

Micro Battery

Product Catalogue

2011 - 2012







Coin type lithium rechargeable battery

MS414GE



MS414GE is coin type rechargeable battery with double capacity compared to the conventional same size battery.
(Compared to SII battery MS412FE)
This capacity per size is top class in the world.

This is achieved by improved electrolyte and electrodes' material.

FEATURES

- 1. Small Size / Large Capacity: 2.0mAh
- Long cycle life:
 Cycle life of over 50 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.

APPLICATIONS

Backup power for Real Time Clock or Memory.
Super small size power supply.

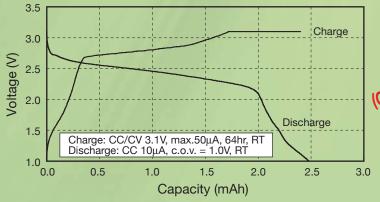
- Digital still camera
- Cellphone
- MP3 player, etc.

SPECIFICATIONS

Туре	Nominal Voltage	Nominal Capacity	Internal Impedance	nternal Impedance Size Diameter Height		
MS414GE	3.0V	2.0mAh	100Ω	4.8mm	1.4mm	0.08g

CHARACTERISTICS

Charge-Discharge Characteristics



Double Capacity! (Compared to SII same size battery)



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

MS414GE 2
Microbattery and Capacitor Lineup 4
MS Lithium Rechargeable Battery 6
HB Lithium Rechargeable Battery10
TS Lithium Rechargeable Battery12
Chip type Electric Double Layer Capacitor 13
XH Capacitor14
Mercury Free Silver Oxide Battery:
SEIZAIKEN18
Environmental Activities20
Precautions for Your Safety21

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.

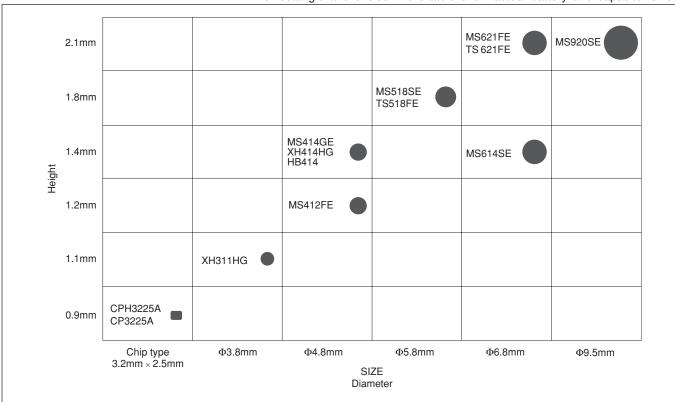
TS lithium rechargeable battery : 1.5V type. Charge voltage range from 1.5V to 3.0V is supported while high

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.



Applications





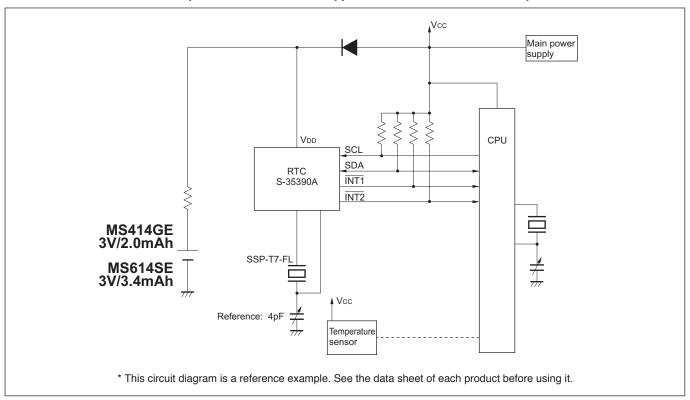




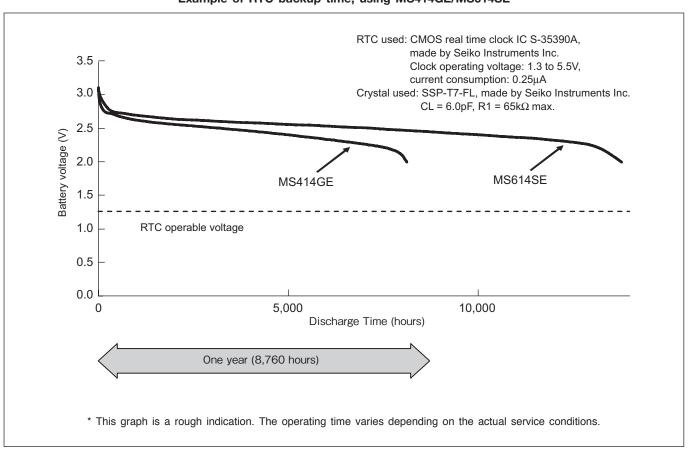




Example of a recommended application circuit: for RTC backup



Example of RTC backup time, using MS414GE/MS614SE

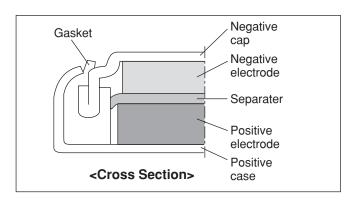


5

MS414GE/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.





- Large discharge capacity:
 For high operational voltage range of 3.3V to 2.0V.
- Long cycle life :

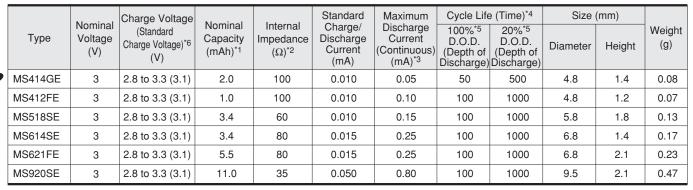
Cycle life of over 100 cycles (over 50 cycles for MS414GE) under charge/discharge conditions of 3.3V to 2.0V (D.O.D.100%).

- 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. (smartphone, tablet, cellphone, PHS, cordless phone, pager, fax machine, PC, video camera, digital camera, tuner, handy terminal, etc.)
- · Main power supply for small and slim portable equipment.



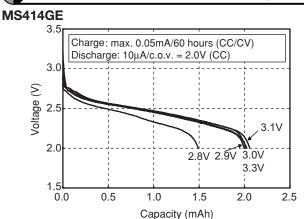


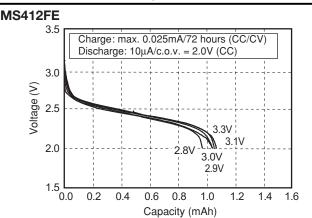
- *1. Nominal capacity: Typical value of discharge capacity between 3.1V and 2.0V
- *2. Internal impedance is measured using an AC (Alternating Current) method at the fully charged state.
- *3. Maximum discharge current indicates the value of a current for approximately 50% of the nominal capacity.
-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

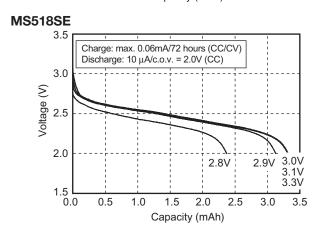
Contact us for further details.

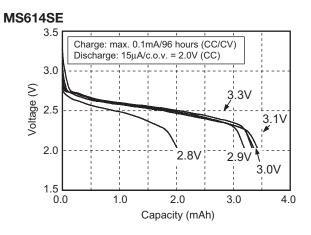
If a constant current charge is required, contact us for more information.

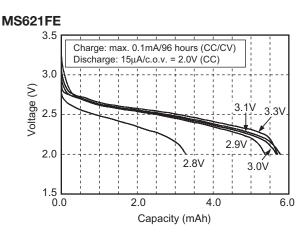
DISCHARGE CHARACTERISTICS (CHARGE VOLTAGE DEPENDENCE)

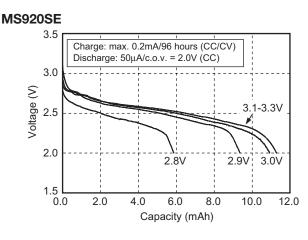




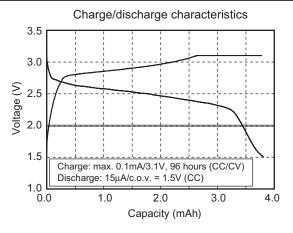


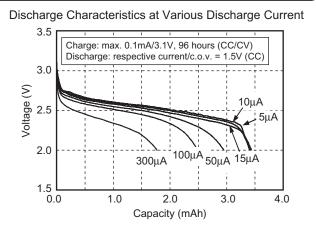






CHARACTERISTICS (MS614SE)

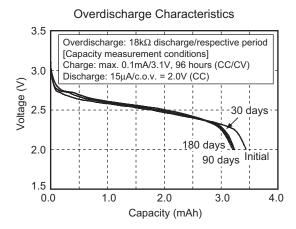




^{*} c.o.v. : Cut Off Voltage (final voltage)

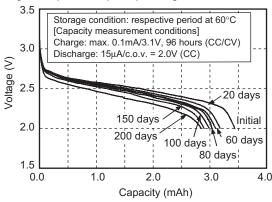
0

CHARACTERISTICS (MS614SE)

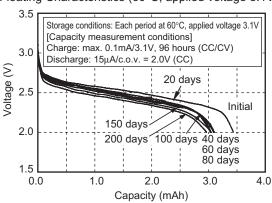


Discharge Temperature Characteristics 3.5 Charge: max. 0.1mA/3.1V, 96 hours, RT (CC/CV) Discharge: 15μA/c.o.v. = 2.0V, respective temperature (CC) Voltage (V) 2.5 -20[¦]°C 2.0 40°C 1.5 0.0 1.0 2.0 3.0 4.0 Capacity (mAh)

High Temperature (60°C) Storage Characteristics



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

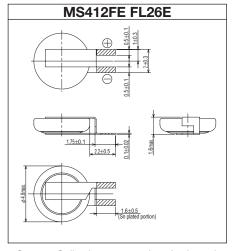


Q

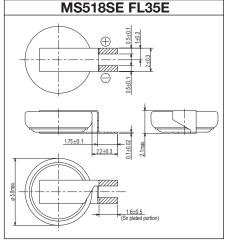
DIMENSIONS OF STANDARD TERMINALS OF MS LITHIUM RECHARGEABLE BATTERIES

■ FL Type

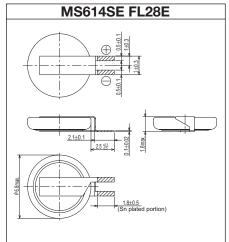
Recommend



Recommend



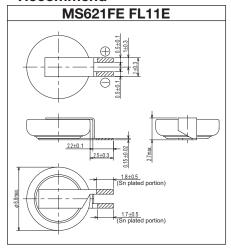
Recommend



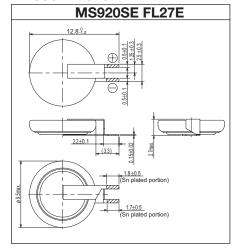
- Contact Seiko Instruments Inc. for batteries with terminals other than the above shapes.
- Units: mm
- The hatched parts are tin plated (Sn: 100%).

DIMENSIONS OF STANDARD TERMINALS OF MS LITHIUM RECHARGEABLE BATTERIES

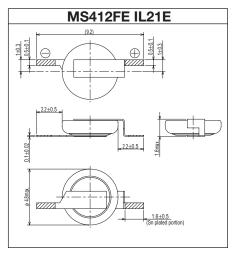
Recommend

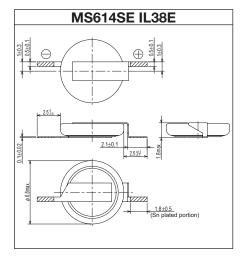


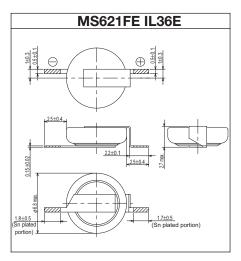
Recommend

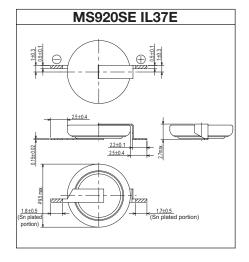


■ IL Type









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 heatresistant 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



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

SPECIFICATIONS

Туре	Nominal Voltage (V)	Charge Voltage ^{*3} (V)	Nominal Capacity (Voltage Range V) (mAh)	Internal Impedance *1 (Ω)	Standard Charge/ Discharge Current (mA)	Lvcie i lie -	Diameter (mm)	Height (mm)	Weight (g)
			0.3 (3.0 to 1.2)			*4 1000 (20% D.O.D.)			
HB414	2.0 10 0.0	0.2 (2.5 to 1.2) 0.14 (3.3 to 2.0)	280	0.005	100 (20% D.O.D.) 4.8	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.

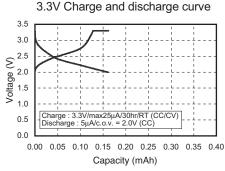
Please contact us for further details.

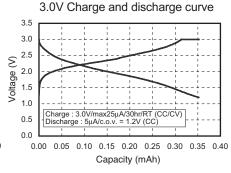
If a constant current charge is required, please contact us for more information.

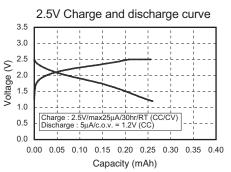
*4. D.O.D.: Depth of Discharge

CHARACTERISTICS

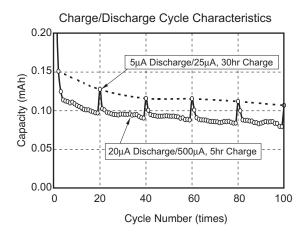
Charge/discharge characteristics

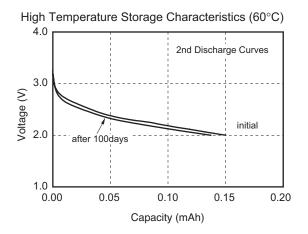




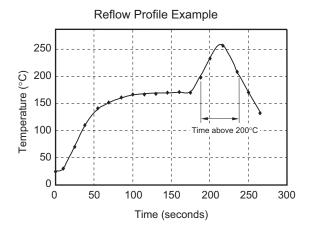


CHARACTERISTICS

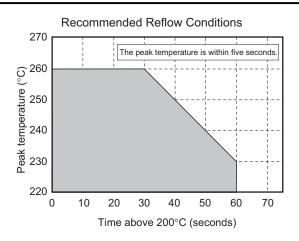




REFLOW SOLDERING CONDITIONS

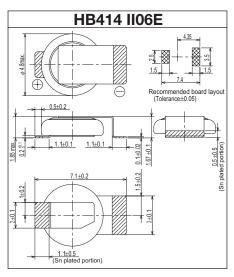


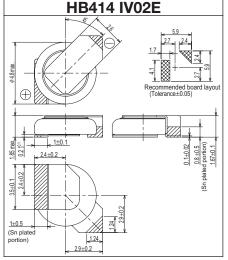
The times of repeated reflow soldering must be two times or less. The Temperature must be measured at top of the cell.

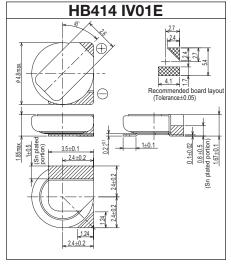


Max. 260 °C (within 5 seconds)

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%).

Micro Battery 2011-2012 Seiko Instruments Inc.

TS518FE/TS621FE



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.

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 smartphone, tablet, cellular and PHS phone

SPECIFICATIONS

Туре	Nominal Voltage (V)	Charge Voltage ^{*3} (V)	Nominal Capacity (Voltage Range V) (mAh)	Internal Impedance*1 (Ω)	Standard Charge/ Discharge Current (mA)		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.) 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.) 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.

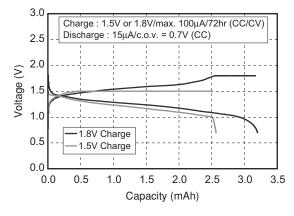
If a constant current charge is required, please contact us for more information.

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

CHARACTERISTICS

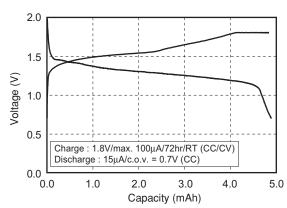
Charge discharge characteristics

TS518FE

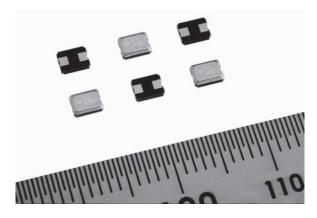


* c.o.v. : Cut Off Voltage

TS621FE



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% (CP3225A) / 85% (CPH3225A) of full capacity.

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

FEATURES

- · Small and thin size
- · Excellent leakage resistance and humidity resistance
- · Pb-free reflowable:

Superior heat resistance (260°C peak) allows reflow soldering by Pr-free solder

- · 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 use the battery at a temperature out of the above temperature range, please consult us.

· RoHS Compliant



Backup Power for various devices.

Super small size power supply.

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

SPECIFICATIONS

Туре	Maximum Use Voltage (V)	Nominal Capacity (Voltage Range) Capacitance	Internal Impedance* <nominal> (Ω)</nominal>	Size(L × W × H) (mm)	Weight (g)
CPH3225A	3.3	4.6μAh (3.3V-1.8V) 0.011F	160	$3.2\times2.5\times0.9$	0.025
CP3225A	2.6	4.5μAh (2.6V-1.4V) 0.014F	80	$3.2\times2.5\times0.9$	0.025

^{*.} 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.

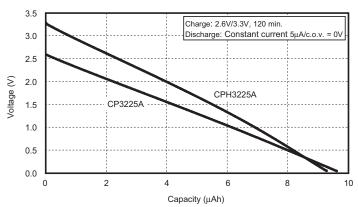
Usage environment

Aging degradation of the capacitor varies depending on the usage environment (temperature and humidity).

Contact us for further details.



Discharge characteristics





XH311HG/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



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

SPECIFICATIONS

	Electrical Sp	Electrical Specifications (Normal Temperature)*1				
Туре	Maximum Use Voltage (V) Capacitance (F)		Internal Impedance *2 (Ω)	Diameter (mm)	Height (mm)	Weight (g)
XH311HG	3.3	0.02	300	3.8	1.1	0.04
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

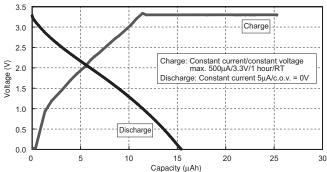
Aging degradation of the capacitor varies depending on the usage environment (temperature and humidity).

Contact us for further details.

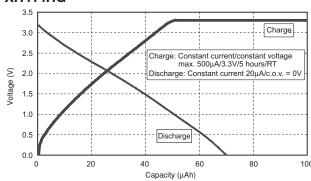


Charge/discharge characteristics

XH311HG



XH414HG

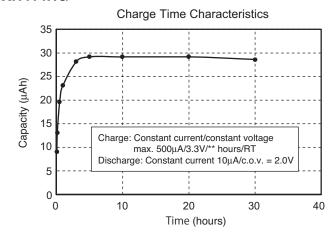


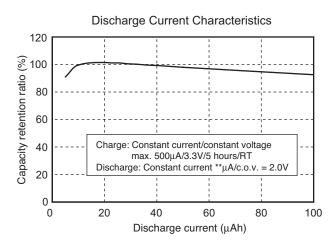
XH Capacitor Pb-free reflowable

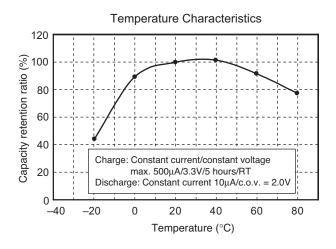


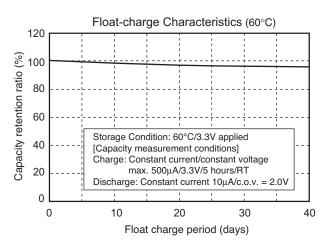
CHARACTERISTICS

XH414HG

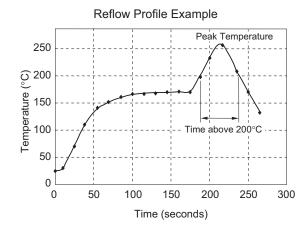




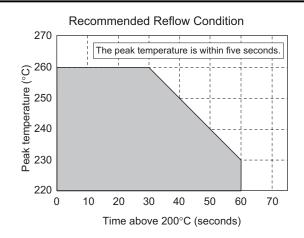




REFLOW SOLDERING CONDITIONS



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



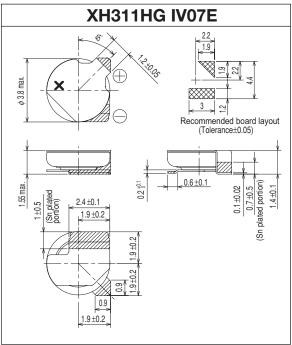
Max.260°C (within 5 seconds)

Micro Battery 2011-2012 Seiko Instruments Inc. 15

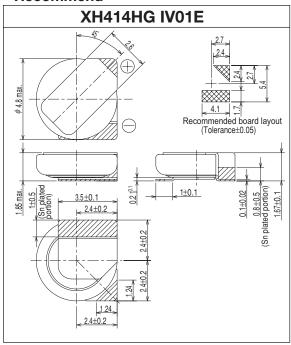


STANDARD TERMINALS

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%).

Seiko Instruments Inc. Micro Battery 2011-2012

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 compan	ny name		
2. Which applic	ation do you use?		
3. Your expecte	ed backup period	hour	/ day / month
4. Your request	ed delivery date		mm / yy
5. Operation vo	Itage of the device for backup	V to	V
6. Consumption	current at backup time	mA •	μΑ
7. Setting value	of charging voltage		V
8. Presence of	reverse current protection diode		Yes • No
9. Vf characteri	stics of the reverse current protection diode (at 10µA)		V
10. Resistance	value of charging protection resistance		Ω
11. Limit of cha	rging time		
12. Required cy	/cle life		times
13. Other reque	ests		
14. Expected lif	e (e.g., xx years or backup for xx hours)		
15. Ambient ten	nperature and humidity		
	Your contact information		
	Name		
	Section		
	Phone		
	Fax		
	E-mail		

Micro Battery 2011-2012 Seiko Instruments Inc. 17

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.



■ 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.

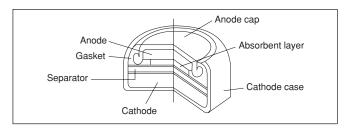


ADVANCED TECHNOLOGY

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.			Characteristics n Temperature)	Dimer	nsions	Weight	C.C	.V.*2
			Nominal Voltage (V)	Nominal Capacity*1 (mAh)	Diameter (mm)	Height (mm)	(g)	+24°C (V)	−10°C (V)
	SR416SW	337		7.5	4.8	1.65	0.11	1.35	
	SR421SW	348		12	4.0	2.15	0.14	1.00	
	(SR512SW)	(SR512SW) 335 5.5		1.25	0.15				
	SR516SW	317		12.5	5.8	1.65	0.18		1.10
	SR521SW	379		16	5.0	2.15	0.23		1.10
	SR527SW	319		22		2.70	0.29	-	
	SR616SW	321		16	6.8	1.65	0.25		
	SR621SW	364		23		2.15	0.32		1.20
	SR626SW	377		30		2.60	0.39		1.20
Low	(SR712SW)	346	1.55	11		1.25	0.26		1.10
Drain	SR716SW	315		21	7.9	1.65	0.33	1.45	
	SR721SW	362		28		2.10	0.42		
	SR726SW	397		34	7.5	2.60	0.52		
	SR731SW	329		36		3.10	0.56		
	SR41SW	384		45		3.60	0.67		
	SR916SW	373		27		1.65	0.51		
	SR920SW	371		46	9.5	2.05	0.60		1.20
	SR927SW	395		60	9.5	2.70	0.75		1.20
	SR936SW	394		85		3.60	1.10	1	
	SR1120SW	381		53		2.05	0.93		
	SR1130SW	390		80	11.6	3.05	1.29		
	SR43SW	301		120	11.0	4.20	1.75	1	
	SR44SW	303		160		5.40	2.20		

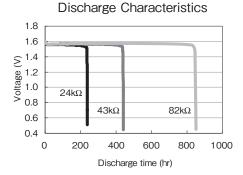
SPECIFICATIONS

	Model No.			Characteristics n Temperature)	Dimer	nsions	Weight	C.C	.V.*2
			Nominal Voltage (V)	Nominal Capacity*1 (mAh)	Diameter (mm)	Height (mm)	(g)	+24℃ (V)	—10°C (V)
	SR626W	26W 376 30		30	6.8	2.60	0.39		0.95
	SR721W	361		26		2.10	0.41	1.35	
	SR726W	396		34	7.9	2.60	0.52	1.00	1.05
	SR41W	392		45		3.60	0.67		
High	SR920W	370	1.55	42	0.5	2.05	0.60		1.10
Drain	SR927W	399		53	9.5	2.70	0.75	1.40	1.10
	SR1120W	391		53		2.05	0.93	1.40	
	SR1130W	389		80	11.0	3.05	1.29		1.00
	SR43W	386		120	11.6	4.20	1.75	1.45	1.20
	SR44W	357		160		5.40	2.20	1.43	

^{*1.} Discharged to 1.2V

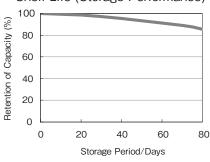
CHARACTERISTICS

SR521SW



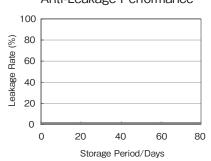
[Measurement conditions] Temperature:23°C

Shelf Life (Storage Performance)



 $\begin{tabular}{ll} \begin{tabular}{ll} \hline [Measurement conditions] & Temperature:23°C \\ Load:43k\Omega \\ \hline [Storage conditions] & 60°C Dry \\ \hline \end{tabular}$

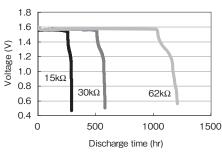
Anti-Leakage Performance



[Storage conditions] Temperature:45°C Humidity:93%RH

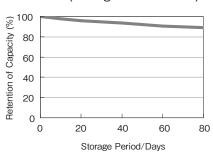
SR626SW

Discharge Characteristics



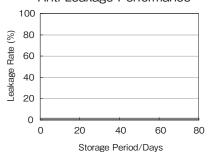
[Measurement conditions] Temperature:23°C

Shelf Life (Storage Performance)



 $\begin{tabular}{ll} \begin{tabular}{ll} & Load:30k\Omega \\ \begin{tabular}{ll} \begin{tab$

Anti-Leakage Performance



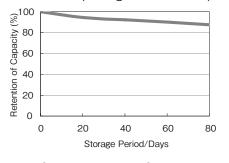
[Storage conditions] Temperature:45°C Humidity:93%RH

SR920SW

Discharge Characteristics 1.8 1.6 \geq 1.4 9, 1.2 9, 1.0 0.8 0.6 0.4 0 200 400 600 800 1000 1200 Discharge time (hr)

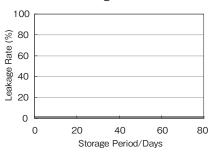
[Measurement conditions] Temperature:23°C

Shelf Life (Storage Performance)



 $\begin{tabular}{ll} \begin{tabular}{ll} \hline & Measurement conditions \end{tabular} & Temperature: 23 °C \\ & Load: 20 k\Omega \\ \hline & Storage conditions \end{tabular} & 60 °C Dry \\ \hline \end{tabular}$

Anti-Leakage Performance



[Storage conditions] Temperature:45°C Humidity:93%RH

^{*2.} C.C.V. : Closed Circuit Voltage High Drain : 200Ω 5sec DC

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, to reduce CO₂, and to conserve biodiversity.
- 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 recommodations 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.

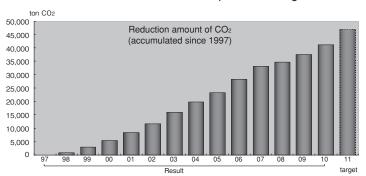
Based on the above policy, the following six environmental approaches are now being implemented throughout Micro-Energy Division.

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, 33 products are certified as SII "High Grade" Green Products.

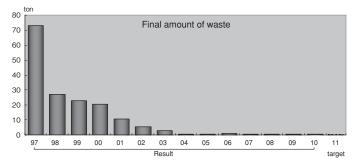
2. Reduction of Greenhouse Gas

• We practice various CO₂ reduction measures like using Eco-machinery. Since 1997, we have successfully reduced a total of 42,500 tons of CO₂. 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. Biodiversity Conservation

We think that contribution to biodiversity conservation is not only a part of our corporate social contributions but also
an important issue that should be discussed through whole our business activities. We are going to consider how to
relate our activities to biodiversity.

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.

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



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.

It is dangerous that children swallow the battery. When you design mechanical hardware around the battery, please fix the battery firmly in order to prevent children from removing it.

When you store the batteries, please keep the batteries out of children's reach.

If 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 weld terminals to the battery

The heat by welding may cause fire, heat generation, leakage or bursting.

We weld standard terminals under strictly controlled conditions

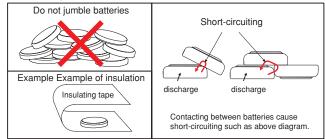
If you need to weld terminals to the battery, please consult us in advance.

• 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.





- 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 no 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 deteriorate 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.I) must be put on each package.
(b) **<Not Restricted Declaration>** Each shipment must be accom-

(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.

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



 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 (for XH only)
 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.
 It is dangerous that children swallow the capacitor.

When you design mechanical hardware around the capacitor, please fix the capacitor firmly in order to prevent children from removing it.

When you store the capacitors, please keep the capacitors out of children's reach. If 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.



- 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.



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.
 It is dangerous that children swallow the battery.
 When you design mechanical hardware around the battery, please

fix the battery firmly in order to prevent children from removing it. When you store the batteries, please keep the batteries out of children's reach.

If 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.



- 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.

IMPORTANT

- The information herein is subject to change without notice.
- Neither reproduction, duplication nor unauthorized use of this catalog in whole or part is allowed without the prior written approval of Seiko Instruments Inc.
- The colors of the products reproduced herein ("Products") may be different from the actual colors. Check colors on actual products before using the Products.
- 4. Circuits and respective application methods described herein are for reference only. Seiko Instruments Inc. shall not be liable for any damages or losses resulting from any claim by third parties that any Products or application methods described herein infringe any right intellectual property
- right. All intellectual property rights with respect to the Products belong exclusively to Seiko Instruments Inc.
- Seiko Instruments Inc. does not grant users of the Products any right or license to the Products hereunder.
- When Products include Strategic Products (or Services) stipulated in the Foreign Exchange and Trade Control Law, they shall not be exported without permission of governmental authorities.
- 6. The Products are designed for consumer equipment and cannot be used as part of any device or equipment which influences the human body or requires a significantly high reliability, such as physical exercise equipment, medical equipment, disaster prevention equipment, gas related equipment, vehicles, aircraft and equipment mounted on vehicles.

Seiko Instruments Inc. Micro Battery 2011-2012

SII Electronic Components for Any Requirement!

Super-small, low current consumption



CMOSIC

ICs for various power supplies Memory ICs (E²PROMs) Sensors (temperature, magnetism, etc.) Mini-analog Real-time clocks

Quartz Crystal

microprocessors

Best suited for

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

Compact

Energy saving

High accuracy

Module design and assembly technology

Low-voltage operation

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

Maximum power in a small body!



Micro Battery

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

High reliablility

Made by SII's unique precision machining technology



Small, precision

machining and

DIANET Rare Earth Magnet

Miniature precision springs Metal diaphragms



SPRON Superior performance Co-Ni Alloy Product

Samarium-cobalt (SmCo) magnets

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!















"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.



www.sii-me.com

Seiko Instruments Inc.

Micro-Energy Division 1-8, Nakase, Mihamaku, Chiba-shi, Chiba 261-8507, Japan Telephone:+81-43-211-1735 Facsimile:+81-43-211-8034 Email:component@sii.co.jp

Asia

Seiko Instruments (H.K.) Ltd.

4-5/F, Wyler Centre 2, 200 Tai Lin Pai Rd., Kwai Chung, N.T., Kowloon, Hong Kong Telephone: +852-2494-5111 Facsimile: +852-2480-5479 E-mail:sales@sih.com.hk http://www.sih.com.hk

Seiko Instruments (Shanghai) Inc.

Room 2902, 29th Floor, Shanghai Plaza, 138 Mid Huaihai Rd., Shanghai 200021, China Telephone: +86-21-6375-6611 Facsimile: +86-21-6375-6727

Seiko Instruments Taiwan Inc.

6F, No.236, Sec.2, Jianguo N. Rd., Taipei 104, Taiwan Telephone: +886-2-2516-8518 Facsimile: +886-2-2516-1186 Email:public@sii.co.jp http://www.sii.com.tw

Seiko Instruments Korea Inc.

#507, 508, Korea City Air Terminal Bldg., 159-6, Samsung-dong, Gangnam-gu, Seoul, 135-728 Korea Telephone: +82-2-565-8006 Facsimile: +82-2-565-8306

Europe

Seiko Instruments GmbH

Siemensstrasse 9 D-63263 Neu Isenburg, Germany Telephone: +49-6102-297-0 Facsimile: +49-6102-297-50100 Email:info@seiko-instruments.de http://www.seiko-instruments.de

French Branch 107, Quai du Docteur Dervaux F-92600 Asnieres-Sur-Seine, France Telephone: +33-1-46-88-08-30 Facsimile: +33-1-46-88-08-39

Email:info@seiko-instruments.fr http://www.seiko-instruments.fr

(Specifications are subject to change without notice.)

Released in August 2011

North/Central/South America

Seiko Instruments U.S.A., Inc.

http://www.sii.co.kr

2990 Lomita Blvd.
Torrance, CA 90505, U.S.A.
Telephone: +1-310-517-8124
Facsimile: +1-310-517-7792
Email:info@seikoinstruments.com
http://www.sii-me.com

Contact us			

