



**GENERAL ELECTRONICS BATTERY CO., LTD.**

No.: SPE091

Version: 01

Date: 2019-03-05

# Product Specification

## for Polymer Lithium-ion Battery

**Model Number: GEB9059156**

**GENERAL ELECTRONICS BATTERY CO., LTD.**

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**1. Scope**

This document describes the performance characteristics and testing methods for Polymer Li-ion Batteries produced by GE Battery Co., Limited.

**2. Product Type and Model Number**

## 2.1 Product Type

Polymer Lithium-ion Battery

## 2.2 Model Number

GEB9059156

**3. Specification**

No.	Item	Characteristics	Remarks
3.1	Nominal Capacity	Minimum: 10000mAh Typical: 10010mAh	Fully charged @1C to 4.2V for 2.5 hrs, then discharge to 3.0V @ 0.2C.
3.2	Nominal Voltage	3.7V	
3.3	Charging Cut-off Voltage	4.20V	
3.4	Discharge Cut-off Voltage	3.0V	
3.5	Max. Charging Current	1C	
3.6	Max. Discharging Current	2C	
3.7	Operating Temperature	Charge 0~45°C Discharge -20~60°C	
3.8	Storage Temperature	-20~45°C for 1Month -20~35°C for 6Months	
3.9	Impedance	8mΩ	Maximum value
3.10	Weight	160g	Approximate value

**4. Dimensions**

Please refer the drawing in appendix 1.

**5. Appearance**

No scratches, dirt, defect, leakage of electrolyte or gassing should be observed as a new product.

**6. Characteristics**

## 6.1 Electrochemical Performance Characteristics

No.	Item	Testing Method	Requirements
1	Fully Charged State	CCCV or Constant current charge to 4.2V @1C follow by a constant voltage holding at 4.2V until current drops below 20±5mA.	
2	Rated Capacity	CCCV at 4.2V (per 6.1.1) at room temp. (20±5°C), rest for 1-2 hrs then discharge at a constant current of 0.2C to 3.0V, testing will be terminated by either 5 cycles or any one discharge time exceeds 5 hrs	≥10000mAh



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3	Cycle Life @25°C	Measure the capacity after 500 cycles with standard charge/discharge method at 0.25C to 3.0V cut-off voltage.	≥80%
4	Internal Impedance	Internal impedance is measured on a 50% charged battery at 1KHz AC at ambient temperature (20±2) °C.	≤8mΩ
5	Capacity Retention	Fully charge cells per 6.1.1, store them at (20±2)°C for 28 days, then discharge the cells to 3.0V at 0.2C.	Discharge capacity ≥8000mAh
6	High Temperature Characteristics	Fully charge cells per 6.1.1, store them at (55±2)°C for 2 hours, then discharge the cells to 3.0V at 0.2C.	Discharge capacity ≥8000mAh
7	Low Temperature Characteristics	Fully charge cells per 6.1.1, store them at (-10±2)°C for 16~24 hours, then discharge the cells to 3.0V at 0.2C.	Discharge capacity ≥6000mAh
8	Cell Voltage during Transportation	Check open circuit voltage (OCV) of cells prior to the delivery to customers.	≥3.75V

**6.2 Safety Characteristics**

No.	Item	Test Method	Requirements
1	Overcharge	Discharge cells to 3.0V at 1C, then charge to 4.8V at 3C and rest for 8 hours.	No fire No explosion
2	Over Discharge	Fully charge cells per 6.1.1, then discharge at 3.0C. The test will be terminated when -10V is reached or discharging time exceeds 2.5 hours.	No fire No explosion
3	Nail Penetration	Penetrate a stainless steel nail with diameter between 2.0~5.0mm through a fully charged battery.	No fire No explosion
4	Hot Oven Test	Put a fully charged battery in a forced air oven and raise the temperature at 5±2°C /min. to 150±2°C. Rest for 10 minutes.	No fire No explosion

**6.3 Reliability**

No.	Item	Test Method	Requirements
1	High Temperature Test	Fully charged per 6.1.1, then stored the cells at 60±2°C for 2 hours.	Electrochemical performance、visual test not changed



2	Low Temperature Test	Fully charge cells per 6.1.1, store them at $-20\pm 2^{\circ}\text{C}$ for 2 hours. Then, cells are placed at room temperature for 3 hours.	No appreciable alternation electrochemically and visually
3	Humidity Test	Fully charge cells per 6.1.1, stored them at $40\pm 2^{\circ}\text{C}$ with 90%~95RH% for 48 hours. Then the cells are placed at room temperature to "dry out" for 2 hours.	No appreciable alternation electrochemically and visually

**7. Standard Testing Environment**

Temperature :  $25\pm 2^{\circ}\text{C}$

Relative humidity :  $45\pm 20\%$  (unless specially requested)

**8. Required Protective Functions**

To ensure safety, the cells need to be assembled with PTC and protective circuitry (refer appendix 2) to prevent abusive situations occur such as over charge and over discharge or over current. The charger and protective circuitry should be consistent with the requirements listed below:

No	Device	Items	Requirements
1	Charger	Charge termination voltage	$4.200\pm 0.049\text{V}$
2	Protective Circuitry (For reference only)	Overcharge detection voltage	$4.275\pm 0.025\text{V}$
3		Overcharge release voltage	$4.175\pm 0.050\text{V}$
4		Discharge termination voltage	$3.00\pm 0.10\text{V}$
5		Over discharge detection voltage	$2.3\pm 0.08\text{V}$
6		Over discharge release voltage	$2.4\pm 0.10\text{V}$
7		Over discharge detection value	$2.7\pm 0.2\text{A}$

**9. Warranty**

Warranty period for this product is 6 months starting from the date when the products left the door of manufacturer.

**10. Liability**

The user has to operate the products according to the instructions printed on the battery label or follow the advices described in this "Product Specification for Polymer Lithium Ion Batteries" published by GE Battery Co., Ltd. In case the battery were overheated or even catch fire or explosion caused by mishandling of the user side, GE Battery Co., Ltd. will not be liable for the lose caused by any of such mishandling.

GE Battery Co., Ltd. will notify the users in written form if any modifications in specification.

**11. Battery Packing Label**

The following warnings should be indicated on the battery pack labels.

Use a specified charger.

Do not throw the battery into fire, or heat.



Do not short-circuit the battery terminals.

Do not disassemble the battery.

**12. Warnings and Cautions in Handling the Polymer Lithium-ion Battery**

To prevent potential leaking, overheating or explosion of batteries please be advised to take following precautions:

**WARNINGS!**

Do not immerse the battery in water or seawater, and keep the battery in a cool dry environment during stands by period.

Do not use or leave the battery near a heat source such as fire or heater.

When recharging, use the battery charger specifically for that purpose.

Do not reverse the position (+) and negative (-) terminals.

Do not connect the battery to an electrical outlet.

Do not dispose the battery in fire or heat.

Do not short-circuit the battery by directly connecting the positive (+) and negative (-) terminal with metal objects such as wire.

Do not transport or store the battery together with metal objects such as necklaces, hairpins etc.

Do not strike or throw the battery against hard surface.

Do not directly solder the battery and pierce the battery with a nail or other sharp object.

**CAUTIONS!**

Do not use or leave the battery at very high temperature (for example, at strong direct sunlight or in a vehicle in extremely hot weather). Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be shortened.

Do not use it in a location where static electricity is rich, otherwise, the safety devices may be damaged, causing a harmful situation.

In case the electrolyte gets into the eyes due to the leakage of battery, do not rub the eyes! Rinse the eyes with clean running water, and seek medical attention immediately. Otherwise, it may injure eyes or cause a loss of sight.

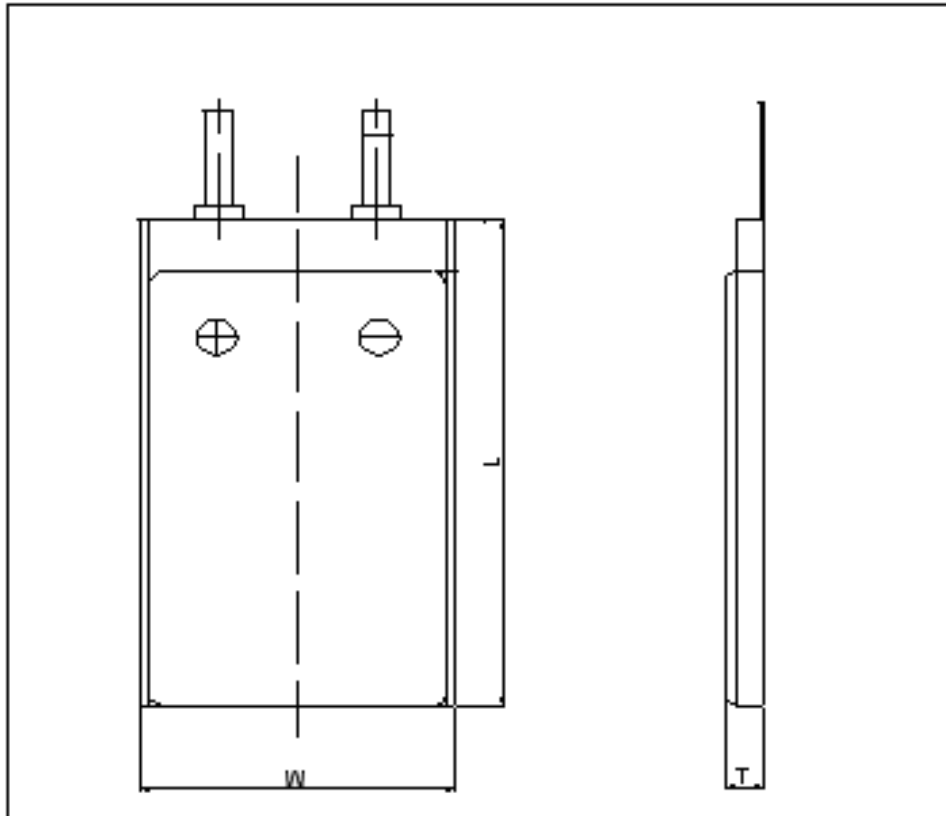
If the battery gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charger and place it in a contained vessel such as a metal box.

In case the battery terminals are contaminated, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection between the battery and the electronic circuitry of the instrument.

Be aware discarded batteries may cause fire, tape the battery terminals to insulate them before disposal.

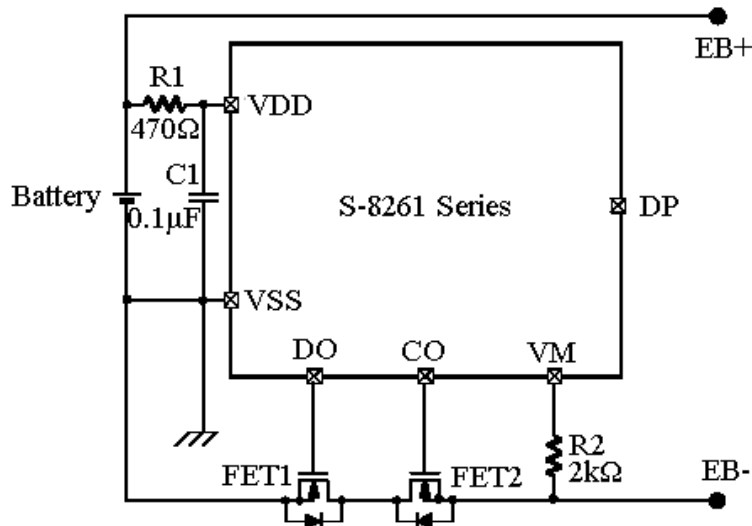
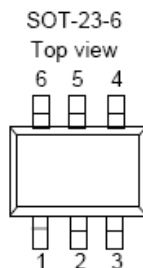


Appendix 1: Cell dimensions with unit in mm



Item	Description	Dimension (mm)
T	Thickness	$9.0 \pm 0.2$
W	Width	$59 \pm 0.5$
L	Length	$156 \pm 0.8$

## Appendix 2: Diagram of Protective Circuit Membrane

**■ Battery Protection IC Connection Example**

**■ Pin Configurations**


Pin No.	Symbol	Pin description
1	DO	FET gate control pin for discharge (CMOS output)
2	VM	Voltage detection pin between VM and VSS (Overcurrent detection pin)
3	CO	FET gate control pin for charge (CMOS output)
4	DP	Test pin for delay time measurement
5	VDD	Positive power input pin
6	VSS	Negative power input pin

**Constant for components**

Symbol	Part	Purpose	Typ.	Min.	Max.	Remarks
FET1	N-channel MOS FET	Discharge control	—	—	—	Threshold voltage $\leq$ Overdischarge detection voltage <sup>1)</sup> Gate to source withstanding voltage $\geq$ Charger voltage <sup>2)</sup>
FET2	N-channel MOS FET	Charge control	—	—	—	Threshold voltage $\leq$ Overdischarge detection voltage <sup>1)</sup> Gate to source withstanding voltage $\geq$ Charger voltage <sup>2)</sup>
R1	Resistor	ESD protection, For power fluctuation	470 $\Omega$	300 $\Omega$	1 k $\Omega$	Resistance should be as small as possible to avoid lowering of the overcharge detection accuracy caused by VDD pin current. <sup>3)</sup>
C1	Capacitor	For power fluctuation	0.1 $\mu$ F	0.022 $\mu$ F	1.0 $\mu$ F	Install a capacitor of 0.022 $\mu$ F or higher between VDD and VSS. <sup>4)</sup>
R2	Resistor	Protection for reverse connection of a charger	2 k $\Omega$	300 $\Omega$	4 k $\Omega$	Select as large a resistance as large as possible to prevent current when a charger is connected in reverse. <sup>5)</sup>