DiVolta®

Product Specifications Model No.: DP-704374

1. APPLICABILITY

This specification is applicable to DiVolta rechargeable Lithium Polymer battery, DP-704374.

2. GENERAL

2.01	Type designation	:	DP-704374
2.02	Nominal voltage	:	3.7V (average voltage at 0.2C discharge)
2.03	Shape and dimension	:	Refer to Drawing 1
2.04	Typical weight	:	43,5g ± 2g
2.05	Typical Capacity	:	2200mAh at 0,2C (400mA)
2.06	Nominal Capacity	:	2000mAh at 0,2C (400mA)
2.07	Charging Voltage	:	4.20V ± 0.05V
2.08	Max. Charging Current	:	2000mA
2.09	Charging Method	:	Constant current, constant voltage
2.09.1	Standard charge (0.5C)	:	1000mA (constant current) charge to 4.20V, then 4.2V (constant voltage) for 3.5hrs.
2.09.2	Fast charge (1C)	:	2000mA (constant current) charge to 4.20V, then 4.2V (constant voltage) for 3.0hrs.
2.10	Operating Temperature	:	Charging: 0°C to 45°C Discharging: -20°C to 60°C Storage: -20°C to 45°C
2.11	Maximum Continuous Discharge Current	:	4000mA
2.12	Discharge cut-off Voltage	:	2.75V
2.13	Cell Dimensions	:	Thickness: 07.0mm ± 0.3mm Width: 43.0mm ± 0.5mm Length: 74.0mm ± 1mm (not including tab length)

3. APPEARANCE

There shall be no dirt, scratch or deformation detrimental to practical service in appearance.

4. TEST METHOD

4.1 Electrical

Voltmeter : Digital Voltmeter with the precision of 1mV (internal resistance not less than 1 Meg ohm)

Test temperature : 25 ± 5 °C

Relative Humidity : 25% to 85%

5. Performance

5.1 Standard Charge
The cell shall be charged at a constant current of 1000mA (0.5C) to 4.2V and then at constant voltage of 4.2V with a charging time of 3.5 hours.

5.2 Rated Capacity (0.2C):
The capacity shall be measured at a discharge current of 400mA (0.2C) and a cut-off voltage of 2.75V after standard charge (section 5.1)
2000mAh (minimum).

5.3 High Rate Discharge Capacity (1C):
The capacity shall be measured at a discharge current of 2000mA (1C) and a cut-off voltage of 2.75V after standard charge (section 5.1)
85% (minimum) of rated capacity.

5.4 Low Temperature Discharge Capacity (0°C):
The capacity shall be measured at a discharge current of 400mA (0.2C) in an ambient temperature of 0°C ± 2°C and a cut-off voltage of 2.75V after standard charge (section 5.1)
80% (minimum) of rated capacity.

5.5 Low Temperature Discharge Capacity (-10°C):
The capacity shall be measured at a discharge current of 400mA (0.2C) in an ambient temperature of -10°C ± 2°C and a cut-off voltage of 2.75V after standard charge (section 5.1)
70% (minimum) of rated capacity.

5.6 High Temperature Discharge Capacity (60°C):
The capacity shall be measured at a discharge current of 400mA (0.2C) in an ambient temperature of 60°C ± 2°C and a cut-off voltage of 2.75V after standard charge (section 5.1)
100% (minimum) of rated capacity.

5.7 Storage Characteristics (25°C)
Capacity Retention: 85% (minimum) of Rated Capacity
Capacity Recovery: 90% (minimum) of Rated Capacity
The capacity retention shall be measured at a discharge current of 400mA (0.2C) and a cut-off Voltage of 2.75V after standard charge (Section 5.1) and being stored for 28 days at 25°C ±5°C.
Then, the capacity recovery shall be measured at a discharge current of 400mA (0.2C) and a cut-off voltage of 2.75V after standard charge (Section 5.1).

5.8 Storage Characteristics (45°C)

Capacity Retention: 60% (minimum) of Rated Capacity
Capacity Recovery: 70% (minimum) of Rated Capacity
The capacity retention shall be measured at a discharge current of 400mA (0.2C) and a cut-off Voltage of 2.75V after standard charge (Section 5.1) and being stored for 28 days at 45°C ±5°C.
Then, the capacity recovery shall be measured at a discharge current of 400mA (0.2C) and a cut-off voltage of 2.75V after standard charge (Section 5.1).

5.09 Cycle Life:

The cycle life shall be conducted as the following procedures:

Step 1 charge the cell with the standard charge (as of section 5.1);
Step 2 discharge the cell at 1000mA (0.5C) to 2.75V;
Step 3 repeat Step 1 and Step 2 for 500 times.

The capacity after 300 cycles is expected to be equal to or more than 80% of the rated capacity. The capacity after 500 cycles is expected to be equal to or more than 60% of the rated capacity.

5.10 Open Circuit Voltage:

3.6V - 4.1V as of shipment.

6. Mechanical Performance

6.1 Vibration Test 95% (min) of Rated Capacity, No Leakage
After standard charge (Section 5.1), the battery is vibrated with an amplitude of 0.8mm (1.6mm total maximum excursion) for 60 minutes in three mutually perpendicular directions. The vibration is performed between 10Hz and 55Hz at a rate of 1Hz per minute. After the completion of the vibration, the capacity shall be measured at a discharge current of 70mA (0.2C) and a cut-off voltage of 2.75V

7. Environmental Performance

7.1 Thermal Shock Test No Leakage, No Fire, No Explosion
The battery is stored at 75°C ±5°C for 48 hours, moved to a temperature of -20°C ±5°C within 5 minutes and stored for 6 hours after standard charge (Section 5.1).

8. Safety Performance

8.1 Short Circuit Test:
After standard charge (Section 5.1), the battery shall be subjected to a short-circuit condition with a wire of resistance less than 50mOhm for 1 hour.
No Fire, No Explosion.

8.2 Overcharge Test [With PCM]:
After standard charge (Section 5.1), the battery shall be charged at 1C (2000mA)/12V for 2.5 hrs.
No Fire, No Explosion.

8.3 Thermal Exposure Test:
After standard charge (Section 5.1), the battery is placed in an oven and is heated up at a rate of 5°C until the temperature reaches 130°C. The oven shall be maintained at 130°C for 60 minutes.
No Fire, No Explosion.

9. Delivery Condition:

about 80% charged.

10. Lithium Ion Polymer Battery Handling Guideline

10.1 In case of contacting the materials from a damaged or ruptured cell or battery:
Eye contact: Washing immediately with plenty of water and soap or for at least 15 minutes. Get medical attention.
Skin Contact: Washing immediately with water and soap.
Inhalation of Vented Gas: Remove to fresh air. Get medical attention.
Ingestion: Get medical attention immediately.

10.2 Keep away batteries from children.

10.3 The cells/batteries are requested to be stored within a proper temperature range specified in these specifications.

10.4 Do not store batteries in a manner that allows terminals to short circuit.

10.5 Do not place batteries near heating sources, nor expose to direct sunlight for long periods. Elevated temperatures can result in reduced battery service life.

10.6 Charging Battery
Use only approved chargers and procedures. Improperly charging a cell or battery may cause the cell or battery to flame or damage. Charge the battery using the "CCCV" or constant current, constant voltage method. Do not charge the battery with a current or voltage higher than the specified maximum value in these specifications. The absolute maximum charging voltage is 4.25V per cell. Prohibit reverse charging of the battery. The battery must be connected correctly.

10.7 Discharging Battery
Discharge battery at the max. current specified in this specification. Avoid discharge the battery below 2.75V for each cell. Do not overdischarge the battery. Over-discharging can damage the performance of the battery. It should be noted that the cell/battery would be at an over-discharged state by its self-discharge characteristics in case the cell is not used for long time. In order to prevent over-discharging, the cell/battery shall be charged periodically to maintain between 3.7V and 4.1V.

10.8 Operation Temperature
The battery shall be operated (stored, charged and discharged) in the temperature specified in this specifications.

10.9 Cell/Battery Protection Circuit Module (PCM)
The cell/battery must be equipped with a PCM that protects the cell/battery from overcharging, overdischarging and over-current.

10.10 Battery Short Circuit
Do not short-circuit a battery. A short circuit can result in overheating of the terminals and provide an ignition source. More than a momentary short circuit will generally reduce the cell or battery service life and can lead to ignition of surrounding materials or materials within the cell or battery if the seal integrity is damaged. Extended short-circuiting creates high temperature in the cell and at the terminals. Physical contact to high temperatures can cause skin burns. In addition, extended short-circuit may cause the cell or battery to flame.

10.11 Prohibit reversing cell polarity within a battery assembly.

10.12 The cell edge of the heat seal zone is electrically conductive. Avoid the edge cross battery terminals, PCB or conductive surfaces.

10.13 Do not bend, fold or fall the battery or part of the battery. It may cause the battery be damaged and result in the battery swelling, leaking, explosion or ignition.

10.14 Do not open or manipulate the folded cell edge.

10.15 Do not bend or fold the sealing edge. And do not tear off the sealing film.

10.16 Battery Pack Design
The battery housing should have sufficient mechanical strength.
No sharp edge components shall be inside the battery housing. The sharp edge may destroy the cell packaging. No cell movement is allowed in the battery housing. The ultrasonic head shall not directly or indirectly pressed the cell if you need to enclose the battery housing by ultrasonic method. Avoid designing airtight battery housing.

10.17 Battery Assembly
We recommend ultrasonic welding or spot welding to connect battery with PCM or other parts. If you employ manual solder method to connect tab with PCM, please pay attention to the followings:
Use a solder with temperature controlled and ESD
Soldering temperature should not exceed 350°C
Soldering time should not be longer than 3s
Soldering times should not exceed 5 times
Keep battery tab cold down before next time soldering
Do not directly heat cell body. It may cause the battery be damaged by heat above 90°C

10.18 Battery Disassembly
Never disassemble a battery. Should a battery unintentionally be crushed, thus releasing its contents, rubber gloves must be used to handle all battery components. Avoid inhalation of any vapors that may be emitted.

10.19 Do not mix Batteries and Types
Avoid to use old and new cells or cells of different sizes, different chemistry or types in the same battery assembly.

10.20 Other Warnings

Do not heat or dispose the battery into fire, water or other liquids.
Do not put the battery into microwave, washing machine or drying machine.
Do not put the battery onto oven.
Do not use a damaged battery.
Do not mechanically destroy the battery.

10.21 Others

DiVolta shall make no liability for problems that occur when the above specifications are not followed.

11. Remarks

If any matters with this specification arise, it shall be revised by mutual agreements.

Agreed by: Company: Date: