

# Integrated Backup Battery for Automotive X-By-Wire System

## 1. Outline

In recent years, the shift to electric vehicles and the electrification of automotive components are progressing toward the realization of a decarbonized society.

The electrification of components has expanded the use of by-wire control, which uses electrical signals to control the target. However, by-wire control has a shortcoming in that it cannot control components if the vehicle power source, such as a lead-acid battery, fails (Fig. 1).

Sumitomo Wiring Systems, Ltd. and AutoNetworks Technologies, Ltd., both of which are Sumitomo Electric Group companies, have jointly developed an integrated backup battery that enables uninterrupted by-wire control of multiple components even in the event of a vehicle power failure (Photo 1).

The new product has been adopted by Toyota Motor Corporation for its Prius, which was launched in 2023.

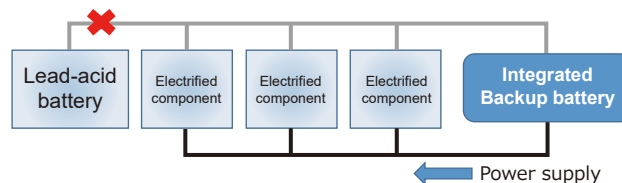


Fig. 1. X-by-wire components and backup battery

## 2. Features

Consisting of a DC/DC converter and energy storage devices (electric double-layer capacitors), the new product achieves higher performance and integration than conventional ones (Photo 2).

### 2-1 High performance

Consisting of a bidirectional buck-boost DC/DC converter that backs up multiple devices, the new product effectively controls the voltage and current of the electric double-layer capacitors to make effective use of the energy stored.

### 2-2 Integration

In the past, each component was equipped with a single backup battery. In contrast, the new product uses a microcomputer to back up a plurality of components with an integrated battery. Specifically, the microcomputer evaluates backup requests from multiple components and controls output according to the backup request.

Further, the energy storage capacity of the new product has been increased to support many by-wire control components that could not be backed up before.

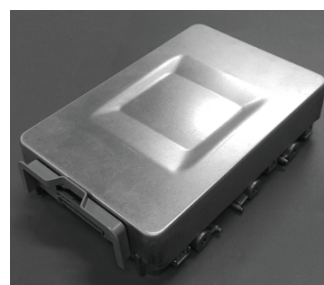


Photo 1. Appearance of integrated backup battery

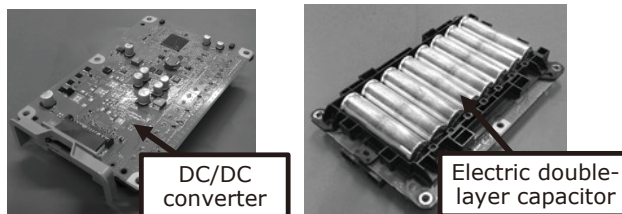


Photo 2. Built-in circuit and electrical storage element

Table 1. Major specifications

	Backup battery for X-by-wire	Integrated backup battery for X-by-wire	
	GEN1	GEN2	GEN3
Stored energy	0.27 Wh	0.36 Wh	0.48 Wh
Operating temperature range	-30°C~65°C	-30°C~65°C	-30°C~65°C
Storage temperature range	-40°C~85°C	-40°C~85°C	-40°C~85°C
Outside dimensions	150×140×40 mm	155×131×50 mm	200×131×50 mm
Weight	800 g	700 g	920 g