



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006

Section 1: Identification of the Substance/Preparation and of the Company/Undertaking

Product Name:	High Power Lithium Ion Cell, Phosphate-Based		
Product Codes:	ANR26650M1B APR18650M1A APR18650M1HDA AHR18700-M1-ULTRA-F1 AHR26700-M1-ULTRA-F1 AHP14M1Ultra-A AHP8AU1	AHR32113-Ultra-A AHR32113-Ultra-B AHR32157-M1-A AHR32157-M1-B APP72161227-M1-A ANR26650M1A APP20DU1	AHP68150202-M1-A AHP68150202-M1-B AHP70161227-M1-A AHP70165227-M1-A AMP20M1HD-A AHR26700-T7-ULTRA-F1
Product Use:	Cell and cell packs		
Restrictions on Use	For use as a battery-based power supply only. Do not rupture or expose solution inside of the power cells.		
Synonyms:	High Power Lithium Ion Battery, Phosphate-Based		
Manufacturer:	A123 Systems LLC 39000 Seven Mile Road Livonia, MI 48152 USA		
Phone Number:	(734) 772-0300		
Fax Number:	(734) 772-0224		
24-hour Emergency:	Chemtrec: (800) 424-9300		
Transportation Emergencies	Chemtrec: (800) 424-9300		

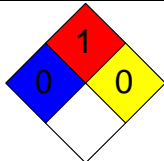
Section 2: Hazards Identification

Hazard Classification(s)	Not applicable under normal use in accordance with United Nations Conference on Environment and Development (UNCED) and Occupational Safety & Health Administration (OSHA) 29 CFR 1910.1200.
Signal Word	Not applicable under normal use in accordance with United Nations Conference on Environment and Development (UNCED) and Occupational Safety & Health Administration (OSHA) 29 CFR 1910.1200.
Hazard Statement(s)	Not applicable under normal use in accordance with United Nations Conference on Environment and Development (UNCED) and Occupational Safety & Health Administration (OSHA) 29 CFR 1910.1200.
Precautionary Statement(s)	P202: Do not handle until all safety precautions have been read and understood. P210: Keep away from heat/sparks/open flames/hot surfaces – No smoking. P370: In case of fire: Use carbon dioxide, dry chemical or water extinguisher. P402: Store in a dry place. P410: Protect from sunlight. P501: Dispose of batteries in accordance with applicable hazardous waste regulations.



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006

Protective Clothing	NFPA Rating (USA)	EC Classification	WHMIS (Canada)	Transportation	GHS Hazard Symbol
Not required with normal use		Not classified as hazardous	Not applicable with normal use	See Section 14	Not applicable with normal use

Preparation Hazards and Classification:

Not classified as dangerous or hazardous with normal use. The cell should not be opened or burned. Exposure to the ingredients contained within or their combustion products could be harmful.

European Communities (EC): This product is not classified as hazardous according to Regulation (EC) No. 1272/2008. This product contains dangerous ingredients however, there is no expected release during use of the product and there is a barrier preventing exposure of the user and the environment.

Appearance, Color and Odor:

Solid object with no odor.

Primary Route(s) of Exposure:

These chemicals are contained in a sealed enclosure. Risk of exposure occurs only if the cell is mechanically, thermally or electrically abused to the point of compromising the enclosure. If this occurs, exposure to the electrolyte solution contained within can occur by Inhalation, Ingestion, Eye contact and Skin contact.

Potential Health Effects:

ACUTE (short term): see Section 8 for exposure controls

In the event that this cell has been ruptured, the electrolyte solution contained within the cell would be corrosive and can cause burns to skin and eyes.

Inhalation:

Inhalation of materials from a sealed cell is not an expected route of exposure. Vapors or mists from a ruptured cell may cause respiratory irritation.

Ingestion:

Swallowing of materials from a sealed cell is not an expected route of exposure. Swallowing the contents of an open cell can cause serious chemical burns of mouth, esophagus, and gastrointestinal tract.

Skin:

Contact between the cell and skin will not cause any harm. Skin contact with contents of an open cell can cause severe irritation or burns to the skin.

Eye:

Contact between the cell and the eye will not cause any harm. Eye contact with contents of an open cell can cause severe irritation or burns to the eye.

CHRONIC (long term): see Section 11 for additional toxicological data

Medical Conditions Aggravated by Exposure:

Not available

Interactions With Other Chemicals:

Immersion in high conductivity liquids may cause corrosion and breaching of the cell enclosure. The electrolyte solution inside of the power cells may react with alkaline (basic) materials and present a flammable hazard

Potential Environmental Effects:

Not available



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006

Section 3: Composition/Information on Ingredients

As a solid, manufactured article, exposure to hazardous ingredients is not expected with normal use.

USA: This cell 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 Safety Data Sheet contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and available for employees and other users of this product.

Canada: This is not a controlled product under WHMIS. This product meets the definition of a "manufactured article" and is not subject to the regulations of the Hazardous Products Act.

Cell component	Chemical Name	CAS #	EINECS #	Concentration range in electrolyte (w/w %)	Mass range in cell (g/g %)
Electrolyte salt	Lithium hexafluorophosphate Lithium bis-trifluoromethanesulfonimide	21324-40-3 90076-65-6	244-334-7 415-300-0	10 – 20 1 - 5	1 – 5 0.1 - 1
Electrolyte solvents	Includes one or more of the following: Ethylene Carbonate Propylene Carbonate Diethyl Carbonate Dimethyl Carbonate Ethyl Methyl Carbonate 1, 3 - Propanesultone	96-49-1 108-32-7 105-58-8 616-38-6 623-53-0 1120-71-4	202-510-0 203-572-1 203-311-1 210-478-4 Not Listed 214-317-9	80 - 90	10-20

Section 4: First Aid Measures

Inhalation:	If contents of an opened cell are inhaled, remove source of contamination or move victim to fresh air. Obtain medical advice.
Eye Contact:	Contact with the contents of an opened cell can cause burns. If eye contact with contents of an open cell occurs, immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 30 minutes while holding the eyelids open. Neutral saline solution may be used as soon as it is available. If necessary, continue flushing during transport to emergency care facility. Take care not to rinse contaminated water into the unaffected eye or onto face. Quickly transport victim to an emergency care facility.
Skin Contact:	Contact with the contents of an opened cell can cause burns. If skin contact with contents of an open cell occurs, as quickly as possible remove contaminated clothing, shoes and leather goods. Immediately flush with lukewarm, gently flowing water for at least 30 minutes. If irritation or pain persists, seek medical attention. Completely decontaminate clothing, shoes and leather goods before reuse or discard.
Ingestion:	Contact with the contents of an opened cell can cause burns. If ingestion of contents of an open cell occurs, NEVER give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Have victim rinse mouth with water again. Quickly transport victim to an emergency care facility.



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006

Section 5: Fire Fighting Measures

Flammable Properties:	Lithium ion batteries contain flammable liquid electrolyte that may vent, ignite and produce sparks when subjected to high temperatures ($> 150^{\circ}\text{C}$ (302°F)), when damaged or abused (e.g., mechanical damage or electrical overcharge). Burning cells can ignite other batteries in close proximity.
Suitable extinguishing Media:	Small Fires - Dry chemical, CO_2 , water spray or regular foam. Large Fires - Water spray, fog or regular foam. Move containers from fire area if you can do it without risk.
Unsuitable extinguishing Media:	Not Applicable
Explosion Data:	Not Applicable
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.
Specific Hazards arising from the Chemical:	The interaction of water or water vapor and exposed lithium hexafluorophosphate (LiPF_6) 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. Fire will produce irritating, corrosive and/or toxic gases. Fumes may cause dizziness or suffocation.
Protective Equipment and precautions for firefighters:	Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. Fight fire from a safe distance.
NFPA:	
Health:	0
Flammability:	1
Instability:	0



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006

Section 6: Accidental Release Measures

Personal Precautions:	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.
Environmental Precautions:	Prevent material from contaminating soil and from entering sewers or waterways.
Methods for Containment:	Stop the leak if safe to do so. Contain the spilled liquid with dry sand or earth. Clean up spills immediately.
Methods for Clean-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.

Section 7: Handling and Storage

Handling/Transportation:	Do not open, disassemble, crush or burn cell. Do not expose cell to temperatures outside the range of -40°C to 80°C.
Storage:	Store cell in a dry location. To minimize any adverse effects on battery performance it is recommended that the cells be kept at room temperature (25°C +/- 5°C). Elevated temperatures can result in shortened cell life. Keep out of reach of children.

Section 8: Exposure Controls/Personal Protection

Exposure Limit Values:	Airborne exposures to hazardous substances are not expected when product is used for its intended purpose.
Engineering Controls:	Use local exhaust ventilation or other engineering controls to control sources of dust, mist, fume and vapor.
Personal Protection:	Not necessary under normal conditions.
Respiratory Protection:	Not necessary under normal conditions.
Skin Protection:	Not necessary under normal conditions. Wear neoprene or natural rubber gloves if handling an open or leaking cell.
Eye Protection:	Not necessary under normal conditions. Wear safety glasses if handling an open or leaking cell.
Other Protective Equipment:	Not necessary under normal conditions. If exposure to the electrolyte solution is expected due to non-routine tasks, a safety shower and eye-wash fountain readily available in the immediate work area.
Hygiene Measures:	Do not eat, drink or smoke in work areas. Maintain good housekeeping.



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006

Section 9: Physical and Chemical Properties

Physical State:	Solid	Vapor Pressure (mm Hg @ 20°C):	Not applicable
Appearance:	Cell	Vapor Density:	Not applicable
pH:	Not applicable	Solubility in Water:	Insoluble
Relative Density:	Not available	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

Section 10: Stability and Reactivity

Stability:	Sealed and normally functioning power cells are considered stable.
Conditions to Avoid:	Avoid exposing the cell to fire or temperatures above 80°C. Do not disassemble, crush, short or install with incorrect polarity. Avoid mechanical or electrical abuse.
Incompatible Materials:	Do not immerse in water or other high conductivity liquids.
Hazardous Decomposition Products:	This material may release toxic fumes if burned or exposed to fire. Breaching of the cell enclosure may lead to generation of hazardous fumes which may include extremely hazardous hydrofluoric acid.
Possibility of Hazardous Reactions:	Not available

Section 11: Toxicological Information

Acute Toxicity Data	Acute oral, dermal and inhalation toxicity data are not available for this article.
Other Toxicity Data	Risk of irritation occurs only if the cell is mechanically, thermally or electrically abused to the point of compromising the enclosure. If this occurs, irritation to the skin, eyes and respiratory tract may occur.
Irritation:	
Corrosivity:	Not applicable
Sensitization:	Not available
Neurological Effects:	Not applicable
Genetic Effects:	Not applicable
Reproductive Effects:	Not applicable
Developmental Effects:	Not applicable
Target Organ Effects:	Not applicable
Carcinogenicity:	Normal safe handling of this product will not result in exposure to substances that are considered human carcinogens by IARC (International Agency for Research on Cancer), ACGIH (American Conference of Governmental Industrial Hygienists), OSHA (Occupational Safety and Health Administration) or NTP (National Toxicology Program).



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006

Section 12: Ecological Information

Ecotoxicity:	Not available
Mobility:	Not available
Persistence and degradability:	Not readily biodegradable
Bioaccumulative potential:	Not available
Other adverse effects:	Solid cells released into the natural environment will slowly degrade and may release harmful or toxic substances. Cells are not intended to be released into water or on land but should be disposed or recycled according to local regulations.

Section 13: Disposal Considerations

Waste Disposal Method:	Cell recycling is encouraged. Do NOT dump into any sewers, on the ground or into any body of water. Store material for disposal as indicated in Section 7 Handling and Storage.
USA:	Dispose of in accordance with local, state and federal laws and regulations.
Canada:	Dispose of in accordance with local, provincial and federal laws and regulations.
EC:	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. In the United States, consult universal/hazardous waste regulations for further information regarding disposal of spent batteries. If a 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.

Section 14: Transport Information

A123 Systems LLC's lithium-ion cells and batteries are designed to comply with all applicable shipping regulations as prescribed by industry and legal standards which includes compliance with the UN Recommendations on the Transport of Dangerous Goods; IATA Dangerous Goods Regulations 57th edition and applicable U.S. DOT regulations for the safe transport of lithium-ion batteries and the International Maritime Dangerous Goods Code. Each of the listed cells in Section 1 has passed the UN Manual of Tests and Criteria Part III Subsection 38.3, which is required by all of the directives listed above.

In the US, shipments of lithium ion cells and batteries are classified as Class 9, UN3480, PG II, by the U.S. Hazardous Materials Regulations (HMR). Packaging, markings and documentation requirements are defined in Title 49 of the Code of Federal Regulations (CFR), Section 173.185 of the U.S. HMR. Excepted cells and batteries are allowed to be transported within the US without Class 9 packaging and markings, but must conform to other requirements as stipulated in the 49 CFR Section 173.185 of the U.S. HMR.

International shipments of lithium ion cells and batteries are generally classified as Class 9, UN3480, PG II, by the International Civil Aviation Organization (ICAO) and the International Maritime Dangerous Goods (IMDG) Code. Packaging, markings and documentation requirements are defined in the International Air Transport Association (IATA) Dangerous Goods Regulations (DGR) PI 965 and PI P903 of the IMDG Code. Excepted cells and batteries are allowed to be transported internationally without Class 9 packaging and in some circumstances markings, but must conform to other requirements as stipulated in PI 965 of the IATA DGR and Special Provision 188 under the IMDG Code.



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006

Section 15: Regulatory Information

USA

TSCA Status:	All ingredients in the product are listed on the TSCA inventory.
SARA Title III:	None
Sec. 302:	None
Sec. 304:	None
Sec. 311/312:	None
Sec. 313:	None
CERCLA RQ:	None

California Prop 65: This product does not contain chemicals known to the State of California to cause cancer or reproductive toxicity.

Canada: This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

WHMIS Classification: Not Controlled

New Substance Notification Regulations: Lithium hexafluorophosphate is listed on the Non-Domestic Substances List (NDSL). All other ingredients in the product are listed, as required, on Canada's Domestic Substances List (DSL).

National Pollutant Release Inventory (NPRI) Substances:

This product does not contain any NPRI chemicals.

EC Classification for the Substance/Preparation:

This product is not classified as hazardous according to Regulation (EC) No. 1272/2008. Keep out of the reach of children.

International

IATA

This product meets all IATA Dangerous Goods Regulations (DGR) – up to 57th edition (2016)



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006

Section 16: Other Information

Revision Summary:

October 13, 2009:

- Revised Section 5 Protective Equipment sub part.
- Revised Section 6 Personal Precautions sub part.
- Reformatted parts of SDS.

March 4, 2010:

- Revised Section 14 and removed reference to IATA edition and packing instruction part.

September 23, 2010:

- Added APP72161227-M1-A to cell list.
- Updated A123 SYSTEMS logo.
- Format changes to accommodate web posting.

March 30, 2011 (REV 19):

- Added AMP20M1HD-A to cell list.
- Updated NFPA information.
- Updated temperatures in section 7.
- Updated section 14.
- Updated company address.

July 1, 2011 (REV 20):

- Added ANR26650M1B to cell list.
- Added under section 8, Other Protective Equipment, "Not necessary under normal conditions"

April 17, 2013 (REV 21):

- Added GHS and Pictogram column and added signal word (warning).
- Removed the word "Material" from section 3.
- Updated Section 14 to include Class 9 markings in some circumstances.

March 3, 2014 (REV 22)

- Updated SDS to meet GHS standards

September 19, 2014 (REV 23)

- Add 2 new products: AHP14M1Ultra-A & AHR26700-T7-ULTRA-F1
- Change Fax number
- Remove Special Provision 188 and 189 in Transportation Information section
- Change company name from A123 Systems to A123 Systems, LLC

January 1, 2015 (REV 24)

- Change Sec. 302/304 of Section 15 Regulation Information to Sec. 302; Sec. 304, i.e. individually list these 2 sections for threshold planning and reportable quantity in EPCRA.

June 10, 2015 (REV 25)

- Add meeting IATA DGR

August 28, 2015 (REV 26)

- Add IATA DGR 56th information and change Packaging Instruction to PI

January 4, 2016 (REV 27)

- Added 1,3-Propanesultone as one of the components of electrolytes

January 19, 2016 (REV 28)

- In section 14: change IATA's DGR from 56th to 57th; in Section 15: change IATA's DGR from 56th (2015) to 57th (2016)

March 15, 2016 (REV 29)

- Include product AHP8UA1 and add Lithium bis-trifluoromethanesulfonimide as one of the salts in the electrolyte



April 11, 2016

- Include cell type APP20DU1

Manufacturer Disclaimer:

The information and recommendations set forth are made in good faith and believed to be accurate at the date of preparation.