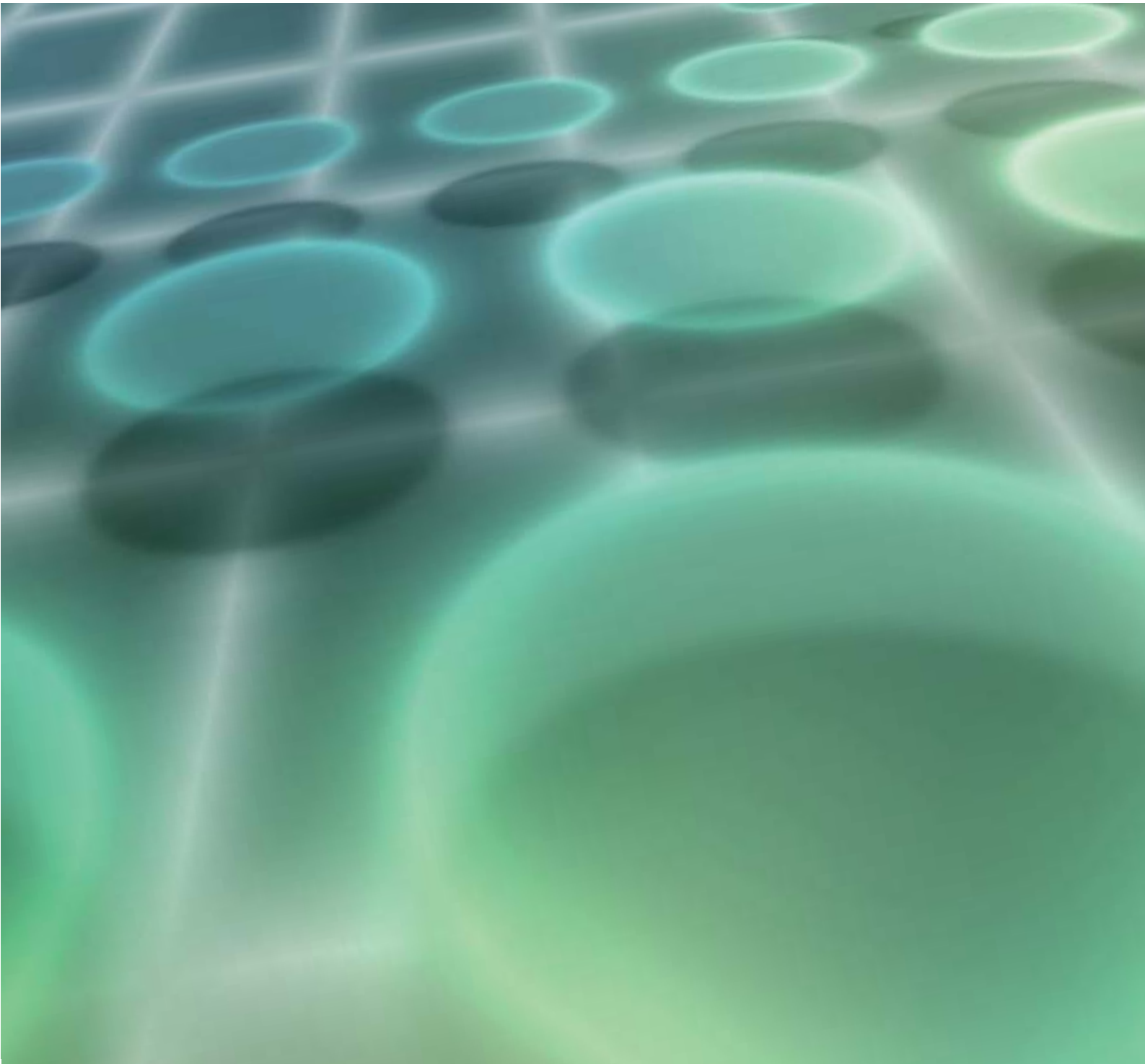


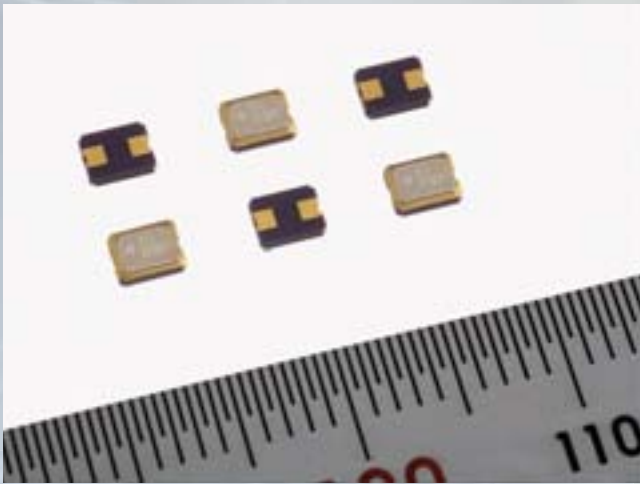
# Micro Battery

Product Catalogue

2010▶2011



# Chip type Electric Double Layer Capacitor CPH3225A / CP3225A



CPH3225A/CP3225A is thinnest and smallest chip-type electric double layer capacitor.

The unique ceramic packaging with superior air-tightness is used. As the result, it offers leakage resistance and humidity resistance. Also, by optimizing its materials, a 1 minute rapid charge stores approximately 90% of full capacity.

Its heat-resistant design allows for Pb-free reflowable SMT board attachment.

## FEATURES

- ◆ Small and thin size
- ◆ RoHS directive compliant
- ◆ Pb free reflowable: 260deg.C peak
- ◆ WEEE not applicable
- ◆ Rapid Charge
- ◆ Long Cycle Life

## APPLICATIONS

Backup Power for various devices.  
Super small size power supply.

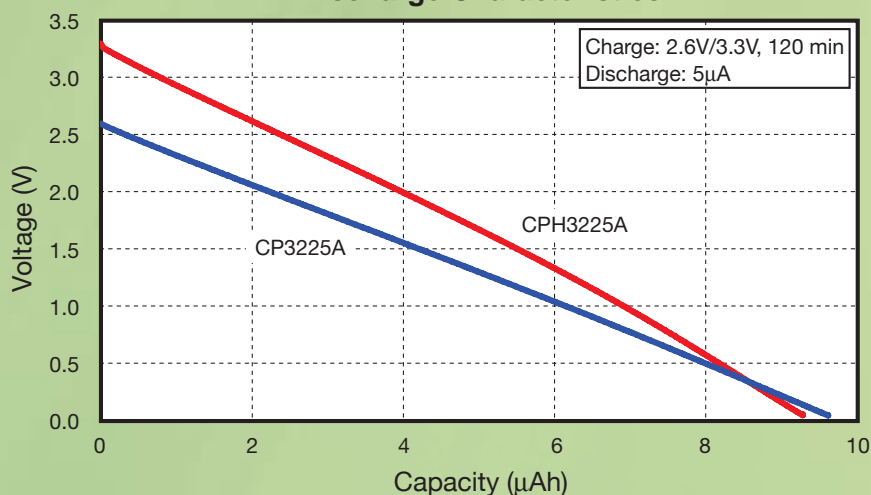
Personal computer, IC card,  
Game machine, Handy terminal, Video camera,  
various kinds of small appliance, etc.

## SPECIFICATIONS

Type	Maximum Use Voltage	Nominal Capacity (Voltage Range)	Internal Impedance <Nominal>	Size (L × W × H)	Weight
<b>CPH3225A</b>	3.3V	4.6μAh (3.3V-1.8V) 0.011F	160Ω	3.2 × 2.5 × 0.9mm	0.025g
<b>CP3225A</b>	2.6V	4.5μAh (2.6V-1.4V) 0.014F	80Ω	3.2 × 2.5 × 0.9mm	0.025g

## CHARACTERISTICS

Discharge Characteristics





A few decades ago, we commercialized a highly reliable silver oxide battery to meet the requirement of quartz watch development. Since then, we have expanded our microbattery offering and technology to support the increased diversity in electronic products available today.

This brochure introduces silver oxide batteries, manganese silicon lithium rechargeable batteries, titanium silicon lithium rechargeable batteries, reflowable lithium rechargeable batteries, and reflowable capacitors.

We plan to continuously develop higher performance microbatteries and widen our products lineup to keep up with our emerging technologies.

Please feel free to contact us with any questions you may have.

## FEATURES

### 1. Superior leakage resistance

Even a slight leakage from a battery may interfere with the connections made by the battery terminals, resulting in unstable device operation.

Seiko Instruments Inc. offers micro batteries that are highly leak-resistant due to special sealing materials and processing technologies.

### 2. Large capacity

In order to extend the operating time of devices with limited battery space, the market demands high volumetric efficiency.

We offer large-capacity microbatteries developed with proprietary technology utilizing high-purity materials.

### 3. Stable operating voltage

Carefully compounded ingredients allow each of our micro batteries to have a stable operating voltage over both a wide temperature range and depth of discharge.

### 4. High reliability

Our micro batteries are manufactured under an integrated system featuring strict quality control, which starts with component manufacturing, through assembly and on to rigorous out-going inspection.

## CONTENTS

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# Microbattery and Capacitor Lineup

## MICROBATTERY AND CAPACITOR FEATURES

- Chip type electric double layer capacitor** : Small and thin size chip type Electric Double Layer Capacitor.
- XH capacitor** : Pb-free reflowable capacitor made possible by a heat-resistant design. High capacity and long cycle characteristics are offered.
- HB lithium rechargeable battery** : Pb-free reflowable rechargeable batteries made possible by a heat-resistant design, offering a wide charge voltage range and excellent cycle life.
- MS lithium rechargeable battery** : 3V type. Large capacity and high cycle life characteristics in a compact body with excellent overdischarge characteristics featured.
- TS lithium rechargeable battery** : 1.5V type. Charge voltage range from 1.5V to 3.0V is supported while high reliability is achieved.
- Mercury free silver oxide battery** : Environment friendly no mercury added coin cell.

### Rechargeable battery and capacitor sizes

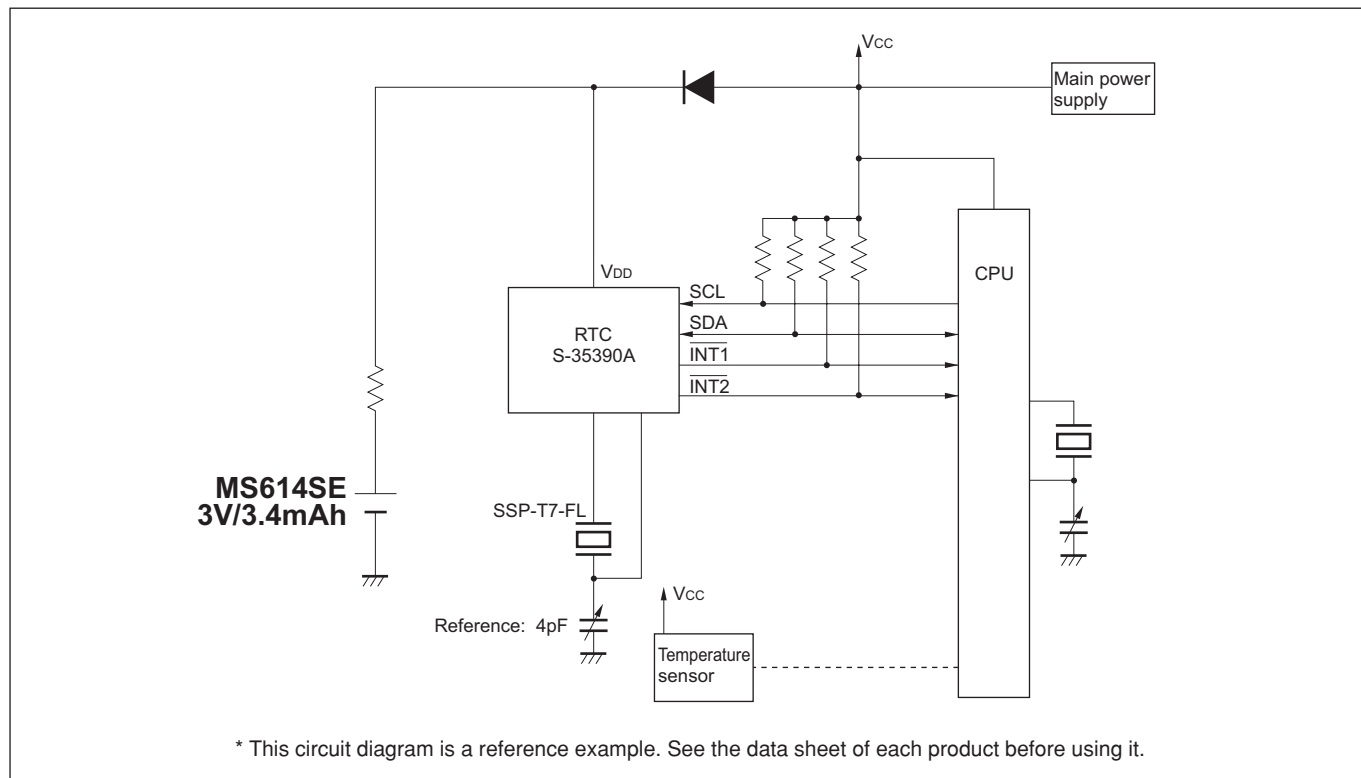
\*The rectangle and circles in the table show actual battery and capacitor sizes.

Height	2.1mm				MS621FE TS 621FE	MS920SE
	1.8mm			MS518SE TS518FE		
	1.4mm		XH414HG HB414		MS614SE	
	1.2mm		MS412FE			
	1.1mm		XH311HU			
	0.9mm	CPH3225A CP3225A		XH409HG		
	Chip type 3.2mm × 2.5mm	Φ3.8mm	Φ4.8mm	Φ5.8mm	Φ6.8mm	Φ9.5mm
		SIZE Diameter				

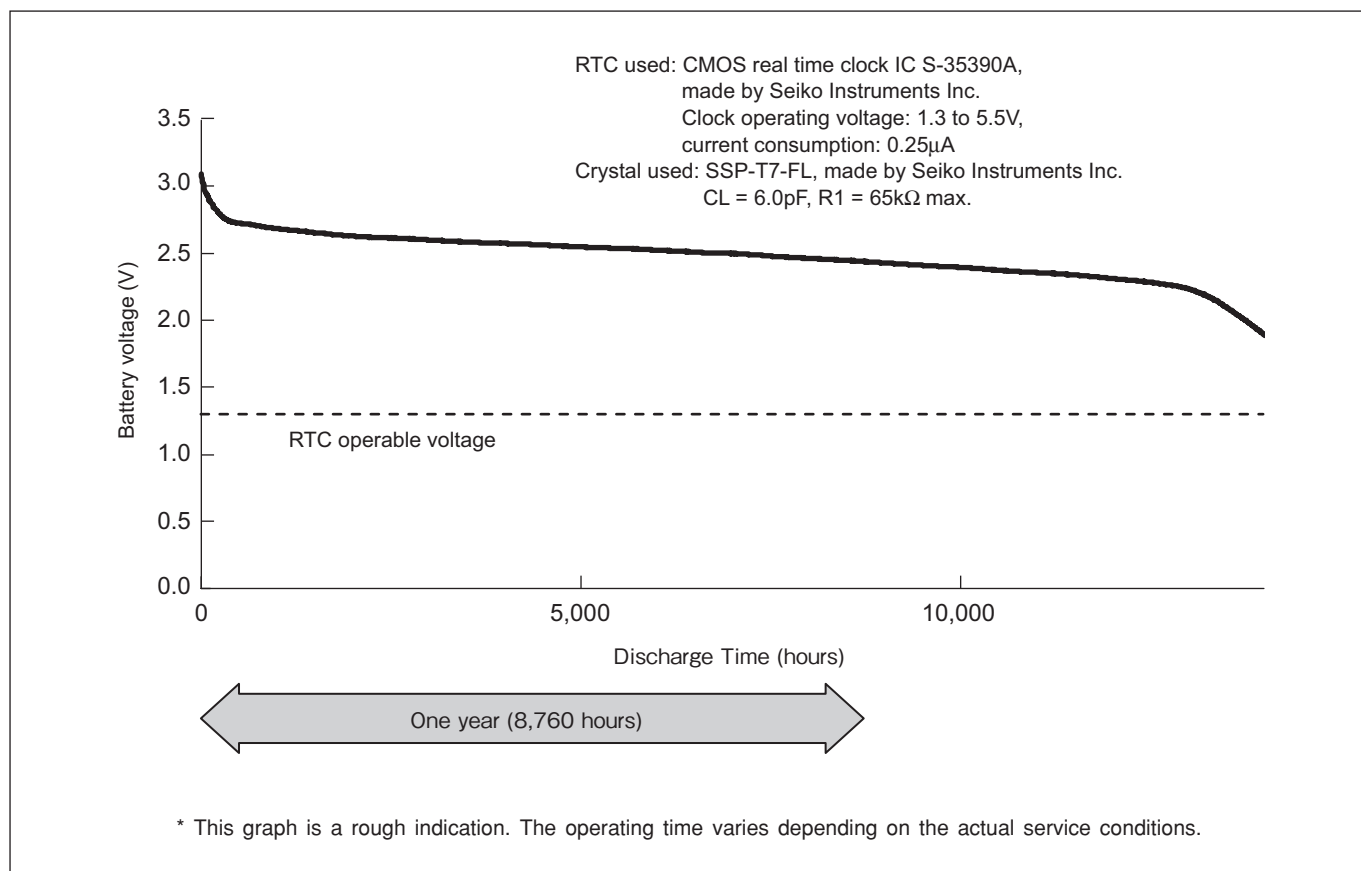
### Applications



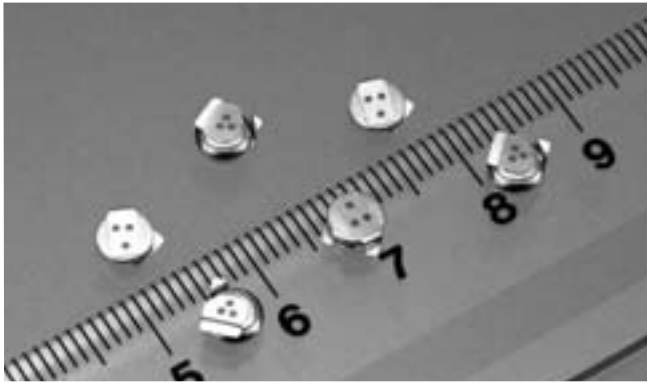
Example of a recommended application circuit: for RTC backup



Example of RTC backup time, using MS614SE



## XH311HU/XH409HG/XH414HG



The XH series capacitor has a better discharge characteristic above 3V. It is an environmentally friendly product that is reflow mounted by Pb-free soldering. It features high capacity, and long-term reliability, as well as a wide operating voltage range. It is thus suitable for backup power supply of clock and memory functions on mobile and information devices.

### FEATURES

- Pb-free reflowable:  
Superior heat resistance (260°C peak) allows reflow soldering by Pb-free solder
- Wide operating voltage range from 0V to 3.3V
- High capacity: 0.08F with "414" size
- Long Cycle Life:  
At least 10,000 times of charge/discharge
- Simple charging circuit (constant voltage charging)
- Wide operating temperature range:  
Operating temperature range: -20°C to +60°C  
For using the battery at a temperature out of the above temperature range, please consult us.
- RoHS Compliant

### APPLICATIONS

Backup power supply for memory and clock functions of cellphone, PHS, cordless phone, digital still camera, PDA, game machine, and printer, etc.

### SPECIFICATIONS

Type	Electrical Specifications (Normal Temperature) <sup>*1</sup>			Size		Weight (g)
	Maximum Use Voltage (V)	Capacitance (F)	Internal Impedance <sup>*2</sup> (Ω)	Diameter (mm)	Height (mm)	
XH311HU	3.3	0.035	150	3.8	1.1	0.04
XH409HG	3.3	0.04	100	4.8	0.9	0.05
XH414HG	3.3	0.08	100	4.8	1.4	0.06

\*1. Normal temperature: 23°C ± 3°C. Electrical characteristics and aging degradation of the products depend on temperature.

\*2. Value measured using AC (Alternating Current) method at the discharged state.

#### <APPLICATION NOTES>

##### • Prohibition ripple charging

A ripple (high frequency fluctuation of voltage) in the charge voltage extremely lowers the capacitor performance.  
Be sure to charge capacitors with a stable voltage.

##### • Charge voltage

The age deterioration of the capacitor depends on the charge voltage.  
The age deterioration is accelerated as charge voltage goes higher.

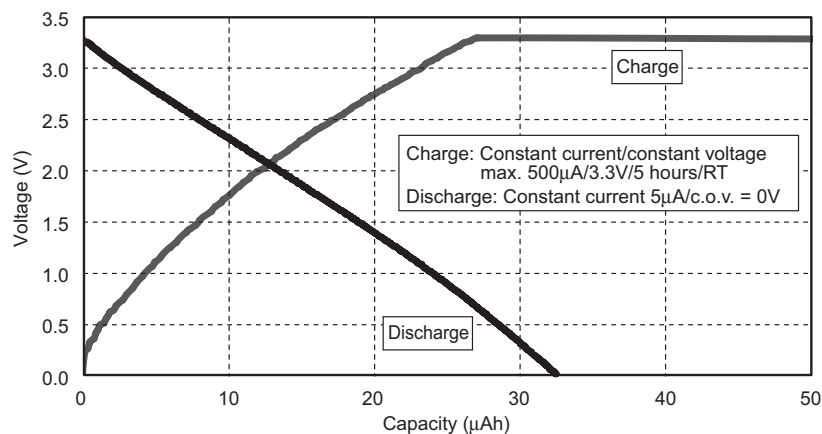
##### • Usage environment

Aging degradation of the capacitor varies depending on the usage environment (temperature and humidity).  
Contact us for further details.

### CHARACTERISTICS

#### Charge/discharge characteristics

##### XH311HU

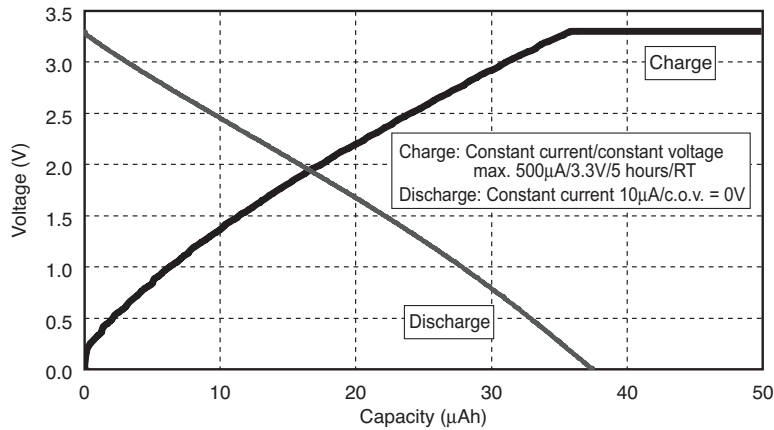




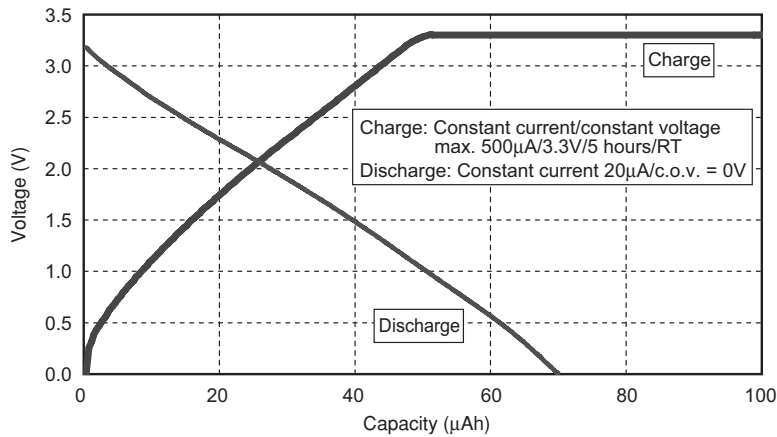
**CHARACTERISTICS**

Charge/discharge characteristics

**XH409HG**

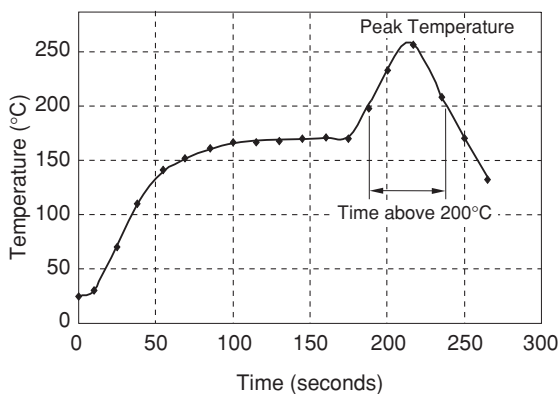


**XH414HG**

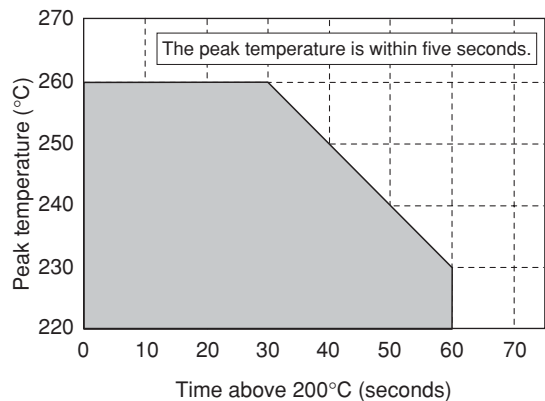


**REFLOW SOLDERING CONDITIONS**

Reflow Profile Example



Recommended Reflow Condition



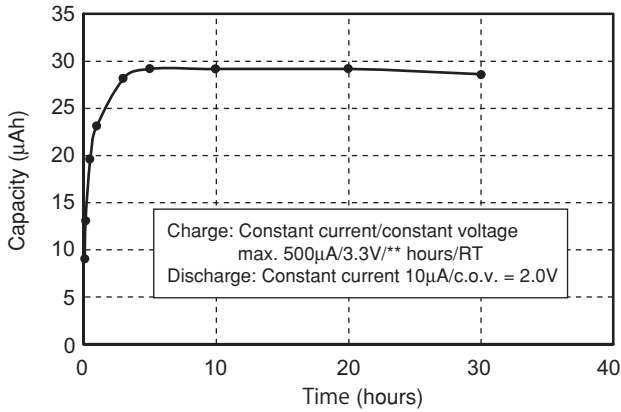
The times of repeated reflow soldering must be two times or less.  
The Temperature must be measured at top of the cell.

Max.260°C (within 5 seconds)

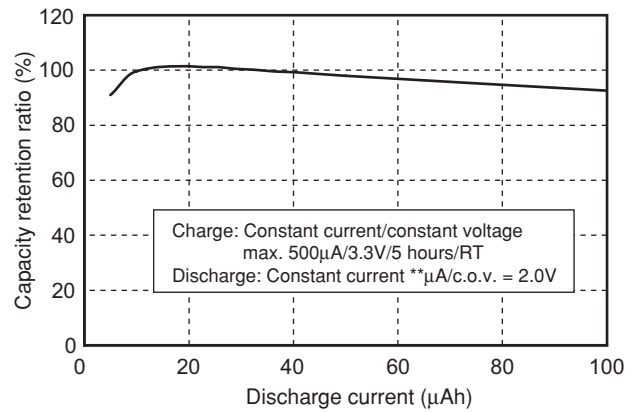
## CHARACTERISTICS

### XH414HG

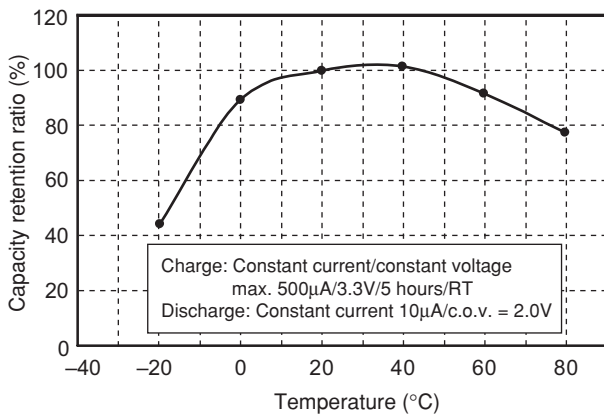
Charge Time Characteristics



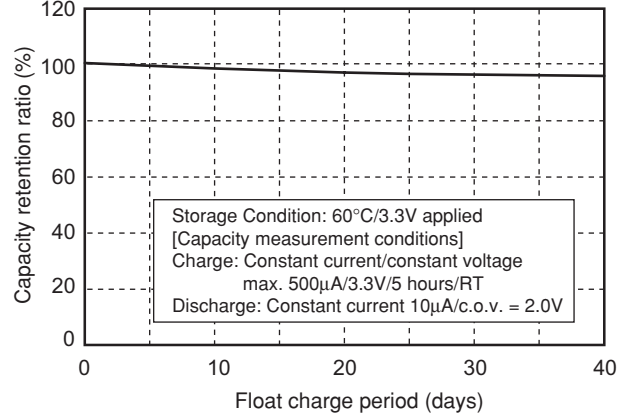
Discharge Current Characteristics



Temperature Characteristics

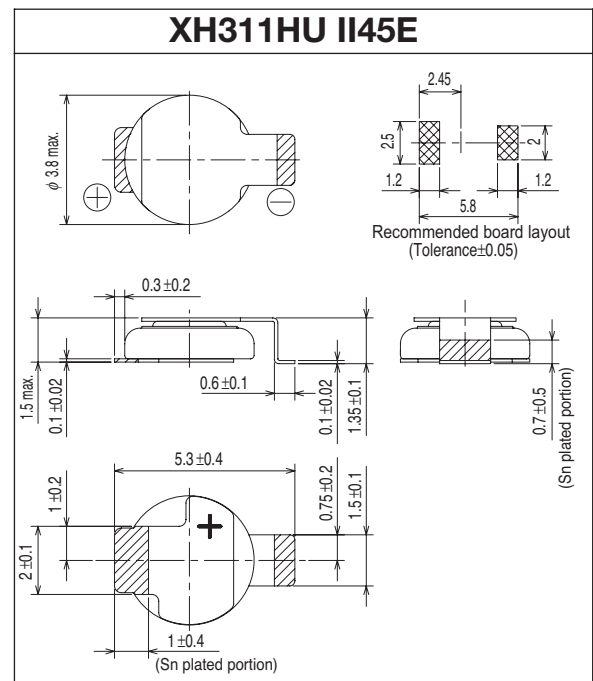
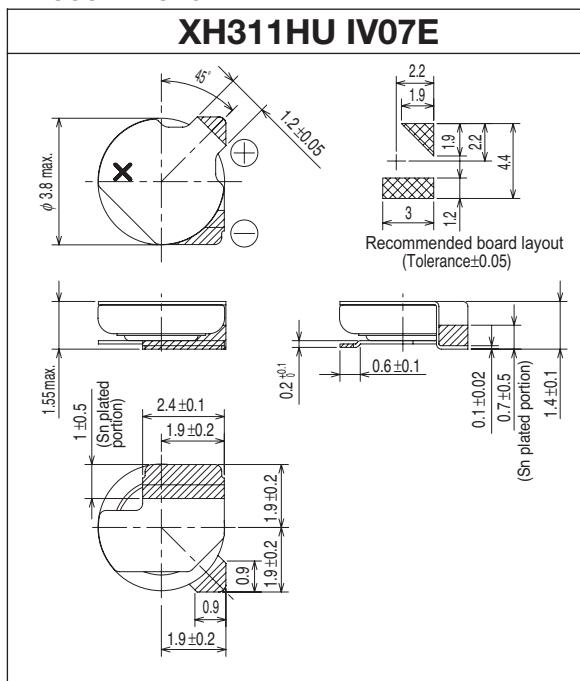


Float-charge Characteristics (60°C)



## STANDARD TERMINALS

### Recommend







### HB414



HB lithium rechargeable batteries are environment-friendly rechargeable batteries that can be reflowed (automatic mounting by Pb-free soldering) with lead-free solder. Pb-free reflow mounting is achieved by a reinforced heat-resistant structure.

The HB414 features high capacity and a long cycle life with a wide charge voltage range.

### FEATURES

- Pb-free reflowable:  
Superior heat resistance (260°C peak) allows reflow mounting by Pb-free solder.
- Wide charge voltage range:  
Wide charge voltage range allows use with various applications (2.5V to 3.3V).
- High Capacity:  
0.3mAh typ. (charge voltage: 3V, cut off: 1.2V)
- Long cycle life:  
1,000 cycles or more (20% D.O.D.)
- Excellent overdischarge characteristics
- Wide range of operating temperatures:  
Operating temperature range: -20°C to +60°C  
For using the battery at a temperature out of the above temperature range, please consult us.
- RoHS Compliant
- Approved by UL (Underwriters Laboratories Inc.)  
UL File No. MH15628

### APPLICATIONS

Power backup for the clock function of small portable such as cellular and PHS phone

### SPECIFICATIONS

Type	Nominal Voltage (V)	Charge Voltage <sup>*3</sup> (V)	Nominal Capacity (Voltage Range V) (mAh)	Internal Impedance <sup>*1</sup> (Ω)	Standard Charge/Discharge Current (mA)	Cycle Life <sup>*2</sup> (Time)	Diameter (mm)	Height (mm)	Weight (g)
HB414	3.0	2.5 to 3.3	0.3 (3.0 to 1.2) 0.2 (2.5 to 1.2) 0.14 (3.3 to 2.0)	280	0.005	<sup>*4</sup> 1000 (20% D.O.D.) 100 (100% D.O.D.)	4.8	1.4	0.07

\*1. Value measured using AC (Alternating Current) method in the fully charged state.

\*2. Counts of charge and discharge repetition that maintains about 50% of the minimum guaranteed capacity

\*3. A constant voltage charge is recommended, but due to a limit in charge current, it is necessary to insert a resistor to regulate charge current.

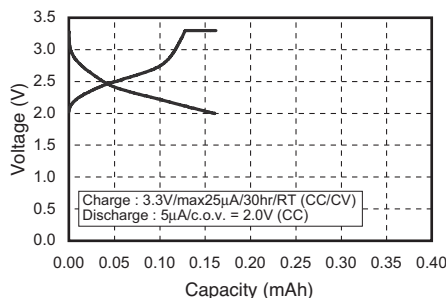
Please contact us for further details.

If a constant current charge is required, please contact us for more information.

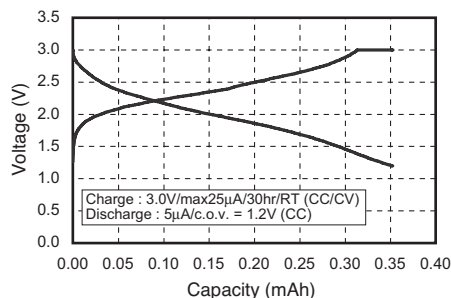
\*4. D.O.D. : Depth of Discharge

### CHARACTERISTICS

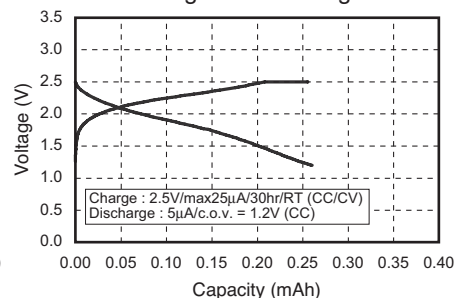
3.3V Charge and discharge curve



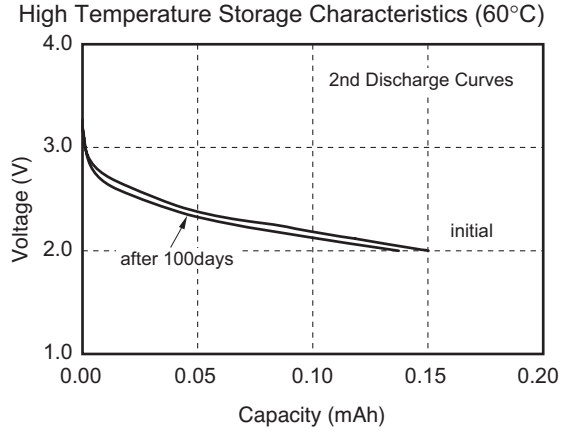
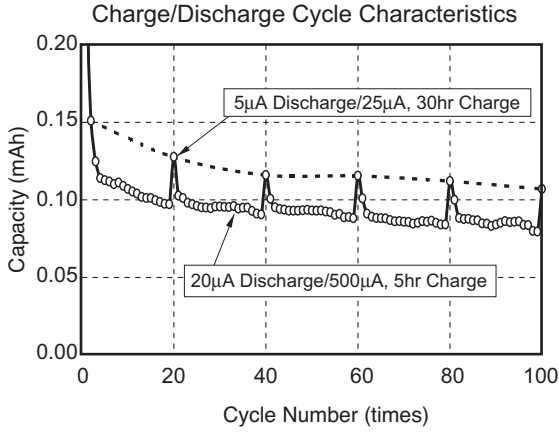
3.0V Charge and discharge curve



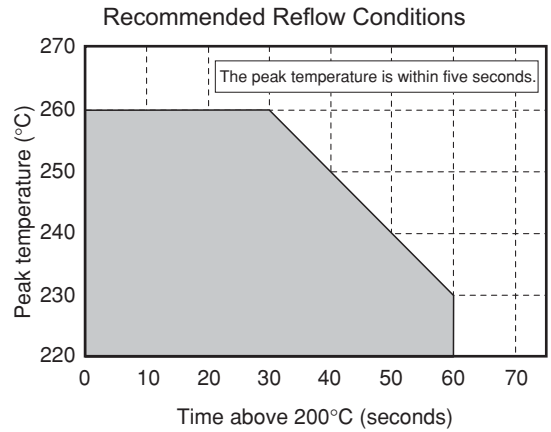
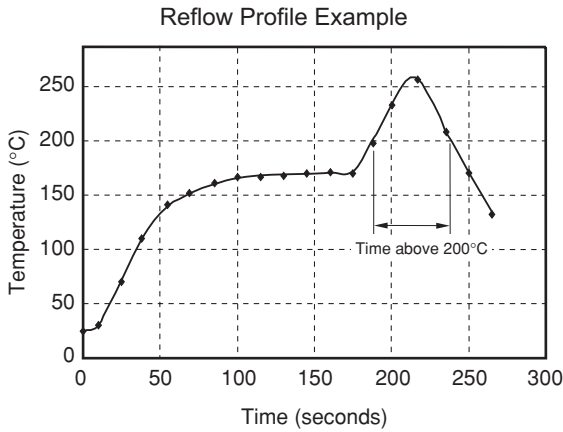
2.5V Charge and discharge curve



**CHARACTERISTICS**



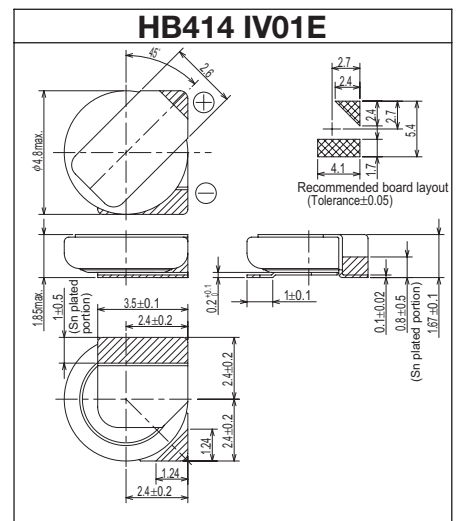
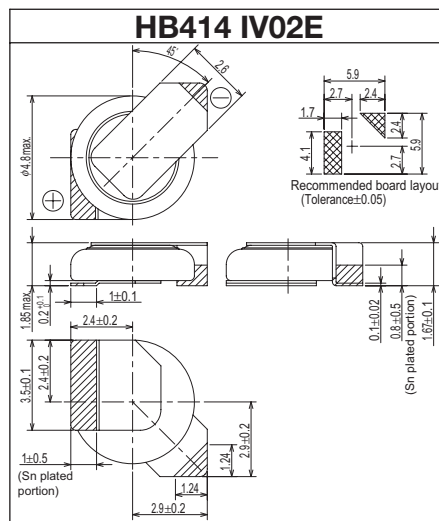
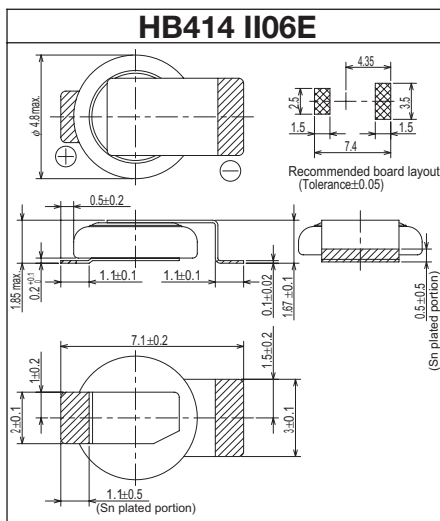
**REFLOW SOLDERING CONDITIONS**



The times of repeated reflow soldering must be two times or less.  
The Temperature must be measured at top of the cell.

Max. 260 °C (within 5 seconds)

**STANDARD TERMINALS**

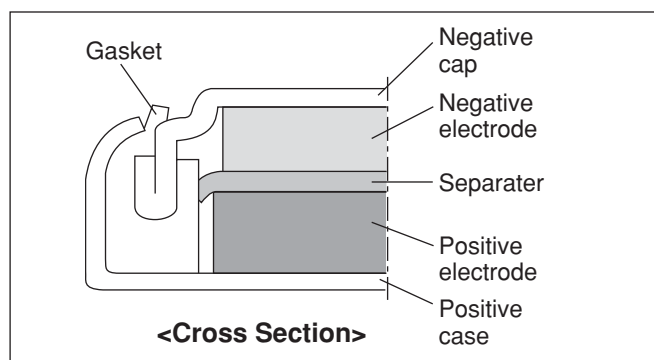


- Please contact Seiko Instruments Inc. for batteries with terminals other than the above shapes.
- Units: mm
- The hatched parts are tin plated (Sn: 100%).

## MS412FE / MS518SE / MS614SE / MS621FE / MS920SE



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.



### 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
- Approved by UL (Underwriters Laboratories Inc.)  
UL File No. MH15628

### 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.)
- Main power supply for small and slim portable equipment.

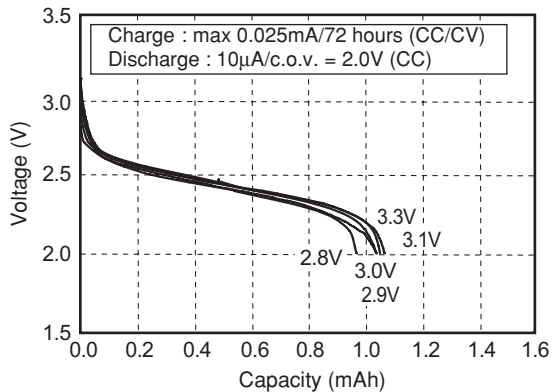
### SPECIFICATIONS

Type	Nominal Voltage (V)	Charge Voltage (Standard Charge Voltage)*6 (V)	Nominal Capacity (mAh)*1	Internal Impedance (Ω)*2	Standard Charge/Discharge Current (mA)	Maximum Discharge Current (Continuous) (mA)*3	Cycle Life (Time)*4		Size (mm)		Weight (g)
							100%*5 D.O.D. (Depth of Discharge)	20%*5 D.O.D. (Depth of Discharge)	Diameter	Height	
MS412FE	3	2.8 to 3.3 (3.1)	1.0	100	0.010	0.10	100	1000	4.8	1.2	0.07
MS518SE	3	2.8 to 3.3 (3.1)	3.4	60	0.010	0.15	100	1000	5.8	1.8	0.13
MS614SE	3	2.8 to 3.3 (3.1)	3.4	80	0.015	0.25	100	1000	6.8	1.4	0.17
MS621FE	3	2.8 to 3.3 (3.1)	5.5	80	0.015	0.25	100	1000	6.8	2.1	0.23
MS920SE	3	2.8 to 3.3 (3.1)	11.0	35	0.050	0.80	100	1000	9.5	2.1	0.47

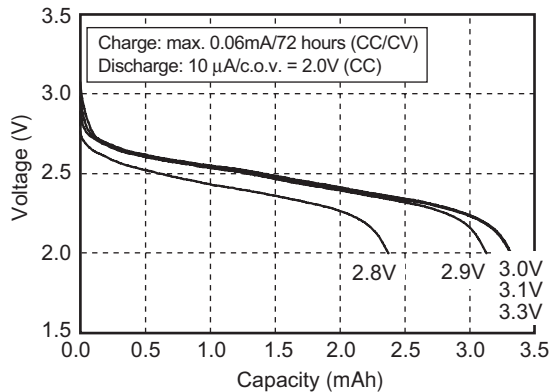
\*1. Nominal capacity: Typical value of discharge capacity between 3.1V and 2.0V  
 \*2. Internal impedance is measured using an AC (Alternating Current) method at the fully charged state.  
 \*3. Maximum discharge current indicates the value of a current for approximately 50% of the nominal capacity.  
 \*4. Cycle Life indicates the times charge/discharge 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.

**DISCHARGE CHARACTERISTICS (CHARGE VOLTAGE DEPENDENCE)**

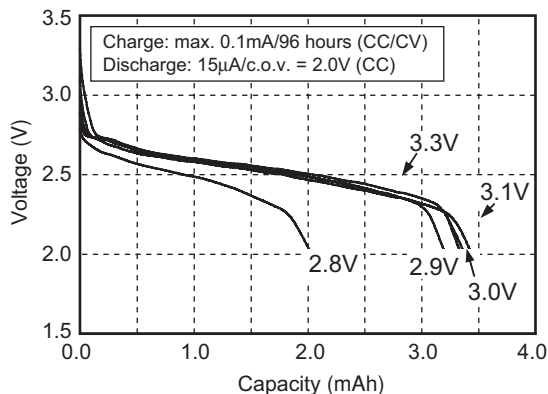
**MS412FE**



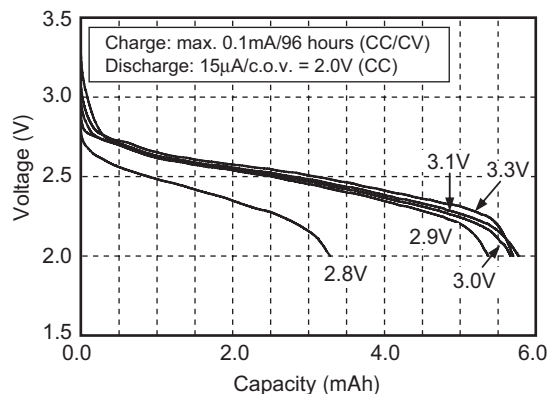
**MS518SE**



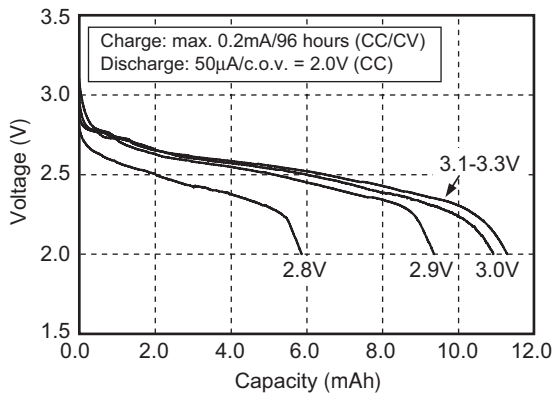
**MS614SE**



**MS621FE**



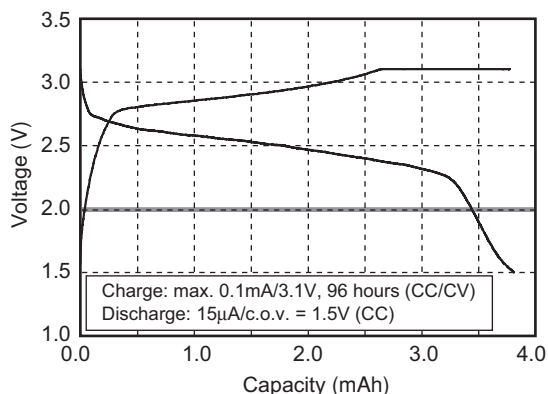
**MS920SE**



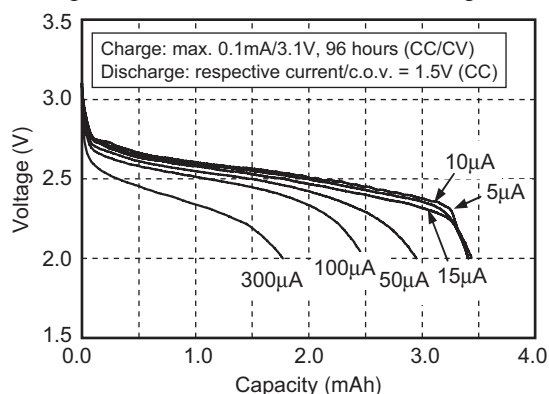
\* c.o.v. : Cut Off Voltage (final voltage)

**CHARACTERISTICS (MS614SE)**

Charge/discharge characteristics

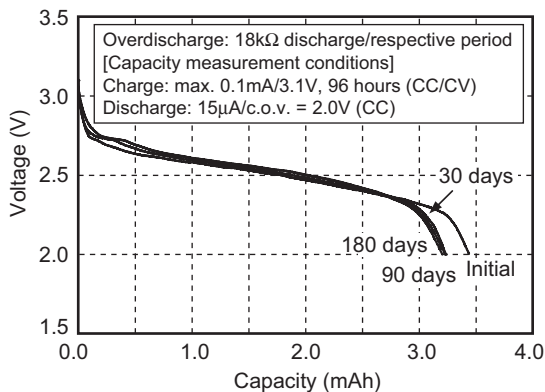


Discharge Characteristics at Various Discharge Current

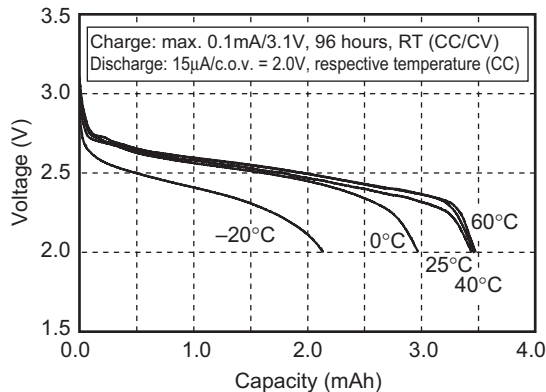


### CHARACTERISTICS (MS614SE)

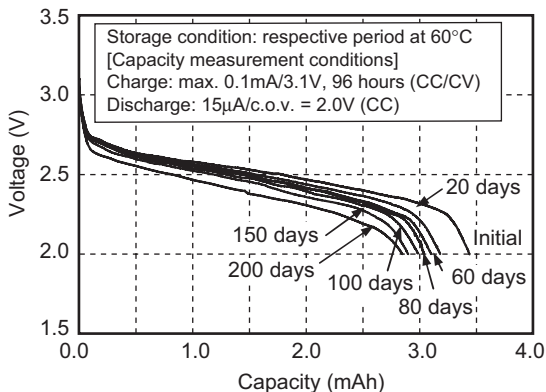
Overdischarge Characteristics



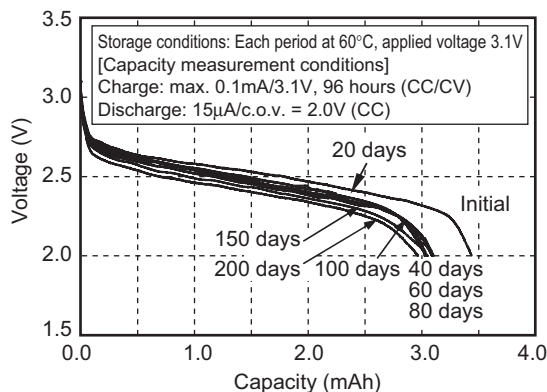
Discharge Temperature Characteristics



High Temperature (60°C) Storage Characteristics



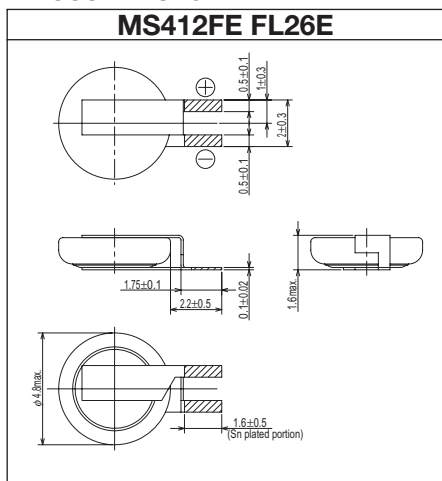
Floating Characteristics (60°C, applied voltage 3.1V)



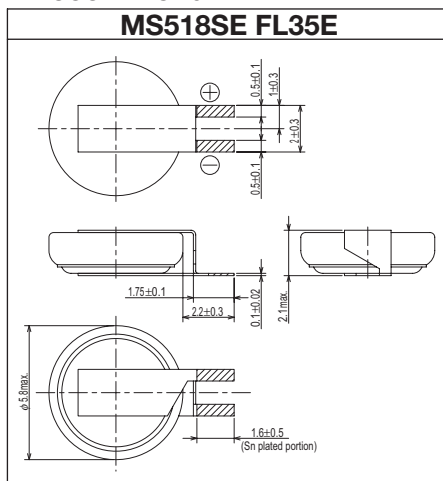
### DIMENSIONS OF STANDARD TERMINALS OF MS LITHIUM RECHARGEABLE BATTERIES

#### FL Type

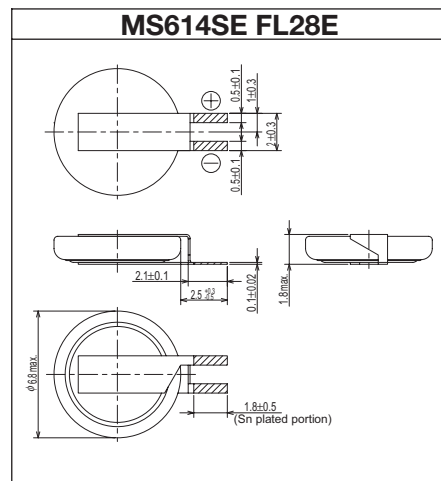
##### Recommend



##### Recommend



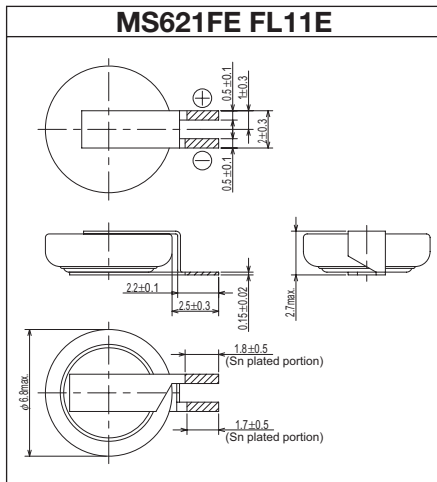
##### Recommend



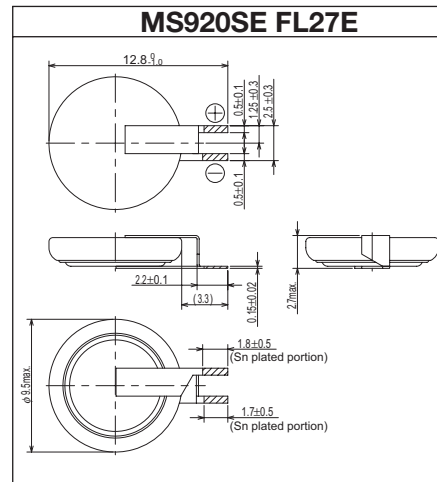
- Contact Seiko Instruments Inc. for batteries with terminals other than the above shapes.
- Units: mm
- The hatched parts are tin plated (Sn: 100%).

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

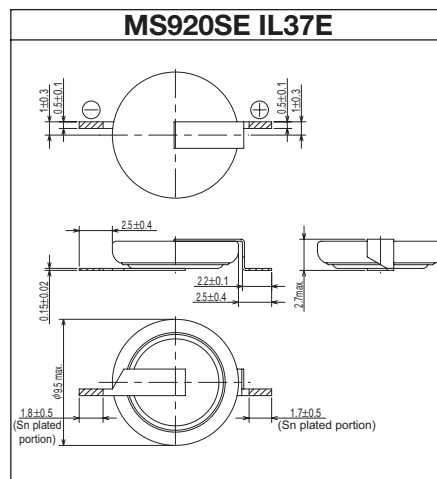
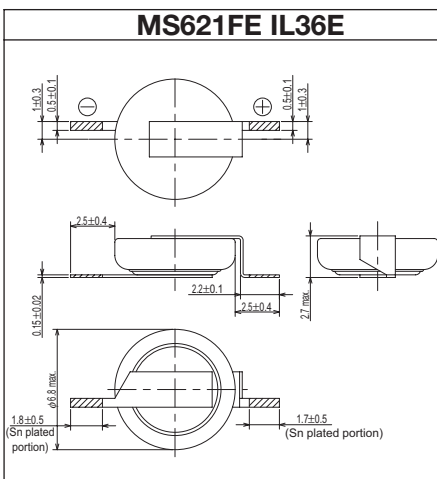
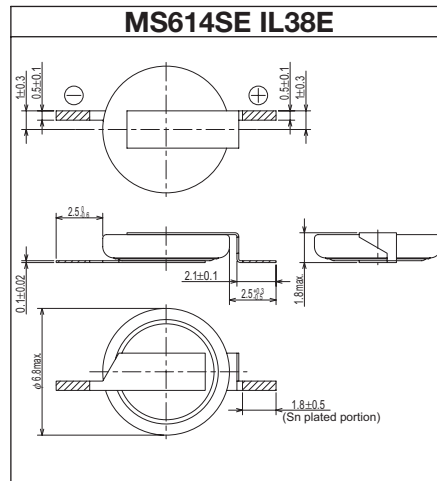
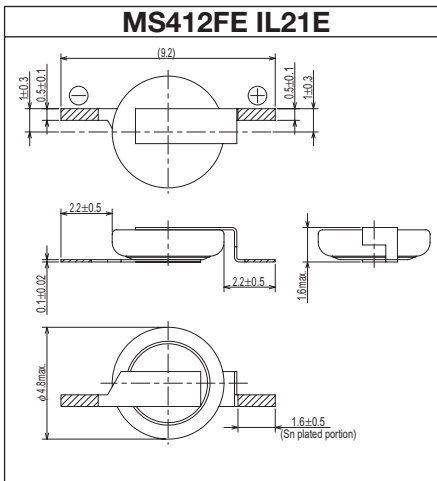
**Recommend**



**Recommend**



**IL Type**



## TS518FE / TS621FE



### FEATURES

- Low-voltage rechargeable
- High capacity
- Long cycle life: at least 1000 cycles (20% D.O.D.)
- RoHS Compliant
- Approved by UL (Underwriters Laboratories Inc.)  
UL File No. MH15628

### APPLICATIONS

Power backup for the clock function of small portable devices such as cellular and PHS phone

TS lithium rechargeable batteries are high capacity 1.5V type non-reflowable rechargeable batteries that provide sufficient discharge capacity with a charge voltage of less than 2.0V, and are intended for support of recent low-operating-voltage mobile devices.

### SPECIFICATIONS

Type	Nominal Voltage (V)	Charge Voltage <sup>*3</sup> (V)	Nominal Capacity (Voltage Range V) (mAh)	Internal Impedance <sup>*1</sup> ( $\Omega$ )	Standard Charge/Discharge Current (mA)	Cycle Life <sup>*2</sup> (Time)	Diameter (mm)	Height (mm)	Weight (g)
TS518FE	1.5	1.5 to 3.0	1.5 (1.5 to 1.0) 2.5 (1.8 to 1.0)	120	0.015	1000 (20% D.O.D.) <sup>*4</sup> 50 (100% D.O.D.)	5.8	1.8	0.12
TS621FE	1.5	1.5 to 3.0	4.2 (2.3 to 1.0)	80	0.015	1000 (20% D.O.D.) <sup>*4</sup> 50 (100% D.O.D.)	6.8	2.1	0.22

\*1. Value measured using an AC (Alternating Current) method in the fully charged state.

\*2. Counts of charge and discharge repetition that maintains about 50% of the minimum guaranteed capacity

\*3. A constant voltage charge is recommended, but due to a limit in the charge current, it is necessary to insert a resistor to regulate the charge current.

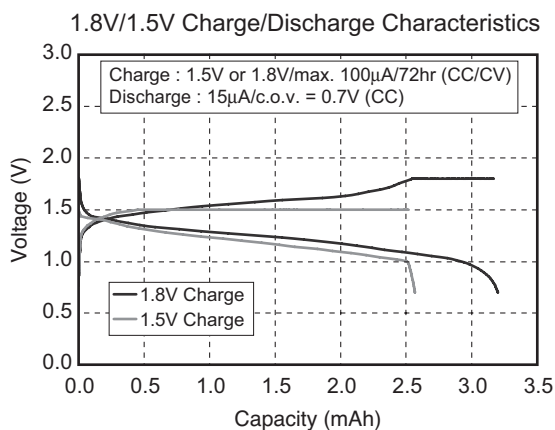
Please contact us for further details.

If a constant current charge is required, please contact us for more information.

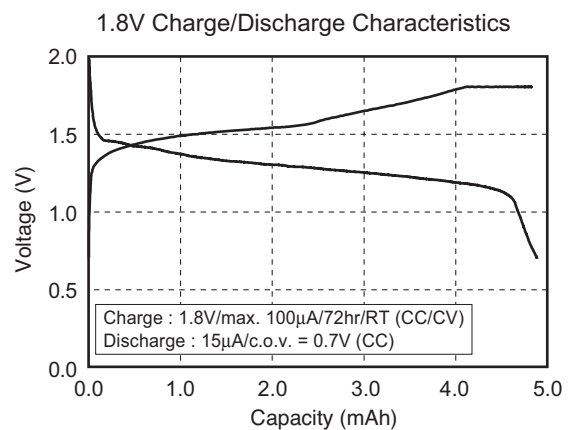
\*4. D.O.D. : Depth of Discharge

### CHARACTERISTICS

#### TS518FE



#### TS621FE



\* c.o.v. : Cut Off Voltage



# ***Microbattery and Capacitor Selection Check Sheet***

## **CHECK SHEET**

If you are considering the purchase of one or more of our microbatteries or capacitors, please complete this check sheet and send it to us. We will let you know which products will be optimum for you to use.

### **Fax Sheet**

Micro-Energy Division   Sales Sec. +81-43-211-8034   Battery Sales Person

1. Your company name

2. Which application do you use?

3. Your expected backup period

hour / day / month

4. Your requested delivery date

mm / yy

5. Operation voltage of the device for backup

V to V

6. Consumption current at backup time

mA •  $\mu$ A

7. Setting value of charging voltage

V

8. Presence of reverse current protection diode

Yes • No

9. Vf characteristics of the reverse current protection diode (at 10 $\mu$ A)

V

10. Resistance value of charging protection resistance

$\Omega$

11. Limit of charging time

12. Required cycle life

times

13. Other requests

14. Expected life (e.g., xx years or backup for xx hours)

15. Ambient temperature and humidity

#### **Your contact information**

Name

Section

Phone

Fax

E-mail

# Mercury Free Silver Oxide Battery : SEIZAIKEN

**SEIZAIKEN** is our trademark for silver oxide battery globally acknowledged in the quartz watch market.



## NO MERCURY & NO LEAD ADDED

According to the European Union (EU) battery directive, the marketing of alkaline manganese batteries containing more than 0.025% of mercury by weight is prohibited due to mercury's hazardous effects on human health and our environment. However, coin cell batteries have been exempt from this prohibition due to the technical difficulty of battery manufacturers to develop a no mercury added silver oxide battery. SII has overcome this challenge with our new SEIZAIKEN mercury free silver oxide battery.

Furthermore, gradual reduction and separate disposal of batteries containing more than 0.4% lead (Pb) by weight was one of the objectives held by the member states of EU. SII has also achieved this goal.

## APPLICATIONS

Watches, Clocks, Cameras, Calculators, Remote Controls, Portable Radio, Digital Thermometers, Digital Instrumentation, Electronic Games, Personal Health Devices.

## SPECIFICATIONS

	Model No.		Electrical Characteristics (at Room Temperature)		Dimensions		Weight (g)	C.C.V.* <sup>2</sup>	
			Nominal Voltage (V)	Nominal Capacity* <sup>1</sup> (mAh)	Diameter (mm)	Height (mm)		+24°C (V)	-10°C (V)
Low Drain	SR416SW	337	1.55	7.5	4.8	1.65	0.11	1.35	1.10
	SR421SW	348		12		2.15			
	(SR512SW)	335		5.5	5.8	1.25	0.15		
	SR516SW	317		12.5		1.65	0.18		
	SR521SW	379		16		2.15	0.23		
	SR527SW	319		22	6.8	2.70	0.29		
	SR616SW	321		16		1.65	0.25		
	SR621SW	364		23		2.15	0.32		
	SR626SW	377		30	7.9	2.60	0.39		
	(SR712SW)	346		11		1.25	0.26		
	SR716SW	315		21		1.65	0.33		
	SR721SW	362		28	9.5	2.10	0.42		
	SR726SW	397		34		2.60	0.52		
	SR731SW	329		36		3.10	0.56		
	SR41SW	384		45	11.6	3.60	0.67		
	SR916SW	373		27		1.65	0.51		
	SR920SW	371		46		2.05	0.60		
	SR927SW	395		60	1.20	2.70	0.75		
	SR936SW	394		85		3.60	1.10		
	SR1120SW	381		53		2.05	0.93		
SR1130SW	390	80	1.10	3.05	1.29				
SR43SW	301	120		4.20	1.75				
SR44SW	303	160		5.40	2.20				

\*1. Discharged to 1.2V

\*2. C.C.V. : Closed Circuit Voltage

Low Drain : 2kΩ 7.8msec Pulse

## FEATURES

### Ecology

The introduction and adoption of new technologies made it possible to avoid using mercury and lead, which are environmentally harmful.

### Excellent leakage resistance

Other than eliminating the need for mercury in the compound, these batteries are manufactured to have excellent leakage resistance attained by our newly developed crimping structure.

This is made possible by our new high-performance manufacturing machinery and process.

### High reliability

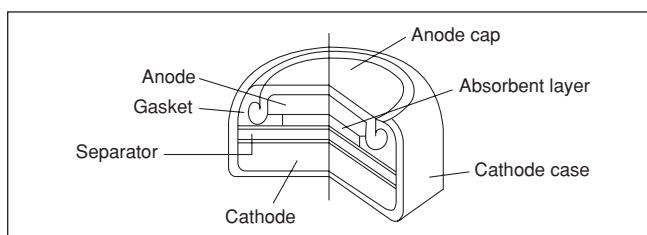
Production in our high precision clean room environment thoroughly prevents contamination – resulting in the most consistent, highest reliability battery.

## ADVANCED TECHNOLOGY

Until recently, a small amount of mercury was included in the chemical compound of the silver oxide battery to suppress the possible generation of hydrogen gas should the zinc-based negative electrode corrode. If this hydrogen gas is generated, leakage resistance and storage stability of the battery will deteriorate and a possibility of swelling may occur.

SII developed and incorporated the following two technologies in our no mercury added silver oxide batteries:

1. Use of high-corrosion resistance zinc alloy
2. Addition of a high performance inhibitor in the electrolyte



**SPECIFICATIONS**

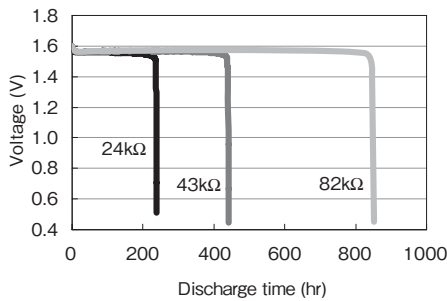
	Model No.		Electrical Characteristics (at Room Temperature)		Dimensions		Weight (g)	C.C.V.*2	
			Nominal Voltage (V)	Nominal Capacity*1 (mAh)	Diameter (mm)	Height (mm)		+24°C (V)	-10°C (V)
High Drain	SR626W	376	1.55	30	6.8	2.60	0.39	1.35	0.95
	SR721W	361		26	7.9	2.10	0.41		
	SR726W	396		34		2.60	0.52		
	SR41W	392		45		3.60	0.67		
	SR920W	370		46	9.5	2.05	0.60	1.40	1.10
	SR927W	399		60		2.70	0.75		
	SR1120W	391		53	11.6	2.05	0.93	1.45	1.20
	SR1130W	389		80		3.05	1.29		
	SR43W	386		120		4.20	1.75		
	SR44W	357		160		5.40	2.20		

\*1. Discharged to 1.2V      \*2. C.C.V. : Closed Circuit Voltage      High Drain : 200Ω 5sec DC

**CHARACTERISTICS**

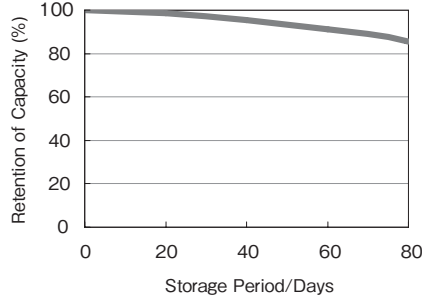
**SR521SW**

Discharge Characteristics



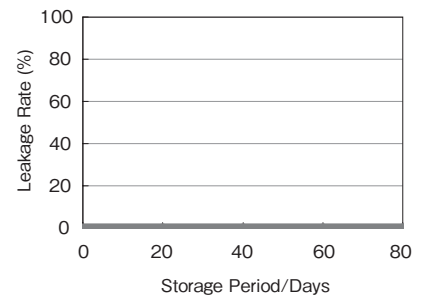
【Measurement conditions】 Temperature:23°C

Shelf Life (Storage Performance)



【Measurement conditions】 Temperature:23°C  
Load:43kΩ  
【Storage conditions】 60°C Dry

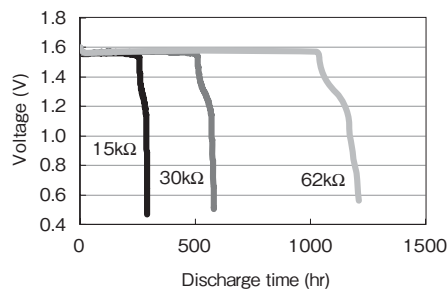
Anti-Leakage Performance



【Storage conditions】 Temperature:45°C  
Humidity:93%RH

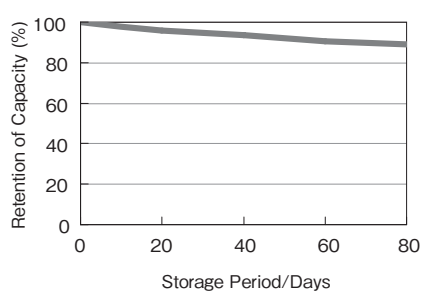
**SR626SW**

Discharge Characteristics



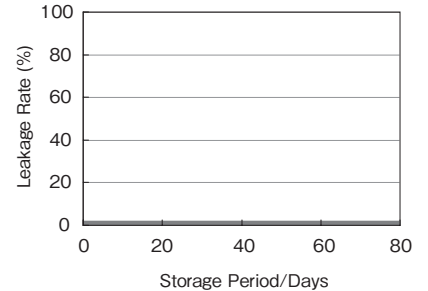
【Measurement conditions】 Temperature:23°C

Shelf Life (Storage Performance)



【Measurement conditions】 Temperature:23°C  
Load:30kΩ  
【Storage conditions】 60°C Dry

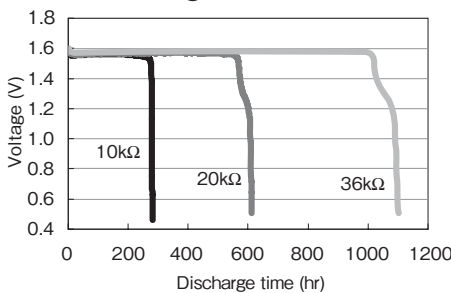
Anti-Leakage Performance



【Storage conditions】 Temperature:45°C  
Humidity:93%RH

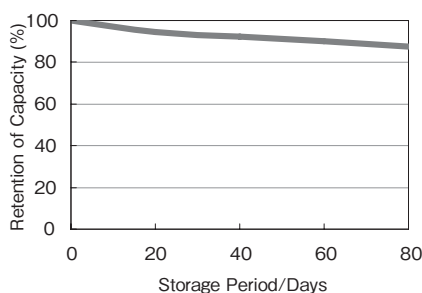
**SR920SW**

Discharge Characteristics



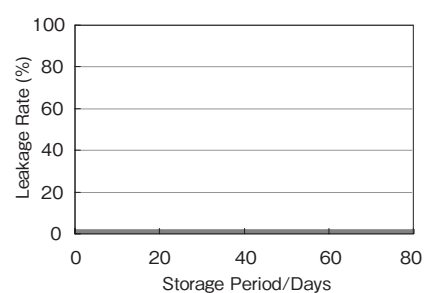
【Measurement conditions】 Temperature:23°C

Shelf Life (Storage Performance)



【Measurement conditions】 Temperature:23°C  
Load:20kΩ  
【Storage conditions】 60°C Dry

Anti-Leakage Performance



【Storage conditions】 Temperature:45°C  
Humidity:93%RH

## Environmental Activities at Micro-Energy Division

### Environment & Quality Policy

Seiko Instruments Inc., Micro-Energy Division is located in Ayashi, a city with beautiful nature, in Miyagi Prefecture. Our aim is to provide customer satisfaction and harmony with the environment through all our products, from Micro battery to other electronic products, and sales activities.

1. We adhere firmly to laws, regulations and customers' specified requirements.
2. We aim to prevent pollution and to reduce CO<sub>2</sub>.
3. We set goals, take actions, conduct regular reviews, and improve the system and performance continuously.
4. We contribute to the society by supporting green procurement, developing green products, and promoting green life activity.
5. We adhere to regulations and recommendations regarding Chemical substance content in our products and will promote reduction and replacement.
6. We vigorously educate ourselves and try to engage voluntarily in green life activity.

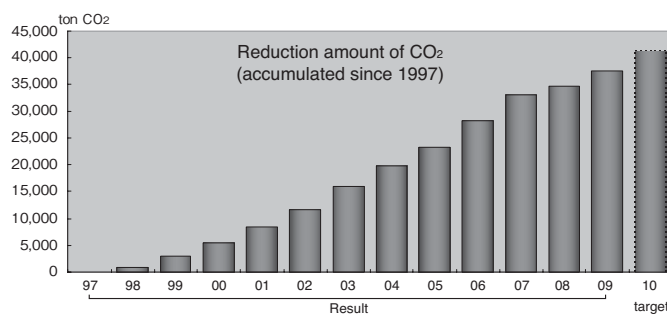
Based on the above policy, the following six environmental approaches are now being implemented throughout Micro-Energy Division.

#### 1. Enrich the line up of Eco-Products

- We introduced the SII Green Product Label System which is equivalent to the ISO 14021 Type II environmental label. At the end of FY2006, 100% of our products are certified as SII Green Products. In addition, 23 products are certified as SII "High Grade" Green Products.

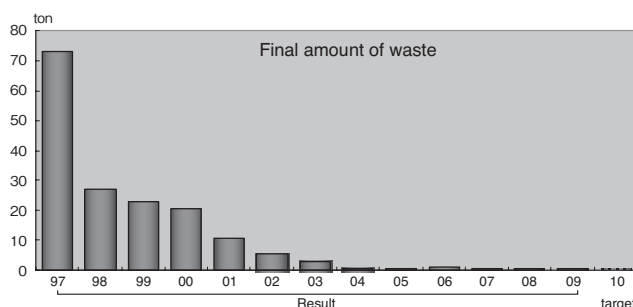
#### 2. Reduction of Greenhouse Gas

- We practice various CO<sub>2</sub> reduction measures like using Eco-machinery. Since 1997, we have successfully reduced a total of 37,500 tons of CO<sub>2</sub>. We believe our efforts contribute to the prevention of global warming.



#### 3. 3R Promotion Activity

- We have promoted the "reduce and reuse" activities and also promoted recycling at the end of the production process. With these activities, we achieved "Zero-emission" in 2004. We have reduced the non-recyclable wastes to less than 1 ton - less than 1% of our 1997 results.



#### 4. Control of Chemical Substances

- We employ chemical-substance control procedures, by incorporating the regulations of JGPSSI (Japan Green Procurement Survey Standardization Initiative) into our documented Environment & Quality control systems.
- We have reduced emissions of chemical substances defined in the Pollutant Release and Transfer Register (PRTR). From 2006, we have successfully reduced our emission by 26%.

#### 5. Green Purchasing

- We adhere to a green purchasing campaign through the purchase of ingredients, manufacturing materials, and other necessary products, whenever appropriate.

#### 6. Green Life

- With the participation of all of Micro-Energy Division members, we deploy a clean-up and beautification campaign in all areas surrounding our factory twice a year. In addition, we participate in the clean up activity at Hirose River once a year.

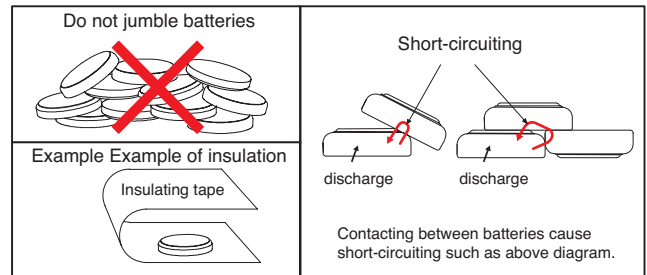
# Precautions for Your Safety

Micro-Energy Division Lithium rechargeable batteries (HB, MS, TS) contain flammable organic solvents. For your safety, please follow the following precautions.

## ⚠ WARNING!

- **Do not charge by higher current or higher voltage than specified.**  
Doing so may generate gas inside the battery, resulting swelling, fire, heat generation or bursting.
- **Do not heat, disassemble nor dispose of in fire**  
Doing so damages the insulation materials and may cause fire, heat generation, leakage or bursting.
- **Do not solder directly to the battery**  
If soldering is performed directly to the battery, the battery is heated up, consequently causing leakage, explosion or fire due to overheating from internal short-circuit.
- **Do not short.**  
If the (+) and (-) come into contact with metal materials, short-circuit occurs. As a result, fire, heat generation, leakage or bursting may occur.
- **Keep batteries out of children's reach.**  
If leaked liquid is ingested or a battery is swallowed, consult a physician immediately.
- **Do not reverse placement of (+) and (-)**  
If the (+) and (-) side of the battery is reverse inserted, it may cause a short-circuit or over discharge of the battery on some equipment and it may induce overheating, explosion or fire.

- **Do not discharge by force**  
If the battery is discharged by direct connection to an external power supply etc., voltage of the battery will decline lower than 0 volts (electrical reversal) and will cause the battery case to expand, overheat, leak, explode or burn.
- **In case of leakage or a strange smell, keep away from fire to prevent ignition of any leaked electrolyte.**
- **In case of disposal, insulate between (+) and (-) of battery by an insulating material.**  
Jumbling batteries or with other metal materials cause short-circuit. As a result, fire, heat generation, leakage or bursting may occur.



## ⚠ CAUTION!

- **If leaked liquid gets in the eyes, wash them with clean water and consult a physician immediately.**
- **Do not use new and used batteries together. Do not use different types of batteries together.**  
It may cause fire, heat generation, leakage or bursting.
- **If you connect two or more batteries in series or parallel, please consult us in advance.**  
It may cause bursting or fire due to unbalanced load or voltage.
- **Do not use nor leave the batteries in direct sunlight nor in high-temperature areas.**  
It may cause fire, heat generation, leakage or bursting.
- **Do not apply strong pressure to the batteries nor handle roughly.**  
It may cause fire, heat generation, leakage or bursting.
- **Avoid contact with water.**  
It may cause heat generation.
- **Keep batteries away from direct sunlight, high temperature and humidity.**  
It may cause heat generation or performance deterioration.

### For prevention of performance deterioration of battery

- **Pay attention to mat or sheet for ESD**  
Battery with tabs or battery on PCB may short-circuit on the mat for ESD. As a result the voltage of the cell is reduced.
- **Pay attention to soldering by tips**  
Do not touch the battery by solder chips, when soldering another components after equipping battery.  
Keep any high temperature process away from battery.
- **Pay attention to material of jig for pick and place**  
Use non-conductive material of jig for pick and place of batteries, for short-circuit protect. If short-circuit of battery occurs, the voltage of battery drops down quickly but raises gradually.
- **Pay attention to washing and drying**  
Some detergent or high temperature drying may cause deterioration of battery. If you need to wash batteries, consult us.

### International Transportation and Disposal

#### International Air/Marine/Ground Transportation

Regarding the transport of Lithium battery, organizations like IATA, ICAO, IMO, DOT have determined transport regulations, based on the United Nations Regulations.

The SII Lithium rechargeable batteries can be transported being not subject to the provisions of dangerous goods, if they meet the following requirements.

(a) **<Caution Label>** Lithium battery handling label (IATA Dangerous Goods Regulations Figure 7.4.) must be put on each package.

(b) **<Not Restricted Declaration>** Each shipment must be accompanied with a document indicating that the packages contain Lithium batteries, that the packages must be handled with care, and that special procedures should be followed in the event the package is damaged, and a telephone number for additional information.

(c) **<Weight Limit>** Except in the case of packed with equipment, package may not exceed 2.5 kg gross mass.

(d) **<Strong Packaging>** Batteries are separated so as to prevent short-circuit and are packed in strong packaging.

(e) **<Package Drop Test>** Each packages is capable of withstanding a 1.2m drop test in any orientation without damage to batteries contained.

**For further information, please consult with us.**

#### Disposal

Recent environment protection concerns have increased globally and waste and recycling are regulated in the world. The current regulations differ in each country, state and local municipality. Please consult local regulations and authorities for recommended disposal of batteries. If you are in question of application or safety of our batteries, please consult your local authorities.

## Precautions for Your Safety

Micro-Energy Division capacitors (XH) contain flammable organic solvents. For your safety, please follow the following precautions.

### WARNING!

- **Do not charge by higher current or higher voltage than specified.**  
Doing so may generate gas inside the capacitor, resulting in swelling, fire, heat generation or bursting.
- **Do not reverse placement of (+) and (-)**  
SII capacitors have polarity. If the (+) and (-) side of the capacitor is reverse inserted, it may cause short-circuit or over discharge of the capacitor on some equipment and it may induce overheating, explosion or fire.
- **Do not solder directly to the capacitor**  
If soldering is performed directly to the capacitor, the capacitor will over heat and, consequently cause leakage, explosion or fire due to overheating from internal short-circuit.
- **Keep capacitors out of children's reach.**  
If leaked liquid is ingested or a capacitor is swallowed, consult a physician immediately.
- **Do not heat, disassemble nor dispose of in fire**  
Doing so damages the insulation materials and may cause fire, heat generation, leakage or bursting.
- **Do not discharge by force**  
If the capacitor is discharged by direct connection to an external power supply etc., voltage of the capacitor will decline lower than 0 volts (electrical reversal) and will cause the capacitor case to expand, overheat, leak, explode or burn.
- **In case of leakage or a strange smell, keep away from fire to prevent ignition of any leaked electrolyte.**

### CAUTION!

- **If leaked liquid gets in the eyes, wash them with clean water and consult a physician immediately.**
- **Do not use nor leave the capacitors in direct sunlight nor in high-temperature areas.**  
It may cause fire, heat generation, leakage or bursting.
- **Do not use new and used capacitors together. Do not use different types of capacitors together.**  
It may cause fire, heat generation, leakage or bursting.
- **If you connect two or more capacitors in series or parallel, please consult us in advance.**  
It may cause bursting or fire due to unbalanced load or voltage.
- **Keep capacitors away from direct sunlight, high temperature and humidity.**  
It may cause heat generation or performance deterioration.

For using SII Silver Oxide batteries, please follow the following precautions.

### WARNING!

- **Do not heat, disassemble nor dispose of in fire**  
Doing so damages the insulation materials and may cause fire, heat generation, leakage or bursting.
- **Do not short.**  
If the (+) and (-) come into contact with metal materials, short-circuit occurs. As a result, fire, heat generation, leakage or bursting may occur.
- **Keep batteries out of children's reach.**  
If leaked liquid is ingested or a battery is swallowed, consult a physician immediately.
- **If leaked liquid, alkaline, get in the eyes, do not rub them, wash them with clean water and consult a physician immediately.**
- **If leaked liquid, alkaline, stick to clothing, for protecting from irritation, wash them with clean water immediately.**

### CAUTION!

- **Do not reverse placement of (+) and (-)**
- **Do not solder directly to the battery**
- **Do not use new and used batteries together. Do not use different types of batteries together.**
- **Do not charge.**
- **Do not use nor leave the batteries in direct sunlight nor in high-temperature areas.**
- **Keep batteries away from direct sunlight, high temperature and humidity.**
- **Avoid letting battery contact water.**
- **Make sure to insert batteries without having (+) and (-) come in contact with metal parts of equipment.**
- **Read the equipment instruction manual and precautions carefully before using. Some usage or types of equipment do not suit the specifications or performance of these batteries.**
- **Remove batteries from the equipment, if finished using. Do not leave batteries connecting with equipment after using.**
- **In case of disposal, insulate between (+) and (-) of battery by an insulating material.**

All data, dimensions, characteristics and values shown in this catalogue are for reference only. Please contact your local Seiko Instruments Representative for current detailed specifications.

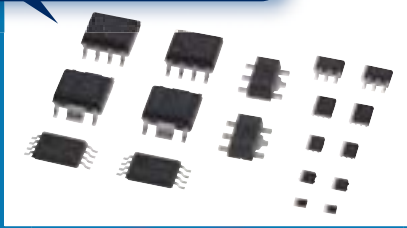
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# SII Electronic Components for Any Requirement!

Super-small,  
low current consumption



## CMOS IC

ICs for various power supplies  
Memory ICs (E<sup>2</sup>PROMs)  
Sensors (temperature, magnetism, etc.)  
Mini-analog  
Real-time clocks

Best suited for  
microprocessors



## Quartz Crystal

Compact SMD tuning-fork quartz crystal unit  
Quartz crystal unit for clocks  
Quartz crystal unit for radio-controlled clocks

Maximum power  
in a small body!



## Micro Battery

Coin-type lithium rechargeable batteries  
Capacitors(Coin-type, Chip-type)  
Mercury-free silver oxide batteries

Compact

Energy saving

High accuracy

Module design and  
assembly technology

Low-voltage operation

High reliability

Vivid and realistic



## LCD Device

Color TFT liquid crystal modules  
Color/monochrome STN liquid crystal modules  
STN liquid crystal panels  
Backlight modules  
Optical films for backlights

Small, precision  
machining and  
reflowable



## DIANET Rare Earth Magnet

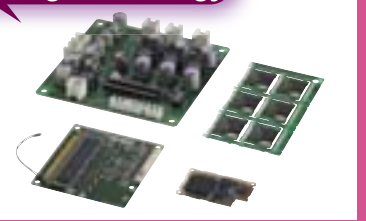
Samarium-cobalt (SmCo) magnets  
Miniature precision springs  
Metal diaphragms  
etc.

Made by SII's unique  
precision machining technology



## SPRON Superior performance Co-Ni Alloy Product

Most advanced  
mounting technology



## From module mounting commission to OEM production

Cleanroom-based (Class 10000) unified production  
SMT/BGA/COB mounting  
Mountable onto PSBs and FPCs  
Module/completed product assemblies

**Ideal for various applications!**

Cellular phone



Game



Notebook PC



Car electronics



Digital still camera



TV





"Takumi" is the Japanese spirit of craftsmanship used to embody our work with the highest quality, precision, and utmost care. Cultivated by a long watch manufacturing history, SII applies its unique technology and know-how to create compact, energy saving, and high quality products to exceed your expectations. SII Electronic Components supports your future with our "Takumi" spirit.



Micro-Energy Division who manufactures the products described in this catalog holds the ISO 9001 quality management system certificate, and the ISO 14001 environmental management systems certificate.



**Seiko Instruments Inc.**

Micro-Energy Division  
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