MS Lithium Rechargeable Battery

Type 3V Type

MS412FE/MS518SE/MS614E/MS614SE/MS621FE/MS920SE

FEATURES

• Large discharge capacity: For high operational voltage range of 3.3V to 2.0V.
• Long cycle life: Cycle life of over 100 cycles under charge/discharge conditions of 3.3V to 2.0V (D.O.D.100%).
• Excellent overdischarge characteristics: Continued stable capacity characteristics even after the battery is overdischarged down to 0.0V.
• Operation over a wide temperature range: Operating temperature range: -20°C to +60°C Consult us for using the battery at a temperature beyond the above temperature range.
• RoHS Compliant

APPLICATIONS

• Backup power supply for memory or clock function in various types of electronic equipment for mobile communication, office automation, audio-visual equipment, mobile information equipment, etc. (cellphone, PHS, cordless phone, pager, memory card, fax machine, PC, video camera, digital camera, tuner, handy terminal, PDA, etc.)
• Hybrid power supply in combination with solar cells.
• Main power supply for small and slim portable equipment.

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Type</th>
<th>Nominal Voltage (V)</th>
<th>Charge Voltage (Standard Charge Voltage)*</th>
<th>Nominal Capacity (mAh)*</th>
<th>Internal Impedance (Ω)*</th>
<th>Standard Charge/Discharge Current (mA)</th>
<th>Maximum Discharge Current (Continuous) (mA)*</th>
<th>Cycle Life (Time)*</th>
<th>100% D.O.D. (Depth of Discharge) Time</th>
<th>20% D.O.D. (Depth of Discharge) Time</th>
<th>Size (mm)</th>
<th>Weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS412FE</td>
<td>3</td>
<td>2.8 to 3.3 (3.1)</td>
<td>1.0</td>
<td>100</td>
<td>0.010</td>
<td>0.10</td>
<td>100</td>
<td>1000</td>
<td>4.8</td>
<td>1.2</td>
<td>0.07</td>
</tr>
<tr>
<td>MS518SE</td>
<td>3</td>
<td>2.8 to 3.3 (3.1)</td>
<td>3.4</td>
<td>60</td>
<td>0.010</td>
<td>0.15</td>
<td>100</td>
<td>1000</td>
<td>5.8</td>
<td>1.8</td>
<td>0.13</td>
</tr>
<tr>
<td>MS614E</td>
<td>3</td>
<td>2.8 to 3.3 (3.3)</td>
<td>2.3</td>
<td>50</td>
<td>0.015</td>
<td>0.25</td>
<td>100</td>
<td>1000</td>
<td>6.8</td>
<td>1.4</td>
<td>0.17</td>
</tr>
<tr>
<td>MS614SE</td>
<td>3</td>
<td>2.8 to 3.3 (3.1)</td>
<td>3.4</td>
<td>80</td>
<td>0.015</td>
<td>0.25</td>
<td>100</td>
<td>1000</td>
<td>6.8</td>
<td>1.4</td>
<td>0.17</td>
</tr>
<tr>
<td>MS621FE</td>
<td>3</td>
<td>2.8 to 3.3 (3.1)</td>
<td>5.5</td>
<td>80</td>
<td>0.015</td>
<td>0.25</td>
<td>100</td>
<td>1000</td>
<td>6.8</td>
<td>2.1</td>
<td>0.23</td>
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<tr>
<td>MS920SE</td>
<td>3</td>
<td>2.8 to 3.3 (3.1)</td>
<td>11.0</td>
<td>35</td>
<td>0.050</td>
<td>0.80</td>
<td>100</td>
<td>1000</td>
<td>9.5</td>
<td>2.1</td>
<td>0.47</td>
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</tbody>
</table>

*1. Nominal capacity: Typical value of discharge capacity between 3.1V and 2.0V (Note that the discharge capacity of MS614E is between 3.3V and 2.0V.)
*2. Internal impedance is measured using an AC (Alternating Current) method at the fully charged state.
*3. Maximum discharge current indicates the value of a current for approximately 50% of the nominal capacity.
*4. Cycle Life indicates the times charged/discharged is repeated for approximately 50% of the capacity values in the specification sheet.
*5. 100% and 20% are based on nominal capacity.
*6. A constant voltage charge is recommended, but due to a limit in charge current, it is necessary to insert a resistor to regulate the charge current. Contact us for further details.
If a constant current charge is required, contact us for more information.

MS (Manganese Silicon) lithium rechargeable batteries, developed by Seiko Instruments Inc., use silicon oxide as the anode and a lithium manganese composite oxide as the cathode. As a result, they offer long cycle life and highly stable overdischarge characteristics.

<Cross Section>

Gasket Negative cap Negative electrode Separator Positive electrode Positive case

Contact us for further details.
If a constant current charge is required, contact us for more information.
MS Lithium Rechargeable Battery 3V Type

**DISCHARGE CHARACTERISTICS (CHARGE VOLTAGE DEPENDENCE)**

**MS412FE**
- Charge: max. 0.005mA/72 hours (CC/CV)
- Discharge: 10μA/c.o.v. = 2.0V (CC)

**MS18SE**
- Charge: max. 0.06mA/72 hours (CC/CV)
- Discharge: 10μA/c.o.v. = 2.0V (CC)

**MS614E**
- Charge: max. 0.3mA/72 hours (CC/CV)
- Discharge: 15μA/c.o.v. = 2.6V (CC)

**MS614SE**
- Charge: max. 0.1mA/72 hours (CC/CV)
- Discharge: 15μA/c.o.v. = 2.0V (CC)

**MS621FE**
- Charge: max. 0.1mA/96 hours (CC/CV)
- Discharge: 15μA/c.o.v. = 2.0V (CC)

**MS920SE**
- Charge: max. 0.2mA/96 hours (CC/CV)
- Discharge: 50μA/c.o.v. = 1.5V (CC)

* c.o.v.: Cut Off Voltage (final voltage)

**CHARACTERISTICS (MS614SE)**

**Charge/discharge characteristics**

**Discharge Characteristics at Various Discharge Current**

* 10μA
* 30μA
* 50μA
* 150μA
* 1mA
* 1.5mA
* 2mA
* 2.5mA
* 3mA
* 3.5mA
**OVERDISCHARGE CHARACTERISTICS**

Overcharge: 18kΩ discharge/respective period

Charge: max. 0.1mA/3.1V, 96 hours (CC/CV)
Discharge: 15μA/c.o.v. = 2.0V (CC)

**DISCHARGE TEMPERATURE CHARACTERISTICS**

Charge: max. 0.1mA/3.1V, 96 hours, RT (CC/CV)
Discharge: 15μA/c.o.v. = 2.0V, respective temperature (CC)

**HIGH TEMPERATURE (60°C) STORAGE CHARACTERISTICS**

Storage condition: respective period at 60°C
Charge: max. 0.1mA/3.1V, 96 hours (CC/CV)
Discharge: 15μA/c.o.v. = 2.0V (CC)

**FLOATING CHARACTERISTICS (60°C, applied voltage 3.1V)**

Storage conditions: Each period at 60°C, applied voltage 3.1V

**DIMENSIONS OF STANDARD TERMINALS OF MS LITHIUM RECHARGEABLE BATTERIES**

- Contact Seiko Instruments Inc. for batteries with terminals other than the above shapes.
- Units: mm
- The hatched parts are tin plated (Sn: 100%).