

Introduction of operation stability for IoT devices (outdoor application) at high ambient temperature

1. Overview

IoT devices used outdoors, such as smart meters and TPMS, are required to be maintenance-free and highly reliable. Primary batteries (such as alkaline batteries or coin-shaped/cylinder-shaped lithium-ion batteries) that are easy to obtain, are used in many IoT devices. However, the battery life is greatly affected by power consumption and load peak current which depends on the ambient temperature, the load sensors, the amount of data communication distance, and frequency. In order to ensure sufficient battery life for maintenance-free operation, it is necessary to take into account the effects of voltage drop during communication, which requires low self-discharge at high temperature, Voltage drop with high discharge current, and an increase in the internal resistance of the battery at low temperatures.

The maximum temperature limit of commonly used alkaline manganese batteries is 45°C, and that of alkaline button batteries is 60°C. As the temperature increases, self-discharge tends to increase. This problem can be solved with Murata's "Extended temperature type" lithium batteries. This "Extended temperature type" can achieve a wide operating temperature range (-40°C to 85°C) with our innovative technology. It suppresses self-discharge of the batteries at high temperatures (85°C) and ensures the operational stability of IoT devices even at high-temperature.

2. Effects

➤ Maximize battery run time

By reducing the self-discharge that affects battery life, the "Extended temperature type" can increase the usage rate of battery run time and support maintenance-free operation. In addition, this type battery can contribute to automotive applications and industrial equipment applications which are used at high ambient temperature.

Recommended applications

- Automotive applications (TPMS, Drive counter)
- Industrial equipment application (RTC back up (Smart meter, FA equipment))



Smart Meter

The following Fig.2 is the high temperature storage data (for 1 year) of standard CR2032 and Extended temperature type CR2032X.

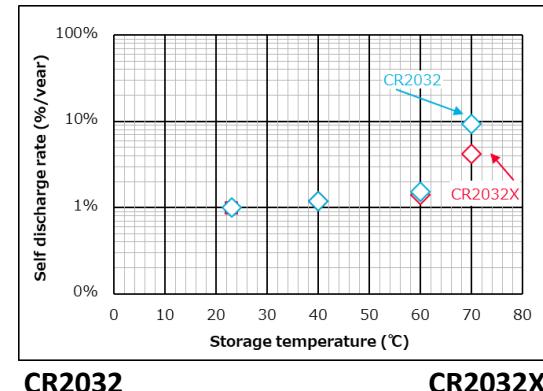


Fig.1 Self-discharge rate at each temperature CR2032 vs CR2032X

As the "Extended temperature type" has low self-discharge rate so it is possible to stably operate application even after high-temperature storage.

3. Series Lineup

Recommended products (High drain type)

PN	Nominal capacity (mAh)	Diameter (inch)	height (inch)	Nominal Voltage (V)	Operating temperature* (°C)
CR2032X	200	0.787	0.126	3.0	-40～85
CR2450X	600	0.965	0.197	3.0	-40～85
CR2477X	1000	0.965	0.303	3.0	-40～85

4. Technical support

Data sheet

[Click ▶ CR2032X](#) [Click ▶ CR2450X](#) [Click ▶ CR2477X](#)

Sample

➤ Samples can be purchased from the link below.

[Click ▶ CR2032X series](#) [Click ▶ CR2450X series](#)
[Click ▶ CR2477X series](#)

Others

➤ Our web page shows more details.
<https://www.murata.com/en-global/products/batteries/micro/cr/extended-temp>

➤ If you have any questions, please feel free to contact.

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