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Product Specification

产品规格书

Description/系统描述: VCU
Part Number/零件号: 3004008-035/036/037/023/
038/039 (SA)
Revision/版本: 1.4

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Customer Approval 客户批准				

Revision History / 变更记录

Revision 版本	Date 日期	Description 描述	Author 修改人	Validation 修改确认
V0.1	2020-10-12	The first version 初始版本	姚龙	
V0.2	2021-04-13	1.Update dimensions and explosive view of the VCU 1.更新 VCU 尺寸和爆炸图	万斌	
V0.3	2021-04-15	1. Update the packing method and add the label of carton 1.更新包装方式, 增加外箱标签	贲霞	
V0.4	2021-05-26	1.Add standby mode current 1. 添加待机工况电流 2.Add brack signal Input port 2. 增加刹车信号检测功能端口 3.Add Charging gun detects physical signals 3. 增加充电枪检测物理信号	姚龙	
V0.5	2021-08-26	Modified DCDC enable port definition 1. 修改 DCDC 使能端口定义	姚龙	
V0.6	2021-09-15	1. Update product label、packing box label 1、更新产品标签、外箱标签 2. Modified Minimum voltage to 9V 2、更改最小工作电压为 9V 3.Modified CAN1 agreement to CAN2.0 3、修改 CAN1 协议为 CAN2.0 4.Modify the data encryption method to AES128 4、修改数据加密方式为 AES128 5.Remove E-CALL function 5、删除 E-CALL 功能	贲霞 姚龙	
V0.7	2021-11-17	1.Update product label、packing box label 1.更新产品标签、外箱标签 2.Add foam、update VCU size and explosion map 2.增加泡棉、更新 VCU 尺寸和爆炸图	贲霞 张远航	
V1.0	2022-02-11	The final version 最终版本	翟金诚	
V1.1	2022-05-10	1. 规格书内标签图纸更新 2. 规格书中工作电流描述, ESD 条件修正书写错误 3. 规格书中 VCU 长宽高修正标注错误	姚龙	

		4. 规格书的功能依照当前情况更新 5. 单体重量增加公差范围		
V1.2	2022-06-16	1.Update product label、packing box label 1.更新产品标签、外箱标签	贡霞	
V1.3	2022-09-14	1、添加晶振和频率 2、更新料号对应表 3、添加注意事项	衡紫阳	
V1.4	2022-09-23	1、原理框图添加晶振频率	衡紫阳	

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Abbreviation/缩略语

CAN	Controller Area Network/控制器局域网络
BCM	Body Control Module/车身控制器
T-BOX	Telematics BOX/远程信息处理器
VCU	Vehicle Control Unit/车辆控制单元
MCU	Microcontroller Unit/微控制单元
HMI	Human Machine Interface/人机界面
VDD	Voltage Drain Device /单电源供电
BT	Bluetooth/蓝牙
LTE	Long term Evolution/长波通信
GPS	Global Positioning System/全球卫星定位系统
BDS	Beidou system/北斗系统
ANT	Antenna/天线
AES	Advanced Encryption Standard/高级加密标准
APP	Application program/应用程序
SN	Serial number/序列号
EMC	Electromagnetic compatibility/电磁兼容
PC	Polycarbonate/聚碳酸酯
ABS	Acrylonitrile Butadiene Styrene/丙烯腈-丁二烯-苯乙烯共聚物
PCBA	Printed Circuit Board Assembly/印刷电路板组装
PET	Polyethylene terephthalate /聚对苯二甲酸乙二酯
NA	Not Applicable/不适用
TBD	To Be Defined/待定义
NC	Not Connected/不连接

1. Scope 范围

Vehicle Control Unit (VCU) is designed for electric motorcycle, electric bicycle body control system, the system development contains handle button detection, body sensors, lamps and lanterns control, vehicle system function module (contains the BMS and ECU, HMI, K - BOX) of logic control, integrated with BT5.0 (blue tooth), LTE (mobile), GPS (global positioning system (GPS) & BDS (BEIDOU positioning system), and other functions. VCU is responsible for the management of the vehicle's electrification logic, operation monitoring and other functions, to provide users with a more user-friendly interactive experience.

This document for electric motorcycle VCU controller function specification, detailed description of VCU controller related technical requirements information, including function realization, component interface, technical parameters, testing specifications, external dimensions, legal specifications and so on. this document is an existing platform project specification, which can be adjusted according to user requirements.

This document is applicable to the design, development and testing stages of Gemini P1 project.

车辆控制系统（简称 VCU）是专门针对电动摩托车，电动自行车系统开发的车身控制系统，包含了把手按键检测，车身传感器检测，灯具控制，整车系统功能模块（包含 BMS,ECU,HMI,K-BOX）的逻辑控制，集成了 BT5.0（蓝牙通信）,LTE（移动通信）,GPS（全球定位系统）&BDS（北斗定位系统）等功能。VCU 负责管理整车的上电逻辑，运行监护等功能，为用户提供更人性化的交互体验。

本文档为电动摩托车 VCU 控制器功能规范，详细描述了 VCU 控制器相关技术需求信息，包括功能实现、部件接口、技术参数、测试规范、外形尺寸、法律规范等等。此文档为现有平台项目规格书，可根据用户需求进行调整。

本文档适用于 3004008-035、3004008-036、3004008-037、3004008-023、3004008-038、3004008-039 项目的设计、开发和测试等阶段。

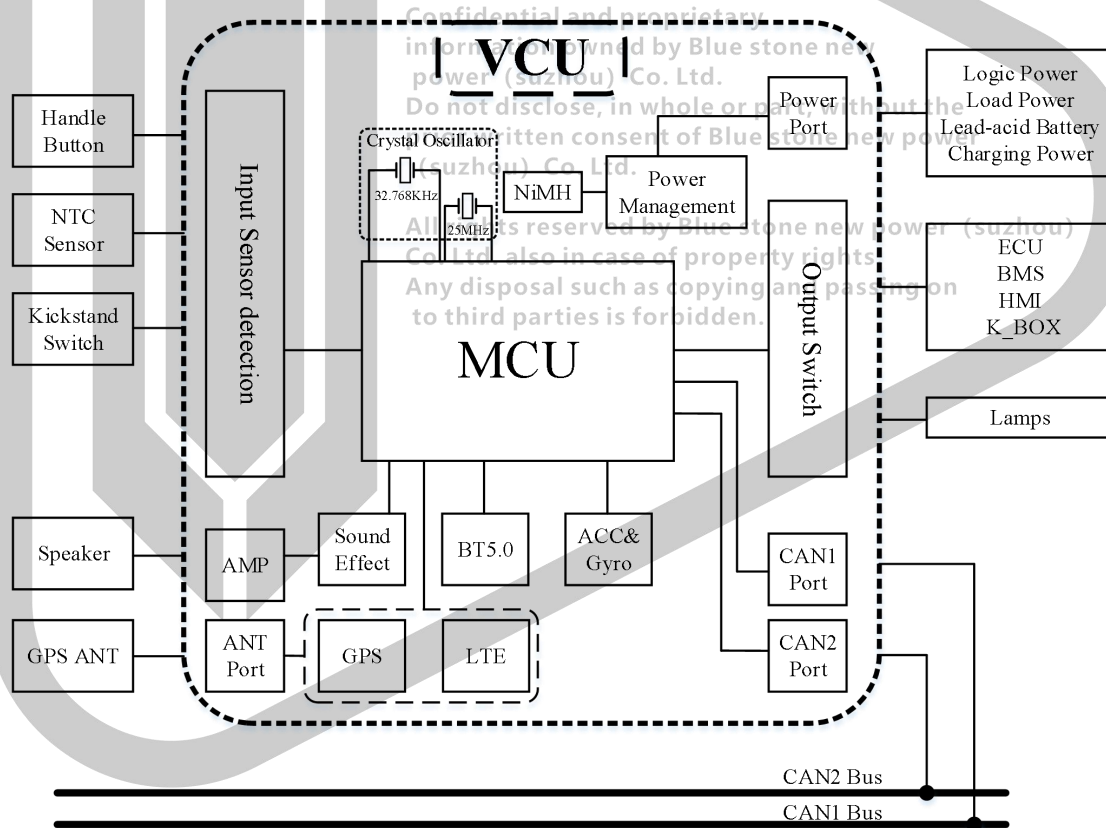
2. General Characteristics 基本参数

Item/项目	Technical parameter/技术参数
Working Voltage 工作电压	Minimum voltage/最小电压: 9.0V Nominal voltage/额定电压: 12.0V Maximum voltage/最大电压: 16.0V
Power dissipation 功耗	Sleep mode/睡眠模式: ≤ 2.5 mA (功耗 ≤ 30 mW) Stable Working mode/稳定运行模式: ≤ 200 mA Maximum current/最大电流: 500 mA
Function module 功能模块	BCM/车身控制
	T-BOX
	Communication/通讯
	Low power wake up/低功耗唤醒
Radio frequency 无线频段	FDD LTE: B1/B2/B3/B4/B5/B7/B8/B28/B66 TDD LTE: B40 WCDMA: B1/B2/B4/B5/B8 GSM: B2/B3/B5/B8
	BT5.0 2.4Ghz
	GPS/BD2
	Working frequency/工作频段: 1575/1561 Mhz Maximum update rate/最大更新速率: 10 Hz
	Sensitivity and Tracking Sensitivity/灵敏度和跟踪灵敏度: -165 dBm
	Recapture/重新捕获: -160 dBm
	Cold start capture/冷启动捕获: -148 dBm
	First positioning time/首次定位时间: Cold start/冷启动: 25s, Warm start/温启动: 23s, Hot start/热启动: < 1s
	EPO auxiliary cold start/EPO 辅助冷启动: 14s
	Positioning accuracy/定位精度: Static/静态: 2.5m, Speed/速度: 0.1m/s
Dimension 尺寸	153.8*106.3*34.8mm
Weight 重量	330g $\pm$ 15g
IP grade 防护等级	IP67

Operation condition	-40℃~+85℃, ≤90% RH (不含电池)
工作环境	-20℃~+85℃, ≤90% RH (备用电池)
Storage condition	-40℃~+85℃, ≤70% RH
存储环境	
EMC	Meets GB 34660-2017 standard
电磁兼容	符合 GB 34660-2017 标准

注：睡眠模式表示在动力电池离线状态下的低功耗模式

3. Block Diagram 原理框图



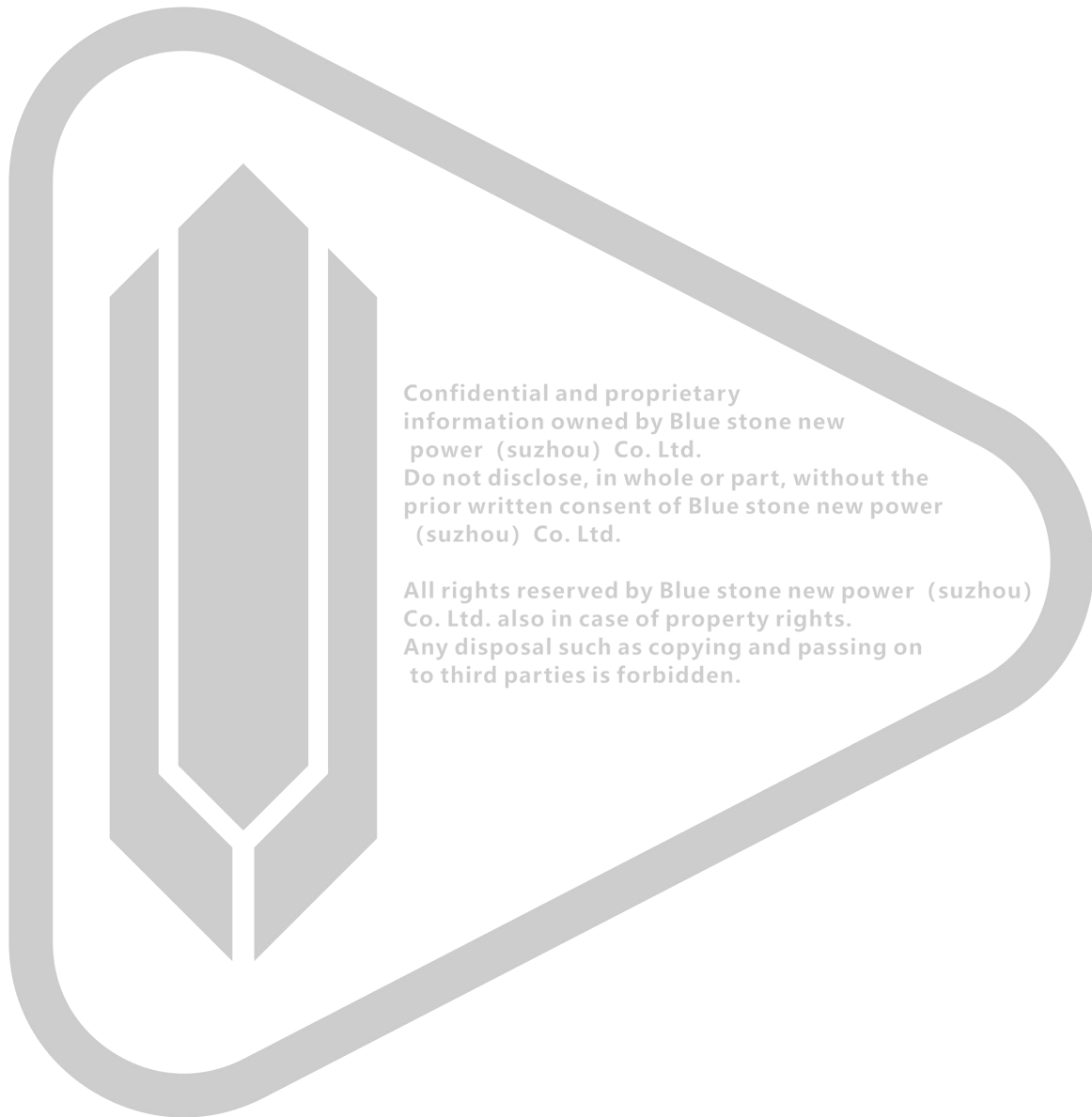
4. Function List 功能清单

Item 分类	Menu 功能菜单	Description 功能描述	Status 状态
BCM 车身控制	Detection 检测	Body sensor signal detection: speed of wheel and kickstand. 车身传感器信号检测:脚撑，NTC 温度传感器	√
		Handle signal detection 把手信号检测	√
	Control 控制	Control of lamps and lanterns 灯具控制	√
		Turn on/off power timing control 车辆上/下电时序控制	√
		Backup battery charging management 备用电池充电管理	√
		Low power standby strategy 低功耗待机策略	√
	Load detection 负载检测	Load failure, short circuit detection, abnormal information report 负载失效，短路检测，异常信息上报	√
	T-BOX	OTA 在线升级	Support remote upgrade and upgrade the system of the functional modules 支持远程升级及升级系统内的各功能模块
Remote control 远程控车		Remote lock the car 远程锁车	√
		Remote fortification 远程设防	√
		burglar alarm 防盗报警	√
Remote status query 远程状态查询		Remote dashboard: Residual power, mileage, total mileage display, average speed, etc. 远程仪表台: 剩余电量、续航里程、总里程显示、平均车速等	√
		The log of driving: display the last driving track, time, energy consumption and mileage; Track, energy consumption and mileage display in any time period. 行车日志: 最近一次行驶轨迹、时间、能耗、里程显示；任意时间段内行驶轨迹、能耗、里程显示等	

		Check parking position 车辆停放位置查询	√
	Safety protection 安全防护	Report vehicle failure: Function module, sensor, lamp abnormal report, etc. 车身故障上报: 功能模块、传感器、灯具等异常上报	√
	Data acquisition 车辆数据采集	Collect and store vehicle speed, power, idle speed and other data when the location is moved illegally, trigger an alarm, and push the message to the phone. 对整车车速、电量、怠速等数据进行采集存储	√
	Vehicle fortification 车辆设防	The alarm is triggered when the location is moved illegally, and the message is pushed to the phone. 位置被非法移动时触发报警，并消息推送手机	√
	Vehicle management 车辆管理	Send vehicle data to the phone 推送车辆数据到手机	√
		Set vehicle parameters 进行车辆参数设置	√
		Send navigation information and push the message to the Meter. 转发导航信息、手机推送消息至仪表	
Communication 通讯	CAN1_BUS CAN 总线	CAN 2.0	√
	CAN2_BUS CAN 总线	CAN 2.0	√
Low power wake up 低功耗唤醒	CAN wakeup CAN 唤醒	Any CAN signal 任何 CAN 报文	√
	BT wakeup 蓝牙唤醒	BT connected 蓝牙连接	√
	Charger wakeup 充电唤醒	Charger Power connect 充电器低压电源连接	√
	Remote wakeup 远程唤醒	Server sends data 服务器发送数据	√
	Abnormal move wakeup 异动唤醒	Vehicle shaking 车身震动	√
	RTC periodic wakeup RTC周期唤醒	Automatic wakeup after the scheduled time 超过定时时间自动唤醒	√

Note: parameters can be adjusted according to user requirements.

注：参数可根据用户需求进行调整



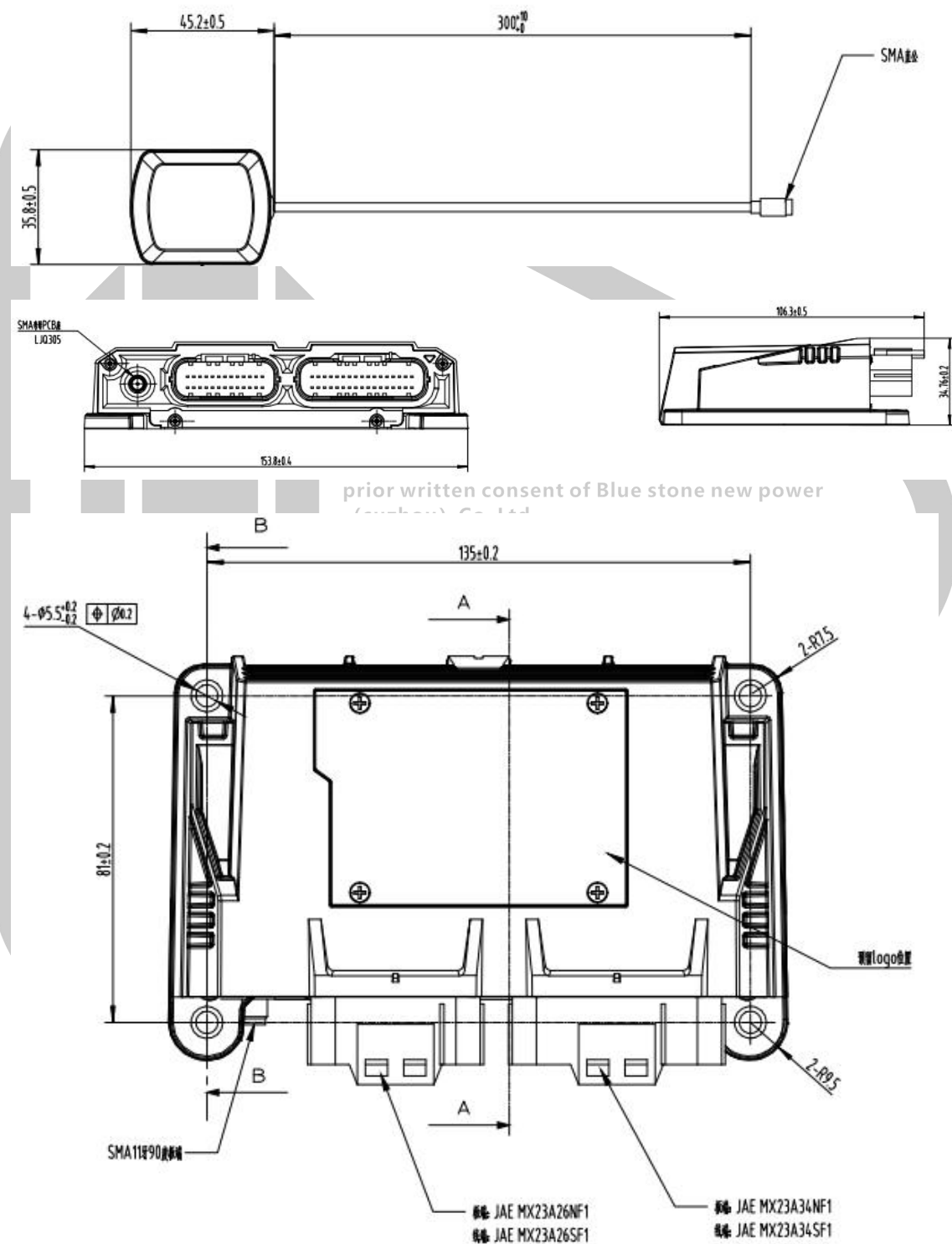
5. Safety Protection 安全保护

Category 分类	Item 项目	Description 描述	Status 状态
Hardware 硬件	Port protection 接口保护	Ground and battery short protection 对地, 对电池短路保护	√
	ESD 静电放电	Power On/上电: Contact/接触:±6kV, Air/空气:±8kV No Power/不上电: Contact/接触:±6kv,Air/空气:±15kv	√
	Load protection 负载保护	Lamp, function module current monitor, abnormal cut off output. 灯具, 功能模块电流监控, 异常切断输出	√
Software 软件	Communication data encryption 通信数据加密	AES128	√
	Functional module binding 功能模块绑定	Each module of the vehicle is bound by SN to prevent abnormal access. 整车各模块通过 SN 号绑定, 防止异常接入	

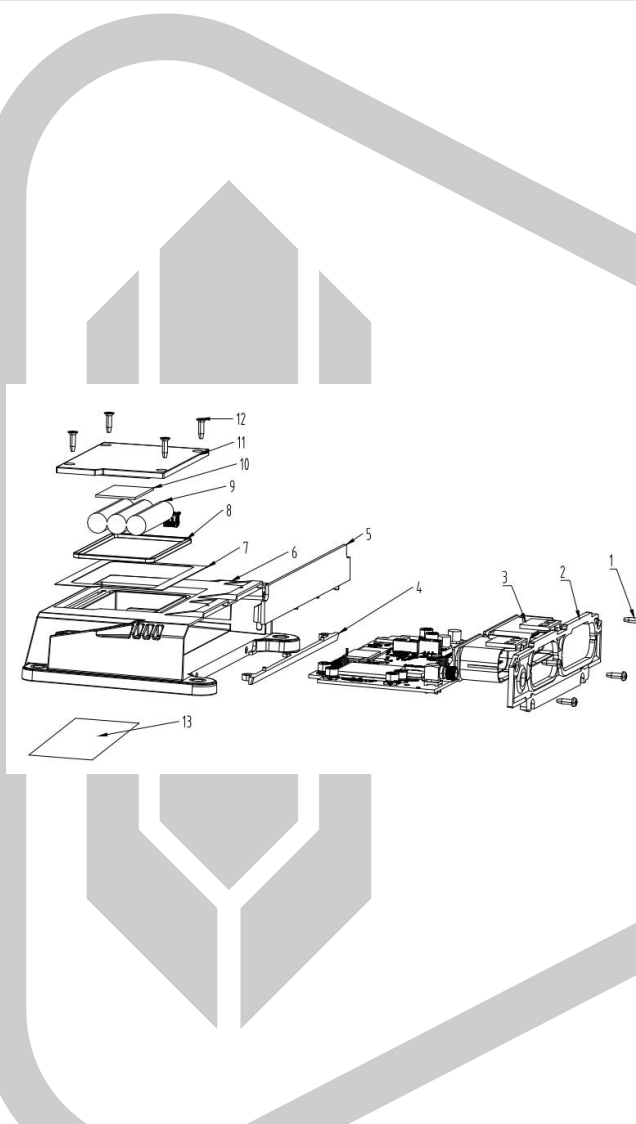
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6. Mechanical Characteristics 机械特性

6.1 Dimensions 尺寸(Unit/单位: mm)



6.2 Explosive view 爆炸图

Explosive view 爆炸图	No 序号	Description 描述	material 材料	QTY 数量
	1	Screw/螺丝 PA2.5*8	NA	5
	2	Cover/端盖	PC+ABS	1
	3	PCBA	NA	1
	4	Segregation board B 隔离板 B	PC+ABS	1
	5	Segregation board A 隔离板 A	PC+ABS	1
	6	Base/底座 Twin	PC+ABS	1
	7	adhesive/VCU 上盖 双面胶条	3M4914	1
	8	Sealing strips/ 底座密封条	Silastic	1
	9	Ni-MH/镍氢电 池组	NA	1
	10	Foam /背胶泡 棉	EVA	1
	11	Top cover/上 盖	PC+ABS	1
	12	Screw/螺丝 KA2.5*8	NA	4
	13	Label/标签	PET	1

7. Connector Definition 接插件定义

7.1 Signal connector 信号连接器

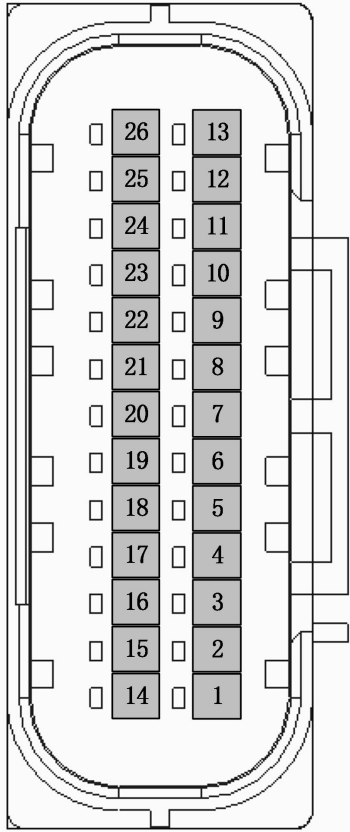
Function definition of GPS antenna interface : the module uses SMA-KWE antenna base with SMA-J terminal.

GPS 天线接口功能定义：模块使用 SMA-KWE 天线座，配套 SMA-J 接线头。

Type/型号	Diagram/图示	No/位号	Description/描述
SMA-KWE		1	GPS Antenna GPS 天线

Function definition of signal input interface : The module uses JAE MX23A26NF1 connector, which is matched with JAE MX23A26SF1 sheath terminal.

信号输入接口功能定义：模块使用 JAE MX23A26NF1 连接器，配套 JAE MX23A26SF1 护套端子。

Type 型号	Diagram 图示	No 序号	Status 状态	Definition 定义	Description 说明	Limiting 最大限流值
JAE MX23A26NF1		1	I	Signal of kickstand up 边撑抬起信号	Low side trigger signal 低边触发信号	≤15mA
		2	I	Brake signal 刹车信号	High side trigger signal 高边触发信号	≤15mA
		3	I	Front Wheel Sensor Signal 前轮速传感器信号	Low side trigger signal 低边触发信号	≤15mA
		4	I	Turn light switch 转向灯回位开关	Low side trigger signal 低边触发信号	≤15mA
		5	I	Charging gun detects physical signals 充电插枪检测物理信号	Low side trigger signal 低边触发信号	≤15mA
		6	P	GND	/	
		7	I	Gear "+" 档位 "+" 按钮	Low side trigger signal 低边触发信号	≤15mA

				低边触发信号	
	8	I	Automatic cruise 定速巡航	Low side trigger signal 低边触发信号	≤15mA
	9	I	Double flash button 双闪按钮	Low side trigger signal 低边触发信号	≤15mA
	10	I	Start Button 启动信号	Low side trigger signal 低边触发信号	≤15mA
	11	O	Speaker+ 扬声器+	Analog output 模拟输出	2W@8Ω
	12	IO	CAN1 Low CAN1-低	CAN1 Low	
	13	IO	CAN1 High CAN1 高	CAN1 High	
	14	I	Signal of kickstand down 边撑落下信号	Low side trigger signal 低边触发信号	≤15mA
	15	R	Reserved	NC	
	16	I	Left turn switch 左转向灯开关	Low side trigger signal 低边触发信号	≤15mA
	17	I	Right turn switch 右转向灯开关	Low side trigger signal 低边触发信号	≤15mA
	18	I	Highbeam /	Low side	≤15mA

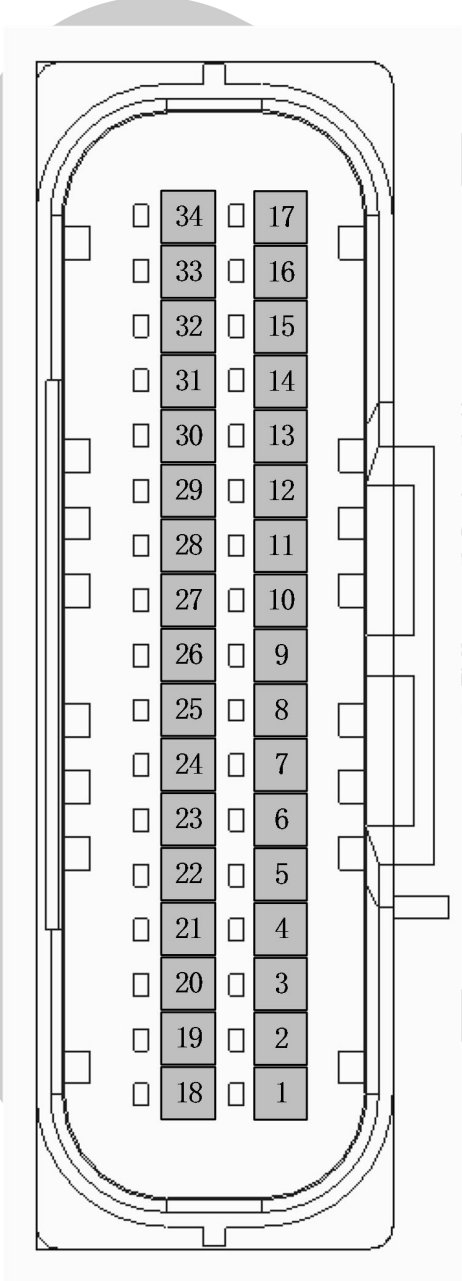
			Head Lamp switch 变光开关	trigger signal 低边触发信号	
19	I		Gear "-" 档位 "-" 按钮	Low side trigger signal 低边触发信号	≤15mA
20	R		Reserved 预留	NC	
21	I		Ignition signal 点火信号 (临时替代 K-box 启动信号)	Low side trigger signal 低边触发信号	≤15mA
22	I		Master light button 灯光总按钮	Low side trigger signal 低边触发信号	≤15mA
23	I		Flameout signal 熄火信号	Low side trigger signal 低边触发信号	≤15mA
24	R		Reserved 预留	NC	
25	O		Speaker- 扬声器-	Analog output 模拟输出	2W@8Ω
26	P		CAN1 Signal Ground CAN1 信号地	CAN1 Signal Ground	

Note/注意: O: Output 输出、I: Input 输入、P: Power 电源、R: Reserved 预留

7.2 Power connector 功率连接器

Function definition of power output interface: The module uses JAE MX23A34NF1 connector, which is matched with JAE MX23A34SF1 sheath terminal.

功率输出接口功能定义: 模块使用 JAE MX23A34NF1 连接器, 配套 JAE MX23A34SF1 护套端子。

Type 型号	Diagram 图示	No 序号	Status 状态	Definition 定义	Description 描述	Limiting 最大限流值
JAE MX23A34NF1		1	P	Logic module power 逻辑模块供电	Power input 电源输入	≤3A
		2	P	Lead-acid battery power 铅酸电池电源	Power input 电源输入	≤3A
		3	P	Charger power 充电器电源	Power input 电源输入	≤3A
		4	P	Lighting load power 灯具负载电源	Power output 电源输入	≤3A
		5	P	Lighting load power 灯具负载电源	Power output 电源输入	≤3A
		6	O	Daytime running light 日行灯	High side output signal 高边输出信号	≤1A
		7	O	Dipped headlight 近光灯	High side output signal 高边输出信号	≤2A
		8	R	Reserved 预留	NC	
		9	O	High beam 远光灯	High side output signal 高边输出信号	≤2A
		10	O	Brake light 刹车灯	High side output signal 高边输出信号	≤0.5A
		11	O	HMI power supply HMI 供电	High side output signal 高边输出信号	≤1A
		12	O	ECU power supply ECU 供电	High side output signal 高边输出信号	≤1A
		13	O	BMS power	High side	≤1A

			supply BMS 供电	output signal 高边输出信号	
	14	R	Reserved 预留	NC	
	15	O	Lighting load power / Lead-acid battery charging enable 灯具负载供电/ 铅酸充电使能	High side enable signal 高边使能信号	≤50mA
	16	O	Logic modes power enable 逻辑模块供电使能	High side enable signal 高边使能信号	≤50mA
	17	I	External NTC temperature sensor input 外置 NTC 温度传感器输入	Analog signal 模拟信号	
	18	P	Logic module power 逻辑模块供电	Power input 电源输入	≤3A
	19	P	GND	/	
	20	P	GND	/	
	21	P	GND	/	
	22	P	GND	/	
	23	O	Left turn light 左转向灯	High side output signal 高边输出信号	≤1A
	24	P	GND	/	
	25	O	Right turn light 右转向灯	High side output signal 高边输出信号	≤1A
	26	P	GND	/	
	27	P	External NTC temperature sensor GND& strain	/	

			gauge GND 外置 NTC GND&压力传 感器 GND		
	28	P	CAN2 GND	CAN2 GND	
	29	IO	CAN2 High CAN 高	CAN2 High	
	30	IO	CAN2 Low CAN 低	CAN2 Low	
	31	O	Speed sensor power supply 轮速传感器供 电	High side output signal 高边输出信号	≤0.5A
	32	R	Reserved 预 留	NC	
	33	R	Reserved 预 留	NC	
	34	I	Signal of strain gauge 压力传感器信 号	Analog signal 模拟信号	

Note/注意: O: Output 输出、I: Input 输入、P: Power 电源、R: Reserved 预留

8. VCU & GPS Antenna Installation Instructions

VCU 及 GPS 外置天线安装要求

The recommended installation location and precautions for VCU and GPS external antenna are described.

对 VCU 和 GPS 外置天线的建议安装位置、安装注意事项做了说明。

No 序号	Description 描述
1	In order to prevent water accumulation, it is recommended to install the connector

	downward 为了防止积水发生，建议安装方向接插件朝下
2	VCU shall be free of metal within 5cm of positions 2、3、4 and the upward side ;the surface of VCU shall not be covered with metal, as shown in Figure 2 below 因 VCU 内置天线性能受安装环境影响，VCU 周围 2,3,4 及朝上面（除接插件 1 侧外）5 厘米内处不得有金属；VCU 表面不能有金属遮盖，见下图 2
3	In order to facilitate the assembly of harness connector, there shall be no other obstacles within 7cm of connector side 为了方便线束接插件组装，接插件侧 7 厘米内不得有其他障碍物
4	GPS external antenna shall be installed face up without metal cover, as shown in Figure 1 below GPS 外置天线安装正面朝上，朝上面不能有金属遮盖，见下图 1
5	VCU is recommended to be installed at the front beam or under seat of the vehicle, and GPS external antenna is recommended to be installed at the front or rear of the vehicle, as shown in Figure 3 below VCU 建议安装在车头前梁 1 处或者座位下方 2 处附近，GPS 外置天线建议安装在车头 1 处附近或者车尾 3 处附近，见下图 3

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Installation Requirement is shown below:

安装要求如下图所示：

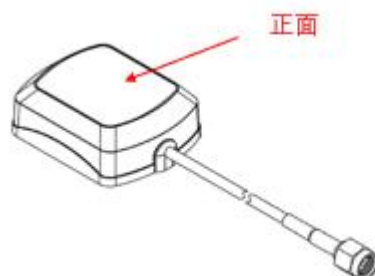


图 1

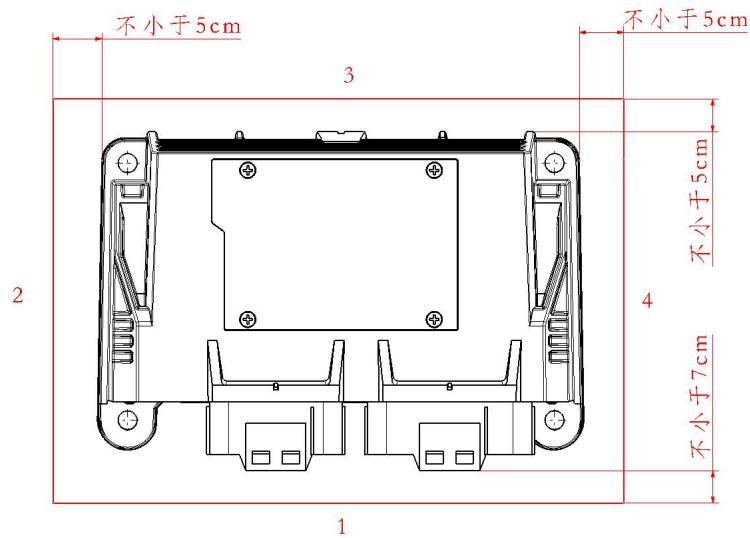


图 2

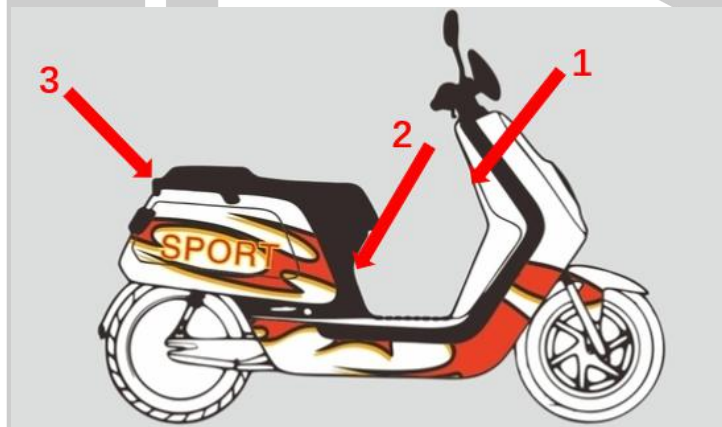


图 3

9. Battery Pack Characteristics 电池组特性

Type 类型:	Nickel Metal Hydride 镍金属氢化物
Nominal voltage 额定电压:	3.6V
Typical capacity 典型容量:	600mAh
Size 尺寸:	49 x 32.5 x 11.9mm (maximum 最大)
Weight 重量:	Approx.38g
Storage temperature 保持温度(≤30 days)	-40°C to +85°C
Discharging temperature 放电温度:	-20°C to +85°C
Charging temperature 充电温度:	0°C to +40°C

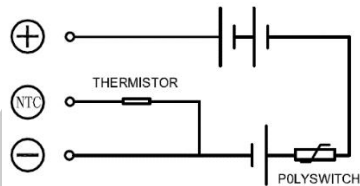
Temperature sensor 温度传感器:

NTC

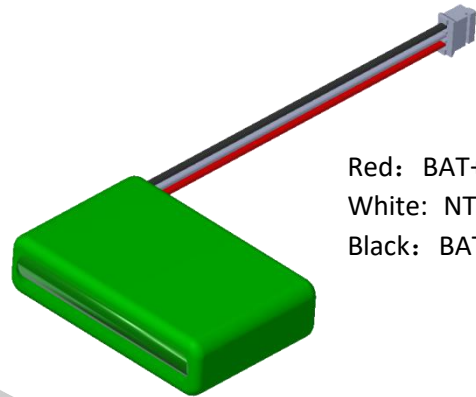
Protection 保护:

Polyswitch 自恢复保险丝

CIRCUIT



极限条件下: -20℃, 系统断电
可满足系统≥10 分钟联网+数据上传



Red: BAT+
White: NTC
Black: BAT-

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10. Label & Mark 标记标签

本规格书适用项目清单:

BST 项目编号	短号	项目名称	客户 PN	客户车型	BMS 供应商
3004008-035	V0835	VCU for CF EB80 SA(BST BMS)	EB80-440100-1100-M3	EB80	BST
3004008-036	V0836	VCU for CF EB80 SA(FN BMS)	EB80-440100-1200-M3	EB80	FN
3004008-037	V0837	VCU for CF FA80 SA(BST BMS)	FA80-440100-1000-M3	FA80	BST
3004008-023	V0823	VCU for CF FA80 SA(ATL BMS)	FA8V-440100-1300-M3	FA80	ATL
3004008-038	V0838	VCU for CF FA80 SA(FN BMS)	FA80-440100-1200-M3	FA80	FN
3004008-039	V0839	VCU for CF FB60 SA(ATL BMS)	FB60-440100-1300-M3	FB60	ATL

料号对照表

10.1 product label 产品标签

Basic label information: product name, trademark, product model, code, ICCID No, IMEI No, QR code SN, date of production, batch number, name of manufacturer.

标签基本信息: 产品名称、商标、产品型号、代号、SIM 卡卡号、串号、二维码序列号、生产日期、生产批号、生产企业名称。

Label Size/标签尺寸: 60*30mm

标签样例 (实际以标签图纸为准, 料号对照见上述表格):



FA80、FB60 SA 系列产品标签示意图

10.2 Packing box label 外箱标签

Label Size/标签尺寸: 100*90mm

标签样例 (料号对照见上述表格)

 NUPO	 3004008023-FFFFFFFF-EEE-AA
Part Number: FA8V-440100-1300-M3 3004008-023	Box Number: AA
Description: 整车控制器	Quantity/Box (PCS): XX
S0 #: XXXXXXXXXX	Customer PO #: XXXXXXXXXX
Batch #: FFFFFFF	Shipper: 蓝石新动力(常熟)有限公司 江苏省苏州市常熟东南大道788号 先进制造业中心7幢 Tel: 0512-87685330
Net Weight (Kg): XX	Consignee: 浙江春风动力股份有限公司 浙江省杭州市余杭经济开发区五洲路116号 Tel: 0571-89281871
Gross Weight (Kg): XX	

 NUPO	 3004008023-CCCCCCCC-XXA/B-D	
Part Number: FA8V-440100-1300-M3 3004008-023	Pallet Number:D	
	Quantity: /	N0. of Cartons: /
Description: 整车控制器	Net Weight: / Kg	Gross Weight : / Kg
	Shipper: 蓝石新动力(常熟)有限公司 江苏省苏州市常熟东南大道788号 先进制造业中心7幢 Tel: 0512-87685330	
Customer PO/SO #: /	Consignee : 浙江春风动力股份有限公司 浙江省杭州市余杭经济开发区五洲路116号 Tel: 0571-89281871	
	Date: YYYY. MM. DD	

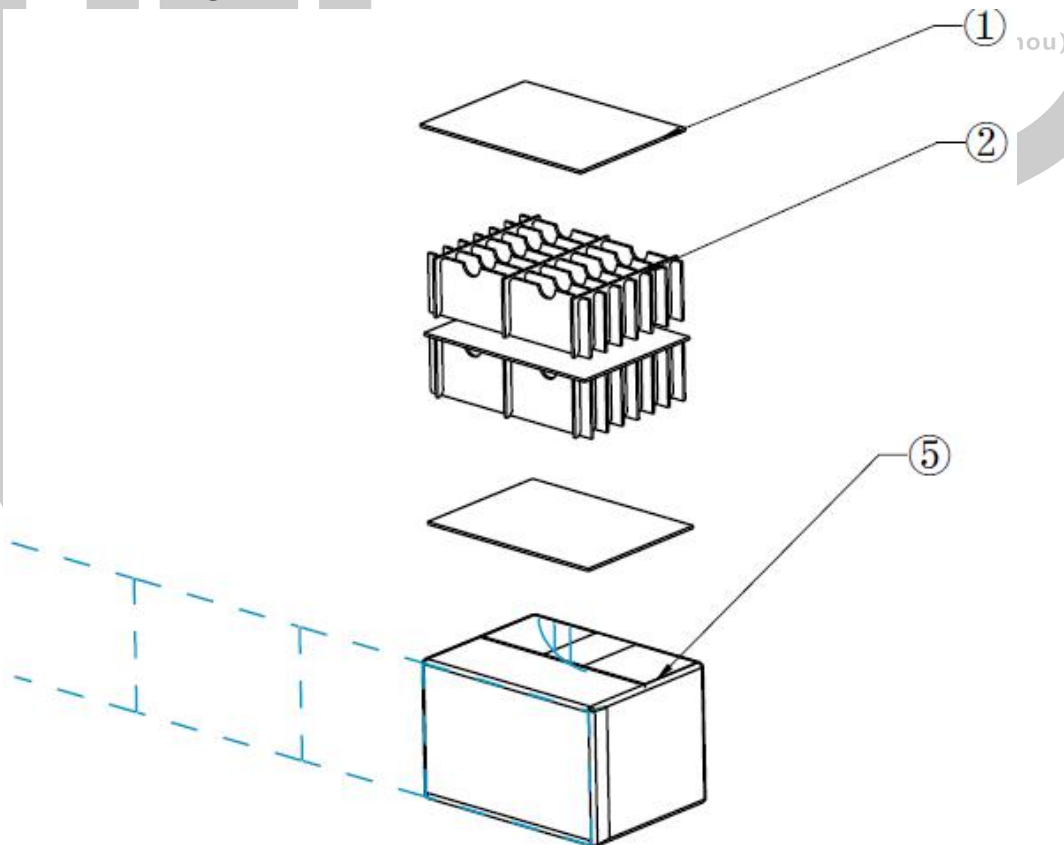
备注: 第一次送样及工程变更后第一次送样增加初物标签。

11. Packaging 包装

Packaging includes: packing material, size, label, quantity, transportation, etc.

包装包括: 包装材料、规格、标签、数量、运输方式等

11.1. Packing method 包装方式

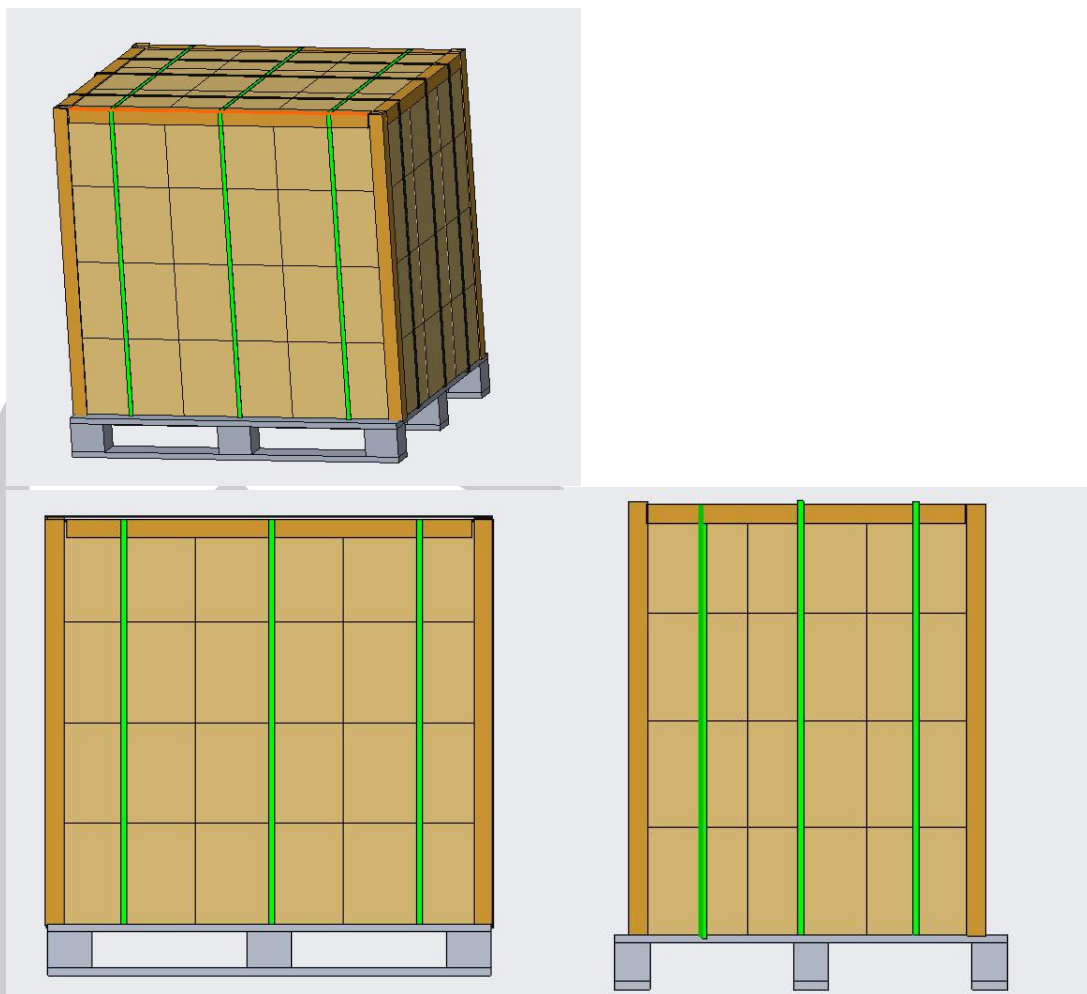


11.2. Product packing list/产品装箱清单:

No. 序号	Name 名称	Description 描述	Consumption per container 单箱消耗用量
1	纸箱	AB/F	1
2	纸垫片	200g 三层楞 A/F/	3
3	长插格	200g 三层楞 A/F/	14
4	短插格	200g 三层楞 A/F/	6
5	气泡袋	气泡膜 18g/m2 d=10	24
6	干燥剂	蒙脱石 15g	1

11.3. 托盘

No.序号	Description 描述
1	Fastening of strap binding; bonding mode: hot welding; 捆扎带捆绑紧固; 结合方式: 热焊;
2	Product wrapping film at least three turns; 产品缠绕膜至少三圈缠绕;
3	864pcs product per pallet = 36pcs carton * 24pcs product 每托 864pcs 产品 = 36pcs 纸箱 * 24pcs 产品;
4	The net weight of one pallet is about 260kg; gross weight is about 300kg 每托盘净重约 260kg; 毛重约: 300kg
5	All current product list per pallet 每托盘放置当前所有产品清单



to third parties is forbidden.

12. Reliability 可靠性

No. 序号	Category 类别	Test items 试验项目	Description 描述	Remark 备注
1	Electrical performance 电气性能	Power supply over voltage 电源过电压	<1>Long-term over voltage: In normal operating mode, test temperature: Tmax-20 °C, apply 16 V voltage to the power input terminal for 1h <1>长时间过电压: 在正常工作模式下, 测试温度: Tmax-20°C, 对电源输入端施加 16 V 电压 1h <2>Short-time over voltage: Apply (16)V voltage to the power input for (60±6) s in normal operation mode <2>短时间过电压: 在正常工作模式下, 对电源输入端施加 (16) V 电压(60±6) s	ISO 16750 2 4.2
2		Reverse voltage resistance	Apply reverse voltage: 14V Test time: 60s	ISO 16750 2 4.3

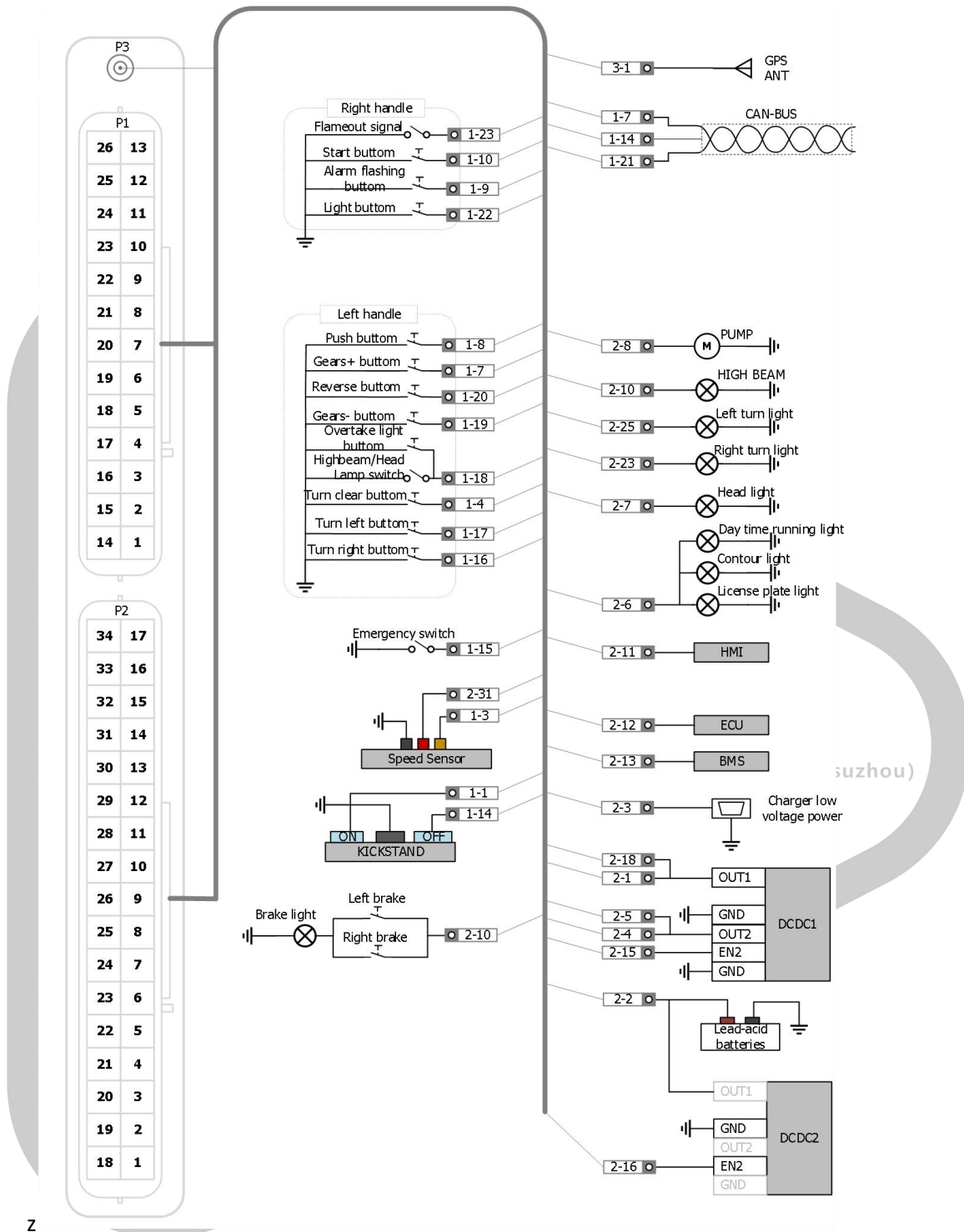
		耐反向电压	施加反向电压: 14V 试验时间: 60s	
3	Environmental test 环境试验类	Low temperature storage 低温储存	Test temperature: -40 °C Test time: 24h 试验温度: -40°C 试验时间: 24h	ISO 16750 4 5.1.1.1
4		High temperature storage 高温储存	Test temperature: 85°C Test time: 48h 试验温度: 85°C 试验时间: 48h	ISO 16750 4 5.1.1.2
5		Low temperature working test 低温工作试验	Test temperature: -40°C Test time: 24h 试验温度: -40°C 试验时间: 24h	ISO 16750 4 5.1.2.1
6		High temperature working test 高温工作试验	Test temperature: 85 °C Test time: 96h 试验温度: 85°C 试验时间: 96h	ISO 16750 4 5.1.2.2
7		Temperature cycle test 温度循环试验	Temperature range: -40 °C ~85 °C Test cycle: 30cycles 温度范围: - 40°C~85°C 试验循环周期: 30cycles	ISO 16750 4 5.3.1
8		Thermal shock test 冷热冲击试验	Temperature range: -40°C ~ 85°C Test cycle: 100cycles 温度范围: - 40°C~85°C 试验循环周期: 100cycles	ISO 16750 4 5.3.2
9		Dust proof experiment 防尘试验	Dust proof grade: IP6X. Simulated dust: talcum powder; Dust usage: 2 kg/m³; Whether to pump: yes; Test time: 8 hours 防尘等级: IP6X。 模拟粉尘: 滑石粉; 粉尘使用量: 2 kg/m³; 是否抽气: 是; 试验时间: 8 h	GB/T 4208-2017

10	Waterproof experiment 防水试验	Waterproof grade: IPX7 1. The lowest point of the shell with height less than 850mm shall be 1000mm lower than the water surface 2. The highest point of the shell with height equal to or greater than 850mm shall be 150 mm lower than the water surface 3. Test time: 30min; 4. The temperature difference between the water temperature and the sample shall not be greater than 5 °C(difference in test of multiple groups of samples) 防水等级: IPX7 1.高度小于 850mm 的外壳的最低点, 应低于水面 1000mm 2.高度等于或大于 850mm 的外壳的最高点, 应低于水面 150mm 3. 试验时间: 30min 4.水温与试样温差不大于 5°C(多组样品测试时差异)	GB/T 4208-2017/ISO 20653
11	Salt spray test 盐雾试验	1.Salt solution concentration: $5 \pm 1\%$ 2.PH value of test solution: 6.5 ~ 7.2 3.Temperature in the chamber: 35°C 4.Spray concentration: 1-2ml 5.Test time: 48H 1.盐溶液浓度: $5 \pm 1\%$ 2.试验溶液 PH 值: 6.5~7.2 3.试验箱体内温度: 35°C 4.喷雾浓度: 1-2ml 5.测试时间: 48h	GB/T 2423.17/IEC 68 2-11
12	Random Vibration Test 随机振动试验	1、Frequency range: (10~1000)Hz. 2. Test time: 8h/axis. 3. Test axis: X axis, Y axis, Z axis. 1、频率范围: (10~1000)Hz. 2、试验时间: 8h/axis。 3、试验轴向: X axis、Y axis、Z axis。	ISO 16750.3
13	Sweep frequency vibration test 扫频振动试验	1. Vibration frequency 10-25Hz, amplitude 1.2mm; 25~500Hz, acceleration 30m/s ² ; 2. Frequency sweep rate 1oct/min; 3. Test time: 8h/axis.	QC/T 413

			1、振动频率 10-25Hz, 振幅 1.2mm; 25~500Hz, 加速度 30m/s ² ; 2、扫频速率 1oct/min; 3、试验时间: 8h/axis。	
14		Mechanical Shock Test 机械冲击试验	1.Waveform: half sine wave; 2. Peak acceleration: 50g; 3. Pulse duration: 6ms; 4. Impact times in each axis direction: 10 times ($\pm X, \pm Y, \pm Z$). 1、波形: 半正弦波; 2、峰值加速度: 50g; 3、脉冲持续时间: 6ms; 4、每个轴线方向上的冲击次数: 10 次($\pm X, \pm Y, \pm Z$)。	ISO 16750.3
15	EMC 电磁兼容	EMC 电磁兼容	According to ECE R10.05-2014 依据 GB 34660-2017/ECE R10.05	GB 34660-2017/ECE R10.05
16		ESD 静电放电试验	According to GB/T 19951-2019 Grade : L3 依据标准 GB/T 19951-2019 等级 : L3 工作状态: 接触放电: $\pm 6\text{kV}$, 空气放电: $\pm 8\text{kV}$ 非工作状态: 接触放电: $\pm 6\text{kV}$, 空气放电: $\pm 15\text{kV}$	GB/T 19951-2019

13. Annex I 附件 1

Typical application/典型应用



14. Matters Needing Attention 注意事项

Please note that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with radio frequency exposure limits set forth by the FCC for an uncontrolled environment.

This equipment should be installed and operated with a minimum distance of 20 cm between the device and the user or bystanders.

This device must not be co-located or operating in conjunction with any other antenna or transmitter.