

SAFETY DATA SHEET

Date of issue 31-5-2023

Canada/English

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier

Product Name Rechargeable Li-ion battery pack BRR-2P4S-5200SL

Other means of identification

Recommended use of the chemical and restrictions on use

Recommended Use LITHIUM ION BATTERIES

Uses advised against No information available

Details of the supplier of the safety data sheet

Initial supplier identifier De.power Technology Limited

Address NO.16 Hongyun Road, Lanjiang Street, Lanxi County, Jinhua City, Zhejiang Province

Telephone 13823288548

E-mail xiangjing@sunwoda.com

Emergency telephone number

Company Emergency Phone Number 0755-29516888

2. HAZARDS IDENTIFICATION

Classification

This is a battery. In case of rupture:

Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2A
Carcinogenicity	Category 2
Specific target organ toxicity (repeated exposure)	Category 1

GHS Label elements, including precautionary statements

Danger

Hazard statements

This is a battery. In case of rupture:.

Causes skin irritation

Causes serious eye irritation

Suspected of causing cancer

Causes damage to organs through prolonged or repeated exposure



Precautionary Statements - Prevention

Obtain special instructions before use

Do not handle until all safety precautions have been read and understood Wear protective gloves/protective clothing/eye protection/face protection Wash face, hands and any exposed skin thoroughly after handling

Do not breathe dust/fume/gas/mist/vapors/spray Do not eat, drink or smoke when using this product

Precautionary Statements - Response

IF exposed or concerned: Get medical advice/attention

Specific treatment (see supplemental first aid instructions on this label)

Eyes

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing If eye irritation persists: Get medical advice/attention

Skin

IF ON SKIN: Wash with plenty of water and soap

If skin irritation occurs: Get medical advice/attention Take off contaminated clothing and wash it before reuse

Precautionary Statements - Storage

Store locked up

Precautionary Statements - Disposal

Dispose of contents/container to an approved waste disposal plant

Other information

Very toxic to aquatic life with long lasting effects

Unknown acute toxicity

30.9 % of the mixture consists of ingredient(s) of unknown toxicity

30.9 % of the mixture consists of ingredient(s) of unknown acute oral toxicity

30.9 % of the mixture consists of ingredient(s) of unknown acute dermal toxicity

30.9 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (gas)

30.9 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (vapor)

30.9 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (dust/mist)

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance

Not applicable.

Mixture

Chemical name	CAS-No	Percent(%)) Max	Hazardous Material Information Review Act registry number (HMIRA registry #)	Date HMIRA filed and date exemption granted (if applicable)
Aluminum	7429-90-5	3.21%	-	-
Cobalt lithium manganese nickel oxide	182442-95-1	35.5%	-	-
1,1-Difluoroethylene polymer	24937-79-9	0.45%	-	-
Styrene-Butadiene polymer	9003-55-8	0.4%	-	-
Copper	7440-50-8	6.38%	-	-
Graphite	7782-42-5	19.15%	-	-
Phosphate(1-), hexafluoro-, lithium	21324-40-3	1.9%	-	-
Iron	7439-89-6	16.17%	-	-
Dimethyl carbonate	616-38-6	8.29%	-	-
Ethylene carbonate	96-49-1	2.37%	-	-
Carbonate, methyl ethyl	623-53-0	1.18%	-	-
Sodium carboxymethyl cellulose	9004-32-4	0.3%	-	-
Polypropylene	9003-07-0	2.07%	-	-
Polyethylene terephthalate	25038-59-9	2.63%	-	-

4. FIRST AID MEASURES

First aid measures

General advice	First aid is upon rupture of sealed battery. IF exposed or concerned: Get medical advice/attention. Show this safety data sheet to the doctor in attendance.
Inhalation	Remove to fresh air. Get medical attention immediately if symptoms occur.
Eye contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Keep eye wide open while rinsing. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists. Do not rub affected area.
Skin contact	Wash off immediately with soap and plenty of water for at least 15 minutes. Get medical attention if irritation develops and persists.
Ingestion	Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Do NOT induce vomiting. Call a physician.
Self-protection of the first aider	Avoid contact with skin, eyes or clothing. Wear personal protective clothing (see section 8).

Most important symptoms and effects, both acute and delayed

Symptoms	Burning sensation.
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Indication of any immediate medical attention and special treatment needed

Note to physicians	Treat symptomatically.
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5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Unsuitable extinguishing media	CAUTION: Use of water spray when fighting fire may be inefficient.

Specific hazards arising from the chemical .	No information available
Hazardous Combustion Products	Carbon oxides.
Explosion Data	
Sensitivity to Mechanical Impact	None.
Sensitivity to Static Discharge	None.
Special protective equipment for fire-fighters	Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions	Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Use personal protective equipment as required. Evacuate personnel to safe areas.
Other Information	Refer to protective measures listed in Sections 7 and 8.
Environmental precautions	Prevent further leakage or spillage if safe to do so.

Methods and material for containment and cleaning up

Methods for containment	Prevent further leakage or spillage if safe to do so.
Methods for cleaning up	Pick up and transfer to properly labeled containers.
Prevention of secondary hazards	Clean contaminated objects and areas thoroughly observing environmental regulations.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling	In case of rupture: Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Do not eat, drink or smoke when using this product. Take off contaminated clothing and wash before reuse.
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Conditions for safe storage, including any incompatibilities

Storage Conditions	Keep containers tightly closed in a dry, cool and well-ventilated place. Protect from moisture. Store locked up. Keep out of the reach of children. Store away from other materials.
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8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Limits	The following ingredients are the only ingredients of the product above the cut-off level (or level that contributes to the hazard classification of the mixture) which have an exposure limit applicable in the region for which this safety data sheet is intended or other recommended limit. At this time, the other relevant constituents have no known exposure limits from the sources listed here.
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Chemical name	ACGIH TLV	OSHA PEL	NIOSH IDLH
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Copper 7440-50-8	TWA: 0.2 mg/m ³ fume	TWA: 0.1 mg/m ³ fume TWA: 1 mg/m ³ dust and mist (vacated) TWA: 0.1 mg/m ³ Cu dust, fume, mist	IDLH: 100 mg/m ³ dust, fume and mist TWA: 1 mg/m ³ dust and mist TWA: 0.1 mg/m ³ fume
Aluminum 7429-90-5	TWA: 1 mg/m ³ respirable particulate matter	TWA: 15 mg/m ³ total dust TWA: 5 mg/m ³ respirable fraction (vacated) TWA: 15 mg/m ³ total dust(vacated) TWA: 5 mg/m ³ respirable fraction	TWA: 10 mg/m ³ total dust TWA: 5 mg/m ³ respirable dust
Phosphate(1-), hexafluoro-, lithium 21324-40-3	TWA: 2.5 mg/m ³ F	TWA: 2.5 mg/m ³ F (vacated) TWA: 2.5 mg/m ³	IDLH: 250 mg/m ³ F

Chemical name	Alberta	British Columbia	Ontario TWA EV	Quebec
Copper 7440-50-8	TWA: 0.2 mg/m ³ TWA: 1 mg/m ³	TWA: 1 mg/m ³ TWA: 0.2 mg/m ³	TWA: 0.2 mg/m ³ TWA: 1 mg/m ³	TWA: 0.2 mg/m ³ TWA: 1 mg/m ³
Aluminum 7429-90-5	TWA: 10 mg/m ³	TWA: 1.0 mg/m ³	TWA: 1 mg/m ³	TWA: 10 mg/m ³
Phosphate(1-), hexafluoro-, lithium 21324-40-3	TWA: 2.5 mg/m ³	TWA: 2.5 mg/m ³	TWA: 2.5 mg/m ³	TWA: 2.5 mg/m ³

Other Exposure Guidelines

Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

Appropriate engineering controls

Engineering controls

Showers
Eyewash stations
Ventilation systems.

Individual protection measures, such as personal protective equipment

Eye/face protection

If splashes are likely to occur, wear safety glasses with side-shields.

Hand protection

Wear suitable gloves. Impervious gloves.

Skin and body protection

Wear suitable protective clothing. Long sleeved clothing.

Respiratory protection

No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

General hygiene considerations

Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using this product. Wash hands before breaks and immediately after handling the product. Wear suitable gloves and eye/face protection. Avoid contact with skin, eyes or clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical and Chemical Properties

Physical state	Solid
Appearance	Blue
Odor	Odorless
Color	No information available
Odor Threshold	Not applicable

<u>Property</u>	<u>Values</u>	<u>Remarks Method</u>
pH	No data available	None known
Melting / freezing point	No data available	None known
Boiling point / boiling range	No data available	None known
Flash Point	No data available	None known
Evaporation Rate	No data available	None known
Flammability (solid, gas)	No data available	None known
Flammability Limit in Air		None known
Upper flammability limit	No data available	
Lower flammability limit	No data available	
Vapor pressure	No data available	None known
Vapor density	No data available	None known
Relative density	No data available	None known
Water Solubility	Insoluble in water	
Solubility(ies)	No data available	None known
Partition coefficient: n-octanol/water ¹		
Autoignition temperature	No data available	None known
Decomposition temperature	No data available	
Kinematic viscosity	No data available	
Dynamic viscosity		
<u>Other Information</u>		
Explosive properties	No information available.	
Oxidizing properties	No information available.	
Softening Point	No information available	
Molecular Weight	No information available	
VOC Content (%)	No information available	
Liquid Density	No information available	
Bulk Density	No information available	
Particle Size	No information available	
Particle Size Distribution	No information available	

10. STABILITY AND REACTIVITY

Reactivity	No information available.
Chemical stability	Stable under normal conditions.
Possibility of Hazardous Reactions	None under normal processing.
Hazardous Polymerization	Hazardous polymerization does not occur.
Conditions to avoid	None known based on information supplied.
Incompatible materials	Strong acids. Strong bases. Strong oxidizing agents.
Hazardous Decomposition Products	Carbonoxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information	Product does not present an acute toxicity hazard based on known or supplied information In case of rupture:
Inhalation	Specific test data for the substance or mixture is not available. May cause irritation of respiratory tract.
Eye contact	Specific test data for the substance or mixture is not available. Causes serious eye irritation. (based on components). Irritating to eyes.

Skin contact	Specific test data for the substance or mixture is not available. Causes skin irritation. (based on components).
Ingestion	Specific test data for the substance or mixture is not available. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Information on toxicological effects

Symptoms Redness. Burning. May cause blindness. Coughing and/ or wheezing

Numerical measures of toxicity

Acute Toxicity

The following values are calculated based on chapter 3.1 of the GHS document .

ATEmix (oral)	12,452.00 mg/kg
ATEmix (dermal)	9,132.00 mg/kg

Unknown acute toxicity 30.9 % of the mixture consists of ingredient(s) of unknown toxicity
 30.9 % of the mixture consists of ingredient(s) of unknown acute oral toxicity
 30.9 % of the mixture consists of ingredient(s) of unknown acute dermal toxicity
 30.9 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (gas)
 30.9 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (vapor)
 30.9 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (dust/mist)

Component Information

Chemical name	Oral LD50	Dermal LD50	Inhalation LC50
Copper	-	-	> 5.11 mg/L (Rat) 4 h
Aluminum	-	-	> 0.888 mg/L (Rat) 4 h

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Skin corrosion/irritation	Classification based on data available for ingredients. Irritating to skin.
Serious eye damage/eye irritation	Classification based on data available for ingredients. Irritating to eyes.
Respiratory or skin sensitization	No information available.
Germ cell mutagenicity	No information available.
Carcinogenicity	Classification based on data available for ingredients. Contains a known or suspected carcinogen.

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)
 A3 - Animal Carcinogen
IARC (International Agency for Research on Cancer)
 Group 2B - Possibly Carcinogenic to Humans
NTP (National Toxicology Program)
 Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen
OSHA (Occupational Safety and Health Administration of the US Department of Labor)
 X - Present

Reproductive toxicity	No information available.
STOT - single exposure	No information available.
STOT - repeated exposure	Causes damage to organs through prolonged or repeated exposure.
Aspiration hazard	No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity Very toxic to aquatic life with long lasting effects.

Chemical name	Algae/aquatic plants	Toxicity to Fish	Toxicity to Microorganism	Crustacea
Copper foil	96h EC50: 0.031 - 0.054 mg/L (Pseudokirchneriella subcapitata) 72h EC50: 0.0426 - 0.0535 mg/L (Pseudokirchneriella subcapitata)	96h LC50: 0.0068 - 0.0156 mg/L (Pimephales promelas) 96h LC50: < 0.3 mg/L (Pimephales promelas)	No data available	48h EC50: = 0.03 mg/L (Daphnia magna)

Persistence and Degradability No information available.

Bioaccumulation No information available

Mobility No information available.

Other adverse effects No information available.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Waste from residues/unused products	Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.
Contaminated packaging	Do not reuse empty containers.

14. TRANSPORT INFORMATION

Note: The transportation of primary lithium cells and batteries is regulated by the International Civil Aviation Organization, International Air Transport Association, International Maritime Dangerous Goods Code and the US Department of Transportation. The batteries must meet the following criteria for shipment: 1. Air shipments must meet the requirements listed in Special Provision A45 of the International Air Transport Association Dangerous Goods Regulations. 2. Meet the requirements for the US Department of Transportation listed in 49 CFR 173.185. 3. The transport of primary lithium batteries is prohibited aboard passenger aircraft. Refer to the Federal Register December 15, 2004 (Hazardous Materials; Prohibited on the Transportation of Primary Lithium Batteries and Cells Aboard Passenger Aircraft; Final Rule)

Lithium batteries shipped as "Lithium batteries", "Lithium batteries packed with equipment", or "Lithium batteries contained in equipment" may not be classified as "Dangerous Goods" when shipped in accordance with "special provision A45 of IATA-DGR" or "special provision 188 of IMO-IMDG Code"

TDG Not regulated

DOT NOT REGULATED
Proper Shipping Name NON-REGULATED
Hazard Class N/A
Emergency Response Guide Number 147

MEX Not regulated

ICAO Not regulated

IATA
UN-No. UN3480
Proper Shipping Name LITHIUM ION BATTERIES
Hazard Class 9
ERG Code 12FZ
Description Lithium Battery Mark, Class 9 lithium battery hazard label, Cargo Aircraft Only Label.

IMDG/IMO Not regulated
Hazard Class N/A
EmS-No. F-A, S-I

RID Not regulated

ADR Not regulated

ADN Not regulated

15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture

International Regulations

Ozone-depleting substances (ODS) Not applicable

Persistent Organic Pollutants Not applicable

Export Notification requirements Not applicable

International Inventories

TSCA	Contact supplier for inventory compliance status.
DSL/NDSL	Contact supplier for inventory compliance status.
EINECS/ELINCS	Contact supplier for inventory compliance status.
ENCS	Contact supplier for inventory compliance status.
KECL	Contact supplier for inventory compliance status.
PICCS	Contact supplier for inventory compliance status.
AICS	Contact supplier for inventory compliance status.

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

<u>NFPA</u>	Health hazards 1	Flammability 0	Instability 0	Physical and Chemical Properties -
<u>HMIS</u>	Health hazards 0	Flammability 0	Physical hazards 0	Personal Protection X

Prepared By Shenzhen Precise Testing Technology Co., Ltd.

Issuing Date 31-50-2023

Revision Note No information available

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of Safety Data Sheet

Inhalation Statement	dust
Not Hazardous	This is a battery. In case of rupture:
Hazard statements	Causes damage to organs through prolonged or repeated exposure
Signal word	Danger
Precautionary Statements	P302 + P352 - IF ON SKIN: Wash with plenty of water and soap P321 - Specific treatment (see supplemental first aid instructions on this label) P332 + P313 - If skin irritation occurs: Get medical advice/attention P362 + P364 - Take off contaminated clothing and wash it before reuse P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing P337 + P313 - If eye irritation persists: Get medical advice/attention P201 - Obtain special instructions before use P202 - Do not handle until all safety precautions have been read and understood P280 - Wear protective gloves/protective clothing/eye protection/face protection P308 + P313 - IF exposed or concerned: Get medical advice/attention P405 - Store locked up P260 - Do not breathe dust/fume/gas/mist/vapors/spray P264 - Wash face, hands and any exposed skin thoroughly after handling P270 - Do not eat, drink or smoke when using this product P314 - Get medical advice/attention if you feel unwell P501 - Dispose of contents/ container to an approved waste disposal plant
Signal word	Danger
Skin corrosion/irritation	Category 2

Hazard statements	Causes skin irritation
Signal word	Warning
Serious eye damage/eye irritation	Category 2A
Hazard statements	Causes serious eye irritation
Signal word	Warning
Carcinogenicity	Category 2
Hazard statements	Suspected of causing cancer
Signal word	Warning
Specific target organ toxicity (repeated exposure)	Category 1
Skin corrosion/irritation	- (H315)
Serious eye damage/eye irritation	- (H319)
Carcinogenicity	- (H351)
STOT - repeated exposure	- (H372)
STOT - repeated exposure	

Graphic



Graphic



Graphic



Hazard statements	Causes skin irritation Causes serious eye irritation Suspected of causing cancer Causes damage to organs through prolonged or repeated exposure
Hazard statements	H315 - Causes skin irritation H319 - Causes serious eye irritation H351 - Suspected of causing cancer H351 - Suspected of causing cancer H372 - Causes damage to organs through prolonged or repeated exposure H372 - Causes damage to organs through prolonged or repeated exposure
Precautionary Statements - EU (§28, 1272/2008)	P103 - Read label before use P280 - Wear face protection P370 + P378 - In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish P234 - Keep only in original container P303 - IF ON SKIN (or hair):
Precautionary Statements	IF ON SKIN: Wash with plenty of water and soap IF ON SKIN: Wash with plenty of water and soap If skin irritation occurs: Get medical advice/attention If skin irritation occurs: Get medical advice/attention Take off contaminated clothing And wash it before reuse Take off contaminated clothing and wash it before reuse Take off contaminated clothing and wash it before reuse IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing If eye irritation persists: Get medical advice/attention If eye irritation persists: Get medical advice/attention Obtain special instructions before use Obtain special instructions before use Do not handle until all safety precautions have been read and understood Do not handle until all safety precautions have been read and understood Wear protective gloves Wear protective gloves IF exposed or concerned: Get medical advice/attention IF exposed or concerned: Get medical advice/attention Store locked up Do not breathe dust/fume/gas/mist/vapors/spray Do not breathe dust/fume/gas/mist/vapors/spray Do not breathe dust/fume/gas/mist/vapors/spray Do not eat, drink or smoke when using this product Do not eat, drink or smoke when using this product Get medical advice/attention if you feel unwell Get medical advice/attention if you feel unwell
Skin	IF ON SKIN: Wash with plenty of water and soap If skin irritation occurs: Get medical advice/attention Take off contaminated clothing and wash it before reuse

Precautionary Statements	P302 + P352 - IF ON SKIN: Wash with plenty of water and soap P321 - Specific treatment (see supplemental first aid instructions on this label) P332 + P313 - If skin irritation occurs: Get medical advice/attention P362 + P364 - Take off contaminated clothing and wash it before reuse P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing P337 + P313 - If eye irritation persists: Get medical advice/attention P201 - Obtain special instructions before use P202 - Do not handle until all safety precautions have been read and understood P280 - Wear protective gloves/protective clothing/eye protection/face protection P308 + P313 - IF exposed or concerned: Get medical advice/attention P405 - Store locked up P260 - Do not breathe dust/fume/gas/mist/vapors/spray P264 - Wash face, hands and any exposed skin thoroughly after handling P270 - Do not eat, drink or smoke when using this product P314 - Get medical advice/attention if you feel unwell P501 - Dispose of contents/ container to an approved waste disposal plant
Precautionary Statements - Prevention	Obtain special instructions before use Do not handle until all safety precautions have been read and understood Wear protective gloves/protective clothing/eye protection/face protection Wash face, hands and any exposed skin thoroughly after handling Do not breathe dust/fume/gas/mist/vapors/spray Do not eat, drink or smoke when using this product
Precautionary Statements - Response	IF exposed or concerned: Get medical advice/attention Specific treatment (see supplemental first aid instructions on this label)
Eyes	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing If eye irritation persists: Get medical advice/attention
Skin	IF ON SKIN: Wash with plenty of water and soap If skin irritation occurs: Get medical advice/attention Take off contaminated clothing and wash it before reuse
Precautionary Statements - Storage	Store locked up
Precautionary Statements - Disposal	Dispose of contents/container to an approved waste disposal plant
The following values are calculated based on chapter 3.1 of the GHS document	
ATEmix (oral)	12,452.00
Units	mg/kg
ATEmix (dermal)	9,132.00
Units	mg/kg
Contains Carbon black, Phosphate(1-), hexafluoro-, lithium	
Unknown acute toxicity	90.77 % of the mixture consists of component(s) of unknown hazards to the aquatic environment
Unknown Acute Aquatic Toxicity	90.77
Unknown Chronic Aquatic Toxicity	90.77
Product ATE Oral Status	1
Product ATE Dermal Status	1
Product ATE Inhalation - Gas Status	1
Product ATE Inhalation - Vapor Status	1
Product ATE Inhalation - Dust/Mist Status	1
Product Skin Corrosion Status	1
Product Eye Damage Status	1
Product Respiratory Sens. Status	1
Product Skin Sensitization Status	1
Product Mutagenic Status	1
Product Carcinogenic Status	1
Product Reproductive Toxicity Status	1
Product STOT Single Status	1
Product STOT Repeated Status	1
Product Aquatic Toxicity Status	1
Product Aspiration Toxicity Status	1
Product Ozone Status	1
Product and Component Overall	1
Classification Status	
STOT - repeated exposure	- (H372)
Unknown acute toxicity	30.9 % of the mixture consists of ingredient(s) of unknown toxicity
30.9 % of the mixture consists of ingredient(s) of unknown acute oral toxicity	
30.9 % of the mixture consists of ingredient(s) of unknown acute dermal toxicity	
30.9 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (gas)	
30.9 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (vapor)	
30.9 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (dust/mist)	
Symbols/Pictograms	
Symbols/Pictograms	
Other hazards	Very toxic to aquatic life with long lasting effects
Health hazards	Skull and Crossbones
Health hazards	Exclamation mark
Inhalation Statement	dust
Health hazards	1

BRR-2P4S-5200FL Battery Specification

Product Type:	Li-ion Cylindrical Rechargeable Battery Pack
Product Name:	BRR-2P4S-5200FL
Product No :	RH5G09010188

Created by : _____ Date: _____

Standard by : _____ Date: _____

Checked by : _____ Date: _____

Project manager : _____ Date: _____

Approved by : _____ Date: _____

Customer	Checked by	Approved by

修订记录/Revision history

Version	Prepared by	Date	Approval by	Remark
V1.0	游国雄	2023-01-12	吴清浪	初版
V1.1	游国雄	2023-01-30	吴清浪	1、更新外形尺寸图 2、调整ID电阻值为105K 3、更新器件清单
V1.2	游国雄	2023-01-30	吴清浪	1、新增线束图表及PCB UL信息 2、客户需求，调整充放电低温保护值 3、产品名称修改 4、删除铭牌标签
V1.3	游国雄	2023-02-21	吴清浪	1、新增连接器、热缩膜和线束认证号； 2、更新外形尺寸图和线束图纸； 3、更新铭牌标签。 4、更新参考标准为 SJ/T 11778-2021 5、补充放电截止电压，更新充电上限电压及充电限制电压英文描述
V1.4	游国雄	2023-03-02	吴清浪	1、调整充电上限电压值； 2、调整放电截止电压值； 3、更新外部短路条件。 4、更新环境温度条件。
V1.5	游国雄	2023-03-20	吴清浪	1、调整出厂电池电压为 14.7~15.0V； 2、更新铭牌标签； 3、更新电池外形尺寸图。 4、更新包装图纸。 5、优化电气性能中标准充电、标准放电容量、高温放电、低温放电、荷电保持容量的描述及判定标准； 6、删除一年储存特性测试，及恒定湿热测试。 7、器件清单增加新的替代料信息
V1.6	游国雄	2023-03-28	吴清浪	1、环境安全试验条件更新 2、电路原理图更新 3、结构外形尺寸图更新
V1.7	游国雄	2023-03-28	吴清浪	1、更新外形尺寸图 2、铭牌标签 3、更新产品名称与铭牌一致

				4、修改放电终止电压为 12V
V1.8	游国雄	2023-05-20	吴清浪	1、修改放电终止电压为 11V 2、修改充电环境温度下限为 0℃，放电环境温度下限为-20℃ 3、注意事项增加中文说明 4、更新电芯型号与 CB 证书一致 5、新增电芯重量和尺寸参数 6、新增电池工作电芯表面温度参数 7、补充各国认证参考标准 8、新增制造商/生产商英文名称和地址 9、补充废弃方式
V1.9	游国雄	2023-05-22	吴清浪	1、线束端子（充/放电）型号更改为瀚荃 CP3504SGO1S-G 2、增加电芯条码规则及电芯产地信息 3、铭牌更新
V2.0	游国雄	2023-05-27	吴清浪	1、电芯生产厂增加英文名称 2、线束连接器型号更新
V2.1	游国雄	2023-06-06	吴清浪	NTC1 增加导热胶，更新履历
V2.2	游国雄	2023-06-09	吴清浪	更新铭牌
V2.3	游国雄	2023-12-14	揭亚旺	1、更新结构图纸 2、封面、页眉、页脚更新
V2.4	游国雄 陈丽敏	2024-05-27	揭亚旺 林致志	1、越南版新建品号 2、更新越南版铭牌图纸 3、修改生厂商信息

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1. Scope/范围

The specification describes the requirements for BRR-2P4S-5200FL Rechargeable Li-Ion battery pack.

Battery supplied by VIET NAM SCUD POWER TECHNOLOGY COMPANY LIMITED

本规格书适用于 BRR-2P4S-5200FL 锂离子电池，由越南飞毛腿动力科技有限公司生产。

2. Standard compliance/参考标准

SJ/T 11778-2021、IEC 62133-2:2017+A1:2021、UN38.3、EN 61000-6-3:2007+A1:2011、
ENIEC 61000-6-1:2019、2006/66/EC 、2013/56/EU、UL 2595（随整机测试）

3. Product name and model/产品型号名称

3.1 Product Name/产品名称: Li-ion Cylindrical Rechargeable Battery Pack

3.2 Product Model/产品型号: BRR-2P4S-5200FL

4. Typical Characteristics/主要参数

4.1 Cell Characteristics/电芯参数

No	Item 项目	Performance target 性能指标	Remark 备注
1	Cell Supplier/电芯厂家	EVE	
2	Cell Model/电芯型号	Lithium-ion rechargeable cell Model :ICR18650/26V	生产厂：宁波亿纬创能锂电池有限公司 Factory: Ningbo EVE Hyperpower Lithium Batteries Inc.
3	Rated Capacity/额定容量	Nominal Capacity 标称容量：2600mAh Minimum Capacity 最小容量：2500mAh	Charge:0.2C,4.2V,CCCV 50mA cut-off Discharge :0.2C,2.5V,DC cut-off
4	Nominal Voltage /标称电压	3.6V	
5	End Voltage of Discharge /放电终止电压	2.5V	



6	Charging Voltage /充电电压	4.2V	
7	Standard charge /标准充电	CCCV,0.2C, 4.2V,50mA, cut-off	
8	Rapid charge /快速充电	CCCV,0.5C, 4.2V,50mA,cut-off	
9	Standard discharge /标准放电	Constant Current: 0.2C 持续电流: 0.2C End Voltage 2.5V 截止电压: 2.5V	
10	Max discharge current /最大放电电流	7.5A	
11	Initial Internal Impedance /初始内阻	$\leq 25\text{m}\Omega$ MAX	Initial Internal Impedance is measured at AC 1Khz at shipping SOC
12	Operation Temperature /工作环境温度	充电: 0 ~ +50 °C 放电: -20 ~ +60 °C	
13	Storage Temperature /贮存温度	1 year 3 months 1 month	0 ~ +25 °C 0 ~ +45 °C 0 ~ +60 °C
14	Cell Weight /电芯重量	47.0g Max	
15	Cell Dimension /电芯尺寸	Height: 65.00 ± 0.15mm Diameter: 18.35 ± 0.10mm	
16	Cell bar code rules /电芯条码规则	见附录 1	

4.2 Battery Characteristics/电池组参数

No.	Item	Specification	Remarks
4.2.1	Typical Capacity /标称容量	5200mAh	Capacity test with 0.2C standard charge and 0.2C standard discharge 以 0.2C 标准充电和 0.2C 标准放电进 行容量测试
	Rated Capacity /额定容量	5000mAh/72Wh	
4.2.2	Nominal voltage /标称电压	14.4V	
4.2.3	Charge method /充电模式	CC/CV	
4.2.4	Upper limit of safe voltage range /充电上限电压	16.8V	The highest safe charging voltage of the pack battery can withstand

4.2.5	Charging limited voltage /充电限制电压		16.8V	
4.2.6	End of discharging voltage /放电终止电压		11V	Capacity test discharge Cut-off voltage is 2.75V/cell
4.2.7	Lower limit of safe voltage range /放电截止电压		10V	Cut-off voltage is 2.5V/cell
4.2.8	Standard Charge Current /标准充电电流		1000mA (0.2C)	Standard Charge Current (Standard current of charger at 0~45℃)
4.2.9	Fast Charge Current /最大充电电流		1750mA	Fast Charge Current (Maximum charging current at 0~15℃)
			2500mA	Fast Charge Current (Maximum charging current at 15~45℃)
4.2.10	Standard Discharge Current /标准放电电流		1000mA (0.2C)	Discharge: 23 ± 3℃, 65% RH max (Recommend discharging current)
4.2.11	Max. Continuous Discharge Current /最大持续放电电流		5200mA	
4.2.12	Max. Pulse Discharge Current /最大瞬时放电电流		9A (<150 ms)	
4.2.13	Weight(g) /重量		About 389 g	
4.2.14	Shipping OCV /出厂电池电压		14.7-15.0V	About 57~65% SOC @0.2C discharge
4.2.15	Internal impedance /电池内阻		≤150 mΩ (initial max.)	AC 1kHz
4.2.16	Operation Temperature /工作环境温度	Charge	0℃ ~ +45℃	/
		Discharge	-20℃ ~ +60℃	/
4.2.17	Operating Cell surface temperature /工作电芯表面温度	Charge	-3℃ ~ +65℃	The whole machine is grade one protection, the battery as the secondary protection /整机一级保护，电池作为二级保护
		Discharge	-23℃ ~ +65℃	
4.2.18	Storage temperature /存储温度	Within 1 month	0℃ ~ +60℃	/
		Within 3 month	0℃ ~ +45℃	
		Within 1 year	0℃ ~ +25℃	

5. Performance/性能

5.1 Electrical characteristics/电气性能

Items	Conditions and others	Performances
Environment /环境	Unless otherwise specified, all test stated in this specification are conducted at 1)temperature: $20 \pm 5^{\circ}\text{C}$; 2)humidity: $\leq 75\%$; 3)atmospheric pressure: 86kPa~106kPa /除非另有规定，本规范中规定的所有试验均在： 1)温度:$20 \pm 5^{\circ}\text{C}$; 2)湿度:$\leq 75\%$; 3)大气压力:86 kpa ~ 106 kpa	
Measure Equipment /测试设备	1) Ammeter and Voltmeter: The ammeter and voltmeter should have an accuracy of the grade 0.5 or higher. 2)Slide caliper: The slide caliper should have less than 0.05mm scale. 3)Impedance meter: The impedance meter with AC 1kHz should be used. /1)电流表和电压表: 电流表和电压表应具有 0.5 级或更高的精度。 2)游标卡尺: 滑动卡尺的刻度应小于 0.05mm。 3)阻抗计: 应使用交流 1kHz 阻抗计。	
Standard Charge /标准充电	Charging the battery with 0.2C of constant current and constant voltage 16.8V at $20 \pm 5^{\circ}\text{C}$. Charge end of current 100mA. /在环境温度 $20 \pm 5^{\circ}\text{C}$ 条件下，以 0.2C 充电，当电池端电压达到充电限制电压 16.8V 时，改为恒压充电,充电截止电流 100mA。	

Standard Discharge Capacity /标准放电容量	Within 10min after standard charge, discharge with 0.2C₅A to end of discharging voltage at 20±5℃. repeat charge and discharge for 2times. The smaller value of the capacity after 2 cycles is taken as the standard discharge capacity. /电池组按标准充电后搁置 10 分钟后, 在 20±5℃ 的温度下以 0.2C₅A 电流放电到放电终止电压。上述实验可以重复 2 次, 取两次充放电完整循环后容量的较小值作为标准放电容量。	Discharge capacity ≥ Rated capacity /放电容量 ≥ 额定容量
High Temperature discharge /高温放电	After standard charged, battery should be stored in a temperature-controlled environment at 45±2℃ for 2 hours. after storage, battery should be discharged with 0.2C₅A to end of discharging voltage. /电池组按标准充电结束后, 将电池组放入 45℃±2℃ 的高温箱中恒温 4h, 然后以 0.2C₅A 电流放电至放电终止电压。	Discharge capacity ≥ 80% Rated capacity /放电容量 ≥ 80% 额定容量
Low Temperature discharge /低温放电	After standard charged, battery should be stored in a temperature-controlled environment at 0±2℃ for 4 hours. after storage, battery should be discharged with 0.2 C₅A to end of discharging voltage. /电池组按标准充电结束后, 将电池组放入 0℃±2℃ 的低温箱中恒温 4h 后, 以 0.2 C₅A 电流放电至放电终止电压。	Discharge capacity ≥ 70% Rated capacity /放电容量 ≥ 70% 额定容量

Storage Characteristics (30 days) /荷电保持容量 (30 天)	A standard charged battery should be stored in a temperature-controlled environment at $20 \pm 5^{\circ}\text{C}$ for 30 days. after storage, battery should be discharged with 0.2 C₅A to end of discharging voltage, the discharge time should meet the requirement. Then, battery should be standard charged and discharged with 0.2 C₅A to end of discharging voltage at $20 \pm 5^{\circ}\text{C}$. The discharge time should meet the requirement. /在环境温度为 $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 条件下, 将充满电电池组开路搁置 30 天后, 在 $20 \pm 5^{\circ}\text{C}$ 的环境温度下以 0.2 C₅A 放电至放电终止电压, 放电容量需要满足规定要求; 然后电池组再以标准充电方式充电后以 0.2 C₅A 电流进行放电至放电终止电压。放电容量需要满足规定要求。	Remaining Capacity (after the storage) $\geq 90\%$ of the standard discharge capacity; Recovery Capacity (after the storage) $\geq 80\%$ of the standard discharge capacity /储存后的剩余容量为标准放电容量的 90%以上; 恢复容量为标准放电容量的 80%以上
Cycle Life /循环寿命	300 cycles charging/discharging is repeated in the below condition: Environment: $20 \pm 5^{\circ}\text{C}$ Charging: 16.8V/1.5A to charging, Charge end of current: 100mA. Discharging: 1.5A Discharge end of voltage: 11V Cell is to be rested for 10min after charged and 30min after discharge. /在环境温度 $20 \pm 5^{\circ}\text{C}$ 的条件下, 以 16.8V/1.5A 充电, 充电截止电流 100mA, 搁置 10min, 然后以 1.5A 电流放电至 11V, 放电结束后, 搁置 30min, 再进行下一个充放电循环。	The battery capacity should be more than 80% of Initial capacity at every 300 cycles. /循环 300 次后电池容量为初始容量 80%以上。

5.2 Environmental Safety Test/环境安全试验

Items	Conditions and others	Performances
Low Pressure /低气压	The standard charged battery is to be stored in the vacuum chamber. After close the vacuum chamber, then reduce the pressure, until the internal pressure is no more than 11.6kPa, and keep for 6 hours. One cycle discharging/charging follow Spec. standard discharge and charge after the test. /充饱电的电池，将其搁置在真空箱中。真空箱密闭后，逐渐减少其内部压力至不高于 11.6kPa(模拟海拔 15240m)并保持 6 小时。 试验后按照规格书定义标准充放电进行一次放电充电循环。	The battery should be no leakage, no fire and no explosion. /电池应不泄露、不起火和不爆炸。
Thermal Shock /温度循环	Battery(standard charged) is repeatedly tested with 10 times heat cycling, which means maintaining the battery for 6 hours at $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and $72^{\circ}\text{C} \pm 2^{\circ}\text{C}$ respectively. The interval of temperature change is kept in 30mins. After cycling, the battery temperature is restored to the ambient temperature of $20 \pm 5^{\circ}\text{C}$. One cycle discharging/charging follow Spec. standard discharge and charge after the test. /电池充满电后，将电池放入温控箱中， 1) 在温度 $72^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 的实验箱中保持 6 小时 2) 将实验箱温度降为 $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$，保持 6 小时 3) 温度转换时间不大于 30 分钟 4) 重复步骤 1)~2)，共循环 10 次。 5) 恢复至 $20 \pm 5^{\circ}\text{C}$ 的环境温度。 试验后按照规格书定义标准充放电进行一次放电充电循环。	The battery should be no leakage, no fire and no explosion. /电池应不泄露、不起火和不爆炸。
Vibration /震动试验	Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration should be a sinusoidal waveform with a logarithmic sweep	The battery should be no leakage, no fire and no explosion. /电池应不泄露、不起火和不爆炸。

	between 7 Hz and 200 Hz and back to 7Hz traversed in 15 minutes. This cycle should be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face. The logarithmic frequency sweep is as follows: from 7 Hz a peak acceleration of 1 gn is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 gn occurs (approximately 50 Hz). A peak acceleration of 8 gn is then maintained until the frequency is increased to 200 Hz. One cycle discharging/charging follow Spec. standard discharge and charge after the test. /电池按规定充电结束后，将电池固定在振动台上，不可使电池变形。采用正弦波进行振动，并以对数扫频方式在 15mins 内从 7Hz 扫频到 200Hz 并返回到 7Hz。振动沿样品互相垂直的三个方向（其中一个方向必须与样品正负极所在平面垂直）进行，每个方向按上述对数扫频方式重复 12 次，振动 3h。 对数扫频方式如下：7Hz~18Hz 保持 9.8m/s² 的峰值加速度。将振幅保持在 0.8mm（位移为 1.6mm）直至峰值加速度达到 78.4m/s²（频率约为 50Hz）。保持 78.4m/s² 的峰值加速度直到频率增长到 200Hz。 试验后按照规格书定义标准充放电进行一次放电充电循环。	
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Acceleration Test /加速度冲击	After charging according to Spec, the battery is fixed on the impact table. In the first 3ms, the minimum average acceleration is 75g.N, the peak acceleration is 150+/-25g.N, and the pulse duration is 6 + / -1ms. The battery has three acceleration shocks in each direction. After the test, the battery performs a single discharge and charging cycle according to the standard charging mode. /电池按照 Spec 规定充电后，固定在冲击台上，最初 3ms 内，最小平均加速度为 75g.N,峰值加速度为 150+/-25g.N,持续脉冲时间为 6+/-1ms,电池每个方向进行三次加速度冲击。测试后，电池按标准充电方式进行一次放电充电循环。	The battery should be no fire, no explosion, or no leakage. /电池应不起火，不爆炸，不漏液。
Drop Test /跌落试验	After the battery is charged according to the regulations, with the whole machine test, the whole machine sample from the height of 1m position free drop to the cement floor, from X, Y, Z positive and negative directions (six directions) each direction free drop 1 times. One cycle discharging/charging follow Spec. standard discharge and charge after the test. /电池按规定充电结束后，配合整机测试，将整机样品由高度为 1m 的位置自由跌落到水泥地板上，从 X、Y、Z 正负方向（六个方向）每个方向自由跌落 1 次。 试验后按照规格书定义标准充放电进行一次放电充电循环。	The battery should be no leakage, no fire or no explosion. /电池应不泄露、不起火和不爆炸。
High temperature stress relieving /高温应力消除 （注塑成型的热塑性外壳电池适用） Applicable for the thermoplastic shell battery for injection molding.	The standard charged battery is to be placed in a 70+/-2℃ circulating air oven for 7 hours. After finishing the test, remove it and restore to room temperature. /将电池按照标准充电方法充满电后，在 70+/-2℃ 的鼓风恒温箱中搁置 7H，取出并恢复至室温。	The enclosure does not result in the physical deformation that causes the internal components to be exposed. /外壳不能发生导致内部组成暴露的物理变形。

Using at high temperature /高温使用	The standard charged battery is to be placed in the high temperature experiment box, emperature is set as the battery charging upper-limit temperature, or battery discharging upper- limit temperature, or cell charge upper-limit temperature, or cell discharge upper-limit temperature, which specified in the specification, or 80 °C,choose the highest one, and keep for 7 hours after waiting for the sample surface temperature stability. /将满电样品置于高温实验箱内,将高温箱温度设为SPEC 规定的电池组充电上限温度, 电池组放电上限温度, 电芯充电上限温度, 电芯放电上限温度, 以及 80℃中的最大值,待样品表面温度稳定后保持 7H。	The battery should meet one of the requirement: 1)Not discharge, store in the high temperature experiment box , there should be no fire, no explosion, or no leakage. 2)Connect with charge/discharge device, conducted with a standard discharge/charge cycle. /样品应满足下列条件之一: 1)切断放电电路, 电池应不起火, 不爆炸, 不漏液 2)未切断电路, 在高温中按规格书进行一次标准放电充电循环。
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5.3 PCM Specification/保护板规格

5.3.1 Function of PCM/保护板参数(Topr= 25°C)

Items	Unit	Min.	Typ	Max.	Remark
1 st Over charge detection voltage /一段过充电保护电压	V	4.20	4.225	4.25	
1 st Over charge detection delay time /一段过充电保护延迟时间	s	0.80	1.00	1.20	
1 st Overcharge release voltage /一段过充保护恢复电压	V	4.10	4.125	4.15	
1 st Over discharge detection voltage /一段过放电保护电压	V	2.67	2.70	2.73	
1 st Over discharge detection delay time /一段过放电保护延迟时间	s	0.80	1.00	1.20	
1 st Over discharge release voltage /一段过放电保护解除电压	V	2.90	3.0	3.10	
1 st Charge over current detection current /一段充电过电流保护值	A	2.97	4.0	5.05	Discharge release /放电解除
1 st Charge over current detection delay time /一段充电过电流保护延迟时间	s	0.40	0.50	0.60	
1 st Discharge over current detection current 1 /一段放电过电流保护值 1	A	8.91	10	11.11	Charge release /充电解除



1 st Discharge over current detection delay time 1 /一段放电过电流保护延迟时间 1	ms	7	10	13	
1 st Discharge over current detection current 2 /一段放电过电流保护值 2	A	17.82	20	22.22	Charge release /充电解除
1 st Discharge over current detection delay time 2 /一段放电过电流保护延迟时间 2	ms	0.7	1	1.3	
1 st Short circuit protection current /一段短路保护值	A	35.64	40	44.44	
1 st Short circuit protection current delay time /一段短路保护延迟时间	us	160	200	500	
Charge over temperature protection /充电高温保护值	°C	62	65	68	The whole machine is grade one protection (50°C), the battery as the secondary protection /整机一级保护（50°C），电池作为二级保护
Charge over temperature protection release /充电高温保护恢复值	°C	52	55	58	
Charge under temperature protection /充电低温保护值	°C	-6	-3	0	The whole machine is grade one protection (0°C), the battery as the secondary protection /整机一级保护（0°C），电池作为二级保护
Charge under temperature protection release /充电低温保护恢复值	°C	-1	2	5	
Discharge over temperature protection /放电高温保护值	°C	62	65	68	The whole machine is grade one protection (60°C), the battery as the secondary protection /整机一级保护（60°C），电池作为二级保护
Discharge over temperature protection release /放电高温保护恢复值	°C	52	55	58	
Discharge under temperature protection /放电低温保护值	°C	-26	-23	-20	The whole machine is grade one protection (0°C), the battery as the secondary protection /整机一级保护（0°C），电池作为二级保护

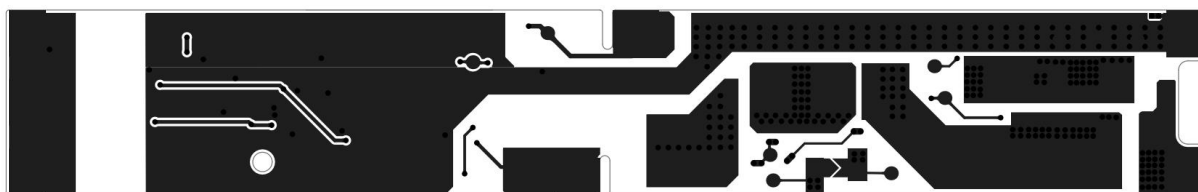
Discharge under temperature protection release /放电低温保护恢复值	°C	-21	-18	-15	
Temperature protection current delay time /温度保护检测延时	s	1	2	3	
Current consumption /工作消耗电流	μ A	-	30	50	
Standby Current /休眠电流	μ A	-	-	30	
0V 充电禁止电压	V	1.4	1.5	1.6	@单节电芯电压
2 st Over charge detection voltage /二段过充电保护电压	V	4.325	4.350	4.375	熔断 fuse
2 st Over charge detection delay time /二段过充电保护延迟时间	s	3.20	4.00	5.20	

5. 3. 2 Parts List/器件清单

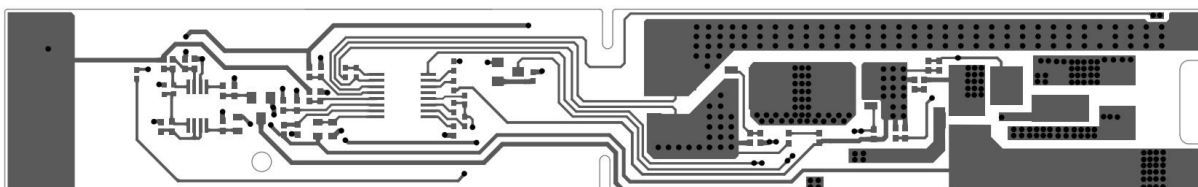
No.	Reference	Description	Part name	Qty.	Maker
1	U1	IC	CW1244ALJS	1	Cellwise
2	Q2,Q3	MOSFET	JMTG035N04A	2	JJW
3	Q2,Q3	MOSFET	MCAC95N065Y		MCC(替代物料)
4	Q2,Q3	MOSFET	CRTM030N04L		CRMICRO(替代物料)
5	Q1	BJT	MMBT3906-SOT23	1	MCC/LRC/ON
6	R1,R22	Chip Resistor	0603-1k-F	2	Yageo
7	R2,R4,R6,R8-R9,R13, R23-R26	Chip Resistor	0402-1k-F	10	Yageo
8	R10,R14	Chip Resistor	0402-3.3M-F	2	Yageo
9	R12	Chip Resistor	0402-200k-F	1	Yageo
10	R3,R5	Chip Resistor	0402-26.1k-F	2	Yageo
11	R7	Chip Resistor	0402-309k-F	1	Yageo
12	R11	Chip Resistor	0402-4.7k-J	1	Yageo
13	R16	Chip Resistor	2512-2W-5mΩ - ± 1%	1	TA-I
14	R16	Chip Resistor	2512-2W-5mΩ - ± 1%		SART (替代物料)
15	R16	Chip Resistor	2512-2W-5mΩ - ± 1%		PROSEMI(替代物料)
16	C2	Capacity	0603-50V-105-K-X7R	1	Yageo /Samsung /muRata/Taiyo
17	C1,C3,C5-C8,C11-C17	Capacity	0402-50V-104-K-X7R	13	Yageo /Samsung /muRata/Taiyo
18	C4	Capacity	0402-50V-102-K-X7R	1	Yageo /Samsung /muRata/Taiyo
19	NTC1,NTC2	NTC	0402-10K-1% /B=3435K-1%	2	TDK/muRata
20	B-,B1,B2-2,B3,B+	贴装镍片	NP-0.4*4*5-方形	5	大同
21	-	PCB	BMS 板-4S2P-A01-2 层-喷锡	1	汇芯/扬宣 (Alt.)

*All listed above are RoHS.

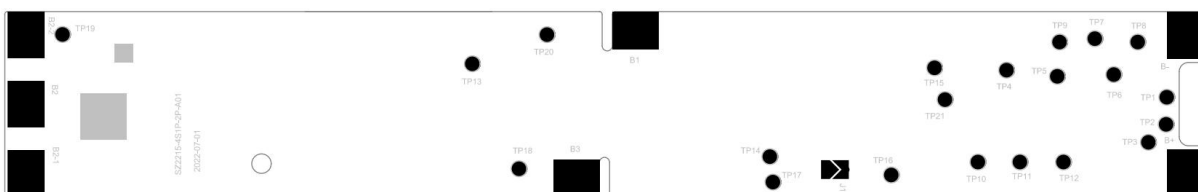
Toplayer:



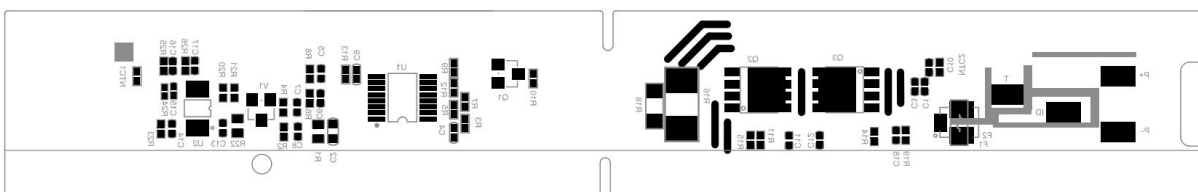
Bottomlayer:



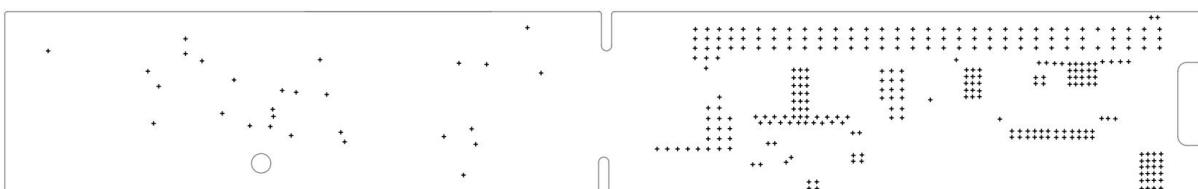
Top Silkscreen & Paste:



Bottom Silkscreen & Paste:



Drill:



5.3.4.2 PCB 板 UL 信息

PCB 型号	产家	UL 编号
BMS 板-4S2P-A01-2 层-喷锡	汇芯	E500302
BMS 板-4S2P-A01-2 层-喷锡	扬宣	E157925
BMS 板-4S2P-A01-2 层-喷锡	胜宏	E248779

5.4 Safety Requirement/安全性能

Items	Conditions and others	Performances
Charge Over Voltage Protection /过压充电	The standard charged battery is continue to be charged with maximum charging current to $n \times 6V$ or the highest possible voltage(Choose the best one), and keep the voltage by CV charging, until the protection circuit starts. /将电池组按标准充电方式充满电后，继续以最大充电电流恒流充至 $n \times 6V$ 或者电池组可能承受的最高电压值（两者取较高者），并保持该电压进行恒压充电，充电至保护电路起动。	The battery should be no fire, no explosion or no leakage. /电池组应不起火，不爆炸，不漏液。
Charge Over Current Protection /过流充电	The standard discharged battery is to be charged with 1.5 times charge protection current, until the protection circuit starts. /电池组按标准放电方式放完电后，然后以 1.5 倍的过流充电保护电流进行恒流充电，直至保护电路起动。	The battery should be no fire, no explosion or no leakage. /电池组应不起火，不爆炸，不漏液。
Over Discharge Protection /欠压放电	The standard charged battery is to be discharged with maximum continuous discharge current, until the protection circuit starts. then keep for 10 minutes, recharging the battery with standard charge method. /将电池按标准充电方式充满电后，以其最大持续放电电流放电至保护电路起动，然后静置 10min,继续按 SPEC 规定方法充满电。	The battery should be no fire, no explosion or no leakage. /电池组应不起火，不爆炸，不漏液。
Over Load Protection /过载	The standard charged battery is to be discharged with 1.5 times discharge protection current, until the protection circuit starts. /将电池按标准充电方式充满电后，然后以 1.5 倍过流保护电流恒流放电至保护电路起动。	The battery should be no fire, no explosion or no leakage. /电池组应不起火，不爆炸，不漏液。
External Short Circuit /外部短路	The test should be conducted under $25 \pm 5^\circ C$. The standard charged battery is to be short-circuited by connecting the positive and	The battery should be no fire, no explosion, no smoke or no leakage. /电池应不起火，不爆炸，不冒烟或漏

	negative terminals of the battery with copper wire having a resistance about $40\text{m}\Omega \pm 10\text{m}\Omega$. until the protection circuit starts or the short circuit time reaches 24h.. /将电池按照标准充电方式充满电后，短路电池组的正负极端子，外部短路总电阻为 $40\text{m}\Omega \pm 10\text{m}\Omega$，直至保护电路启动或者短路时间达到 24h。	液。
Reverse Charge /反向充电	The standard charged battery should be reverse charged with recommending current for 90 minutes. /将电池按标准充电方式充满电后，然后以推荐充电电流反向充电 90min。	The battery should be no fire, no explosion, no smoke or no leakage. /电池应不起火，不爆炸，不冒烟或漏液。
ESD /静电放电	The standard charged battery should be test under ESD $\pm 4\text{kV}$ contact discharge and $\pm 8\text{kV}$ air discharge for each 5 times. The interval of discharge is 1min. /对充饱电后的电池（金属端子）进行 $\pm 4\text{kV}$ 接触放电与 $\pm 8\text{kV}$ 空气放电各 5 次，每次放电间隔 1 分钟。	The function of battery should be work well. /电池所有功能正常。
Drop Impact test /重物冲击测试 (对于软包装电池，本条不适用)	Battery is to be placed on a flat surface. To place $15.8\text{mm} \pm 0.2\text{mm}$ diameter bar across the center of standard charged battery, and drop 9.1kg weight from $610 \pm 25\text{mm}$ height onto the battery. Then keep for 6hr, /充饱电的电池放置于平面冲击台上，并将一个直径 15.8mm 的钢柱放置于电池中心，钢柱的纵轴平行于平面，让质量 9.1kg 的重物从 $610\text{mm} \pm 25\text{mm}$ 高度自由落到电池中心上方的钢柱上，测试完毕，观察 6 小时。	The battery should be no fire, no explosion. /电池应不起火、不爆炸。
Heating test /热滥用	A battery is to be heated in a circulating air oven. The temperature of the oven is to be raised at a rate of $(5^\circ\text{C} \pm 2^\circ\text{C})/\text{min}$ to a temperature of 130°C. The oven is to remain for 30 minutes. /电池放置于热箱中，温度以 $(5^\circ\text{C} \pm 2^\circ\text{C})/\text{min}$ 的速率升至 $130^\circ\text{C} \pm 2^\circ\text{C}$ 并保温 30mins。	The battery should be no fire, no explosion. /电池应不起火、不爆炸。

6. Mechanical characteristics/机械性能

6.1 Appearance/外观

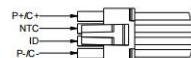
NO.	Item	Conditions and others	Remark
1	Dimension/外形尺寸	Refer to the structure diagram /参见机械结构图表	
2	Connection PIN/接触极片	Refer to the structure diagram /参见机械结构图表	
3	The material of housing/塑壳材料	Combustion proof grade:V-0 /阻燃等级: V-0	
4	Connector/连接器	VAMP AMID 66 0023 V0 Nero 02 HGW (CP3504SG01S-G)	E140692
5	Heat shrink film/热缩膜	10-1000PVC	E513299
6	Wiring harness/线束	UL1007-20AWG	E315421(兴鸿蒙) E355578(中振) E148000(乐庭)
7	Mark and Label/标签	Refer to the attachment of battery label. /参见结构标签部分	

6.2 Mechanical diagrams/机械图表

Refer to the attachment of battery structure diagram./参考附件电池结构图表

6.3 Harness diagrams/线束图表

6.3.1 接口定义:

功能定义	型号	额定电流	引脚定义	端子图纸
放电	瀚荃 CP3504SG01S-G	5. 2A	P+/P-	
充电	瀚荃 CP3504SG01S-G	5. 2A	C+/C-	

6.3.2 线材要求:

功能定义	型号	线长	额定电流	颜色	是否过 UL 认证
P-/C-	UL1007-20AWG	85mm	5. 2A	黑色	是
ID	UL1007-20AWG	91mm	0. 1A	黄色	是
NTC	UL1007-20AWG	97mm	0. 1A	白色	是
P+/C+	UL1007-20AWG	85mm	5. 2A	红色	是

6.3.3 线材尺寸图:

Refer to the attachment of battery structure diagram./参考附件电池结构图表

7. Label/标签

Refer to the attachment of battery label./ 参考附件电池标签

8. Others/其他

8.1 Odor/气味

The battery do not product special smell or harmful odor./本电池不会产生特别或有害的气味

8.2 Protection for Environment/环境保护

The material used for packing should meet the criterion to protect environment./封装电池所用材料须全部符合环境保护标准

8.3 Manufacturer and Factory/制造商和生产厂

Manufacturer: VIETNAM SCUD POWER TECHNOLOGY COMPANY LIMITED

/制造商: 越南飞毛腿动力科技有限公司

Address: Workshop A04, N2 street, Nhon Trach V industrial park, Hiep Phuoc town, Nhon Trach district, Dong Nai province.Viet Nam

/制造商地址: Workshop A04, N2 street, Nhon Trach V industrial park, Hiep Phuoc town, Nhon Trach district, Dong Nai province.Viet Nam

Factory: VIETNAM SCUD POWER TECHNOLOGY COMPANY LIMITED

/生产厂: 越南飞毛腿动力科技有限公司

Address: Workshop A04, N2 street, Nhon Trach V industrial park, Hiep Phuoc town, Nhon Trach district, Dong Nai province.Viet Nam

/生产厂地址: Workshop A04, N2 street, Nhon Trach V industrial park, Hiep Phuoc town, Nhon Trach district, Dong Nai province.Viet Nam

9. Package and Marking 包装与标志

9.1 Package 包装

According to the attached.

包装箱外应标明产品名称、型号、数量、毛重、制造厂商及联络地址、出厂日期；其包装储运的标志应符合 GB-191-7000 的规定。

Refer to the attachment of battery packaging./参考附件电池包装示意图

10. Warning and notice/注意事项



- 1、 Do not put the battery into a fire, or heat the battery. /请勿将电池组放入火中或加热电池组。
- 2、 Do not store the battery in high temperature environment. /请勿将电池组储存在高温环境中
- 3、 Do not connect the battery reversed in positive (+) and negative (-) terminals in the charger or equipment. /请勿将电池组反接在充电器或设备的正极(+)和负极(-)上。
- 4、 Do not let the battery terminals (+ and -) contact a wire or any metal (like a metal necklace or a hairpin) with which it carried or stored together, may cause short-circuit. /不要让电池组(+)和(-)端子与随身携带或储存在一起的电线或任何金属(如金属项链或发夹)接触,可能导致短路。
- 5、 Do not drive a nail in, hit with a hammer, or stamp on the battery, do not strike the battery in other ways. /禁止钉、锤、戳电池组, 禁止用其他方式敲击电池组。
- 6、 Do not disassemble or alter the batteries' outside structure. /禁止拆卸或改变电池组的外部结构。
- 7、 Do not submerge the battery in water, do not wet the battery when store the battery. /请勿将电池组浸入水中, 储存电池组时请勿弄湿电池组。



- 1、 Battery should be charged and discharged with proper charger, in compliance with correct operation contents. /电池组应按照正确的操作内容, 使用合适的充电器进行充放电。
- 2、 Do not use the battery with other maker's batteries, different types and /or models of batteries such as dry batteries, nickel-metal hydride batteries, or nickel-cadmium batteries, or new and

old lithium batteries together. /请勿与其他厂商的电池、干电池、镍氢电池、镍镉电池、新旧锂电池等不同型号和类型的电池或电池组混用。

- 3、Do not leave the battery in a charger or equipment if it generates an older and/or heat, changes color and/or shape, leaks electrolyte, or cause any other abnormality. /如果电池组产生老化和/或发热、变色和/或形状改变、电解液泄漏或导致其他任何异常，请不要将电池组留在充电器或设备中。
- 4、Do not discharge the battery continuously when it is not charged. /电池组未充电时，请勿连续放电。



- 1、Before using the battery, carefully read and follow battery specification and the information on the surface of the batteries. /使用电池组前，请仔细阅读和遵守电池组规格书，以及电池组表面的信息。
- 2、Children should not be allowed to play with them. /避免儿童玩弄电池组。
- 3、The batteries should only be charged with a matching charger. /本电池组只能使用配套充电器充电。
- 4、Caution – The battery used in this device may present a risk of fire or chemical burn if mistreated. Do no disassemble, heat above (manufacturer's maximum temperature limit), or incinerate. Replace battery with (battery manufacturer's name or end product manufacturer's name and part number) only. Use of another battery may present a risk of fire or explosion. /注意事项-在设备中使用的电池组如果使用不当，可能存在着火或化学灼伤的风险。请不要拆卸、加热超过规格书定义的最高温度限制，或焚烧。只使用(电池组制造商名称或最终产品制造商名称和零件号)替换电池组。使用其他电池组可能会有起火或爆炸的危险。
- 5、When the batteries are not be used for a long time, please store them safely, the battery shall be charged every three months so that they will stay in a half-charged state. Please wrap the batteries with non-conductive materials in order that metallic materials will not contact the batteries directly, which may result in damage to the batteries. Keep the batteries in a cool and dry place. /长期不用时，请将电池组储存完好，电池组应每隔 3 个月补电一次，让电池组处于半荷电状态。请用不导电材料包裹电池组，以避免金属直接接触电池组造成电池组损坏。将电池组保存于阴凉干燥处。
- 6、If batteries need to be discarded, dispose of them according to local regulations on the disposal of waste electronic products. It cannot be treated as ordinary municipal garbage. /当电池需要废弃时，应该按照当地有关废旧电子产品处理的相关规定进行处理。不能当做普通城市垃圾处理。



File Name	BRR-2P4S-5200FL 锂离子电池规格书	Security Level	Internal public	Page	Total 25
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Battery Specification

Product Name: Li-ion Cylindrical Rechargeable BatteryPack

Product Model: BRR-2P4S-5200FL

Product No : RH5G09010065

Prepared by : _____ Date: _____

Standard by : _____ Date: _____

Checked by : _____ Date: _____

Approved by : _____ Date: _____

Project	
Manager	

Customer	
Approval	

	Fujian SCUD Power Technology Co., Ltd.		Version	V1.9
	File Name	BRR-2P4S-5200FL 锂离子电池规格书	Security Level	Internal public

修订记录/Revision history

Version	Prepared by	Date	Approval by	Remark
V1.0	游国雄	2022-12-29	吴清浪	初版
V1.1	游国雄	2023-01-12	吴清浪	1、添加铭牌标签 2、调整元器件清单 3、添加电池尺寸图
V1.2	游国雄	2023-01-30	吴清浪	1、更新外形尺寸图 2、调整ID电阻值为105K 3、更新器件清单
V1.3	游国雄	2023-02-09	吴清浪	1、产品名称修改 2、新增线束图表及PCB UL信息 3、更新铭牌标签 4、客户需求，调整充放电低温保护值
V1.4	游国雄	2023-02-21	吴清浪	1、新增连接器、热缩膜和线束认证号； 2、更新外形尺寸图和线束图纸； 3、更新铭牌标签。 4、更新参考标准为 SJ/T 11778-2021 5、补充放电截止电压，更新充电上限电压及充电限制电压英文描述
V1.5	游国雄	2023-03-02	吴清浪	1、调整充电上限电压值； 2、调整放电截止电压值； 3、更新外部短路条件。 4、更新环境温度条件。
V1.6	游国雄	2023-03-20	吴清浪	1、调整出厂电池电压为 14.7~15.0V； 2、更新铭牌标签； 3、更新电池外形尺寸图。 4、更新包装图纸。 5、优化电气性能中标准充电、标准放电容量、高温放电、低温放电、荷电保持容量的描述及判定标准； 6、删除一年储存特性测试，及恒定湿热测试。 7、器件清单增加新的替代料信息
V1.7	游国雄	2023-03-28	吴清浪	1、环境安全试验条件更新 2、电路原理图更新 3、结构外形尺寸图更新

	Fujian SCUD Power Technology Co., Ltd.		Version	V1.9
	File Name	BRR-2P4S-5200FL 锂离子电池规格书	Security Level	Internal public

V1.8	游国雄	2023-04-10	吴清浪	1、更新外形尺寸图 2、铭牌标签 3、修改放电终止电压为 12V
V1.9	游国雄	2023-04-26	吴清浪	1、修改放电终止电压为 11V 2、修改充电环境温度下限为 0℃，放电环境温度下限为-20℃ 3、注意事项增加中文说明 4、更新电芯型号与 CB 证书一致

	Fujian SCUD Power Technology Co., Ltd.		Version	V1.9
	File Name	BRR-2P4S-5200FL 锂离子电池规格书	Security Level	Internal public

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1. Scope/范围

The specification describes the requirements for BRR-2P4S-5200FL Rechargeable Li-Ion battery pack.
 Battery supplied by Fujian SCUD Power Technology Co., Ltd.
 本规格书适用于 BRR-2P4S-5200FL 锂离子电池，由福建飞毛腿动力科技有限公司生产。

2. Standard compliance/参考标准

The battery should be complied with the standard of SJ/T 11778-2021.

3. Product name and model/产品型号名称

3.1 Product Name/产品名称: Li-ion Cylindrical Rechargeable Battery Pack

3.2 Product Model/产品型号: BRR-2P4S-5200FL

4. Typical Characteristics/主要参数

4.1 Cell Characteristics/电芯参数

No	Item 项目	Performance target 性能指标	Remark 备注
1	Supplier/电芯厂家	EVE	
2	Cell Model/电芯型号	Lithium-ion rechargeable cell Model :ICR18650/26V	
3	Rated Capacity/额定容量	Nominal Capacity 标称容量: 2600mAh Minimum Capacity 最小容量: 2500mAh	Charge:0.2C,4.2V,CCCV 50mA cut-off Discharge :0.2C,2.5V,DC cut-off
4	Nominal Voltage /标称电压	3.6V	
5	End Voltage of Discharge /放电终止电压	2.5V	
6	Charging Voltage /充电电压	4.2V	
7	Standard charge /标准充电	CCCV,0.2C, 4.2V,50mA, cut-off	

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8	Rapid charge /快速充电	CCCV,0.5C, 4.2V,50mA,cut-off	
9	Standard discharge /标准放电	Constant Current: 0.2C 持续电流: 0.2C End Voltage 2.5V 截止电压: 2.5V	
10	Max discharge current /最大放电电流	7.5A	
11	Initial Internal Impedance /初始内阻	$\leq 25\text{m}\Omega$ MAX	Initial Internal Impedance is measured at AC 1Khz at shipping SOC
12	Operation Temperature /工作环境温度	充电: 0 ~ +50 °C 放电: -20 ~ +60 °C	
13	Storage Temperature /贮存温度	1 year 3 months 1 month	0 ~ +25 °C 0 ~ +45 °C 0 ~ +60 °C

4.2 Battery Characteristics/电池组参数

No.	Item	Specification	Remarks
4.2.1	Nominal Capacity /标称容量	5200mAh/74.88Wh	Capacity test with 0.2C standard charge and 0.2C standard discharge 以 0.2C 标准充电和 0.2C 标准放电 进行容量测试
	Rated Capacity /额定容量	5000mAh/72Wh	
4.2.2	Nominal voltage /标称电压	14.4V	
4.2.3	Charge method /充电模式	CC/CV	
4.2.4	Upper limit of safe voltage range /充电上限电压	16.8V	The highest safe charging voltage of the pack battery can withstand
4.2.5	Upper limit charging voltage /充电限制电压	16.8V	
4.2.6	End of discharging voltage /放电终止电压	11V	Capacity test discharge Cut-off voltage is 2.75V/cell
4.2.7	Lower limit of safe voltage range /放电截止电压	10V	Cut-off voltage is 2.5V/cell
4.2.8	Standard Charge Current /标准充电电流	1000mA (0.2C)	Standard Charge Current (Standard current of charger at 0~45°C)
4.2.9	Fast Charge Current /最大充电电流	1750mA	Fast Charge Current (Maximum charging current at 0~15°C)
		2500mA	Fast Charge Current (Maximum charging current at

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			15~45℃)
4.2.10	Standard Discharge Current /标准放电电流	1000mA (0.2C)	Discharge: 23±3℃, 65% RH max (Recommend discharging current)
4.2.11	Max. Continuous Discharge Current /最大持续放电电流	5200mA	
4.2.12	Max. Pulse Discharge Current /最大瞬时放电电流	9A (<150 ms)	
4.2.13	Weight(g) /重量	About 383 g	
4.2.14	Shipping OCV /出厂电池电压	14.7-15.0V	About 57~65% SOC @0.2C discharge
4.2.15	Internal impedance /电池内阻	≤150 mΩ (initial max.)	AC 1kHz
4.2.16	Operation Temperature /工作环境温度	Charge	0℃~+45℃ /
		Discharge	-20℃~+60℃ /
4.2.17	Storage temperature /存储温度	Within 1 month	0℃~+60℃
		Within 3 month	0℃~+45℃
		Within 1 year	0℃~+25℃
			Recovery capacity after the storage ≥ 80% of minimum energy(or capacity)

5. Performance/性能

5.1 Electrical characteristics/电气性能

Items	Conditions and others	Performances
Environment /环境	Unless otherwise specified, all test stated in this specification are conducted at 1)temperature: 20±5℃; 2)humidity: ≤75%; 3)atmospheric pressure: 86kPa~106kPa /除非另有规定, 本规范中规定的所有试验均在: 1)温度:20±5℃; 2)湿度:≤75%; 3)大气压力:86 kpa ~ 106 kpa	

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Measure Equipment /测试设备	1) Ammeter and Voltmeter: The ammeter and voltmeter should have an accuracy of the grade 0.5 or higher. 2) Slide caliper: The slide caliper should have less than 0.05mm scale. 3) Impedance meter: The impedance meter with AC 1kHz should be used. /1) 电流表和电压表: 电流表和电压表应具有 0.5 级或更高的精度。 2) 游标卡尺: 滑动卡尺的刻度应小于 0.05mm。 3) 阻抗计: 应使用交流 1kHz 阻抗计。	
Standard Charge /标准充电	Charging the battery with 0.2C of constant current and constant voltage 16.8V at $20 \pm 5^{\circ}\text{C}$. Charge end of current 100mA. /在环境温度 $20 \pm 5^{\circ}\text{C}$ 条件下, 以 0.2C 充电, 当电池端电压达到充电限制电压 16.8V 时, 改为恒压充电, 充电截止电流 100mA。	
Standard Discharge Capacity /标准放电容量	Within 10min after standard charge, discharge with $0.2\text{C}_5\text{A}$ to end of discharging voltage at $20 \pm 5^{\circ}\text{C}$. repeat charge and discharge for 2times. The smaller value of the capacity after 2 cycles is taken as the standard discharge capacity. /电池组按标准充电后搁置 10 分钟后, 在 $20 \pm 5^{\circ}\text{C}$ 的温度下以 $0.2\text{C}_5\text{A}$ 电流放电到放电终止电压。上述实验可以重复 2 次, 取两次充放电完整循环后容量的较小值作为标准放电容量。	Discharge capacity $\geq$ Rated capacity /放电容量 $\geq$ 额定容量
High Temperature discharge /高温放电	After standard charged, battery should be stored in a temperature-controlled environment at $45 \pm 2^{\circ}\text{C}$ for 2 hours. after storage, battery should be discharged with $0.2\text{C}_5\text{A}$ to end of discharging voltage. /电池组按标准充电结束后, 将电池组放入 $45^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 的高温箱中恒温 4h, 然后以 $0.2\text{C}_5\text{A}$ 电流放电至放电终止电压。	Discharge capacity $\geq 80\%$ Rated capacity /放电容量 $\geq 80\%$ 额定容量

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Low Temperature discharge /低温放电	After standard charged, battery should be stored in a temperature-controlled environment at $0 \pm 2^{\circ}\text{C}$ for 4 hours. after storage, battery should be discharged with 0.2 C ₅ A to end of discharging voltage. /电池组按标准充电结束后，将电池组放入 $0^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 的低温箱中恒温 4h 后，以 0.2 C ₅ A 电流放电至放电终止电压。	Discharge capacity $\geq 70\%$ Rated capacity /放电容量 $\geq 70\%$ 额定容量
Storage Characteristics (30days) /荷电保持容量 (30 天)	A standard charged battery should be stored in a temperature-controlled environment at $20 \pm 5^{\circ}\text{C}$ for 30 days. after storage, battery should be discharged with 0.2 C ₅ A to end of discharging voltage, the discharge time should meet the requirement. Then, battery should be standard charged and discharged with 0.2 C ₅ A to end of discharging voltage at $20 \pm 5^{\circ}\text{C}$. The discharge time should meet the requirement. /在环境温度为 $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 条件下，将充满电电池组开路搁置 30 天后，在 $20 \pm 5^{\circ}\text{C}$ 的环境温度下以 0.2 C ₅ A 放电至放电终止电压，放电容量需要满足规定要求；然后电池组再以标准充电方式充电后以 0.2 C ₅ A 电流进行放电至放电终止电压。放电容量需要满足规定要求。	Remaining Capacity (after the storage) $\geq 90\%$ of the standard discharge capacity; Recovery Capacity (after the storage) $\geq 80\%$ of the standard discharge capacity /储存后的剩余容量为标准放电容量的 90% 以上；恢复容量为标准放电容量的 80% 以上
Cycle Life /循环寿命	300 cycles charging/discharging is repeated in the below condition: Environment: $20 \pm 5^{\circ}\text{C}$ Charging: 16.8V/1.5A to charging, Charge end of current: 100mA. Discharging: 1.5A Discharge end of voltage: 11V Cell is to be rested for 10min after charged and 30min after discharge. /在环境温度 $20 \pm 5^{\circ}\text{C}$ 的条件下，以 16.8V/1.5A 充电，充电截止电流 100mA，搁置 10min，然后以 1.5A 电流放电至 11V，放电结束后，搁置 30min，再进行下一个充放电循环。	The battery capacity should be more than 80% of Initial capacity at every 300 cycles. /循环 300 次后电池容量为初始容量 80% 以上。

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5.2 Environmental Safety Test/环境安全试验

Items	Conditions and others	Performances
Low Pressure /低气压	The standard charged battery is to be stored in the vacuum chamber. After close the vacuum chamber, then reduce the pressure, until the internal pressure is no more than 11.6kPa, and keep for 6 hours. One cycle discharging/charging follow Spec. standard discharge and charge after the test. /充饱电的电池，将其搁置在真空箱中。真空箱密闭后，逐渐减少其内部压力至不高于 11.6kPa(模拟海拔 15240m)并保持 6 小时。 试验后按照规格书定义标准充放电进行一次放电充电循环。	The battery should be no leakage, no fire and no explosion. /电池应不泄露、不起火和不爆炸。
Thermal Shock /温度循环	Battery(standard charged) is repeatedly tested with 10 times heat cycling, which means maintaining the battery for 6 hours at $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and $72^{\circ}\text{C} \pm 2^{\circ}\text{C}$ respectively. The interval of temperature change is kept in 30mins. After cycling, the battery temperature is restored to the ambient temperature of $20 \pm 5^{\circ}\text{C}$. One cycle discharging/charging follow Spec. standard discharge and charge after the test. /电池充满电后，将电池放入温控箱中， 1) 在温度 $72^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 的实验箱中保持 6 小时 2) 将实验箱温度降为 $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$，保持 6 小时 3) 温度转换时间不大于 30 分钟 4) 重复步骤 1) ~2)，共循环 10 次。 5) 恢复至 $20 \pm 5^{\circ}\text{C}$ 的环境温度。 试验后按照规格书定义标准充放电进行一次放电充电循环。	The battery should be no leakage, no fire and no explosion. /电池应不泄露、不起火和不爆炸。
Vibration /震动试验	Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration should be a sinusoidal waveform with a logarithmic sweep	The battery should be no leakage, no fire and no explosion. /电池应不泄露、不起火和不爆炸。

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between 7 Hz and 200 Hz and back to 7Hz traversed in 15 minutes. This cycle should be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face. The logarithmic frequency sweep is as follows: from 7 Hz a peak acceleration of 1 gn is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 gn occurs (approximately 50 Hz). A peak acceleration of 8 gn is then maintained until the frequency is increased to 200 Hz. One cycle discharging/charging follow Spec. standard discharge and charge after the test. /电池按规定充电结束后，将电池固定在振动台上，不可使电池变形。采用正弦波进行振动，并以对数扫频方式在 15mins 内从 7Hz 扫频到 200Hz 并返回到 7Hz。振动沿样品互相垂直的三个方向（其中一个方向必须与样品正负极所在平面垂直）进行，每个方向按上述对数扫频方式重复 12 次，振动 3h。 对数扫频方式如下：7Hz~18Hz 保持 9.8m/s² 的峰值加速度。将振幅保持在 0.8mm（位移为 1.6mm）直至峰值加速度达到 78.4m/s²（频率约为 50Hz）。保持 78.4m/s² 的峰值加速度直到频率增长到 200Hz。 试验后按照规格书定义标准充放电进行一次放电充电循环。	
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Acceleration Test /加速度冲击	After charging according to Spec, the battery is fixed on the impact table. In the first 3ms, the minimum average acceleration is 75g.N, the peak acceleration is 150+/-25g.N, and the pulse duration is 6 + / -1ms. The battery has three acceleration shocks in each direction. After the test, the battery performs a single discharge and charging cycle according to the standard charging mode. /电池按照 Spec 规定充电后，固定在冲击台上，最初 3ms 内，最小平均加速度为 75g.N,峰值加速度为 150+/-25g.N,持续脉冲时间为 6+/-1ms,电池每个方向进行三次加速度冲击。测试后，电池按标准充电方式进行一次放电充电循环。	The battery should be no fire, no explosion, or no leakage. /电池应不起火，不爆炸，不漏液。
Drop Test /跌落试验	After the battery is charged according to the regulations, with the whole machine test, the whole machine sample from the height of 1m position free drop to the cement floor, from X, Y, Z positive and negative directions (six directions) each direction free drop 1 times. One cycle discharging/charging follow Spec. standard discharge and charge after the test. /电池按规定充电结束后，配合整机测试，将整机样品由高度为 1m 的位置自由跌落到水泥地板上，从 X、Y、Z 正负方向（六个方向）每个方向自由跌落 1 次。 试验后按照规格书定义标准充放电进行一次放电充电循环。	The battery should be no leakage, no fire or no explosion. /电池应不泄露、不起火和不爆炸。
High temperature stress relieving /高温应力消除 (注塑成型的热塑性外壳电池适用)	The standard charged battery is to be placed in a 70+/-2℃ circulating air oven for 7 hours. After finishing the test, remove it and restore to room temperature.	The enclosure does not result in the physical deformation that causes the internal components to be exposed.

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Applicable for the thermoplastic shell battery for injection molding.	/将电池按照标准充电方法充满电后，在 70+/-2℃的鼓风恒温箱中搁置 7H，取出并恢复至室温。	/外壳不能发生导致内部组成暴露的物理变形。
Using at high temperature /高温使用	The standard charged battery is to be placed in the high temperature experiment box, emperature is set as the battery charging upper-limit temperature, or battery discharging upper- limit temperature, or cell charge upper-limit temperature, or cell discharge upper-limit temperature, which specified in the specification, or 80 °C,choose the highest one, and keep for 7 hours after waiting for the sample surface temperature stability. /将满电样品置于高温实验箱内，将高温箱温度设为 SPEC 规定的电池组充电上限温度，电池组放电上限温度，电芯充电上限温度，电芯放电上限温度，以及 80℃中的最大值，待样品表面温度稳定后保持 7H。	The battery should meet one of the requirement: 1)Not discharge, store in the high temperature experiment box , there should be no fire, no explosion, or no leakage. 2)Connect with charge/discharge device, conducted with a standard discharge/charge cycle. /样品应满足下列条件之一： 1)切断放电电路，电池应不起火，不爆炸，不漏液 2)未切断电路，在高温中按规格书进行一次标准放电充电循环。

5.3 PCM Specification/保护板规格

5.3.1 Function of PCM/保护板参数(Topr= 25℃)

Items	Unit	Min.	Typ	Max.	Remark
1 st Over charge detection voltage /一段过充电保护电压	V	4.20	4.225	4.25	
1 st Over charge detection delay time /一段过充电保护延迟时间	s	0.80	1.00	1.20	
1 st Overcharge release voltage /一段过充保护恢复电压	V	4.10	4.125	4.15	
1 st Over discharge detection voltage /一段过放电保护电压	V	2.67	2.70	2.73	
1 st Over discharge detection delay time /一段过放电保护延迟时间	s	0.80	1.00	1.20	
1 st Over discharge release voltage /一段过放电保护解除电压	V	2.90	3.0	3.10	
1 st Charge over current detection current	A	2.97	4.0	5.05	Discharge release

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/一段充电过电流保护值					/放电解除
1 st Charge over current detection delay time /一段充电过电流保护延迟时间	s	0.40	0.50	0.60	
1 st Discharge over current detection current 1 /一段放电过电流保护值 1	A	8.91	10	11.11	Charge release /充电解除
1 st Discharge over current detection delay time 1 /一段放电过电流保护延迟时间 1	ms	7	10	13	
1 st Discharge over current detection current 2 /一段放电过电流保护值 2	A	17.82	20	22.22	Charge release /充电解除
1 st Discharge over current detection delay time 2 /一段放电过电流保护延迟时间 2	ms	0.7	1	1.3	
1 st Short circuit protection current /一段短路保护值	A	35.64	40	44.44	
1 st Short circuit protection current delay time /一段短路保护延迟时间	us	160	200	500	
Charge over temperature protection /充电高温保护值	°C	62	65	68	The whole machine is grade one protection (50°C), the battery as the secondary protection /整机一级保护（50°C），电池作为二级保护
Charge over temperature protection release /充电高温保护恢复值	°C	52	55	58	
Charge under temperature protection /充电低温保护值	°C	-6	-3	0	The whole machine is grade one protection (0°C), the battery as the secondary protection /整机一级保护（0°C），电池作为二级保护
Charge under temperature protection release /充电低温保护恢复值	°C	-1	2	5	
Discharge over temperature protection /放电高温保护值	°C	62	65	68	The whole machine is grade one protection (60°C), the battery as the secondary protection /整机一级保护（60°C），电池作为二级保护
Discharge over temperature protection release /放电高温保护恢复值	°C	52	55	58	
Discharge under temperature protection	°C	-26	-23	-20	The whole machine is

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/放电低温保护值					grade one protection (0°C), the battery as the secondary protection /整机一级保护 (0°C), 电池作为二级保护
Discharge under temperature protection release /放电低温保护恢复值	°C	-21	-18	-15	
Temperature protection current delay time /温度保护检测延时	s	1	2	3	
Current consumption /工作消耗电流	μ A	-	25	40	
Standby Current /休眠电流	μ A	-	-	20	
0V 充电禁止电压	V	1.4	1.5	1.6	@单节电芯电压

5. 3. 2 Parts List/器件清单

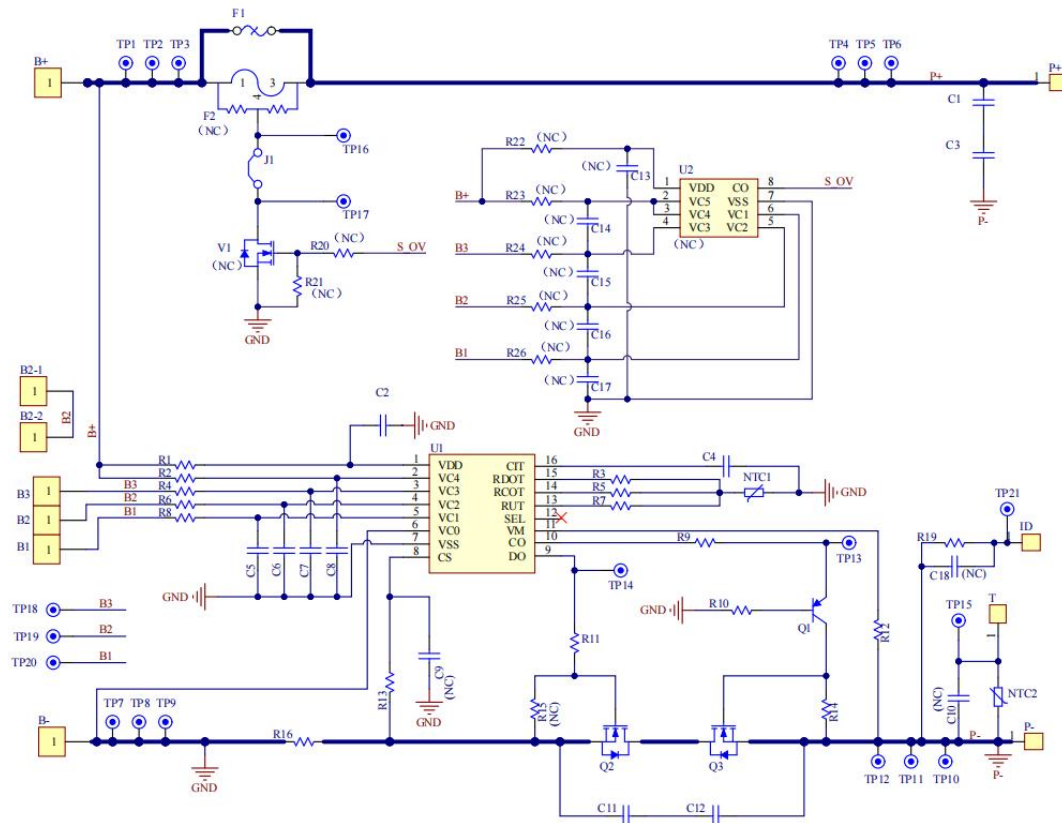
No.	Reference	Description	Part name	Qty.	Maker
1	U1	IC	CW1244ALJS	1	Cellwise
2	Q2,Q3	MOSFET	JMTG035N04A	2	JJW
3	Q2,Q3	MOSFET	MCAC95N065Y		MCC(替代物料)
4	Q1	BJT	MMBT3906-SOT23	1	MCC/LRC/ON
5	R1	Chip Resistor	0603-1k-F	1	Yageo
6	R2,R4,R6,R8-R9,R13	Chip Resistor	0402-1k-F	6	Yageo
7	R10,R14	Chip Resistor	0402-3.3M-F	2	Yageo
8	R12	Chip Resistor	0402-200k-F	1	Yageo
9	R3,R5	Chip Resistor	0402-26.1k-F	2	Yageo
10	R7	Chip Resistor	0402-309k-F	1	Yageo
11	R11	Chip Resistor	0402-4.7k-J	1	Yageo
12	R16	Chip Resistor	2512-2W-5mΩ - ± 1%	1	TA-I
13	R16	Chip Resistor	2512-2W-5mΩ - ± 1%		SART (替代物料)
14	R16	Chip Resistor	2512-2W-5mΩ - ± 1%		PROSEMI(替代物料)
15	C2	Capacity	0603-50V-105-K-X7R	1	Yageo /Samsung /muRata/Taiyo
16	C1,C3,C5-C8,C11-C12	Capacity	0402-50V-104-K-X7R	8	Yageo /Samsung /muRata/Taiyo
17	C4	Capacity	0402-50V-102-K-X7R	1	Yageo /Samsung /muRata/Taiyo
18	NTC1,NTC2	NTC	0402-10K-1% /B=3435K-1%	2	TDK/muRata
19	B-,B1,B2-2,B3,B+	贴装镍片	NP-0.4*4*5-方形	5	大同
20	-	PCB	BMS 板-4S2P-A01-2 层-喷锡	1	汇芯/扬宣 (Alt.)

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					/胜宏 (Alt.)
21	F1	Fuse	12 110.15/15A	1	ASTM
22	F1	Fuse	1206SF15.0A32V		Walter (替代物料)
23	R19	Chip Resistor	0402-105k-F	1	Yageo

*All listed above are RoHS.

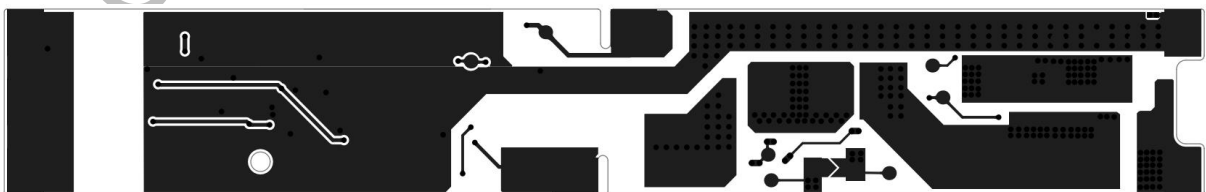
5.3.3 Circuit Diagram/电路原理图



5.3.4 PCB Layout

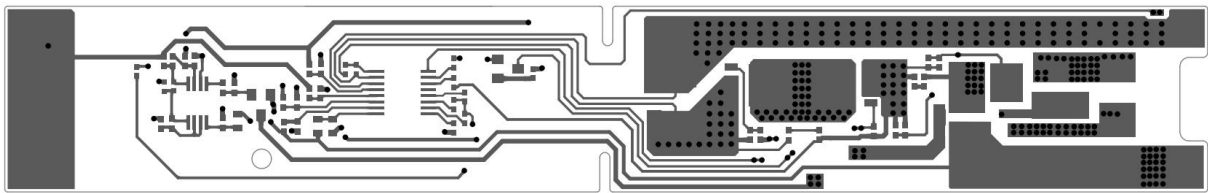
5.3.4.1 PCB

Toplayer:

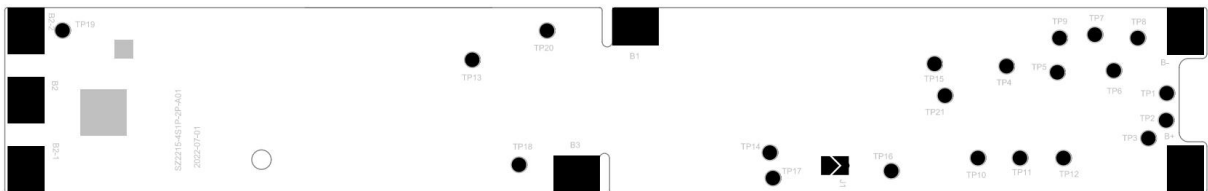


Bottomlayer:

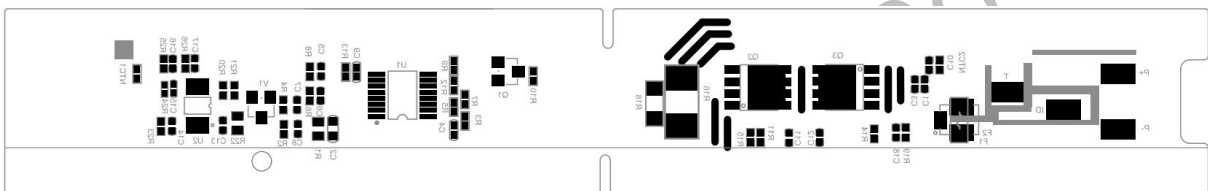
	Fujian SCUD Power Technology Co., Ltd.		Version	V1.9
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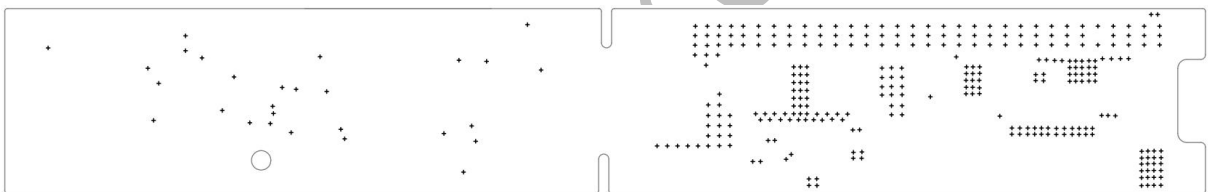
Top Silkscreen & Paste:



Bottom Silkscreen & Paste:



Dirll:



5.3.4.2 PCB 板 UL 信息

PCB 型号	产家	UL 编号
BMS 板-4S2P-A01-2 层-喷锡	汇芯	E500302
BMS 板-4S2P-A01-2 层-喷锡	扬宣	E157925
BMS 板-4S2P-A01-2 层-喷锡	胜宏	E248779

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5.4 Safety Requirement/安全性能

Items	Conditions and others	Performances
Charge Over Voltage Protection /过压充电	The standard charged battery is continue to be charged with maximum charging current to $n \times 6V$ or the highest possible voltage(Choose the best one), and keep the voltage by CV charging, until the protection circuit starts. /将电池组按标准充电方式充满电后，继续以最大充电电流恒流充至 $n \times 6V$ 或者电池组可能承受的最高电压值（两者取较高者），并保持该电压进行恒压充电，充电至保护电路起动。	The battery should be no fire, no explosion or no leakage. /电池组应不起火，不爆炸，不漏液。
Charge Over Current Protection /过流充电	The standard discharged battery is to be charged with 1.5 times charge protection current, until the protection circuit starts. /电池组按标准放电方式放完电后，然后以 1.5 倍的过流充电保护电流进行恒流充电，直至保护电路起动。	The battery should be no fire, no explosion or no leakage. /电池组应不起火，不爆炸，不漏液。
Over Discharge Protection /欠压放电	The standard charged battery is to be discharged with maximum continuous discharge current, until the protection circuit starts. then keep for 10 minutes, recharging the battery with standard charge method. /将电池按标准充电方式充满电后，以其最大持续放电电流放电至保护电路起动，然后静置 10min,继续按 SPEC 规定方法充满电。	The battery should be no fire, no explosion or no leakage. /电池组应不起火，不爆炸，不漏液。
Over Load Protection /过载	The standard charged battery is to be discharged with 1.5 times discharge protection current, until the protection circuit starts. /将电池按标准充电方式充满电后，然后以 1.5 倍过流保护电流恒流放电至保护电路起动。	The battery should be no fire, no explosion or no leakage. /电池组应不起火，不爆炸，不漏液。
External Short Circuit /外部短路	The test should be conducted under $25 \pm 5^\circ C$. The standard charged battery is to be short-circuited by connecting the positive and negative terminals of the battery with copper	The battery should be no fire, no explosion, no smoke or no leakage. /电池应不起火，不爆炸，不冒烟或漏液。

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	wire having a resistance about $40\text{m}\Omega \pm 10\text{m}\Omega$. until the protection circuit starts or the short circuit time reaches 24h.. /将电池按照标准充电方式充满电后，短路电池组的正负极端子，外部短路总电阻为 $40\text{m}\Omega \pm 10\text{m}\Omega$，直至保护电路起动或者短路时间达到 24h。	
Reverse Charge /反向充电	The standard charged battery should be reverse charged with recommending current for 90 minutes. /将电池按标准充电方式充满电后，然后以推荐充电电流反向充电 90min。	The battery should be no fire, no explosion, no smoke or no leakage. /电池应不起火，不爆炸，不冒烟或漏液。
ESD /静电放电	The standard charged battery should be test under ESD $\pm 4\text{kV}$ contact discharge and $\pm 8\text{kV}$ air discharge for each 5 times. The interval of discharge is 1min. /对充电后的电池（金属端子）进行 $\pm 4\text{kV}$ 接触放电与 $\pm 8\text{kV}$ 空气放电各 5 次，每次放电间隔 1 分钟。	The function of battery should be work well. /电池所有功能正常。
Drop Impact test /重物冲击测试 (对于软包装电池，本条不适用)	Battery is to be placed on a flat surface. To place $15.8\text{mm} \pm 0.2\text{mm}$ diameter bar across the center of standard charged battery, and drop 9.1kg weight from $610 \pm 25\text{mm}$ height onto the battery. Then keep for 6hr, /充电后的电池放置于平面冲击台上，并将一个直径 15.8mm 的钢柱放置于电池中心，钢柱的纵轴平行于平面，让质量 9.1kg 的重物从 $610\text{mm} \pm 25\text{mm}$ 高度自由落到电池中心上方的钢柱上，测试完毕，观察 6 小时。	The battery should be no fire, no explosion. /电池应不起火、不爆炸。
Heating test /热滥用	A battery is to be heated in a circulating air oven. The temperature of the oven is to be raised at a rate of $(5^\circ\text{C} \pm 2^\circ\text{C})/\text{min}$ to a temperature of 130°C. The oven is to remain for 30 minutes. /电池放置于热箱中，温度以 $(5^\circ\text{C} \pm 2^\circ\text{C})/\text{min}$ 的速率升至 $130^\circ\text{C} \pm 2^\circ\text{C}$ 并保温 30mins。	The battery should be no fire, no explosion. /电池应不起火、不爆炸。

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6. Mechanical characteristics/机械性能

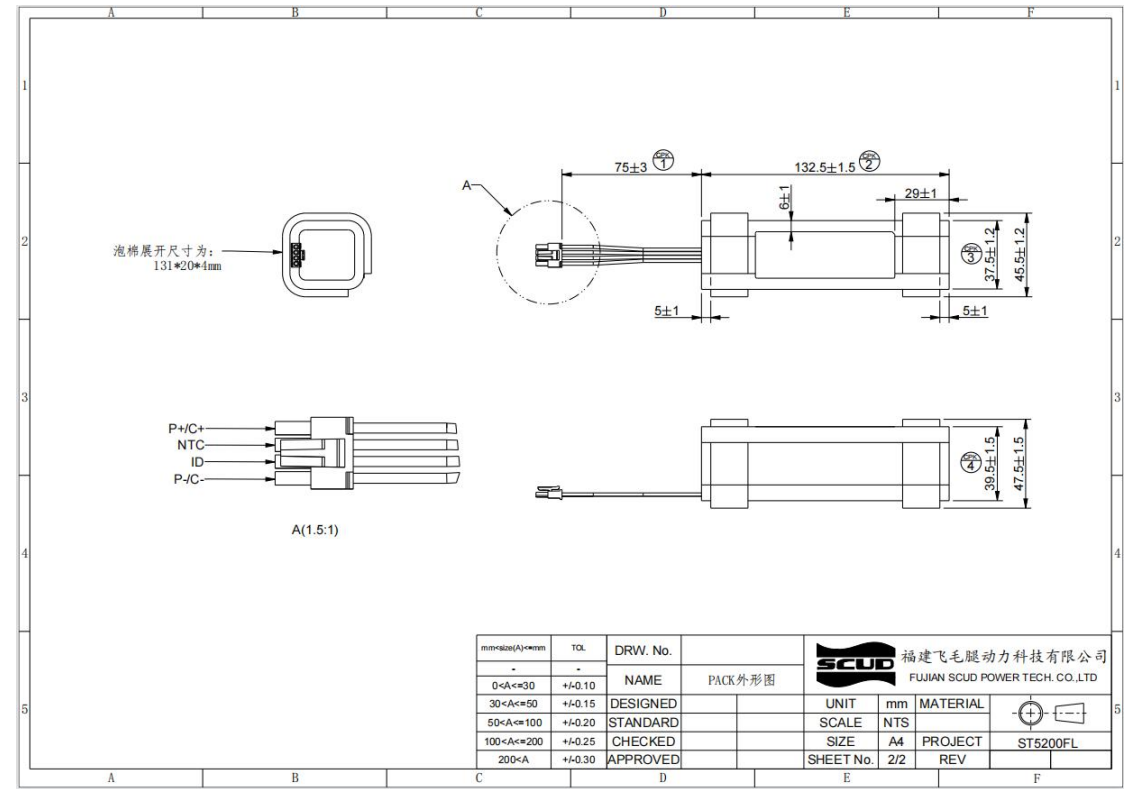
6.1 Appearance/外观

NO.	Item	Conditions and others	Remark
1	Dimension/外形尺寸	Refer to the structure diagram /参见机械结构图表	
2	Connection PIN/接触极片	Refer to the structure diagram /参见机械结构图表	
3	The material of housing/塑壳材料	Combustion proof grade:V-0 /阻燃等级: V-0	
4	Connector/连接器	LHE MX3.0 (C3001-H04)	E364711
5	Heat shrink film/热缩膜	10-1000PVC	E513299
6	Wiring harness/线束	UL1007-20AWG	E355578(中振) E148000(乐庭) E315421(兴鸿蒙)
7	Mark and Label/标签	Refer to the attachment of battery label. /参见结构标签部分	

6.2 Mechanical diagrams/机械图表

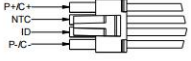
Refer to the attachment of battery structure diagram./参考附件电池结构图表
见附页

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6.3 Harness diagrams/线束图表

6.3.1 接口定义:

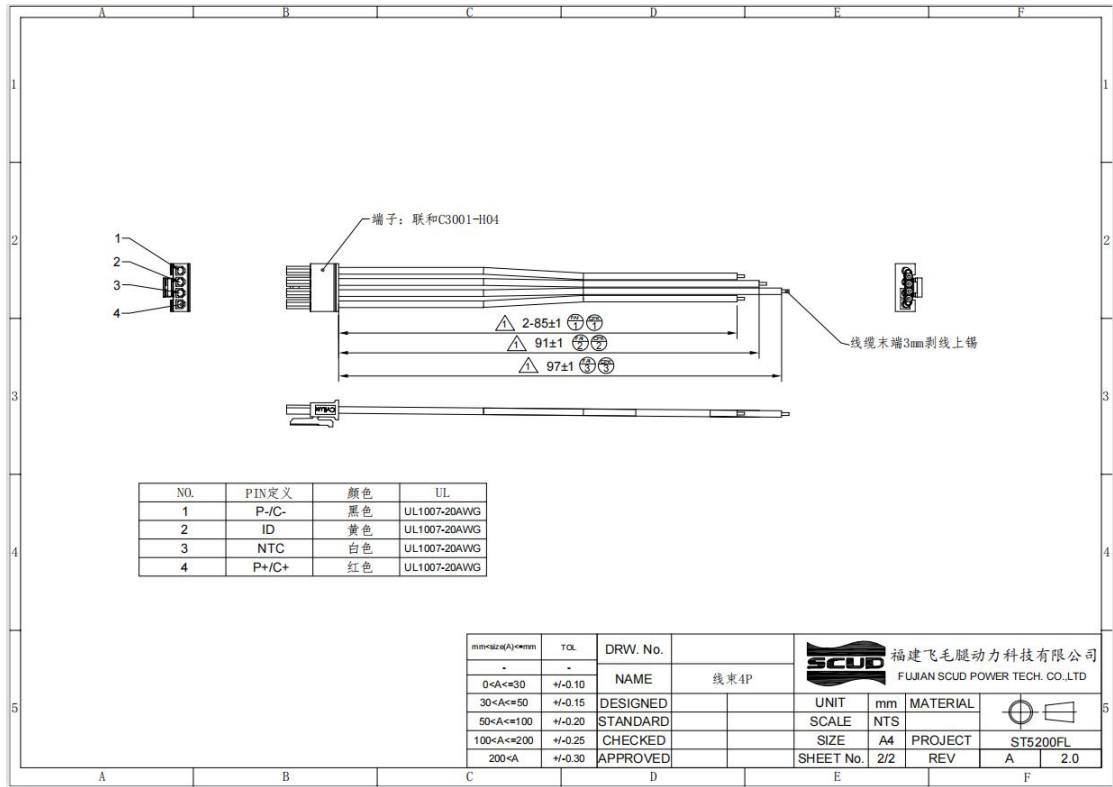
功能定义	型号	额定电流	引脚定义	端子图纸
放电	联和 C3001-H04	5. 2A	P+/P-	
充电	联和 C3001-H04	5. 2A	C+/C-	

6.3.2 线材要求:

功能定义	型号	线长	额定电流	颜色	是否过 UL 认证
P-/C-	UL1007-20AWG	85mm	5. 2A	黑色	是
ID	UL1007-20AWG	91mm	0. 1A	黄色	是
NTC	UL1007-20AWG	97mm	0. 1A	白色	是
P+/C+	UL1007-20AWG	85mm	5. 2A	红色	是

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6.3.2 线材尺寸图:



7. Label/标签

Refer to the attachment of battery label./ 参考附件电池标签



产品名称/產品名稱: 锂离子圆柱可充电电池组/二次鋰電池組
Type: Li-ion Cylindrical Rechargeable Battery Pack
产品型号/Model/產品型號: BRR-2P4S-5200FL 4INR19/66-2
标称电压/Nominal Voltage/標稱電壓: 14.4 V ---
充电限制电压/Charging Limited Voltage/充電限制電壓: 16.8 V ---
典型电容量/Typical Capacity: 5200 mAh / 74.88 Wh
额定容量/Rated Capacity/額定容量: 5000 mAh
额定能量/Rated Energy/額定能量: 72 Wh
制造商/生產廠: 福建飞毛腿动力科技有限公司
Manufacturer/Production Plant: Fujian SCUD Power Technology Co., Ltd.
执行标准/Standard: SJ/T11778-2021
中国制造/Made in China/中國製造



*****F A7*****0001

WARNING

- Dry location use only.
- Do not disassemble, impact and crush the battery.
- Do not put the battery into fire or heat the battery.
- Do not continue to use if the battery balloons severely.
- Do not expose battery to high temperature.
- Do not immerse the battery in water.
- Stop using the battery after it is immersed in water.
- 仅使用于干燥场所。
- 禁止拆解，撞击和挤压电池。
- 禁止将电池投入火中或加热电池。
- 若出现严重鼓胀，切勿继续使用。
- 切勿置于高温环境中。
- 禁止将电池放入水中，电池浸水后禁止使用。
- 仅使用于干燥场所。
- 禁止拆解，撞击和挤压电池。
- 禁止将电池投入火中或加热电池。
- 若出现严重鼓胀，切勿继续使用。
- 切勿置于高温环境中，禁止吞噬。
- 禁止将电池放入水中，电池浸水后禁止使用。



14.4V 5000mAh
VANLINS株式会社
R30710
廢電池請回收



+ Red wire / 红线 - Black wire / 黑线

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8. Others/其他

8.1 Odor/气味

The battery do not product special smell or harmful odor./本电池不会产生特别或有害的气味

8.2 Protection for Environment/环境保护

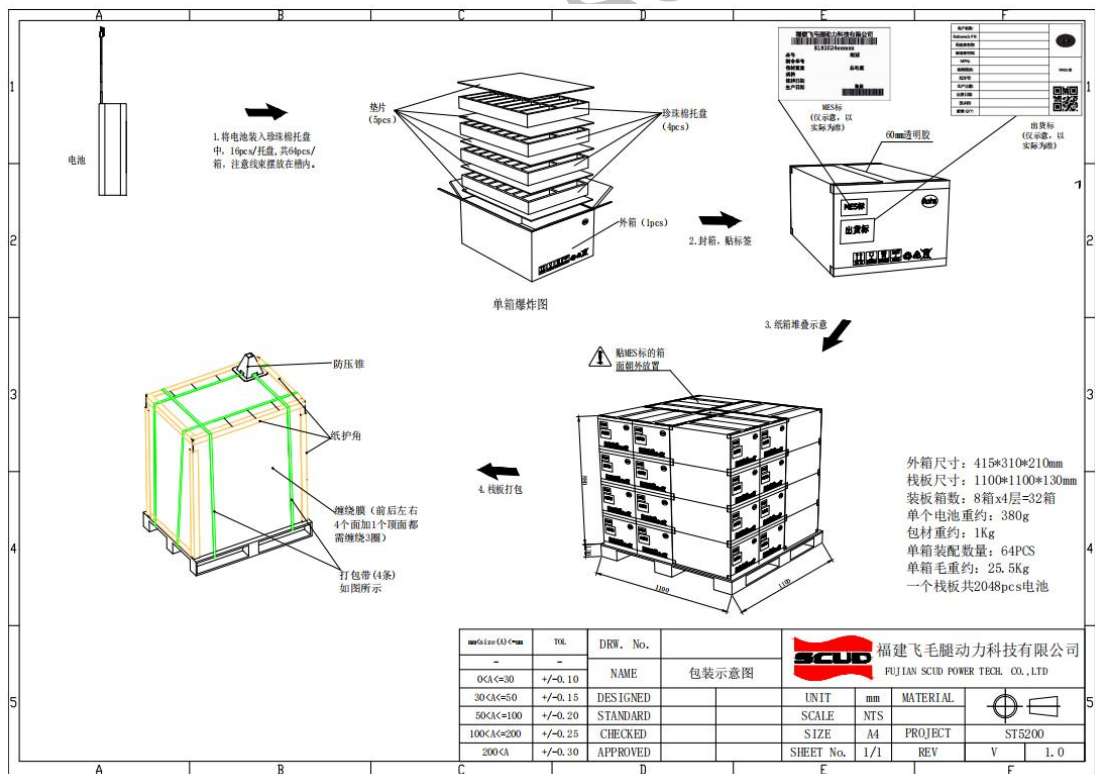
The material used for packing should meet the criterion to protect environment./封装电池所用材料须全部符合环境保护标准

9. Package and Marking 包装与标志

9.1 Package 包装

According to the attached.

包装箱外应标明产品名称、型号、数量、毛重、制造厂商及联络地址、出厂日期；其包装储运的标志应符合 GB-191-7000 的规定。



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10. Warning and notice/注意事项

WARNING

- 1、Do not put the battery into a fire, or heat the battery. /请勿将电池组放入火中或加热电池组。
- 2、Do not store the battery in high temperature environment. /请勿将电池组储存在高温环境中
- 3、Do not connect the battery reversed in positive (+) and negative (-) terminals in the charger or equipment. /请勿将电池组反接在充电器或设备的正极(+)和负极(-)上。
- 4、Do not let the battery terminals (+ and -) contact a wire or any metal (like a metal necklace or a hairpin) with which it carried or stored together, may cause short-circuit. /不要让电池组(+)和(-)端子与随身携带或储存在一起的电线或任何金属(如金属项链或发夹)接触,可能导致短路。
- 5、Do not drive a nail in, hit with a hammer, or stamp on the battery, do not strike the battery in other ways. /禁止钉、锤、戳电池组,禁止用其他方式敲击电池组。
- 6、Do not disassemble or alter the batteries' outside structure. /禁止拆卸或改变电池组的外部结构。
- 7、Do not submerge the battery in water, do not wet the battery when store the battery. /请勿将电池组浸入水中,储存电池组时请勿弄湿电池组。

NOTICE

- 1、Battery should be charged and discharged with proper charger, in compliance with correct operation contents. /电池组应按照正确的操作内容,使用合适的充电器进行充放电。
- 2、Do not use the battery with other maker's batteries, different types and /or models of batteries such as dry batteries, nickel-metal hydride batteries, or nickel-cadmium batteries, or new and old lithium batteries together. /请勿与其他厂商的电池、干电池、镍氢电池、镍镉电池、新旧锂电池等不同型号和类型的电池或电池组混用。
- 3、Do not leave the battery in a charger or equipment if it generates an older and/or heat, changes color and/or shape, leaks electrolyte, or cause any other abnormality. /如果电池组产生老化和/或发热、变色和/或形状改变、电解液泄漏或导致其他任何异常,请不要将电池组留在充电器或设备中。
- 4、Do not discharge the battery continuously when it is not charged. /电池组未充电时,请勿连续放电。

Caution

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- 1、 Before using the battery, carefully read and follow battery specification and the information on the surface of the batteries./使用电池组前，请仔细阅读和遵守电池组规格书，以及电池组表面的信息。
- 2、 Children should not be allowed to play with them. /避免儿童玩弄电池组。
- 3、 The batteries should only be charged with a matching charger. /本电池组只能使用配套充电器充电。
- 4、 Caution – The battery used in this device may present a risk of fire or chemical burn if mistreated. Do no disassemble, heat above (manufacturer’s maximum temperature limit), or incinerate. Replace battery with (battery manufacturer’s name or end product manufacturer’s name and part number) only. Use of another battery may present a risk of fire or explosion. /注意事项-在设备中使用的电池组如果使用不当，可能存在着火或化学灼伤的风险。请不要拆卸、加热超过规格书定义的最高温度限制，或焚烧。只使用(电池组制造商名称或最终产品制造商名称和零件号)替换电池组。使用其他电池组可能会有起火或爆炸的危险。
- 5、 When the batteries are not be used for a long time, please store them safely, the battery shall be charged every three months so that they will stay in a half-charged state. Please wrap the batteries with non-conductive materials in order that metallic materials will not contact the batteries directly, which may result in damage to the batteries. Keep the batteries in a cool and dry place. /长期不用时，请将电池组储存完好，电池组应每隔 3 个月补电一次，让电池组处于半荷电状态。请用不导电材料包裹电池组，以避免金属直接接触电池组造成电池组损坏。将电池组保存于阴凉干燥处。