

Proposal of operation stability with network communication in IoT devices

1. Overview

IoT devices such as tracking devices and wireless sensor nodes 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 get are used in many IoT devices. However the battery life is greatly affected by power consumption and load peak current which depend on the load sensors, the amount of data communication, distance and frequency. To ensure sufficient battery life for maintenance-free operation, it is necessary to reduce the influence by voltage fluctuation during data communication that requires high current and consider the internal resistance of the battery at low temperature. Even if the battery capacity remains, a large voltage fluctuation reaches the minimum operating voltage of the device, and then it does not work. To solve this problem, it is necessary to use a primary battery with a larger capacity than the originally required capacity. Murata's "High drain type" coin manganese dioxide lithium battery can solve this problem. The "High drain type" can achieve the industry's highest resistance reduction. If this type of battery applied to IoT devices with limited power supply, it can reduce the voltage fluctuation and stabilize the stable operation of the device.

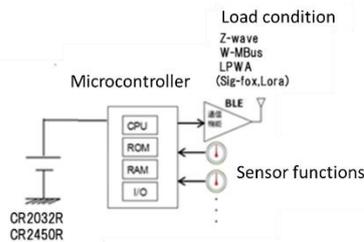


Fig.1 Block diagram of wireless sensor node

2. Effects

➤ Stability of Power Supply Line

The "High drain type" can reduce the voltage fluctuation at high peak load and stabilize the operation of the device.

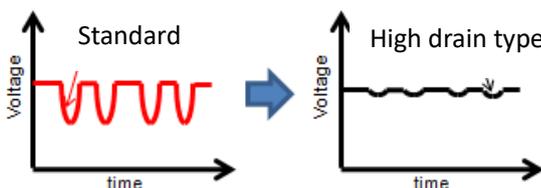


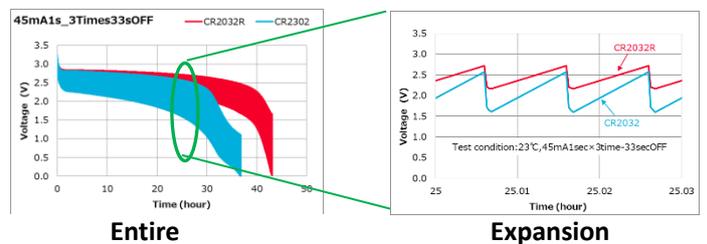
Fig.2 High load peak levelling by "High drain type"

➤ Maximize the battery run time performance

"High drain type" battery can reduce voltage fluctuation

that affects battery life and maximizes battery run time.

Next, Fig.3 shows data comparing the battery voltage stabilization of IoT system using a standard type CR2302 vs "High drain type" CR2032R. Generally, when standard type CR2032 is used, the maximum output power is limited to approximately 0.05W, and the battery voltage fluctuation becomes larger. As shown on Fig.3, the battery voltage fluctuation is large when the power of about 0.15W output is discharged from battery. On the other hand, "High drain type" can minimize the battery voltage drop as shown in the right side of Fig.3 and it can be discharged an instantaneous maximum output of 0.15W. These effects are caused by supplying a large amount of energy from "High drain type" due to of low resistance.



* Battery Voltage fluctuation of CR2032 (in blue) and CR2032R (in red) with assuming LPWA condition (Discharge condition: 45mA×3sec, Rest time:33sec).

Fig.3 Battery voltage fluctuation at 23 °C with assuming LPWA

3. Series Lineup

Recommended products (High drain type)

PN	Nominal capacity (mAh)	Diameter (inch)	height (inch)	Nominal Voltage (V)	Operating temperature* (°C)
CR2032R	200	0.787	0.126	3.0	-30~70
CR2450R	500	0.965	0.197	3.0	-30~70

4. Technical support

Data sheet

Click ▶ [CR2032R](#)
Click ▶ [CR2450R](#)

Sample

➤ Samples can be purchased from the link below.

Click ▶ [CR2032R series](#) Click ▶ [CR2450R series](#)

Others

➤ Our web page shows more details.

<https://www.murata.com/en-global/products/batteries/micro/cr/high-drain>

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

Click ▶ [Send your inquiry](#)