

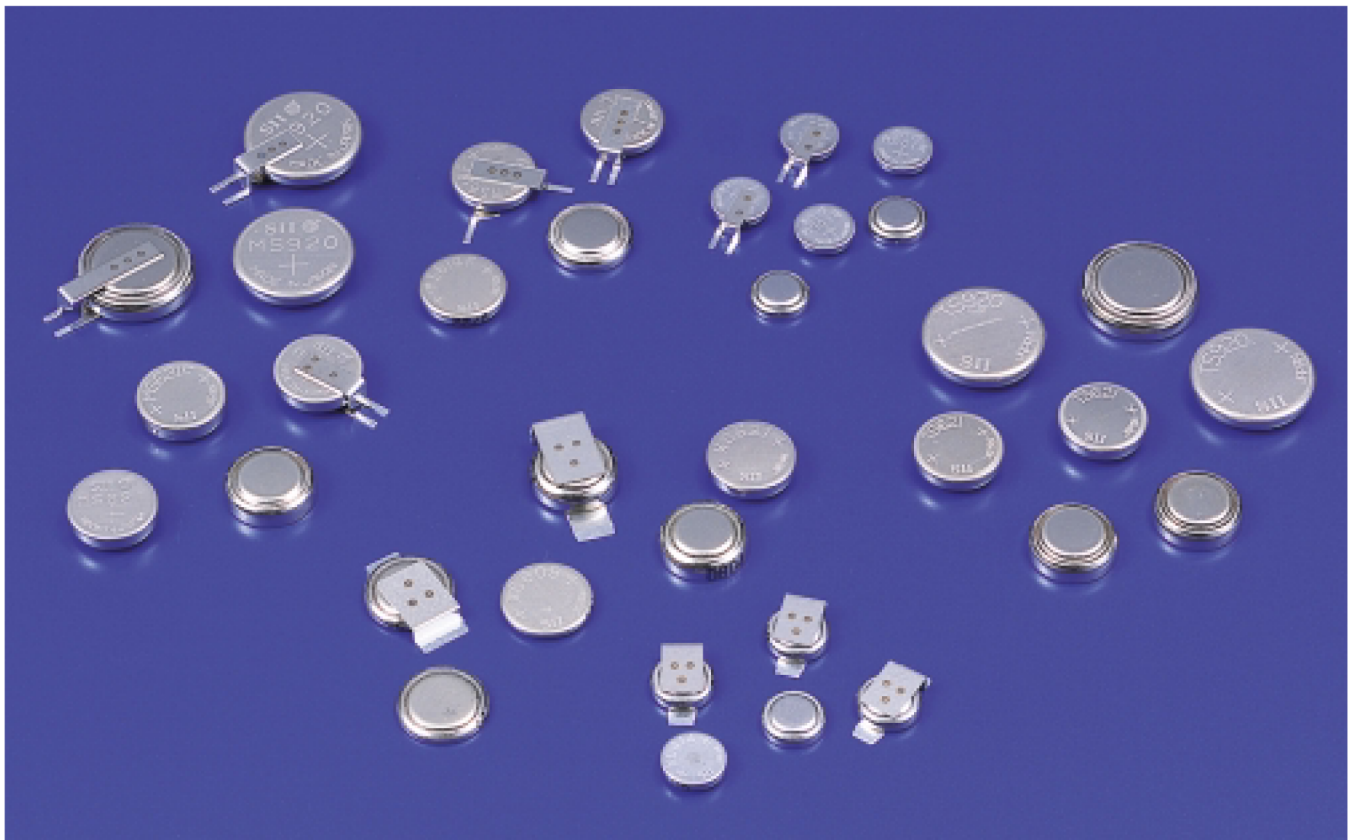
Micro Batteries

Product Catalog

Components Headquarters Product Catalog

CMOS IC
Quartz Crystals
Micro Batteries
Fiber Optics
MATERIALS
Liquid Crystal Display
Custom LCD Module





GENERAL DESCRIPTION

Seiko Instruments Inc. has commercialized a highly reliable silver oxide battery in response to quartz watches. Since then the company has expanded its microbattery business. With rapid progress in LSI technologies, highly advanced microbatteries are now being strongly demanded for sophisticated electronic instruments and equipment. The company continues its best efforts to develop high performance microbatteries which meet any users' needs and requirements.

We would like to continuously develop higher performance micro battery and widen product lineup. Please feel free to contact us.

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TS Lithium-Ion Rechargeable Battery	12
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FEATURES

1. Superior leakage resistance

Electrolytic leakage may lower the contact with terminals of the electronic instruments which use microbatteries. This interferes the stable operations. Special sealing materials and processing technologies are employed in the manufacture of our batteries.

2. Large capacity

In order to extend the operating time of the machinery and equipment with in the limited battery space, batteries need large capacity.

Our microbatteries have large capacity. It is obtained by our original design technologies and by use of high purity materials.

3. Stable operating voltage

The battery Voltage depends on the temperature and the depth of discharge. Since the change of the voltage affects characteristics of machinery and equipment, the operating voltage must be stable.

Our microbatteries have a stable operating voltage over a wide temperature range and in a depth of discharge.

4. High reliability

Batteries are required to have high performance in any events, that is, high reliability.

Our microbatteries are manufactured under our high quality control.

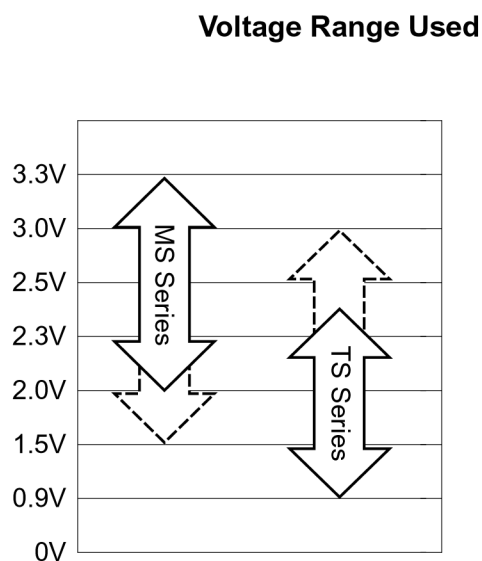
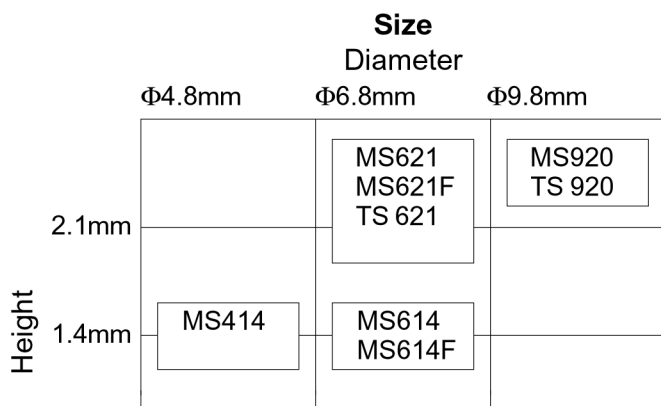
Only batteries with high quality are delivered to customers.

Lineup of Micro Batteries and Capacitors

Features of Micro Battery and Capacitor

MS Series: Obtains small size large, capacity and highly long cycle life. Also superior in Over-discharge characteristics.

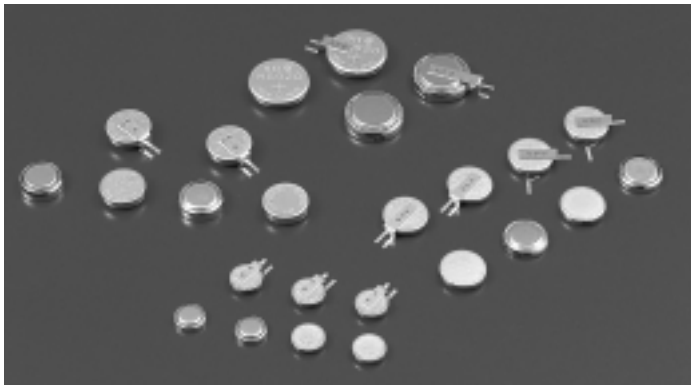
TS Series : Wide charging voltage range from 1.5V to 3.0V with keeping high reliability.



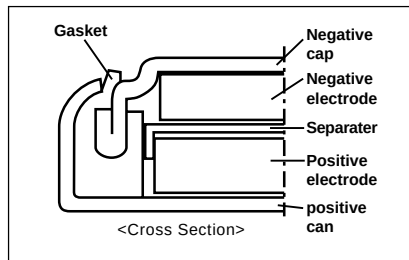
Fitting List by Applications

Usage	Application	TS	MS	Necessary Features
Backup use	GSM	○	○	Long cycle life and Over-discharge
	PDC/CDMA	○	○	Small and Large capacity
	Digital Camera		○	Long cycle life
	VCR Camera		○	Long cycle life and large capacity
	PDA		○	Large capacity
	Long time backup		○	Large capacity
	Short time backup		○	Long cycle life
Power Supply	Watch	○		Low voltage and Over-discharge
Battery Type		Recharge-able	Recharge-able	

MS Lithium-Ion Rechargeable Battery <3V Type>



SII own developed MS(Manganese Silicon) Lithium-ion rechargeable battery addresses the demand most effectively. The battery uses silicon oxide as anode and lithium manganese composite oxide as cathode. As a result, it offers twenty times the capacity of conventionally available batteries, in addition to longer cycle-life and highly stable over-discharge characteristics.



FEATURES

- Large discharge capacity:
Large discharge capacity for high operational voltage range of 2.0V to 3.3V.
- Long cycle-life:
Over 200 times cycle-life under the charge/discharge condition at 2.0V to 3.3V.
- Excellent over-discharge characteristics:
Continued stable characteristics after the battery is over-discharged down to 0.0V.

APPLICATIONS

- Back up power supply for memory or clock in various electronic equipment e.g. pagers, cellular-phones, cordless phones, PHS, memory-cards, FAX machines, personal computers, PDA, Video cameras, digital cameras, tuners, handy terminals etc.
- Combined use with solar cells.
- Main power source for small and slim portable equipment.

SPECIFICATIONS

Type	Nominal Voltage (v)	Nominal Capacity (mAh)	Internal Resistance (Ω)*1	Standard Charge/Discharge Current (mA)	Maximum Discharge Current (continuous) (mA)*2	Cycle Life(Times)*3		Size(mm)		Weight (g)
						100% D.O.D (Depth of Discharge)	20% D.O.D (Depth of Discharge)	Diameters	Height	
MS414	3.3	0.25	200	0.010	0.15	200	1000	4.8	1.4	0.07
MS614	3.3	2.3	50	0.025	0.50	200	1000	6.4	1.4	0.17
MS621	3.3	4.0	50	0.025	0.50	200	1000	6.8	2.1	0.23
MS920	3.3	8.0	35	0.050	1.00	200	1000	9.5	2.1	0.46
MS614F	3.0	3.0	150	0.025	0.50	200	1000	6.8	1.4	0.16
MS621F	3.0	5.0	150	0.025	0.50	200	1000	6.8	2.1	0.23

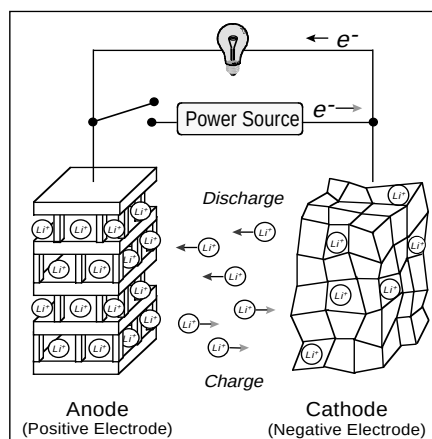
*1 Internal resistance is measured using AC(Alternating Current) method.

*2 Maximum discharge current indicates the value of current for approximately 50% of nominal capacity.

*3 100% and 20% D.O.D are based on nominal capacity.

(24°C, 3.3V to 2.0V / 3.0V to 2.0V(F type))

Principle System of Lithium-Ion



1. High Reliability

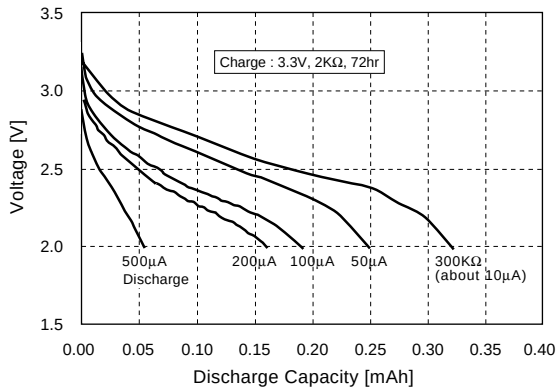
2. Long Cycle Life

3. Overdischarge

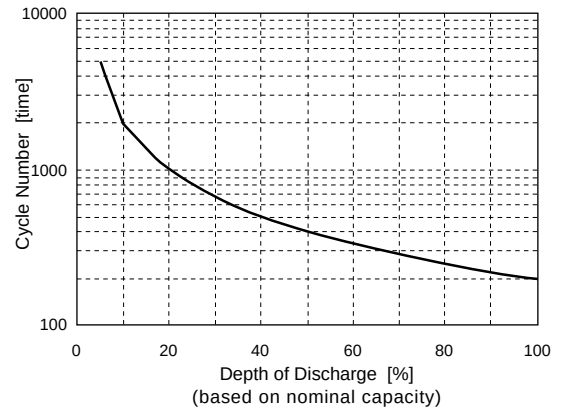
CHARACTERISTICS

MS414

Discharge current characteristics

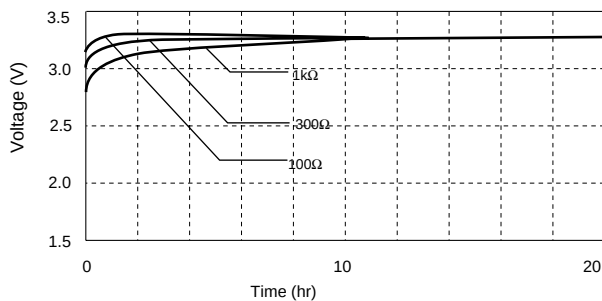


Charge/discharge cycle characteristics

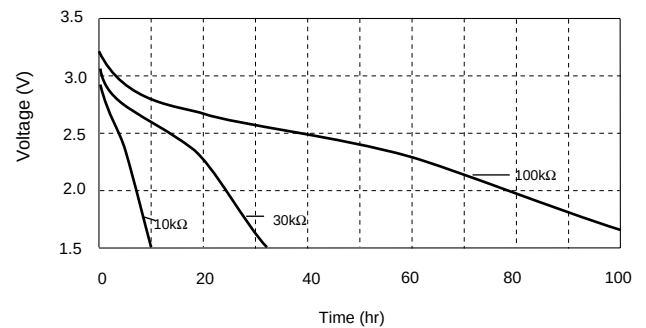


MS614

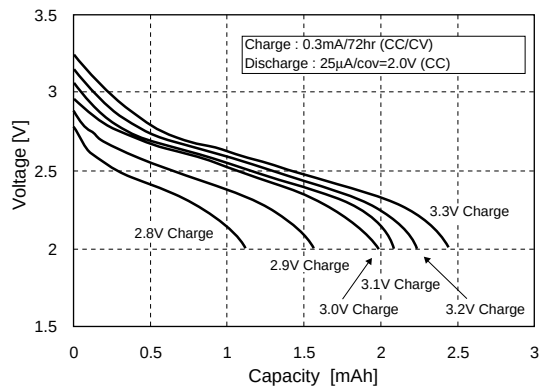
Charging Characteristics



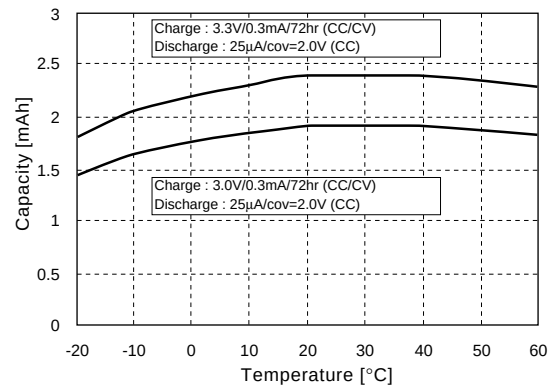
Discharging Characteristics
(Discharging on constant loads)



Charge voltage dependence of discharge characteristics

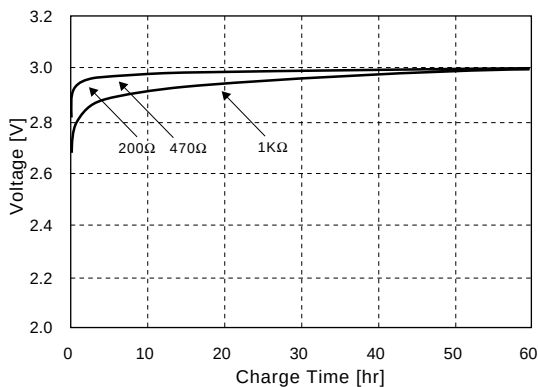


Temperature characteristics

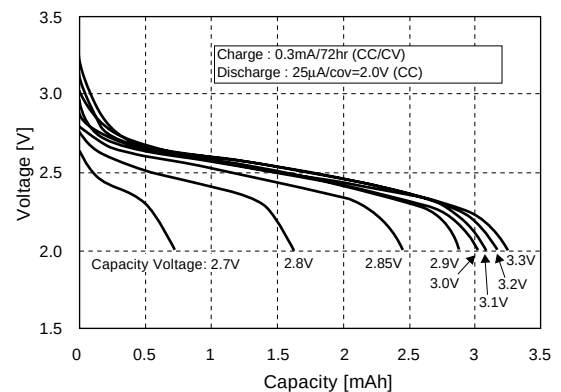


MS614F

Charge characteristics (Charge voltage 3.0V)



Charge voltage dependence of discharge characteristics

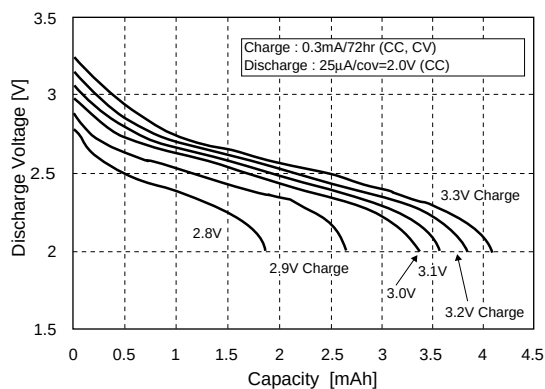


MS Lithium-Ion Rechargeable Battery <3V Type>

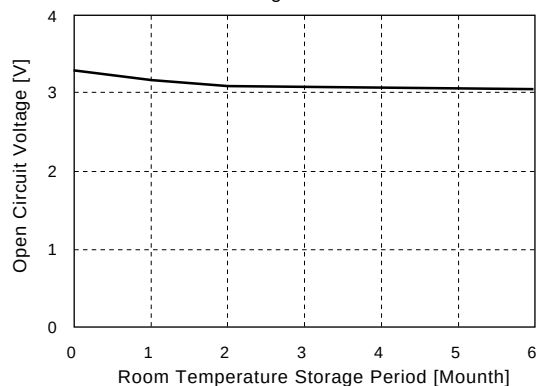
CHARACTERISTICS

MS621

Discharge Characteristics

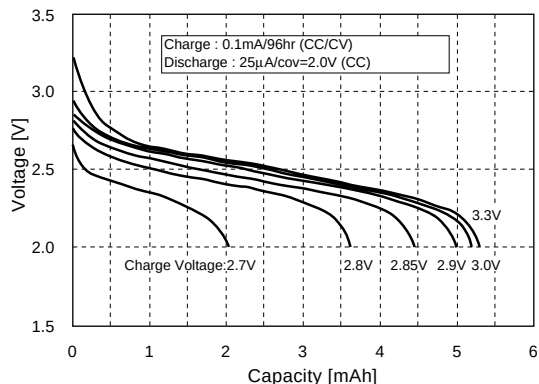


Selfdischarge Characteristics

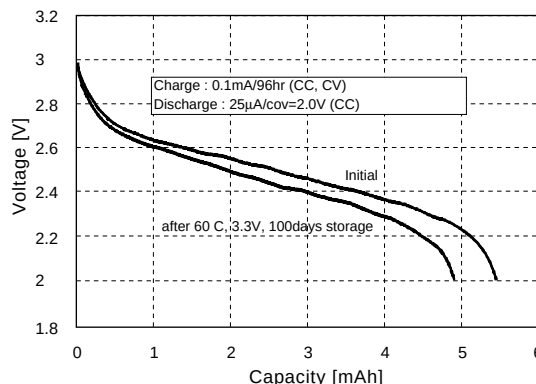


MS621F

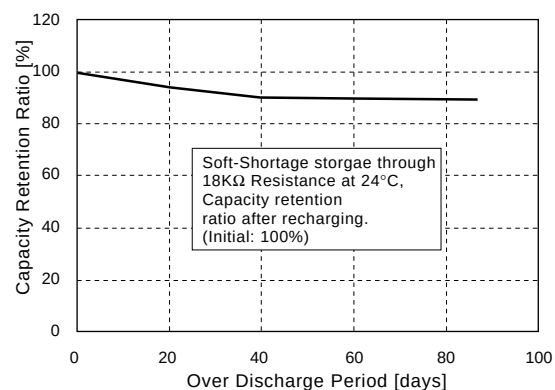
Charge voltage dependence of discharge characteristics



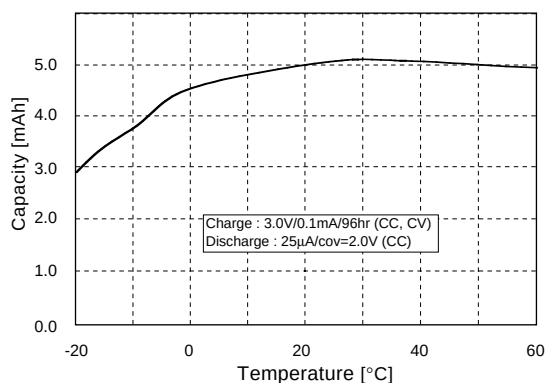
Over Charge characteristics



Over Discharge Characteristics

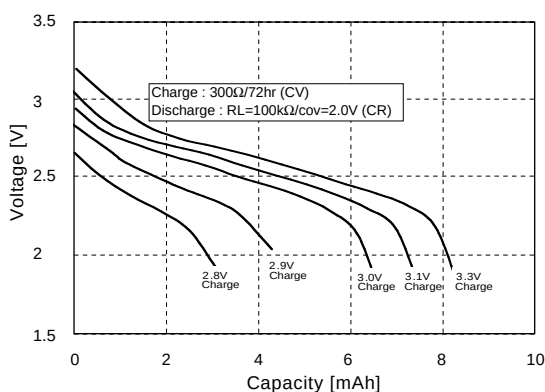


Temperature Characteristics

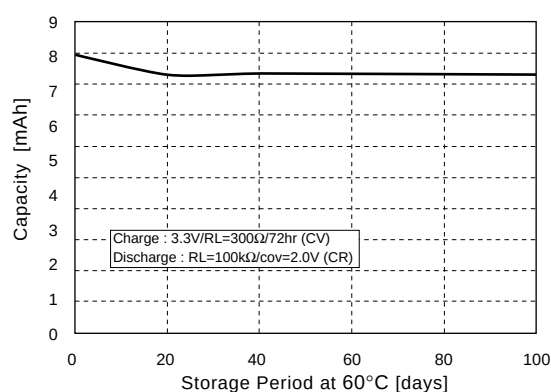


MS920

Discharge Capacity depend on Charge Voltage



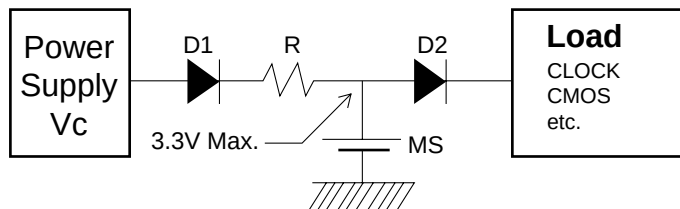
High Temperature Storage Characteristics (60°C)



MS Lithium-Ion Rechargeable Battery <3V Type>

CHARGING CIRCUIT

◆ Standard Charging Circuit Settings List for Using MS Rechargeable Battery with Constant Voltage and Constant Resistance.



Charging Voltage : 3.3V Max.

Charging current limiting resistance : R

D1 : Diode(Item of smaller VF, IR is recommendable)

D2 : Using a schottky type of smaller VF will lead better performance

Type	Charging Voltage Range(V)	Recommendable Charging Current(mA) At Battery Voltage of 3.0V I_c	Maximum Charging Current(mA)	
			At the Battery Voltage of 3.0V I_u	At the Battery Voltage of 0V I_L
MS414	2.7 to 3.3	0.08max.	0.15	2
MS614, 614F	2.7 to 3.3	0.30max.	0.5	10
MS621, 621F	2.7 to 3.3	0.30max.	0.5	10
MS920	2.7 to 3.3	0.60max.	1.0	20

As for the minimum limit resistance R, please use the value which satisfies the following two formula;

1) In the case a battery voltage is 3.0V:

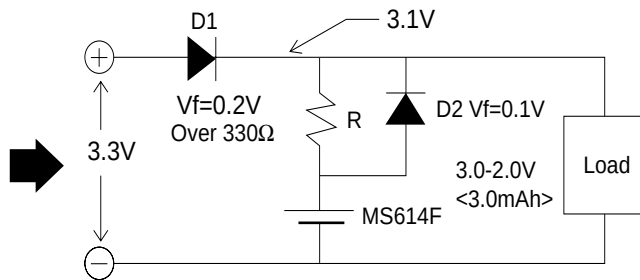
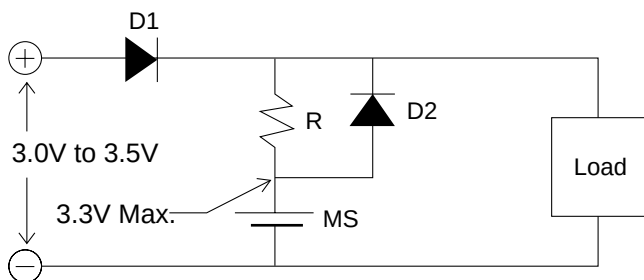
$$R > (V_c - 3.0 - V_f) / I_u$$

2) In the case a battery voltage is 0V:

$$R > (V_c - V_f) / I_L$$

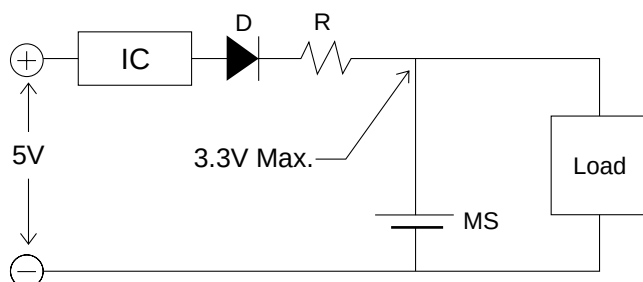
Also for the recommendable limit resistance, please use I_c instead of I_u in the formula 1).

◆ Circuit Example in the case of using 3V for Power Supply.

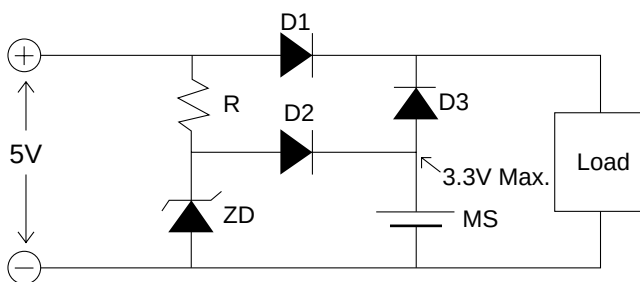


◆ Circuit Example in the case of using 5V for Power Supply.

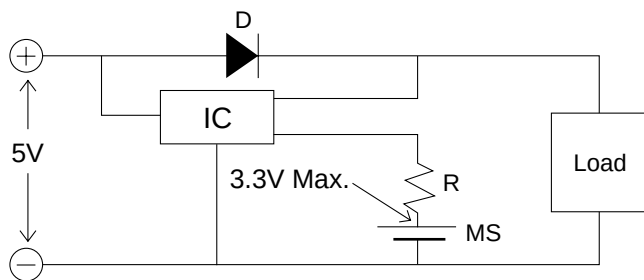
(1) with using voltage regulator IC



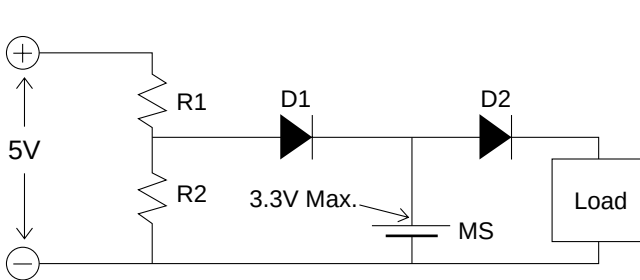
(2) with using Zener diode



(3) with using charge/discharge control IC

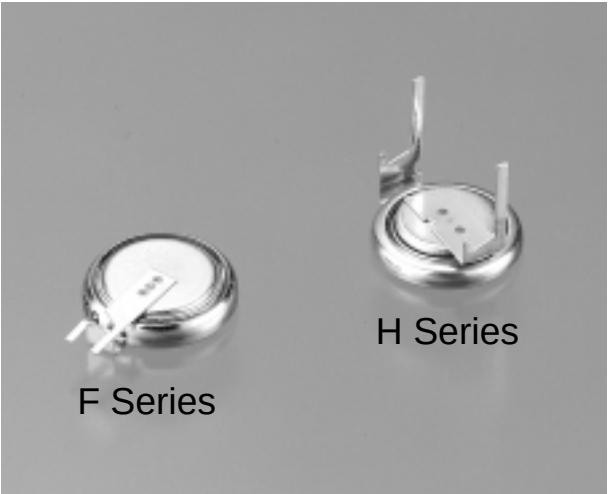
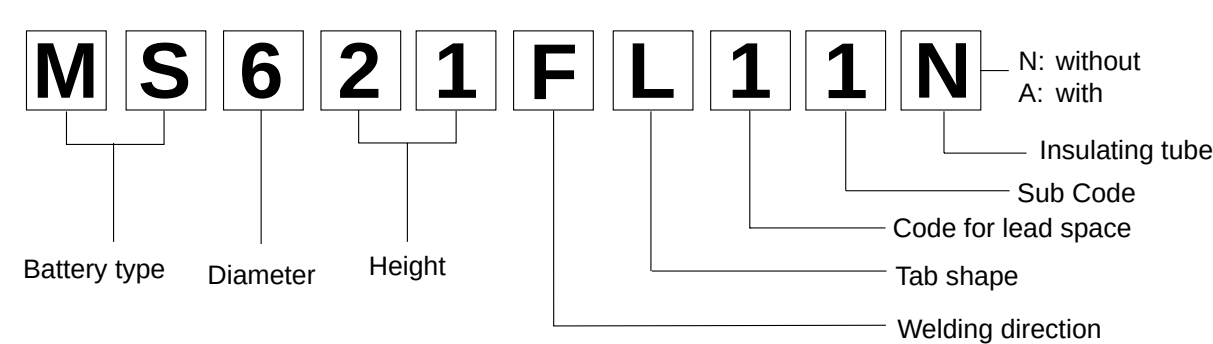


(4) with using divided resistance for voltage



Tab Specifications for Battery

DESIGNATION SYSTEM



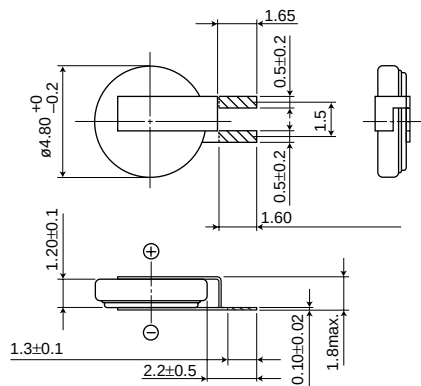
TAB-WELD BATTERIES

Welding direction		H Horizontal						V Vertical					F Flat			I Flat I type	W Wire
Tab Shape	+	A	B	C	D	F	N	C	E	F	I	M	E	F	L	I	G
	-																

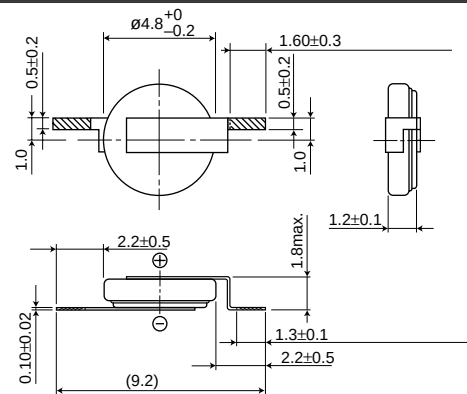
MS Lithium-Ion Rechargeable Battery <3V Type>

■ DIMENSIONS OF STANDARD TAB-WELD FOR MANGANESE SILICON LITHIUM-ION

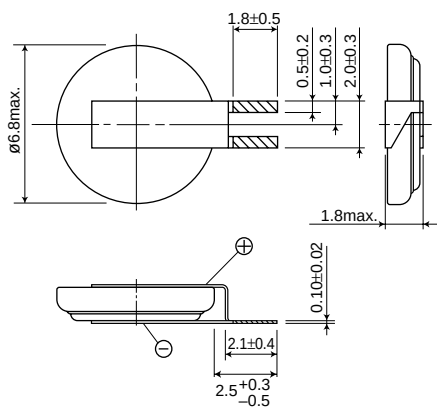
MS414 FL26N



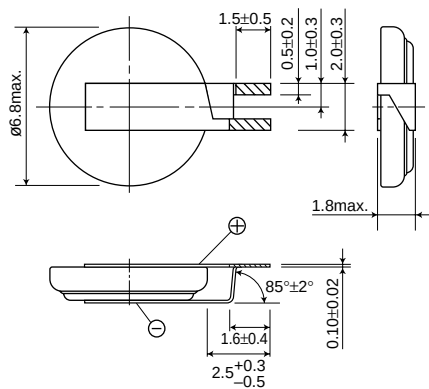
MS414 IL21N



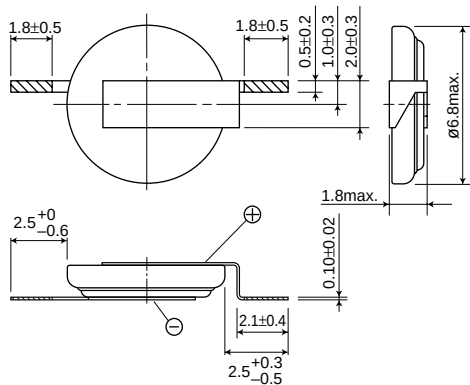
MS614, 614F FL28N



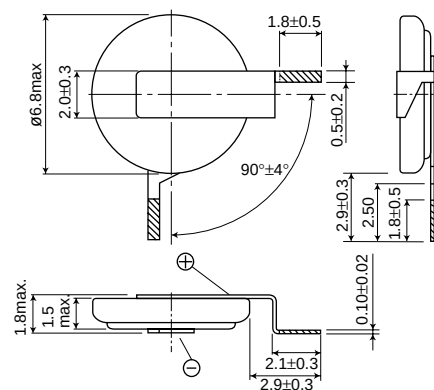
MS614, 614F FL29N



MS614, 614F IL38N



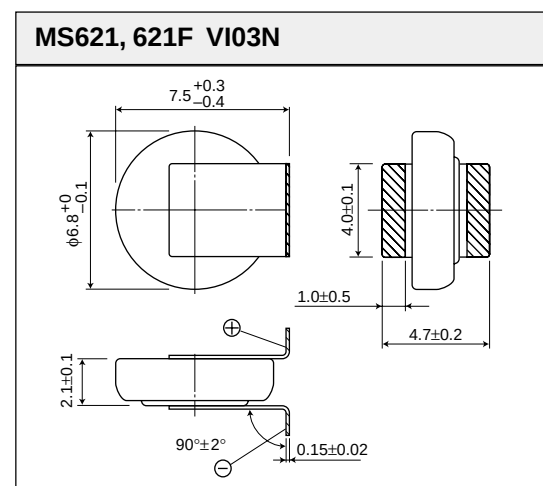
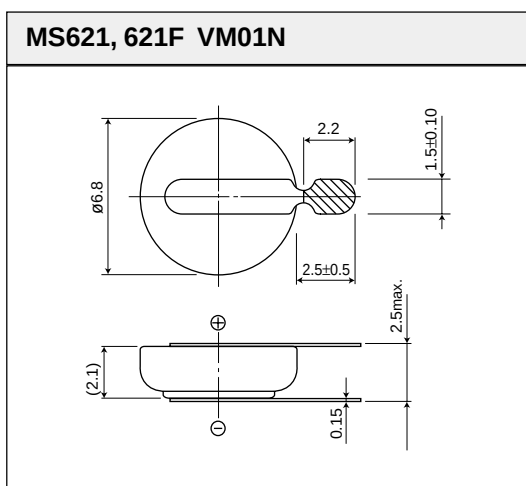
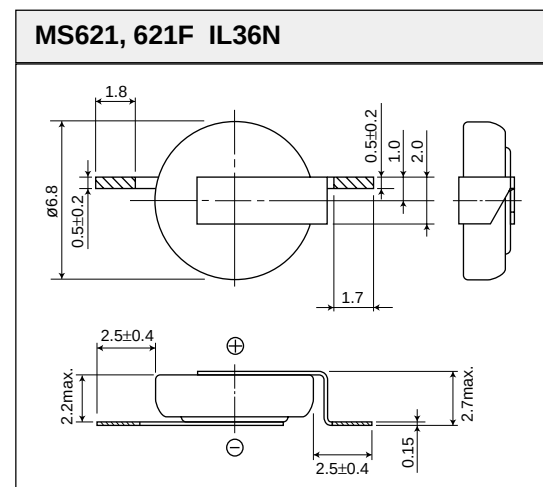
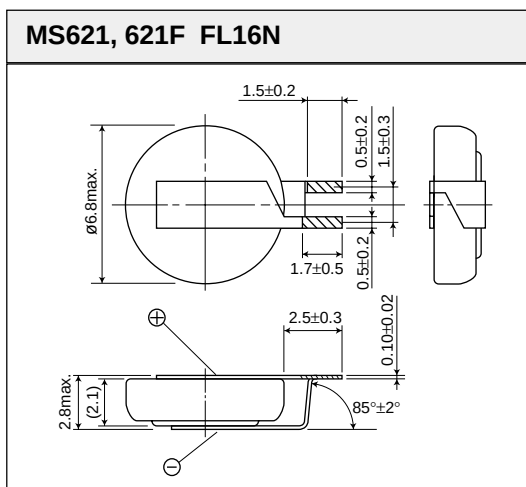
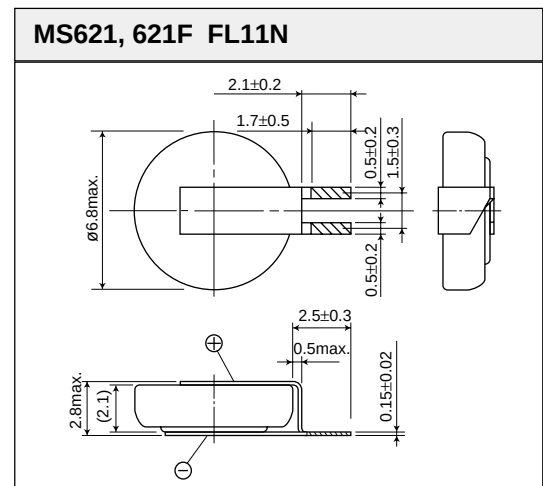
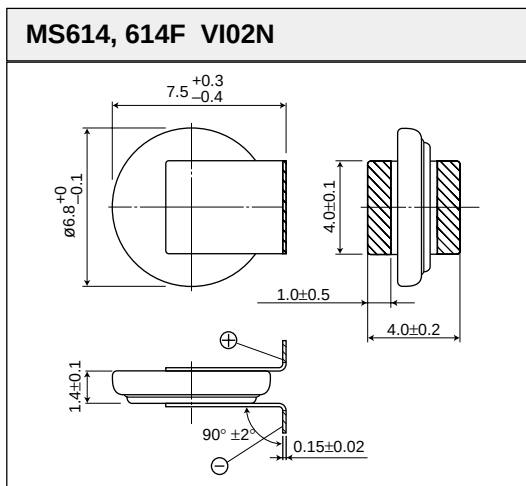
MS614, 614F LL32N



- Hatched parts are solder plated(Su90% Pb10%)
- For any optional terminal shapes, contact us.
- Unit of dimensions : mm

MS Lithium-Ion Rechargeable Battery <3V Type>

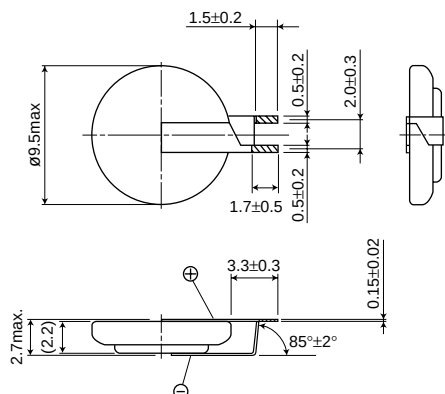
■ DIMENSIONS OF STANDARD TAB-WELD FOR MANGANESE SILICON LITHIUM-ION



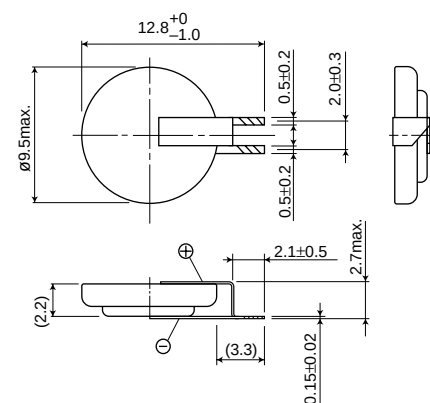
- Hatched parts are solder plated(Su90% Pb10%)
- For any optional terminal shapes, contact us.
- Unit of dimensions : mm

■ DIMENSIONS OF STANDARD TAB-WELD FOR MANGANESE SILICON LITHIUM-ION

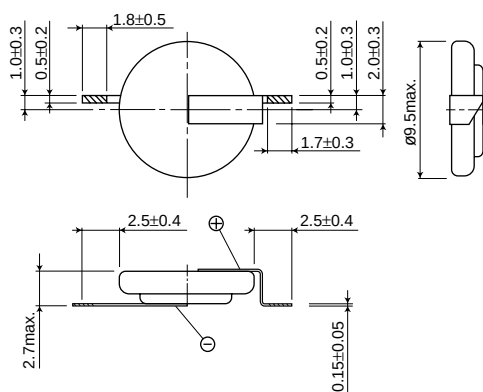
MS920 FL20N



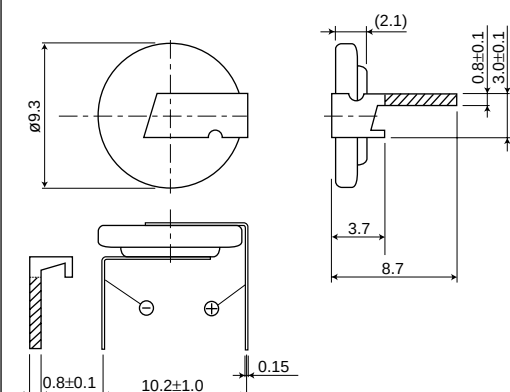
MS920 FL27N



MS920 IL37N

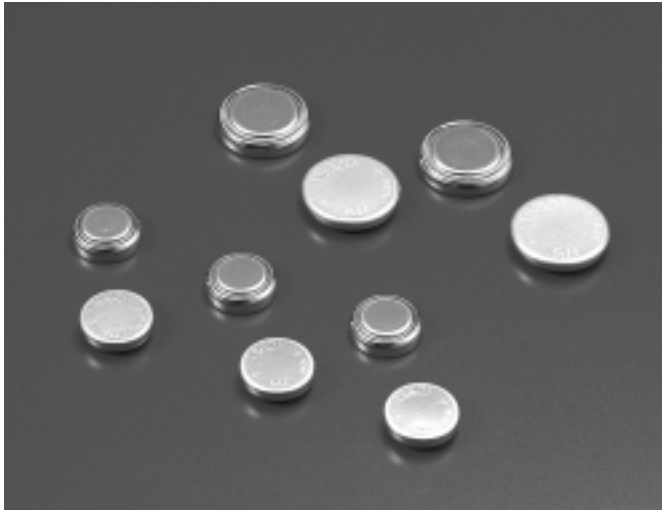


MS920 HF51N



- Hatched parts are solder plated(Su90% Pb10%)
- For any optional terminal shapes, contact us.
- Unit of dimensions : mm

TS Lithium-Ion Rechargeable Battery <1.5V Type>



TS(Titanium Silicon) Lithium-Ion battery is 1.5V type rechargeable battery features large capacity, wide charging voltage range, long cycle-life and excellent reliability with using titanium composite oxide as cathode and originally developed Litium silicon oxide as anode.

FEATURES

- Large discharge capacity:
TS obtains 15 times larger capacity to same size capacitor.
- Long cycle-life:
Realizes more than 1000 charge/discharge cycles at 20% of discharge depth.
- Excellent over-discharge characteristics:
TS maintains continuous stable characteristics after over-discharge to 0V.
- High-rated voltage:
TS maintains outstanding stability for continuous impress up to 3.0V.
- Wide charging voltage range:
TS has excellent charge-efficiency even at the charge voltage of 1.5V.
Any setting is available from 1.5V to 3.0V.
- Outstanding leakage resistance:
SII's long experienced sealing technology through silver oxide battery manufacturing for timepiece achieved the excellent leakage resistance.

APPLICATIONS

- Power supply for backing up memory or clock in cellular phone, PHS, pagers etc.
- Combined use with solar cells (watch, calculator, blinking road-marker etc.)
- Main power source for small portable equipment.

SPECIFICATIONS

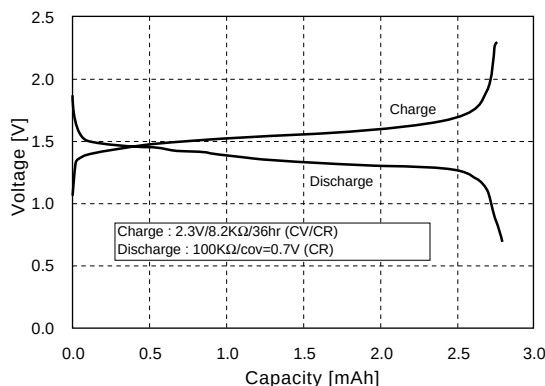
Type	Nominal Voltage (v)	Nominal Capacity (mAh)*1	Standard Charge/Discharge Current (mA)	Maximum Discharge Current (continuous) (mA)	Cycle Life(Times)*2		Size(mm)		Weight (g)
					100% D.O.D*3	20% D.O.D*4	Diameter	Height	
TS621	1.5	2.5	0.015	0.5	over 200	over 1000	6.8	2.1	0.22
TS920	1.5	5.0	0.030	1.2	over 200	over 1000	9.5	2.1	0.45

*1: at 2.3V charge *2: 100% and 20% are based on nominal capacity *3: *4: D.O.D indicates depth of discharge

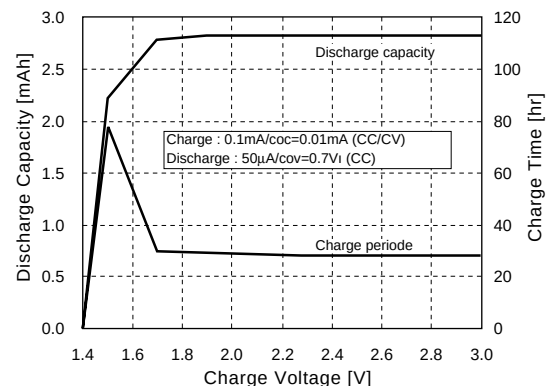
CHARACTERISTICS

TS621

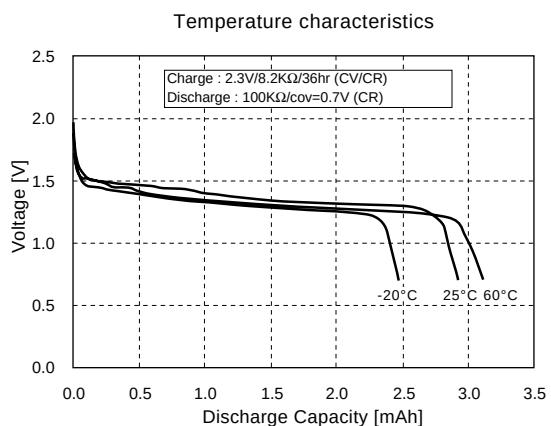
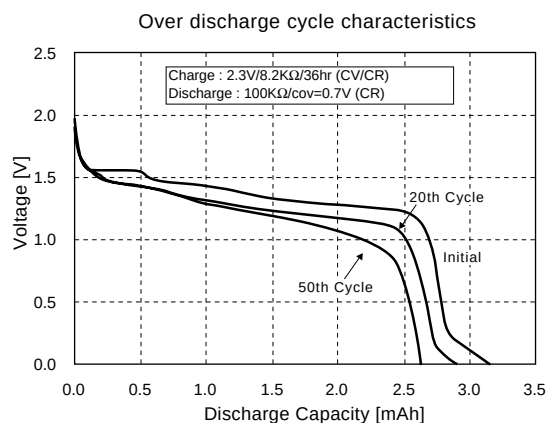
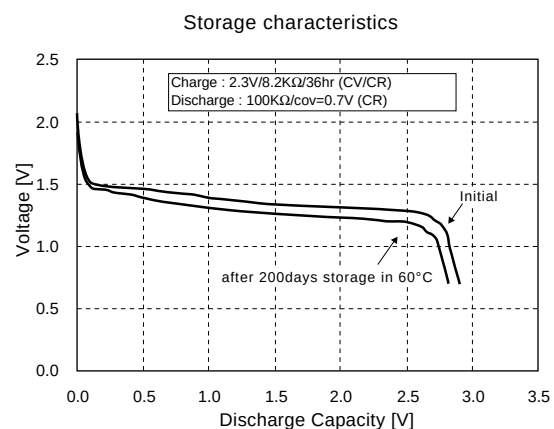
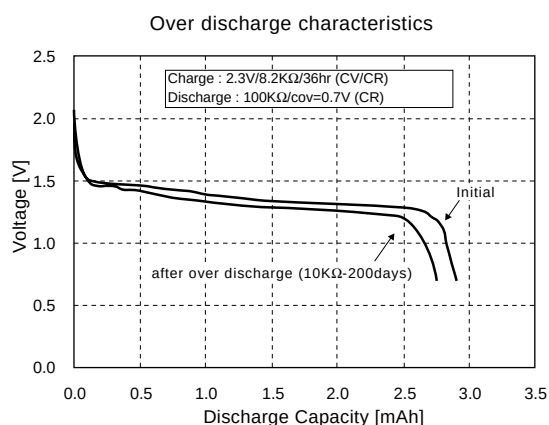
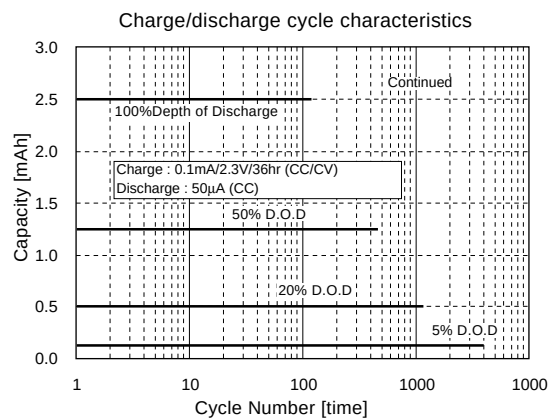
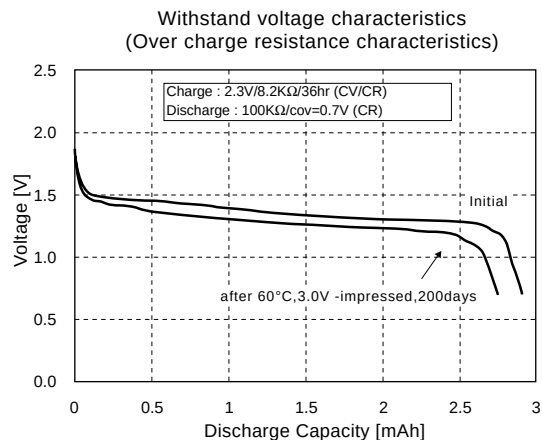
Charge/discharge characteristics



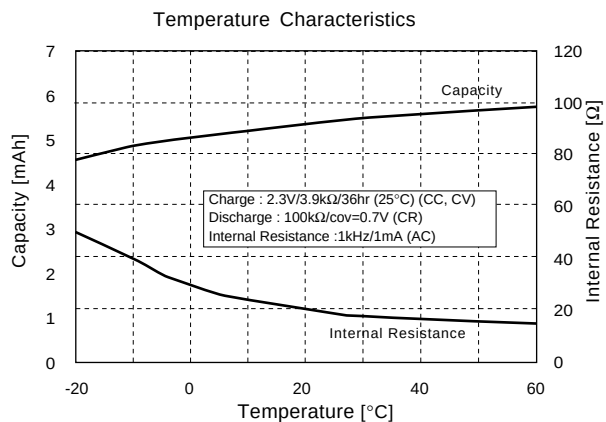
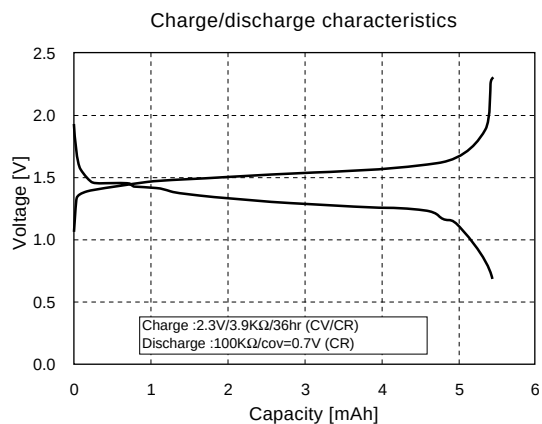
Charge voltage dependence of discharge capacity



TS621



TS920



Read through safety precautions thoroughly to ensure safe use.
For any optional terminal shapes, please contact us.

WARNINGS

- NEVER short-circuit the battery.
- DO NOT heat the battery or throw it into a fire.
- NEVER dent, bend, or disassemble the battery.
- NEVER subject the battery to forcible discharge, overcharge or overdischarge with a large current or high voltage.
- Keep the battery out of reach of children. Immediately contact a physician or poison control center if swallowed.
- When the liquid of the battery gets into the eye, immediately rinse with clean water and contact a doctor.

CAUTIONS

- Insert the battery with its positive (+) and negative (–) terminals properly aligned with corresponding marks of the device.
- DO NOT mix new and old batteries together.
- Store the battery in a dry place at normal temperature, out of direct sunlight.
- NEVER charge the battery (for silver oxide batteries only).
- DO NOT directly solder the battery.
- DO NOT throw the battery into water.
- DO NOT use the battery for any purposes other than the purpose for which it was designed.
- If you find an abnormality or a problem in the battery, DO NOT use it.
- Always read through the Operation Manual or Precautions before use.

BATTERY DISPOSAL

- When disposing of the battery, cover either the positive (+) or the negative (–) terminal or both terminals of the battery with insulation tape.
- The attention of the world is focused on environmental protection. Although the pace of establishing rules for disposal and recycling of batteries is accelerating throughout Europe, USA and Japan, these rules have not yet been standardized. Contact local, state or national authorities for the proper disposal method.

Approved product by UL

- Manganese Silicon Lithium-ion Battery (MS series) is approved by UL (Underwriters Laboratories Inc.).
UL File MH 15628
MS414/MS614/MS614F/MS621/MS621F/MS920

For Shipping of Micro Battery

- The amount of lithium battery containing lithium less than 1.0g/cell and less than 2.0g/two-combined cells are excepted from dangerous product by Dangerous Goods Regulations (DGR) of International Civil Aviation Organization (ICAO). By strong packaging preventing short circuit, all of our Micro Battery product clears any shipping regulations. Also, the judge of International Maritime Organization (IMO), US Department of Transportation (DOT) and International Air Transport Association (IATA) is according to DGR of ICA.

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SII Micro Parts Ltd. who manufactures the products described in this catalog holds the ISO-9001 quality management system certificate and the ISO-14001 environmental management system certificate.

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