Battery Specification

Product Name: Rechargeable Lithium-ion Battery

Product Model: 890-00350-A

Product Number: RH4G13016406

Customer's Number: _____

Prepare: _____ Date: _____

Check: _____ Date: _____

Approval: _____ Date: _____

Project Manager	

Address: No.98, Jiangbin East Avenue, Mawei District, Fuzhou, Fujian, China

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Revision History

Rev.	Date	Item	Author
V1.0	2020-07-07	Original draft	Menghong Sun
V1.1	2020.08-05	1.Add Pack OCV 3.67-3.85V. 2.Update Battery impedance ≤130 mΩ. 3.Update pack cycle life charge voltage to 4.15V	Menghong Sun
V1.2	2020-8-26	1. Update the charge voltage to 4.18V 2. Update the min capacity from 2940mAh to 2960mAh 3. Update the discharge maximum continuous current to 2000mA 4. Update the protection parameters,schematic, PCB LAYOUT,Dimension	Cong.Huang
V1.3	2020-9-1	1. Update the product model to 890-00350-08 2. Update the certifications list. 3. Update the Pack connector definition	Cong.Huang/Jia Liang.Liao
V1.4	2020-9-25	1. Update the charge voltage to 4.18V and Min. capacity to 2940mAh 2. Update shipping OCV 3. Update the certificaton list	Yawang Jie
V1.5	2020-10-12	1. Correct product modle name to 890-00350-A 2. Add PCB information in part list; correct R2,R4 value accuracy tolerance to +/-5%	Yawang Jie
V1.6	2020-10-14	1. Update the mechanical structure parameters table at Dimension 2. Update the Facebook 890-00350-09 Battery Specification drawing at Appendix 3. Update the label drawing at Appendix	Liang Chen
		Release specification	

Contents

Scope

The specification describes the requirements for 890-00350-08 Rechargeable Li-ion Battery pack. Battery supplied by Fujian SCUD Power Technology Co., Ltd.

1 Certification

1.1 Safety regulation: GB31241-2014.

1.2 Environment: RoHS, HF

2 Electrical specification

No.	Item		Specification	Remark
3.1	Capacity	Min/Rated	2940mAh	Charge:0.5C to 4.15V,cut off 0.05C; Discharge:0.2C to 3.0V; at 24±2℃,rest 10 min.
		Typ	3034mAh	
3.2	Energy	Min/Rated	10.87Wh	-
		Typ	11.22Wh	
3.3	Normal voltage		3.7V	-
3.4	End of charge voltage		4.15V	CC/CV mode
3.5	Discharge cut off voltage		3.0V	-
3.6	Pack shipping OCV		3.5-3.6V	<30% SOC
3.7	Charge current	Standard Charge	0.2Cmax to 4.15V,cut off 0.05C	0~20℃
			0.5Cmax to 4.15V,cut off 0.05C	20~45℃
3.8	Discharge current	Standard	0.2C	Cut off 3.0V
		Maximum Continuous	2000mA	Cut off 3.0V
3.9	Battery impedance		≤130 mΩ	@AC 1kHz,as shipping OCV
3.10	0V battery charge function		Inhibition	-
3.11	Operating temperature	Charge	0℃~45℃	Humidity: less than 85%RH
		Discharge	-20℃~60℃	
3.12	Storage temperature	1 month	-20℃~60℃	20℃ is recommended storage temperature
		3 month	-20℃~45℃	
3.13	0.2C Discharge Capacity		≥2960mAh	Charge:0.5C to 4.18V,cut off 0.05C. discharge:0.2C to 3.0V, at 24±2℃,rest 30min.
3.14	0.5C Discharge Capacity 1		≥2850 mAh	Charge:0.5C to 4.18V,cut off 0.05C, discharge:0.5C to 3.0V, at 24±2℃,rest 30min.

3. 15	Long term storage characteristic	Recovery capacity ≥2646mAh		After standard charge and then storage at 24±2℃ for 30 days. The discharge time of the second; discharge shall be measured after standard discharge, standard charge, and standard discharge.
3. 16	Discharging Temperature Characteristic	-10℃	≥2058mAh	The capacity shall be measured after standard; 0.5C charge at 24±2℃ and 0.2C discharge at the temperature shown in the table.
		0℃	≥2499mAh	
		24℃	≥2960mAh	
		45℃	≥2881mAh	
		60℃	≥2881mAh	
3. 18	Weight	About 48.2g		-
3. 19	Cell Model	LG: INR18650 MH1		Cell Internal Impedance: ≤40mΩ (At AC 1kHz)
3. 20	Series and Parallel type	1S1P		-

3 Pack Cycle Life

No.	Item	Condition	Remark
4. 1. 1	Pack cycle life	The capacity on discharge shall be measured after following cycle condition. Charge 4.18V/0.5C/0.05C cutoff/rest 10min. Discharge0.5C/3.0V cutoff/rest 10min. Temperature 24±2℃	500 cycles ≥2058mAh

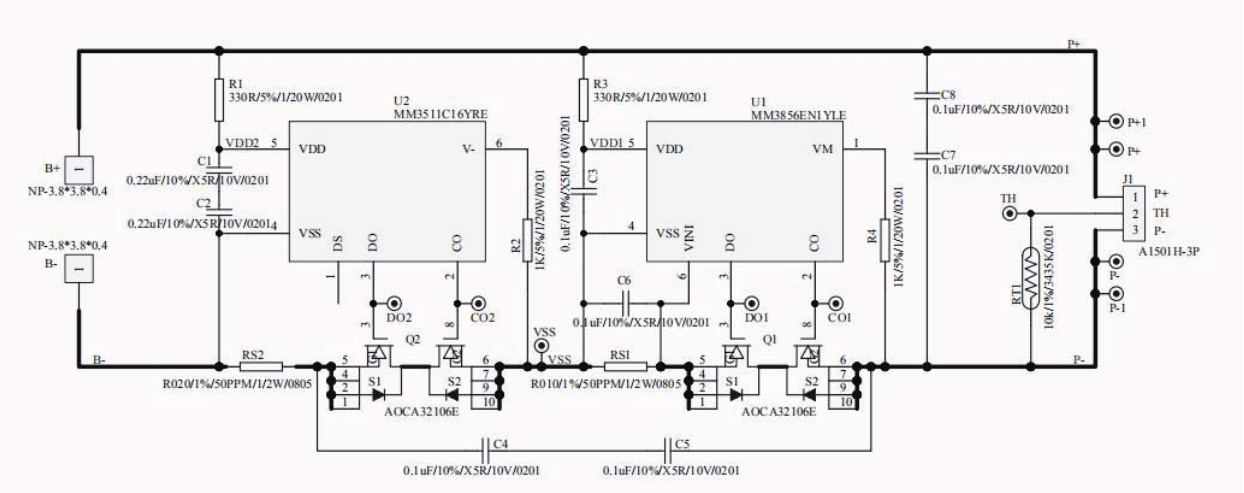
4 Pack Storage Life

No.	Item	Condition	Remark
5. 1. 1	High Temperature Storage	The capacity on standard charge and then storage at 60℃ for 7 days. After storage, the capacity shall be on standard discharge and cycled per standard charge and standard discharge for 3cycles to obtain recovery capacity .	≥2352mAh (Recovery capacity)
5. 1. 2	Thermal shock	The capacity on standard charge and then at 65℃（8h）← 3hrs →-20℃（8h） for 8cycles. After storage, the capacity shall be on standard discharge and cycled per standard charge and standard discharge for 3cycles to obtain recovery capacity .	≥2352mAh (Recovery capacity)

5 Protection specification

No.	Item	Unit	Min.	Typ.	Max
Primary Protection(@-20 to 60℃)					
5.1	Overcharge protection voltage	V	4.21	4.23	4.25
5.2	Overcharge protection delay time	s	0.71	1.0	1.3
5.3	Overcharge released voltage	V	Discharge Release		
5.4	Over discharge protection voltage	V	2.46	2.5	2.54
5.5	Over discharge protection delay time	ms	14	20	26
5.6	Over discharge released voltage	V	Charge Release		
5.7	Charge over current protection	A	1.92	2.25	2.59
5.8	Charge over current protection delay time	ms	11.2	16	20.8
5.9	Discharge over current protection	A	2.03	2.35	2.68
5.10	Discharge over current protection delay time	ms	22.4	32	41.6
5.11	Short circuit protection	A	6.42	7.5	8.61
5.12	Short circuit protection delay time	μs	156	250	375
5.13	0 V charging	-	Enable		
2nd Protection(@-20 to 60℃)					
5.14	Overcharge protection voltage	V	4.26	4.28	4.3
5.15	Overcharge protection delay time	s	0.84	1.2	1.56
5.16	Overcharge released voltage	V	Discharge Release		
5.17	Over discharge protection voltage	V	2.24	2.3	2.35
5.18	Over discharge protection delay time	ms	105	150	195
5.19	Over discharge released voltage	V	Charge Release		
5.20	Charge over current protection	A	2.05	3.8	4.92
5.21	Charge over current protection delay time	ms	6.3	9	11.7
5.22	Discharge over current protection	A	2.3	3.8	5.53
5.23	Discharge over current protection delay time	ms	6.3	9	11.7
5.24	Short circuit protection	A	10.2	19	30.7
5.25	Short circuit protection delay time	μs	195	300	450
5.26	0V charging	-	disable		
Others(@25℃)					
5.27	Current consumption	Operating	μA	-	5.5	10
		Over discharge		-	0.3	0.7
5.28	PCM IR (Without wire connector)	-	mΩ	-	50	60

6 Circuit Diagram



7 Stack-up

stack up				
Layers Descriptions(Stackup)			trademark/model	Typical layer thickness (um)
				Nominal / Tolerance(um)
OSP				0.3 / 0.2-0.6
Silkscreen			(white)	15 / +/-5
Solder Mask			(black)	25 / +/-15
L1	Copper Plating			30 / 46+/-10
	Copper foil (0.5oz)			16
	Core	Via Copper	SHENGYI S1150G	670 / +/-65
L2	Copper foil (0.5oz)			16 / 46+/-10
	Copper Plating			30
Solder Mask			(black)	25 / +/-15
Silkscreen			(white)	15 / +/-5
OSP				0.3 / 0.2-0.6
Theoretical Total thickness(um)				812
Total thickness(um)				800 / ±100

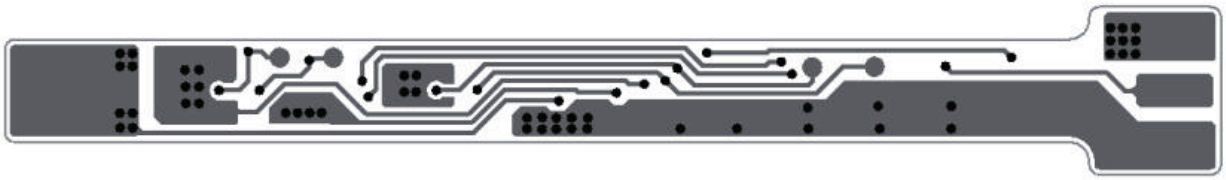
8 PCBA part list

#	Type	Symbol	Description	Qty	Vendor	Package
1	Protection IC	U1	Primary protection IC MM3856EN1YLE	1	Mitsumi	SON-6C
2	Protection IC	U2	Secondary protection IC MM3511C16YRE	1	Mitsumi	SON-6C
3	MOS	Q1,Q2	AOCA32106E	2	AOS	CSP
4	Resistor	R1,R3	330Ω, +/-5%, 1/20W	2	Yageo	0201
		R2,R4	1KΩ, +/-5%, 1/20W	2	Yageo	0201
5	Thermistor	RT1	10KΩ, +/-1%,Beta = 3435K	1	TDK/ Murata	0201
6	Sense Resistor	RS1	10mΩ, +/-1%,50ppm,1/2W	1	Ralec, Yageo	0805
7	Sense Resistor	RS2	20mΩ, +/-1%,50ppm,1/2W	1	Ralec, Yageo	0805
8	Capacitor	C1,C2	220nF, 10V,10%	2	Murata	0201
9	Capacitor	C3,C4, C5,C6, C7,C8	100nF, 10V,10%	6	Murata	0201
10	Weld pads	B+,B-	3.8 x 3.8 x 0.4mm	2	Da Tong/ Fu Ci	TBD
11	PCB	-	PCB-FB-Titan-A02	1	Victory Giant/ Red board	NA
12	Underfill		HS-601UF		Hanstars	NA
13	UV Adhesive		326-Loctite		Henkel	NA
14	Connector	J1	A1501H-3PN0WN00G UL3302 - 24AWG	1	Joint Tech	

9 Layout

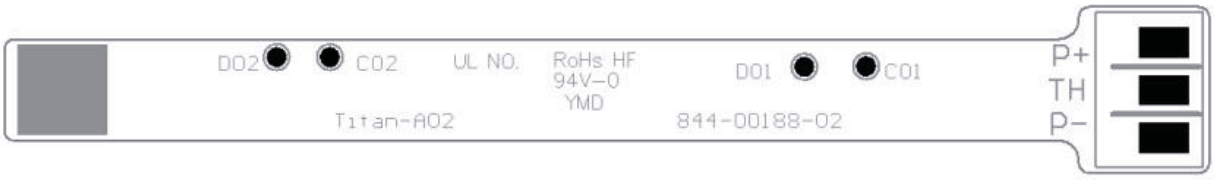
Toplayer:

Bottomlayer:

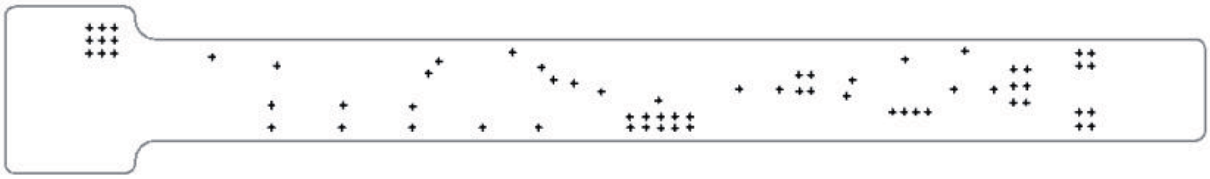


Top Silkscreen/Paste:

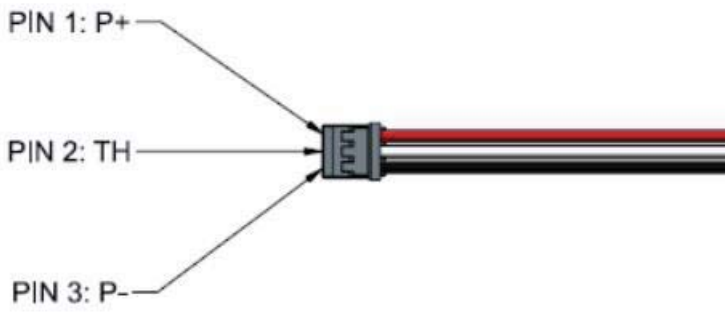
BottomSilkscreen/Paste:



Dirll:



10 Pack connector definition



PIN NO.	Name	Description	Remark
1	P+	Battery pack positive terminal	Red
2	TH	Battery pack thermistor terminal	White
3	P-	Battery pack negative terminal	Black

11 Safety and reliability test

1. UN38.3
2. PI965 (CSTCG Shanghai +Beijing)
3. CB IEC62133-2:2017
4. CB IEC62133:2012
5. CB IEC60950-1
6. CB IEC62368-1
7. UL2054 Limited Power Source (LPS)
8. UL 60950
9. Korea KC62133
10. Taiwan BSMI CNS15364
11. Japan PSE
12. UL WERC Registration
13. Australia/New Zealand RCM

12 Dimension

The mechanical structure parameters table

Item	Parameters		Note
Dimensions (mm)	Upper Wide	21.73~22.73	详见附录 See the appendix for details
	Lower Wide	20.15~20.95	
	Diameter	18.80 MAX	
	High	66.20 MAX	
Pack Weight (g)	47.9		For Reference Only

13 Label drawing

See the appendix

14 Others

14.1 Odor

The battery should not produce foul smell or harmful odor.

14.2 Protection for Environment

The material used for packing should meet the criterion to protect environment.

15 Warning and notice

⚠WARNING

1. Do not put the battery into a fire, or heat the battery.
2. Do not store the battery in high temperature environment.
3. Do not connect the battery reversed in positive (VBAT) and negative (GND) terminals in the charger or equipment.
4. Do not let the battery terminals (VBAT and GND) contact a wire or any metal (like a metal necklace or a hairpin) with which it carried or stored together, may cause short-circuit.
5. Do not drive a nail in, hit with a hammer, or stamp on the battery, do not strike the battery in other ways.
6. Do not disassemble or alter the batteries' outside structure.
7. Do not submerge the battery in water, do not wet the battery when store the battery.

⚠NOTICE

1. Battery should be charged and discharged with proper charger, in compliance with correct operation contents
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.
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.
4. Do not discharge the battery continuously when it is not charged.

Caution

1. Complete instructions as to how to replace the battery including the following or equivalent statement:Dispose of used battery promptly. Keep away from children.

2. 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."

3. For long-term storage, please charge at Standard Charge for about one hour in advance.

4. Do not use the battery in other than the following conditions; otherwise, the battery might cause heat generation, damage, or deterioration of its performance.

1) Do not put the battery into a fire, or heat the battery.

2) Do not store the battery in high temperature environment.

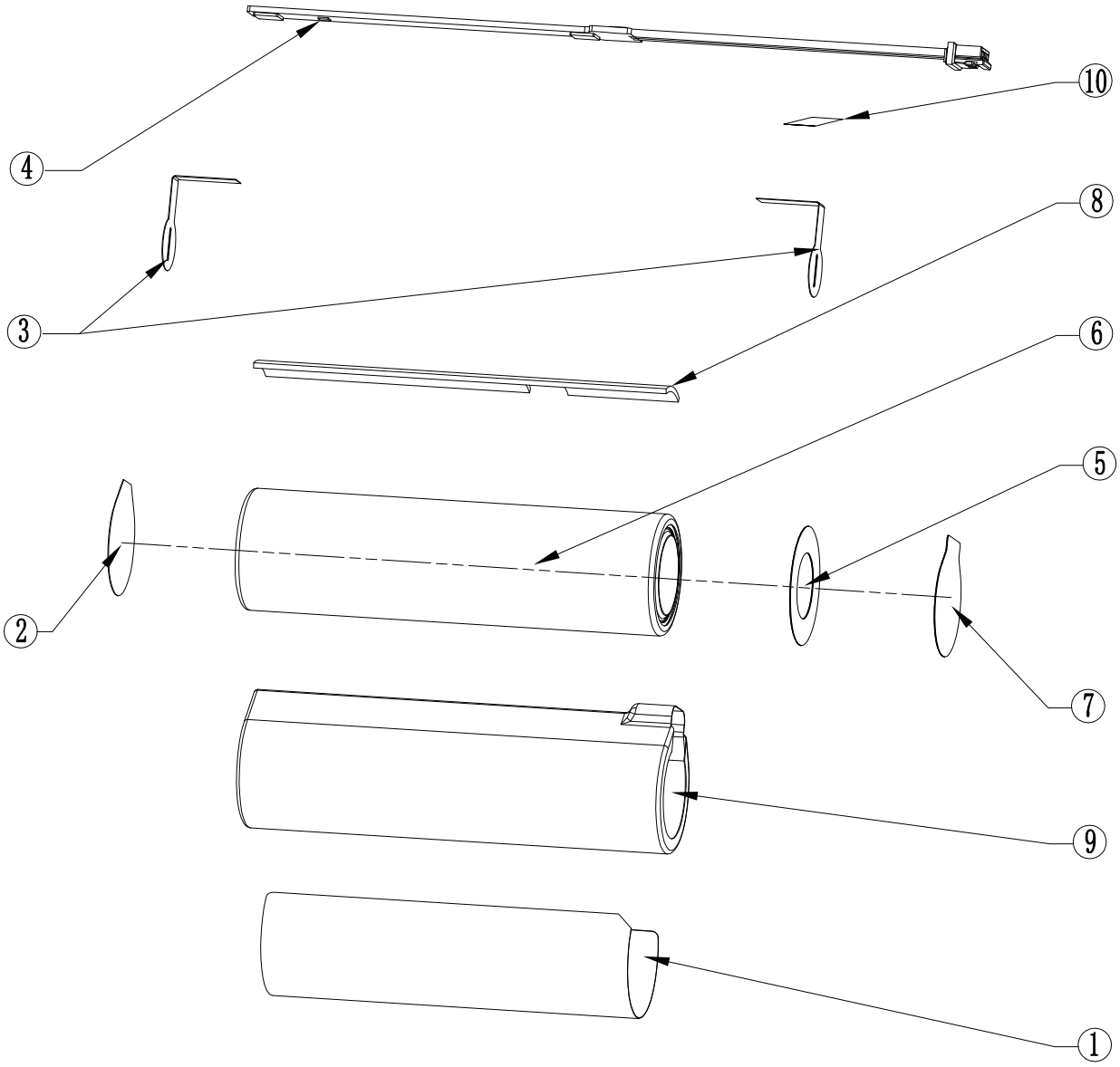
3) Do not connect the battery reversed in positive (VBAT) and negative (GND) terminals in the charger or equipment.

4) Do not let the battery terminals (VBAT and GND) contact a wire or any metal (like a metal necklace or a hairpin) with which it carried or stored together, may cause short-circuit.

5) Do not drive a nail in, hit with a hammer, or stamp on the battery, do not strike the battery in other ways.

6) Do not disassemble or alter the batteries' outside structure.

7) Do not submerge the battery in water, do not wet the battery when store the battery.



List	Specification	Part Name	Quantity
1	铭牌-MP-SC15-PET-57*40mm	RH070150999781	1
2	BQ-Titan-PET-17*16mm	RH070150999825	1
3	NP-1/4HNi-23.8*8-T0.1-Starlet	RH060806999723	2
4	PCBA-FB-Titan-A02	RH3823990658	1
5	CD-动力电源-PC-φ18xT0.13-1B-Titan	RH040316002299	1
6	DC-LI-FB-Titan-LG-MH1-充电预-新电极三孔	RH3021990671	1
7	CD-动力电源-17.9*φ16*T0.13-PC-Titan	RH040316002535	1
8	CD-动力电源-GJ-64*9*0.8-2B-Starlet	RH040316002489	1
9	RSG-黑色PET-折径34.4-T0.1-200米/卷	RH090104010587	75mm
10	CD-动力电源-4.8*8*T0.13-PC-Titan	RH040316002536	1

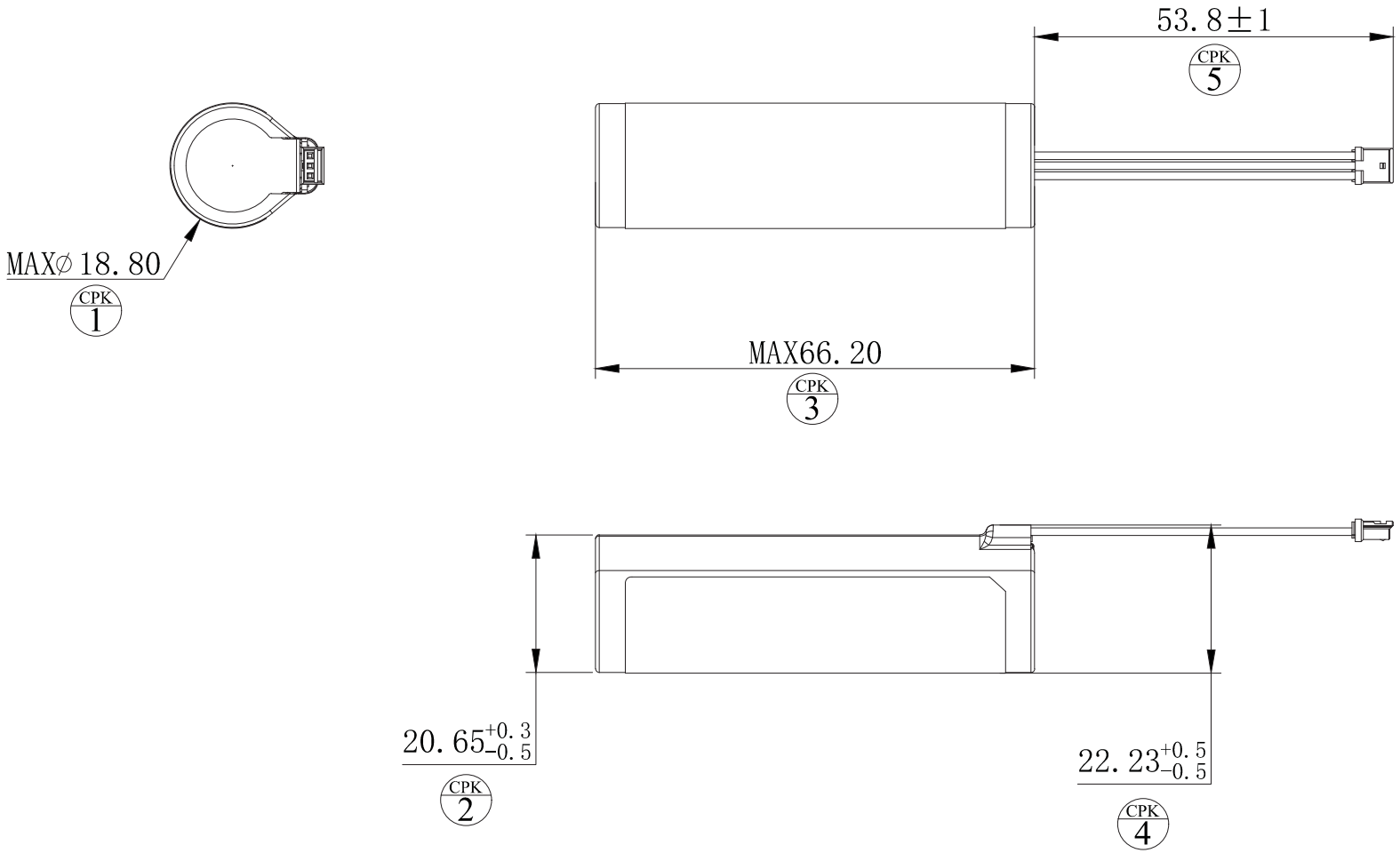
REV.	MARK	QTY	DATE	REVISER	CONTENTS OF CHANGE

mm＜size(A)≤mm	TOLERRANCE
–	-
0＜A≤30	±0.10
30＜A≤50	±0.15
50＜A≤100	±0.20
100＜A≤200	±0.25
200＜A	±0.30

PART No.	RH4G13016406		STATUS	REFERRAL	DIE SINKING / APPROVED
				√	
PART NAME	VR眼镜电池		SPEC.	LI-Titan-FB-LG-MH1	
DATE	2020.09.21	UNIT	PROJECT	FB-Titan	
DRAWN	STANDARD	CHECKED	MM	SCALE 1:1	
陈亮			APPROVED	A4 297×210mm	SHEET No. 01/01

福建飞毛腿动力科技有限公司 REV.:A1.0

A B C D E RD-001



STATUS	REFERRAL	DIE SINKING	APPROVED
	√		

						mm<size(A)≤mm	TOLERRANCE	PART No.	XXXX		SPEC.	XXXX	
						-	-	PART NAME	PACK		PROJECT	FB-Titan	
						0<A≤30	±0.10	DATE	2020.08.28	UNIT	MM	SCALE	1:1
						30<A≤50	±0.15	DRAWN	STANDARD	CHECKED	APPROVED	A4 297×210mm	SHEET No. 01 / 01
						50<A≤100	±0.20						
						100<A≤200	±0.25	廖加亮				福建飞毛腿动力科技有限公司	REV.:V1.0
REV.	MARK	QTY	DATE	REVISER	CONTENTS OF CHANGE	200<A	±0.30						

RD-001

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1Product Identifier

Name of Product: Rechargeable Lithium-ion Polymer Battery

1.2 Other means of identification

Product Models: 890-01923-B
Nominal Voltage: 3.87V
Nominal capacity: 154mAh
Nominal Power: 0.596Wh
Weight: 2.765g

1.3 Recommended use of the chemical and restriction on use

Recommended Use: Rechargeable Li-ionBattery
Restriction on Use: No information available

1.4 Information Of Supplier:

Company Name: Huizhou Desay Battery Co.,LTD
Address: No.15 Zone, Zhong Kai Hi_Tech Development Zone, Huizhou, Guangdong, China
Zip code: 516006
Contact person: Guocheng Wei
Tel: 86-752-2629634
E-mail: desay_certification@desay.com

1.5 Emergency Telephone

86-0752-2629750

2. Hazard(s) Identification

2.1 Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

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

2.2 Label elements

2.2.1 Signal WordDanger

2.2.2 Hazard Statements

Causes skin irritation
Causes serious eye damage
Suspected of causing cancer
Causes damage to organs through prolonged or repeated exposure

2.2.3 Symbol

This product is an article which contains a chemical substance. Safety information is given for exposure to the article as solid. Intended use of the product should not result in exposure to the chemical substance, this is a battery. In case of rupture: the above hazards exist.

2.3 Precautionary Statements

2.3.1 Precautionary Statements – Prevention

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Use personal protective equipment as required.
Wash face, hands and any exposed skin thoroughly after handling.
Contaminated work clothing should not be allowed out of the workplace.
Keep away from flames and hot surface –no smoking.
Do not breathe dust/fume/gas/mist/vapors/spray.
Do not eat, drink or smoke when using this product.

2.3.2Precautionary Statements – Response

If exposed or connected: Get medical advice/attention.
Specific treatment (see supplemental first aid/instruction on this label).

Skin

If ON SKIN: wash with plenty of soap and water.
Take off contaminated clothing and water before reuse.
If skin irritation or rash occurs: get medical advice/attention if feel unwell.

Eye

If IN EYES: Rinse cautiously with water for several minutes, remove contact lenses, if present and easy to do, Continue rinsing. Call a POISON CENTER or doctor/physician.

Inhalation

If inhalation: if breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. If experiencing respiratory symptoms: Call a poison center or doctor/physician.

Ingestion

If swallowed: rinse mouth, do not induce vomiting, Call a poison center or doctor/physician if feel unwell.

2.3.3 Precautionary Statements – Storage

Store locked up

2.3.4 Precautionary Statements – Disposal

Dispose of contents/container to an approved waste disposal plant.

2.4 Hazards not otherwise classified (HNOC)

Not applicable

2.5 Unknown Toxicity

39% of the mixture consists of ingredient(s) of unknown toxicity.

2.6 Other information

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

2.7 Interactions with other chemicals

Use of alcoholic beverages may enhance toxic effect.

3. Composition/ Information on Ingredients

Chemical Name	CAS No.	Weigh%
Cobalt lithium dioxide	12190-79-3	28
Ethy1 propionate	105-37-3	15
Copper foil	7440-50-8	9
Aluminum foil	7429-90-5	10
Graphite	7782-42-5	16.2
Ethylene Carbonate	96-49-1	1.2
Propylene Carbonate	108-32-7	2.6
Lithium Hexafluorophosphate(1-)	21324-40-3	15
Separator	9002-88-4	3

4. First Aid Measures

4.1 General Advice

First aid is upon rupture of sealed battery.

4.1.1 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. Do not rub affected area. Seek immediate medical attention/advice.

4.1.2 Skin Contact

Wash off immediately with plenty of water and soap for at least 15 minutes. Remove and isolate contaminated clothing and shoes. Get medical attention if irritation develops and persists.

4.1.3 Inhalation of Vented Gas

Remove to fresh air. Get medical attention immediately if symptoms occur. If not breathing, give artificial respiration. If breathing is difficult, (trained personnel should) give oxygen.

4.1.4 Ingestion

Do NOT induce vomiting. Rinse mouth immediately and drink plenty of water. Never give anything by mouth to an unconscious person. Call a physician or poison control center immediately.

4.1.5 Self-protection of the first aider

Ensure that medical personnel are aware of the material(s) involved. Take precaution to protect themselves and prevent spread of contamination. Avoid contact with skin, eyes or clothing. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Use personnel protective equipment as required. Wear personnel protective clothing (see section8).

4.2 Most important symptoms and effects, both acute and delayed

Burning sensation, Itching. Rashes. Hives, Coughing.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician

Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated. Do not give chemical antidotes. Asphyxia from glottal edema may occur. Marked decrease in blood pressure may occur with moist rales, frothy sputum, and high pulse pressure. May cause sensitization of susceptible persons. Treat symptomatically.

5. Fire – Fighting Measures

5.1 Suitable Extinguishing Media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.Dry chemical, CO_2,water spray or regular foam. Move containers from fire area if you can do it without risk.

5.2 Unsuitable Extinguishing Media

CAUTION: Use of water spray when fighting fire may be inefficient.

5.3 Specific Hazards Arising from the chemical

Thermal decomposition can lead to release of irritating gases and vapors. In the event of fire and/or explosion do not breathe fumes. May cause sensitization by inhalation and skin contact. Product is or contains a sensitizer.

Hazardous Combustion products

Carbon oxides

5.4 Explosion Data

Sensitivity to Mechanical Impact:None.
Sensitivity to Static Discharge: None.

5.5 Protective equipment and precautions for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/IOSH (approved or equivalent) and full protective gear.Move containers from fire area if you can do it without risk.

6. Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Use personal protective equipment as required. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak.

6.2 Environmental Precautions

Refer to protective measures listed in Sections 7 and 8. Prevent further leakage or spillageif safe to do so. Should not be released into the environment. Do not allow to enter intosoil/subsoil. Prevent product from entering drains.

6.3 Methods for containment

Prevent further leakage or spillage if safe to do so.Absorb with earth, sand or othernon-combustible material and transfer to containers for later disposal.

6.4 Methods for cleaning up

Pick up and transfer to properly labeled containers.

7. Handling and Storage

7.1 Precaution for safe handling

In case of rupture, use personal protection equipment. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Do not breathe dust/fume/gas/mist/vapors/spray.

7.2 Conditions for safe storage, including any incompatibilities

Storage

Keep containers tightly closed in a dry, cool and well-ventilated place. Store locked up. Keep out of the reach of children.

Incompatible products

Strong acids.Strong oxidizing agent. Strong bases.

8. Exposure Controls/Personal Protection

8.1 Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Graphite 7782-42-5	TWA:2mg/m^3 respirable particulate matter all forms except graphite fibers	TWA: 15 mg/m^3 total dust synthetic TWA: 5 mg/m^3respirable fraction synthetic (vacated) TWA: 2.5 mg/m^3respirable dust natural (vacated) TWA: 10 mg/m^3 total dust synthetic (vacated) TWA: 5 mg/m^3respirable fraction synthetic TWA: 15 mppcf natural	IDLH: 1250 mg/m^3 TWA: 2.5 mg/m^3 respirable dust
Lithium Cobalt Oxide 12190-79-3	TWA:0.02mg/m^3	-	-

ACGIH TLV: American Conference of Governmental Industrial Hygienists-Threshold Limit Value
OSHA PEL：Occupational Safety and Health Administration-Permissible Exposure Limits
NIOSH IDLH Immediately Dangerous to Life or Health.

Other Exposure Guidelines:

Vacated limits revoked by the court of Appeals decision in AFL-CLO v. OSHA, 965F, 2d 962(11th Cir., 1992) See section 15 for national exposure control parameters.

8.2 Appropriate engineering controls

Engineering Measures:

Showers、 Eyewash stations、Ventilation systems

8.3 Individual protection measures, such as personal protective equipment

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.

Eye /face protection:if splashes are likely to occur: Wear safety glasses with side shields(or goggles). None required for consumer use.

Skin protection: Wear protective gloves and protective clothing. Long sleeved clothing. Imperious gloves.

Hygiene Measure: Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using this product. Take off contaminated clothing and wash before reuse. Avoid contact with skin, eyes or clothing. Wear suitable gloves and eye/face protection. Wash hands before breaks and immediately after handling the product. For environmental protection, remove and wash all contaminated protective equipment before re-use. No information available.

9. Physical and Chemical Properties

Physical State: Solid

Color: Black

Odor: Odorless

Odor Threshold: No information available

pH: No data available

Melting/freezing point: No data available

Boiling point/boiling range: No data available

Flash Point: No data available

Evaporation Rate: No data available

Flammability(Solid, gas): No data available

Flammability Limit in Air: No data available

Upper flammability limit: No data available

Lower flammability limit: No data available

Vapor pressure: No data available

Vapor density: No data available

Specific Gravity: No data available

Solubility: Insoluble in water

Partition coefficient: n-octanol/water: No data available

Autoignition temperature: No data available

Decomposition temperature: No data available

Kinematic viscosity: No data available

Dynamic viscosity: No data available

10. Stability and Reactivity

Reactivity:
No data available

Chemical stability:
Stable under recommended storage conditions.

Possibility of Hazardous Reactions:
None under normal processing.

Hazardous Polymerization:
Hazardous polymerization does not occur.

Conditions to avoid:
Do not subject battery to mechanical shock. Keep away from open flames, high temperature.

Incompatible materials:
Strong acids, Strong oxidizing agents. Strong bases.

Hazardous decomposition products:
Carbon oxides

11. Toxicological Information

11.1 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. Corrosive by inhalation(base on components). Inhalation of corrosion fumes/gases may cause coughing, choking, headache, dizziness and weakness for several hour. Pulmonary edema may occur with tightness in the chest, shortness of breath, bluish skin, decreased blood pressure and increased heart rate. Inhaled corrosion substances can lead to a toxic edema of the lungs. Pulmonary edema can be fatal. May cause irritation of respiratory tract.

Eye Contact:
Specific test data for the substance or mixture is not available. Cause burns. (based on components). Corrosion to the eyes and may cause severe damage including blindness. Cause serious eye damage. May cause irreversible damage to eyes.

Skin Contact:
Specific test data for the substance or mixture is not available.Corrosion (based on components). Cause burns. Toxic in contact with skin.May be absorbed through the skin in harmful amounts.

Ingestion:
Specific test data for the substance or mixture is not available. Cause burns. (based on components). Ingestion cause burns of the upper digestive and respiratory tracts. May cause

severe burning pain in the mouth and stomach with vomiting and diarrhea of dark blood. Blood pressure may decrease. Brownish or yellowish stains may be seen around the mouth. Swelling of the throat may cause shortness of breath and choking. May cause lung damage if swallowed. May be fatal if swallowed and enters airways. Ingestion may cause irritation to mucous membranes. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. May be harmful if swallowed.

Component Information

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Graphite 7782-42-5	> 10000mg/kg (Rat)	-	-

11.2 Information on toxicological effects

Symptoms:

Erythema (skin redness).May cause redness and tearing of eyes.Itching.Rashes.Hives. Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain, or flushing. Coughing and/or wheezing.

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

Sensitization: May cause sensitization of susceptible person, May cause sensitization by skin contact. May cause sensitization by inhalation.

Mutagenic Effects: No information available.

Carcinogenicity: the table below whether each agency has listed any ingredient as a carcinogen.

Chemical Name	ACGIH	IARC	NTP	OSHA
Lithium Cobalt Oxide12190-79-3	A3	Group 2B		X

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 Carcinogenic.
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: Cause damage to organs through prolonged or repeated exposure. Based on classification criteria from the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200), this product has been determined to cause systemic target organ toxicity from chronic or repeated exposure. (STOT RE)

Chronic Toxicity: Prolonged exposure may cause chronic effects. Repeated contact may cause allergic reactions in very susceptible persons. Contain a known or suspected carcinogen. Avoid repeated exposure. May cause adverse effects on the bone marrow and

blood-forming system.May cause adverse liver effects.

Target Organ Effects: Respiratory system. Eyes.Skin. Gastrointestinal tract(GI). Blood. Central Nervous System(CNS). Kidney.Liver.Lungs.Nasal cavities.

Aspiration Hazard: No information available.

11.4 Numerical measures of toxicity product information

The following values are calculated based on chapter 3.1 of the GHS document.
ATE mix(oral):6513mg/kg
ATE mix(dermal): 5141mg/kg (ATE)

12. Ecological Information

Ecotoxicity :

Chemical name	Toxicity to Aglae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water Flea)
-	-	-	-	-

Persistence and Degradability: No information available

Bioaccumulation: No information available

Other adverse effects: No information available

13. Disposal Considerations

13.1Waste treatment methods

Disposal methods:
This material, as supplied, is not a hazardous waste according to Federal regulations (40 CFR 261). This material could become a hazardous waste if it is mixed with or otherwise comes in contact with a hazardous waste, if chemical additions are made to this material, or if the material is processed or otherwise altered. Consult 40 CFR 261 to determine whether the altered material is a hazardous waste. Consult the appropriate state, regional, or local regulations for additional requirements. Should not be released into the environment.

Contaminated Packaging:

Dispose of in accordance with federal, state and local regulations.

California Hazardous Waste Codes 141
This product contains one or more substances that are listed with the State of California as a hazardous waste.

Chemical Name	California Hazardous Waste
Lithium Cobalt Oxide 12190-79-3	Toxic

14. Transportation Information

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 "PI965-967 section II of IATA-DGR" or "special provision188 of IMO-IMDG Code"

DOT: NOT REGULATED

Proper Shipping Name: NON REGULATED

Emergency Response Guide Number: 147

Hazard Class: N/A

TDG: Not regulated

MEX: Not regulated

ICAO: Not regulated

IATA: Not regulated

Proper Shipping Name: Not regulated

Hazard Class: Not regulated

IMDG/IMO: Not regulated

Proper Shipping Name: NON REGULATED

Hazard Class: N/A

Ems No.: F-A,S-1

RID: Not regulated

ADR: Not regulated

AND: Not regulated

15. Regulatory information

15.1International Inventories

TSCA Complies

DSL All components are listed either on the DSL or NDSL.

TSCA – United State Toxic Substance Control Act Section 8(b) Inventory

DSL/NDSL – Canadian Domestic Substance List/Non-Domestic Substance List

15.2 US Federal Regulations

SARA 313: Section 313 of Title III of the superfund Amendments and Reauthorization Act of 1986(SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical Name	CAS No.	Weight (%)	SARA313-Threshold values(%)
Lithium Cobalt Oxide	12190-79-3	15-40	0.1

15.3SARA 311/312Hazard Categories

Acute Health Hazard No
Chronic Health Hazard No
Fire Hazard No
Sudden release of pressure hazard No
Reactive Hazard No

15.4CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

15.5CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

15.6 US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals.

Chemical Name	California Proposition 65
-	Carcinogen

U.S State Right-to-Know Regulations

Chemical Name	NewJersey	Massachusetts	Pennsylvania	RhodeIsland	IIIinois
Graphite 7782-42-5	×	×	×		
Lithium Cobalt Oxide 12190-79-3	×	×	×	×	×

15.7 International Regulations

Mexico

National occupational exposure limits

Chemical Name	Carcinogen Status	Exposure Limits
Graphite		Mexico: TWA= 2 mg/m^3

Canada

WHMIS Hazard Class
Non-controlled

16. Other Information

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 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 material used in combination with any other materials or in any process, unless specified in the test.

Prepared By: Guangzhou MCM Certification and Testing Co., Ltd.

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--- End of SDS ---