



SAFETY DATA SHEET (SDS) – SDS064

SECTION 1: IDENTIFICATION			
Product Description	Lithium-Ion Rechargeable Battery		
Product Identification	Applicable Part Number(s): PB-AM-01, Rev. F		
	Nominal Voltage: 11.1 VDC		
	Nominal Capacity: 8.7 Ampere Hours (Ah)		
	Nominal Energy: 96 Watt Hours (Wh)		
Nominal Weight: 1.14 lbs. (0.515 kg)			
Manufacturer Name/Address	PATCO Electronics, LLC Subsidiary of Technology Research, LLC 5250 140 th Ave. North Clearwater, FL 33760	24 Hour Emergency Contact	ChemTrec 800-424-9300 (US) 703-527-3887 (International)
CAGE Code	03UN7		
Technical Contact	727-535-0572	Issue Date	24 May 2013
Prepared By	Bob Kvederas	Revision Date	17 March 2016
NSN # (if applicable)			

SECTION 2: HAZARD(S) IDENTIFICATION	
Hazard Classification	This PATCO battery product(s) meet the definition of an article. Under the Globally Harmonized System of Classification and Labeling of Chemicals (GHS), "Articles" as defined in the Hazard Communication Standard (29 CFR 1910.1200) of the Occupational Safety and Health Administration of the United States of America, or by similar definition, are outside the scope of the system. [Rev. 2 (2007) Part 1.3.2.1.1]
Hazard/Caution Statements	<ul style="list-style-type: none"> • Do not open or disassemble • Do not expose to fire or open flame • Do not mix with batteries of varying sizes, chemistries or types • Do not puncture, deform, incinerate or heat above 85°C (194°F).
Routes of Entry	<ul style="list-style-type: none"> • Inhalation: Not anticipated. Respiratory and eye irritation may occur if fumes are released due to heat or an abundance of leaking batteries. • Skin: Yes • Ingestion: Yes
Potential Health Effects	<ul style="list-style-type: none"> • These chemicals are contained in a sealed can. Risk of exposure occurs only if the battery is mechanically or electrically abused. The most likely risk is acute exposure when a cell/battery vents. Propylene Carbonate is mildly irritating upon eye and skin contact. Contact of electrolyte and extruded lithium with skin and eyes should be avoided. Inhalation and ingestion of lithium trifluoromethane sulfonate may be harmful.
Signs/Symptoms of Exposure	<ul style="list-style-type: none"> • Skin and eye irritation may occur following exposure to a leaking battery.
Medical Conditions Generally Aggravated by Exposure	<ul style="list-style-type: none"> • An acute exposure will not generally aggravate any medical condition.
<p>The materials contained in this product may only represent a hazard if the integrity of the cells or battery is compromised; physically or electrically abused.</p>	



SECTION 3: COMPOSITION / INFORMATION on INGREDIENTS

Although the chemical composition of the various cell manufacturers is proprietary, the following is typical of the chemistry. Under normal use conditions, cells and batteries do not emit hazardous or regulated substances.

Component	% by Wt.	CAS Number	EINECS Number
Lithium Cobalt Oxide	25 - 35	12190-79-3	235-362-0
Carbon – Various Forms	10 – 30	7440-44-0	231-153-3
Copper	0.1 - 1	7440-50-8	231-159-6
Polymer Binders	0.1 - 1	N/A	N/A
Aluminum	0.1 -1	7429-90-5	231-072-3
Biphenyl (BP)	0.1 - 0.3	92-52-4	202-163-5
Organic Carbonates	5 - 20	N/A	N/A
Lithium Salts	1 - 6	N/A	N/A

These chemicals and metals are contained in a sealed can. Depending on product configuration, components used to assemble battery packs (e.g. housings, electronic components and wiring) may contain additional hazardous materials, such as lead solder.

SECTION 4: FIRST AID MEASURES

Inhalation	<ul style="list-style-type: none"> Avoid inhaling any vented gases Remove to fresh air immediately; consult a physician immediately If breathing is difficult, seek emergency medical attention.
Ingestion	<ul style="list-style-type: none"> If ingested, rinse mouth and surrounding area with clear, tepid water for at least 15 minutes. Consult a physician or local poison control center immediately for treatment and to rule out involvement of the esophagus and other tissues.
Skin Contact	<ul style="list-style-type: none"> Exposure to materials from a ruptured or otherwise damaged cell or battery may cause skin irritation Flush immediately with copious amounts of clear tepid water for at least 15 minutes; consult a physician immediately..
Eye Contact	<ul style="list-style-type: none"> Exposure to materials from a ruptured or otherwise damaged cell or battery may cause eye irritation Flush immediately with copious amounts of clear tepid water for at least 30 minutes; consult a physician immediately.



SECTION 5: FIRE-FIGHTING MEASURES	
Extinguishing Media	<ul style="list-style-type: none">• Carbon Dioxide (CO₂) extinguisher, dry chemical powder or appropriate foam is most effective.• Use agent appropriate for surrounding materials.• For fires involving exposed, raw lithium metal (characterized by deep red flames), use only metal (Class D) fire extinguishers• Do not use Halon type extinguishing material.
Special Fire Fighting Procedures	<ul style="list-style-type: none">• Use a positive pressure self-contained breathing apparatus (SCBA) if cells or batteries are involved in a fire• Full fire fighting protective clothing is necessary• During water application, caution is advised as burning pieces of flammable particles may be ejected from the fire• Detailed information on fighting lithium ion cell/battery fire can be found in Guide 147 (Lithium Ion Batteries) of the US DOT Emergency Response Guide.
Unusual Fire and Explosion Hazard	<ul style="list-style-type: none">• Cells or batteries that are damaged, opened or exposed to excessive heat/fire may flame or leak potentially hazardous/toxic organic vapors/fumes.• Organic components will burn if cell incinerated.• Combustion of cell contents will cause evolution of extremely corrosive Hydrogen Fluoride gas.

SECTION 6: ACCIDENTAL RELEASE MEASURES	
Ventilation	<ul style="list-style-type: none">• None under normal operating conditions.• Avoid inhalation of any vapors that may be emitted.• Use a positive pressure self-contained breathing apparatus (SCBA) if cells or batteries are involved in a fire.
Skin Protection / Protective Gloves	<ul style="list-style-type: none">• None under normal operating conditions.• In the event a cell / battery is crushed, releasing its contents, butyl gloves must be used to handle all battery components.
Eye Contact	<ul style="list-style-type: none">• None under normal operating conditions.• Wear safety glasses when handling leaking batteries
Storage	<ul style="list-style-type: none">• Damaged batteries that are not hot or burning should be placed in a sealed plastic bag or container.



SECTION 7: HANDLING and STORAGE	
Precautions for Safe Handling	<ul style="list-style-type: none"> Batteries are designed to be recharged. However, improperly charging a cell or battery may cause the product to flame or leak. Use only approved chargers and procedures Never disassemble a battery or bypass any safety device More than a momentary short circuit will cause temporary battery voltage loss until the battery is subjected to a charge. Batteries have re-settable fuses that can be reactivated through applying a charge to the battery Extended short-circuiting creates high temperatures in the cell Avoid reversing battery polarity within the battery assembly. To do so may cause cell or battery to flame or to leak. Do not disassemble battery or battery pack. Do not puncture, crush or dispose of in fire.
Conditions for Safe Storage and Incompatibility	<ul style="list-style-type: none"> Batteries should be separated from other materials and stored in a non-combustible, well ventilated structure with sufficient clearance between walls and battery stacks. Do not place batteries near heating equipment, nor expose to direct sunlight for long periods Do not store batteries above 60°C (140°F) or below 20°C (-4°F). Store batteries in a cool (below 25°C (77°F)), dry area that is subject to little temperature change. Elevated temperatures can result in reduced battery service life. Battery exposure to temperatures in excess of 130°C (266°F) will result in the battery venting flammable liquid and gases Do not store batteries in a manner that allows terminals to short circuit. Do not place near heating equipment, nor expose to direct sunlight for long periods of time

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION	
Steps to Be Taken if Material is Released or Spilled	<ul style="list-style-type: none"> Notify safety personnel of spills. Evacuate the area and allow vapors to dissipate. Increase ventilation. Avoid eye or skin contact. DO NOT inhale vapors. Clean up personnel should wear appropriate protective gear/equipment. Remove spilled liquid with absorbent and contain for disposal. Transport containers outdoors Hold burned cells/batteries and fire cleanup solids for disposal as potential hazardous waste. Unburned cells/batteries are not hazardous waste. A fire with over 100 kg of cells burnt will likely require reporting to environment offices. Always consult and obey all international, federal and local environmental laws.
Engineering Controls and Work Practices	<ul style="list-style-type: none"> Under conditions of normal use, batteries do not emit hazardous or regulated substances No engineering controls are required for handling batteries that have not been damaged.
Personal Protective Equipment	<ul style="list-style-type: none"> Personal protective equipment for damaged batteries should include chemical resistant gloves and safety glasses In the event of a fire, SCBA should be worn along with thermally protective outer garments.



SECTION 9: PHYSICAL and CHEMICAL PROPERTIES

Appearance	Cell pack or rectangular/square plastic box shape	UEL/LEL	Not Applicable
Odor	None	Vapor Pressure	Not Applicable
Odor Threshold	Not Applicable	Vapor Density	Not Applicable
pH	Not Applicable	Relative Density	Not Available
Melting Point	Not Available	Solubility	Not Applicable
Boiling Point	Not Available	Partition Coefficient	Not Applicable
Flash Point	Not Applicable	Auto-ignition Temperature	Not Available
Evaporation Rate	Not Applicable	Decomposition Temperature	Not Available
Flammability	Not Applicable	Viscosity	Not Applicable

SECTION 10: STABILITY and REACTIVITY

Stability	Stable	Hazardous Polymerization	Will Not Occur
Conditions to Avoid	<ul style="list-style-type: none"> Prolonged overcharging and/or overheating. It is not recommended that this product be stored above 60°C (140°F). Do not heat, crush, disassemble or short circuit. 		
Hazardous Decomposition or By-products	<ul style="list-style-type: none"> Thermal degradation may produce hazardous fumes; hydrofluoric acid; oxides of carbon and sulfur and other toxic products. 		
Incompatible Materials	<ul style="list-style-type: none"> Contents incompatible with strong oxidizing agents. 		
Reactivity	<ul style="list-style-type: none"> Damaged non-discharged batteries contain elemental lithium that is water reactive. This reaction with water gives off heat and hydrogen gas. 		

SECTION 11: TOXICOLOGICAL INFORMATION

- No toxicological impacts are expected under normal use conditions.
- The electrolytes contained in this cell or battery can irritate eyes with any contact.
- Prolonged contact of electrolytes with lung tissue, skin or mucous membranes may cause irritation.
- Information regarding sensitization, mutagenicity or reproductive toxicity related to internal cell or battery components has not been included in this document
- Carcinogen Reference: NTP – No; IARC Monograph – No; OSHA Regulated - No**

SECTION 12: ECOLOGICAL INFORMATION

- No ecological impacts expected under normal use conditions.

SECTION 13: DISPOSAL CONSIDERATIONS

- Batteries must be completely discharged prior to disposal and the terminals must be taped or capped to prevent short circuit.
- Do not dispose in fire. Battery disposal regulations vary on national, state/provincial and local bases. For example, under US federal regulations, lithium-ion batteries are classified as non-hazardous waste. However, under California state regulations, all batteries are considered hazardous waste when discarded.
- Disposal of batteries containing lithium cells must be conducted in accordance with the applicable Federal, State and/or Local regulations. These batteries contain recyclable materials and recycling is encouraged over disposal.**



SECTION 14: TRANSPORTATION INFORMATION

PATCO Electronics, LLC lithium-ion cells and batteries are classified and regulated as Class 9 dangerous goods (also known as “hazardous materials” in the United States) by the International Civil Aviation Organization (ICAO), International Air Transport Association (IATA), International Maritime Organization (IMO) and many government agencies such as the U.S. Department of Transportation (DOT). These organizations and agencies publish regulations that contain detailed packaging, marking, labeling, documentation, and training requirements that must be followed when offering (shipping) PATCO Electronics, LLC cells and batteries for transportation. **However, small cells and batteries are not subject to certain provisions of the regulations (e.g. Class 9 labeling and UN specification packaging) if they meet specific requirements.** The regulations are based on the UN Recommendations on the Transport of Dangerous Goods Model Regulations and the UN Manual of Tests and Criteria. **These regulations also apply to shipments of cells and batteries that are “packed with” or “contained in” equipment.** Failure to comply with these regulations can result in substantial civil or criminal penalties.

The dangerous goods regulations require that each cell and battery design be subject to tests contained in Section 38.3 of the UN Manual of Tests and Criteria prior to being offered for transport. **Approved, production level cells and batteries manufactured and assembled by PATCO Electronics, LLC have been tested to Section 38.3 of the UN Manual of Tests and Criteria and passed T1 through T8.** Batteries or battery packs constructed by other parties using PATCO Electronics, LLC cells and/or batteries must be subjected to the tests contained in Section 38.3, T1-T8 of the UN Manual of Tests and Criteria. **Important Note Regarding Prototype Cells and Batteries:** PATCO Electronics LLC is permitted to ship prototype cells and batteries as Class 9 hazardous materials/dangerous goods in accordance with the requirements contained in A competent authority approval; provided by the US Department of Transportation. Recipients of these shipments are prohibited from reshipping unless they have received similar approval from the governing Component Authority.

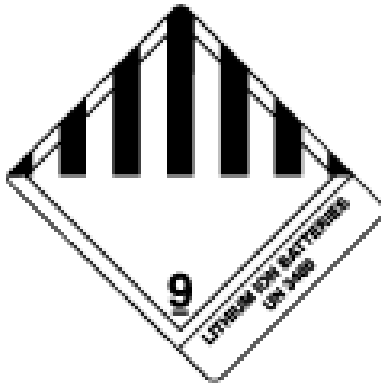
Air, Sea (Cargo Vessel) and Surface Classification

- UN 3480, Lithium ion batteries
- UN 3481, Lithium ion batteries “contained in” equipment
- UN 3481, Lithium ion batteries “packed with” equipment

- The cell(s) and battery(s) must be identified as above, accordingly, on the Bill of Lading and/or other shipping documentation and properly packaged with their terminals must be protected from short circuit.
- **Lithium Ion Batteries “Standalone”** must be shipped as Class 9 Dangerous Goods with proper certified outer packaging, label(s), marking(s), Shipper’s Declaration for Dangerous Goods (SDDG) and emergency response information. Batteries must be properly packaged with their terminals protected from short circuit.
- **Lithium Ion Batteries “Contained In” equipment and Lithium Ion Batteries “Packed With” equipment** are shipped as non-Class 9 with proper certified outer packaging that must be strong enough to withstand a 1.2 meter drop test , label(s), marking(s), required shipping documentation and emergency response information. Batteries must be properly packaged with their terminals protected from short circuit.
- The battery and component cells conform and are tested to Section 38.3 of the UN Manual Tests and Criteria, T1-T8.
- Any person and/or employee preparing or offering batteries for transport/shipment must receive hazardous materials training in accordance with 49 CFR requirements and dangerous goods training in accordance with applicable regulations.
- **Battery Shipping State-of-Charge (SOC) for Air Shipments**
 - Regulation is effective April 01, 2016.
 - The battery/cell limit for State-of-Charge (SOC) is not to exceed 30% maximum for shipping all lithium ion cells and batteries on both Passenger (Pax A/C) and Cargo Aircraft (CAO).
 - This will impact just the shipment of Lithium Ion cells and batteries (UN3480) by air.
 - This does not impact the shipment Lithium Ion cells or batteries “packed with” equipment (UN3481) or “contained in” equipment (UN3481).
 - This does not impact the shipment of cells and batteries by ground or sea/ocean.



SECTION 14: TRANSPORTATION INFORMATION (continued)					
Lithium Ion Batteries "Standalone"					
Hazard Class	9	Packing Instruction	PI 965	Packing Section	IB
Classification	UN3480	Stowage Location	A	Marine Pollutant	No
Tunnel Code	E	Shippers Dangerous Goods Declaration			Required
Maximum Gross Weight Limit per Package	Ground Only (Domestic USA) (Motor Vehicle & Rail)		30 kg (66 lbs)		
	Air (Domestic USA) Cargo Aircraft Only (CAO) Passenger Aircraft (Pax A/C)		10 kg (22 lbs) – Batteries Ship at 30% SOC Max. Forbidden From Transport on Pax A/C		
	Air (International) Cargo Aircraft Only (CAO) Passenger Aircraft (Pax A/C)		10 kg (22 lbs) – Batteries Ship at 30% SOC Max. Forbidden From Transport on Pax A/C		
	Cargo Vessel (Sea/Ocean)		No Limit		
Label(s)	Class 9 Label & Cargo Aircraft Only Label & Lithium Battery Handling Label (See page 8 of 9 of this document for label details)				
Lithium Ion Batteries "Packed With" Equipment					
Hazard Class	9	Packing Instruction	PI 966	Packing Section	II
Classification	UN3481	Stowage Location	A	Marine Pollutant	No
Tunnel Code	E	Shippers Dangerous Goods Declaration			Not Required
Maximum Gross Weight limit per Package	Ground Only (Domestic USA) (Motor Vehicle & Rail)		30 kg (66 lbs)		
	Air (Domestic USA) Cargo Aircraft Only (CAO) Passenger Aircraft (Pax A/C)		5 kg (11 lbs) 5 kg (11 lbs)		
	Air (International) Cargo Aircraft Only (CAO) Passenger Aircraft (Pax A/C)		5 kg (11 lbs) 5 kg (11 lbs)		
	Cargo Vessel (Sea/Ocean)		No Limit		
Label(s)	Lithium Battery Handling Label (See page 8 of 9 of this document for label details)				
Lithium Ion Batteries "Contained In" Equipment					
Hazard Class	9	Packing Instruction	PI 967	Packing Section	II
Classification	UN3481	Stowage Location	A	Marine Pollutant	No
Tunnel Code	E	Shippers Dangerous Goods Declaration			Not Required
Maximum Gross Weight limit per Package	Ground Only (Domestic USA) (Motor Vehicle & Rail)		30 kg (66 lbs)		
	Air (Domestic USA) Cargo Aircraft Only (CAO) Passenger Aircraft (Pax A/C)		5 kg (11 lbs) 5 kg (11 lbs)		
	Air (International) Cargo Aircraft Only (CAO) Passenger Aircraft (Pax A/C)		5 kg (11 lbs) 5 kg (11 lbs)		
	Cargo Vessel (Sea/Ocean)		No Limit		
Label(s)	Lithium Battery Handling Label (See page 8 of 9 of this document for label details)				



Class 9 Label (UN3480)
Lithium Ion Batteries "Only"



Cargo Aircraft Only Label



Lithium Battery Handling Label



SECTION 15: REGULATORY INFORMATION		
US	Hazard Communication Standard (29 CFR 1910.1200)	Article
	CERCLA SECTION 304 Hazardous Substances	NA
	EPCRA SECTION 302 Extremely Hazardous Substance	NA
	EPCRA SECTION 313 Toxic Release Inventory	NA
	EPCRA SECTION 312	NA
	Components Listed on US Toxic Substances Control Act (TSCA) Inventory	Article
	Batteries are considered to be “articles” and thus are exempt from TSCA regulation.	
EU	Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) 1907/2006	Article
	European RoHS Directive 2008/35/EC	NA
	European WEEE Directive 2008/34/EC Note: Applies to cells and batteries incorporated into electrical and electronic equipment, when that equipment becomes waste.	See Note

SECTION 16 - OTHER INFORMATION

If returning product to PATCO Electronics, LLC a subsidiary of Technology Research, LLC, consult the relevant regulations regarding handling, packaging, labeling and transportation. An RMA **must** be obtained from PATCO Electronics, LLC a subsidiary of Technology Research, LLC prior to any return shipment.

Disclaimer: The information and recommendations contained herein are made in good faith and believed to be accurate as of the date of preparation. PATCO Electronics, LLC a subsidiary of Technology Research, LLC, makes no warranty, expressed or implied, regarding the accuracy of the data or the results to be obtained from the use thereof. **Users should consider this data only as a supplement to other information gathered by them and must make independent determinations of the suitability and completeness of information from all sources to assure proper use, shipping and disposal of these materials and the safety and health of employees and customers.**