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
Electrochemical system:	Lithium ion
Anode (negative):	Carbon (proprietary)
Cathode (positive):	Metal oxide (proprietary)

This MSDS applies to the following cell types or batteries assembled from these types.

The values listed for energy and voltage are given for reference only; they are not contractual assurances of product attributes and may differ from values given in specifications, data sheets or other documents or on the products.

Type	Energy per cell	Nominal voltage per cell
LIC 14500 PD	3.0 Wh	3.7 V
LIC 18650-FTC1H	3.5 Wh	3.2 V
LIC 18650-15 LC	5.6 Wh	3.6 V
LIC 18650-20 RC	7.2 Wh	3.6 V
LIC 18650-22 BT	8.1 Wh	3.6 V
LIC 18650-22 PC	7.8 Wh	3.7 V
LIC 18650-22 FC	8.0 Wh	3.6 V
LIC 18650-22 AL *)	7.9 Wh	3.6 V
LIC 18650-22 S3B *)	8.0 Wh	3.6 V
LIC 18650-25 FKD	9.3 Wh	3.7 V
LIC 18650-26 HC	9.4 Wh	3.7 V
LIC 18650-26 FC	9.6 Wh	3.7 V
LIC 18650-26 JC	9.5 Wh	3.63 V
LIC 18650-M26B	9.4 Wh	3.6 V
LIC 18650-26SKE	9.5 Wh	3.65 V
LIC 18650-29 EC	10.4 Wh	3.7 V
LIC 18650-29 FC	10.7 Wh	3.7 V
LIC 18650-30 BC	11.2 Wh	3.7 V
LIC 18650-VTC4H	7.6 Wh	3.6 V
LIC 18650-VTC5AH	9.4 Wh	3.6 V
LIC 26650-30 H	9.6 Wh	3.2 V
LIP 103450 SC	7.5 Wh	3.7 V
LIP 103450 AC	8.4 Wh	3.7 V
LIP 103450-CAT	7.3 Wh	3.7 V
LIP 383450 AJL *)	2.8 Wh	3.7 V
LIP 423048 AJL *)	2.6 Wh	3.7 V
LIP 423450 AJL *)	3.2 Wh	3.7 V
*) These cells contain SVHC substances $>$ 0.1 % (see section 3)		

Electronically generated document - no signature required.

VARTA Storage GmbH
Nürnberger Straße 65
D-86720 Nördlingen
Germany

Type	Energy per cell	Nominal voltage per cell
LIP 463048 FD	2.7 Wh	3.7 V
LIP 523450 AJL *)	4.1 Wh	3.7 V
LIP 553450 WC	4.2 Wh	3.7 V
LIP 663450 MC	4.9 Wh	3.7 V
LPP 383450 PL *)	2.6 Wh	3.7 V
LPP 402025 CE *)	0.5 Wh	3.7 V
LPP 402934 E *)	1.1 Wh	3.7 V
LPP 422339 PL *)	1.3 Wh	3.7 V
LPP 423566 BE *)	4.2 Wh	3.7 V
LPP 442834 PVL *)	1.5 Wh	3.7 V
LPP 443441 S *)	2.4 Wh	3.7 V
LPP 454261 8TH	5.9 Wh	3.7 V
LPP 463149 S *)	2.6 Wh	3.7 V
LPP 486588 H	13.0 Wh	3.7 V
LPP 503562 S *)	4.5 Wh	3.7 V
LPP 503759 DL *)	4.6 Wh	3.7 V
LPP 503759 8HH	5.2 Wh	3.7 V
LPP 523450 S *)	3.7 Wh	3.7 V
LPP 553048 PL *)	3.0 Wh	3.7 V
LPP 553436 S *)	2.9 Wh	3.7 V
LPP 683566 BE *)	6.7 Wh	3.7 V
LPP 702035 S *)	1.6 Wh	3.7 V
LPP 702035 PVL *)	1.6 Wh	3.7 V
LPP 751930 PL *)	1.5 Wh	3.7 V
*) These cells contain SVHC substances $>$ 0.1 % (see section 3)		

Supplier details

Address: VARTA Storage GmbH
Nürnberger Straße 65
D-86720 Nördlingen
Germany

Emergency Phone Number: +49 7961 921 110 (VAC)

Legal remark (EU)

These batteries are no “substances” or “mixtures” 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 “safety data sheet according to Regulation (EC) 1907/2006, Article 31”.

General remark

This 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 sections 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)
0 - 5 %	Confidential	Binder
2 - 10 %	7440-50-8	Copper foil
10 - 30 %	Confidential	Carbon (proprietary)
10 - 20 %	Confidential	Electrolyte (proprietary)
Remainder	N/A	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.

Heavy Metals and RoHS relevant Substances

Contents	CAS no.	Material
< 1 mg/kg	7440-43-9	Cadmium
< 10 mg/kg	7439-92-1	Lead
< 1 mg/kg	7439-97-6	Mercury (none intentionally introduced, see section 12)
< 5 mg/kg		Hexavalent Chromium (Cr6+)
< 5 mg/kg		PBB
< 5 mg/kg		PBDE

SVHC substances according to REACH (Article 33)

Contents	CAS no.	EC no.	Material
> 0.1 %	1120-71-4	214-317-9	1,3-Propanesultone (only for cells marked with *) in section 1)

For information to allow safe use: see section 7.

VARTA Storage GmbH
Nürnberger Straße 65
D-86720 Nördlingen
Germany

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 of battery components:	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 of 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 of 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.

VARTA Storage GmbH
Nürnberger Straße 65
D-86720 Nördlingen
Germany

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. Storage of unpacked batteries can cause short circuit and heat generation.
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 lithium ion batteries do according to storage category 11 (“combustible solids“).
Storage of large amounts:	Follow the recommendations of the German Insurance Association (GDV - “Gesamtverband der Deutschen Versicherungswirtschaft e.V.”) concerning lithium batteries: https://vds.de/fileadmin/vds_publikationen/vds_3103en_web.pdf In case of storage of large amounts (used storage volume $> 7\,m^3$ and/or more than 6 pallets) batteries shall be stored in fire-resistant or separated rooms or areas (e.g. warehouse or container for hazardous materials). Mixed storage with other products is not allowed. The storage area shall be monitored by an automatic fire detection system, connected to a permanently manned place. A fire-extinguishing system shall reflect the extinguishing agents mentioned in section 5.

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℃ the risk of rupture occurs.

VARTA Storage GmbH
Nürnberger Straße 65
D-86720 Nördlingen
Germany

11 Toxicological information

Under normal conditions (during charge and discharge) release of ingredients does not occur. In case of accidental release see information in sections 2 to 4 and 6.

12 Ecological information

VARTA lithium ion batteries do not contain heavy metals as defined by the European directives 2006/66/EC Article 21; they comply with the chemical composition requirements of this Directive.

Mercury has not been “intentionally introduced (as distinguished from mercury that may be incidentally present in other materials)” in the sense of the U.S.A. “Mercury-Containing and Rechargeable Battery Management Act” (May 13 1996).

The Regulation on Mercury Content Limitation for Batteries promulgated on 1997-12-31 by the China authorities including the State Administration of Light Industry and the State Environmental Protection Administration defines ‘low mercury’ as ‘mercury content by weight in battery as less than 0.025 %’, and ‘mercury free’ as ‘mercury content by weight in battery as less than 0.0001 %’. And therefore: VARTA lithium ion batteries belong to the category of mercury-free battery (mercury content lower than 0.0001 %).

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 Call2Recycle, Inc. Please go to their website at www.call2recycle.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

VARTA lithium ion batteries 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, as well as the requirements of DOT / 49 CFR § 173.185, and the requirements of IATA DGR packing instruction 965. Test results as well as other relevant information required for transportation are given in dedicated “Declarations of Conformity”.

Please note that for some products state of charge and VARTA packaging are not designed for air transport in bulk after 01 April 2016; this does not affect air transport of batteries packed with equipment or contained in equipment.

Transportations of cells or batteries packed with equipment or contained in equipment have to follow the appropriate regulations for UN 3481.

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

VARTA Storage GmbH
Nürnberger Straße 65
D-86720 Nördlingen
Germany

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.

Compilations of transport requirements for Lithium batteries can be found in:
https://www.lithium-batterie-service.de/en/
https://www.iata.org/whatwedo/cargo/dgr/Documents/lithium-battery-shipping-guidelines.pdf

Each cell or battery is manufactured under a quality management program according to IATA DGR clause 3.9.2.6, ADR clause 2.2.9.1.7 e), and IMDG code clause 2.9.4.5.

15 Regulatory information

Marking consideration

European Union: According to "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" 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 directives 2004/108/EC or 2014/35/EU (as they are end-user replaceable devices), must undergo a EU conformity assessment and must wear the CE marking.

According to Dangerous Goods Regulations (see section 14) battery packs have to be marked with the Watt-hour rating.

Water hazard class

The regulations of the German Federal Water Management Act (WHG) are not applicable as Li-Ion Accus are articles and not substances, thus there is no risk of water pollution, except the batteries are violated or dismantled.

16 Other information

Note:	Date of issue of the transport regulations: ADR 2019, RID 2019, IATA DGR 2019 (60th edition), IMDG 2016, DOT / 49 CFR 2019. Latest covered modification of the European Battery Directive 2006/66/EC: Directive (EU) 2018/849.
RoHS:	See special Declaration https://www.varta-storage.com/wp-content/uploads/General-Declarations-RoHS_Declaration_VS.pdf
REACH:	See special Declaration https://www.varta-storage.com/wp-content/uploads/General-Declarations-REACH_Declaration_VS.pdf
Issued by:	VARTA Microbattery GmbH Quality / Environmental Management
Contact:	https://www.varta-storage.com/contact-storage/?lang=en
Updates:	Current SDS can be downloaded from VARTA's web page https://products.varta-microbattery.com/en/news-downloads/document-search.html (select Document Type "MATERIAL SAFETY DATA SHEET").

VARTA Storage GmbH
Nürnberger Straße 65
D-86720 Nördlingen
Germany