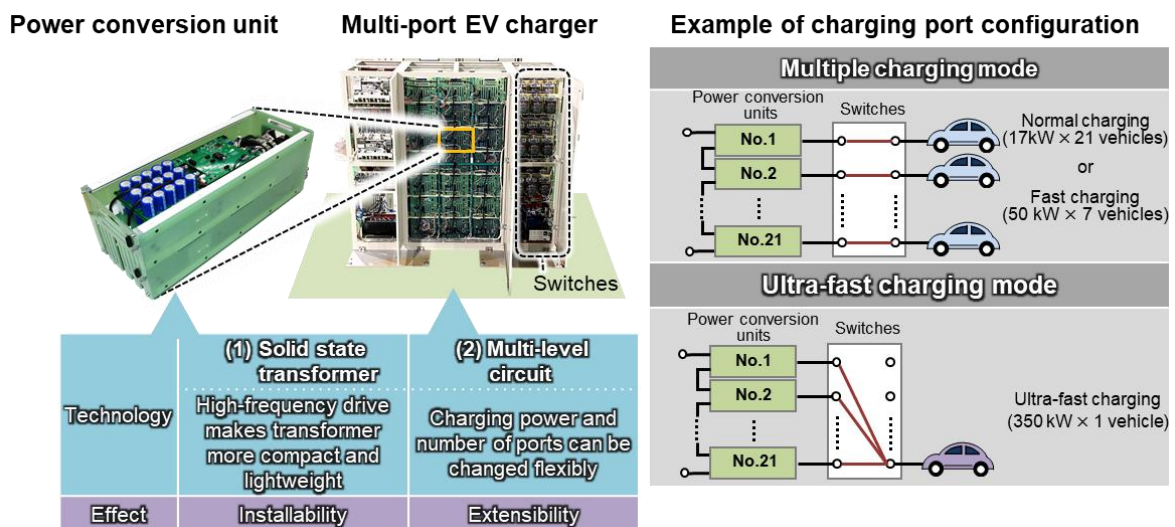


News Release

FOR IMMEDIATE RELEASE

Hitachi Develops the Most Compact, Lightweight EV Charging Technology in the Industry with Fast Charging and Multi-Vehicle Charging Capabilities

New technology will accelerate the spread of electric vehicles by reducing charging equipment's footprint by 40% and weight by 70% while having the flexibility to handle fast charging and multi-vehicle charging



Features of developed technology and trial electric vehicle charging system

Tokyo, August 25, 2021 --- Hitachi, Ltd. (TSE: 6501, "Hitachi") today announced that, with the aim of supporting the realization of a decarbonized society, it has developed a multi-port EV ⁽¹⁾ charging technology that will enable users to switch between fast charging or multi-vehicle charging while making charging infrastructure more compact and lightweight, which is essential to promoting the spread of EVs. Specifically, Hitachi developed a prototype of a 350-kW EV charging system equipped with compact solid state transformers (SST⁽²⁾) which is the most compact and lightweight system of its kind in the industry.⁽³⁾ Based on this, it will be possible to easily install EV charging equipment even in existing infrastructure with limited installation space. Furthermore, its extensibility means it may be used for either fast charging or multi-vehicle charging, enabling it to meet users' needs in a variety of scenarios, such as charging an EV equipped with a large-capacity battery in a short time or simultaneously charging multiple EVs overnight.

Hitachi will pursue further research aimed at practical application of this technology, and in collaboration with the entire Hitachi Group, it will contribute to the realization of a decarbonized society by creating new energy solutions and services such as EV operations management.

In tandem with the pursuit of a carbon-neutral and decarbonized society by 2050, the shift toward EVs is gathering momentum globally. With the adoption of EVs in urban areas, where populations are concentrated, the need for EV charging equipment is growing. In particular, there is demand for fast charging equipment that enables charging times to be reduced. However, if the capacity of the equipment is increased for the purpose of fast charging, the charging equipment itself will become larger, which makes installing it in existing apartment or office buildings with limited installation space difficult.

Accordingly, Hitachi has leveraged the expertise in power conversion technology and high-frequency drive technology it has acquired to date to develop EV charging technology that enables EV charging equipment to be more compact and lightweight while also being extensible, so that the charging capacity and number of ports may be flexibly changed. A 350-kW multi-port EV charging system has been trialed by using these technologies. Key features of the developed technology are described below.

1. Reducing size and weight with solid state transformer (SST)

The transformer occupies a considerable amount of a charging system's volume. This time, Hitachi developed a solid state transformer (SST) that enables to make the charging system more compact by operating the transformer with a high-frequency drive that uses a power semiconductor device. By using SiC,⁽⁴⁾ the power that may be delivered is increased by improving the drive frequency by a factor of approximately 1,000 (50 kHz) compared with previous technology, which makes fast charging possible as well as enabling the industry's most compact, lightweight EV charging technology, reducing the footprint by about 40% and the weight by about 70%.

2. Improving extensibility with multi-level circuit

Hitachi has developed a multi-level circuit that divides an input voltage of 6.6 kV using seven connected power conversion units. By arranging three of these circuits in parallel, for a total of 21 power conversion units, and controlling output using switches, the charging power and number of ports may be changed to flexibly meet users' needs. For example, it is possible to simultaneously charge 21 EVs with normal charging (17 kW) or seven EVs with fast charging (50 kW). Furthermore, the technology has the extensibility to handle ultra-fast charging (350 kW), which means it can charge even EVs with large-capacity batteries, which will become more widespread in the future, in a short time.

A part of the results from this work will be presented at the IEE-Japan Industry Applications Society Conference held at the Nagaoka University of Technology from August 25 to 27, 2021.

- (1) EV: Electric Vehicle.
- (2) SST: Solid State Transformer. This technology makes a transformer more compact using a semiconductor drive.
- (3) Based on in-house research (as of July 2021). "EV charging equipment" indicates the power converter and power receiving equipment (transformer) but does not include the charging port. Specifically, the calculations were performed by comparing the combined footprint and weight of a power converter and transformer with a capacity of at least 150 kW. The value factors in the conventional installation interval of 20 cm between the power converter and transformer.
- (4) SiC: Silicon Carbide. This has lower on resistance than conventional silicon (Si) devices, delivering superior performance in high-temperature, high-frequency, and high-voltage environments.

About Hitachi, Ltd.

Hitachi, Ltd. (TSE: 6501), headquartered in Tokyo, Japan, is focused on its Social Innovation Business that combines information technology (IT), operational technology (OT) and products. The company's consolidated revenues for fiscal year 2020 (ended March 31, 2021) totaled 8,729.1 billion yen (\$78.6 billion), with 871 consolidated subsidiaries and approximately 350,000 employees worldwide. Hitachi is working to increase social, environmental and economic value for its customers across six domains; IT, Energy, Industry, Mobility, Smart Life and Automotive Systems through Lumada, Hitachi's advanced digital solutions, services, and technologies for turning data into insights to drive digital innovation.

Hitachi is a Principal Partner of COP26, playing a leading role in the efforts to achieve a decarbonized society and become a climate change innovator. Hitachi strives to achieve carbon neutrality at all its business sites by 2030 and to achieve an 80% reduction in CO₂ emissions across the company's value chain by 2050.



For more information on Hitachi, please visit the company's website at <https://www.hitachi.com>.

For more information, use the enquiry form below to contact the Research & Development Group, Hitachi, Ltd. Please make sure to include the title of the article. <https://www8.hitachi.co.jp/inquiry/hqrd/news/en/form.jsp>

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