Research and Development

Combining its core technologies in power semiconductors and power electronics with instrumentation and control systems, Fuji Electric is focusing R&D on products and systems that effectively and stably provide and use electricity and thermal energy.

R&D Policies

- Expand and strengthen core technologies of power semiconductors and power electronics
- Accelerate new product development though technology synergies between thermal, machinery, and control systems
- Promote open innovation

Major Initiatives in Fiscal 2013

Power and Social Infrastructure

- We developed smart meters for electric power companies and will continue to enhance our lineup of products that meet our customers' needs.

Industrial Infrastructure

- We developed the MICREX-VieW XX (double X), a small- and medium-scale monitoring and control system which offers the newest monitoring, operating, and engineering capabilities to factory production lines and other facilities, while maintaining compatibility with existing systems.

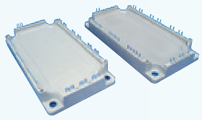
- We developed the F-COOLNEO, an air conditioner which combines both indirect outside air cooling and a heat pump to offer significant energy savings. The F-COOLNEO was developed for data centers, as well as production facilities fields such as precision electronic equipment, food, and chemicals.

Power Electronics

- We developed the DC1,000 V / 660 kW indoor-type power conditioner, a unit which is highly resistant to sea salt corrosion.
- For customers in Asia, China, and Europe, we expanded the lineup of the FRENIC-Ace series of high-performance, standard-type inverters, which can be customized according to customers' applications.

Electronic Devices

- We developed the AT-NPC 3-level 12in1 IGBT modules, which significantly reduce the power loss and the sizes of power electronics components such as inverters and uninterruptive power supplies.



- For switching power supply controls, we developed the 2nd Generation LLC Current Resonant control ICs, which achieve lower standby power and provide enhanced protection functions.
- In the area of the next-generation power semiconductors by SiC, we are the first in the industry to establish production technology for a 6-inch SiC wafer line.

Food and Beverage Distribution

- We developed the D-BOX, a mobile refrigerated storage container with a traceability function, capable of maintaining a constant temperature for five hours without the need for electricity.

New Technology/Technological Foundation

- We worked with the University of Tokyo and JAMSTEC (Japan Agency for Marine-Earth Science and Technology) to jointly develop an aerosol* particle combined analyzer which enables the identification of PM2.5 sources.

* Microscopic liquid or solid particles that are suspended in a gas

Case Example

Market Introduction of SiC Power Semiconductors and SiC Power Electronics Featuring SiC Power Semiconductors for Next-Generation Power Saving

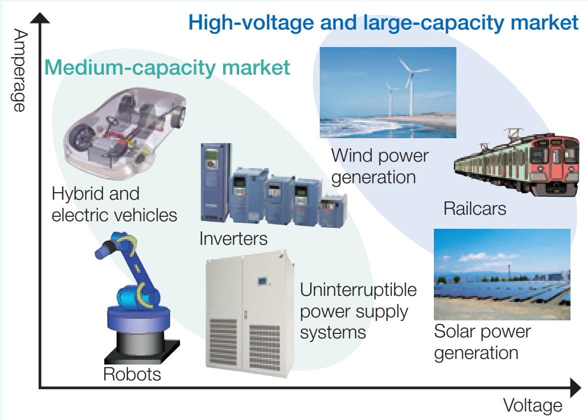
Potential of SiC Power Semiconductors

There is a demand for power semiconductors that can control large amounts of electricity precisely and efficiently in order to increase power conversion efficiency and realize high energy savings.

Compared to a conventional semiconductor material, SiC conducts electricity easily and suppresses electric power loss. Power semiconductor devices using SiC enable significant energy savings and enable the products they are used in to be smaller and lighter.

By advancing the commercialization of SiC power semiconductors and SiC power electronics, Fuji Electric is bolstering its initiatives in the medium-capacity market, including inverters, where we have focused our efforts, as well as the high-voltage and large-capacity markets, where renewable energy including solar power generation systems is expected to bring expansion.

Markets for Application of SiC Power Electronics

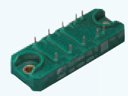


Creation of a Production Line for 6-Inch SiC Power Semiconductors

Constructing a production line for 6-inch SiC power semiconductors was considered a challenge. In October 2013, in order to drive down the cost of SiC power semiconductors and hasten the introduction of SiC power electronics into the market, Fuji Electric completed a 6-inch production line first in the industry, and also back-end process assembly and testing line.

Following this achievement, in May 2014, we announced the launch of a large-capacity power conditioner for mega solar power generation using SiC power semiconductors (sales scheduled to begin in August 2014).

Power conditioner using SiC power semiconductors



SiC power semiconductor

Case Example

Research to Analyze Atmospheric Pollutant PM2.5 and Other Fine Particles

Voice A Message from the Development Partner

Associate Professor
Nobuyuki Takegawa,
(Then) Research Center for Advanced Science and Technology, the University of Tokyo
(Currently) Professor at the Environment and Geochemistry Research Laboratory of the Graduate School of Science and Engineering, Tokyo Metropolitan University

PM2.5 are fine particles smaller than 2.5 micrometers in particle diameter, believed to significantly impact both health and climate change. In order to correctly understand these impacts and study solutions, it is first necessary to measure the fine particles in the atmosphere in real time. As such, the development of equipment to perform such an analysis became a pressing issue.

In response, we at the University of Tokyo launched a collaborative effort, joining forces with Fuji Electric, which possesses instrumentation technologies, and JAMSTEC (Japan Agency for Marine-Earth Science and Technology), which has its own unique measurement technologies. We were commissioned by the Japan Science and Technology to work on an advanced measurement device development program, and in fiscal 2008, we began joint research towards the development of such a device.

During the research process, the close industry-academia partnership-based development platform, in which engineers worked full-time at the university, played a major role in moving the program forward.

In particular, one of the keys to developing the analyzer was a particle trap for capturing particulate matter. In our discussions with the engineers, we discovered that we could utilize Fuji Electric's micromachining technology, which we had not considered at the beginning. This led to a remarkable increase in the performance of the equipment. Making use of these various technology synergies, in March 2013, we succeeded in developing a combined aerosol particle analysis technology capable of analyzing the main components of PM2.5 in real time.

Going forward, the commercialization of analyzers applying this technology will allow us to shed light on the sources of PM2.5 and establish effective countermeasures for it. Furthermore, this technology will hopefully lead to an overall understanding of the impacts that the various fine particles suspended in the atmosphere have on the earth overall, as well as a general understanding of climate change.