

Safety & Transport Regulations

Standards

General safety recommendations for lithium batteries have been published in the standards *UL 1642* and *IEC 60086-4*.

UL-recognition

Tadiran Lithium Batteries are recognized by UL under file *MH 12827*, please refer to *UL ONLINE CERTIFICATIONS DIRECTORY* for further information. The following text or a modified version thereof appears on each battery:

WARNING:

Fire, explosion, and severe burn hazard. Do not recharge, disassemble, heat above 100°C, incinerate, or expose contents to water.

Classification of lithium batteries

Lithium metal batteries are dangerous goods, UN No. 3090. Lithium ion batteries are dangerous goods, UN No. 3480. *Table 2* indicates which Tadiran Lithium cells are exempted from the dangerous goods regulations and which are not. In air transport, exemptions are limited.

For more information on classification and transport regulations, please refer to Tadiran's technical notice: www.tadiranbatteries.de/regulations/

UN tests

Table 2 also shows the status of UN-tests for Tadiran Lithium Batteries according to the UN Handbook of Tests and Criteria, part III, sub-section 38.3. Regarding Tadiran Lithium Batteries not listed in *table 2*, please apply to Tadiran Batteries for a confirmation.

Protection against charging

Whenever lithium batteries are not the single power source in a circuit the following measures are recommended by the Underwriters Laboratories:

The battery should not be connected in series with an electrical power source that would increase the forward current through the battery.

The circuit shall include one of the following:

- A. Two suitable diodes in series with the battery to prevent any reverse (charging) current. The second diode provides protection if the other one fails; or

- B. A blocking diode or the equivalent to prevent any reverse (charging) current and a resistor to limit current in case of a diode failure. The resistor should be sized to limit the reverse (charging) current to the maximums $I_{R \max}$ shown in *table 1*.

In addition to this UL requirement, which gives the safety limits, Tadiran Batteries recommend to limit the reverse (charging) current to values below 10 μA . This will ensure that service life is not affected.

Type	$I_{R \max}$
SL-350	15 mA
SL-360	50 mA
SL-361	20 mA
SL-550	15 mA
SL-560	50 mA
SL-561	15 mA
SL-750	15 mA
SL-760	50 mA
SL-761	20 mA
SL-840	15 mA
SL-850	15 mA
SL-860	50 mA
SL-861	20 mA
SL-886	25 mA
SL-889	20 mA
SL-2770	15 mA
SL-2780	50 mA
SL-2790	100 mA
SL-2870	15 mA
SL-2880	50 mA
TLM-1520HP	100 mA
TLM-1530HP	100 mA
TLM-1550HP	100 mA
TLM-1520HE	25 mA
TLM-1530HE	50 mA
TLM-1550HE	100 mA

Protection against forced discharge

Forced discharge of a cell can occur when it is connected in series with other cells. A by-pass diode should be provided in parallel with each cell in a series connection. The effect of a by-pass diode is that current passes through the diode if a cell has been discharged, preventing forced discharge.

REACH and RoHS

All Tadiran cell are compliant with REACH regulation and RoHS directive.

Table 1: Maximum reverse current

System	Size	Type	Exempted ¹⁾	Lithium content [g]	UN Test passed	UN Number		
Lithium Thionyl Chloride (LTC)	BEL		SL-840	Yes	0.13	Yes 3090/91		
	1/10C	TLH-2450	TL-2450	Yes	0.18	Yes 3090/91		
	1/10D		SL-786	SL-886	Yes	0.3	Yes 3090/91	
	1/6D		SL-789	SL-889	Yes ²⁾	0.5	Yes 3090/91	
	1/2AA	SL-350	SL-550	SL-750	SL-850	Yes ²⁾	0.35	Yes 3090/91
	2/3AA	SL-361	SL-561	SL-761	SL-861	Yes ²⁾	0.5	Yes 3090/91
	AA	SL-360	SL-560	SL-760	SL-860	Yes ²⁾	0.65	Yes 3090/91
	C			SL-2770	SL-2870	No	2.5	Yes 3090/91
	D			SL-2780	SL-2880	No	5	Yes 3090/91
	DD			SL-2790		No	10	Yes 3090/91
Hybrid Layer Capacitors (HLC)	1/2AAA	HLC-1020 (3.67 V and 3.9 V)		Yes	0.01	Yes 3090/91		
	1/2AA	HLC-1520 (3.67 V)		Yes	0.02	Yes 3090/91		
	2/3AA	HLC-1530 (3.67 V)		Yes	0.02	Yes 3090/91		
	AA	HLC-1550 (3.67 V)		Yes	0.05	Yes 3090/91		
	1/2AA	HLC-1520 (3.9 V)		Yes	0.03	Yes 3090/91		
	2/3AA	HLC-1530 (3.9 V)		Yes	0.05	Yes 3090/91		
	AA	HLC-1550 (3.9 V)		Yes	0.10	Yes 3090/91		
TLM batteries	1/2AA	TLM-1520HP		Yes	0.04	Yes 3090/91		
	2/3AA	TLM-1530HP		Yes	0.08	Yes 3090/91		
	AA	TLM-1550HP		Yes	0.18	Yes 3090/91		
	1/2AA	TLM-1520HE		Yes	0.11	Yes 3090/91		
	2/3AA	TLM-1530HE		Yes	0.20	Yes 3090/91		
	AA	TLM-1550HE		Yes ²⁾	0.44	Yes 3090/91		
TLI batteries	1/2AAA	TLI-1020		Yes	< 0.3 Wh	Yes 3480/81		
	1/2AA	TLI-1520		Yes	< 0.8 Wh	Yes 3480/81		
	2/3AA	TLI-1530		Yes	< 1.2 Wh	Yes 3480/81		
	AA	TLI-1550		Yes	< 2.8 Wh	Yes 3480/81		

Table 2: Classification of Tadiran Lithium Batteries

¹⁾ if conditions mentioned in Tadiran's technical notice are fulfilled

²⁾ see also IATA DGR under UN 3090 / PI 968 / Table 968-II