Global Power Semiconductor Market: Key Research Findings 2013

◆ Research Outline

Yano Research Institute has conducted a study on the global power semiconductor market with the following conditions:

1. Research period: October 2012 to April 2013
2. Research target: Manufacturers of power semiconductor devices, wafers, and systems
3. Research methodologies: Face-to-face interviews by the specialized researchers, telephone/email surveys, and literature research

<What are power semiconductors?>
Power semiconductors are semiconductor devices mainly used for switching and converting electricity, and controlling motors within the circuits of inverters/converters. This research particularly targets those power semiconductors made with conventional silicon wafer, and those with next-generation materials such as SiC, and GaN.

◆ Key Findings

- **Size of Global Power Semiconductor Market in 2012 Declined by 11.5% to US$ 13.512 Billion on Y-o-Y Bases**
  The global power semiconductor market in 2012, based on the shipment volume of manufacturers, dropped by 11.5% to US$13.512 from what it had been US$15.280 billion in 2011. The market once experienced precipitous fall in 2009, but had showed recovery for consecutive increase in 2010 and 2011. However, it turned to a two-digit decline in 2012 due to the recession caused both in Europe and China and to sluggish demands for information/telecommunication devices and consumer equipments, among other various reasons.

- **Market Size Estimated as US$29.010 Billion in 2020 Driven by Power Modules**
  It is highly possible that the global power semiconductor market recover from the latter half of 2013. Power modules are likely to be the new driving force of the market, replacing the role from MOSFET, diodes, and other discrete semiconductors. The market size, based on the shipment volume of manufacturers, is estimated to attain US$29.010 billion in 2020.

- **Global Market of Next-Generation Power Semiconductors Using SiC, GaN and Other Materials to Reach US$2.98 Billion, with Increasing Introduction in 2015 and Beyond**
  Those power semiconductors using next-generation materials such as SiC and GaN, characterized as lower loss, higher-speed switching, and higher heat resistant than
conventionally used silicon, are only limitedly embedded in the devices required for a certain use. However, adoption of those power semiconductors are likely to expand because lower budget is needed for producing them from 2015 and onward, by the time when the market is launched in full scale. The size of SiC or GaN power semiconductor market is anticipated to be US$2.98 in 2020, based on the manufacturer shipment volume.

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**Figure 1: Transition and Estimation of Size of Global Power Semiconductor Market**

US$ Hundred Million
### Yearly Power Semiconductor Market by Material

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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Si</td>
<td>134.3</td>
<td>139.5</td>
<td>147.5</td>
<td>159.1</td>
<td>174.4</td>
<td>192.7</td>
<td>214.2</td>
<td>237.4</td>
<td>260.3</td>
</tr>
<tr>
<td>Y-o-Y</td>
<td></td>
<td>103.9%</td>
<td>105.7%</td>
<td>107.8%</td>
<td>109.6%</td>
<td>110.5%</td>
<td>111.2%</td>
<td>110.8%</td>
<td>109.7%</td>
</tr>
<tr>
<td>SiC/GaN</td>
<td>0.8</td>
<td>1.2</td>
<td>2.4</td>
<td>5.1</td>
<td>9.3</td>
<td>13.7</td>
<td>18.9</td>
<td>24.1</td>
<td>29.8</td>
</tr>
<tr>
<td>Y-o-Y</td>
<td></td>
<td>147.3%</td>
<td>203.6%</td>
<td>211.3%</td>
<td>182.5%</td>
<td>148.5%</td>
<td>137.4%</td>
<td>127.7%</td>
<td>123.6%</td>
</tr>
<tr>
<td>Total</td>
<td>135.1</td>
<td>140.7</td>
<td>149.9</td>
<td>164.1</td>
<td>183.6</td>
<td>206.4</td>
<td>233.1</td>
<td>261.5</td>
<td>290.1</td>
</tr>
<tr>
<td>Y-o-Y</td>
<td></td>
<td>104.1%</td>
<td>106.5%</td>
<td>109.5%</td>
<td>111.9%</td>
<td>112.4%</td>
<td>112.9%</td>
<td>112.2%</td>
<td>110.9%</td>
</tr>
</tbody>
</table>

*Estimated by YRI*

**Notes:**

1. The figures are based on shipment volume from manufacturers.
2. The figures in 2012 are actual and the figures from 2013 to 2020 are estimate.
3. Si stands for those power semiconductors made with silicon wafer, SiC/GaN stands for those power semiconductor made with SiC or GaN, and other next-generation materials. Power semiconductors include power MOSFET (Metal Oxide Semiconductor Field Effect Transistor)/IPD (Intelligent Power Device), diode, IGBT (Insulated Gate Bipolar Transistor), power module, and bipolar transistor.
4. Because of rounding, parts of total values and ratio may be different.