Prepared to OSHA, ACC, ANSI, NOHSC, WHMIS & 2001/58 EC Standards | MSDS Revision: 5 | MSDS Revision Date: 01/01/2019

1. PRODUCT IDENTIFICATION

1.1	Product Name: **MANGANESE DIOXIDE (CR TYPE) LITHIUM BATTERY**
1.2	Chemical Name: **MANGANESE DIOXIDE LITHIUM BATTERY**
1.3	Synonyms: **MANGANESE DIOXIDE LITHIUM (CR TYPE) BATTERY**
1.4	Trade Names: **13.05, 13.042, 13.047, 13.050, 13.055, 13.056, 20392, 25164, 27592, 27914, 29192, 29594, 29825, 34613, 57829, BAT-002-00, G808042-001, P1055413, P1072148, P1075298, P1088988, P1097039, P1103321, P1104261**
1.5	Product Use: **POWER SUPPLY**
1.6	Manufacturer's Name: **ZEBRA TECHNOLOGIES CORPORATION**
1.7	Manufacturer's Address: **3 OVERLOOK POINT, LINCOLNSHIRE, IL, 60069 USA**
1.8	Emergency Phone: **CHEMTREC 1-800-424-9300 (NORTH AMERICA) / + 1-703-527-3887 (INTERNATIONAL)**
1.9	Business Phone: **1-847-634-6700**

2. HAZARD IDENTIFICATION

2.1	Hazard Identification: **This product is classified as a hazardous substance and as dangerous goods according to the classification criteria of NOHSC and ADG Code (Australia). These products are solid articles consisting of sealed cylindrical and coin batteries. The following information is for the chemicals contained inside the batteries. As manufactured, exposure to individual components is not expected. If these products are cut or otherwise manipulated in such a way that will release the chemicals contained inside, exposure to these components is possible. If involved in a fire, the chemicals contained in the battery may decompose and produce toxic gases (e.g. carbon, phosphorous, sulfur, and metal oxides and metal compounds). During a fire involving this product care should be taken to avoid inhalation of fumes. Water applied to ruptured batteries involved in fire may generate flammable hydrogen gas.**						
2.2	Routes of Entry:	Inhalation:	**NO**	Absorption:	**NO**	Ingestion:	**YES**
2.3	Effects of Exposure: **INGESTION: Ingestion is unlikely, however, if electrolyte is swallowed, may cause nausea, vomiting and/or diarrhea and localized burns. EYES: Exposure to the electrolyte contained inside the battery may result in severe irritation and chemical burns. Symptoms of overexposure may include redness, itching, irritation and watering. SKIN: Exposure to the electrolyte contained inside the battery may result in chemical burns. Exposure to lithium may cause dermatitis in some sensitive individuals. Misuse of these products, such as deliberate destruction, may release diethyl carbonate, ethylene carbonate, and organic solvents contained within the batteries. Diethyl carbonate, ethylene carbonate, and organic solvents may cause irritation. INHALATION: During normal use inhalation is an unlikely route of exposure due to containment of hazardous materials within the battery case. However, should the batteries be exposed to extreme heat or pressures causing a breach in the battery cell case, exposure to the constituents may occur. Misuse of these products, such as deliberate destruction, may release diethyl carbonate, ethylene carbonate, and organic solvents contained within the batteries, which may cause irritation and central nervous system effects. Central nervous system effects can include headache, dizziness, nausea, weakness, and loss of consciousness.**						
2.4	Symptoms of Overexposure: **EYES: Exposure of electrolyte or lithium metal to eyes may cause severe eye irritation, possible corneal burns or eye damage. SKIN: Symptoms of skin overexposure may include redness, itching, and irritation of affected areas. The product can cause allergic skin reactions (e.g., rashes, welts, dermatitis) upon prolonged or repeated exposure.**						
2.5	Acute Health Effects: **EYES: Severe irritation to eyes near affected areas. SKIN: Mild to moderate irritation to skin near affected areas. INHALATION: Inhalation of lithium compounds or metals may result in irritation to the nose, throat and lungs.**						
2.6	Chronic Health Effects: **None reported by the manufacturer. Dermal contact with lithium metal or its salts (e.g., from deliberate destruction) may result in dermatitis in sensitive individuals.**						
2.7	Target Organs: **Eyes, skin & respiratory system.**						

NA = Not Available; ND = Not Determined; NE = Not Established; C = Ceiling Limit; See Section 16 for Additional Definitions of Terms Used NOTE: all WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-2004 format.

3. COMPOSITION & INGREDIENT INFORMATION

CHEMICAL	CAS	RTECS	EINECS		EXPOSURE LIMITS IN AIR (mg/m³)					
					ACGIH -		OSHA - ppm			OTHER
					TL	S	P	S	IDL	TWA – STEL
1,2-Dimethoxyethane	110-71-4	KI145100	203-794-9	N	NE	N	N	N	NE	
Lithium (Cells ≤ 1g / Batteries ≤ 2g)	7439-93-2	OJ554000	231-102-5	N	NE	N	N	N	NE	
Lithium Perchlorate	7791-03-9	1007733L	232-237-2	N	NE	N	N	N	NE	
Manganese Dioxide	1313-13-9	OP03500	215-202-6	N	(5)	N	(5	N	NE	
Propylene Carbonate	108-32-7	FF965000	203-572-1	N	NE	N	N	N	NE	

4. FIRST AID

4.1 First Aid:

INGESTION: **DO NOT INDUCE VOMITING. Contact PERS at +1 (800) 633-8253 or the nearest Poison Control Center or local emergency telephone number for assistance and instructions. Seek immediate medical attention. If vomiting occurs spontaneously, keep victim's head lowered (forward) to reduce the risk of aspiration.**

EYES: **If product gets in the eyes, immediately flush with copious amounts of lukewarm water for at least 15 minutes. Open and close eyelid(s) to ensure thorough irrigation. Seek immediate medical attention.**

SKIN: **If irritation occurs & product is on the skin, rinse thoroughly with lukewarm water, followed by a thorough washing of the affected area with plenty of soap and water. Remove all contaminated clothing, including footwear and wash thoroughly before reuse. If irritation, redness or swelling persists, seek medical attention.**

INHALATION: **Remove victim to fresh air at once. Under extreme conditions, if breathing stops, perform artificial respiration. Seek immediate medical attention.**

4.2 Medical Conditions Aggravated by Exposure:
Pre-existing dermatitis, other skin conditions, and disorders of the target organs (eyes, skin, respiratory system).

5. FIREFIGHTING

5.1 Flashpoint & Method: **Not Applicable**

5.2 Autoignition Temperature: **Not Applicable**

5.3 Flammability Limits: | Lower Explosive Limit (LEL): **NA** | Upper Explosive Limit (UEL): **NA**

5.4 Fire & Explosion Hazards:
If involved in a fire, the chemicals contained in the battery may decompose and produce toxic gases (e.g. lithium oxides, and metal compounds). During a fire involving this product, the battery may rupture and release corrosive lithium hydroxide. Care should be taken to avoid inhalation of fumes and skin and eye contact. Water applied to ruptured batteries may generate flammable hydrogen gas. In a confined space, smothering agents are recommended.

5.5 Extinguishing Methods:
Dry Chemical, Water (flooding quantities only), Class "D" Fire Extinguishers, Sand

5.6 Firefighting Procedures:
First responders should wear eye protection. Structural fire fighters must wear full protective equipment and MSHA/NIOSH-approved self-contained breathing apparatus. Chemical resistant clothing may be necessary. Move containers from fire area if it can be done without risk to personnel. Water spray can be used to cool fire-exposed containers. Water fog or spray can also be used by trained firefighters to disperse this product's vapors and to protect personnel. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas. If necessary, rinse contaminated equipment with soapy water before returning to service.

6. ACCIDENTAL RELEASE MEASURES

6.1 Spills:
Before cleaning any spill or leak, individuals involved in spill cleanup must wear appropriate Personal Protective Equipment. In case of broken battery or electrolyte leakage, trained personnel using pre-planned procedures should respond to uncontrolled releases. Proper protective equipment should be used. Clear the affected area and protect people. Personal Protective Equipment should include, at least, double-gloves (rubber over latex gloves) and rubber apron, splash goggles or safety glasses. Monitor the area to determine the levels of vapors before personnel are allowed into the spill area. The atmosphere must have levels lower than those listed in Section 8, (Exposure Limits and Personal Protection) and at least 19.5 percent oxygen before personnel can be allowed into the area without Self-Contained Breathing Apparatus (SCBA). Absorb spilled liquid with absorbent materials suitable for strong bases. Neutralize residue with citric acid solution or other neutralizing agent for basic materials. Decontaminate the area thoroughly. Test area with litmus paper to ensure neutralization. Place all spill residue in a suitable container. Dispose of in accordance with appropriate Federal, state, provincial and local regulations.

7. HANDLING & STORAGE INFORMATION

7.1 Work & Hygiene Practices:
Do not eat, drink, smoke, or apply cosmetics while handling this product. Wash hands thoroughly after handling this product or containers of this product. Avoid breathing gases generated by this product. Use in a well-ventilated location. Follow specific instructions for use supplied with product.

7.2 Storage & Handling:
Employees must be trained to properly use this product. Keep away from heat, sparks, and other sources of ignition. Do not allow metal objects to simultaneously contact both positive and negative terminal of battery. Do not charge in unventilated areas. Do not use organic solvents other than recommended chemical cleaners on battery. Store in a cool, dry, ventilated area away from combustible materials and away from material with which it is incompatible (see Section 10, Stability and Reactivity). Storage areas should be made of corrosion resistant materials. Post warning and "NO SMOKING" signs in storage and use areas as appropriate. Have appropriate extinguishing equipment in the storage area (i.e., sprinkler system, portable fire extinguishers). Inspect all incoming packages before storage to ensure batteries are properly labeled and not damaged.

7.3 Special Precautions:
None

8. EXPOSURE CONTROLS & PERSONAL PROTECTION

8.1 Ventilation & Engineering Controls:
Use with adequate ventilation (e.g., open doors and windows, local exhaust ventilation). Ensure appropriate decontamination equipment is available (e.g., sink, safety shower, eye-wash station).

8.2 Respiratory Protection:
No special respiratory protection is required under typical circumstances of use or handling. In instances where vapors or sprays of this product may be generated, and respiratory protection is needed, use only protection authorized by 29 CFR §1910.134, applicable U.S. State regulations, or the Canadian CAS Standard Z94.4-93 and applicable standards of Canadian Provinces, EC member States, or Australia [NOHSC: 2007 (1994)].

8.3 Eye Protection:
Wear protective eyewear (e.g., safety glasses with side-shield) always when handling this product. Contact lenses pose a special hazard - soft lenses may absorb and concentrate irritants.

8.4 Hand Protection:
None required under normal conditions of use.

8.5 Body Protection:
No apron required when handling small quantities. If necessary, refer to appropriate Standards of U.S. OSHA, Canada, the European Standard CEN/TR 15419:2006, Australian Standard 3765-Clothing for Protection Against Hazardous Chemicals, New Zealand standards, or Japanese standards. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136 and the Canadian CSA Standard Z195-02, Protective Footwear.

HEALTH	1
FLAMMABILITY	0
REACTIVITY	0
PROTECTIVE EQUIPMENT	B

EYES	SKIN		

9. PHYSICAL & CHEMICAL PROPERTIES

9.1	Density:	**NA**
9.2	Boiling Point:	**NA**
9.3	Melting Point:	**NA**
9.4	Evaporation Rate:	**NA**
9.5	Vapor Pressure:	**NA**
9.6	Molecular Weight:	**NA**
9.7	Appearance & Color:	**Solid article, sealed cylindrical (coin cell) batteries**
9.8	Odor Threshold:	**NA**
9.9	Solubility:	**NA**
9.10	pH	**NA**
9.11	Viscosity:	**NA**
9.12	Other Information:	**NA**

10. STABILITY & REACTIVITY

10.1	Stability: **Stable under normal conditions of use (see section 7).**
10.2	Hazardous Decomposition Products: **Products of thermal decomposition can include produce toxic gases (e.g. carbon oxides, manganese oxides, sulfur oxides, chlorine compounds, and corrosive lithium hydroxide).**
10.3	Hazardous Polymerization: **Will not occur.**
10.4	Conditions to Avoid: **Exposure or contact to extreme temperatures, incompatible chemicals, sparks, open flame.**
10.5	Incompatible Substances: **Strong oxidizers, chlorine, peroxides or strong acids.**

11. TOXICOLOGICAL INFORMATION

11.1	Toxicity Data: **This product has NOT been tested on animals to obtain toxicology data. There are toxicology data for the components of the product, which are found in scientific literature. These data have not been presented in this document.**	
11.2	Acute Toxicity: **See section 2.5**	
11.3	Chronic Toxicity: **See section 2.6**	
11.4	Suspected Carcinogen: **NO**	
11.5	Reproductive Toxicity: **NE**	
	Mutagenicity:	**This product is not reported to produce mutagenic effects in humans.**
	Embryotoxicity:	**This product is not reported to produce embryotoxic effects in humans.**
	Teratogenicity:	**This product is not reported to cause teratogenic effects in humans.**
	Reproductive Toxicity:	**This product is not reported to cause reproductive effects in humans.**
11.6	Irritancy of Product: **Misuse of these products, such as deliberate destruction, may release 1,2-dimethoxymethane and propylene carbonate contained within the batteries. 1,2-dimethoxyethane and propylene carbonate may cause irritation and central nervous system**	
11.7	Biological Exposure Indices: **ACGIH Biological Exposure Indices (BEIs) have not been determined for the components of this product.**	
11.8	Physician Recommendations: **Treat symptomatically.**	

12. ECOLOGICAL INFORMATION

12.1 Environmental Stability:
NA

12.2 Effects on Plants & Animals:

There is no specific data available for this product.

12.3 Effects on Aquatic Life:
There is no specific data available for this product. Releases of large volumes may be harmful or fatal to overexposed aquatic life. Aquatic toxicity data for components of this product are available, but are not presented in this MSDS.

13. DISPOSAL CONSIDERATIONS

13.1 Waste Disposal:

Perchlorate Material - Special Handling May Apply - See www.dtsc.ca.gov/hazardouswaste/perchlorate. Dispose in accordance with local, state, provincial and federal hazardous waste laws. Check with the competent authority in your area for specific guidance and advice on local battery collectors and recyclers.

13.2 Special Considerations:

Undamaged lithium batteries may be managed and disposed of as Universal Waste – Batteries. Leaking lithium batteries must be managed as U.S. EPA Characteristic Hazardous Waste: D003 (Reactivity).

United States: The Mercury-Containing and Rechargeable Battery Management Act (42 USC 14301) may be applicable to these batteries. The U.S. Federal Universal Waste Rule (40 CFR 273) may be applicable to the batteries when destined for recycling.

Canada: As of February 2007, there are no national regulations for the disposal of batteries; however, some Canadian jurisdictions have implemented collection and disposal bans targeting batteries.

European Union: Disposal of batteries is regulated by 91/157/EEC, 93/86/EEC, and 98/101/EEC. Member countries are responsible for establishing collection programs; therefore, check with the competent authority in your area for specific guidance and advice on local battery collectors and recyclers.

Japan: The Law to Promote the Efficient Usage of Resources requires all manufacturers and importers of rechargeable batteries and equipment using rechargeable batteries to establish collection and recycling systems for the batteries. The Battery Association of Japan's (BAJ) Center to Promote Rechargeable Battery Recycling promotes the collection and recycling of batteries.
Australia: The requirements of the Hazardous Waste Act 1989 may be applicable to wastes of these products.
New Zealand: Batteries are on the New Zealand Waste list.

14. TRANSPORTATION INFORMATION

The basic description (ID Number, proper shipping name, hazard class & division, packing group) is shown for each mode of transportation. Additional descriptive information may be required by 49 CFR, IATA/ICAO, IMDG and the CTDGR. All Zebra lithium metal batteries and cells are tested and comply with the UN Manual of Test and Criteria, Part III, Subsection 38.3

14.1 49 CFR (GND): **UN3090, LITHIUM BATTERY, 9**
EXCEPTED FROM REGULATION (EXCEPT BY AIR) PER 49 CFR §173.185(c)
PACKAGES SHIPPED TO, FROM OR WITHIN THE UNITED STATES, INCLUDING ITS TERRITORIES AND POSSESSIONS, BY ANY MODE OF TRANSPORT, MUST BE MARKED "PRIMARY LITHIUM BATTERY – FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT" PER 49 CFR §173.185(c)

14.2 IATA (AIR): **UN 3090, LITHIUM METAL BATTERIES, 9. CARGO AIRCRAFT ONLY. THESE BATTERIES COMPLY WITH PACKING INSTRUCTION 968 OF IATA DGR.**

14.3 IATA (AIR): **UN 3091, LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT, 9, IN COMPLIANCE OF PACKING INSTRUCTION 970 SECTION II (NO BATTERY MARK REQUIRED) – ADDITIONAL REQUIREMENTS**

14.3 IMDG (OCN): **UN 3090, LITHIUM METAL BATTERIES, 9. EXCEPTED FROM REGULATION PER IMDG SPECIAL PROVISION 188.**

14.4 TDGR (Canadian GND): **UN3090, LITHIUM BATTERY, 9**
EXCEPTED FROM REGULATION PER TDGR SPECIAL PROVISION 188

14.5 ADR/RID (EU): **UN3090, LITHIUM BATTERY, 9**
EXCEPTED FROM REGULATION PER ADR/RID SPECIAL PROVISION 188

14.6 SCT (MEXICO): **UN3090, LITHIUM BATTERY, 9**
EXCEPTED FROM REGULATION PER SCT SPECIAL PROVISION 188

15. REGULATORY INFORMATION

15.1	SARA Reporting Requirements: **NA**	
15.2	SARA Threshold Planning Quantity: **NA**	
15.3	TSCA Inventory Status: **All components of this product are listed in the TSCA Inventory or are exempt.**	
15.4	CERCLA Reportable Quantity (RQ): **NA**	
15.5	Other Federal Requirements: **NA**	
15.6	Other Canadian Regulations **This product has been classified according to the hazard criteria of the CPR and the MSDS contains all the information required by the CPR. The components of this product are listed on the DSL/NDSL. None of the components of this product are listed on the Priorities Substances List.**	
15.7	State Regulatory Information: **The following substances are listed on the following state criteria lists: Massachusetts Hazardous Substances List (1,2,-dimethoxymethane, lithium), Pennsylvania Hazardous Substances List (1,2-dimethoxyethane, lithium).**	
15.8	67/548/EEC (European Union) Requirements: **The primary component of this product is listed in Annex I of EU Directive 67/548/EEC: Lithium: Xn (Harmful). R: 20/22-43- Harmful by inhalation and if swallowed. Limited evidence of a carcinogenic effect. May cause sensitization by skin contact. S: 2-25 – Keep out of reach of children. Avoid contact with eyes.**	

16. OTHER INFORMATION

16.1	Other Information: **NA**	
16.2	Terms & Definitions: **See last pages of this MSDS.**	
16.3	Disclaimer: This Material Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR §1910.1200. Other government regulations must be reviewed for applicability to this product. To the best of ShipMate's & Zebra Technologies' knowledge, thee information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either expressed or implied, are provided. The information contained herein relates only to the specific product(s). If this product(s) is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.	
16.4	Prepared for: **Zebra Technologies Corporation** **3 Overlook Point** **Lincolnshire, IL 60069** **+1 (866) 230-9494 phone** **+1 (847) 913-8760 fax** **http://www.zebra.com/**	ZEBRA
16.5	Prepared by: **ShipMate, Inc. 18436 Hawthorne Boulevard, Suite 201 Torrance, CA 90504** **+1 (310) 370-3600 phone +1 (310) 370-5700 fax http://www.shipmate.com/**	ShipMate Dangerous Goods Training & Consulting

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these that are commonly used include the following:

GENERAL INFORMATION:

CAS No.	Chemical Abstract Service Number

EXPOSURE LIMITS IN AIR:

ACGIH	American Conference on Governmental Industrial Hygienists
TLV	Threshold Limit Value
OSHA	U.S. Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
IDLH	Immediately Dangerous to Life and Health

FIRST AID MEASURES:

CPR	Cardiopulmonary resuscitation - method in which a person whose heart has stopped receives manual chest compressions and breathing to circulate blood and provide oxygen to the body.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: HMIS

HEALTH, FLAMMABILITY & REACTIVITY RATINGS:

0	Minimal Hazard
1	Slight Hazard
2	Moderate Hazard
3	Severe Hazard
4	Extreme Hazard

PERSONAL PROTECTION RATINGS:

A	
B	
C	
D	
E	
F	
G	
H	
I	
J	
K	
X	**Consult your supervisor or S.O.P. for special handling directions.**

Note: the dotted circle indicates that this respiratory protective equipment is required for high concentrations or for large volume spills or releases of product.

FLAMMABILITY LIMITS IN AIR:

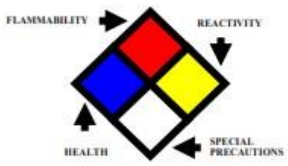
Autoignition Temperature	Minimum temperature required to initiate combustion in air with no other source of ignition
LEL	Lower Explosive Limit - lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source
UEL	Upper Explosive Limit - highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source

OTHER STANDARD ABBREVIATIONS:

NA	Not Available
NR	No Results
NE	Not Established
ND	Not Determined
ML	Maximum Limit
SCBA	Self-Contained Breathing Apparatus

NATIONAL FIRE PROTECTION ASSOCIATION: NFPA HAZARD RATNGS:

0	Minimal Hazard
1	Slight Hazard
2	Moderate Hazard
3	Severe Hazard
4	Extreme Hazard
ACD	Acidic
ALK	Alkaline
COR	Corrosive
-W-	Use No Water
OX	Oxidizer



TOXICOLOGICAL INFORMATION:

LD50	Lethal Dose (solids & liquids) which kills 50% of the exposed animals s
LC50	Lethal concentration (gases) which kills 50% of the exposed animal
ppm	Concentration expressed in parts of material per million parts
TDlo	Lowest dose to cause a symptom
TCLo	Lowest concentration to cause a symptom
TDlo, LDlo, & LDo or TC, TCo, LClo, & LCo	Lowest dose (or concentration) to cause lethal or toxic effects
IARC	International Agency for Research on Cancer
NTP	National Toxicology Program
RTECS	Registry of Toxic Effects of Chemical Substances
BCF	Bioconcentration Factor
TLm	Median threshold limit
log KOW or log KOC	Coefficient of Oil/Water Distribution

REGULATORY INFORMATION:

CPR Canada's Controlled Product Regulations
DOT U.S. Department of Transportation
DSL Canadian Domestic Substance List
EPA U.S. Environmental Protection Agency
EU European Union (European Union Directive 67/548/EEC)
NDSL Canadian Non-Domestic Substance List
NOHSC Australia National Occupational Health & Safety Code
PSL Canadian Priority Substances List
TC Transport Canada
TSCA U.S. Toxic Substance Control Act
WHMIS Canadian Workplace Hazardous Material Information System

EC INFORMATION:

							
C	**E**	**F**	**N**	**O**	**T+**	**Xi**	**Xn**
Corrosive	Explosive	Flammable	Harmful	Oxidizing	Toxic	Irritant	Harmful

WHMIS INFORMATION:

							
A	**B**	**C**	**D1**	**D2**	**D3**	**E**	**F**
Compressed	Flammable	Oxidizing	Toxic	Irritation	Infectious	Corrosive	Reactive