

Product Specification

Semi-Solid-State Lithium-ion battery

Model: TULIP-5.2-3.95V



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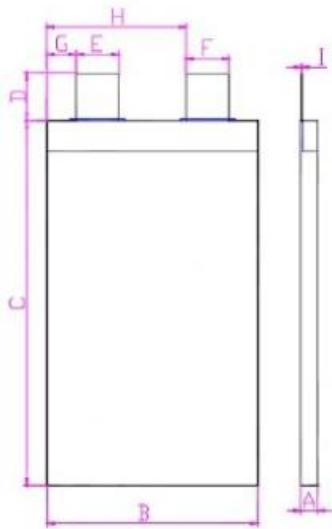
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Scope of application

This product specification describes the performance indicators of solid-state lithium-ion battery products produced for mainly UAV and robotics applications.

Dimensions



Code	Entry name	Size
A	Thickness	8.4 ±0.2mm
B	Width	35 ±1mm
C	Length	106 ±1mm
D	Electrode length	12 ± 0.5 , Adjustable
E	Electrode Width(+)	8 ± 0.5 , Adjustable
F	Electrode Width(-)	8 ± 0.5 , Adjustable
G	Electrode margin(+)	Adjustable
H	Electrode margin(-)	Adjustable
I	Electrode thickness	Positive pole: 0.3 ± 0.02mm (Nickel Plated Copper) Negative pole: 0.2 ± 0.03mm (Nickel Plated Copper)

Cell option	2,5Ah	3,8Ah	4,0Ah	5,2Ah	6,3Ah	7,5Ah	9,7Ah	...	
Weight									
Dimension A									
Dimension B									
Dimension C									
Dimension D									



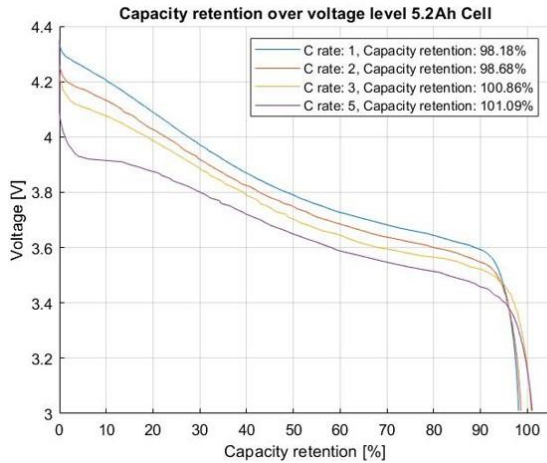
Product Specifications

	Property	Value	
1	Nominal capacity	5200 mAh (1C)	
2	Nominal voltage	3.95V	
3	Charging voltage	4.45V	
4	Termination voltage	3.0V	
5	Charging method	Ultrafast	Possible but needs to be tested.
		Fast	3C (15.6A) constant current (CC) charge to 4.45V, then constant voltage (CV) charge until the charging current is less than 0.1A
		Standard	1C (5.2A) constant current (CC) charge to 4.45V, then constant voltage (CV) charge until the charging current is less than 0.1A
6	Discharge method	Pulse (< 8 s)	12C (64.2A)
		High Continuous	7C (36.4A)
		Continuous	5C (26A)
		Standard	1C (5.2A)
7	Cycle life	400 times (1C/5C ; 100% DOD) Estimated 1000 times (1C/1C ; 90% DoD)	
8	Working temperature	Charge : 0°C~45°C Discharge : -20°C~70°C	
9	Storage temperature	Short term storage (1 month):-20°C~45°C Long term storage (6 months): - 10 °C~35 °C	
10	Storage humidity	<75%RH	
11	Energy density	Specific energy by weight: > 285 Wh/KG (0.5C/1C) Volume specific energy: > 615 Wh/L (0.5C/1C)	
12	Internal resistance	3.1 ± 0.4mΩ	
13	Weight	74 g	

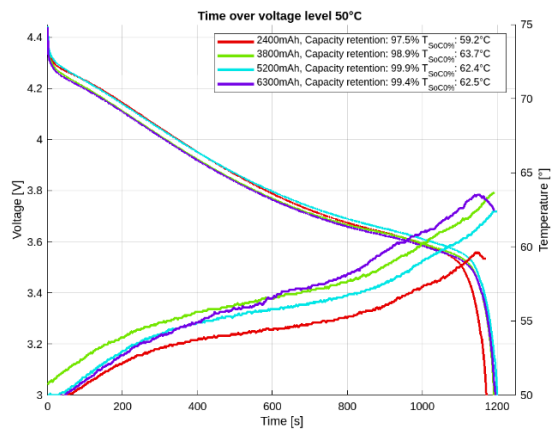
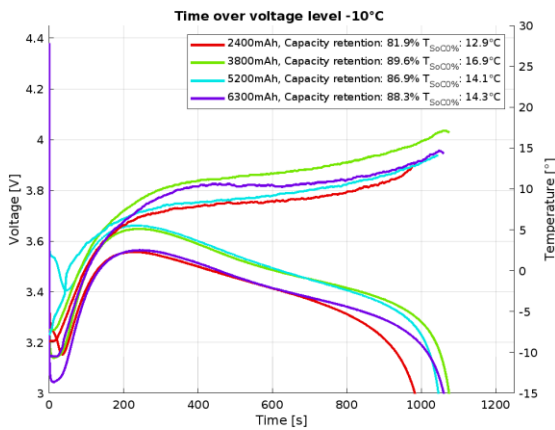
Electrical performance

Tests have been performed at Tulip Tech to evaluate the performance of this cell. Interestingly, the cell performance better at higher temperatures.

Room temperature, different C-rates:



Low and High Temperature tests:



Visual inspection

All batteries are inspected by at least two electrical engineers at Titan Batteries B.V. The batteries shall not show any damage, cracks, or blemishes on the outside.

Standard test environment

Unless otherwise specified, all tests in this specification shall be conducted under the following environmental conditions: temperature: 20 ± 2 °C

Humidity: $\leq 75\%$ RH

Atmospheric pressure: 86KPa \sim 106 kPa

Storage

If the battery is stored for a long time (more than 3 months), it must be placed in a dry and cool place. The battery must be charged and discharged every 6 months. The storage voltage is 3.5-3.6V, and the charging and discharging environment requirements are as described in the previous paragraph.

Shelf life and product liability

The warranty period is 6 months from the production date (printing batch). **Titan Batteries B.V. (Tulip Tech)** is not responsible for the accidents caused by the failure to operate in accordance with the provisions of this specification. When there are some changes in this specification, the company will notify the client.

Validity of documents

This document is issued until the next revision date.

Disclosure

All rights in this specification are dedicated to **Titan Batteries B.V.** (Tulip Tech) under no circumstances should this data be shared with any third party.

Release Date

The battery cell specifications were released by Titan Batteries B.V. (Tulip Tech) on January 16th, 2023.

Warnings and precautions

- Do not put the battery into fire (or heated environment above 65 degrees C).
- Do not disassemble the battery pack or battery cell.
- Do not immerse the battery in seawater or water. When not in use, it should be placed in a cool and dry environment.
- When charging, please use the charging precautions proved by Titan Batteries.
- Do not insert the battery directly into a power socket.
- Do not use a conductor to directly connect the positive and negative electrodes of the battery.
- Do not knock or throw, step on the battery, etc.
- Do not use it in places with strong static electricity and strong magnetic fields, otherwise it will easily damage the battery safety protection device and bring unsafe hidden dangers.
- If the battery leaks, and the electrolyte gets into the eyes, please do not rub it, rinse the eyes with clean water, and seek medical treatment immediately.
- If the battery emits odour, heat, discoloration, deformation, or any abnormality during use, storage, or charging, immediately remove the battery from the device or charger and stop using it.
- Discarded batteries should be covered with insulating paper to prevent fire and explosion.
- If the battery pole is dirty, wipe it with a dry cloth before use, otherwise it may cause poor contact and function failure.