

Electronic Devices

Increase automotive sales by expanding our power semiconductor production capacity

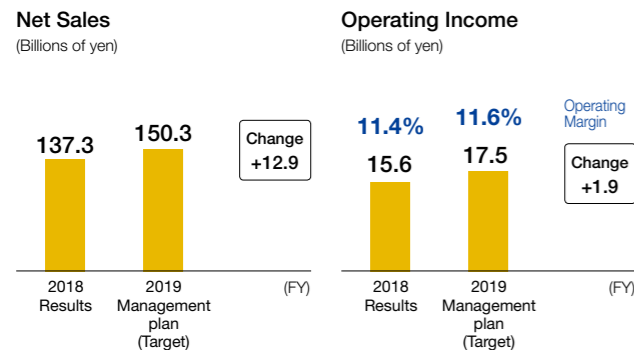
Managing Executive Officer
Corporate General Manager,
Electronic Devices Business Group

Toru Housen



Business Areas

- Semiconductors
(Industrial and automotive fields)
- Magnetic disks



Awareness of Market Needs

Demand in the industrial and social infrastructure fields is increasing for power semiconductors that fulfill the role of energy saving with high levels of conversion efficiency and power control. This demand is driven by increasing energy demands and environmental regulations such as global warming countermeasures.

In the industrial field, the adoption of renewable energies such as wind power and solar power is proceeding centered on China and Europe, while demand for inverter air-conditioning units is growing in China. Over the medium and long term, we forecast that investments in production floor automation with the aim of solving labor shortages and enhancing productivity will result in growing demand for machine tools and robots.

The driver of growth going forward will be the automotive field. We anticipate demand throughout the world for power semiconductors for motor control inverters which are necessary for electric vehicles (EVs).

Strengths of the Electronic Devices Segment

The strengths of the Electronic Devices segment are in technologies that enable the commercialization of IGBT modules that contribute to increasing the efficiency, miniaturization, and reliability of power electronics by combining cutting-edge IGBT chip technologies with package technologies possessing high heat dissipation and high levels of reliability. We are promptly meeting market needs and providing ideal products for a variety of applications through collaboration with our power electronics systems business.

Priority Measures for Fiscal 2019

Launching mass production of new products for automotive applications

We are moving ahead with the development and mass production of Reverse-Conducting IGBT (RC-IGBT) chips and 4th-generation direct liquid cooling modules and we will provide these products to customers throughout the world. We will bolster specification incorporation activities that conduct proposals at the customers' product design stage and provide new products that meet customer needs. Through these efforts we will aim for further customer acquisition. By continuing to provide full support after specification incorporation, we will heighten the value of Fuji Electric products.

Boost sales of 7th-generation IGBT for industrial applications

We will aim to boost sales by bolstering product lines that combine 7th-generation IGBT chips that reduce losses by approximately 30% more than before and 7th-generation IGBT modules, which boast high levels of heat dissipation and reliability. We will achieve differentiation by creating a lineup of high-capacity products not provided by other companies that can be easily applied to equipment.

Targeting air conditioners, where there are calls for further energy saving, we will respond to customer needs by expanding our lineup of products for large, rather than compact models.

Accelerate improvements to manufacturing capabilities

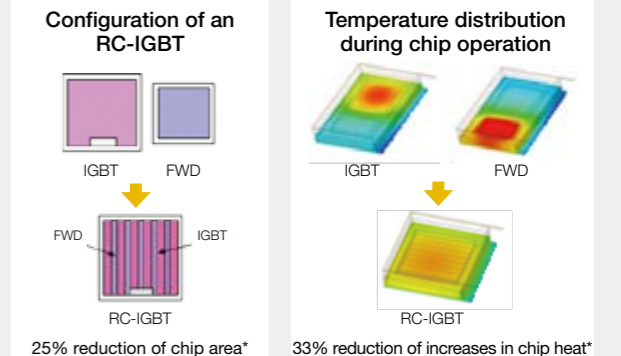
In order to grow sales, we are implementing appropriate equipment investments in a timely manner. In chip manufacturing (front-end processes), we are increasing 8-inch chip production equipment centered on our Yamanashi Factory, while for module assembly (back-end processes), we are augmenting capacities for production bases in Japan and overseas that are accelerating local production and consumption.

Close-Up

RC-IGBTs that realize miniaturization and high levels of reliability

One of Fuji Electric's strengths is its RC-IGBT. RC-IGBTs were adopted by the automotive industry and are currently being deployed horizontally in industrial fields.

By using an RC-IGBT that arranges two types of semiconductor with differing functions—an IGBT and a free-wheeling diode (FWD)—alternately in a straight line on a single chip, it is possible to realize significant miniaturization when compared with arranging an IGBT and an FWD in two separate chips. A high level of reliability is realized as a result of dispersal of the heat generated during operation.



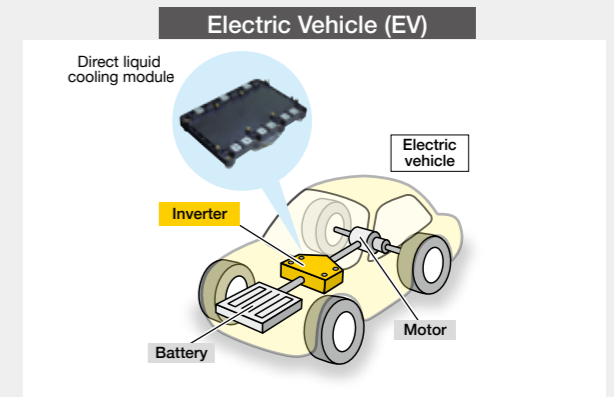
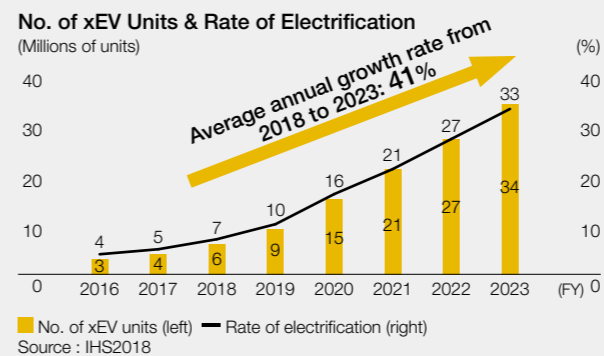
* Figures derived by comparing IGBT and FWD with RC-IGBT under certain assumed conditions

Contribute to reducing the environmental impact of EVs and enhance driving distance

In order to improve environmental impact reductions and driving distances for EVs and hybrid electric vehicles, for which we anticipate an increase in demand, there is a need for smaller, lighter, and highly reliable mounted components.

In order to meet that need, Fuji Electric provides direct liquid cooling modules for inverters for motor control applications, which are essential to electrified vehicles (xEVs).

A direct liquid cooling module is equipped with an RC-IGBT and uses a direct cooling structure that has higher heat dissipation performance than prior products, realizing smaller size, lighter weight, and a high level of reliability.



Realizing higher levels of efficiency and more compact size of power conditioning systems for wind and solar power generation

The introduction of renewable energies such as wind and solar power is proceeding in order to realize a low-carbon society. Power conditioning systems (PCSs), an apparatus for stabilizing power, are needed for wind and solar power generation, while power semiconductors, which convert power efficiently, are indispensable.

The 7th-generation IGBT products offered by Fuji Electric are thinner than previous models. The combination of a chip that reduces power loss through the application of Fuji Electric's micro-machining technology and a module with enhanced heat dissipation properties by applying newly developed materials, realizes highly efficient energy conversion and enhances levels of output electric power density*. As a result, more efficient and compact PCSs can be realized.

In order to expand use of 7th-generation IGBTs, we will reinforce specification incorporation activities at our design

centers throughout the world, targeting PCS manufacturers. Going forward, we will aim to increase sales by expanding our lineup of high-capacity products not provided by other companies.

*Power density per unit

