

Integrated Backup Battery for X-By-Wire System

1. Outline

In recent years, the electrification of automobile components/parts has been progressing with the aim of shifting to electric vehicles to realize a decarbonized society.

Electrification will expand the use of by-wire control, which allows devices to be controlled by electrical signals; however, a control failure occurs if the vehicle power source, such as a lead-acid battery, becomes inoperative (Fig. 1).

Sumitomo Wiring Systems, Ltd. and AutoNetworks Technologies, Ltd. of the Sumitomo Electric Group have developed an integrated x-by-wire backup battery designed for uninterrupted by-wire control of more than one device even in the event of a vehicle power failure (Photo 1).

The product was adopted by Toyota Motor Corporation for their Lexus NX launched in 2021.

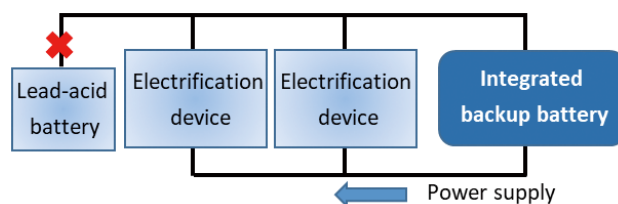


Fig. 1. X-by-wire devices and backup battery

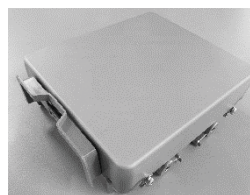


Photo 1. Exterior of integrated backup battery

2. Features

We have developed an integrated x-by-wire backup battery with a built-in DC/DC converter and energy storage devices (electric double-layer capacitors) that has lighter weight and higher performance than those of our conventional product (Photo 2).

2-1 Weight reduction and high performance

This product uses a bidirectional DC/DC step-up/step-down converter to back up multiple loads, and by efficiently controlling the voltage and current of the electric double-layer capacitors, it has achieved a 12.5% reduction in weight and a 10% improvement in the amount of energy stored per volume compared to those of our conventional products.

2-2 Integration

In the past, a single backup battery was installed for each load, such as our x-by-wire backup battery. In this product, in order to serve as a backup battery for multiple loads, the microcomputer judges the backup requests from multiple loads and controls the output according to the backup request, thereby realizing backup battery integration.

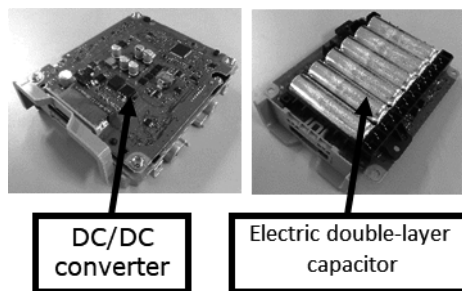


Photo 2. Internal circuits and energy storage devices

Table 1. Specifications

	Backup battery for X-by-wire (1st gen)	Integrated backup battery for X-by-wire (2nd gen)
Stored energy	0.27 Wh	0.36 Wh
Operating temperature range	-30°C ~ 65°C	-30°C ~ 65°C
Storage temperature range	-40°C ~ 85°C	-40°C ~ 85°C
Outside dimensions	150 × 140 × 40 mm	155 × 131 × 50 mm
Weight	800 g	700 g