protection release value)		60	65	70	℃	可设Y
	MOS高温警告值(MOS high temperature alarm value)		85	90	95	℃	可设Y
	MOS高温保护值(MOS high temperature protection value)		90	95	100	℃	可设Y
	MOS 高温保护释放值(MOS high temperature protection release value)		80	85	90	℃	可设Y
均衡功能 (Balance Function)	被动均衡（Passive balance）	均衡开启电压(Balance turn-on voltage)	3.350	3.400	3.450	V	可设Y
		开启压差(Turn-on voltage difference)		30		mV	可设Y
		均衡电流（Balance current）		50		mA	不可设N
	外接主动均衡（Connect active balancer externally）	均衡开启电压(Balance turn-on voltage)	3.350	3.400	3.450	V	可设Y
		开启压差(Turn-on voltage difference)		30		mV	可设Y
		均衡电流（Balance current）		5		A	不可设N

注：测试需在温度25±2℃，相对湿度65±20% 的环境　Note: Test should be at temperature 25±2°C, and relative humidity 65±20% of environment.

过流保护值配置表(Configuration table of over-current protection value)

电流选型 (Current selection)	持续电流 (Continuous current)		充电过流保护值 (Charge Over-current value)	一级放电过流保护值 (1st discharge over-current value)	二级放电过流保护值 (2nd discharge over-current value)	短路保护值 (Short circuit protection value)	是否可设 (Set or not)	
	充电电流 Charge	放电电流 Discharge						
☐	10A	10A	20±5A	20±5A	60±10A	≥ 100A		常规 Common
☐	20A	20A	30±5A	30±5A	70±10A	≥ 200A		
☐	30A	30A	40±5A	40±5A	80±10A	≥ 300A		
☐	40A	20A	50±5A	50±5A	90±10A	≥ 400A		
☐	50A	50A	60±5A	60±5A	100±10A	≥ 500A		
☐	60A	20A	70±5A	70±5A	110±10A	≥ 600A		
☐	70A	70A	80±5A	80±5A	120±10A	≥ 700A		
☐	80A	80A	90±5A	90±5A	130±10A	≥ 800A		
☑	100A	100A	110±10A	110±10A	150±10A	≥ 1000A		
☐								**客定 Customization**

3.3. 参数设置(parameter settings)



* 注意事项Note：

1. 上位机与BMS通讯时，需要保证接线规则正确

When the upper computer communicates with the BMS, you need to ensure that the wiring connections are correct

4. 功能说明（Function Description)

4.1. 过充保护和恢复(Overcharge protection and recovery)

4.1.1. 单体过充保护及恢复(Cell overcharge protection and recovery)

当任意一节电芯电压高于单体过充电压设定值，并且持续时间达到单体过充延时，系统进入过充保护状态，关闭充电 MOS，不能对电池充电。

单体过充保护后，当所有单体电压降到单体过充恢复值以下时，解除过充保护状态。也可放电解除。

When the voltage of any cell is higher than the set value of the cell overcharge voltage, and the time of duration reaches the cell overcharge delay, the system enters the overcharge protection state, the charging MOS will turn off, and the battery cannot be charged.

After the cell overcharge protection, when the voltage of all cells drops below the cell overcharge recovery value, the overcharge protection state is released. It can also be released by discharge.

4.1.2. 总体过充保护及恢复(Overall overcharge protection and recovery)

当总体电压高于总体过压设定值，并且持续时间达到总体过充延时，系统进入过充保护状态，关闭充电 MOS，不能对电池充电。

当总体电压降到总电压过压保护恢复值以下时，解除过充保护状态，也可放电解除。

When the overall voltage is higher than the overall over-voltage set value, and the time of duration reaches the overall overcharge delay, the system enters the overcharge protection state, turns off the charging MOS, and cannot charge the battery.

When the overall voltage drops below the recovery value of the overall voltage over-voltage protection, the overcharge protection state is released, and it can also be released by discharge.

4.2. 过放保护和恢复(Over-discharge protection and recovery)

4.2.1. 单体过放保护及恢复(Cell over-discharge protection and recovery)

当最低节电压低于单体过放电压设定值，并且持续时间达到单体过放延时，系统进入过放保护状态，关闭放电MOS，不能对电池放电。

发生单体过放保护后，对电池组充电可以解除过放保护状态。

When the minimum cell voltage is lower than the set value of the over-discharge voltage of the cell, and the time of duration reaches the over-discharge delay of the cell, the system enters the over-discharge protection state, turns off the discharge MOS, and cannot discharge the battery.

After the cell over-discharge protection occurs, charging the battery pack can release the over-discharge protection state.

4.2.2. 总体过放保护及恢复(Overall over-discharge protection and recovery)

当总体电压低于总体过放电压设定值，并且持续时间达到总体过放延时，系统进入过放保护状态，关闭放电MOS，不能对电池放电。

发生总体过放保护后，对电池组充电可以解除过放保护状态。

When the overall voltage is lower than the overall over-discharge voltage set value, and the time of duration reaches the overall over-discharge delay, the system enters the over-discharge protection state, turns off the discharge MOS, and cannot discharge the battery.

After the overall over-discharge protection occurs, charging the battery pack can release the over-discharge protection state

4.3. 充电过流保护和恢复(Over-current protection and recovery in charging)

当充电电流超过充电过流保护电流且持续的时间达到过流检测延迟时间，系统进入到充电过流保护状态，不能对电池进行充电。发生充电过流保护后延时自动恢复，如需不要自动恢复可将对应的释放时间设长; 放电也可以解除充电过流状态。

When the charging current exceeds the charging protection current and the time of duration reaches the over-current detection delay time, the system enters the charging over-current protection state and cannot charge the battery. After the charging over-current protection occurs, it will automatically recover after a delay. If you want to automatically recover or not, you can set the corresponding release time to be longer; the charging over-current state can also be released by discharging.

4.4. 放电过流保护和恢复(Over-current protection and recovery in discharging)

当放电电流超过放电过流保护电流且持续的时间达到过流检测延迟时间，系统进入到放电过流保护状态，关闭放电MOS。发生放电过流后延时自动恢复，如需不要自动恢复可将对应的释放时间设长。充电也可以解除放电过流状态。放电有两级过流保护功能，对不同的电流值具有不同的响应速度，更加可靠地保护电池。

When the discharge current exceeds the discharge over-current protection current and the time of duration reaches the over-current detection delay time, the system enters the discharge over-current protection state and turns off the discharge MOS. Delayed automatic recovery after discharge over-current occurs, and the corresponding release time can be set longer if automatic recovery is required. Charging can also release the discharge over-current protect condition. Discharge has two-level over-current protection function, which has different response speeds for different current values, and protects the battery more reliably.

4.5. 温度保护和恢复(Temperature Protection and Recovery)

4.5.1. 充放电高温保护及恢复(High temperature protection and recovery in charging and discharging)

当充放电时NTC检测电芯表面的温度高于设定的高温保护温度时，管理系统进入高温保护状态，充电或放电MOS关闭，在该状态不能对电池包充电或放电。

当电芯表面的温度下降到高温恢复设定值时，管理系统从高温状态恢复，重新导通充放电MOS。

When the NTC detects that the temperature of the battery cell surface is higher than the setting of high temperature protection value during charging and discharging, the management system enters the high temperature protection state, the charging or discharging MOS is turned off, and the battery pack cannot be charged or discharged in this state.

When the temperature of the surface of the cell drops to the high temperature recovery set value, the management system recovers from the high temperature state and turns on the charge and discharge MOS again.

4.5.2. 充放电低温保护和恢复(Low temperature protection and recovery in charging and discharging)

当充放电时NTC 检测电芯表面的温度低于设定的低温保护温度时，管理系统进入低温保护状态，充电或放电MOS关闭，在该状态不能对电池包充电或放电。

当电芯表面的温度上升到低温恢复设定值时，管理系统从低温状态恢复，重新导通充放电MOS。

When the NTC detects that the temperature of the cell surface is lower than the setting of low temperature protection value during charging and discharging, the management system enters the low temperature protection state,the charging or discharging MOS is turned off, and the battery pack cannot be charged or discharged in this state.

When the temperature of the cell surface rises to the low temperature recovery set value, the management system recovers from the low temperature state and turns on the charge and discharge MOS again.

4.6. 均衡功能(Balance function)

管理系统采用电阻旁路的方式进行电芯均衡,充电过程中电池组最高节单体电芯电压达到设定的均衡启动电压值 ,且电池组单体电芯最低电压与最高电压压差大于设定值时，达到条件的电芯均衡功能开启，相邻的两路均衡不能同时开启。

当电芯压差小于设定值或者电芯电压小于均衡开启电压时均衡停止。

The management system uses the resistance bypass method to balance the cells. During the charging process, the voltage of the highest single cell of the battery pack reaches the set balance starting voltage value, and the voltage difference between the minimum voltage and the maximum voltage of the single cell of the battery pack is greater than the set value. When the value is set, the balance function of the cells that meet the conditions is enabled, and the two adjacent balancers cannot be enabled at the same time.

The balance stops when the cell voltage difference is less than the set value or the cell voltage is less than the balance turn-on voltage.

4.7. 容量计算(Capacity calculation)

可以通过对电流、时间积分的方式精准地进行电池组的SOC计算。电池组满容量、及循环容量可以通过上位机进行设置，在进行完整充放电循环后容量可自动更新。具有充放电循环次数计算功能，当电池组累积放电容量达到设定循环容量时，循环次数增加一次。

The SOC calculation of the battery pack can be accurately performed by integrating current and time. The full capacity and cycle capacity of the battery pack can be set through the PC software, and the capacity can be automatically updated after a complete charge and discharge cycle. It has the function of calculating the number of charge and discharge cycles. When the cumulative discharge capacity of the battery pack reaches the set cycle capacity, the number of cycles increases once.

注：新装电池请根据电池容量设定标称容量和循环容量，并进行一次容量学习，否则可能出现容量不准问题。容量学习操作：先充满电至过压保护，然后放空电至欠压保护，再充一次电即可。

Note: For newly installed batteries, please set the nominal capacity and cycle capacity according to the battery capacity, and conduct a capacity study, otherwise the capacity inaccuracy may occur. Capacity learning operation: first fully charge to over-voltage protection, then discharge to under-voltage protection, and then charge it again.

4.8. 休眠及唤醒功能（ Sleep and Arousal)

休眠：当满足以下任意一条件时，系统进入低功耗模式：

Sleep: When any of the following conditions is met, the system is in low-power consumption mode.

1）单体或总体过放保护 5分钟内仍未解除。

Monomer or overall over-discharge protection does not release within 5 minutes.

2） 弱电开关断开，6秒后进入休眠。

When the on/off switch is off, it will be in the sleep mode after 6 seconds.

3）最低单体电压低于休眠电压，并且持续时间达到休眠延迟时间（ 同时满足无通信、无保护、无均衡、无电流）。

The lowest monomer voltage is lower than the sleep voltage, and the time of duration reaches the sleep delay time (while meeting the condition of no communication, no protection, no balance, no current).

4）待机时间超过 30分钟（无通信、无充放电）。

The standby time is more than 30 minutes (no communication, no charge and discharge).

5）通过上位机软件强制关机。

It closes down compulsively through the software of the upper computer.

进入休眠前，需确保输入端未接入外部电压，否则将无法进入低功耗模式

Before it is in the sleep mode, you need to ensure that the input port is not connected to external voltage. Otherwise, it can not be in the low-power mode.

唤醒：当系统处于低功耗模式，满足以下任意一条件时，系统将退出低功耗模式，进入正常运行模式：

Arousal: when the system is in low-power consumption mode and meets any of the following conditions, the system exits the low-power consumption mode. And then it will be in the normal running mode:

1）接入充电器，充电器输出电压需大于电池电压2V以上。

Connecting to the charger, and the output voltage of the charger should be more than 2V of the battery voltage.

2）蓝牙连接 Connecting bluetooth

3）弱电开关闭合 The on/off switch is on.

4）通讯信号输入 RS485、UART

Inputting communication signal(RS485、UART)

注意：单体或总体过放保护后BMS进入深度休眠，必需充电器才能换醒。**Note:** After monomer or overall over-discharge protection, BMS is in deep sleep mode, so a charger is required to wake it up.

4.9. 通讯功能(Communication)

4.9.1. 串口通讯(Serial Communication)

UART通讯工具communication tool

RS485通讯工具communication tool

注：上述工具都需要另行购买。Note: The above tools need to be purchased separately.

连接方式：在电脑端安装我司通讯盒专用驱动程序后，将通讯盒的USB端插在电脑的USB端口，另一头接在已经接好电池的保护板对应接口。打开上位机，点通讯口设置，选择通讯盒对应CMO口，其他选项不用动，确认后点击开始，即可读取保护内数据。

如需更改保护板参数，一定要先在参数页面点击读取参数后，再来更改参数。

The connection method: After installing the special driver for our communication tool on the computer, insert the USB end of the communication tool into the USB port of the computer, and connect the other end to the corresponding interface of the BMS that has been connected to the battery pack. Open the upper computer, click the communication port settings, select the CMO port corresponding to the communication tool, and do not change other options. After confirming, click start to read the data in the protection.

If you need to change the parameters of the BMS, you must click on the parameter page to read the parameters before changing the parameters.

4.9.2. RS485/UART通讯(RS485/UART Communication)

RS485通信:BMS可以通过RS485接口 ,可以查看PACK的各种信息 ,包括电池电压、电流、温度、状态等 ,也可以使用RS485与上位机进行通讯 ,默认波特率为 9600bps。通讯协议请联系销售人员获取。BMS也可以通过RS485通讯盒与上位机进行通讯，从而通过上位机监控电池的各种信息，包括电池电压、电流、温度、状态及电池生产信息等，默认波特率为 9600bps

RS485 communication: the BMS can use view various information of the battery pack through RS485 communication interface, including battery voltage, current, temperature, state, etc., and it can also use RS485 to communicate with the upper computer. The default baud rate is 9600bps. Please

contact the sales to obtain the communication protocol

UART通信:设备可以通过蓝牙接口或UART通信接口，使用TTL通讯盒与上位机进行通讯，查看PACK的各种信息，包括电池电压、电流、温度、容量、状态等。通讯协议请联系销售人员获取。LCD屏可以通过UART通信接口，读取显示各种参数，包括电池电压、电流、温度、容量、状态等。

UART communication: BMS can communicate with the PC software through the UART/TTL communication tool and Bluetooth module, then you can view a variety of battery pack information, including battery voltage, current, temperature, capacity, state, etc., Please contact the sales to obtain the communication protocol. The LCD screen can read and display various parameters, including battery voltage, current, temperature, capacity, and status through the UART communication interface.

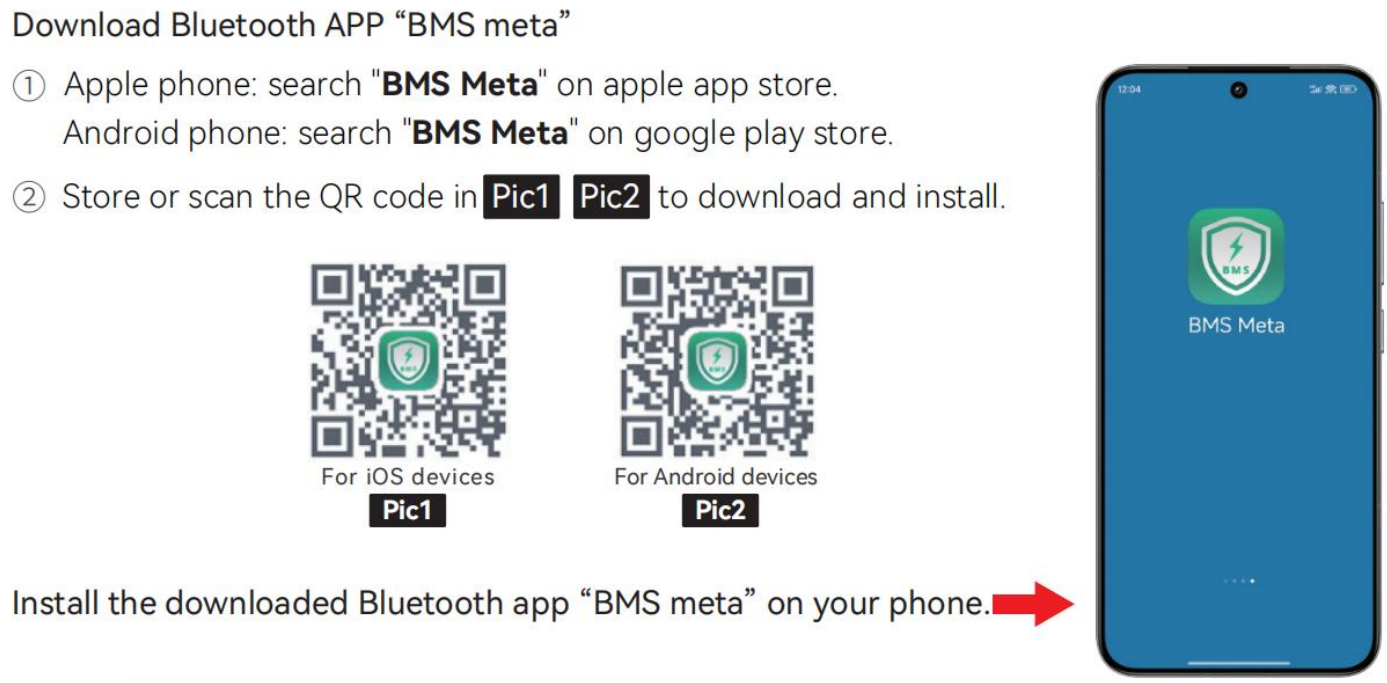
注：以上通讯是否有功能请对照配置表。

Note: Please refer to the configuration table to check whether the above communication has functions.

4.9.3. 蓝牙通讯及“BMS META”APP安装说明(Bluetooth Communication and the instruction of “BMS META” APP)

蓝牙通讯: 具有蓝牙连接功能，可以通过手机APP连接蓝牙，监测电池的各种信息

Bluetooth communication: With Bluetooth function, you can connect Bluetooth through the mobile phone APP to monitor various information of the battery.



4.10. 弱电开关说明(The instructions of on/off switch)

弱电开关闭合时，打开充放电MOS，BMS处于正常工作状态。弱电开关断开时，关闭充放电MOS，BMS处于保护状态，此时BMS进入深度休眠。不能充电也不能放电。 弱电开关功能可以在上位机上关闭此功能。

When the on/off switch is on, then the charge and discharge of MOS is turned on, and the BMS is in normal working state. When the on/off switch is off, then the charge and discharge of MOS is turned off, and the BMS is in the protection state. It is in deep sleep state at the same time, and it can not charge or discharge. The function of on/off switch can be turned off on the upper computer.

4.11. 屏幕说明 The introduction of screen

彩色触摸屏 color touch screen

库仑计 Coulombmeter screen

5. 保护板主要物料和尺寸图 (The main materials and dimension drawing of the BMS)

序号 (No)	物料名称 (Name of Material)	规格型号(Model)	生产厂家 (Manufacturer)
1	IC	SH367306Q/303QY	中颖
2	MCU	SMT32G030C8T6	意法
3			

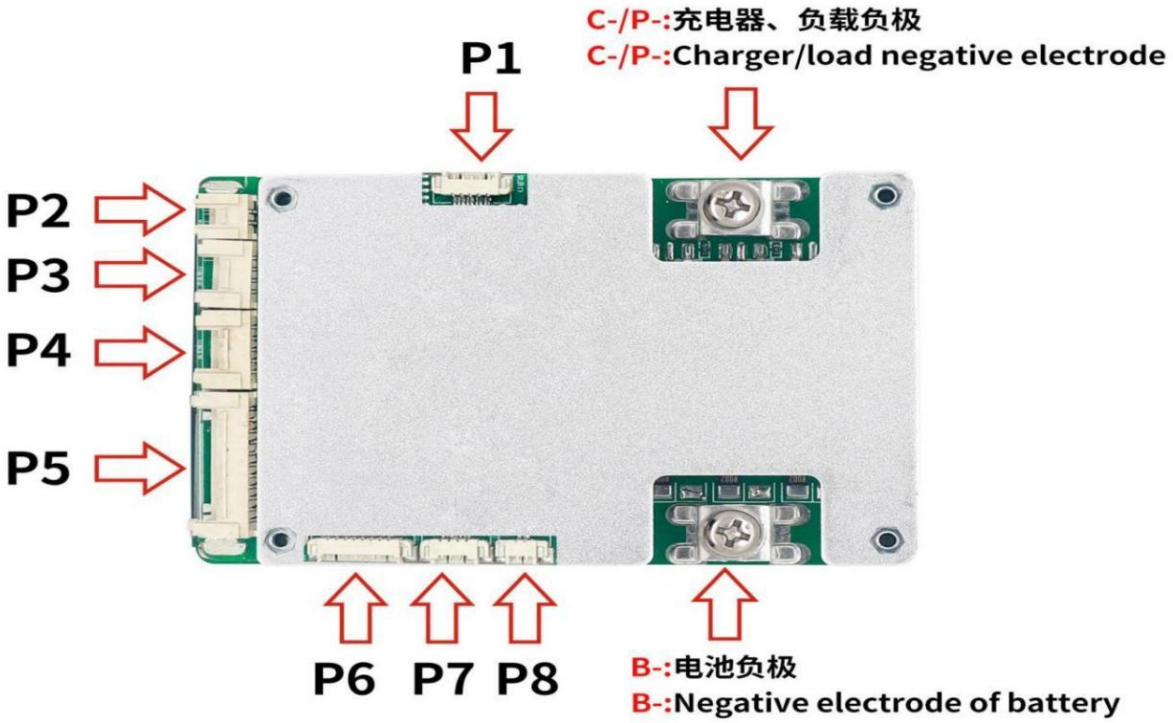
注:以上物料可能用同等规格参数或者更好的规格参数的物料替代,如有认证需求不允许更换物料,需要通知我司业务重新送样,受控规格书,最终解释权归拓达通所有。

Note: The above materials may be replaced by materials with the same specifications or better specifications. If there are certification requirements, it can not change materials. And we need to notify our sales to send samples again. TDT BMS reserves the right of final interpretation of this specification.

保护板尺寸图 (Dimensional figure of BMS)

6. 信号口定义 (Definition of signal port)

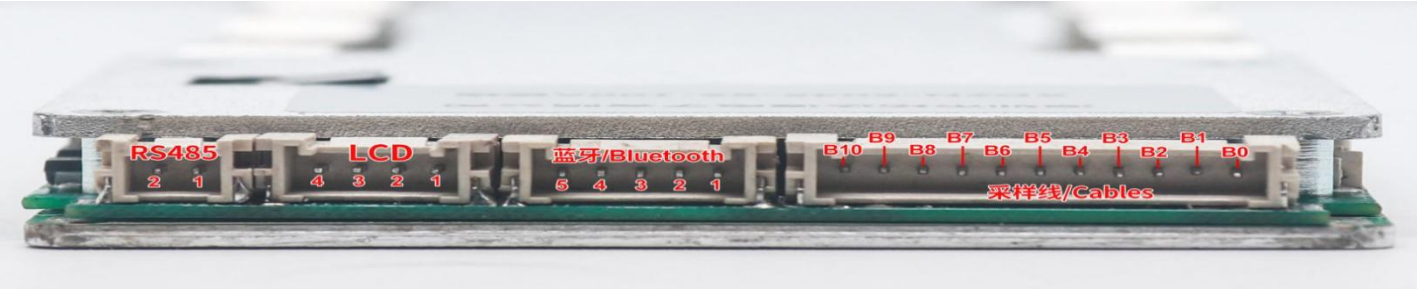
6.1. 示意图标注接口标号见下图 (Illustration annotation refer to the following figures)



标号 (Label)	位号 (Tag number)	接插件功能 (Connector)	规格型号 (Model)	PIN 功能定义 (Pin function definition)	备注 (Note)
1	P5	电压检测插座 (Voltage detection interface)	HY2.0-2*5P	接最低节电芯负极 Connect to Negative Side of Cell 1	B0
				接第 1 节电芯正极 Connect to Positive Side of Cell 1	B1
				接第 2 节电芯正极 Connect to Positive Side of Cell 2	B2
				接第 3 节电芯正极 Connect to Positive Side of Cell 3	B3
				接第 4 节电芯正极 Connect to Positive Side of Cell 4	B4

2	**P4**	蓝牙插座(Bluetooth Interface)	HY2.0-5P	蓝牙插口(Bluetooth Interface)	
3	**P3**	屏插座(LCD interface)	HY2.0-4P	屏幕插口 LCD interface	
4	**P7**	弱电开关插座 On/off interface	1.25-4P	弱电开关接口 On/off switch interface of Integrated style board	
5	**P1**	烧录插座 Programmer interface	1.25-5P	生产程序烧录口（客户无需使用） Programmer interface（Customers don't need to use this interface）	
6	**P6**	NTC 插座 NTC interface	1.25-8P	NTC 插口 NTC interface	
7	**P2**	RS485 通讯座 Programmer interface	HY2.0-2P	RS485 通讯插口 RS485 Interface	
8	**P8**	主动均衡插座	1.25-2P	主动均衡控制插座	

7. RS485、UART 接口图示和电气接口定义：（The definition of RS485， UART interface diagram and electric interface）：

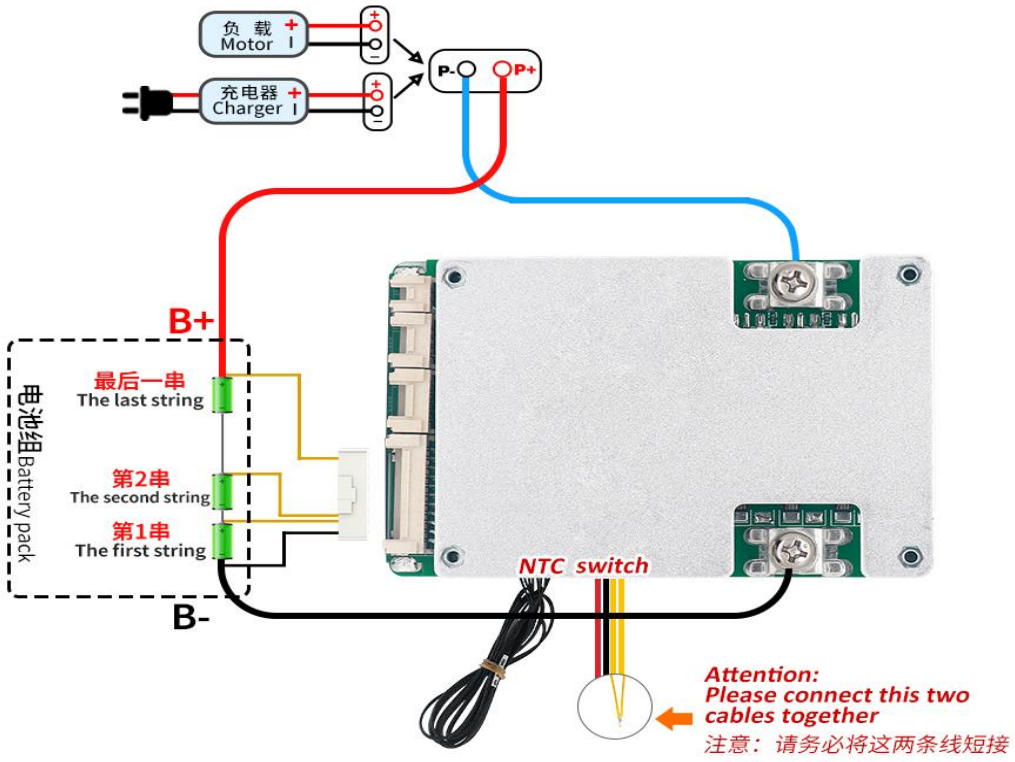


蓝牙--采用 HY2.0-5P 插座 Bluetooth-- HY2.0-2P socket				RS485-采用 HY2.0-2P 插座 RS485-- HY2.0-2P socket		UART--采用 HY2.0-4P 插座 UART--HY2.0-4P socket	
蓝牙 Bluetooth		上位机（PC software）UART		CAN	RS485	LCD 屏	UART
P4 引脚	定义说明	P4 引脚	定义说明	P2 引脚	定义说明	P3 引脚	定义说明
1	VDD	1	VDD	1	RS485A	1	12V
2	WAK	2	NC	2	RS485B	2	RX
3	RX	3	RX			3	TX
4	TX	4	TX			4	GND
5	GND	5	GND				

弱电开关--采用 1.25-4P 插座 On/off switch--1.25-4P socket		主动均衡控制--采用 1.25-2P 插座 Active balancer--1.25-2P socket	
P7 引脚 Pin	定义说明 Defined Instructions	P8 引脚 Pin	定义说明 Defined Instructions
1	SW-	1	AB+
2	SW+	2	AB-
3	LED-		
4	LED+		

8. 接线图、接线顺序以及注意事项 （wiring diagram、Wiring sequence and Cautions）

8.1. 接线图说明(Description of the wiring diagram)



8.2. 接线顺序以及注意事项 (Wiring sequence and Cautions)

保护板上电有严格的顺序要求，先接 B-、然后B0~B+依次由低到高的顺序插接电池采样线连接器，最后接上B +，上电后需要充电或按键激活，所有连接线安装好后才能加负载或充电器。如果保护板上的纽扣电池拆下来重新装上后需要重新更新时间。

拆除时，先拔掉充电器或负载，从B+~B0依次由高到低的顺序拆卸电池采样线连接器，最后拆卸 B-。

The BMS is powered on in a strict sequence. Connecting B- first, then connecting sampling cables with battery pack in ascending order B0 to B+, and finally connecting to B+. After power-on, you need to charge the battery or press a button to activate it. Load or charger can only be connected after all cables are installed.If the button battery on the protection plate is removed, time needs to be updated again after being installed.

When removing, first removing the charger and load, and then removing to the sampling cables from the battery back in descending order B+ to B0, and finally removing B-.

9. 工作和存储环境 (Working Environment & storage)

9.1. 工作环境 (Working Environment)

BMS 保护板允许在下列条件下正常工作:

BMS allows normal operation under the following conditions:

· 环境温度：-20℃ ~ 75℃ ；

Ambient temperature: -20°C ~ 75°C;

· 相对湿度：5% ~ 90%;

Relative humidity: 5% ~ 90%;

· 大气压力：86kPa~106 kPa;

Atmospheric pressure: 86kPa~106kPa;

9.2. 存储环境 (The environment of storage)

BMS保护板应存储在环境温度为-5 °C~+40 °C、相对湿度不大于70%、清洁通风良好的库房内，空气中不得含有腐蚀性气体及影响电气绝缘的介质，不得受任何机械冲击或重压。不受阳光直射，与热源(暖气设备等)之间的距离不得 少于 2m。在以上存储条件下，BMS 保护板可存放一年。

BMS should be stored in a clean and well-ventilated warehouse with an ambient temperature of -5°C~+40°C, a relative humidity of not more than 70%, and the air must not contain corrosive gases and media that affect electrical insulation, and must not be affected by any mechanical shock or heavy pressure. Not subject to direct sunlight, and the distance from the heat source (heating equipment, etc.) should not be less than 2m. Under the above storage conditions, the BMS BMS can be stored for one year.

10. 包装运输 (Packing and shipping)

10.1. 标志 (Logo)

BMS 保护板应有下列清晰耐久标志:

The BMS shall have the following clear durability signs:

· 产品名称、型号Product name and model

· 电芯型号 Cell model

· 出厂日期及编号Date and number of production

10.2. 包装（Package)

· 包装应符合防潮、防振动的要求，包装箱应牢固可靠， 箱内应衬有防潮材料， 产品在箱内不应窜动。

The packaging should meet the requirements of moisture-proof and anti-vibration, the packing box should be firm and reliable, the inside of the box should be lined with moisture-proof material, and the product should not move in the box.

· 外部纸箱包装箱，单板防静电袋加气泡袋包装;

External carton box, veneer anti-static bag plus bubble bag packaging;

10.3. 运输（transportation)

在运输中，产品不得受剧烈机械冲撞、暴晒、雨淋、化学腐蚀性物品及有害气体侵蚀；在装卸过程中， 产品轻搬轻放，严禁摔掷、重压。

During transportation, the product shall not be subject to severe mechanical impact, exposure to the sun, rain, chemical corrosive substances and harmful gases; During the loading and unloading process, the product should be handled with care, and it is strictly forbidden to throw or press it.

包装箱码放高度小于 5 层。

The height of the packing boxes shall be less than 5 layers.

11. 特别说明（Special Note)

1. 本管理系统的短路保护功能适用于多种应用情景，但并不能保证可以在任意条件下短路。当电池包和短路回路的内阻值总和低于 40mΩ、电池组容量超出额定值 20%、短路电流超过 2000A、短路回路的电感非常大或者短路的导线总长度非常长时， 请自行测试确定是否可以使用本管理系统。

The short-circuit protection function of this management system is suitable for a variety of application scenarios, but it does not guarantee that it can be short-circuited under any conditions. When the total internal resistance of the battery pack and the short-circuit loop is lower than 40mΩ, the capacity of the battery pack exceeds the rated value by 20%, the short-circuit current exceeds 2000A, the inductance of the short-circuit loop is very large, or the total length of the short-circuit wire is very long, please test to determine whether this management system can be used.

2. 焊接电池引线时，一定不可有错接或反接。如果确实已接错，这块电路板可能已损坏，需要重新测试合格后才可使用。

When soldering the battery leads, there must be no wrong or reverse connection. If it is indeed connected incorrectly, the circuit board may be damaged and needs to be re-tested before it can be used.

3. 装配时管理系统不要直接接触到电芯表面，以免损坏电路板。装配要牢固可靠。

When assembling, the management system should not directly touch the surface of the cell to avoid damage to the circuit board. Assembly should be firm and reliable.

4. 使用中注意引线头、烙铁、焊锡等不要碰到电路板上的元器件，否则有可能损坏本电路板。焊接本电路板请不要使用膏状助焊剂，否则有可能导致本电路板工作不正常。

During use, be careful not to touch the components on the circuit board such as lead tips, soldering iron, solder, etc., otherwise the circuit board may be damaged. Please do not use paste flux when soldering this circuit board, otherwise it may cause this circuit board to work abnormally.

5. 使用过程要注意防静电、防潮、防水等。

During use, pay attention to anti-static, moisture-proof, waterproof, etc.

6. 使用过程中请遵循设计参数及使用条件， 不得超过本规格书中的值， 否则有可能损坏管理系统。

During use, please follow the design parameters and conditions of use, and must not exceed the values in this specification, otherwise the management system may be damaged.

7. 将电池组和管理系统组合好以后，初次上电如发现无电压输出或充不进电，请检查接线是否正确。

After the battery pack and the management system are combined, please check whether the wiring is correct if you find that there is no voltage output or charging fails when the battery is powered on for the first time.

8. 本规格书中的参数、功能和外形仅供参考，请以保护板实物为准。

he Parameter, function and outlook of BMS in this specification are for reference only, please refer to actual product.

9. 我司产品进行严格的出厂检验测试，但是因为客户使用的环境不同（特别是在高温、超低温、太阳下等），难免会出现保护板故障，所以客户在选择和使用保护板时，需要在友好的环境下使用，及选择一定冗余量的保护板。

Our products undergo strict factory inspection and testing, but due to the different environments used by customers (especially in high temperature, ultra-low temperature, under the sun, etc.), it is inevitable that the BMS will fail. Therefore, when customers choose and use BMS, BMS needs to be in a friendly environment, and they need to select a BMS with a certain redundancy capability.