

Research and Development / Intellectual Property

Research and Development

Fuji Electric is focused on research and development activities for creating competitive components and systems centered on power semiconductor technologies and power electronics technologies as well as activities for developing solutions that produce value for customers by combining fundamental technologies.

The Company has designed its R&D system to accelerate R&D activities by delegating product development functions to the respective business groups while the corporate R&D group handles technology marketing, advanced research, and basic research.

R&D Policies

- Create competitive components and systems utilizing cutting-edge technologies
- Develop competitive product technologies utilizing technology marketing
- Realize new innovation by combining Fuji Electric's fundamental technologies with open innovations



Initiatives in Fiscal 2016

Creation of Competitive Components and Systems

■ Motion Control System

Fuji Electric has succeeded in developing a new motion controller and servo system that enables faster and more accurate positioning of precision processing and other equipment. The motion control system comprised of these two new products realizes fast and precise device control and features safety functions for guaranteeing safer operation.



New motion controller, SPH3000D



New servo system, ALPHA7

■ Trench Gate SiC-MOSFET

Fuji Electric was involved in the development of a trench gate SiC-MOSFET.*1 This device boasts a resistance level that is among the lowest in the world (1200 V, 3.5 mΩ cm²), meaning that it can contribute to loss reductions of more than 70% in comparison to Fuji Electric's Si devices when incorporated into an inverter. We intend to utilize this device in all SiC modules going forward.

*1 Created through joint research with Tsukuba Power-Electronics Constellations, which was established by the National Institute of Advanced Industrial Science and Technology



Trench gate SiC-MOSFET

Development of Product Technologies Utilizing Technology Marketing

■ Diagnosis Functions for Steel Rolling Facilities

Customers can incur losses if the operation of facilities is halted. Fuji Electric is currently developing abnormality diagnosis functions for steel rolling facilities with the aim of helping minimize these losses. Installing these diagnosis functions into facilities' drive control equipment will allow for facility data to be collected and diagnosed so that facility abnormalities can be predicted before they occur. In the future, we will look to install such diagnosis functions into cloud-based systems*2 in order to deliver this service to as many customers as possible.



Steel rolling facilities

Note: The facilities in the photograph above are not equipped with Fuji Electric's diagnosis functions.

*2 Server systems that collect data via networks and analyze this data

■ Digital Signage Vending Machines

Together with JR East Water Business Co., Ltd., Fuji Electric developed a digital signage vending machine to provide new and valuable experiences through vending machines. Equipped with the Company's payment interface,*3 this vending machine makes purchasing drinks more convenient by making pre-payment or regular purchases possible via a smartphone application.

*3 Program that links digital signage applications to vending machine software



New digital signage vending machine

Realization of New Innovation

Fuji Electric is advancing joint research with Japanese universities and research institutions based on comprehensive partnership agreements. In addition, we have endowed laboratories at the

University of Tsukuba and the University of Yamanashi and are advancing efforts in research and the development of human resources in the fields of power devices and power electronics.

Future Initiatives

Focuses of Fuji Electric's R&D activities going forward will include SiC power semiconductors, automotive power semiconductors, SiC-equipped power electronics products, and other components with unrivaled levels of competitiveness. We also develop factory automation and process automation systems and IoT solutions that are synergetic with these components while fostering human resources through the process of tackling new challenges.

Intellectual Property

Positioning intellectual property (IP) rights as one of the most important management resources, Fuji Electric is working to implement IP strategies that are aligned with its business and R&D strategies to contribute to the strengthening and expansion of its globalization-compatible business.

IP Policies

- Strengthen IP activities that extend back into the stages of business planning and R&D
- Investigate and respond to overseas IP systems and their current statuses and reinforce IP activities at overseas bases
- Promote international standardization activities

Initiatives in Fiscal 2016

IP Activities in the Initial Stages of Business

We endeavored to formulate IP strategies from the business and R&D theme planning stage. After confirming business and R&D directives, these strategies were drafted based on patent analysis and surveys. We also took steps to develop patent portfolios that ensure a strong advantage in business activities.

Main Fields for Patent Applications

- Patents relating to increasing the efficiency and energy savings of power electronics products
- Patents pertaining to power semiconductors, such as those for SiC-related technologies
- Patents relating to vending machines and other areas of the food and beverage distribution field

Global IP Activities

Fuji Electric continues to investigate overseas IP systems and implement measures against counterfeit products to minimize business risks related to IP.

In fiscal 2016, our local IP division in China led efforts to enhance patent survey and application functions and to implement countermeasures against counterfeit products. In addition, more stringent measures were implemented for reducing IP risks in conjunction with the growth of the vending machine business.

As part of its contributions to international standardization movements, with the aim of ramping up acquisition of certification under the standards of the International Electrotechnical Commission (IEC), Fuji Electric registered the Fukiage Factory as a factory certified by the IEC System of Conformity Assessment Schemes for Electrotechnical Equipment and Components (IECEE). As a result, it is now possible to conduct certification tests at this factory.



IP risk seminar in China