Business Strategy of Semiconductors

August 18, 2010
Fuji Electric Holdings Co., Ltd.
1. Business Outline

2. Market Trends


4. Capital Investment / R&D Expenditures

5. Performance Trends / Targets
Business Outline

Power supply field

Industrial field

Automobile field

Application

Power ICs

IGBT modules

Pressure sensors

IGBT IPM

Applied product

MOSFETs

Characteristics

- Contributes to miniaturization of equipment and energy saving with its industry leading low-loss and high efficiency
- Offers the most advanced high-speed and low-loss properties and a high-damage tolerance level (6th-generation IGBT)
- Offers high reliability through PKG technologies
- Meets market needs with highly reliability technologies
- Achieves low loss and high efficiency through utilization of 6th-generation IGBT
- Possesses high energy tolerance (Igniters)
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Trends in the Power Semiconductor Market

Average growth rate after 2010
Entire semiconductor market: 4.5%
Entire power semiconductor market: 5.3%
Markets applicable to the Company: 7.0%
IGBT market: 10.6%

Markets applicable to the Company:
IGBT: Entire
MOSFET: Transistors with resistance of over 200V and automotive transistors with resistance of below 200V
Power diodes: SBD and FRD

Data source: Compiled by Fuji Electric based on data released by the WSTS
## Business Policies / Growth Strategies

### Basic Strategies

- Increase sales of high-capacity power semiconductors in the field of energy and the environment and aim to enter into the low-capacity field
- Increase overseas sales and bolster overseas production (local production for local consumption)
- Aim to be No. 1 in the IBGT field

### Target

Net sales in Fiscal 2011: Medium-term management plan

\[ ¥90.0 \text{ billion} \Rightarrow ¥100.0 \text{ billion} \]

### Manufacturing measures

- Realize the effects of integrating domestic subsidiaries and expand overseas production
- Strengthen production systems in response to the rapid expansion of markets (New cleanrooms, new assembly bases)

### Sales measures

- Development and advance products matched to regional needs and characteristics
- Introduce sales engineers and develop coordination with technical centers in areas such as China and Europe

### Development measures

- Concentrate resources in focus areas (energy and the environment, automobiles)
- Commercialize next-generation devices (SiC, GaN) and establish production technologies
Business Policies / Growth Strategies:
Target Markets and Market Shares (IGBT)

- Aim to increase shares of the large-scale and high-growth new energy, infrastructure, and EV/HEV markets
- Aim to recover and maintain share of the Factory automation related market following the recovery of the market

Market size and Fuji Electric’s predicted share by individual field of the IGBT module market

Data source: Compiled by Fuji Electric based on data released by IMS Research and CSM
Business Policies / Growth Strategies:
Target Markets and Market Shares (IGBT)

- Expanding markets (High capacity, high resistance)
- Newly entered markets (Low-capacity)

- Consumer electronics
- Inverters
- Robots
- UPSs
- EVs/HEVs
- Wind power generation
- Electric railways

Markets in which Fuji Electric is currently operating
**Target Markets**

Wind power generation, Mega solar

**Target Areas**

Europe, U.S., China

**Measures**

Expand of our series of products for high-capacity IGBTs (up to 3,300V/3,600A)  
Apply new RB-IGBT* technology

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*RB-IGBT (New 3-Level Reverse Blocking Power Modules)

Characteristics:  
Substantially reduces loss from converter circuits  
Particularly, in power conditioners for photovoltaic power generation, for which converter efficiency is important, operational losses can be significantly decreased.

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![Graph showing reduction of loss when used in UPSs](graph.png)
Target Markets
Motor controllers, charging systems, etc. for EVs and HEVs

Target Areas
Japan, China

Measures
Advance development of miniature and advanced-heat radiating modules* with low-loss properties through the application of 6th generation IGBT technology

*Miniature and advanced-heat radiating modules

Traditional 2-in-1 model → New 6-in-1 model

Area per A of current reduced by half
(Note: Area of PKG is calculated as a rectangle with dimensions taken from their outer-most edges)
Business Policies / Growth Strategies: Global Expansion

- Develop and advance products that meet the needs of customers in China and Europe, principal sales regions
- Evaluate the facilities of production bases in focus regions

![Map of Business Expansion]

- **Philippines:** Shift of production completed
- **Malaysia:** Shift of production underway
- **Europe:** Under evaluation
- **China:** Under evaluation

- New production bases (area)
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Accelerate overseas investment in order to increase the share of overseas production

Focus resources on the energy and the environment field and the development of next-generation devices

**Capital investment**

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<tbody>
<tr>
<td>FY2009</td>
<td>4.5</td>
<td></td>
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<tr>
<td>FY2010</td>
<td>10</td>
<td>12</td>
<td>13.5</td>
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(Major development themes for 2010)
Energy: Develop high-capacity modules
Environment: Develop devices for EVs and HEVs, expand 6th-generation series, develop highly functional discrete devices and low-capacity modules
Next generation: Develop SiC and GaN devices (Group-wide initiative)

**R&D expenditures**

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<td>FY2009</td>
<td></td>
<td></td>
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<tr>
<td>FY2010</td>
<td></td>
<td>5.9</td>
<td>7.0</td>
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<tr>
<td>FY2011</td>
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<td>7.5</td>
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Next-Generation SiC Device Initiatives

Respond to needs by accelerating R&D of next-generation SiC devices

◆ New specialized SiC production line installed within the National Institute of Advanced Industrial Science and Technology, operation of facilities, etc., has been commenced (currently conducting test-run)

◆ Sample development
  SBD : During fiscal 2010
  MOSFET : During fiscal 2011

◆ Mass-production
  SBD : Begins April 2011
  MOSFET : Begins April 2012

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<thead>
<tr>
<th>Characteristics</th>
<th>Benefits</th>
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<tbody>
<tr>
<td>High-voltage</td>
<td>Miniaturization of equipment</td>
</tr>
<tr>
<td>Low-resistance</td>
<td>Low electrical power consumption</td>
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<tr>
<td>High-speed operation</td>
<td>Highly efficient electrical power conversion</td>
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<tr>
<th>Applications</th>
<th>Estimated reduction values</th>
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<tr>
<td>(Calculated by Fuji Electric using Si IGBTs as a base of 100%)</td>
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<tr>
<td>Server power source</td>
<td>Loss △ 35%</td>
</tr>
<tr>
<td>General-purpose / high-voltage inverter</td>
<td>Loss △ 60%  Volume △ 75%</td>
</tr>
<tr>
<td>UPS</td>
<td>Loss △ 60%  Volume △ 40%</td>
</tr>
<tr>
<td>EV</td>
<td>Loss △ 50%</td>
</tr>
<tr>
<td>Vehicle</td>
<td>Loss △ 50%  Volume △ 50%</td>
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SiC MOSFET: Currently under joint development with National Institute of Advanced Industrial Science and Technology
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< Fiscal 2011 Medium-term Targets >
Aim for net sales of ¥100.0 billion and operating income of ¥10.0 billion

- **Automobile field**
  - FY2009: ¥70.0 billion, Sales ¥4.0 billion, OP +¥5.0 billion
  - Forecast (2010/5/15): Sales ¥83.0 billion, OP +¥5.0 billion
  - Forecast (2010/7/30): Sales ¥88.0 billion, OP +¥6.0 billion

- **Industrial field**
  - FY2009: ¥-20.0 billion
  - Forecast (2010/5/15): Sales ¥20.0 billion, OP +¥6.0 billion
  - Forecast (2010/7/30): Sales ¥20.0 billion, OP +¥6.0 billion

- **Power Supply field**
  - FY2009: ¥80.0 billion, Sales ¥20.0 billion, OP +¥6.0 billion
  - Forecast (2010/5/15): Sales ¥120.0 billion, OP +¥10.0 billion
  - Forecast (2010/7/30): Sales ¥120.0 billion, OP +¥10.0 billion

- **Medium-term Management Plan**
  - FY2011: Sales ¥100.0 billion, OP +¥10.0 billion

- **Medium-term Target**
  - FY2011: Sales ¥100.0 billion, OP +¥10.0 billion
Disclaimer

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