

Ideal for IoT and Wearables

Small Li-Ion Rechargeable Battery



nichicon

Jun. 2022

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3. Market trend

4. Introduction of IoT solutions

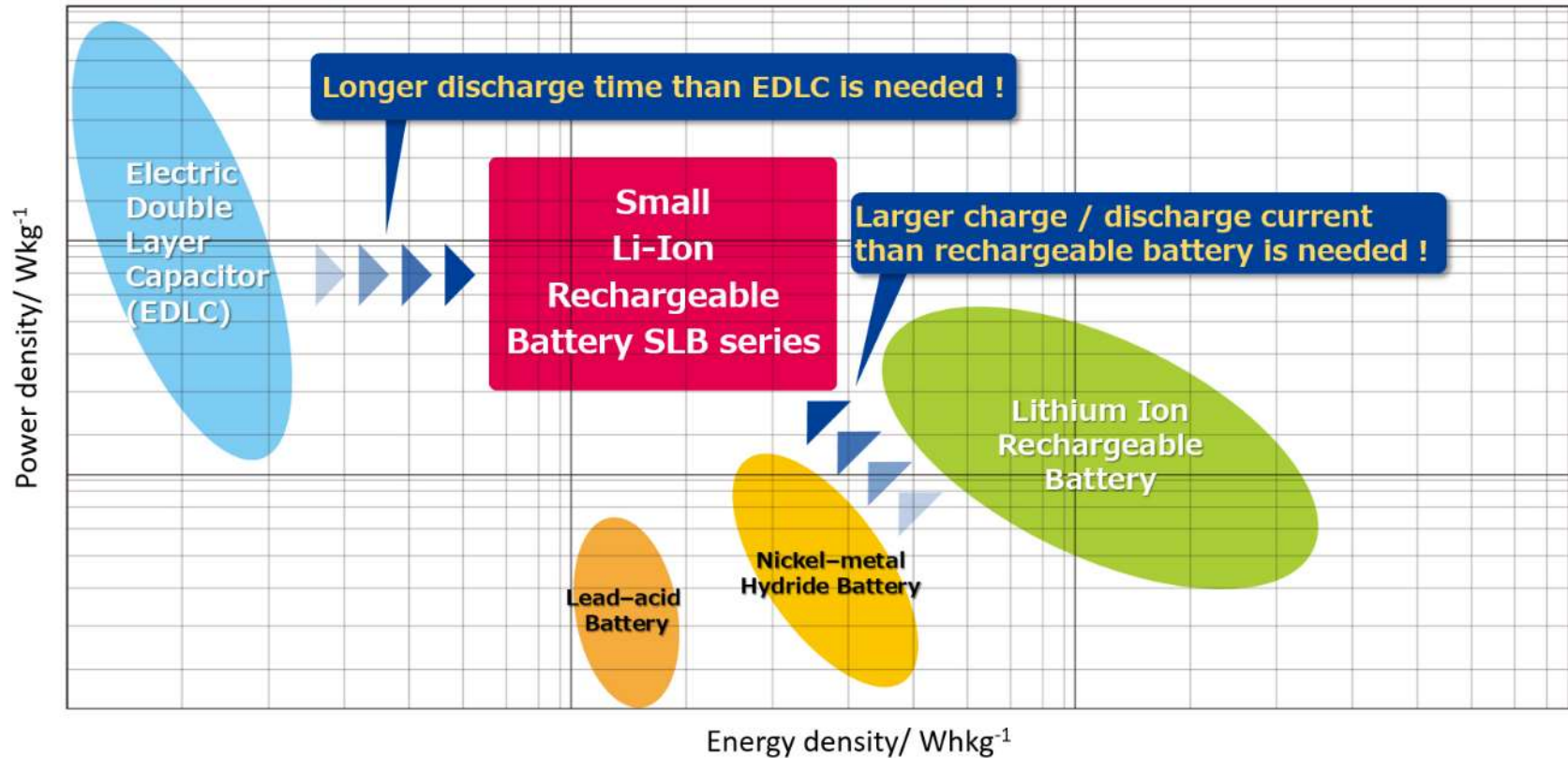
5. Charge/discharge power supply IC

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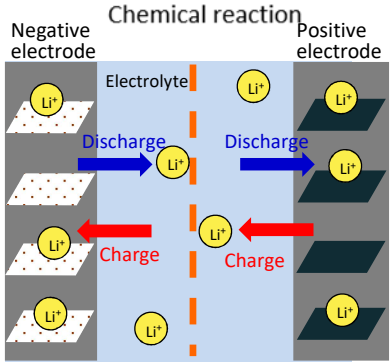
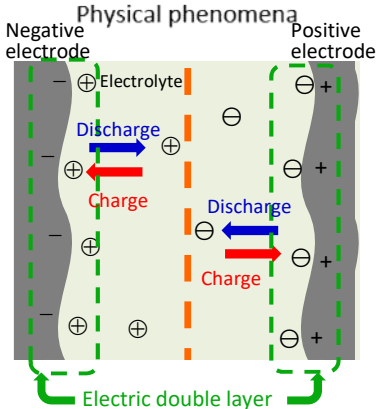
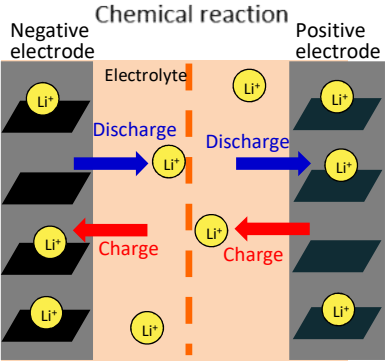
Development background

Overview of SLB series



Electric storage device having high output and large capacity is demanded.

Difference of Electric storage devices

Name	SLB series	Electric double layer capacitor	Lithium-Ion Batteries
mechanism	 <p>Chemical reaction</p>	 <p>Physical phenomena</p>	 <p>Chemical reaction</p>
Voltage	To 2.8V	To 2.7V	To 4V
Energy density	To 40Wh/kg Advantage over EDLC	To 7Wh/kg	To 300Wh/kg
Power density	To 3kW/kg Advantage over Batteries	To 10kW/kg	To 1kW/kg
Operating temperature range	-30 to +60°C Advantage over Batteries	-40 to +85°C	-20 to +60°C
Cycle life	25,000 times over Advantage over Batteries	1,000,000 times over	To 3,000 times
Discharge range	There is a lower limit voltage	Discharge to 0 V	There is a lower limit voltage
Safety	No rupture or ignition Advantage over Batteries	No rupture or ignition	Rupture or ignition
Merit	High power, Long life, safety	High power, Long life, safety	High energy density
Demerit	Low energy density	Low energy density	Short life time

New electric storage device has long life and excellent safety.

Special “Negative electrode” of Small Lithium Ion Rechargeable Battery

What is the difference between “Small Lithium Ion Rechargeable Battery” and “Conventional Lithium Ion Rechargeable Battery” ?

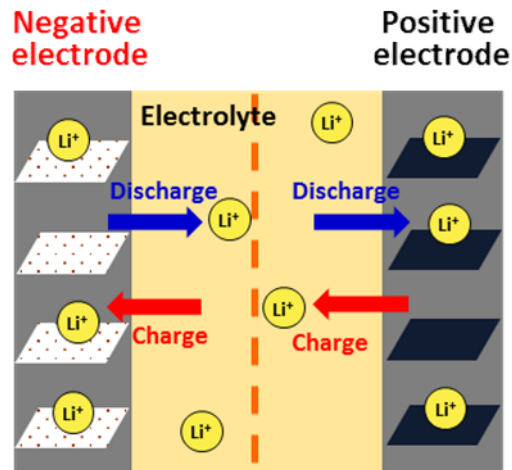
→ **Negative electrode**

Negative electrode : Conventional Lithium Ion Rechargeable Battery



Small Lithium Ion Rechargeable Battery

LTO



Advantages of LTO (Lithium Titanate):

- Material with thermal stability that does not burn.
- Low reactivity with electrolyte → Low heat generation
- Material with low electron conductivity
→ Only little current and heat will generate when short occurs between positive and negative electrode
Only a small current and heat are generated.



High safety and reliability

Main Advantages

1

Long life

Over **25,000 cycles** life time

2

Rapid Charge/discharge

Charge/discharge at large current rate (**20C Max.**)

3

Low-current charging

Low rate (**0.01C**) chargeable

4

Low-temperature operation Can be used at temperatures as low as **-30deg.C**

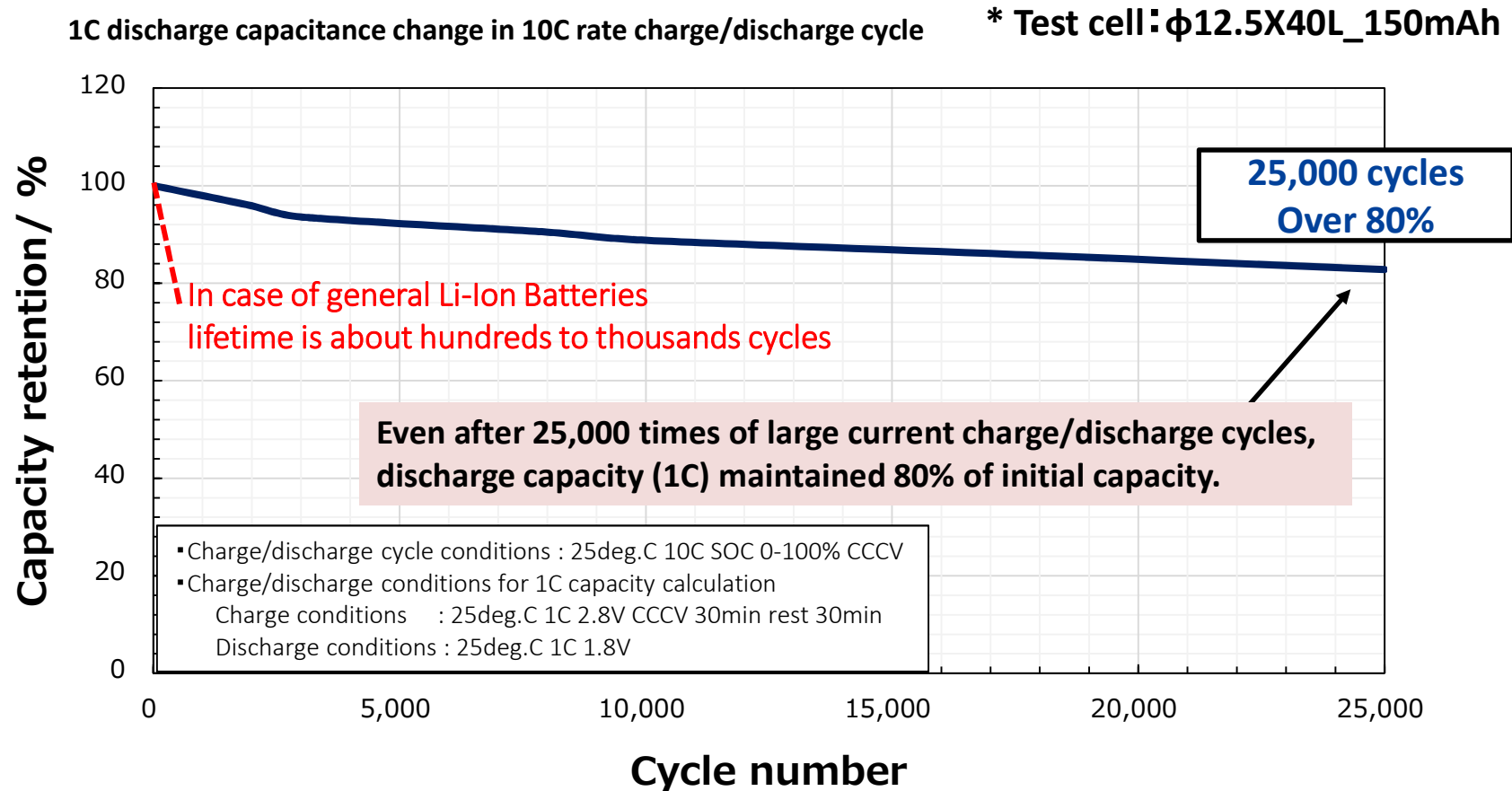
5

Safety

Uses highly safe lithium titanium oxide (**LTO**)

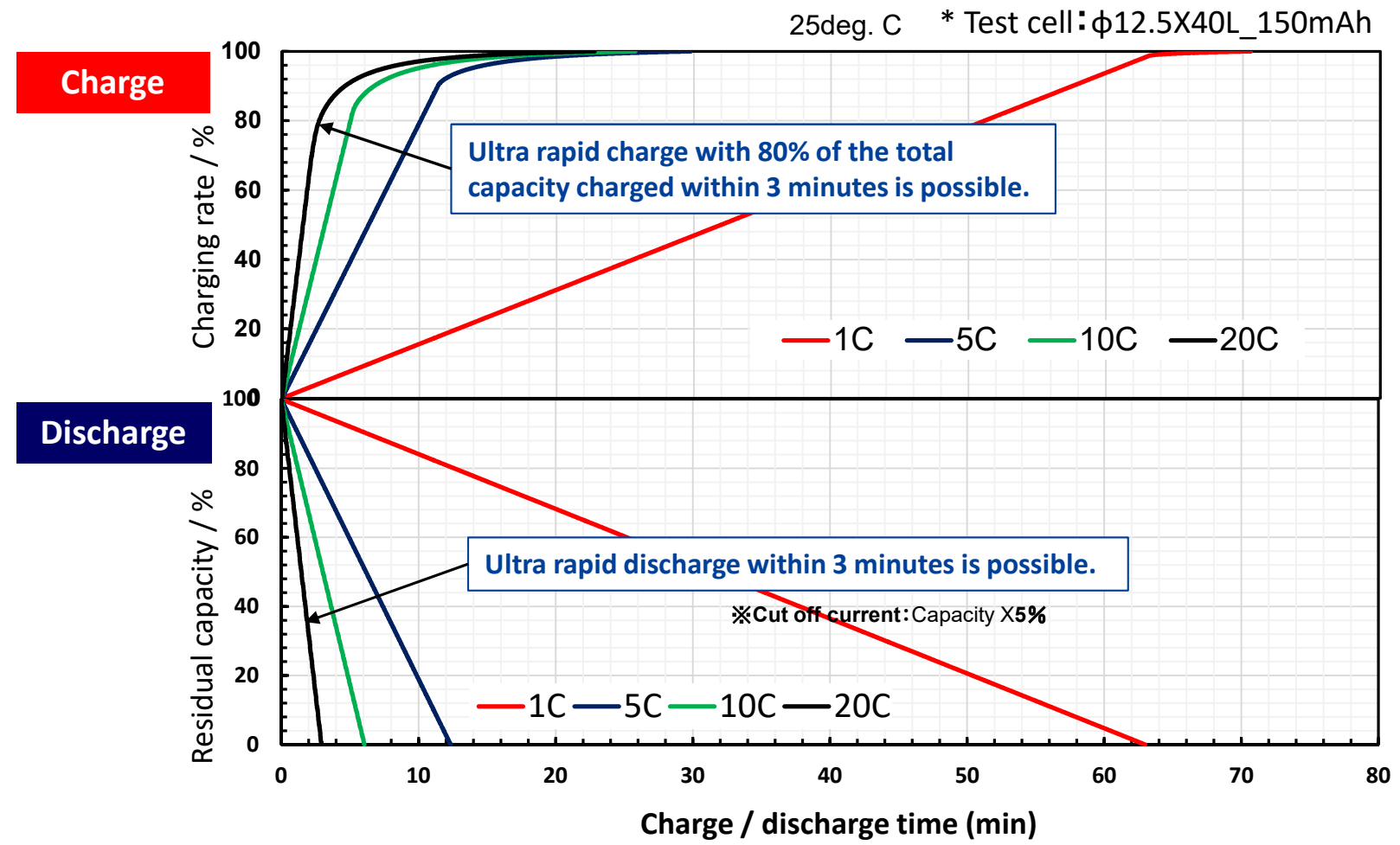
Cycle characteristics

1 Long life: Over 80% of the capacity is maintained after 25,000 cycles of charge/discharge.



Charge/discharge characteristics

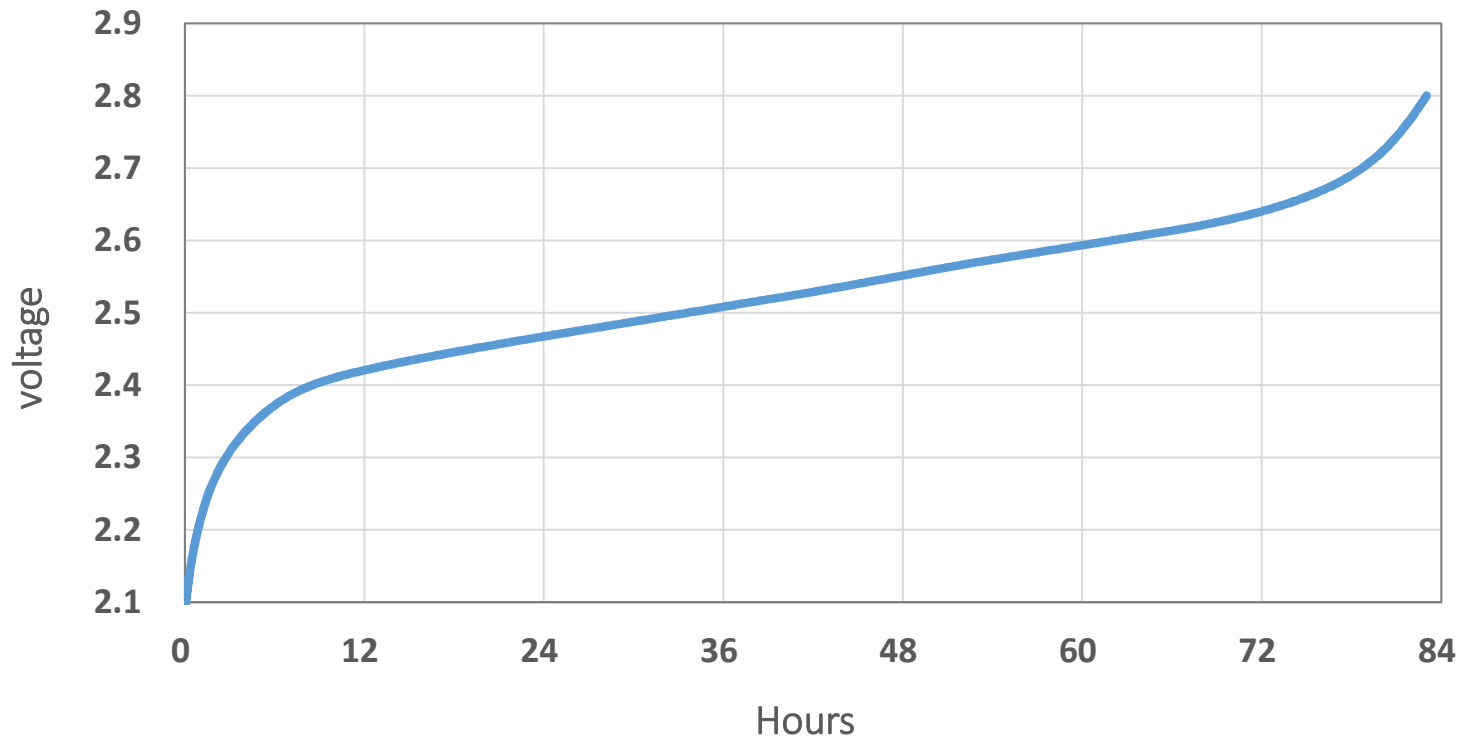
2 Rapid charge/discharge is possible: Power density similar to EDLC.



Low current charging

3 Low-current charging Low rate (0.01C) chargeable

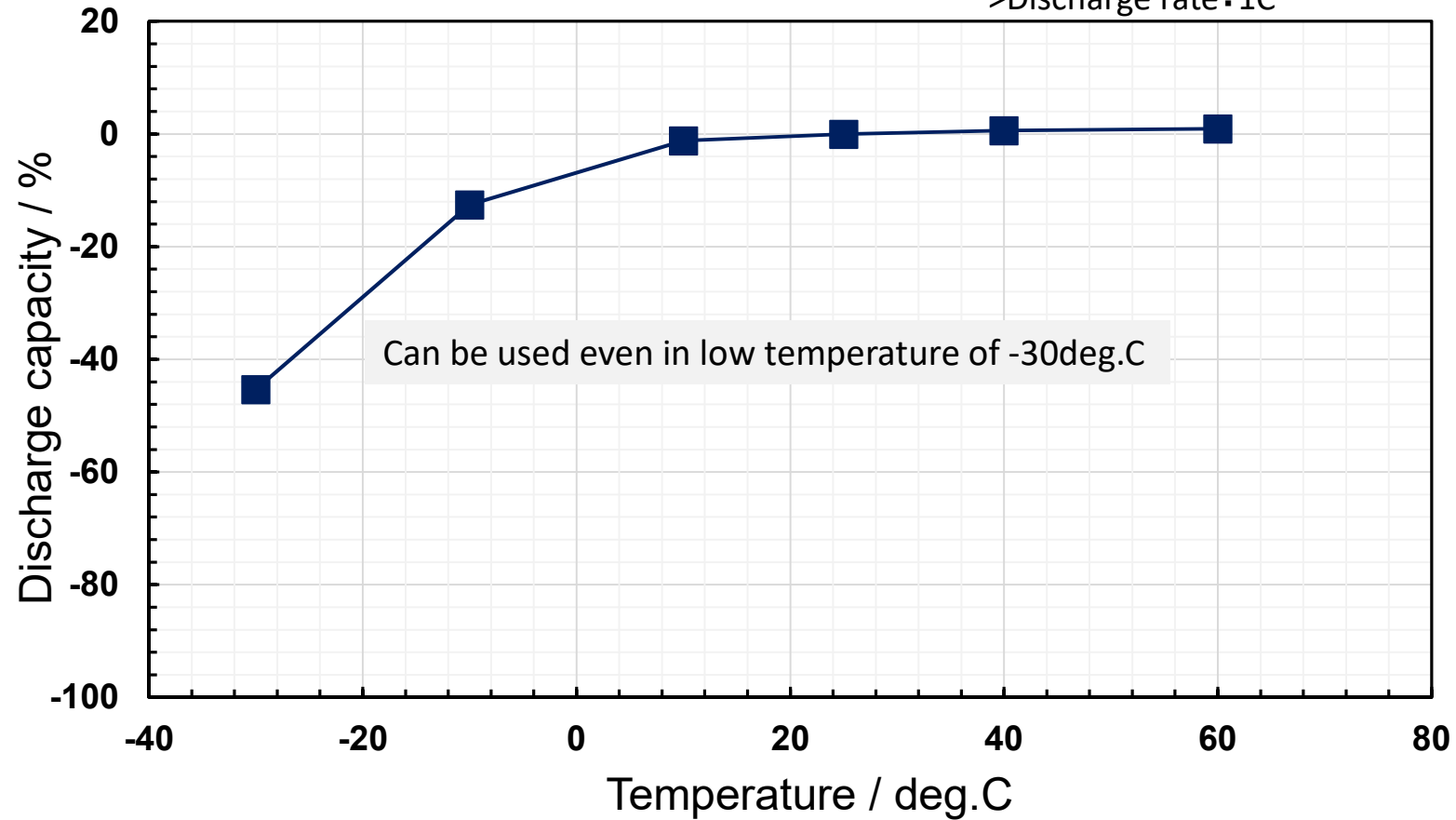
Size
φ3×7L (0.35mAh) Test conditions
Charging current; 5μA (=0.014C)



Temperature characteristics

4 Low-temperature operation: Can be used at low temperatures (-30deg.C)

>Test cell: ϕ 12.5X40L_150mAh
>Discharge rate: 1C



Safety

5 Safety: There is a very low risk of **fire or explosion** from internal short circuit.

No.	Test Item	Judgement Criteria	Result
1	Crushing by pressure	No Rupture or ignition	No Rupture or ignition
2	Nail penetration test	No Rupture or ignition	No Rupture or ignition
3	Blunt Nail Test	No Rupture or ignition	No Rupture or ignition
4	External short circuit	No Rupture or ignition	No Rupture or ignition
5	Over charge	No Rupture or ignition	No Rupture or ignition
6	Forced discharge	No Rupture or ignition	No Rupture or ignition

Li-Ion Rechargeable Battery

There is a device with very low risk of fire or explosion and high safety.



Safe

Crushing by pressure



Nail penetration

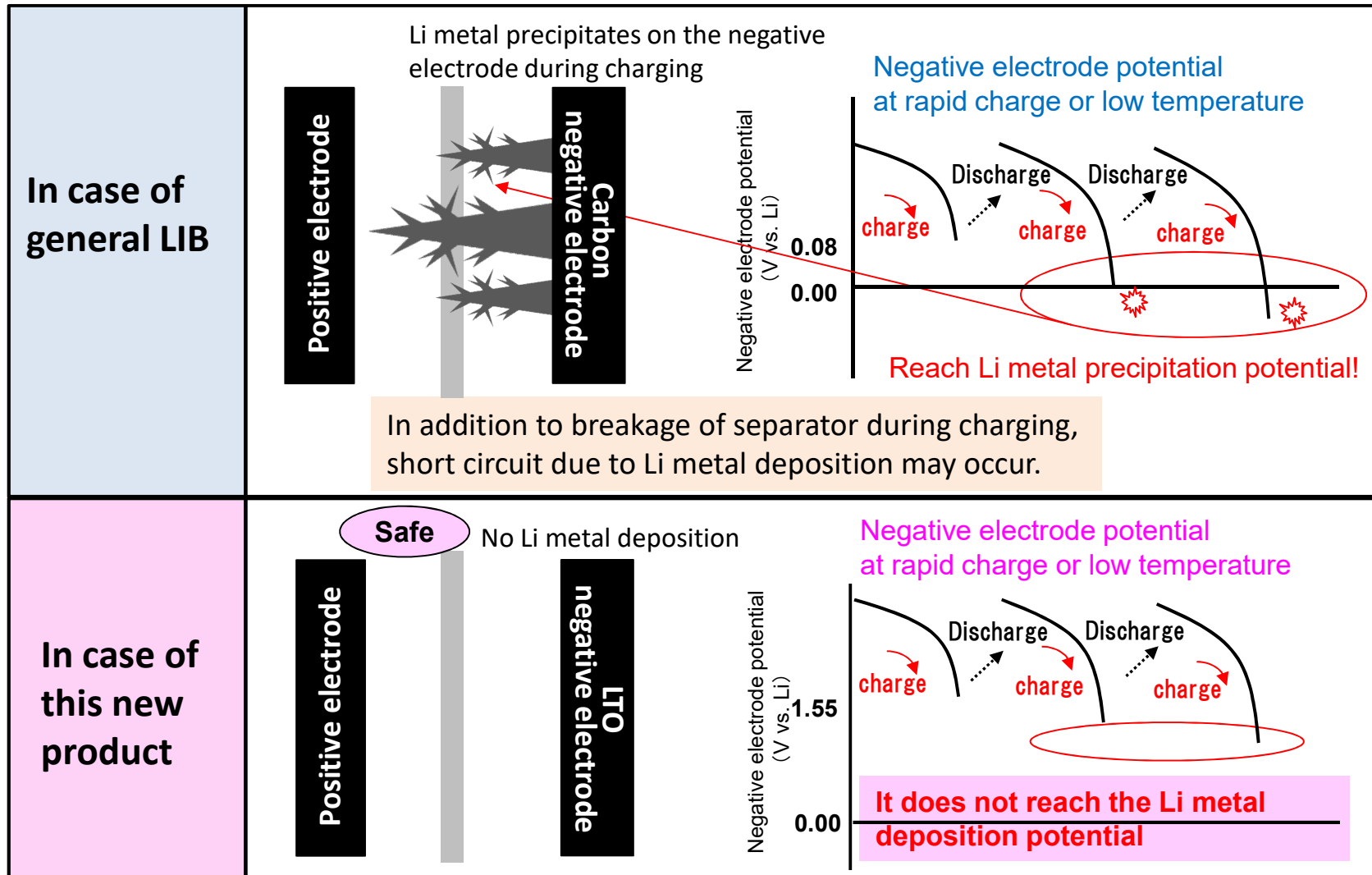


- UL1642 and IEC62133-2: 2017 certified.
- It was confirmed to be safe with no rupture or ignition in tests of crushing, nailing, external short circuit, overcharging, and forced discharge.






High safety due to materials used

Materials / Technology	This development product	Conventional LIB
Negative electrode material	<p>LTO (using incombustible materials) → Thermally stable</p>	<p>Carbon material (Graphite)</p>
Internal short circuit current	<p>Small (When short-circuited, the resistance of the LTO surface is increased due to phase change)</p>	<p>Large</p>
Li metal deposition	<p>None (During fast charge, low temperature, It does not reach the Li deposition potential even in the long cycle)</p>	<p>Occur (During fast charge, low temperature, the Li deposition potential is reached at long cycle)</p>

No short circuit due to lithium deposition



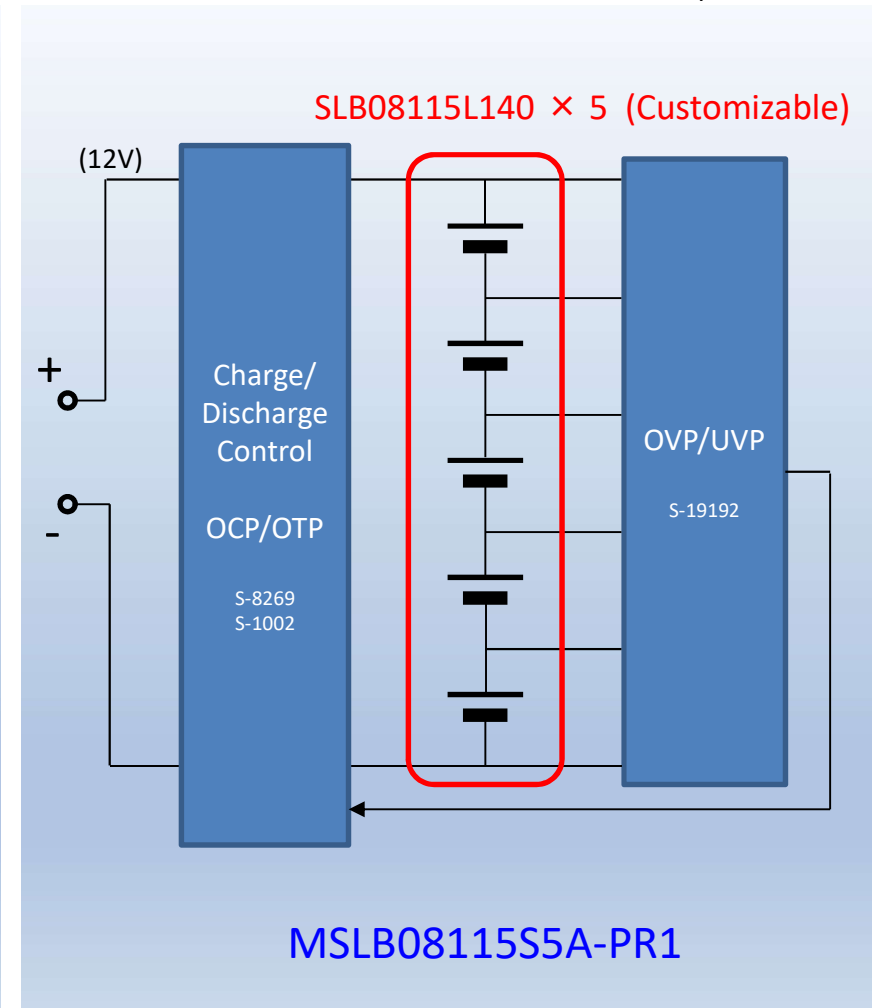
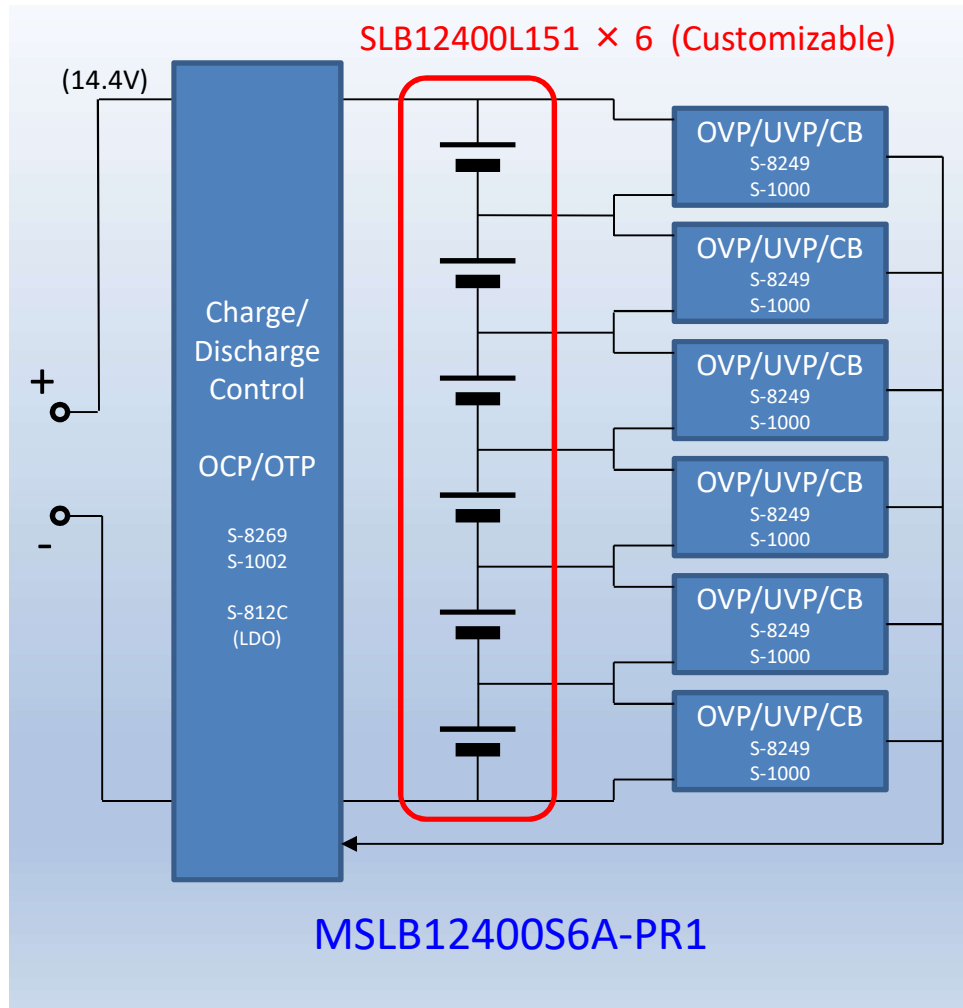
Specifications of Small Li-Ion Rechargeable Battery

Part number		SLB03070LR35	SLB03090LR80	SLB04255L040	SLB08115L140	SLB12400L151
			 TENTATIVE	 TENTATIVE		
Size	φ	3.0 mm	3.3 mm	4.0 mm	8.0 mm	12.5 mm
	L	7.0 mm	9.0 mm	25.5 mm	11.5 mm	40.0 mm
Nominal voltage		2.4V	2.4V	2.4V	2.4V	2.4V
Voltage range		2.8 - 1.8V	2.8 - 1.8V	2.8 - 1.8V	2.8 - 1.8V	2.8 - 1.8V
Nominal capacity		0.35mAh	0.80mAh	4mAh	14mAh	150mAh
Max.charge/ discharge current (C rate)		7mA (20C)	16mA (20C)	80mA (20C)	280mA (20C)	3000mA (20C)
ESR (at 1kHz)		Max. 12 Ω	Max. 8 Ω	Max. 0.6 Ω	Max. 0.24 Ω	Max. 0.06 Ω
Temperature range		-30 ~ +60°C	-30 ~ +60°C	-30 ~ +60°C	-30 ~ +60°C	-30 ~ +60°C
Energy density		17Wh/L	25Wh/L	30Wh/L	58Wh/L	73Wh/L
Weight		0.12g	0.16g	0.75g	1.2g	9.0g

MP : July 2022

MP : July 2022

SLB Battery Pack Block Diagram



OVP: Over Voltage Protection / UVP: Under Voltage Protection / CB : Cell Balancing / OCP: Over Current Protection / OTP: Over Temperature Protection

SLB Battery Pack Tentative Specifications

Part number(tentative)	MSLB12400S6A-PR1	MSLB08115S5A-PR1
Nominal voltage	14.4V	12V
Voltage range	15.6 - 10.8V	14.0 - 9.0V
Nominal capacity	135mAh (1,944mWh)	14mAh (168mWh)
Max. Charge / discharge current	3000mA	280mA
Minimum Charge current	1.5mA or less	140μA or less
Cycle life	Over 20,000 time	Over 10,000 time
ESR (@1kHz)	Max. 360mΩ	Max. 1.2Ω
Temperature range	-30 ~ +60°C (under development 85°C)	-30 ~ +60°C (under development 85°C)
Cell configuration	SLB12400L151 × 6 In-line	SLB08115L140 × 5 In-line
Protection functions	Overvoltage / Lower limit voltage (per cell), Charge/discharge overcurrent, High temperature	Overvoltage/Lower limit voltage (per cell), Charge/discharge overcurrent, High temperature
Voltage balance function	○ / 2.6V (per cell)	—
External dimensions (L x W x H)	Approx. 95 x 50 x 16mm	Approx. 51 x 23 x 15mm
Weight	Approx.70g	Approx.10g

※ Specifications are subject to change without notice.

SLB Battery Pack Characteristics and expected applications

Characteristics

- ◇ Higher voltage with the superior advantages of the SLB series
 - Long life of more than 25,000 charge/discharge cycles
 - High current Charge/Discharge approaching EDLC
 - Capable of charging at low rate using energy harvesting
 - Low temperature characteristics enabling operation even at -30°C
 - Extremely low possibility of explosion or ignition even when used under harsh conditions
- ◇ Voltage and capacity can be customized according to the application (please consult with HQ).

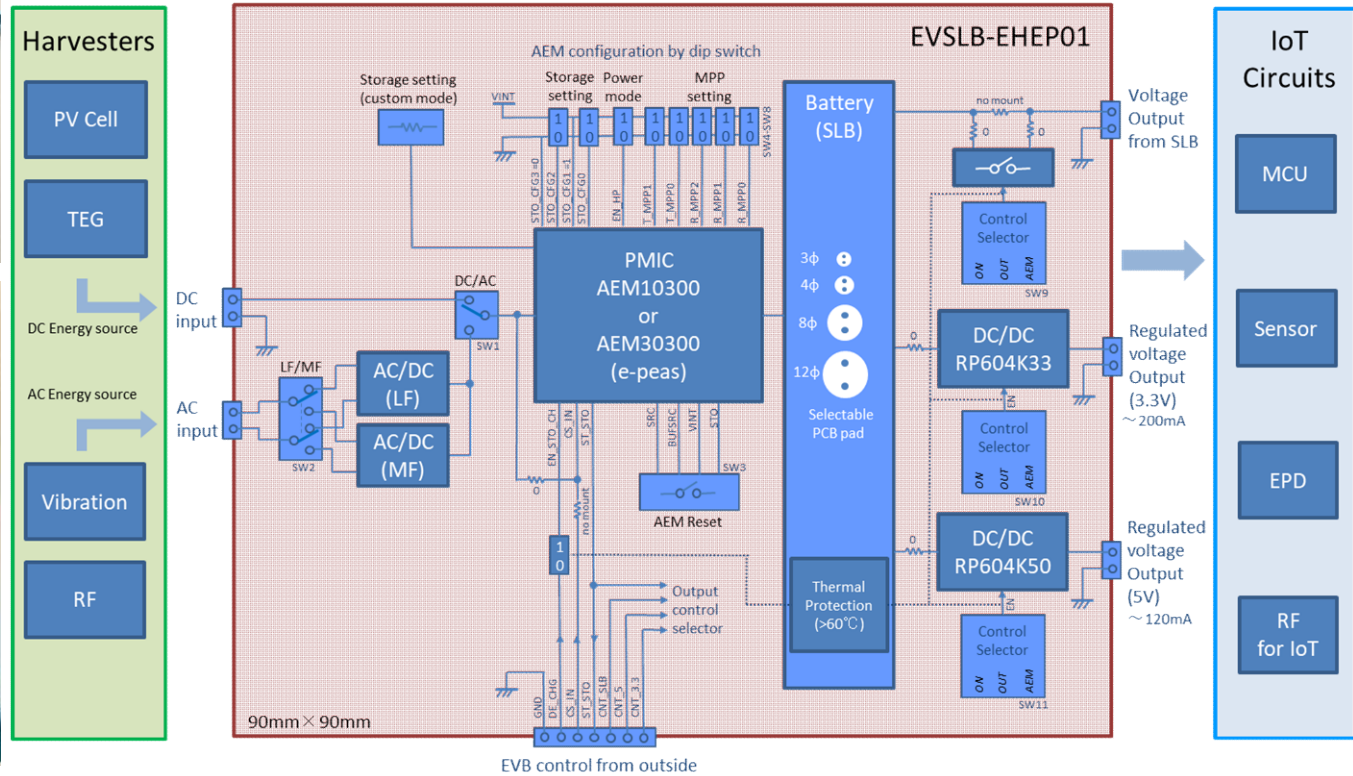
Potential Application

- ◇ Industrial Equipment (Industrial robots, Compact AGV)
- ◇ Automotive (Power supply for door locks and drive recorders)
- ◇ Backup power supply
- ◇ Power Boosts

SLB Energy Harvesting Evaluation Board (Block diagram)



1st prototype PCB has arrived on Mar. 11th



Features of the evaluation board (Prototype)

- Supports input from various types of harvesters. (DC or AC input).
- Compatible with all 5 sizes of SLB series.
- 3.3V, 5V, and direct output from SLB.

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Target Market

■ Target product of SLB



Handy measuring device



Rechargeable toy



Electric tool



Remote controller



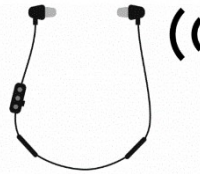
Drive recorder



Automotive auxiliary power supply (EPS , Door unlock , E-call , ADAS etc)



Stylus pen



Wireless earphone



Assist power suit



Wearable terminal



Smart glasses



Mobile terminal



lighting



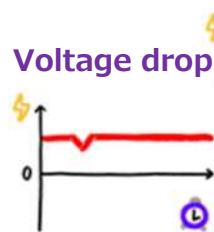
IoT device



Smart meter



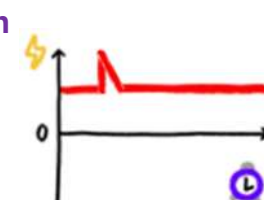
Emergency call



Backup

(Home appliances, industrial, etc.)

Power down



Peak assist



Cold regions

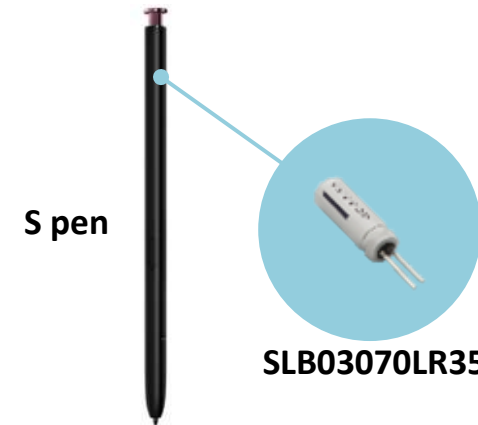
Application case (Stylus pen)

Galaxy series S pen

Galaxy Note10 / Note10+
Galaxy Note20 / Note20 Ultra
Galaxy S22 Ultra

Galaxy

Samsung Electronics Co., Ltd.



S Pen size (5.8 x 4.35 x 105.08 mm) S Pen board (from Web disassembly site)



Background of adoption

IFIXIT HP (<https://www.ifixit.com/Teardown/Samsung+Galaxy+Note10++5G+Teardown/125590>)

Note9 is equipped with an electric double-layer capacitor from another company

⇒ Replaced by our lithium-ion battery

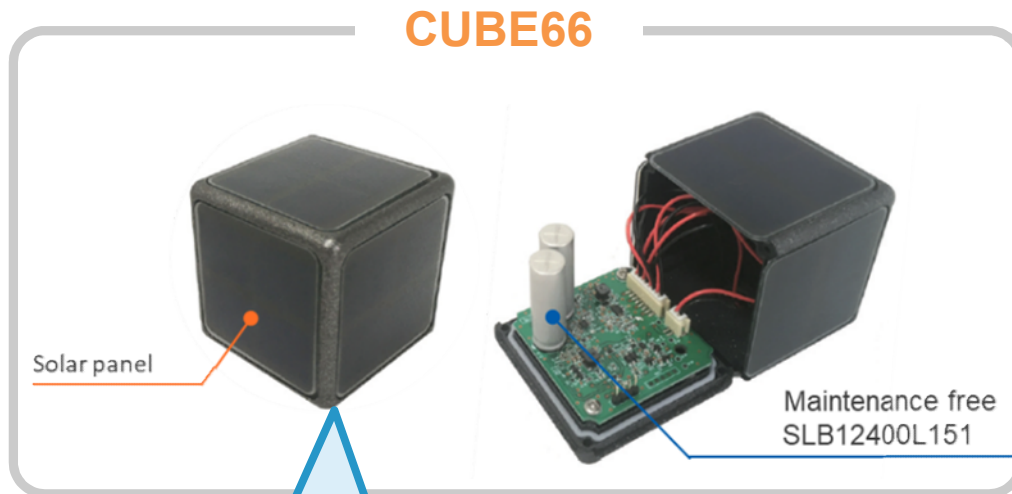
The key factor for adoption was to cope with increased power consumption due to new functions

Application case (Compact solar independent power supply)

Compact solar independent power supply 「CUBE66」

L-kougen^{1/4}

L-Kougen Co.Ltd



The best in the industry Compact size
 W66xH66xD66mm
 ※Excluding the protruding parts

- Power supply for sensors
- Power supply for communication modules
- IoT devices (replacement of primary power supply)

Model trend	The battery needs	Special Features of SLB High adaptability
Automatic operation for long periods of time	maintenance-free	Long life
Small size power supply	Small size and large current discharge	Rapid (charging) discharge possible
Environmental power generation (other than solar)	Low charging current	Can be charged with very low current
Installation in cold regions	Stable operation at low temperatures	Good low-temperature performance
Can be placed in the wild	Eliminate the risk of ignition	High safety

Application case (Flood monitoring system)

Flood monitoring system

A maintenance-free disaster prevention system for monitoring water levels in dams and rivers.

SLB series applications in flood control monitoring power packs.

YE DIGITAL Corporation
L-Kougen Co.Ltd

Flood monitoring system
L-Kougen Co.Ltd / YE DIGITAL Corporation

LPWA water level gauge + Cloud

Small solar independent power supply + surveillance camera

- Solar cell
- surveillance camera

CUBE66

SLB installed

※Installed product: SLB1 Installed product400L151



The burden of installation work is greatly reduced!

Easy to install LPWA water level meter
On-site work is not required.

Succeeded in reducing the cost of the water level gauge

- Compact battery thanks to LPWA
- 1/3 the cost of a conventional system

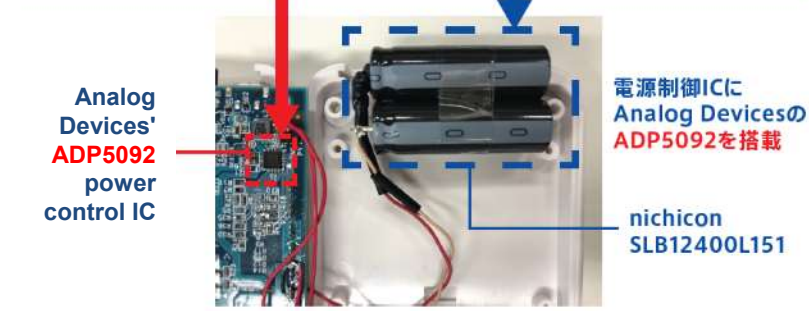
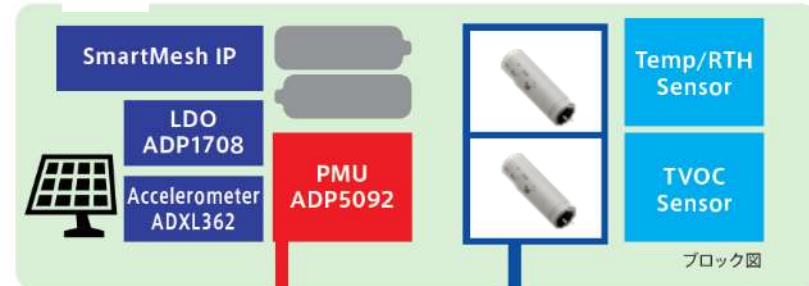
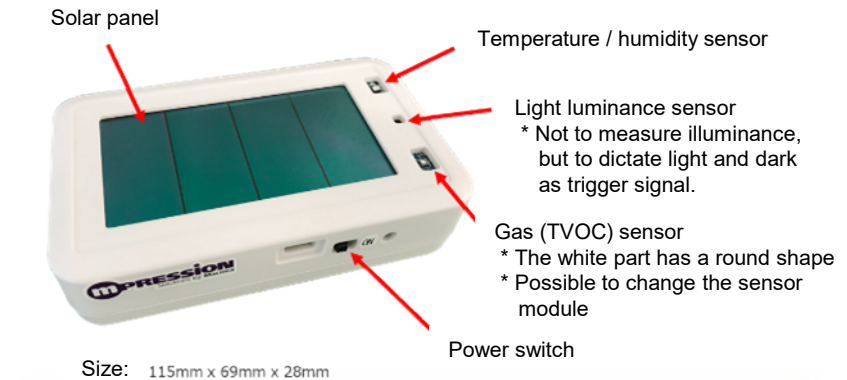
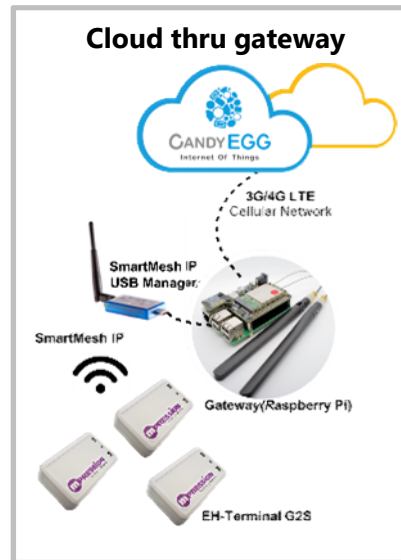
Data linkage available

Link to the disaster prevention system Load the available API

Application case (Maintenance free sensor network)

Sensor terminal with SmartMesh IP (solar version)

SmartMesh IP-based sensor terminal (solar version) prototype
 Our SLB series is used as a rechargeable battery



- Periodic transmission of TVOC, temperature, humidity, illumination, acceleration, battery voltage, and operating voltage data
- Wireless module with SmartMesh IP (2.4GHz band, mesh network)
- Hybrid battery configuration with solar panels and two AA batteries (prototype)

Application case (Maintenance free sensor network)

RICOH EH environmental sensor D201 / D202

The SLB series is used for the environmental sensing device RICOH EH Environmental Sensor D201/D202. Monitoring of refrigerated, high temperature and high humidity environments with wiring-free and maintenance-free.

Ricoh Company, Ltd.

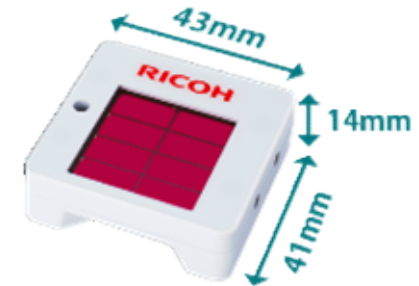
With solid-state dye-sensitized solar cell
RICOH EH environmental sensor D201 / D202



※ D202 is waterproof model

Product features

- Can be used in dark places
- Suitable for use in refrigeration facilities over a wide temperature range
- Ultra-small size and easy to install
- 5 sensors to measure different environments
- Easy linkage monitoring
- Added water and dust proof model



Long-life cycle batteries for maintenance-free operation !

Rapid discharge (20C) for wireless (e.g. BLE) possible !

Low current charging (0.01 C) with environmental power generation !

Can be charged and discharged at low temperatures (-30°C) !



SLB08115L140



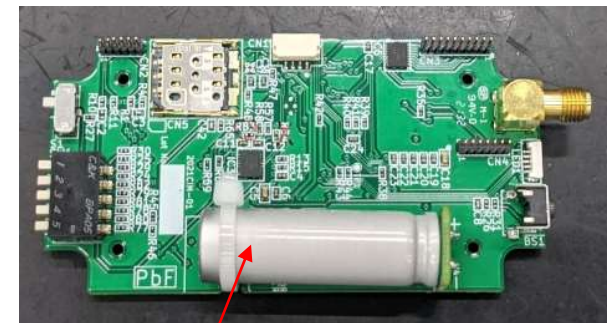
Advantages of adopting SLB

Application case (communication module)

LTE Cat. M1 communication module (integrated in the device)

An IoT system that focuses on small volumes of data such as sensor data and suppresses communication costs. The SLB is used as a power supply in the circuit board of this system.

- Rechargeable batteries enable communication even when mains power is cut
- Available in Japan, USA and Europe for €12 for 10 years or approx. 10 ¢/month. (1NCE with eSIM)
- Secure communication with AWS-IoT is possible, or 1NCE Cloud and AWS can be OpenVPN connection between 1NCE Cloud and AWS as a pseudo-closed network to enhance data security.
- Cat.M1 communication reduces price and current consumption
- High safety, high power and over 25,000 charge/discharge cycles.



SLB12400L151 (150mAh)



1NCE社 eSIM

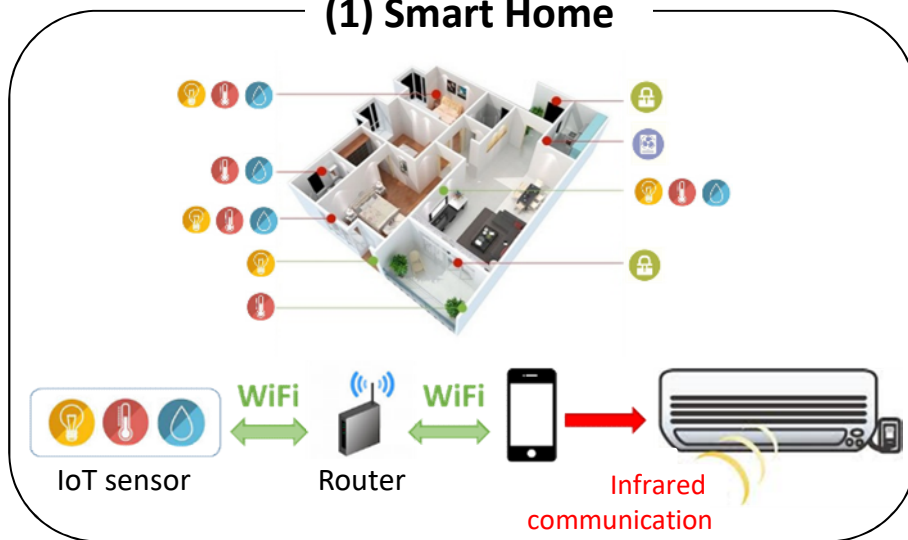
Cat.M1 Modem IC

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IoT Solutions: The Potential of Sensing Technology

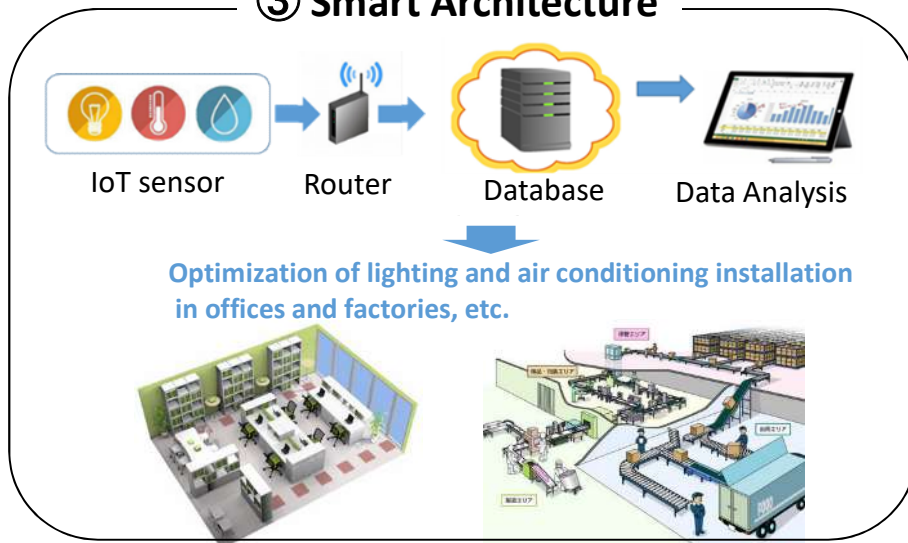
(1) Smart Home



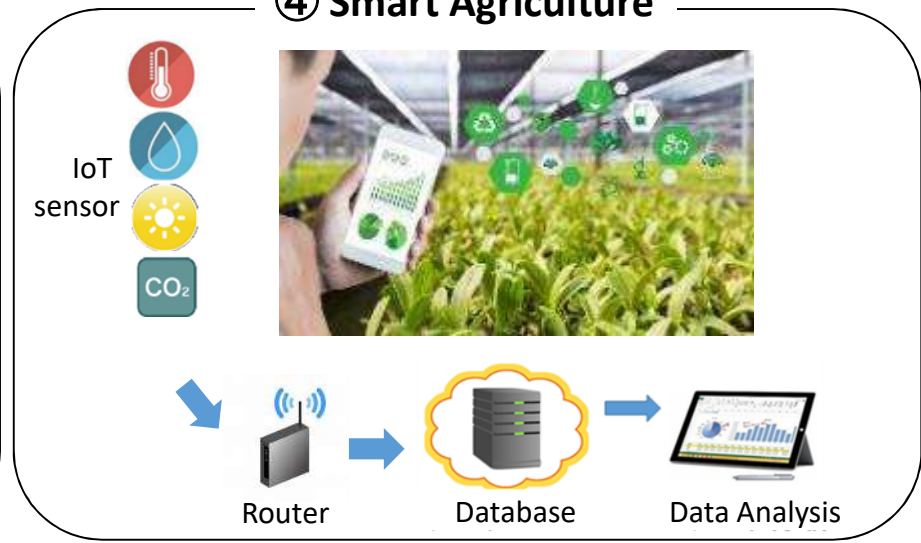
(2) Disaster Prevention Solutions



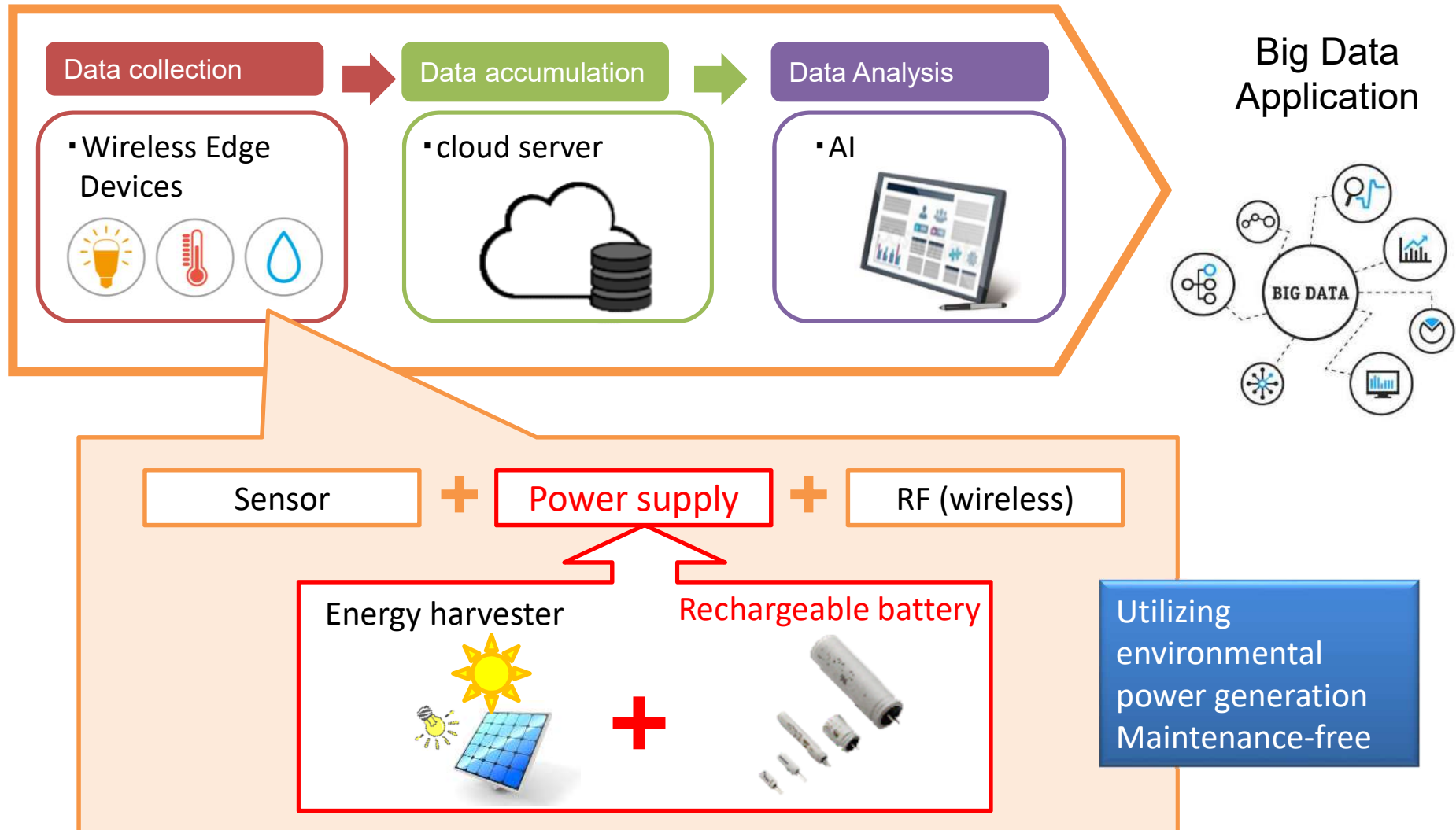
(3) Smart Architecture



(4) Smart Agriculture



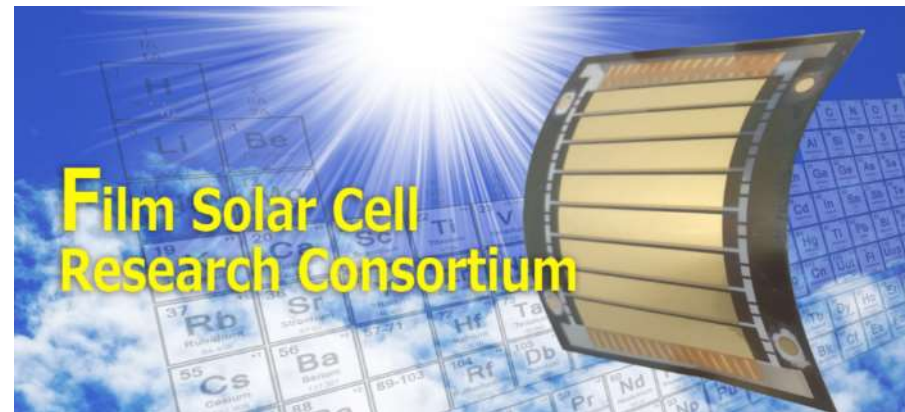
Utilizing Big Data through IoT



Trends of energy harvesting

Perovskite solar cells

It is a low-cost, light and flexible film-type solar cell that is expected to be used in a variety of applications.



Usage

Clock/wearable
Smart street light
Disaster relief tent
Rooftop power generation
Car boat

ZEH/ZEB
solar powered car
Universe development
Solar plane/drone



+



=



IoT Market

Trends of energy harvesting

Wireless Power Transfer (WPT)

Spatial power is possible when and where it is needed.

It is a radio wave emitting wireless power supply system that can supply power from a distance of 10 meters or more, and is expected to be used in a variety of applications.



Usage

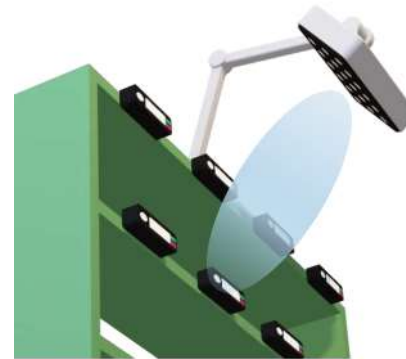
Long distance charging



Sensor for the part of machine that used to manufacturing

It is possible to sense the parts that cannot be connected before, without frequent battery replacement, to collect high-quality information, and achieve more accurate prediction and advance protection

Long distance charging



Intelligent selection system

Set position freely;
No need to change batteries frequently

Free the devices from wires

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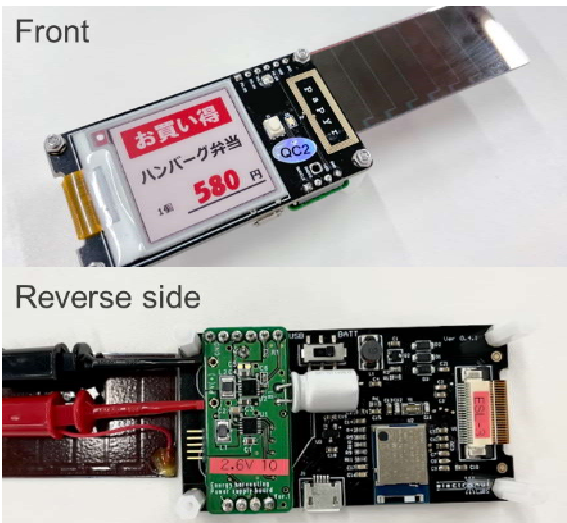
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Case 1 : Maintenance-free ESL

Maintenance-free ESL

Electronic shelf tag which is maintenance free and can be updated frequently Powered by in-store lighting and can be updated by using a PC or mobile device

Nisshinbo Micro Devices Inc.



Three advantages of the maintenance-free electronic shelf tag

Can be frequently rewritten by solar cells

Electricity is generated by the light energy obtained from the lighting in the store, allowing you to get rid of the limitation of the number of rewrites.

Power saving circuit and rechargeable battery for maintenance-free operation

Driven by energy harvesting, no battery replacement required.

By using BLE / NFC communication, shelf label management and promotion is possible

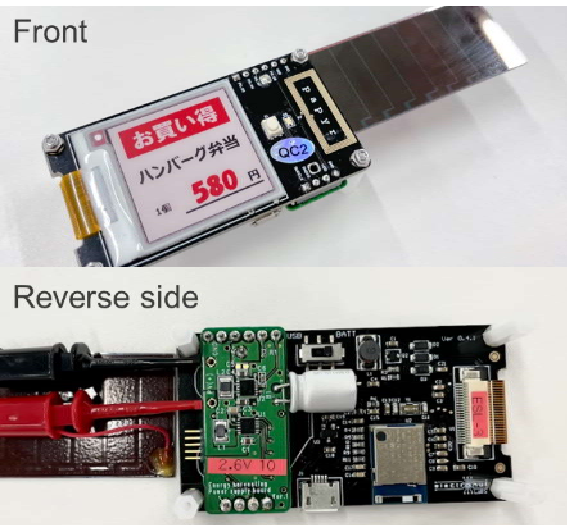
Rewriting shelf tag data in the application and guiding the user to the link via NFC communication.

Case 1 : Maintenance-free ESL

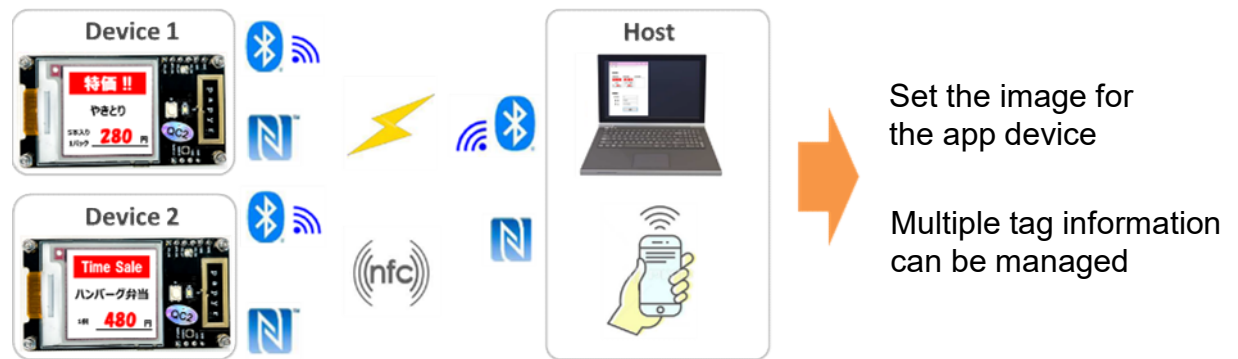
Maintenance-free ESL

Electronic shelf tag which is maintenance free and can be updated frequently Powered by in-store lighting and can be updated by using a PC or mobile device

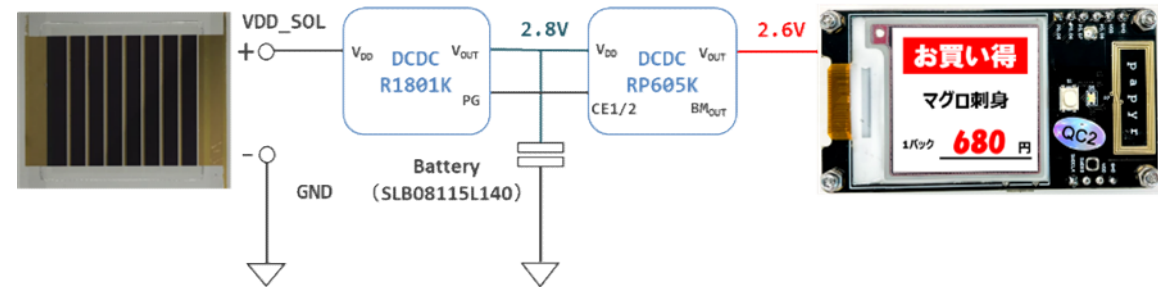
Nisshinbo Micro Devices Inc.



Example of data transmission



Circuit diagram



Case 2 : Bridge Monitoring System

Infrastructure Monitoring System Using Vibration Power Generation



Store the power generated by vibration or by large
Generate power by movement and transmit various sensor information via LPWA, etc.

Collects information via a cloud network to monitor infrastructure status and collect big data monitoring and big data collection.

1. Simple and easy to manufacture, high durability
2. High power and high sensitivity
3. Excellent power supply characteristics (low output resistance)
4. High degree of freedom in size and shape
5. low cost

Generation unit

V-GENERATOR



Vibration generation

Storage unit

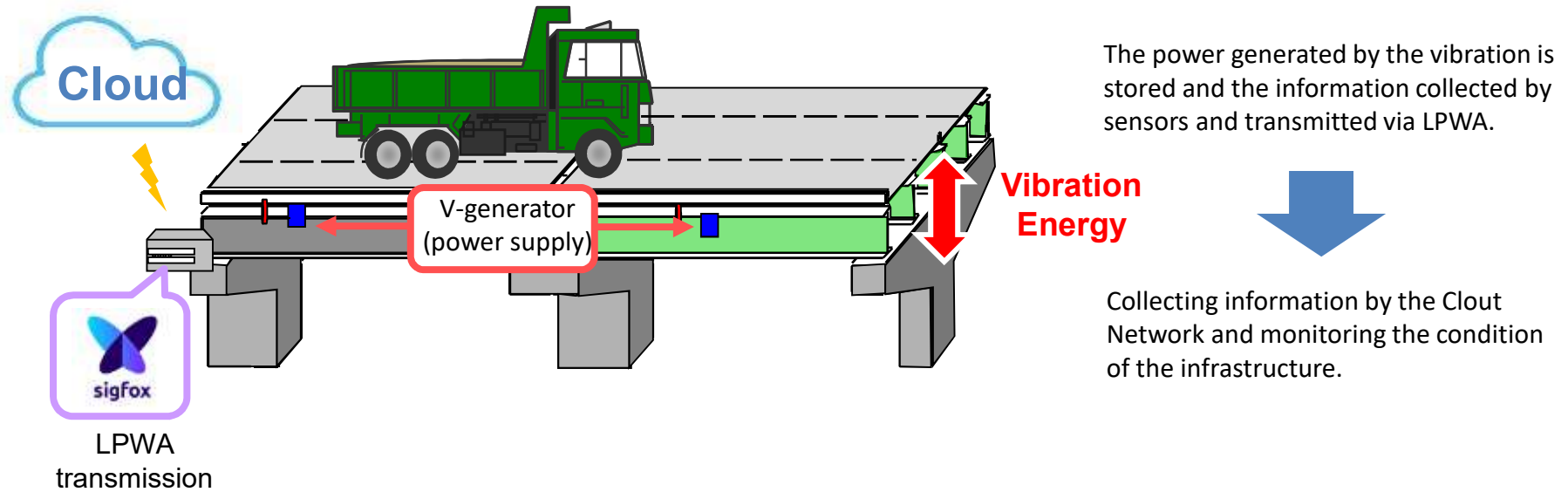
SLB series



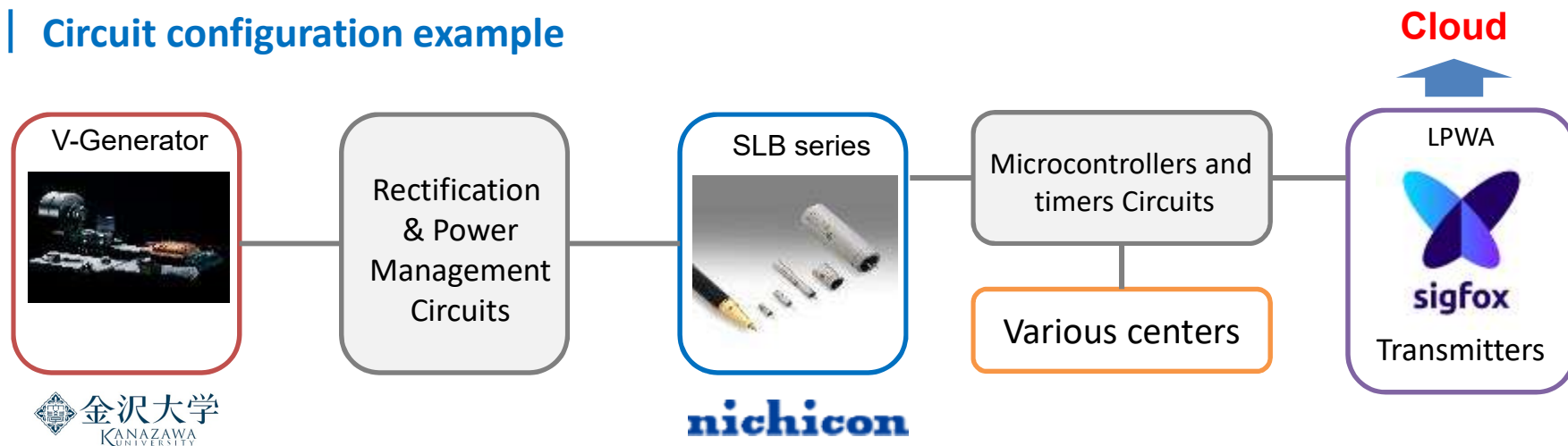
Stores Low current

Case 2 : Bridge Monitoring System

Example of infrastructure monitoring system



Circuit configuration example

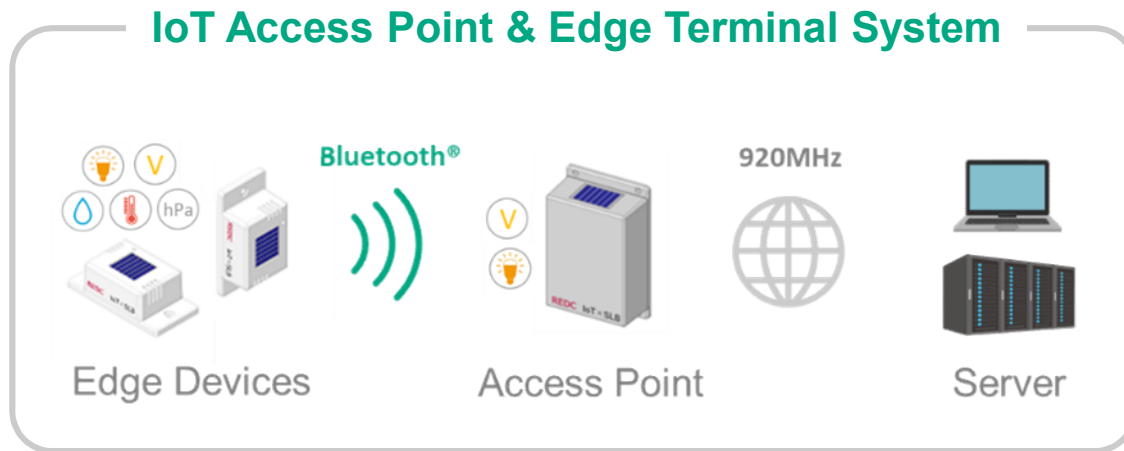


Case 3 : IoT Access Point & Edge Terminal

IoT Access Point & Edge Terminal

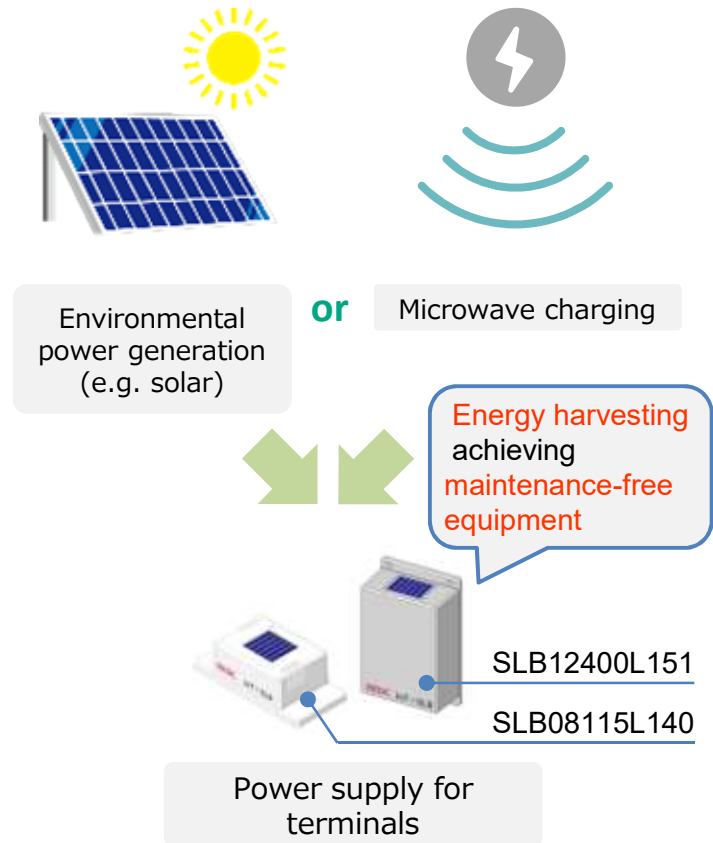
Easy asset management for infrastructure, production equipment and more.
 Wireless, maintenance-free IoT access point and edge terminal systems.

Nisshinbo Micro Devices Inc.



Sensor information updated **every 10 seconds**.
 Temperature, humidity, barometric pressure, illumination, motion
 • GAS (Indoor Air Quality),
 Send battery voltage information

Wireless communication device in the 920MHz band for **200m** communication between edge devices and servers



Case 3 : IoT Access Point & Edge Terminal




IoT Access Point & Edge Terminal

Easy asset management for infrastructure, production equipment and more.

Wireless, maintenance-free IoT access point and edge terminal systems.

Nisshinbo Micro Devices Inc.

IoT Access Point & Edge Terminal System

IoT Monitor Sensor Status				
Sensor	No.1	No.2	No.3	Gateway
Battery [V]	2.294	2.542	2.533	2.642
Illuminance [Lux]	112.0	104.4	104.0	207.4
Pressure [hPa]	1004.9	1004.9	1004.7	
Temperature [°C]	27.8	27.0	23.0	
Humidity [%RH]	52.2	55.1	55.1	
Cube face				
Air Quality				
IAQ Index	25			
Accuracy	0			
Resistance [Ω]	140496.0			



- Possible to monitor the status of the sensors **remotely**
- Collecting sensing data on servers, etc., and using it for **big data analysis**

Remote monitoring of environmental information such as temperature, humidity and air pressure by IoT

Predictive maintenance of infrastructure and production equipment

Temperature and humidity control of office space

Agricultural **house environmental monitoring**

Environment monitoring of warehouses and stores

Case 4 : Maintenance-free Smart Remote

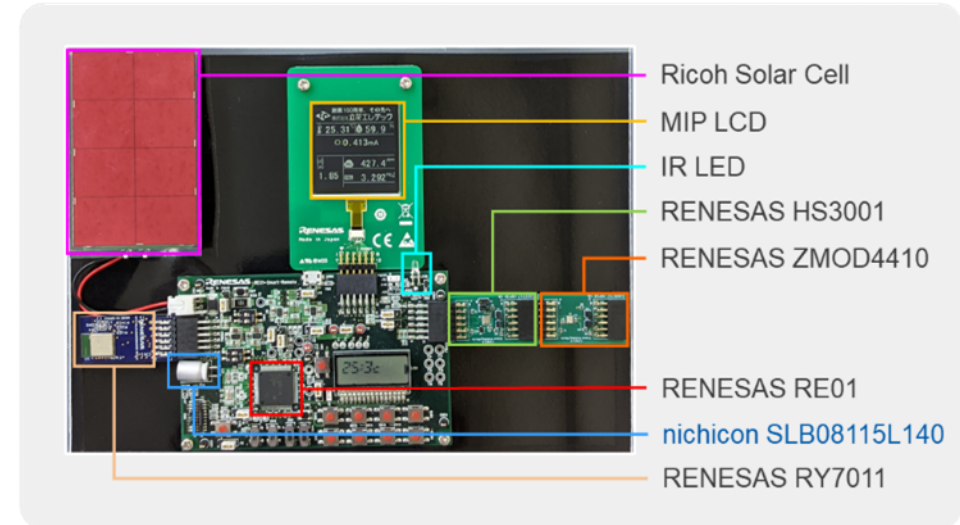
Maintenance-free Smart Remote

Maintenance-free IoT devices achieve energy harvesting by utilising SOTB technology and embedded controllers of the SLB series. Other devices can be controlled by an intelligent remote control function linked to the data acquired by the sensors.



RE family「Maintenance-free Smart Remote」

▶ Circuit board composition



Case 5 : Zero Carbon LoRa Evaluation Board

Maintenance-free Asset Management system

Location and sensor information can be acquired by energy harvesting operations and sent to the cloud via Zero Carbon LoRa.



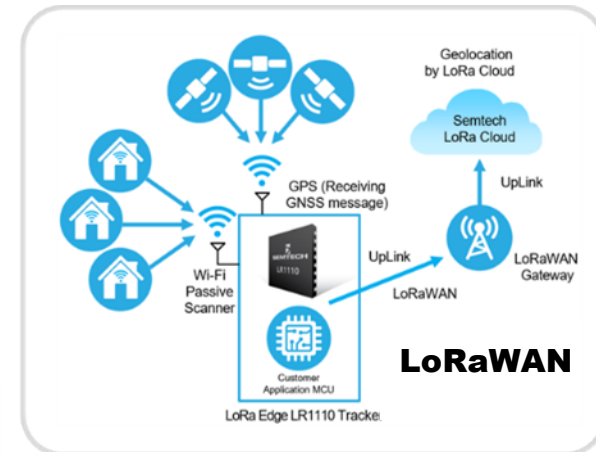
Features of Zero Carbon LoRa Evaluation



Energy harvesting using natural energy sources for charging.



World's highest grade with low current consumption, low voltage and high speed operation



Low power LoRa communication and unique indoor/outdoor tracking

Case 5 : Zero Carbon LoRa Evaluation Board

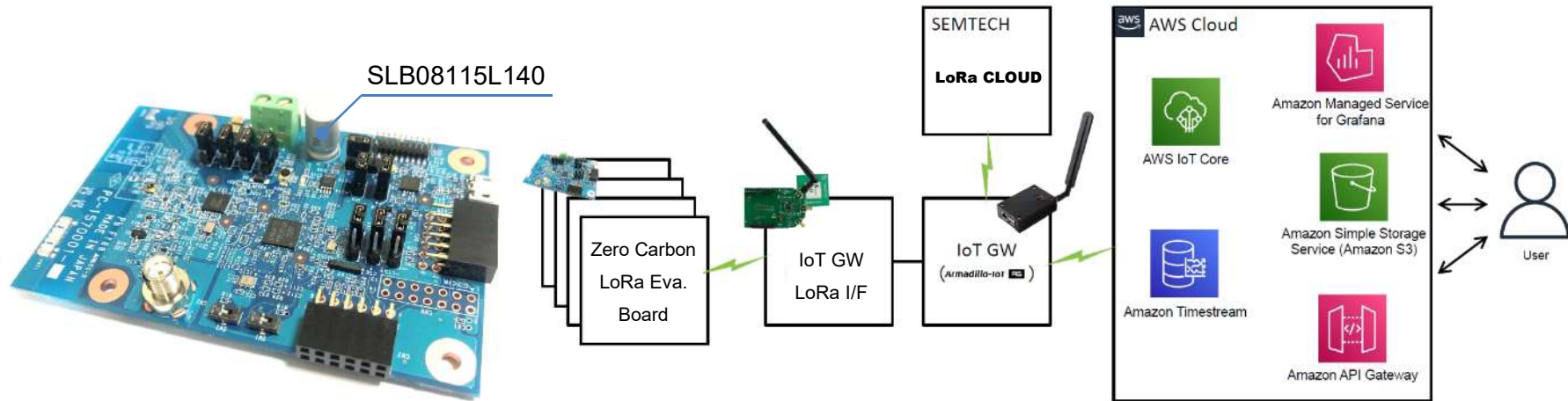
Maintenance-free Asset Management system

Location and sensor information can be acquired by energy harvesting operations and sent to the cloud via Zero Carbon LoRa.



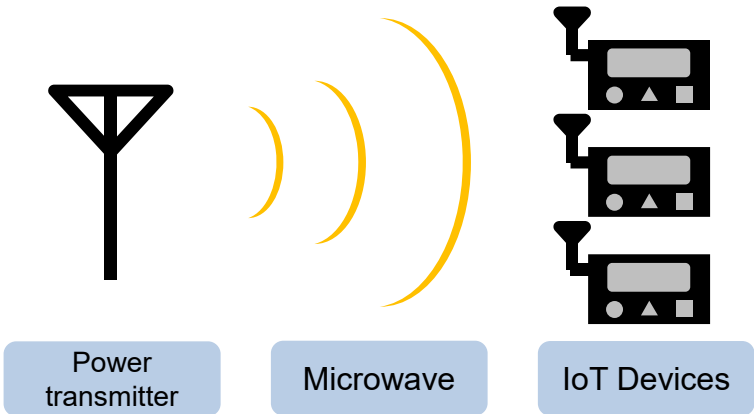
Examples of use of Zero Carbon LoRa Evaluation Board

- Luggage, cart management and lost child tracking in the airport
- Shopping cart management and lost child tracking in shopping malls
- Equipment management in hospitals and factories.

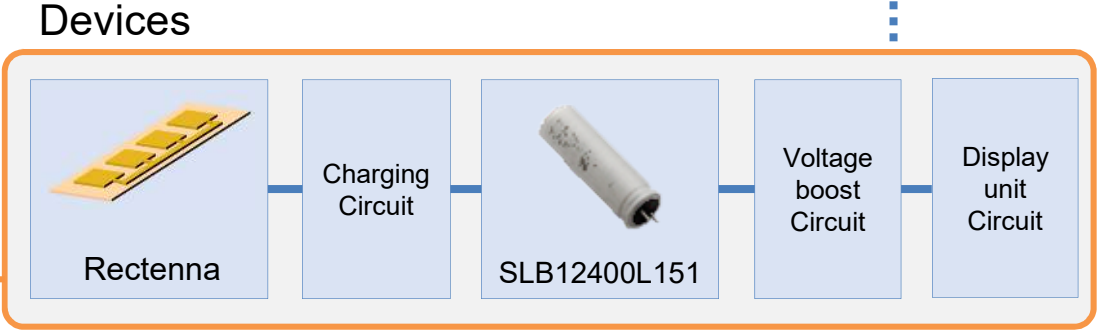


Case 6 : Wireless Power Transfer Solutions

Digital Picking Indicator Using Microwave Power Supply



- 1. No wiring required! Wireless power supply
- 2. Free from the constraints of battery capacity
- 3. Maintenance free



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Power IC for SLB (Recommended List)

No	Supplier	Part No	Feature	SLB type		
				φ3x7 0.35mAh	φ8x11.5 14mAh	φ12.5x40 150mAh
1	Analog Devices	LTC4079	Linear Charger	—	○	○
2	Analog Devices	LTM4661	μModule Regulator	—	○	○
3	Renesas Electronic	RE01	Renesas MCU	○	○	○
4	Nisshinbo Micro Devices Inc.	R1800 R1801	Buck DC/DC Converter	○	○	—
5	Nisshinbo Micro Devices Inc.	RP604 RP605	Buck-Boost DC/DC Converter	○	○	—
6	ROHM	BD99954GW/MWV	Battery Manager	—	—	○
7	ROHM	BD71631QWZ	Linear Charger	○	○	—
8	TOREX SEMICONDUCTOR	XC8109	High Function Power Switch	○	○	○
9	TOREX SEMICONDUCTOR	XC6504	LDO	○	○	○
10	TOREX SEMICONDUCTOR	XC6240	LDO	○	○	○
11	TOREX SEMICONDUCTOR	XC6140C	Reset IC	○	○	○
12	TOREX SEMICONDUCTOR	XCL103	DC/DC Converter	○	○	○

The ICs listed are not guaranteed to work by us, so be sure to check them on your own when considering them.
For detailed control IC specifications, please check the IC manufacturer's datasheet.

<https://www.nichicon.co.jp/english/products/slb/referencenote/>

https://www.nichicon.co.jp/_assets/pdf/products/slb/slb_technicalnote_all_E.pdf

Power IC for SLB (Recommended List)

№	Supplie	Part No	Feature	SLB type		
				φ3x7 0.35mAh	φ8x11.5 14mAh	φ12.5x40 150mAh
13a	e-peas	AEM10330	Solar Energy Harvesting - Buck Boost	○	○	○
13b	e-peas	AEM30330	Vibration/RF Energy Harvesting - Buck Boost	○	○	○
13c	e-peas	AEM00330	Ambient Energy Manager with Source Voltage Level Configuration	○	○	○
14a	e-peas	AEM10300	Solar Energy Harvesting - Storage Charger only - Buck boost	○	○	○
14b	e-peas	AEM30300	Vibration/RF Energy Harvesting - Storage Charger only - Buck boost	○	○	○
14c	e-peas	AEM00300	Ambient Energy Manager - Storage Charger only - Buck boost	○	○	○
15	e-peas	AEM10941	Solar Energy Harvesting with boost and LDO	○	○	○
16	e-peas	AEM20940	Ambient Thermal energy harvesting - Buck boost and LDO	○	○	○

The ICs listed are not guaranteed to work by us, so be sure to check them on your own when considering them. For detailed control IC specifications, please check the IC manufacturer's datasheet.

<https://www.nichicon.co.jp/english/products/slb/referencenote/>

https://www.nichicon.co.jp/_assets/pdf/products/slb/slb_technicalnote_all_E.pdf

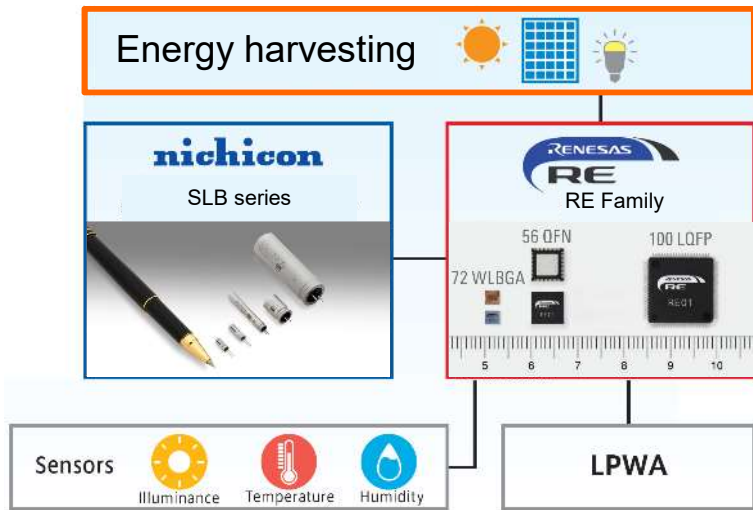
Power IC for SLB

RE Family “LoRa Solution without Battery Replacement”

Realization of energy-harvesting IoT devices by using embedded controllers with SOTB technology and SLB series



Renesas Electronics Corporation



LoRa Case of Solution Applications



- Gas meter
- Water flow meter
- Vending machine data collection



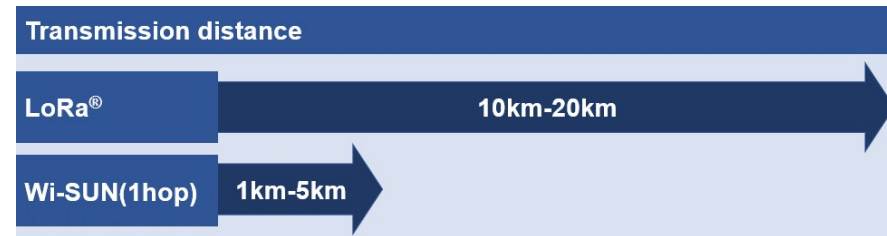
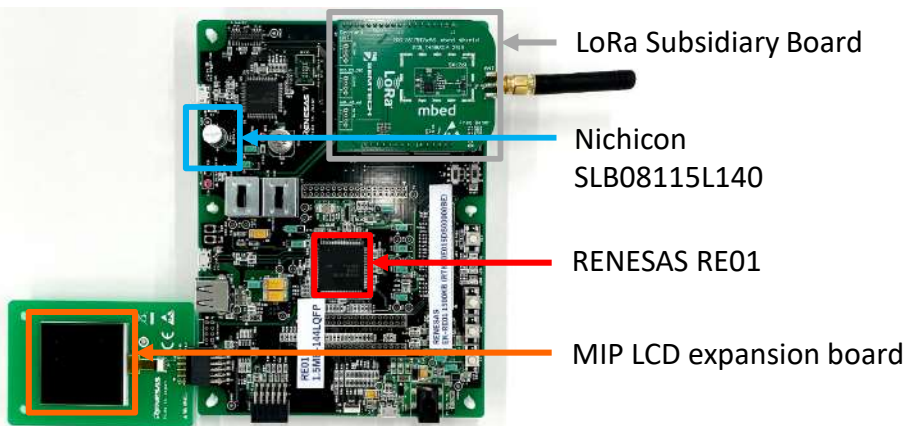
- Structural anomaly notification
- Building/Parking Lot Management
- Warehouse Inventory Management



- Agriculture / Livestock Management
- Livestock Feed Management
- Livestock location detection



- Healthcare Data Management and Transfer
- Tracking of people



Power IC for SLB

Ultra-rapid Charging IC

It provides ultra-fast charging that enables 80% charge in 2 minutes

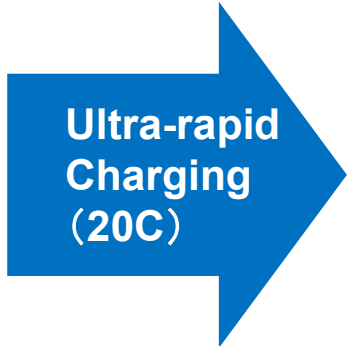


ROHM CO., LTD.



BD99954MWV
UQFN040V5050W

★**BD71631QWZ**
UMMP10LZ1824



80% charge
Achieved in
2 minutes

Small lithium-ion rechargeable battery “SLB Series”



**Charge waveform at
BD99954MWV**



Charge time -120s

Charge time 20C=3A

VBAT 0.5V/div 5.6V

IBAT 1A/div

20s/div

3V

φ 12.5 × 40L / 150mAh
2 connection

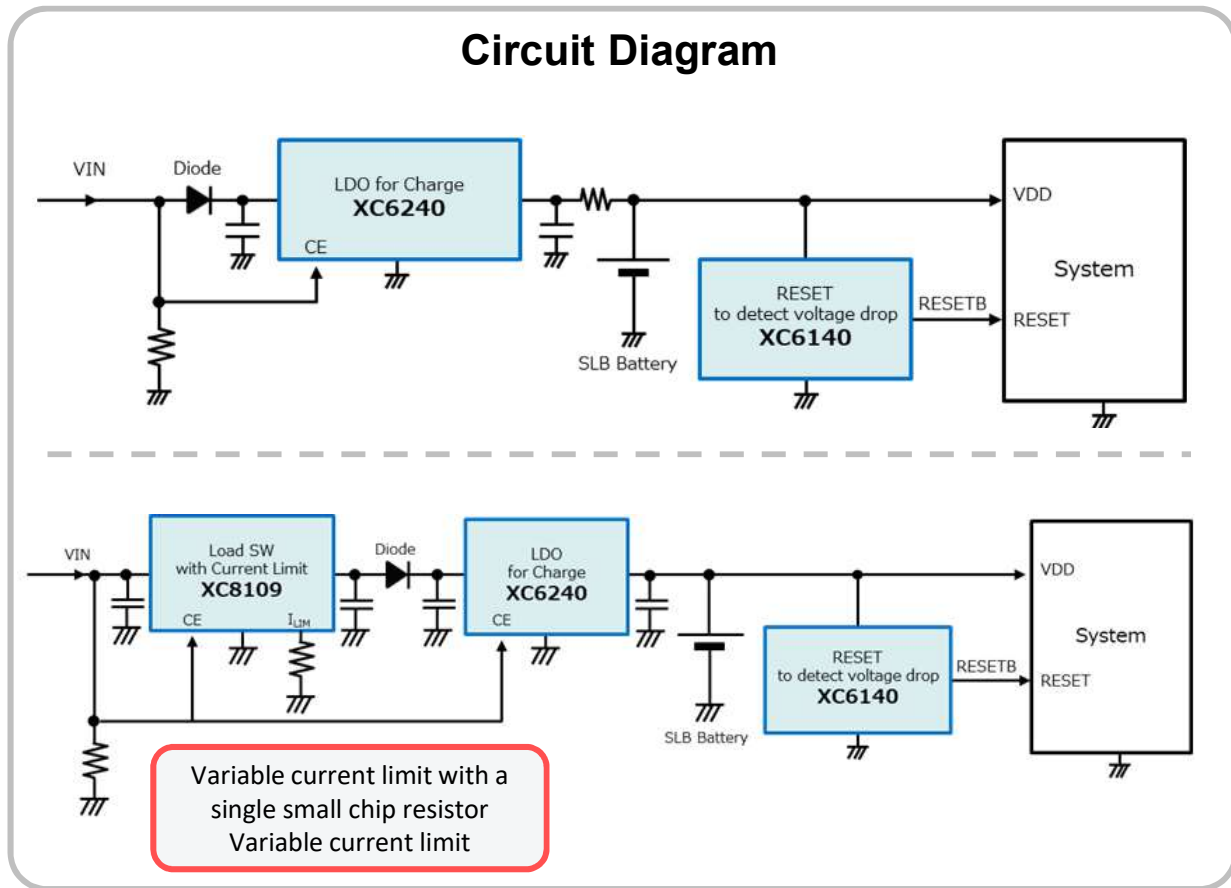
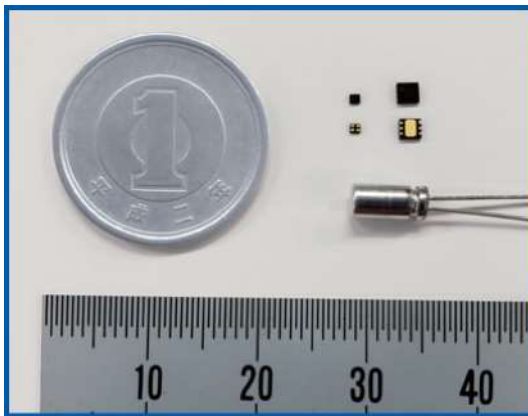
20C=3A charging setting
(Full charge setting: 5.6V)

Power IC for SLB

Ultra-compact charging solution IC

LDO sealed in an ultra-compact package.
 By using a line switch, it is possible to The use of LDO and line switches in an ultra-compact package enables space-saving CCCV charging of the SLB series of $\phi 3 \times 7L$

TOIREX
 TOREX
 SEMICONDUCTOR LTD.



0.8 μ A Ultra Low Supply Regulator
XC6240 Series

Battery Voltage Monitoring IC
XC6140 Series

85m Ω High Performance Load Switch
XC8109 Series

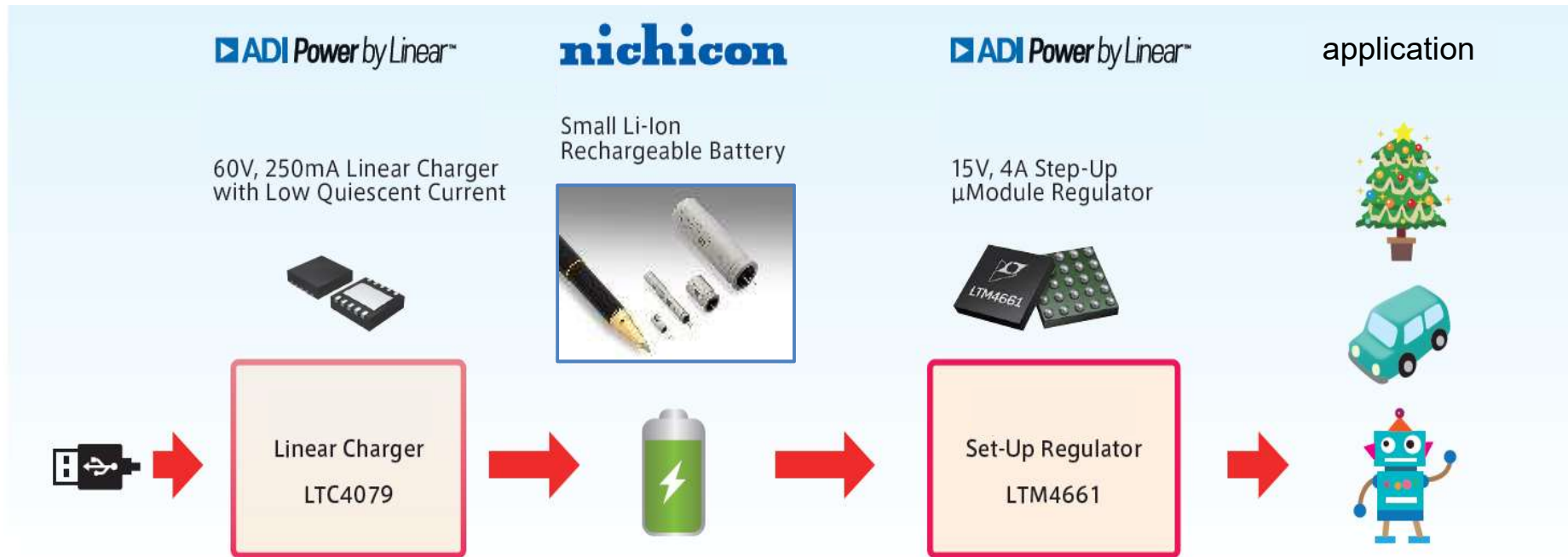
Power IC for SLB

Linear Charger and Set-Up Regulator

The SLB series can be used with linear chargers and set-up/set-down regulators to power a variety of devices according to specifications. The SLB series can be used to run a variety of devices according to your specifications.



Analog Devices, Inc.

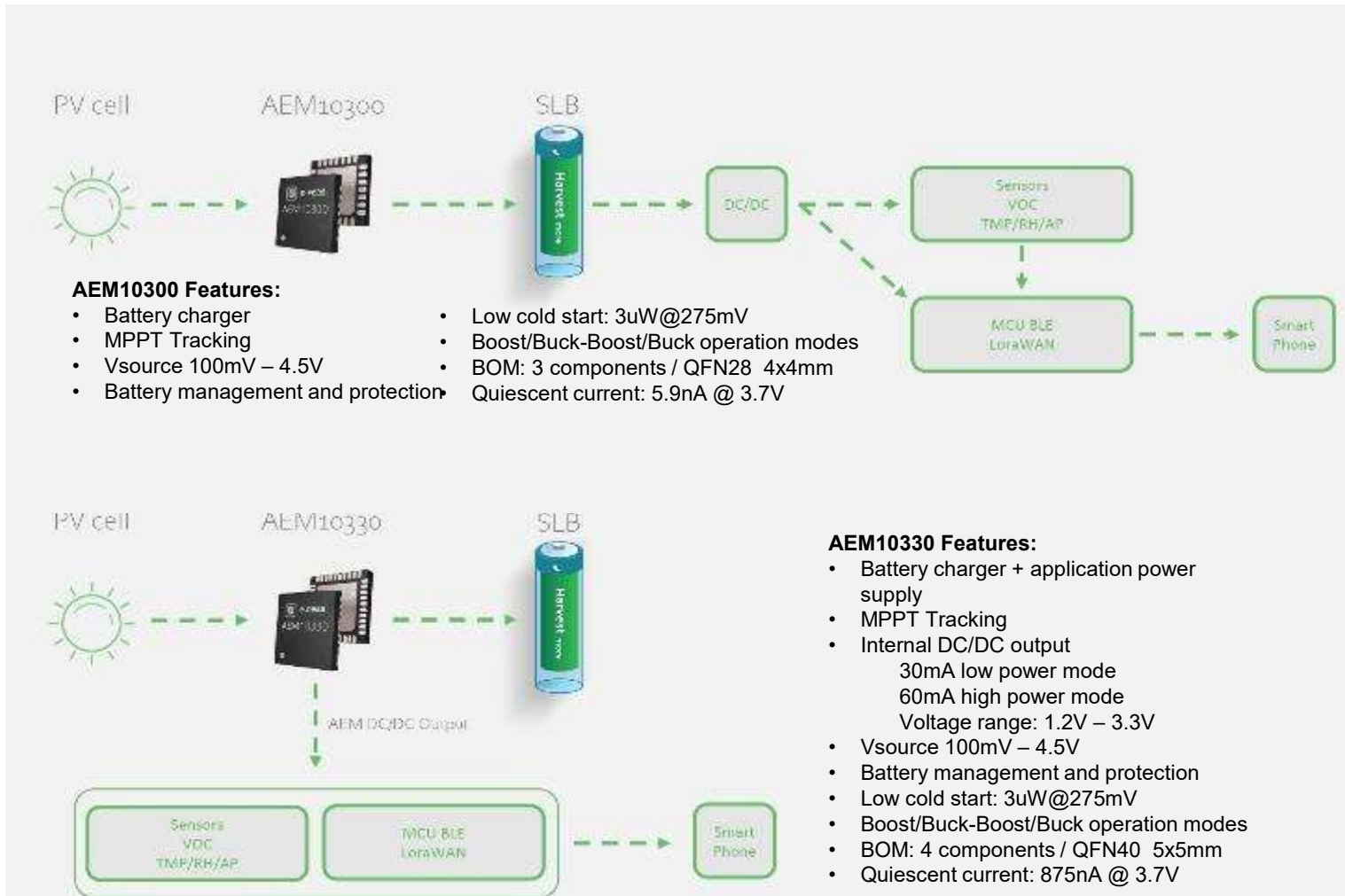


Power IC for SLB

PMIC with MPPT function for solar power generation



MPPT : Maximum Power Point Tracking



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Online contents

Dedicated HP for SLB

<https://www.nichicon.co.jp/english/products/slb/>



SLB Series TOP

About SLB

Products

Reference Note

Q & A

For Transport

•What's New

•Features
•introduction video
•Adoption case
•Pamphlet

•Dimensional drawing
•Characteristic diagram
•Specification table
•Data sheet

• Circuit Design Support

•FAQ
• Contact Us

•Precautions when transporting
For Air Freight IATA
For Ocean IMDG
•Safety data sheets
PSDS, UN38.3 summary

Online contents

Video contents

Introduction of SLB



Nail penetration test (safety confirmation test)



- It is explained in an easy-to-understand manner using a video.
- Content will be added in the future.

Technical notes

https://www.nichicon.co.jp/_assets/pdf/products/slb/slb_technicalnote_all_E.pdf



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1. About Small Li-Ion rechargeable batteries
2. Features of Small Li-Ion rechargeable batteries
3. How to use Small Li-Ion rechargeable batteries
4. Reliability of Small Li-Ion rechargeable batteries
5. Safety of Small Li-Ion rechargeable batteries
6. Precautions on use
7. About transportation and return of products
8. About product disposal

**Described battery characteristics, usage, reliability, safety, etc.
A technical note was released in December 2020.**

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Precautions for handling Small Li-Ion rechargeable batteries

❑ Hazardous

- Since chemical components are sealed in a new electric storage device, the hazards are extremely low.
- However, if you mistakenly use it, the new electric storage device may cause deformation, leakage, rupture, heat generation, or irritating gas or corrosive gas, so please be extremely careful in handling.

❑ Stability and reactivity

- When two or more devices are randomly mixed without insulation treatment on the terminals, there is a possibility of bursting and rapid heat generation by short-circuiting.
- When overcharged, heated, or dropped in a fire, electrolyte or other substances may burst out rapidly.
- When disassembling the device, there is a possibility of rapid heat generation due to a short circuit.

Precautions for handling Small Li-Ion rechargeable batteries

- **Do not short circuit the battery**
Overheating of the cell may cause leakage, overheating, or explosion.
- **Do not apply current via reversed polarity**
An abnormal reaction may occur internally, causing leakage, overheating, or explosion.
- **Do not apply physical load.**
If excessive force is applied, the parts will be damaged, causing electric shock, short circuit, or liquid leakage.
- **Do not conduct the tests listed below**
Overcharge test, overdischarge test, nail penetration test, crushing test, drop test, chemical resistance test, high temperature exposure test.

Treatment when electrolyte leaks

The electrolyte is flammable and is a liquid with irritation to the eyes, skin and mucosa. If leakage occurs, please take below measures.

- **When adhering to the skin**
Immediately wash the adhering part with water or tepid water by using soap. If there is a change in your skin or pain continues, please consult your doctor immediately.
- **When gets into eyes**
Wash your eye with clean water for 15 minutes and submit to medical treatment.
- **Smoke or fire**
Please extinguish with carbon dioxide, powder fire extinguisher, or a lot of water.

Storage of Small Li-Ion rechargeable batteries

○ Storage condition

- Please do not let the terminals contact with each other or contact with the conductors.

- Please avoid storage under the following circumstances.

- (a) Being exposed to water, high temperature & high humidity atmosphere, or condensation of moisture.

- (b) Being exposed to oil or an atmosphere that is filled with particles of oil.

- (c) Being exposed to salty water or an atmosphere that is filled with particles of salt.

- (d) In an atmosphere filled with toxic gasses (such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, bromine, methyl bromide, ammonia, etc.)

- (e) Being exposed to direct sunlight, ozone, ultraviolet ray, or radiation.

- (f) Being exposed to acidic or alkaline solutions

- Long term storage performance is being confirmed.

The logo features two stylized, overlapping blue wavy lines that curve upwards from the left and downwards from the right, framing the central text. The top line is a darker shade of blue, while the bottom line is a lighter shade.

nichicon

SINCE 1950