



Date	2009/7/1
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Lithium Ion Battery Cell Result of UN Test

IDX Company, Ltd.
Products Div.

K. Ishii, General Manager
Technical Development

Model	POWER CUBE
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Manual of Tests and Criteria (38.3 Lithium Batteries)		Test Results	Note
No.	Test Item		
T1	Altitude Simulation	Pass	
T2	Thermal Test	Pass	
T3	Vibration	Pass	
T4	Shock	Pass	
T5	External Short Circuit	Pass	
T6	Impact	Pass	
T7	Overcharge	Pass	For Battery Only
T8	Forced Discharge	-	For Cell Only

Lithium Ion Cell Specification

Item	Value	Note
Nominal Voltage	14.8V	
Capacity	5.7Ah	
Capacity(Wh)	84Wh	

We declare that the above-mentioned test is the result of being checked according to UN test.
(PROVING UN Manual of Tests and Criteria, Part III, sub-section 38.3 is met)

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Date 2009/7/1

Lithium Ion Cell Result of Package Drop Test

IDX Company, Ltd.
Products Div.

Model	POWER CUBE
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K. Ishii, General Manager
Technical Development

Test Item	Test Results	Note
Package Drop Test	Pass	The package shall be dropped from 1.2meter.
		high on to a concrete surface (flat and horizontal)
		with five orientations
		(1)flat on the bottom, (2)flat on the top, (3)flat on the long side,
		(4)flat on the short side, (5)on a corner

Lithium Ion Cell Specification

Item	Value	Note
Nominal Voltage	14.8V	
Capacity	5.7Ah	
Capacity(Wh)	84Wh	

We declare that above-mentioned test is passed.

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MATERIAL SAFETY DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

- Product Name : Lithium Ion Rechargeable Battery Pack
- Product code : Power Cube
- Company Name : IDX Company, Ltd.
- Address : 6-28-11 Shukugawara, Tama-ku, Kawasaki-shi,
Kanagawa-ken, 214-0021 Japan
- TEL : +81-44-850-8801
- FAX : +81-44-850-8838
- Emergency Telephone Number : +81-44-850-8831 (Products Div. Direct)

2. COMPOSITION / INFORMATION ON INGREDIENTS

For cell

- Substance or preparation: Preparation
- Information about the chemical nature of product:*1

Portion	Material name	CSA No.	Concentration range (wt %)
Positive electrode	Lithium transition metal oxidate (Li[M] _m [O] _n *2)	12190-79-3 12057-17-9 182442-95-1	20~60
Positive electrode's base	Aluminum	7429-90-5	1~10
Negative electrode	Carbon	7782-42-5 7440-44-0	10~30
Negative electrode's base	Copper	7440-50-8	1~15
Electrolyte	Organic electrolyte principally involves ester carbonate	-	5~25
Outer case	Iron	7439-89-6	1~30

*1 Not every product includes all of these materials.

*2 The letter M means transition metal and candidates of M are Co, Mn, Ni and Al. One compound includes one or more of these metals and one product includes one or more of the compounds. The letter m and n means the number of atoms.

For molding case

- Chemical Name : Polycarbonate based on bisphenol A
- Composition : Polycarbonate more than 81 wt%(CAS No.25971-63-5)
Flame Retardant less than 12 wt%
Elastomer less than 7 wt%
- Chemical Formula : [-O-C₆H₄-C(CH₃)₂-C₆H₄-O-CO-]_n-
- CAS Registry No. : 25971-63-5

3. HAZARDS IDENTIFICATION

For cell

- GHS Classification : Not available

(This products is outside the scope of GHS system since it's considered as an "article".)

For the battery cell, chemical materials are stored in a hermetically sealed metal or metal laminated plastic case, designed to withstand temperatures and pressures encountered during normal use.

As a result, during normal use, there is no physical danger of ignition or explosion and chemical danger of hazardous materials' leakage.

However, if exposed to a fire, added mechanical shocks, decomposed, added electric stress by miss-use, the gas release vent will be operated. The battery cell case will be breached at the extreme, hazardous materials may be released.

Moreover, if heated strongly by the surrounding fire, acrid gas may be emitted.



- Most important hazard and effects

Human health effects

- Inhalation : The steam of the electrolyte has an anesthesia action and stimulates a respiratory tract.
- Skin contact : The steam of the electrolyte stimulates a skin. The electrolyte skin contact causes a sore and stimulation on the skin.
- Eye contact : The steam of the electrolyte stimulates eyes. The electrolyte eye contact causes a sore and stimulation on the eye. Especially, substance that causes a strong inflammation of the eyes is contained.
- Environmental effects : Since a battery pack remains in the environment, do not throw out it into the environment.

Specific hazards

If the electrolyte contacts with water, it will generate detrimental hydrogen fluoride.
Since the leaked electrolyte is inflammable liquid, do not bring close to fire.

For molding case

According to GHS Classification

- Classification : Not Classification
- Possible hazards : No specific dangers known

4. FIRST-AID MEASURES

For cell

Spilled internal cell materials

- Inhalation : Make the victim blow his/her nose, gargle. Seek medical attention if necessary.
- Skin contact : Remove contaminated clothes and shoes immediately. Wash extraneous matter or contact region with soap and plenty of water immediately.
- Eye contact : Do not rub eyes. Immediately flush eyes with water continuously for at least 15 minutes. Seek medical attention immediately.

A battery cell and spilled internal cell materials

- Ingestion : Make the victim vomit. When it is impossible or the feeling is not well after vomiting, seek medical attention.

For molding case

- Inhalation : If fumes are inhaled, remove person to fresh air. If breathing is difficult, get medical attention.
- Ingestion : This product does not show significant acute toxicity. Get medical attention if considerable amounts of this product are ingested.



- Skin contact : Wash contaminated skin with soap and water after contact with processing vapors and fumes. Immediately cool contaminated skin with water and get medical attention after contact with molten resin.
- Eye contact : Flush the eyes with plenty of water without rubbing the eyes with hands. Get medical attention if irritation persists.

5. FIRE-FIGHTING MEASURE

For cell

- Suitable extinguishing media : Plenty of water, carbon dioxide gas, nitrogen gas, chemical powder fire extinguishing medium, and fire foam.
- Specific hazards : Corrosive gas may be emitted during fire.
- Specific methods of fire-fighting : When the battery burns with other combustibles simultaneously, take fire-extinguishing method which corresponds to the combustibles. Extinguish a fire from the windward as much as possible.
- Special protective equipment for firefighters
- Respiratory protection : Respiratory equipment of a gas cylinder style or protection – against - dust mask.
- Hand protection : Protective gloves.
- Eye protection : Goggle or protective glasses designed to protect against liquid splashes.
- Skin and body protection : Protective cloth.

For molding case

- Special firefighting procedures
This product is a combustible thermoplastic material which will melt and drip when ignited and gives off combustion product mainly consisting of carbon dioxide carbon monoxide. Formation of traces of aliphatic and aromatic hydrocarbons, aldehydes, acids, phenol and phenol derivatives may occur. Fire-men have to wear self-containing breathing apparatus.
- Extinguishing media : Water spray or other Class A extinguishing agent.



6. ACCIDENTAL RELEASE MEASURES

Spilled internal cell materials, such as electrolyte leaked from a battery cell, are carefully dealt with according to the following.

- Precautions for human body : Remove spilled materials with protective equipment (protective glasses and protective gloves). Do not inhale the gas as much as possible. Moreover, avoid touching as much as possible.
- Environmental precautions : Do not throw out into the environment.
- Method of cleaning up : The spilled solids are put into a container. The place that was leaked on is wiped off with dry cloth.
- Prevention of secondary hazards : Avoid re-scattering. Do not bring the collected materials close to fire.

In general for molding case

Sweep or gather up product and place in proper container for disposal or recovery. Do not discard in sewers or waterways because fish may eat pellets, resulting in obstruction of their digestive tracts.

7. HANDLING AND STORAGE

- Handling

For cell

- Do not connect the positive terminal to the negative terminal with electrical wire or chain.
- Avoid polarity reverse connection when installing the battery to an instrument.
- Do not wet the battery with water, seawater, drink or acid; or expose to strong oxidizer.
- Do not damage or remove the battery case.
- Keep the battery away from heat and fire.
- Do not disassemble or reconstruct the battery; or solder the battery directly.
- Do not give a mechanical shock or deform.
- Do not use unauthorized charger or other charging method. Terminate charging when the charging process doesn't end within specified time.
- In the case of charging, use only dedicated charger or charge according to the conditions specified by IDX.

For molding case:

Avoid breathing processing fumes and vapors. Processing fumes and vapors may cause eye, skin and respiratory tract irritation, and in case of overexposure, nausea and headache. Clean dust from cutting and sanding operation to prevent its accumulation, since it may cause spark due to statics electricity or dust explosion. Properly ground air transportation lines including hoppers, bad filters to prevent accumulation of static electricity.



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- Storage

For cell

- Do not store the battery with metalware, water, seawater, strong acid or strong oxidizer.
- Make the charge amount 30~50% then store at room temperature or less (temperature= -20~35 degree C) in a dry (humidity: 45~85%) place. Avoid direct sunlight, high temperature, and high humidity.
- Use insulative and adequately strong packaging material to prevent short circuit between positive and negative terminal when the packaging breaks during normal handling. Do not use conductive or easy to break packaging material.

For molding case:

Store this product in place not subject to direct sunlight or elevated temperatures or where there are no ignition sources. Take measures to prevent an accident due to static electricity from occurring.

8. EXPOSURE CONTROL / PERSONAL PROTECTION

For cell

- Control parameters
ACGIH has not been mentioned control parameter of electrolyte.
- Personal protective equipment
 - Respiratory protection : Respirator with air cylinder, dust mask
 - Hand protection : Protective gloves
 - Eye protection : Goggle or protective glasses designed to protect against liquid splashes
 - Skin and body protection : Working clothes with long sleeve and long trousers

For molding case

- Personal protections
 - respiratory protection : Avoid breathing dust, vapors or fumes.
Use NIOSH/OSHA approved respiratory protection equipment(full facepiece recommended) when airborne exposure limits are exceeded.
 - Eye protection : Does not cause significant eye irritation or eye toxicity requiring special protection, except when in molten state. Use good industrial practice to avoid eye contact. Processing of this product releases vapors or fumes which may cause eye irritation. Where there is significant potential for eye contact, wear appropriate eye protection and have eye flushing equipment available.
 - Skin protection : Does not present a significant skin concern requiring special protection at room temperature. Minimize skin contamination by following good industrial hygiene practice. Processing of this product releases vapors or fumes which may cause skin irritation.



Wash hands and contaminated skin thoroughly after contact with processing vapors or fumes. Wear rubber glove when handling molten resin.

ACGIH : American Conference of Governmental Industrial Hygienists, Inc.

NIOSH : National Institute for Occupational Safety and Health

OSHA : Occupational Safety & Health Administration

9. PHYSICAL AND CHEMICAL PROPERTIES

For cell

- Appearance
- Physical stat : Solid
- Form : Cylindrical
- Color : Metallic color(without tube if it has tube)
- Odor : No odor

For molding case

- Appearance : Pellet
- Boiling point : Not applicable
- flash point : > 520°C
- Ignition point : > 550°C
- Vapor pressure : Not applicable
- Melting point : Not applicable
- Specific gravity : 1.2
- Oxidizibility : None under normal handling conditions
- Flammability : combustible
- Explosion Limit : Not applicable
- Solubility in water : Insoluble
- Odor : None

10. STABILITY AND REACTIVITY

For cell

- Stability : Stable under normal use.
- Hazardous reactions occurring under specific conditions
 - Conditions to avoid : When a battery cell is exposed to an external short-circuit, crushes, deformation, high temperature above 100 degrees Celsius, it will be the cause of heat generation and ignition. Direct sunlight and high humidity.
 - Materials to avoid : Conductive materials, water, seawater, strong oxidizers and strong acids.
 - Hazardous decomposition products : Acrid or harmful gas is emitted during fire.



For molding case

- Thermal decomposition :Decomposition begins at 380°C
- Reactivity with water : none
- Self-reactivity : none
- Hazardous decomposition products :
Smoldering or incomplete combustion leads to the formation of toxic gas mixture such as carbon dioxide, carbon monoxide and traces of aliphatic and aromatic hydrocarbons, aldehydes, acids, phenol and phenol derivatives.
- Hazardous reaction : No hazardous reaction observed.

11. TOXICOLOGICAL INFORMATION

For cell

- Organic Electrolyte

- Acute toxicity : LD₅₀, oral - Rat 2,000mg/kg or more
- Irritating nature : Irritative to skin and eye

For molding case

- Skin corrosivity, Irritation : None
- Acute Toxicity, Sub-acute toxicity, Chronic Toxicity, Mutagenic effects : Not known
- Carcinogenic effects : IARC group 3 (not classifiable as to its carcinogenicity to humans)

12. ECOLOGICAL INFORMATION

- Persistence / degradability : Since a battery cell and the internal materials remain in the environment, do not bury or throw out into the environment.

For molding case

Relevant information is not available.

13. DISPOSAL CONSIDERATIONS

- Recommended methods for safe and environmentally preferred disposal :

Product (waste from residues)

Specified collection or disposal of lithium ion battery is required by the law like as "battery control law" in several nations. Collection or recycle of the battery is mainly imposed on battery's manufacturer or importer in the nations recycle is required.

Contaminated packaging

Neither a container nor packing is contaminated during normal use. When internal materials leaked from a battery cells contaminates, dispose as industrial wastes subject to special control.



- Waste disposal : Efforts to recycle material should be made. If unable to use recycle, material should be buried in approved landfill or incinerated in accordance all applicable with federal, state and local regulations.

14. TRANSPORT INFORMATION

In the case of transportation, avoid exposure to high temperature and prevent the formation of any condensation. Take in a cargo of them without falling, dropping and breakage. Prevent collapse of cargo piles and wet by rain. The container must be handled carefully. Do not give shocks that result in a mark of hitting on a batteries. Please refer to Section 7 – HANDLING AND STORAGE also.

UN classification

- UN Number and proper shipping name :
UN3480 “Lithium ion batteries ” [or UN3481 “Lithium ion batteries packed with equipment ” or UN3481 “Lithium ion batteries contained in equipment”].
Class9 Dangerous Goods (PI965 section 1B)
Exempted Dangerous Goods (PI965 section 2) is 2 batteries per one packaging.
UN Specification packaging is not required. Packaging must be test for 1.2m drop test.

* However this product is defined as above, it is not recognized as "DANGEROUS GOODS" or is treated as almost non-DANGEROUS GOODS when its transport condition accords with instructions or provisions depend on region and transportation mode.

About the instructions or provisions, please see descriptions in box brackets of following regulations.

Regulation depends on region and transportation mode

- Worldwide, air transportation :
IATA-DGR [As non-DANGEROUS GOODS : "packing instruction 965 section II" /
Almost as above however displayed as DANGEROUS GOODS : "packing instruction 965 section IB"] (When batteries are packaged with equipments or contained in equipments, refer packing instruction 966 or 967 instead of 965.)



15. REGULATORY INFORMATION

- Regulations specifically applicable to the product:
 - IATA-DGR (air transportation)
 - IMO-IMDG Code (sea transportation)
 - US Department of Transportation 49 Code of Federal Regulations [USA]
 - Wastes Disposal and Public Cleaning Law [Japan]
 - Law for Promotion of Effective Utilization of resources [Japan]

16. OTHER INFORMATION

- The information contained in this Safety data sheet is based on the present state of knowledge and current legislation.
- This safety data sheet provides guidance on health, safety and environmental aspects of the product and should not be construed as any guarantee of technical performance or suitability for particular applications.
- IDX makes no warranty, expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. IDX assumes no responsibility for injury from the use to the product described herein.

- Reference

- Dangerous Goods Regulations – 58th Edition Effective from 1 January 2017: International Air Transport Association (IATA)
- MSDS of raw materials prepared by the manufactures

5th edition: January 4, 2017

Prepared and approved by
Engineering Dept., Products Div.
IDX Company, Ltd.



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