SII

SEIKO GROUP

Micro Battery

Seiko Instruments Inc.

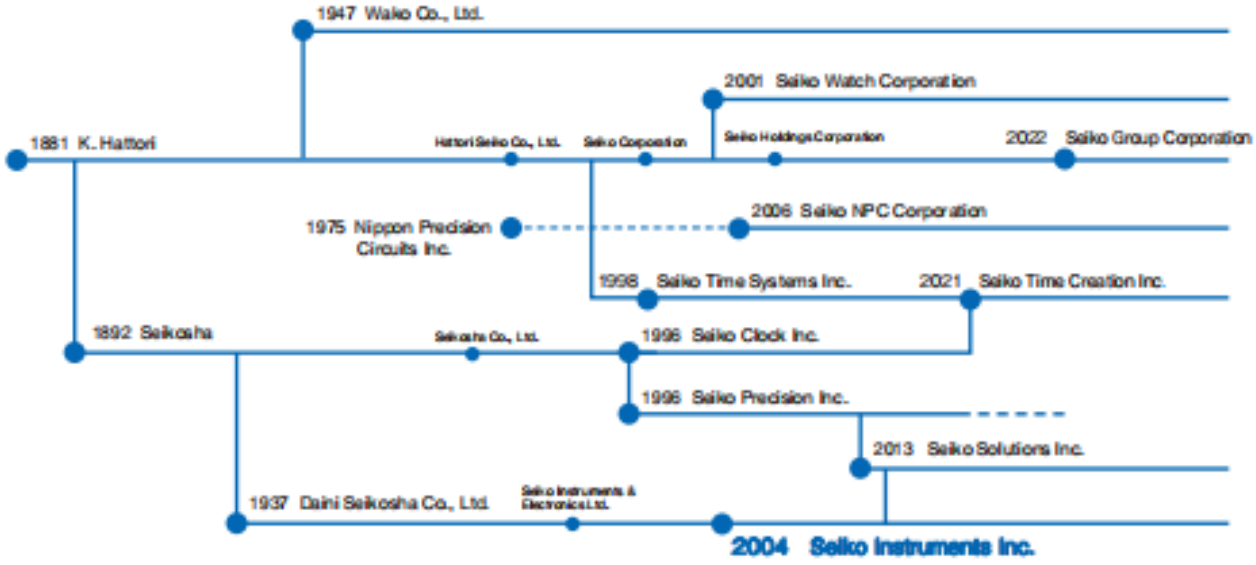
Creating Time - Optimizing Time - Enriching Time

Seiko Instruments Inc. (SII), founded in 1937 as a member of the Seiko Group specializing in the manufacture of watches, has leveraged its core competency in high precision watches to create a wide range of new products and technologies.

Over the years SII has developed high-precision processed parts and machine tools that pride themselves on their sub-micron processing capability, quartz crystals that came about as a result of our quartz watch R&D, and electronic components such as micro batteries. Optimizing our extensive experience and expertise, we have since diversified into such new fields as compact, lightweight, exceedingly quiet thermal printers, and inkjet printheads, a key component in wide format inkjet printers for corporate use.

SII, in the years to come, will maintain an uncompromised dedication to its time-honored technologies and innovations of craftsmanship, miniaturization, and efficiency that meet the needs of our changing society and enrich the lives of those around us.

Genealogy of Seiko Group



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PRECISION, CRAFTSMANSHIP and MINIATURIZATION

Leveraging Watch Making Technology

With Precision, we apply our Craftsmanship to provide Miniaturization advantages to customers' product development around the world.

Electronic Components and High-performance Materials

SII's electronic components were originally derived from the development and manufacturing of quartz watches.

Since 1953

No corrosion, strong, ultra high elasticity Co-Ni alloy product

"SPRON"

The sophisticated metal product, "SPRON", was born as a material to be used in a "mainspring", which is a drive source of mechanical watches. "SPRON" has been used for over 50 years as a drive source of watches by utilizing its high elasticity, high strength, and high heat resistance. Evaluated highly for its corrosion resistance and durable quality, "SPRON" is used for key devises in various fields.

Since 1975

Small and powerful Silver Oxide Battery

Silver Oxide Battery "SEIZAIKEN"

A small-sized primary battery that features a large electrical capacity and almost no voltage drop until the last stage of electrical discharge even though its minimum diameter is 4.8 mm. Since the birth of quartz watches, we have developed batteries to increase their electrical capacity. We have also pursued better leakage resistance and long term reliability characteristics. It is expected to be used as a power supply for disposable, wearable, IoT, and the low energy Bluetooth products.

Since 1976

Precise Timing for Electronic Devices

Tuning Fork Quartz Crystal Resonator

Tuning Fork Quartz Crystal Resonators were developed as the basis for accuracy in the Quartz Watch. Our high quality and reliability was prioritized to meet the stringent requirements for watches. Recent demand in IoT developments where devices are required to operate with low power consumption and accurate communication protocol timing have increased the demand for smaller components with the same rugged reliability as is required in watches. For applications which require absolute lowest power consumption, our Timing Crystals are available in our Low CL specifications.

Since 1979

Excellent heat and corrosion resistance

Samarium-cobalt Magnet "DIANET"

"DIANET", which has its origin in rotor magnets of quartz watches, has superior heat resistance and strong magnetic force even though its outside diameter is only 1 mm or less. The Sendai Unit acquired IATF 16949 Quality Management System for the automotive production industry. "DIANET" is used for a wide range of automotive products, and its advanced quality and performance are highly recognized. In addition, "DIANET" is also used in actuators of cameras for smart phones and medical devices.

Since 1988

Stable and reliable

Rechargeable Battery and Capacitor

The rechargeable batteries supporting a wide temperature range of -40℃ to 85℃ are available in our lineup. They are suitable for operating very low power consumption devices, for backup power supply of clock and memory functions of a wide range of products. The capacitor will correspond to the new needs of energy harvesting devices. Capacitors are extremely useful in various applications.

Micro battery Products Lineup

Our rechargeable batteries, capacitors and silver oxide batteries are available in various sizes for broad range of applications.

Lithium Rechargeable Battery Features
- Excellent cycle characteristics
- Available in many compact sizes
- Wide Temperature Range (MS-T)
- Reflowable (MS-R, ML)

Capacitor Features
- Reflowable and high reliability
- Super small and thin size

Silver Oxide Battery Features
- Stable output voltage
- Available in many sizes of φ11mm or less
- High capacity and High output

Lithium Rechargeable Battery

Series	Type	Size (DxH) (mm)	Nominal Voltage (V)	Maximum Use Voltage (V)	Nominal Capacity (mAh)	Internal Impedance (Ω)	Operating Temperature Range (°C)	Cycle Life (100% D.O.D.) (Time)	Reflowable
MS-R	MS421R	4.8 × 2.1	3	3.3	1.5	600	−20 to +60	50	Yes
	MS621R	6.8 × 2.1	3	3.3	3.0	400	−20 to +60	50	Yes
MS	MS412FE	4.8 × 1.2	3	3.3	1.0	100	−20 to +60	100	–
	MS414GE	4.8 × 1.4	3	3.3	2.0	100	−20 to +60	50	–
	MS518SE	5.8 × 1.8	3	3.3	3.4	90	−20 to +60	100	–
	MS614SE	6.8 × 1.4	3	3.3	3.4	80	−20 to +60	100	–
	MS621FE	6.8 × 2.1	3	3.3	5.5	80	−20 to +60	100	–
	MS920SE	9.5 × 2.1	3	3.3	11.0	35	−20 to +60	100	–
MS-T	MS621T	6.8 × 2.1	3	3.3	3.0	80	−40 to +85	100	–
	MS920T	9.5 × 2.0	3	3.3	6.5	60	−40 to +85	100	–
TS	TS621E	6.8 × 2.1	1.5	3.0	2.5	50	−20 to +60	100	–
	TS920E	9.5 × 2.0	1.5	3.0	5.5	20	−20 to +60	50	–
ML	ML414H	4.8 × 1.4	3	3.1	1.0	600	−20 to +60	300*	Yes

*10% D.O.D.

Electric Double Layer Capacitor

Type	Size (LxWxH) (mm)	Maximum Use Voltage (V)	Capacitance (mF)	Internal Impedance (Ω)	Temperature Range (°C)	Reflowable
CPH3225A	3.2 × 2.5 × 0.9	3.3	11.0	160	−20 to +60	Yes
CPM3225A	3.2 × 2.5 × 0.9	2.6	11.5	80	−30 to +70	Yes

Silver Oxide Battery (High Drain)

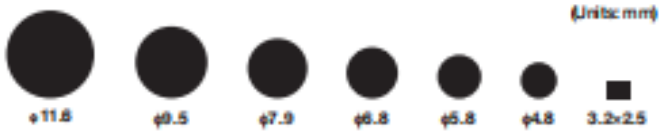
Type	Nominal Voltage (V)	Nominal Capacity (mAh)	Size (DxH) (mm)	Weight (g)
SR626W	1.55	28	6.8 × 2.60	0.39
SR721W	1.55	26	7.9 × 2.10	0.41
SR726W	1.55	34	7.9 × 2.60	0.52
SR41W	1.55	45	7.9 × 3.60	0.67
SR920W	1.55	42	9.5 × 2.05	0.60
SR927W	1.55	53, 60	9.5 × 2.70	0.75
SR1120W	1.55	53	11.6 × 2.05	0.93
SR1130W	1.55	80	11.6 × 3.05	1.29
SR43W	1.55	120	11.6 × 4.20	1.75
SR44W	1.55	160	11.6 × 5.40	2.20

Applications

General digital equipment | Communication modules | Wireless sensor network devices | Health care equipment | Vehicle devices

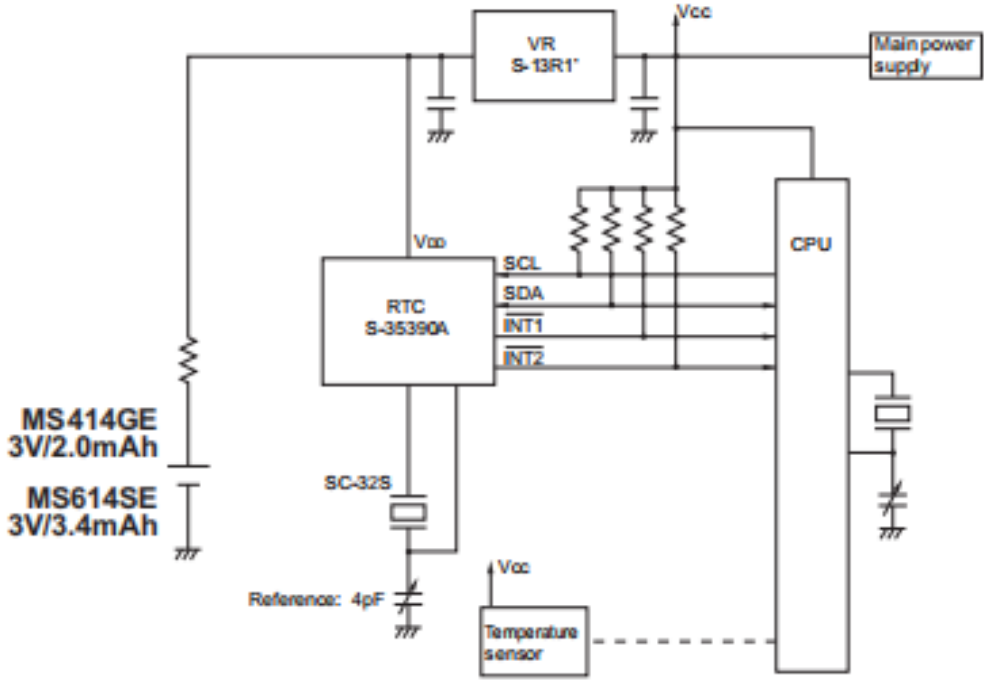
Actual sizes

(Units: mm)



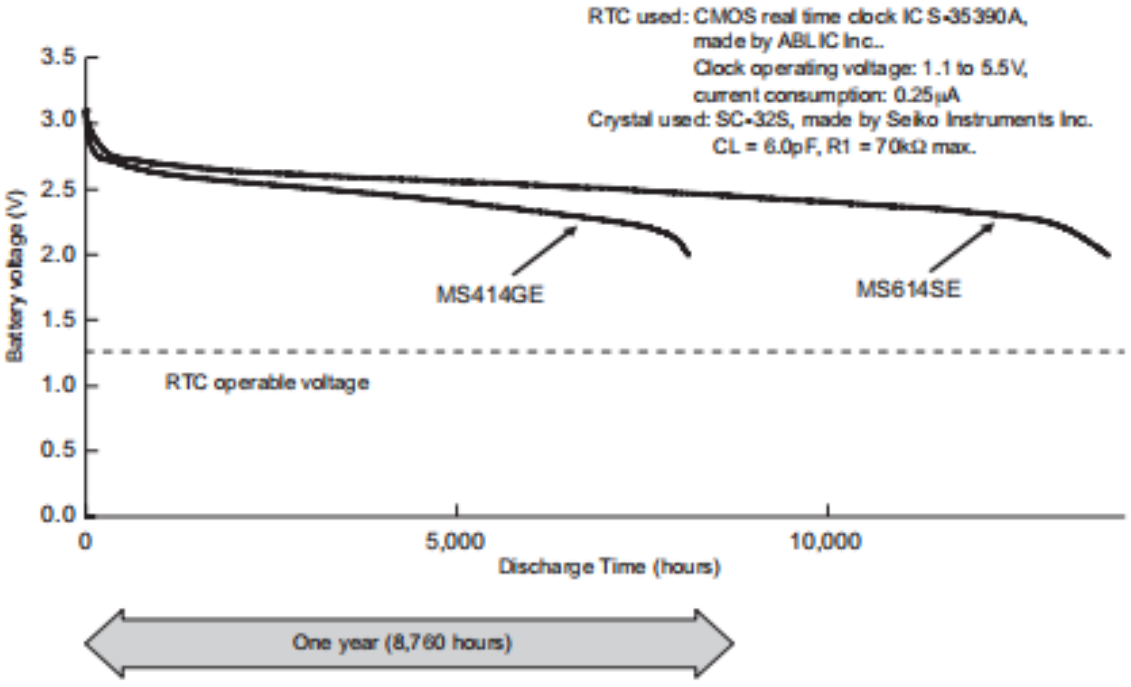
Example of a Application Circuit

Example of RTC backup circuit



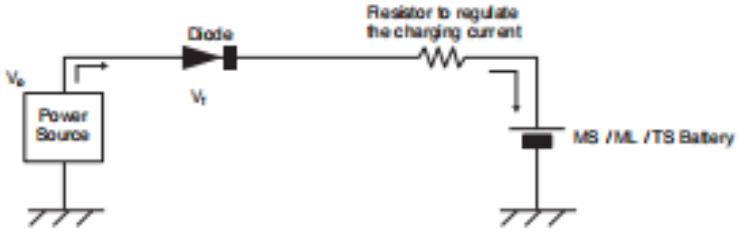
* Reverse Current Protection CMOS Voltage Regulator S-13R1, made by ABLIC Inc..
* This circuit diagram is a reference example. See the data sheet of each product before using it.

Example of RTC backup time, using MS414GE / MS614SE



* This graph is a rough indication. The operating time varies depending on the actual service conditions.

Charging circuit for MS / ML / TS Lithium Rechargeable Battery



The charging voltage "Vo" must Not be higher than 3.3V (MS series) / 3.1V (ML414H) / 3.0V (TS series).
A resistor must be inserted to regulate the charging current, because our rechargeable batteries have a limit for charging current.
Please see the below table for recommended resistor values.
Those values are minimum for each battery type and "Vo" in the charging circuit.
The following table lists the recommended resistance values. For example, MS614SE and Vo 3.3V, the resistor value should be 620 ohm or more.

■MS lithium rechargeable battery / ML lithium rechargeable battery

	MS412FE MS414GE	MS421R	MS518SE	MS614SE	MS621FE MS621T MS621R	MS920SE MS920T	ML414H
Vo (V)	Resistor (ohm)	Resistor (ohm)	Resistor (ohm)	Resistor (ohm)	Resistor (ohm)	Resistor (ohm)	Resistor (ohm)
3.3	2,000	3,000	1,500	620	620	620	prohibited
3.1	1,600	3,000	820	330	330	330	3,000

■TS lithium rechargeable battery

	TS621E	TS920E
Vo (V)	Resistor (ohm)	Resistor (ohm)
3.0	10,000	12,000
2.3	6,800	8,200
1.6	3,000	4,700

Discharge capacity depends on charging voltage.
Lower charging voltage may cause lower discharge capacity.
Please see Charge Voltage Characteristics data in respective battery pages.

Charging circuit for CPH / CPM capacitor

You do not need to insert a resistor to regulate charging current.
Our CPH / CPM capacitor do not have a limit for charging current.
The charging voltage "Vo" must Not be higher than 3.3V (CPH3225A) / 2.6V (CPM3225A).