JustBrand Limited
MSDS for Li Ion Battery Pack
Model: G0720U-BAT-852
Oct 12, 2020

Material Safety Data Sheet

*Product and Company Identification

Important Note: As a solid, manufactured article, exposure to hazardous ingredients is not expected with normal use. This battery is an article pursuant to 29 CFR 1910.1200 and, as such, is not subject to the OSHA Hazard Communication Standard requirement. The information contained in this Material Safety Data Sheet contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

Commercial product name
G0720U-BAT-852

Use of the substance/preparation
Lithium-Ion battery

Battery Cell Manufacturer
DLG（SHANDONG）ENERGY TECHNOLOGY CO.,LTD.

Further Information
The G0720U-BAT-852 battery is made from 2pcs DLG li ion battery cell type NCM18650-260, and protected with strong ABS plastic shell. This battery is certificated to meet UN38.3 as Non-restricted Goods for air/boat shipments.
The pages follow is MSDS information from DLG（SHANDONG）ENERGY TECHNOLOGY CO.,LTD.

Battery-System: Lithium-Ion (Li-ion)
Nominal Voltage: 7.4V
Rated Capacity: 2.6Ah
Wh rating: 19.24Wh
Anode (negative electrode): based on intercalation graphite
Cathode (positive electrode): based on lithiated metal oxide (Cobalt, Nickel, Manganese)

Rema rk:
The information and recommendations set forth are made in good faith and believed to be accurate as of the date of preparation. JustBrand Limited makes no warranty, expressed or implied, with respect to this information and disclaims all liabilities from reliance on it.

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Document No.	QA-TDD-SDS-0013 A.0

MSDS SHEET OF PRODUCT

For Lithium-ion Rechargeable Cell

Model: NCM18650-260 Series

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Document No.	QA-TDD-SDS-0013 A.0

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1	2019-02-16	7	A.0	New release	

Document No.	QA-TDD-SDS-0013 A.0

MATERLAL SAFETY DATA SHEET

LITHIUM-ION RECHARGEABLE BATTERY

1. PRODUCT.IDENTIFEICATION

Product: Rechargeable Battery
Trade name: Lithium-ion rechargeable battery
Electrochemical system:
Negative Electrode: Carbon (C)
Positive Electrode: Cobalt lithium manganese nickel oxide
Electrolyte: $LiPF_6$
Cell Type: NCM18650-260
Minimum Cell Capacity: 2550mAh
Nominal Voltage: 3.6 Volt

2. COMPOSITION.

Although the chemical composition of the various cell manufacturers is proprietary, the following is typical of the chemistry.

Hazardous Components (Specific Chemical Identity; Common Name(s))	%	CAS Number	LD50(mg/kg) (oral-rat)	LC50 (mg/L)
Cobalt lithium manganese nickel oxide	30-45w/w	182442-95-1	N/A	N/A
Graphite Powder	15-25 w/w	7782-42-5	440 (ivn-mouse)	N/A
Lithium hexaflurorphosphate ($LiPF_6$)	1-3 w/w	21324-40-3	1702	Rat: >20
Poly (vinylidene fluoride) (PVDF)	0.1 -2w/w	24937-79-9	N/A	N/A
Aluminum foil	2-8 w/w	7429-90-5	N/A	N/A
Copper foil	5 -10 w/w	7440-50-8	3.5(ipr-mouse)	N/A
Carbon black and others	0.5-2w/w	1333-86-4	N/A	N/A
Steel, nickel and inert polymer	0.5-5 w/w	9003-55-8	N/A	N/A

These chemicals and metals are contained in a sealed can.

3. HAZARD DATA

3.1 Physical:

The LITHIUM-ION batteries described in this Material Safety Data Sheet are sealed which are not hazardous when used according to the recommendations of the manufacturer.

Under normal conditions of use, electrode materials and liquid electrolyte they contain are non-reactive provided the battery integrity is maintained and seals remain intact, Risk of exposure only in case of abuse, e.g. mechanical, thermal, electrical, which leads to the activation of safety valves and/or the rupture of the battery containers. Electrolyte leakage, electrode materials reaction with moisture/water of battery vent/ explosion/fire may follow depending upon circumstances.

Document No.	QA-TDD-SDS-0013 A.0

3.2 Chemical:

Classification of dangerous Substances Contained into the Product as per Directive

Substance		Melting point	Boiling point	Classification			
CAS N °	Chemical symbol			Exposure limit	Indication of danger	Special risk (1)	Safety advices (2)
182442-95-1	Cobalt lithium manganese nickel oxide	N/A	N/A	N/A		R36/37/38	S22/S24/S25

1. Name of Special Risks:

R21 Harmful in contact with ski

R22 Harmful us swallowed

R36/37/38 Irritating to eyes, respiratory system and skin.

R41 Risk of serious damage to the eye

R42 May cause sensitization by inhalation and skin contact

R43 May cause sensitization by skin contact

2. Safety Advices:

S2 Keep out of reach from children

S22 Do not breathe dust

S24 Avoid contact with skin

S25 Avoid contact with eyes.

S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical attention

S36 Wear suitable protective clothing

S37 Wear suitable gloves

S45 In case of incident, seek medical attention

In case of battery rupture or explosion, evacuate personnel from contaminated area and provide maximum ventilation to clear out corrosive fumes/gases and pungent odors. In all case, seek immediate medical attention,

Eye contact: Flush with plenty of water(eyelids-held open)for at least 15 minutes

Skin contact: Remove all contaminated clothing and flush affected areas with plenty of water and sop for at least 15minutes.

Document No.	QA-TDD-SDS-0013 A.0

Ingestion: Dilute by giving plenty of water and get immediate medical attention.
Assure that the victim does not aspirate vomited material by use of positional drainage.
Assure that mucus does not obstruct the airway.
Do not give anything by mouth to an unconscious person

Inhalation: Remove to fresh air and ventilate the contaminated area.
Give oxygen or artificial respiration if needed.

5. Fire-Fighting Measures

Fire and explosion hazard	The batteries can leak and/or spout vaporized or decomposed and combustible electrolyte fumes in case of exposure above 90 ℃ resulting from inappropriate use or from the environment. Possible formation of hydrogen fluoride (HF) and phosphorous oxides during fire.LiPF6 salt contained in the electrolyte releases hydrogen fluoride (HF) in contact with water.
Extinguishing media	Suitable : CO_2, Dry chemical or Foam extinguishers Not to be used : Type D extinguishers
Special exposure hazards:	Following cell overheating due to external source or due to improper use, electrolyte leakage or battery container rupture may occur and release inner component/material in the environment. Eye contact : The electrolyte solution contained in the battery is irritant to ocular tissues. Skin contact : The electrolyte solution contained in the battery causes skin irritation. Ingestion : The ingestion of electrolyte solution causes tissue damage to throat and gastro/respiratory tract. Inhalation : Contents of a leaking or ruptured battery can cause respiratory tract, mucus, membrane irritation and edema.
Special protective equipment	Use self-contained breathing apparatus to avoid breathing irritant fumes. Wear protective clothing and equipment to prevent baby contact with electrolyte solution.

6. Accidental Release Measures

Personal Precautions, protective equipment, and emergency procedures	Restrict access to area until completion of clean-up. Do not touch the spilled material. Wear adequate personal protective equipment as indicated in Section 8.
Environmental Precautions	Prevent material from contaminating soil and from entering sewers or waterways.
Methods and materials for Containment	Stop the leak if safe to do so. Contain the spilled liquid with dry sand or earth. Clean up spills

Document No.	QA-TDD-SDS-0013 A.0

	immediately.
Methods and materials for cleaning up	Absorb spilled material with an inert absorbent (dry sand or earth). Scoop contaminated absorbent into an acceptable waste container. Collect all contaminated absorbent and dispose of according to directions in Section 13. Scrub the area with detergent and water; collect all contaminated wash water for proper disposal.

7. Handling and Storage

The batteries should not be opened destroyed nor incinerated since they may leak or rupture and release in the environment the ingredients they contain.

Handling	Do not crush, pierce, short (+) and (-) battery terminals with conductive (i.e. metal) goods. Do not directly heat or solder. Do not throw into fire. Do not mix batteries of different types. Do not mix new and used batteries. Keep batteries in non-conductive (i.e. plastic) trays.
Storage	Store in a cool (preferably below 30 ℃) and ventilated area away from moisture, sources of heat, open flames, food and drink. Keep adequate clearance between walls and batteries. Temperature above 90 ℃ may result in battery leakage and rupture. Since short circuit can cause burn, leakage and rupture hazard, keep batteries in original packaging until use and do not jumble them.
Other	Manufacturer recommendations regarding maximum recommended currents and operating temperature range. Applying pressure on deforming the battery may lead to disassembly followed by eye, skin and throat irritation.

8. Exposure Controls/Personal Protection

Respiratory protection:	Not necessary under normal use. In case of battery rupture, use self-contained full-face respiratory equipment. equipment with type ABEK filter.
Hand protection:	Not necessary under normal use. Use rubber gloves if handling a leaking or ruptured battery.
Eye protection:	Not necessary under normal use. Wear safety goggles or glasses with side shields if handling a leaking or ruptured battery.
Skin protection:	Not necessary under normal use. Use rubber apron and protective working in case of handling of a ruptured battery.

9. Physical And Chemical Properties

9.1 Appearance (Physical shape and color as supplied:)

Cobalt lithium manganese nickel oxide is a Black Powder; Graphite is a black or odorless power; Organic solvent is a colorless liquid.

9.2 Specific gravity (H_2O=1)

Cobalt lithium manganese nickel oxide: 2.2 Graphite: 2.0-2.2

Document No.	QA-TDD-SDS-0013 A.0

9.3 Melting point

Graphite: 3500-3900 ℃

10. Stability and Reactivity

Conditions to avoid	Heat above 90 ℃ or incinerate. Deform, mutilate, crush, pierce, disassemble. Short circuit. Prolonged exposure to humid conditions.
Materials to avoid	N/A
Hazardous decomposition products	Corrosive/Irritant Hydrogen fluoride (HF) is produced in case of reaction of lithium (LiPF6) with water. Combustible vapors and formation of Hydrogen fluoride (HF) and phosphorous oxides during fire.

11. Toxilogical Information

The LITHIUM-ION batteries do not contain toxic materials

12 Ecological Information

When properly used or disposed, the LITHIUM-ION batteries do not resent environmental hazard

13. Disposal Considerations

Dispose in accordance with applicable regulations which vary from country to country.

(In more countries, the thrashing of used batteries is forbidden and the end-users are invited to dispose them properly, eventually through not-for-profit organizations, mandated by local governments or organized on a voluntary basis by professionals).

Lithium-Ion batteries should have their terminals insulated and be preferably wrapped in plastic bags prior to disposal.

13.1 Incineration: Incineration should never be performed by battery users but eventually by trained professionals in authorized facilities with proper gas and fumes treatment.

13.2 Land filling: Leach ability regulations (mg/l)

Component	Leach ability	EC limit	EPA	Other*
Iron	100			5
Nickel	500	2		0.5

13.3 Recycling: Send to authorized recycling facilities, eventually through licensed waste carrier.

14. TRANSPORT INFORMATION

14.1 Lithium ion batteries containing Watt-hour rating is not more than 100Wh.

14.2 The Lithium-ion battery have been tested under provisions of the UN Manual of Tests and Criteria, the battery is passed the UN 38.3 test, Part III, sub-section 38.3(withstanding a 1.2m drop test) and are classified as non-dangerous goods.

14.3 Lithium-ion batteries can be treated as "Non-dangerous goods" under the United Nations Recommendations on the Transport of Dangerous Goods, Special Provision 188, provided that packaging is strong and prevent the products from short-circuit.

14.4 The Li-ion battery are complied with Section II of PI967 (53nd Edition - 2012).

14.5 The consignment can be shipped as “Not Restricted” in accordance with the current edition-53nd of IATA-DGR-2012.

Document No.	QA-TDD-SDS-0013 A.0

14.6 With regard to air transport, the following regulations are cited and considered:

- The International Civil Aviation Organization(ICAO) Technical Instructions.
- The International Air transport Association (IATA) Dangerous Goods Regulations.
- The International Maritime Dangerous Goods (IMDG) Code.
- The US Hazardous Materials Regulation (HMR) pursuant to a final rule issued by RSPA
- The Office of Hazardous Materials Safety within the US Department of Transportations' (DOT)

Research and Special Programs Administration (RSPA).

15. REGULATORY INFORMATION

The LITHIUM-ION CYLINDRICAL BATTERY (≥2550mAh) according to Section Ⅱ/IA/IB of PACKING INSTRUCTION 965/966/967 of the 2018 IATA Dangerous Goods regulations 59th Editon may be transported and applicable U.S.DOT regulations for the safe transport of Li-ion Battery.

Depending on their lithium metal equivalent weight content, design, and ability to pass safety tests defined by the UN in the "Recommendations on the Transport of Dangerous Good - Manual of Tests and Criteria – 4th Revised edition - Ref. ST/SG/AC.10/11 Rev.4 Amendment 1 «Lithium Batteries »", the Lithium-ion cells and the battery packs are not be assigned to the UN N ℃3480 Class-9, that is restricted for transport.

Individual Lithium-ion cells and battery packs with respectively less than 20 and 100 Wh per gram that pass the UN-defined safety tests, are not restricted for transport .

16. OTHER INFORMATION/DISCLAIMER

This information has been compiled from sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty (either expressed or implied) or guarantee is made to the accuracy, reliability or completeness of the information contained herein.

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