Material Safety Data Sheet
MSDS 2.001.031

Rechargeable Lithium Ion Battery
(Series: LIC…, LIP…, LPP…)

1. Identification of the product and of the company undertaking

Product details

Trade name:	Rechargeable Lithium ion battery
Voltage:	3.7 V (or multiples of this in case of multi-cell configurations)
Electrochemical system:	Lithium ion
Anode (negative):	Carbon (proprietary)
Cathode (positive):	Metal oxide (proprietary)

Supplier details

Address:	VARTA Microbattery GmbH Daimlerstr. 1 D-73479 Ellwangen/Jagst Germany
Emergency telephone number:	+49 7961 921 110 (VAC)

Legal Remark (U.S.A.)

Material Safety Data Sheets (MSDS) are a sub-requirement of the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR Subpart 1910.1200. This Hazard Communication Standard does not apply to various subcategories including anything defined by OSHA as an "article". OSHA has defined "article" as a manufactured item other than a fluid or particle; (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g. minute or trace amounts of a hazardous chemical, and does not pose a physical hazard or health risk to employees.

Because all of our batteries are defined as "articles", they are exempted from the requirements of the Hazard Communication Standard.

Legal remark (EU)

These batteries are no “substances” or “preparations” according to Regulation (EC) No 1907/2006 EC. Instead they have to be regarded as “articles”, no substances are intended to be released during handling. Therefore there is no obligation to supply a MSDS according to Regulation (EC) 1907/2006, Article 31.

General remark

This “Safety Information” is provided as a service to our customers. The details presented are in accordance with our present knowledge and experiences. They are no contractual assurances of product attributes.

2. Hazards identification

The battery is sealed hermetically. Thus, the ingredients have no hazard potential, except the battery is violated or dismantled.

If in case of mistreatment the ingredients are released, a spontaneously flammable gas mixture may be released under certain circumstances (measures according to chapter 4 to 6).

Attention: If batteries are treated wrong the danger of burns or bursts occurs. Batteries must not be heated above 100°C or incinerated. The battery contents must not get in contact with water. If the negative electrode gets in contact with water or humidity hydrogen gas is formed, which may inflame spontaneously.

3. Composition/information on ingredients

Ingredients

Contents	CAS No.	Material
2 - 10 %	7429-90-5	Aluminum foil
20 - 50 %	Confidential	Metal oxide (proprietary)
< 5 %	Confidential	Binder
2 - 10 %	7440-50-8	Copper foil
10 - 30 %	Confidential	Carbon (proprietary)
10 - 20 %	Confidential	Electrolyte (proprietary)
Remainder	N/A	Aluminum and inert materials

During charge process a lithium carbon intercalation phase is formed, which is highly flammable and corrosive, but not released under the circumstances of normal usage.

4. First-aid measures

Measures at accidental release

After inhalation:	Fresh air. Seek for medical assistance.
After skin contact:	Remove solid particles immediately. Flush affected areas with plenty of water (at least 15 min.). Remove contaminated cloth immediately. Seek for medical assistance.
After eye contact:	Flush the eye gently with plenty of water (at least 15 min.). Seek for medical assistance.
After ingestion:	Drink plenty of water. Avoid vomiting. Seek for medical assistance. No trials for neutralization.

5. Fire-fighting measures

Suitable extinguishing media:	Metal fire extinction powder, rock salt or dry sand shall be used. In case only water is available, it can be used in large amounts.
Extinguishing media with limited suitability:	Carbon dioxide (CO_2) is not suitable. Water in small quantities may have adverse effects.
Special protection equipment during fire-fighting:	Contamination cloth including breathing apparatus.
Special hazard:	Cells may explode and release metal parts. At contact of electrolyte with water traces of hydrofluoric acid may be formed. In this case avoid contact and take care for good ventilation. At contact of charged anode material with water extremely flammable hydrogen gas is generated.
Attention:	Do not let used extinguishing media penetrate into surface water or ground water. If necessary, thicken water or foam with suitable solids. Dispose off properly.

6. Accidental release measures

Person related measures:	Wear personal protective equipment adapted to the situation (protection gloves, face protection, breathing protection).
Environment protection measures:	Bind released ingredients with powder (rock salt, sand). Dispose off according to the local law and rules. Avoid leached substances to penetrate into the earth, canalization or water.
Treatment for cleaning:	If battery casing is dismantled, small amounts of electrolyte may leak. Package the battery tightly including ingredients together with lime, sand or rock salt. Then clean with water.

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7. Handling and storage

Guideline for safe handling:	Always follow the warning information on the batteries and in the manuals of devices. Only use the recommended battery types. Keep batteries away from children. For devices to be used by children, the battery casing should be protected against unauthorized access. Unpacked batteries shall not lie about in bulk. In case of battery change always replace all batteries by new ones of identical type and brand. Do not swallow batteries. Do not throw batteries into water. Do not throw batteries into fire. Avoid deep discharge. Do not short-circuit batteries Use recommended charging time and current. Do not open or disassemble batteries.
Storage:	Storage preferably at room temperature (approx. 20°C). Avoid large temperature changes. Do not store close to heating devices. Avoid direct sunlight. At higher temperature the electrical performance may be reduced. Preferred storage at 50% of the nominal capacity (OCV 3.7 – 3.9V or multiples of this in case of serial multi-cell configurations). Storage of unpacked batteries can cause short circuit and heat generation.
Storage of large amounts:	If possible, store the batteries in original packaging (because of short circuit protection and exemptions according to transport regulations). A fire alarm is recommended. For automatic fire extinction consider chapter 5 “Fire fighting measures”.
Storage category according to TRGS 510:	It is recommended to consider the “Technical Rule for Hazardous Substances TRGS 510 - Storage of hazardous substances in nonstationary containers” and to handle rechargeable Lithium ion batteries according to storage category 11 (“combustible solids“).

8. Exposure controls/personal protection

Under normal conditions (during charge and discharge) release of ingredients does not occur.

9. Physical and chemical properties

Not applicable if closed.

10. Stability and reactivity

Dangerous reactions:	When heated above 100°C the risk of rupture occurs.

11. Toxicological information

Under normal conditions (during charge and discharge) release of ingredients does not occur. In case of accidental release see information in chapter 2, 3, 4.

12. Ecological information

Not applicable if closed.

13. Disposal considerations

USA: Lithium ion batteries are classified by the federal government as non-hazardous waste and are safe for disposal in the normal municipal waste stream. These batteries, however, do contain recyclable materials and are accepted for recycling by the Rechargeable Battery Recycling Corporation's (RPBC) Battery Recycling Program. Please go to the RPRC website at www.rbrc.org for additional information.

In the European Union, manufacturing, handling and disposal of batteries is regulated on the basis of the DIRECTIVE 2006/66/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC. Customers find detailed information on disposal in their specific countries using the web site of the European Portable Batteries Association (http://www.epbaeurope.net/legislation_national.html).

Importers and users outside EU should consider the local law and rules.

In order to avoid short circuit and heating, used lithium ion batteries should never be stored or transported in bulk. Proper measures against short circuit are:

- Storage of batteries in original packaging
- Coverage of the terminals
- Embedding in dry sand

14. Transport information

Rechargeable Lithium ion batteries manufactured by VARTA Microbattery are considered to be UN 3480 Lithium Ion Batteries, and are tested according to 38.3 of the "UN Manual of Tests and Criteria" for compliance with the requirements of special provisions ADR 188, IMDG 188, DOT / 49 CFR § 173.102, and the requirements of IATA DGR packing instruction 965. Positive test results as well as other relevant information required for transportation are stated in dedicated "Declarations of Conformity".

Transportations of cells or batteries packed with equipment or contained in equipment have to follow the appropriate regulations for UN3481.

During the transportation of large amounts of batteries by ship, trailer or railway, do not store them in places of high temperature and do not allow them to be exposed to condensation. During the transportation do not allow the packaging to be damaged, as a damage of the packaging may cause fire. In the event packaging is damaged, special procedures must be used including inspection and repackaging if necessary and handle with care.

Code of practice for packaging and shipment of secondary batteries given in IEC 62133*: The packaging shall be adequate to avoid mechanical damage during transport, handling and stacking. The materials and pack design shall be chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of moisture.*

15. Regulatory information

Marking consideration:	European Union: According to Directive 2006/66/EC, the batteries have to be marked with the crossed wheel bin symbol. According to Commission Regulation (EU) No 1103/2010 portable secondary (rechargeable) batteries and accumulators shall be marked with a capacity marking, except those which are incorporated or designed to be incorporated in appliances before being provided to end-users, and not intended to be removed. Rechargeable Lithium ion batteries, which contain electronic modules (e.g. PCM) and which are subjected to the EMC directive 93/97/EEC, must be CE approved and must wear the CE marking. According to Dangerous Goods Regulations (see 14.) battery packs have to be marked with the Watt-hour rating.
International safety standards:	The basis cells are approved according to UL 1642
Water hazard class:	(according to German Federal Water Management Act) non-water pollution according to VwVwS Appendix 1 (No. 1443 and 766)

Electronically generated document - no signature required.

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16. Other information

Note:	Date of issue of the transport regulations: ADR 2013, RID 2013, IATA 2013, IMDG 2010, DOT / 49 CFR 2013. Latest covered modification of the European Battery Directive 2006/66/EC: Directive 2008/103/EC.
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