



WAMA ELECTRONICS TECH CO.,LTD

1. SCOPE

This specification describes the related technical standard and requirements of the rechargeable Li-ion battery pack supplied by WaMa. Battery packs produced with the 17280 cell will meet the specification.

2. BATTERY PACK SPECIFICATION

| ITEMS | SPECIFICATION | | REMARK |
|------------------|------------------------------------|--------|-------------------------------|
| Model | RCR123A | | |
| Constant Voltage | 3.0V | | No Load of Specification 3.7V |
| Capability | Nominal | 600mAh | |
| | Minimal | 550mAh | |
| Cell Type | 17280 | | |
| Dimensions | $\Phi 16.3(+0.3)*34.3(\pm 0.2)$ mm | | |
| Color | / | | |
| Weight | 20.0(± 2)g | | |

3. STANDARD TESTING CONDITIONS (No Load)

| ITEMS | REGISTER | | |
|-------------------------|--|----------------|----------------|
| Standard charge | CC/CV model, constant voltage 4.2V, constant current 0.2C, end current 0.01C | | |
| General charge. | CC/CV model, constant voltage 4.2V, constant current 0.5C, end current 0.01C | | |
| Standard discharge | Constant current 0.2C, end voltage 3.0V | | |
| General discharge | Constant current 0.5C, end voltage 3.0V | | |
| Environment temperature | Charge | 0 -- +45°C | |
| | Discharge | -20°C -- +60°C | |
| | Storage temperature | One month | -20°C -- +55°C |
| | | Three months | -20°C -- +45°C |
| | | One year | -5°C -- +30°C |
| | General temperature | 20°C \pm 5°C | |
| | Atmospheric pressure | 86 -- 106Kpa | |
| Relative humidity | 45% -- 85% | | |



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4. APPEARANCES

| ITEMS | TEST CONDITION | REQUIRE |
|------------|----------------------|---|
| APPEARANCE | Under light lamp 40W | Shall be free noticeable flaws breaks, age, Discoloration, deformation, uneven, and other Defects which impair the value of the commodity |

5. ELECTRICAL CHARACTERISTICS

| ITEMS | TEST CONDITION | REQUIRE |
|------------------|--|--|
| Complete Charge | The battery is charged with constant current 1CmA and constant voltage 4.2v until the charging current is less than 0.01CmA. The longest charging time is less than 3 hours. | |
| Initial capacity | The capacity measured after the battery is discharged with constant current 0.2C until the voltage reaches 3.0V cut-off in one hour after complete charge. | 600mAh |
| Cycle life | The capacity measured after 500 cycles of complete charge and discharge at 1C current to 3.0V cut-off. | Capacity more than 70% of Initial capacity |
| Impedance | Internal resistance measured at 1KHz after complete charge. | $\leq 200\text{m}\Omega$ |

6. TEMPERATURE ADAPABILITY

| ITEMS | TEST CONDITION | REQUIRE |
|----------------------------|--|---|
| High temperature discharge | After complete charge, at 60°C , discharging current 0.2C to 3.0V-END discharge. | No explosion, fire, or smoke. Discharge efficiency $\geq 85\%$. |
| High temperature exposure | After relative charge, all batteries being tested are stored in chamber of 150°C for 0.5 hour. After taking the batteries out of the chamber, all the batteries are visually examined. | No explosion, fire, or smoke. |
| Low temperature discharge | After complete charge. At -20°C , discharging current 0.2CmA to 3.0V-END discharge. | No explosion, fire, or smoke. Discharge efficiency $\geq 80\%$. |



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7. DESTROY ADAPTABILITY

| ITEMS | TEST CONDITION | REQUIRE |
|----------------|--|--|
| E.S.D TEST | To apply 33 Ω resistance and stasis Electricity energy of 1500PF capacitor. To All terminals (+, -) apply the below for 10 times each, 1. Contact : $\pm 8KV$ 2. Air : $\pm 15KV$ | No malfunction. No damage. |
| Vibration Test | Subject to 1 hour 10-55Hz 3.5mm amplitude Vibration for any direction at shipment (complete packing) state. Then test discharge and rated charge at $25 \pm 2^{\circ}C$. | No xplosion.fire ,or Smoke.No leakage or damage |
| Drop Test | Drop test battery 1.2m above steel board of more than 10mm thickness. One time drop each for 6 surface,4 ride direction of a battery pack | No leakage or damage No explosion, fire or Smoke. Discharge time Less than 50 minute. |

8.8.1 PCM SPECIFICATION

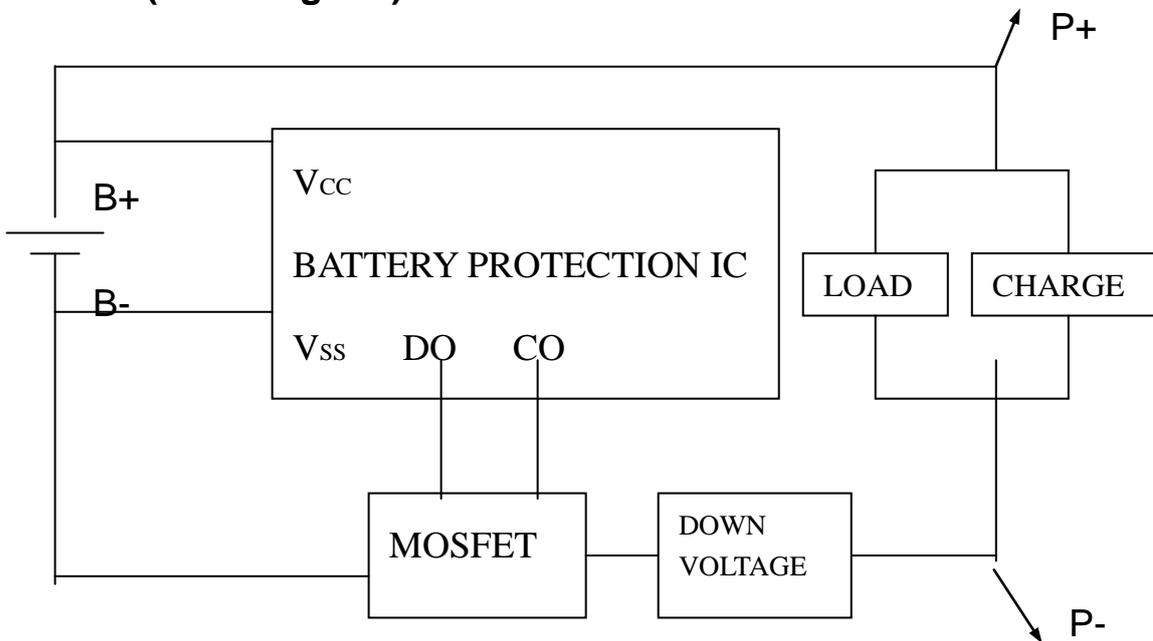
| ITEMS | TEST CONDITION |
|-----------------------------|---|
| Over charge protection | The battery should be charged under 5.0V/1C. The charging should be shut off when the internal cell voltage becomes more than the specified protection voltage. |
| Over discharge protection | The battery should be discharged with 1C, The discharging should be shut off when the internal cell voltage becomes less than the specified protection voltage. |
| Short protection | After rated charge, (+) and (-) terminals are connected with 10m mental resistor or equivalence. |
| Current consumption | Ordinary current consumption: consumption current of the protection circuit when internal cell voltage reaches 3.7V(Max:6 μ A) |
| General current consumption | Shut off current consumption: consumption current of the Protection circuit when internal cell voltage reaches 3.0v(Max:3 μ A) |



8.2 PCM STANDARD

| Symbol | Name | Conditions | MIN. | TYP. | MAX. | Unit |
|---------------------------------|--------------------------------|---|-------|-------|-------|------|
| V _{DET1} | Over-Charge detect voltage | | 4.25 | 4.28 | 4.31 | V |
| V _{HVS1} | Over-Charge reset voltage | | | | | V |
| T _{V_{DD}DET1} | Output delay of over-Charge | C ₃ =0.01uF, V _{DD} =3.6, V->4.4V | 175 | 250 | 325 | ms |
| V _{DET2} | Over-discharge detect voltage | | 2.24 | 2.3 | 2.36 | V |
| T _{V_{DET}2} | Output delay of over-Discharge | V _{DD} =3.6V, V->2.4V | 14 | 20 | 26 | ms |
| V _{DET3} | Excess current detect voltage | | 0.105 | 0.125 | 0.145 | V |
| I _{EC} | Excess current theshold | | | 2.1 | | A |
| T _{V_{DET}3} | Output delay of Excess current | V _{DD} =3.0V | 8 | 12 | 16 | ms |
| I _{DD} | Supply current | V _{DD} =3.9V, V-=0V | | 3 | 6 | μ A |
| I _{STANDBY} | Standby current | V _{DD} =2.0V | | | 0.2 | μ A |

8.3(PCMDiagram)





9. CAUTIONS IN USE

To ensure proper use of the battery please read the manual carefully before using it.

. Handling

- Do not expose to, dispose of the battery in fire.
- Do not put the battery in a charger or equipment with wrong terminals connected.
- Avoid shorting the battery
- Avoid excessive physical shock or vibration.
- Do not disassemble or deform the battery.
- Do not immerse in water.
- Do not use the battery mixed with other different make, type, or model batteries.
- Keep out of the reach of children.

. charge and discharge

- Battery must be charged in appropriate charger only.
- Never use a modified or damaged charger.
- Do not leave battery in charger over 24 hours.

. storage

- Store the battery in a cool, dry and well-ventilated area.

. disposal

- Regulations vary for different countries. Dispose of in accordance with local regulations.
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