

Technical Notice

Guidelines for the usage of TLI cells

This LTN is intended to be used as a guideline for the usage of the TLI-Tadiran Lithium Ion rechargeable cells in an application. It provides the use with guidelines for incorporating necessary technical and safety criteria.

1. Charge/Discharge cycles

In order to obtain more than 80 % of the initial capacity the recommended number of cycles is 3000, under the condition that the cells are being charged and discharged as instructed in the charge and discharge sections.

2. Electrical/Charge

2.1 Full Charge

The charge method is CCCV (Constant Current/Constant Voltage).

The charger will supply constant current, not larger than the maximum charging current given in tables 2 and 3, until the battery voltage reaches $4.1 \text{ V} + 0 \text{ V} - 0.05 \text{ V}$. Then the charging method is changed to constant voltage, tapering the charge current to not more than the maximum end of charge current as displayed in tables 2 and 3.

Charging Cut-Off

(a) by time

Table 1: Charging time

	Standard Charge	Rapid Charge
Charging temperature range $-20 \text{ }^{\circ}\text{C}$ to $+50 \text{ }^{\circ}\text{C}$	6.6 h	3.3 h
Charging temperature range $-40 \text{ }^{\circ}\text{C}$ to $+85 \text{ }^{\circ}\text{C}$	33 h	16.5 h

or

(b) by end of charge current.

2.2 Maximum allowed charge current

Table 2 below displays the maximum charging current in a temperature range from $-20\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$.

Table 2: Maximum charging current from $-20\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$.

Cell Type	Maximum charging current for one cell	End of charge current for one cell	Maximum charge current for 2 or more cells in parallel
TLI-1550	100 mA	20 mA	250 mA
TLI-1530	50 mA	10 mA	125 mA
TLI-1520	25 mA	5 mA	62.5 mA
TLI-1020	8 mA	1.6 mA	20 mA

Table 3 below displays the maximum charging current in a temperature range from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$.

Table 3: Maximum charging current from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$

Cell Type	Maximum charging current for one cell	End of charge current for one cell	Maximum charge current for 2 or more cells in parallel
TLI-1550	20 mA	4 mA	50 mA
TLI-1530	10 mA	2 mA	25 mA
TLI-1520	5 mA	1 mA	12.5 mA
TLI-1020	1.6 mA	0.32 mA	4 mA

2.3 Maximum allowed charge voltage

The maximum allowed charging voltage for all different cell types is 4.1 V.

For 2 cells or more in series, voltage should be monitored separately for each cell in order to ensure symmetrical use and balancing.

3. Electrical/Discharge

3.1 Maximum allowed discharge current in cells without PTC

The maximum discharge current @ RT is 5 A.

Table 4 shows the maximum discharge current in a temperature range from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$.

Table 4: Maximum discharge current from $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$

Cell Type	Maximum discharge current for one cell	Maximum discharge current for n cells in parallel
TLI-1550	2 A	n x 2 A
TLI-1530	1 A	n x 1 A
TLI-1520	0.5 A	n x 0.5 A
TLI-1020	0.16 A	n x 0.16 A

3.2 Minimum allowed discharge voltage

The minimum allowed discharge voltage for all the different cell types is $2.5 \text{ V} + 0.05 \text{ V} / -0 \text{ V}$. For 2 cells or more in series, voltage should be monitored on each cell. The customer should design a suitable low voltage protection in order to prevent charging of a cell that has been deeply discharged.

4. Protections

TLI cells (only in sizes: 1550 & 1530 not in sizes: 1520 & 1020) should be protected with PTC either on the battery or on the board.

The standard TLI cells are protected by a PTC of types SRP120 and SRP200, respectively, as follows:

SRP120 limits the discharge current to 1.2 A and the SRP200 to 2 A.

In special cases cells without PTC can be supplied – please consult with Tadiran.

There is no integrated overcharge protection in the TLI cells.

The protection circuit should be designed by the customer and be approved by Tadiran.

The following example (see **Fig. 1**) represents an approved protection circuit diagram when TLI-1550 is being used in an application. The maximum allowed voltage of the power supply should be regulated to 4.1 V. In case a smaller cell is being used in the application, the size of the resistor should be adjusted.

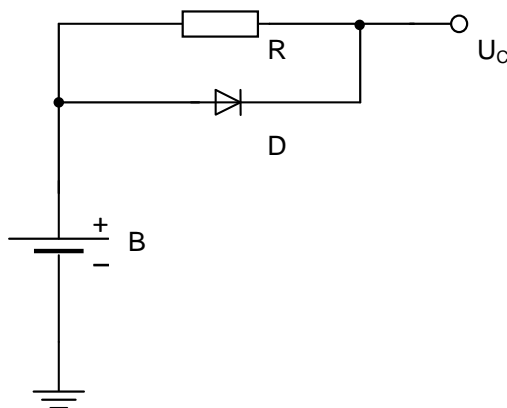


Fig. 1

Approved protection circuit diagram (Example)

B = Battery TLI-1550

D = Diode SB560

R = Resistor 25 Ω

U_C = Charging voltage, max. 4.1 V

For more details please consult Tadiran Technical Support.

5. Approval by Tadiran

The design of the following items should be approved by Tadiran:

5.1 Implementation of the low voltage protection against deep discharge (see paragraph 3.2).

5.2 Implementation of the protection circuit against overcharge (see paragraph 4).