Hochleistungstechnologien für Energieeffiziente Produkte

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e2050 Energie und Endverbraucher,
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- Infineon Technologies – Short company overview
- Worldwide energy and electricity needs
- Electricity savings potential
- Infineon’s contribution to energy efficiency
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Infineon – a Semiconductor Company
Overview

- More than EUR 4 bn in revenues in the fiscal year 2006
- Approx. 30,000 employees (incl. 6,000 R&D staff) as of March 31, 2007
- Strong technology portfolio with about 22,900 patents and applications; more than 35 major R&D locations worldwide
- Focus on Energy Efficiency, Connectivity & Security
- Majority holding of Qimonda
After carve-out of the memory business, Infineon organized in two business groups: AIM and COM.

<table>
<thead>
<tr>
<th>Business Groups</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIM</td>
<td><strong>Car Electronics</strong> (powertrain, safety management, body &amp; convenience, infotainment), <strong>Power control</strong> (distributed power generation, automation / motor control, transportation, power supplies, medical, building control), <strong>Chipcard &amp; Security</strong> (communications, payment, identification, entertainment)</td>
</tr>
<tr>
<td>Automotive, Industrial &amp; Multimarket</td>
<td>Mobile telephone systems for major standards (GSM, GPRS, EDGE, UMTS), cordless telephone systems for major standards (WDCT, DECT), RF connectivity solutions (Bluetooth, GPS, etc.), cellular base stations, traditional telecom and enterprise equipment, broadband access solutions for central office and customer premises equipment, home networking equipment.</td>
</tr>
<tr>
<td>COM</td>
<td>Communication Solutions</td>
</tr>
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</table>
Infineon Gains Worldwide Market Leadership in Power Semiconductors

Global Power Semiconductor Market Ranking

<table>
<thead>
<tr>
<th>Rank 2004</th>
<th>Rank 2005</th>
<th>Supplier</th>
<th>2005</th>
<th>2004</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>1</td>
<td>Infineon (incl. eupec)</td>
<td>9.4%</td>
<td>8.4%</td>
<td>1.0%</td>
</tr>
<tr>
<td>(3)</td>
<td>2</td>
<td>Fairchild</td>
<td>7.2%</td>
<td>7.6%</td>
<td>-0.4%</td>
</tr>
<tr>
<td>(2)</td>
<td>3</td>
<td>IR</td>
<td>7.1%</td>
<td>7.8%</td>
<td>-0.7%</td>
</tr>
<tr>
<td>(4)</td>
<td>4</td>
<td>STM</td>
<td>6.9%</td>
<td>7.0%</td>
<td>-0.1%</td>
</tr>
<tr>
<td>(5)</td>
<td>5</td>
<td>Toshiba</td>
<td>6.2%</td>
<td>6.5%</td>
<td>-0.3%</td>
</tr>
</tbody>
</table>

Market size

- 2005: USD 11,320 m
- 2004: USD 11,278 m

Source: IMS Research, Global Market for Power Semiconductors, September 2006
About one third of the global energy use is based on electricity.

~1/3 of **global energy consumption** is electricity.

USA and China are the largest consumers of electricity.

**Global energy consumption 2004**

- USA: 33%
- Others: 67%

Total 15.4 million GWh

**Global electricity consumption 2004**

- USA: 7.5 million GWh
- China: 3.7 million GWh
- Russia: 1.9 million GWh
- Japan: 1 million GWh
- Germany: 0.8 million GWh
- Others: 0.5 million GWh

Total 15.4 million GWh

The **easy control of electrical energy** offers great potential for efficiency increase.

Global demand for electricity is expected to double until 2030

Annual increase in global electricity demand of 2.7%

Global consumption of electricity
2003 – 2030
in million GWh

Forecast
30,1

2003
14,8

2015
21,7

2030

Annual increase of electricity demand
2003 - 2030
in %

North America
1,7%

OECD Europe
1,2%

China
4,8%

India
4,6%

Global average
2,7%

Source: Energy Information Administration (EIA), International Energy Outlook 2006
Energy Efficiency – not just a new buzzword, but a reality

**EU**
- EU Action Plan ‘Realizing the Potential’ with 10 priorities; Goal: 20% savings until 2020 (released Oct 06)
- Set up of national Energy Efficiency Action Plans by EU Member States (Energy Services Directive until June 07)

**Japan**
- Energy Conservation Law
- Extend to 13 target products groups (2004)

**USA**
- Strong history in voluntary labeling and obligatory standards for public procurement of E Eff characteristics of products - Energy Star Agreement
- Climate Savers Computing Initiative (Microsoft, Dell, HP, IBM, Google, Intel) Goal: starting from 2010, yearly saving of 54 Mt CO2 emissions (= 5,5 bn $)
- Pay-back initiatives, e.g. 80+
- Wal-Mart demanding scorecard on energy efficiency for all electronic products (starting from 2008)

**China**
- Energy Efficiency – a central topic in the 11th Five-year-plan
- 10 Energy Savings Priority Groups (incl. E.g. Green Lighting)

**Singapore**
- Clean Energy Thrust about $ 170 million (March 07)

**Australia**
- Ban on conventional light bulbs from 2010 on (Feb 07)

**Examples**

Source: press articles
## Saving Potentials using Power Electronic based solutions is possible to be achieved today!

<table>
<thead>
<tr>
<th>Component</th>
<th>Saving Potential</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POWER SUPPLY</strong></td>
<td>up to 40%</td>
<td>~6% of total electricity consumption</td>
</tr>
<tr>
<td><strong>LIGHTING</strong></td>
<td>25% Saving potential</td>
<td>~5% of total electricity consumption</td>
</tr>
<tr>
<td><strong>INDUCTIVE COOKING</strong></td>
<td>25% Saving potential</td>
<td>(using induction instead of electric ovens)</td>
</tr>
<tr>
<td><strong>TRACTION DRIVES</strong></td>
<td>20-30% Saving potential</td>
<td>(using power semiconductors e.g. recuperation of braking energy)</td>
</tr>
<tr>
<td><strong>MOTOR CONTROL</strong></td>
<td>30-40% Saving potential</td>
<td>~40% of total electricity consumption</td>
</tr>
<tr>
<td><strong>AIR CONDITIONER</strong></td>
<td>30-40% Saving potential</td>
<td>(using Intelligent Compressor Control)</td>
</tr>
<tr>
<td><strong>STAND-BY POWER (TV)</strong></td>
<td>90% Saving potential</td>
<td>(using auxiliary power supplies)</td>
</tr>
</tbody>
</table>

Sources: eupec GmbH; BVG- Berlin; Siemens / ECPE, 10/2005
Enormous savings potential in households: White goods, standby operation & lighting

Power consumption in European households in TWh (Forecast 2010)

Quelle: Wal, Kern 2004

Saving potential
~ 8 power plants à 1 GW

~ 70 TWh per year

333 TWh per year

402 TWh
per year

150

Under general conditions (currently)

In consideration of additionally standards

Domestic electric storage water heater

Lighting

Refrigerators and freezers

Dishwashers

Electric ovens

Washing machines

Standby

Air-conditioners

Dryers

Dishwashers

~ 8 power plants à 1 GW

Dishwashers
How Much Money Can a European Household Save?

Average European Household

Energy efficiency
due to
innovative technology

+ 

Energy Savings
due to
energy-saving behavior

Average energy saving potential
up to 1000€ p.a. *

*Source: BMU, Energie effizient nutzen, 2006
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Our Products Help Reduce Losses Along the Entire Energy Distribution Chain

1. Energy Generation: AC/AC
2. Energy Distribution: AC/DC/AC
3. Motor Drives, Traction: AC/DC/AC
4. Energy Consumption: Power Supply AC/DC
5. Point of Load: DC/DC
Higher energy efficiency through new AC/DC power supplies

Miniaturization, reduced losses, wider input range

**Yesterday**
- AC 230 V
- Efficiency ~65%

**Today**
- AC 85-240 V
- Efficiency ~75%

**Vision**
- AC 85-240 V
- Efficiency >90%
Massive energy waste during stand-by!
Example: Television

Europe: ~ 200 million TV sets
consuming 2 GW during stand-by of 20h
(with about 200Wh/day per set)

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</thead>
<tbody>
<tr>
<td>&gt; 0.3W and &lt; 15W</td>
<td>1.0W</td>
<td>0.75W</td>
<td>0.30W</td>
</tr>
<tr>
<td>&gt; 15W and &lt; 50W</td>
<td>1.0W</td>
<td>0.75W</td>
<td>0.50W</td>
</tr>
<tr>
<td>&gt; 50W and &lt; 75W</td>
<td>1.0W</td>
<td>0.75W</td>
<td>0.75W</td>
</tr>
</tbody>
</table>

IEA recommendation: Up to 90% savings possible

Implementation of IEA recommendation would save power of 1 nuclear power plant (1.8 GW)
Lighting Applications - High Energy Saving Potential
Electronic Control of Lighting and Switching Reduces Energy

15% of worldwide electrical energy is used by lighting.
Energy Saving in Server Power Supplies
Higher Efficiency Factor in Power Supply Units through COOLMOS™

Amount of server ww in 2006* ~9.5Mio
Amount of server (additionally) until 2011 ~30Mio
Ø Electric power consumption of one server ~1200W
Total electric power consumption server ww 36.000MW

1% saving is equivalent to a hydroelectric power plant (360MW)
Additionally you can save the cooling power

Source: Darnell, Power Factor Correction, 2006; CPES Bing Lu – APEC Proceedings 2002
Air-conditioners – Infineon products enable improved efficiency and convenience

- Takes 1/3 less time to achieve the desired temperature
- Energy savings up to 30 – 40%
- Permanent control without disturbing noise and constant draft

Source: eupec GmbH, 2005
Infineon – Never stop thinking