

## MATERIAL SAFETY DATA SHEET (MSDS)

**Product Name:** ACK081 lithium-ion battery pack

### 1. Product and Company Identification

: Rechargeable Lithium-ion Battery Pack  
3.7V 1800mAH 6.7Wh

Manufactured exclusively for 3M PSD V änamo

Manufactured By: Flexworks Huizhou Limited

Address: No.1 Xingli Road,XiaotieVillage,Xiaojinkou, Huizhou,Guangdong Province,China.

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Revised: 10-01-2017

Reference: Sophia Feng

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Reference to the

### 2. Hazards Identification

2.1 Preparation Hazards and Classification: The product is a Lithium ion battery pack and is therefore classified as an article and is not hazardous when used according to the recommendations of the manufacturer. The hazard is associated with the contents of the battery or cell. Under recommended use conditions, the electrode materials and liquid electrolyte are non-reactive provided that the battery or cell integrity remains and the seals remain intact. The potential for exposure should not exist unless the battery or cell leaks, is exposed to high temperatures or is mechanically, electrically or physically abused/damaged. If the battery or cell is compromised and starts to leak, base dup on the battery ingredients, the contents are classified as Hazardous.

#### 2.2 Hazard Summary

Physical hazards: Not classified for physical hazards.

Health hazards: Not classified for health hazards.

Environmental hazards: Not classified for hazards to the environment.

Specific hazards: Exposure to contents of an open or damaged cell or battery: contact with this material will cause burns to the skin, eyes and mucous membranes.

May cause sensitization by skin contact.

Main Symptoms: Symptoms include itching, burning, redness and tearing.

### 3. Composition / Information on Ingredients

CAS #	Chemical Name	% (w/w)Typical	STEL(ACGIH)	LD <sub>50</sub>	LC <sub>50</sub>
7440-50-8	Copper(Cu)	2%	--	--	--
7440-02-0	Nickle(Ni)	tace	--	--	--
7440-31-5	Tin(Sn)	1%	--	--	--
9003-56-9	ABS resin	24.5%	--	--	--
67763-03-5	Vinylsilicone Polymer	18%	--	--	--
25038-59-9	PET resin	2%	--	--	--
782-42-5	Graphite	8%	2mg/m3	Unkown	Unkown



616-38-6	Dimethyl carbonate	2.5%	Unkown	13000 mg/kg (rat/oral) 5000 mg/kg (rabbit/dermal)	Unkown
96-49-1	Ethylene Carbonate	2%	Unkown	10400 mg/kg (rat/oral) > 3000 mg/kg (rabbit/dermal)	Unkown
21324-40-3	Lithium Hexafluorophosphate	2%	Unkown	1702 mg/kg (rat/oral)	>20 mg/kg (rat/4 hour)
108-32-7	propylene Carbonate	1.5%	Unkown	29100 mg/kg (rat/oral)	>5000 mg/m3 (rat/4 hour)
12190-79-3	Cobalt Lithium Dioxide	22%	0.02mg/m3	Unkown	Unkown
38891-59-7	Epoxy Resin	1.5%	--	--	--
65997-17-3	Glass fiber	1.5%	--	--	--

#### 4. First Aid Measures

##### 4.1 Description of first aid measures

The hazardous components of battery are contained within a sealed plastic unit. The following measures are only applicable if exposure has occurred to components when a cell or battery leaks, is exposed to high temperatures or is mechanically, electric ally or physically abused/damaged. The hazardous contents are caustic alkaline electrolytes contained in cells with lithium metal oxide cathodes, graphite and carbon anodes and Polyviny lidenfluoride binders.

##### 4.2 Response(If cell/battery leaks)

- \* Do not breathe vapor or spray.
- \* Wear protective gloves/protective clothing/eye protection/face protection.
- \* IF SWALLOWED: Rinse mouth. DO NOT induce vomiting.
- \* IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- \* IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- \* IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- \* Immediately call a POISON CENTER or doctor/physician.
- \* In case of fire: Use carbon dioxide, dry chemical or water extinguisher.

##### 4.3 MOST IMPORTANT SYMPTOMS & EFFECTS, ACUTE & DELAYED, CAUSED BY EXPOSURE:

ACUTE: The contents of the battery are rated as corrosive. Ingestion of the electrolyte could lead to severe gastrointestinal tract irritation with nausea, vomiting and potentially burns. Inhalation of vapors may lead to severe irritation of the mouth and upper respiratory tract with a burning sensation, pain, burns and inflammation in the nose and throat; there may also be coughing or difficulty breathing.

Eye contact may lead to severe eye irritation or in worst case scenario irreversible damage and possible eye burns. Skin contact may lead to irritation and possible skin burns.



CHRONIC: Skin contact may aggravate/exacerbate existing skin conditions, such as dermatitis. Chronic inhalation may lead to the same symptoms as listed for acute inhalation above.

#### 4.3 Indication of any immediate medical attention and special treatment needed

ADVICE TO DOCTOR: Treat symptomatically if the person comes into contact with the corrosive electrolyte liquid contents of a damaged battery.

### 5. Fire Fighting Measures

#### 5.1 Extinguishing media

- \* Suitable extinguishing media: Dry chemical, carbon dioxide and foam. Water acts as a cooling agent.
- \* Unsuitable extinguishing media: Strong oxidizing agents, strong reducing agents, strong acids and strong alkalis. Despite water incompatibility, water is the most effective firefighting tool to control the spread of fire to other cells and batteries and combustibles.
- \* Explosion Data: Closed containers may explode, burst, rupture or vent when exposed to temperatures above 120°C(248°F).
- \* Hazchem Code (Australia, New Zealand, UK and Malaysia): 4W
- \* Sensitivity to Mechanical Impact: Extreme mechanical abuse will result in rupture of the individual battery cells.
- \* Sensitivity to Static Discharge: Electrostatic discharges imposed directly on the spilled electrolyte may start combustion.

#### 5.2 Special hazards arising from the Chemical:

The interaction of water vapor and exposed lithium hexa fluorophosphate (LiPF<sub>6</sub>) may result in the generation of hydrogen and hydrogen fluoride (HF) gas. Contact with battery electrolyte may be irritating to skin, eyes and mucous membranes. Thermal degradation may produce hazardous fumes of lithium, cobalt and manganese, hydrofluoric acid, hydrogen and oxides of carbon, aluminum, lithium, copper and cobalt as well as smoke and irritating, corrosive and/or toxic gases. Fumes may cause dizziness or suffocation.

#### 5.3 Advice for firefighters:

In case of fire where lithium-ion cells and batteries are present, flood the area with water. If any cells or batteries are burning, water may not extinguish them, but will cool the adjacent cells or batteries and control the spread of fire. Carbon Dioxide, dry chemical and foam extinguishers may be preferred for small fires, but also may not extinguish burning lithium-ion cells or batteries. Burning cells or batteries will burn themselves out. Virtually all fires involving lithium-ion cells and batteries can be controlled with water. When water is used, however, hydrogen gas may be evolved which can form an explosive mixture with air. LITH-X (powdered graphite) or copper powder fire extinguishers, sand, dry ground dolomite or soda ash may also be used. These materials act as smothering agents.

#### 5.4 Protective Equipment and Precautions for firefighters:

In the case of a fire and the release of hydrogen fluoride, it is critical to protect the skin from any contact. Fire fighters should wear a self-contained breathing apparatus. Burning lithium-ion cells and batteries can produce toxic fumes including hydrogen fluoride (HF), oxides of carbon, aluminum, lithium, copper and cobalt. Volatile phosphorous penta fluoride may form at temperatures above 110°C (230°F). Wear adequate personal protective equipment as indicated in Section 8.



## 6. Accidental Release Measures

### 6.1. Personal precautions, protective equipment and emergency procedures:

As an immediate precautionary measure, isolate spill or leak area for at least 25 meters (75 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Ventilate closed areas before entering. Wear adequate personal protective equipment as indicated in Section 8.

### 6.2. Environmental precautions

Absorb spilled material with non-reactive absorbent such as vermiculite, clay or earth. Prevent from migration into soil, sewers and natural waterways – inform local authorities if this occurs.

### 6.3. Methods and material for containment and cleaning up

Evacuate spill area immediately and remove sources of ignition. Do NOT touch spilled material. Cleanup personnel must be trained in the safe handling of this product. Spills may be absorbed on non-reactive absorbents such as vermiculite. Place cells or batteries into individual plastic bags and then place into appropriate containers and close tightly for disposal. Ensure that cleanup procedures do not expose spilled material to any moisture. Immediately transport closed containers outside. Lined steel drums are suitable for storage of damaged cells or batteries until proper disposal can be arranged.

## 7. Handling and Storage

### 7.1. Precautions for safe handling

- \* Do not short circuit, open, disassemble, crush, puncture or burn cells or batteries.
- \* Do not expose cells or batteries to extreme heat or fire.
- \* Do not directly heat or solder cells.
- \* Do not mix cells of different types and brands. Do not mix new and used cells or batteries.
- \* Do not immerse cell or battery in liquids as there is a danger of short circuiting the cells or batteries.
- \* Do not incinerate the cells or batteries as there is a danger of explosion.
- \* Do not use or charge damaged, defective or deformed cells or batteries.
- \* Observe good industrial hygiene practices. Wash hands thoroughly after handling.

### 7.2. Conditions for safe storage, including any incompatibilities

Conditions for safe storage: Store in a cool, dry, well-ventilated area, out of direct sunlight and away from heat and ignition sources. To minimize any adverse effects on cell and/or battery performance, it is recommended that the cells and/or batteries be kept at room temperature (25°C +/- 5°C). Elevated temperatures can result in shortened cell and/or battery life. Keep out of reach of children. Store away from incompatible materials, see Section 10 of the SDS.

Incompatibilities: Water, strong oxidizing agents, strong reducing agents, strong acids and strong alkalis.

## 8. Exposure Controls, Personal Protection

### 8.1. Exposure Control Measures

- \* Exposure Limit Values: Airborne exposures to hazardous substances are not expected when the cells or batteries are used for their intended purposes. Exposure standards are not applicable to the sealed articles.
- \* Biological Monitoring: Not applicable.
- \* Control Banding: Not applicable.



- \* Recommended monitoring procedures: Follow standard monitoring procedures.
- \* Derived no-effect level (DNEL): Not applicable.
- \* Derived minimal effect level (DMEL): Not applicable.
- \* Predicted no-effect concentrations (PNECs): Not applicable.

## 8.2 Individual Protection Measures

- \* Eye and Face protection: Eye protection is not required when handling cells or batteries during normal use. Wear safety glasses/goggles if handling a leaking or ruptured cell or battery.
- \* Skin (Hand) protection: Hand protection is not required when handling the cell or battery during normal use. PVC gloves are recommended when dealing with a leaking or ruptured cell or battery.
- \* Skin (clothing) protection: Skin protection is not required when handling the cell or battery during normal use. Wear long sleeved clothing to avoid skin contact if handling a leaking or ruptured cell or battery. Soiled clothing should be washed with detergent prior to re-use.
- \* Respiratory protection: During routine operation, a respirator is not required. However, if dealing with an electrolyte leakage and irritating vapors are generated, an approved half face inorganic vapor and gas/acid/particulate respirator is required.
- \* Thermal Protection: Not applicable.
- \* Other Protective Equipment: Have a safety shower or eye wash station readily available.
- \* Do not eat, drink or smoke in work areas. Avoid storing food, drink or tobacco near the product. Practice and maintain good housekeeping.
- \* Environmental exposure controls: Avoid release to the environment.

## 9. Physical and Chemical Properties

- \* Physical State: Solid, Sealed Unit Vapor Pressure (mm Hg @ 20°C): Not Applicable
- \* Appearance: Cell or Battery Pack Vapor Density: Not Applicable
- \* PH: Not Applicable Solubility in Water: Insoluble
- \* Relative Density: Not Applicable Water/Oil distribution coefficient: Not Applicable
- \* Boiling Point: Not Applicable Odor Type: Odorless
- \* Melting Point: Not Applicable Odor Threshold: Not Applicable
- \* Viscosity: Not Applicable Evaporation Rate: Not Applicable
- \* Oxidizing Properties: Not Applicable Auto Ignition Temperature (°C): Not Applicable
- \* Flash Point and Method (°C): Not Applicable Flammability Limits (%): Not Applicable
- \* Octanol/Water Partition Coefficient: Not Applicable Decomposition Temperature: 90°C

## 10. Stability and Reactivity

- \* Reactivity: The cells or batteries do not pose any further reactivity hazards other than those listed in the following sub-sections.
- \* Chemical Stability: The cells or batteries are stable under normal conditions of use, storage and transport.
- \* Possibility of hazardous reactions: Keep away from water, strong oxidizing agents, strong reducing agents, strong acids and strong alkalis. Reaction of the leaking electrolyte materials with water may produce flammable and explosive hydrogen gas as well as corrosive hydrogen fluoride gas. Hazardous polymerization does not occur.
- \* Conditions to avoid: Avoid exposing the cells or batteries to fire or temperatures above 80°C. Do not



disassemble, crush, short circuit, puncture, immerse in liquid, burn, expose to flame or install with incorrect polarity. Avoid mechanical, physical or electrical abuse.

\*Incompatible materials: Do not immerse in water or other high conductivity liquids.

\*Hazardous decomposition products: May decompose to produce hydrogen fluoride, phosphorus oxides, sulfuroxides, sulfuric acid, lithium hydroxide, carbon monoxide and carbon dioxide.

## 11. Toxicological Information

### 11.1. Information on toxicological effects:

The hazardous components of the cell or battery are contained within a sealed unit. Under recommended use conditions, the electrode materials and liquid electrolyte are non-reactive provided that the cell or battery integrity remains and the seals remain intact. The potential for exposure should not exist unless the battery leaks, is exposed to high temperature or is mechanically, electrically or physically abused/damaged. The following toxicology data is in respect to if a person comes into contact with the electrolyte.

### 11.2 Acute Toxicity:

\* Swallowed: The electrolyte contained within the cell or battery is a corrosive liquid. Ingestion of this electrolyte would be harmful. Swallowing may result in nausea, vomiting, diarrhea, abdominal pain and chemical burns to the gastrointestinal tract. During normal usage ingestion should not be a means of exposure.

\*Eye: The electrolyte contained within the cell or battery is a corrosive liquid and it is expected that it would cause irreversible damage to the eyes. Contact may cause corneal burns. Effects may be slow to heal after eye contact. Correct handling procedures incorporating appropriate eye protection should minimize the risk of eye irritation.

\*Skin: The electrolyte contained within the cell or battery is a corrosive liquid and it is expected that it would cause skin burns or severe irritation to the skin if not washed off immediately. Correct handling procedures should minimize the risk of skin irritation. People with pre-existing skin conditions, such as dermatitis, should take extreme care so as not to exacerbate the condition.

\*Inhaled: Inhalation of vapors from a leaking cell or battery is expected to cause severe irritation of the mouth and upper respiratory tract with a burning sensation, pain, burns and inflammation in the nose and throat; there may also be coughing or difficulty breathing.

\*Skin Corrosion/Irritation: The electrolyte contained within the

## 12. Ecological Information

\*Ecotoxicity: The sealed cell or battery does not pose an Ecotoxicity hazard. Cells or batteries under normal use condition pose no ecotoxicity hazard. In the case of a broken or damaged cell or battery and leakage of the electrolyte, it will react with water and potentially cause damage to flora and fauna if not disposed of properly. See Section 13 of this SDS for proper disposal considerations.

\*Persistence and degradability: There is currently no data available.

\*Bio accumulative potential: There is currently no data available.

Partition coefficient n-octanol/water (log Kow): Not applicable.

Bio concentration factor (BCF): Not available.

\*Mobility in soil: There is currently no data available.

\*Results of PBT and vPvB assessment: Not a PBT or vPvB substance or mixture.



\*Other adverse effects: Solid cells and batteries released into the natural environment will slowly degrade and may release harmful or toxic substances. Cells and batteries are not intended to be released into water or on land but should be disposed or recycled according to local regulations. See section 13 of this SDS for Disposal Considerations.

### 13. Disposal Considerations

#### 13.1 Waste treatment methods:

Cell and battery recycling is encouraged. Cells and batteries should not be released into the environment, do NOT dump into any sewers, on the ground or into any body of water. Do not dispose of in fire. Used cells and batteries should be stored in their original packaging, a plastic bag or with their terminals/contacts taped, to minimize the potential for short-circuiting to occur. Cells and batteries should be fully discharged before being sent for recycling. Do not store used cells or batteries near heat sources, chemicals or food. Do not store or transport used lithium-ion cells or batteries with lead acid batteries as they have different regulatory requirements. Do not break open or damage lithium-ion cells or batteries prior to disposal. Care should be taken at all times to ensure that used cells or batteries are not damaged during storage or transport. Store material for disposal as indicated in Section 7 Handling and Storage.

#### 13.2 Classification of the waste to comply with Waste Regulations.

\*Canada: Spent cells and batteries are not considered hazardous waste. Cells and batteries involved in a fire may be considered to be hazardous waste. Dispose of in accordance with local, provincial and federal laws and regulations. Consult the Canadian Environmental Protection Act for additional details.

USA: Spent cells and batteries are not considered hazardous waste. Cells and batteries involved in a fire may be considered to be hazardous waste. Dispose of in accordance with local, state and federal laws and regulations. Consult universal/hazardous waste regulations for further information regarding disposal of spent batteries. If a cell or battery is leaking/broken open, consult hazardous waste regulations under US Environmental Protection Agency's Resource Conservation and Recovery Act (RCRA). Also, consult state and local regulations for further disposal requirements.

\*Australia: Spent cells and batteries must be taken for recycling or disposal at an appropriate collection depot by suitably licensed contractors in accordance with government regulations.

\*EU: Waste must be disposed of in accordance with relevant EC Directives and national, regional and local environmental control regulations. For disposal within the EC, the appropriate code according to the European Waste Catalogue (EWC) should be used. EU Waste Code: 16 06 05 – other batteries and accumulators.

\*Taiwan: Cells and batteries are not considered hazardous waste. Cells and batteries should be recycled at an appropriate collection site in accordance with government regulations.

\*Japan: Recycling of spent lithium-ion cells and batteries is regulated by the Wastes Disposal and Public Cleaning Law and the Law for Promotion of Effective Utilization of Resources, cells and batteries should be recycled at a JBRC (Japan Battery Recycling Center) approved facility.

#### 13.3 Classification of the waste to comply with Transport Regulations:

Spent lithium-ion cells and batteries are not considered hazardous waste. Lithium-ion cells and batteries involved in a fire may be considered to be hazardous waste and should be classified as such. Damaged lithium-ion cells and batteries are explicitly prohibited from transport by air.

#### 13.4 Classification of Packaging materials:



Unsoiled excess packaging should be disposed of according to any applicable recycling regulations and is not considered hazardous waste. Soiled packaging or packaging exposed to the interior of a lithium-ion cell or battery pack should be considered hazardous waste and disposed of according to local hazardous waste rules and regulations.

#### 14. Transport Information

Lithium-ion cells and batteries are regulated for land, sea and air transportation. It is recommended that Lithium-ion cells and batteries should not be fitted to equipment during transportation. Note: Cells and Batteries must always be protected against short-circuiting during transport. Special precautions should be undertaken when damaged or defective cells and batteries are transported. You must contact the manufacturer before transporting damaged or defective cells and batteries. It is prohibited to carry defective or damaged cells and batteries by air.

14.1. UN Number: 3480 or 3481

14.2. UN Proper Shipping Name: 3480 – Lithium Ion Batteries.

3481 – Lithium Ion Batteries Contained in Equipment

3481 – Lithium Ion Batteries Packed with Equipment

14.3. Transport Hazard Class:

Class: 9

Hazard No. (ADR): -Tunnel Restriction code: E

14.4. Packing Instruction: PI965, PI966, PI967

14.5. Environmental hazards: Marine Pollutant: No

14.6. Special Precautions for user: Read safety instructions, SDS and emergency procedures before handling.

14.7. Hazchem Code: 4W

14.8. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not Applicable

14.9. Modal Information

\*Land (ADR): 3480 – 188, 230, 310, 348 (Special packaging instruction P903 applies). 3481 – 188, 230, 248, 360 (Special packaging instruction P903 applies).

\*Land (RID): 3480 – 188, 230, 310, 348 (Special packaging instruction P903 applies). 3481 – 188, 230, 248, 360 (Special packaging instruction P903 applies).

\*Land (ADN): 3480 – 188, 230, 310, 348 (Special packaging instruction P903 applies). 3481 – 188, 230, 248, 360 (Special packaging instruction P903 applies).

\*Sea (IMDG): 188, 230, 310 (Special packaging instruction P903 applies). EmS: F-A, S-I; Stowage category A IMDG Code: 9033

\*Air (IATA): A88, A99, A154, A164, A183 (Packing Instruction 965, 966, 967). ERG Code: -

**Disclaimer:** This Safety Data Sheet was prepared in accordance with criteria and requirements of the Hazardous Products Act and the Controlled Products Regulations (Canada), Safe Work Australia (Australia), European Union Commission Directives (EU/EC), Japanese Industrial Standard (JIS), Taiwan Bureau of Metrology and Inspection (BSMI), China Regulation GB/T 16483-2008 and the Occupational Safety and Health Administration (OSHA) using information provided by the manufacturer and other sources. The information in the Safety Data Sheet is offered for your consideration and guidance when exposed to these products.