# Cheuvreux European IT and Technology Conference „Automotive, Industrial & Multimarket“

Paris, March 17, 2006

Peter Bauer
Member of the Management Board

Never stop thinking

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- **Global Trends**
- Automotive Business
- Industrial Business
- Chipcard & Security ICs Business
- Technology, Manufacturing, Customer Focus
- Questions & Answers



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# The Development of The Global Society Will Continue to Provide Solid Profitability and Growth in Our Businesses

## AIM Business Drivers

- Innovation for safer and more economical mobility.
- Saving energy, managing electrical power for environmental protection.
- Protection of privacy and investment in the information society.
- Enabling customer visions through IP and technology integration.
- Participation in the growth of the Asian continent.

## Fields of Business

- Automotive
- Industry
- Chipcard & Security
- Customer-specific design solutions

## Mid-term Goal

- Double-digit EBIT margin and double-digit growth rate.

- Global Trends
- **Automotive Business**
- Industrial Business
- Chipcard & Security ICs Business
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- Questions & Answers



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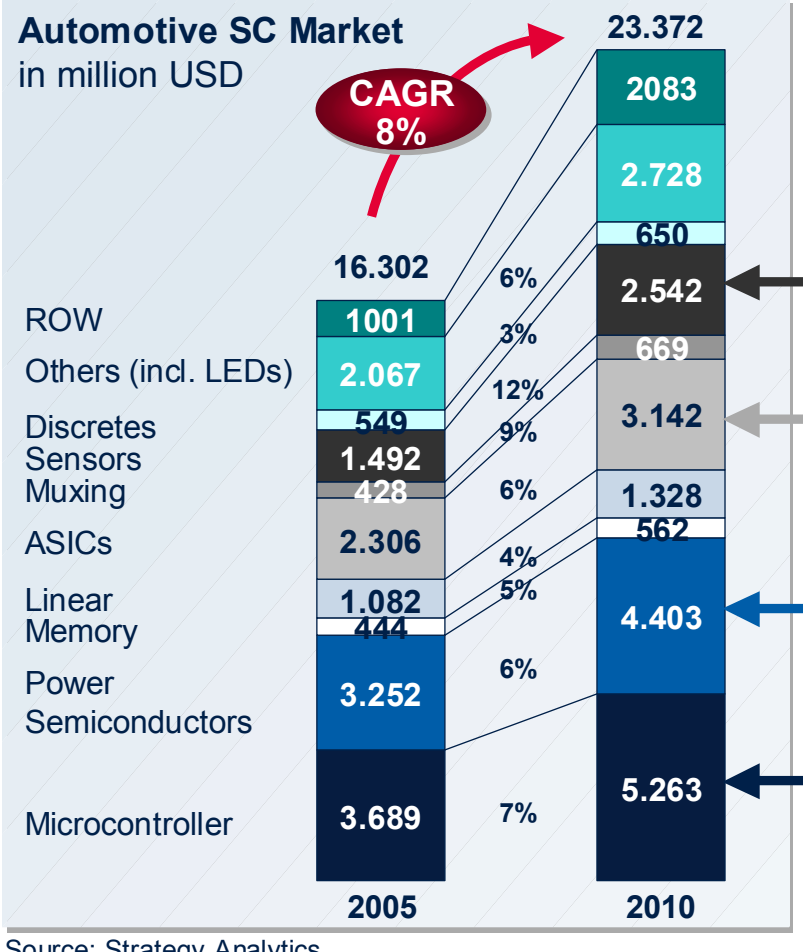
# Infineon Focuses on the Major Growth Markets in Automotive Semiconductors




Source: Strategy Analytics,
incl. North America, Europe, Japan, S. Korea, China, excl. ROW

## What Infineon provides:

**Sensors:**
TPMS, Radar, Magnetic, Wireless Control, Pressure, Intertia and Temperature.

**ASICs:**
Offering of customer-specific system ICs using IFX automotive IP and technologies.

**Power Semiconductors:**
MOSFETs, IGBTs, Regulators Transceivers, Smart Power, System ICs.

**Microcontroller:**
8/16/32bit microcontroller for all automotive applications using C800, C166 and TriCore + peripherals.

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# Key Innovations:
# Engine and Transmission Control Based on TriCore™

## Infineon's Tricore 32-bit Controller

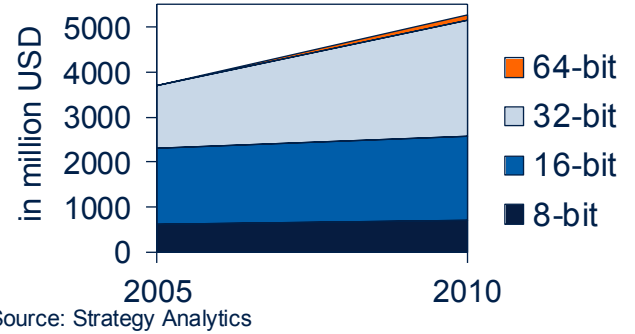

- Highest performing 32-bit embedded Control MCU family in automotive market
- First eFlash in 130nm in volume
- Embedded realtime performance + DSP in one chip
- Extremely fast interrupt response time and highest level of fault tolerance

## Application trends

- Reduced emissions
- Less fuel consumption
- Better engine behavior and more comfort

-> 32bit performance required!

## Auto MCU Market Development




Source: Strategy Analytics

# Key Innovations:
# Electrical Power Steering (EPS)

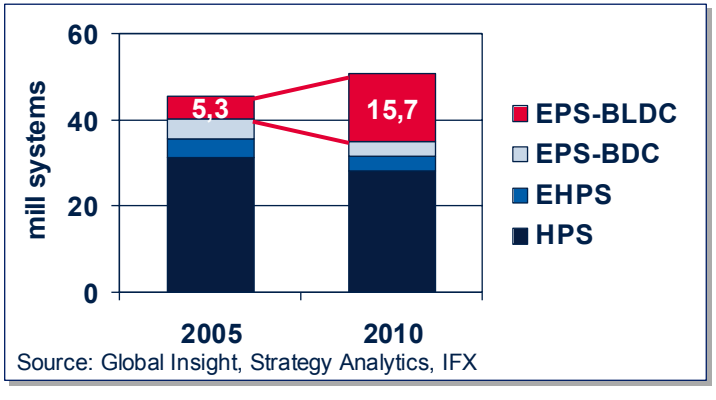
## Application Trends

- Reduced installation costs, complete module can be tested at supplier
- Easy adaptation to different cars with software modification, platform approach
- Increased utilization of EPS in smaller and cheaper vehicles
- Progressive steering and other new features can be realized much simpler with EPS

## Infineon Solution

- Leading in driver ICs and MOSFETs
- Almost complete coverage of semiconductor BoM (~ 85%); excellent application know-how
- Strong technology roadmap to drive further integration on system level
- Excellent quality & reliability for this safety-relevant application

## EPS Market Development

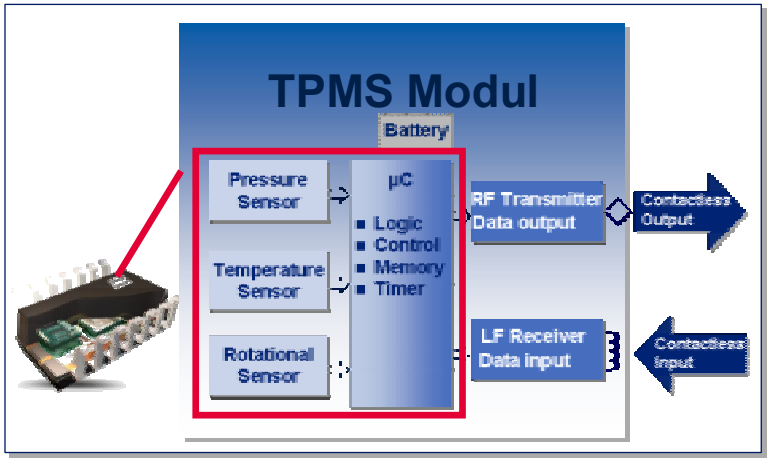



Source: Global Insight, Strategy Analytics, IFX

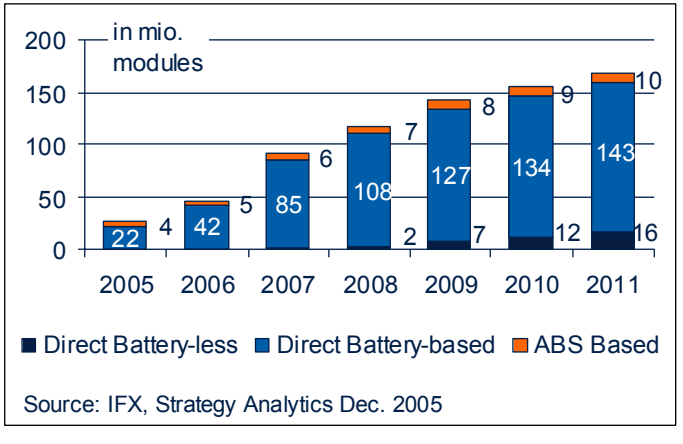
# Key Innovations:
# Tire Pressure Monitoring Systems

## Key Trends

- Further integration of functionality through advanced signal processing.
- Increased robustness.
- Standardized signal transmission concepts.
- All new light vehicles in US after Sept. 1, 2007 have to be equipped.




## TPMS Market




Source: IFX, Strategy Analytics Dec. 2005

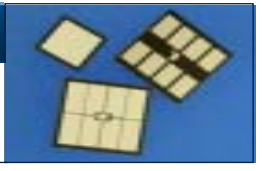
## Infineon Solution

- Leading-edge pressure, temperature and rotational sensors.
- High-performance microcontrollers.
- Broad range of transmitter, receiver and transceiver ICs.

# Key Innovations:
# Hybrid Electrical Vehicles

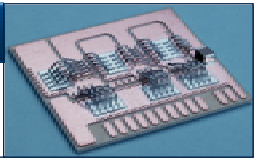
## Power semiconductors

- Leading trench-fieldstop technology (IGBT³)
- CoolMOS best in class MOSFET



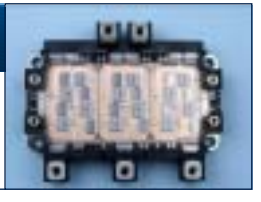
## Interconnection technology

- Durable wedge bonding with 30-500µm Al
- Void-free large area soldering



## Packaging technology

- Green package molding
- High power module experience
- DCB technology



## System components

- Dedicated driver ICs (SOI/coreless)
- Full product range microcontrollers
- Sensors, transceivers, power supply )

## System know-how

- Experience in automotive industry
- Dedicated hybrid business group
- Wide application know-how

Product Offering

DI-Supp.

**Infineon's value proposition along the value chain**



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# Automotive Semiconductor Solutions
# Combining Sensing, Computing and Actuating

| | | Sense | Compute | Actuate |
|---|---|---|---|---|
| **Powertrain**<br>- Diesel Engine Mgmt.<br>- Gasoline Engine Mgmt.<br>- Transmission Control<br>- Starter / Alternator |  | ▪ Pressure Sensors<br>▪ Hall Sensors | ▪ 16 bit µC<br>▪ 32 bit TriCore® (µC + DSP) | ▪ MOSFETs<br>▪ IGBTs<br>▪ Regulators<br>▪ Transceivers<br>▪ Smart Power<br>▪ System ICs |
| **Safety Management**<br>- ABS / Traction Control<br>- Suspension<br>- Airbag + Restraint Systems<br>- Power Steering<br>- Tire Pressure Monitoring |  | ▪ Pressure Sensors<br>▪ Hall Sensors<br>▪ RF ICs | ▪ 8 bit µCs<br>▪ 16 bit µCs<br>▪ 32 bit TriCore® (µC + DSP) | ▪ Diodes<br>▪ Transistors<br>▪ MOSFETs<br>▪ Regulators<br>▪ Transceivers<br>▪ Smart Power<br>▪ System ICs |
| **Body & Convenience**<br>- Light Control<br>- Heating, Ventilation, Air Condition<br>- Door & Seat<br>- Smart Battery Terminal |  | ▪ Hall Sensors<br>▪ Temp. Sensors<br>▪ RF ICs | ▪ 8 bit µCs<br>▪ 16 bit µCs | ▪ Diodes<br>▪ Transistors<br>▪ MOSFETs<br>▪ Regulators<br>▪ Transceivers<br>▪ Smart Power |
| **Infotainment**<br>- Telematics<br>- Navigation<br>- Multimedia<br>- Car Audio<br>- Dashboard |  | Microcontrollers, Wide Range (GSM/GPRS) and Short Range (Bluetooth, WLAN) communication solutions, GPS, High Frequency ICs, CAN/MOST Transceivers, Plastic Optical Fibres, Multimedia Cards, Power ICs, Security ICs | | |



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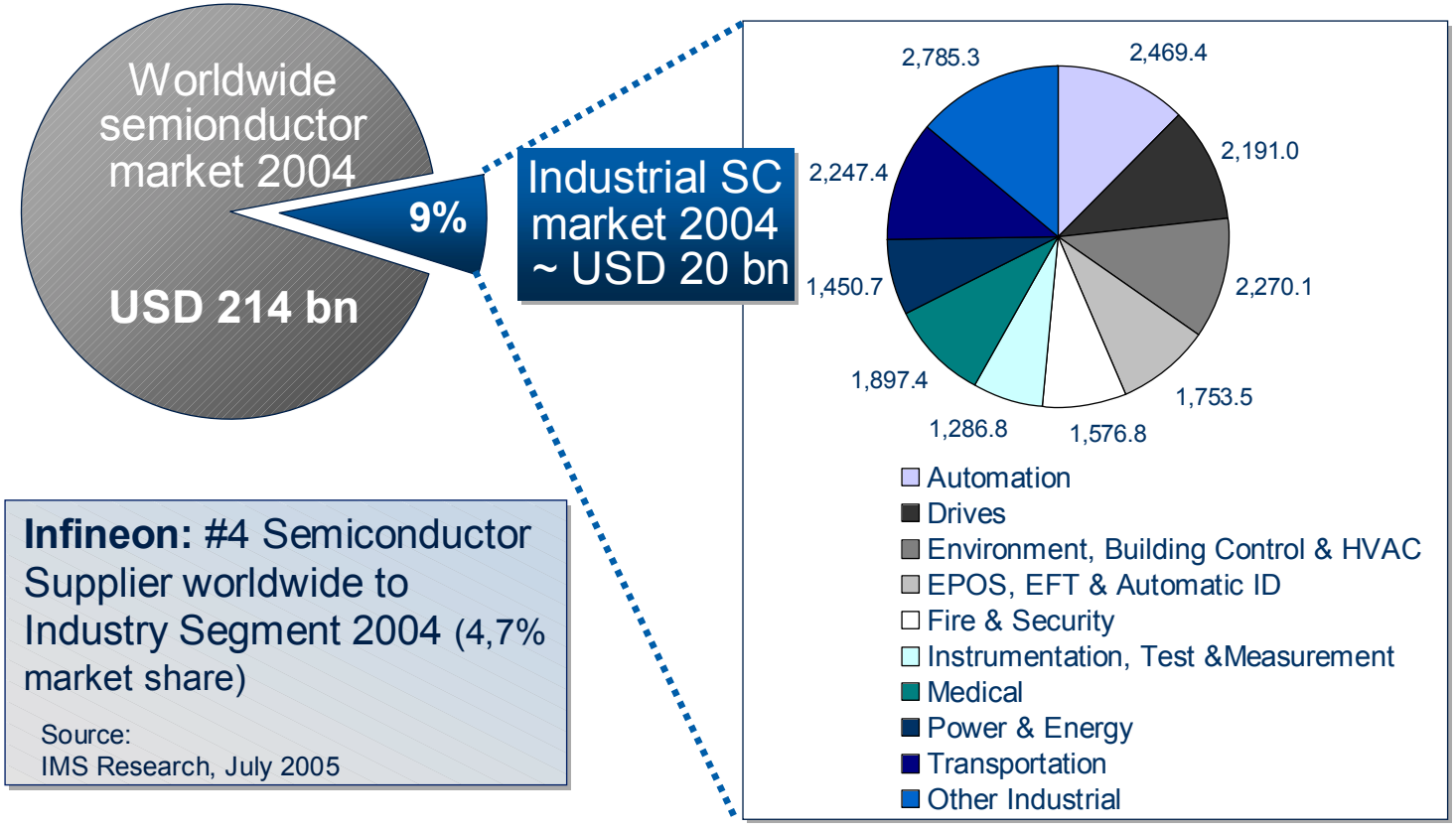
# The Industrial Market is Very Fragmented, Regarding Market Players, Applications and Requirements




**Infineon:** #4 Semiconductor Supplier worldwide to Industry Segment 2004 (4,7% market share)

Source:
IMS Research, July 2005



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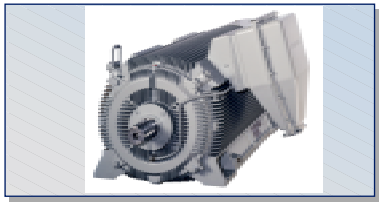
# Our Current Microcontroller Portfolio is Well Suited to Address Our Target Markets

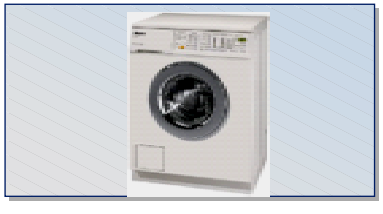
## Target applications

**Automotive**

**Industrial**



**Home Appliances**



## Key success factors for target applications

- Leading real-time performance
- Outstanding peripherals
- Complete portfolio
- Superior quality
- Ease of use and expert support

## Product families

**8-bit**

C5xx, C8xx, XC8xx

**16-bit**

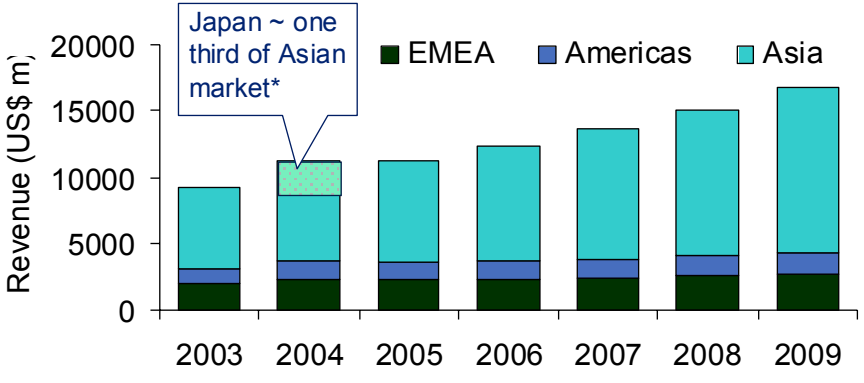
C16x, XC16x


**32-bit**

TC11xx, TC17xx

# Global Power Semiconductor Market: Market Development by Region

**Overall CAGR: 8.3 %**




| Rank 2004 | Rank 2003 | Supplier | 2004 | 2003 | Change |
|---|---|---|---|---|---|
| **1** | **1** | **Infineon** | **8.4%** | **8.1%** | **0.3%** |
| 2 | 2 | IR | 7.8% | 8.0% | -0.2% |
| 3 | 4 | Fairchild | 7.7% | 7.6% | 0.1% |
| 4 | 3 | STM | 7.2% | 6.7% | 0.5% |
| 5 | 5 | Toshiba | 6.7% | 7.4% | -0.7% |

Source: IMS Research, Global Market for Power Semiconductors, August 2005
*Source: iSuppli, "Power Management Competitive Analysis 2005", Sept 2005,
**Source: IFX estimation, 2005

| **Americas** | **2004** | **2003** |
|---|---|---|
| 1. IR | 14.9% | 15.4% |
| **2. Infineon** | **11.4%** | **10.9%** |
| 3. ON Semi | 9.1% | 8.7% |
| 4. STM | 7.9% | 6.6% |
| 5. Vishay | 6.7% | 5.5% |

| **EMEA** | **2004** | **2003** |
|---|---|---|
| **1. Infineon** | **21.6 %** | **20.2%** |
| 2. STM | 11.5 % | 11.1% |
| 3. IR | 10,1 % | 10,7% |
| 4. Semikron | 7.7 % | 7.2% |
| 5. Vishay | 5.8% | 5.2% |

| **ASIA** | **2004** | **2003** |
|---|---|---|
| 1. Toshiba | 9.3% | 9.4% |
| 2. Fairchild | 8.9% | 8.7% |
| … | … | … |
| 9. Sanyo | 4.3% | 4.2% |
| 10. NEC | 4.1% | 4.3% |
| **11. Infineon** | **3.8%** | **3.7%** |

thereof > 8% share in APAC, < 1% in Japan**

# Key Innovations: Flat Panel Displays and Computing Products using CoolMOS™

## CoolMOS – the ultimate high-voltage power MOSFET

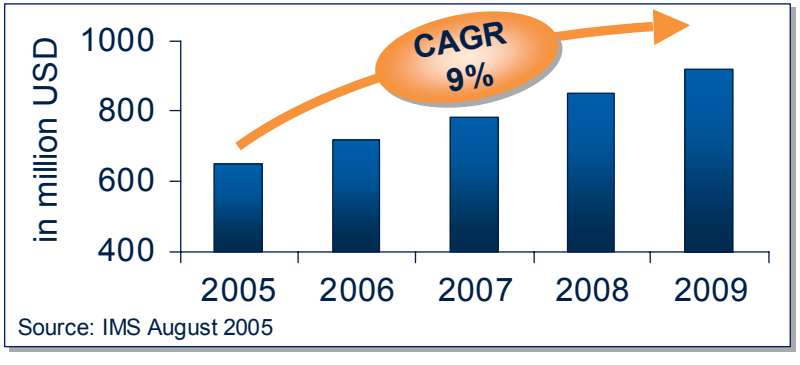
- New technological standard in high-voltage MOSFETs.
- Enables a significant reduction of conducting and switching losses.
- Extremely reduced heat generation.
- Largest range of packaging options.
- Reduced overall system cost with CoolMOS.

## Application trends

- Increased output power
- Reduced size and weight of the power supply

⇨ highest conversion efficiency is achieved by combining CoolMOS with thinQ!™ Silicon Carbide Schottky diode!

## Market development HV MOSFETs (>500V)




Source: IMS August 2005



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# Key innovations:
# Power Supplies for Graphics Cards with OptiMOS 2

## OptiMOS 2 in Graphics Card Applications

**High end: 2005**

Photo: NVIDIA GeForce 7800 GTX F


**High end: 2002**


Photo: NVIDIA GeForce TI/4800

- Increasing graphics processor performance requires higher power density.
- This requires a high efficient power supply using state-of-the-art MOSFET technologies and packages.
- Power consumption increased from 2002 to 2005 by 30% in high-end segment.
- Infineon OptiMOS 2 offering:
  - performance leadership which offers very high efficiency in application
  - state-of-the-art SuperSO8 package
  - excellent cost / performance ratio
- Infineon's key customers include NVIDIA and ATI.



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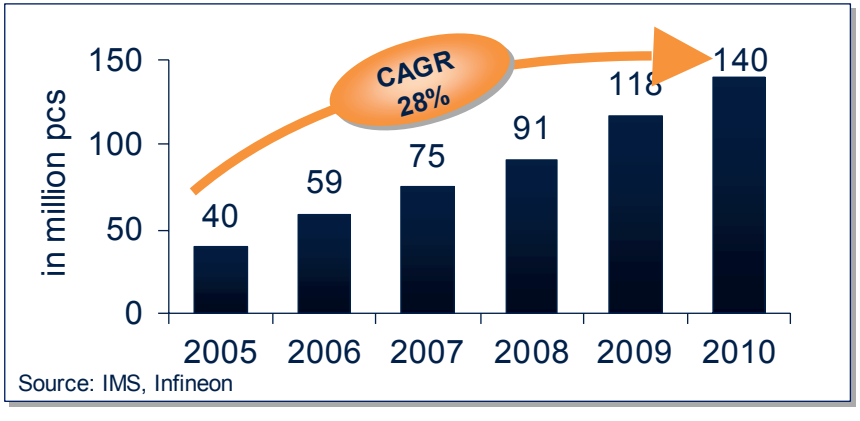
# Key Innovations:
# Induction Heating with IGBT

## Induction heating with IGBTs

- Reverse Conducting IGBT
  - IGBT's based on Infineon TrenchStop™ technology with integrated backside diode lead to highest efficiency in induction conduction applications.
- 600-900-1200V families cover all used line voltages in the world.

## IGBTs in induction heating market




Source: IMS, Infineon

EMC Technologies

SUNPENTOWN

TOPBAND 拓邦

Label on the Sunpentown cookers

# Controlling Power With Power Semiconductors, Power Modules and Microcontrollers

| | | Power Discretes | Power Modules | Power ICs | Micro-controllers |
|---|---|---|---|---|---|
| **Distributed Power Generation** |  | ■ Thyristor & Diodes PressPACK | ■ EasyPIM<br>■ EasyPACK<br>■ EconoPACK<br>■ IHM modules<br>■ BIP modules<br>■ Stacks | ■ EiceDrive | ■ 8-bit µCs<br>■ 16-bit µCs<br>■ 32-bit TriCore (µC + DSP) |
| **Automation / Motor Control**<br>- Industrial Drives<br>- Consumer Drives |  | ■ EmCon<br>■ Trench Stop IGBTs<br>■ Fast IGBTs | ■ EasyPIM<br>■ EasyPACK<br>■ EconoPACK<br>■ IHM modules<br>■ BIP modules<br>■ Stacks | ■ PWM & PFC ICs<br>■ EiceDrive | ■ 8-bit µCs<br>■ 16-bit µCs<br>■ 32-bit TriCore (µC + DSP) |
| **Traction** |  | ■ Thyristor & Diodes PressPACK | ■ IHM / IHV modules<br>■ Stacks<br>■ PrimePACK<br>■ 62mm IGBT modules | ■ EiceDrive | ■ 8-bit µCs<br>■ 16-bit µCs<br>■ 32-bit TriCore (µC + DSP) |
| **Power Supplies**<br>- UPS<br>- AC / DC<br>- DC / DC |  | ■ CoolMOS<br>■ thinQ! (SiC Schottky Diode)<br>■ Highspeed IGBTs<br>■ OptiMOS | ■ EasyPIM<br>■ EasyPACK<br>■ IsoPACK<br>■ EconoPACK<br>■ Thyristor- / Diode- modules | ■ PWM & PFC ICs<br>■ CoolSET<br>■ Integrated switches<br>■ Gate drivers<br>■ EiceDrive | ■ 8-bit µCs<br>■ 16-bit µCs |



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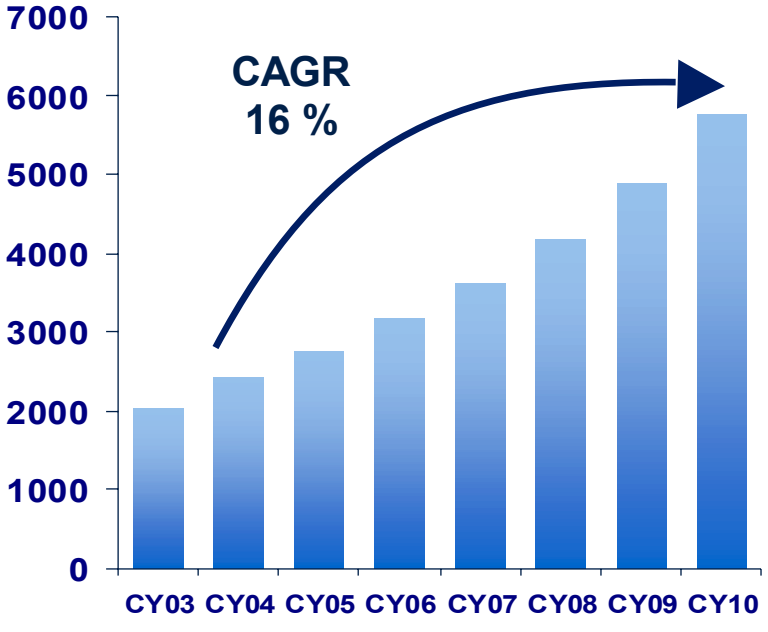
# Total Smart Card Market: Strong Drivers

## Smart card market Unit development

[million units]




Source: Frost & Sullivan 2005

## Key market drivers

- Contactless technology is breaking through in more applications and drives potential demand
- SIM cards continue to grow faster than expected
- ePass offer a tremendous growth potential for the smart card industry
- Enhanced value of c'less smart cards, e.g. flexibility, speed, personalization benefits, and convenience promotes its usage



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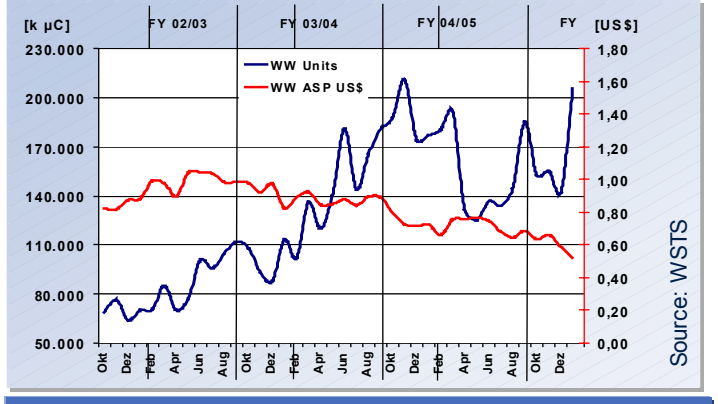
# Realization of significant manufacturing cost reduction required for profitability in chip card ICs

## Market Situation

- Volumes stable due to seasonal effects; further growth expected in Q2 and Q3.
- Continuing price pressure in the main controller-based product segments: 25 – 40% price decline y-o-y for the main SIM card applications




## Chipcard Strength

- Leading in security certification
- 88 state-of-the-art security architecture
- Leading edge NVM technology, 1st in 130nm Flash
- Microslim & FCOS for cost advantage in chips & modules
- Security architecture and low-power design
- Contactless chip and system expertise

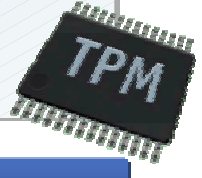
## MicroSlim technology & FCOS

- Continuous execution of the previously announced cost reduction measures of MicroSlim, FCOS and the 130nm product introduction.
- Introduction of new optimized MicroSlim derivatives (scheduled for 2nd half FY 2006).

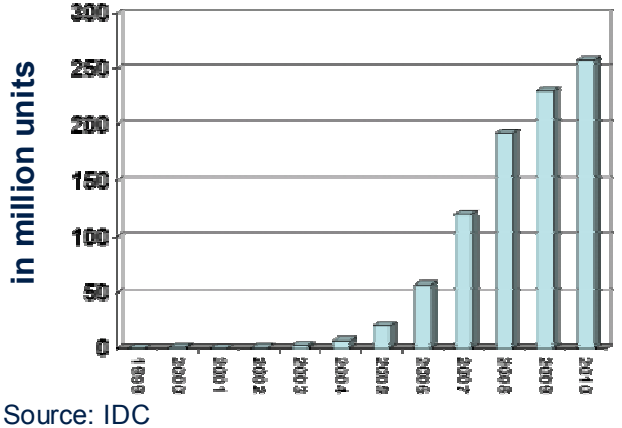
# Key Innovations:
# Trusted Platform Module (TPM)

Windows Vista supports full-volume encryption to prevent disk access by other operating systems. It also stores encryption keys in a **Trusted Platform Model (TPM) v1.2** chip.
(Source: http://www.microsoft.com/windowsvista/basics/security.mspx)

→ **Support for other OS (eg. Linux) in preparation!**




## Trusted Platform Module Market

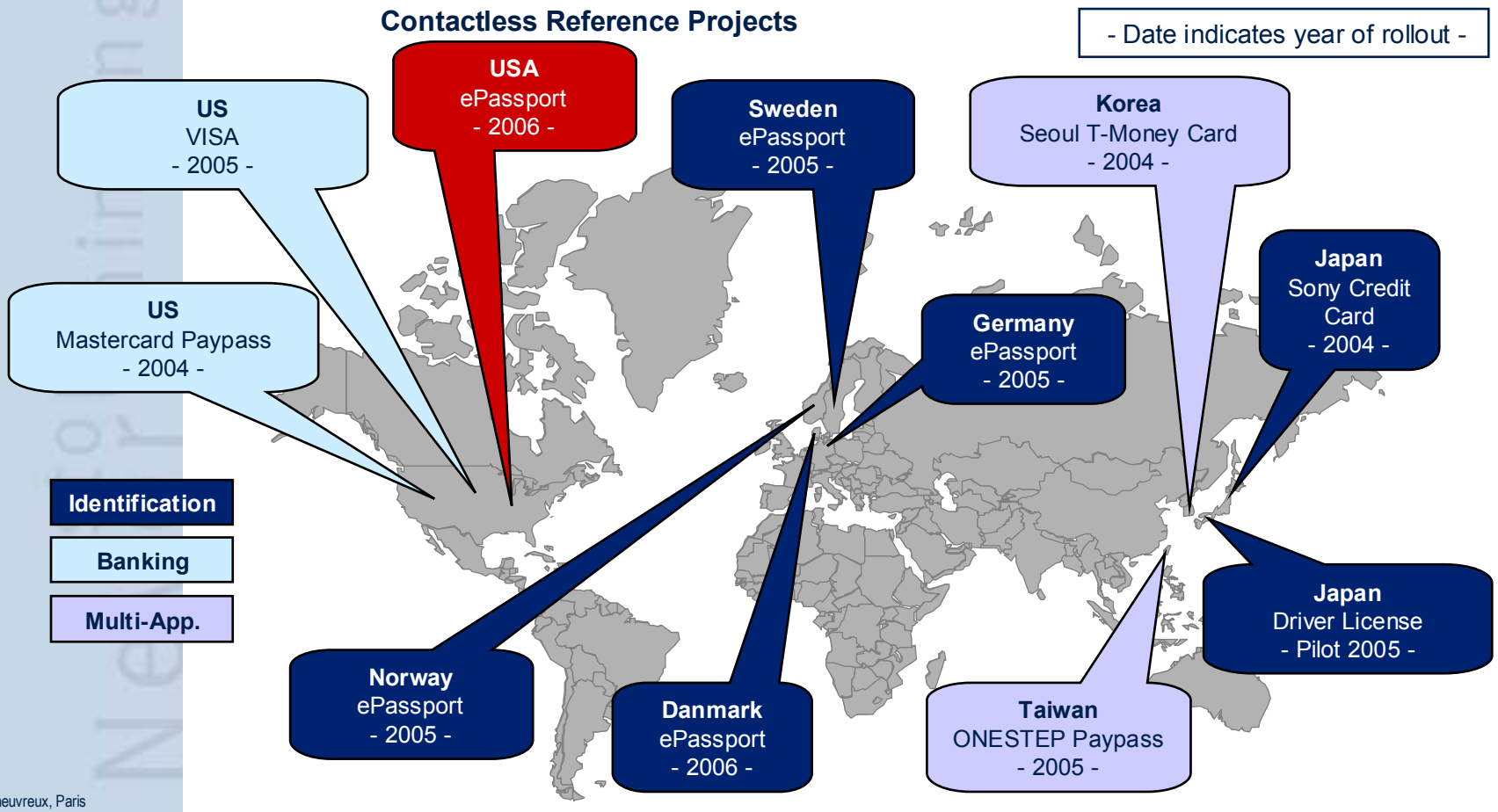



Source: IDC

## TPM Features

- **Check the system integrity**
  What is the status of the hardware and software environment?
- **Authenticate and provide information on the security status of the platform**
  Inform user and communication partners (if allowed by user).
- **Secure storage**
  Safe environment for customer secret and private data.
- **Ensure the privacy of the user**
  Full control of privacy by the user.

# Infineon Was Named First Supplier for the U.S. ePassport and is Currently the Only Company With Necessary Security Approval by NIST*




*Note: NIST = National Institute of Standards and Technology, U.S.



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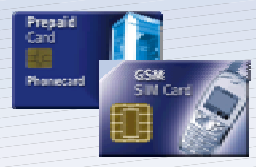
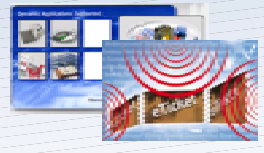
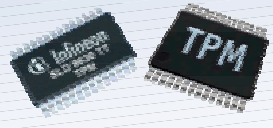
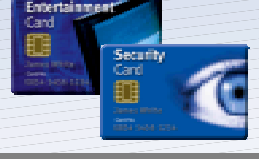
# Chip Card and Security Applications:
# Infineon is Well-positioned to Serve Key Growth Markets

| | Contact-based chip cards | Contactless chip cards, RFID | Security ICs |
|---|---|---|---|
|  **Communications**<br>Prepaid<br>Mobile |  |  | |
|  **Payment**<br>Credit/Debit, e-purse<br>**Transport, Ticketing** |  |  | |
|  **Identification**<br>ePassport, national ID<br>Social, Access<br>RFID, e-Government |  |  |  |
|  **Entertainment**<br>Pay-TV, Gaming<br>Video/Audio |  | |  |



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# Infineon's Frontend Fab Locations for Power Logic: Global Technology and Manufacturing Competence

## Regensburg

**Production and development**
of Power, RF, BiCMOS, Sensors, Mixed-Signal

## Villach, Austria

**Production and development**
of Power, Mixed-Signal and Discretes

*) Will be phased out by early 2007

## Munich *

**Production and development**
of Mixed-Signal, Bipolar RF, BiCMOS, Sensors, Discretes

New fab

## Kulim, Malaysia

**Production**
of Power, Power-Bipolar, Mixed-Signal

**Additional capacities at silicon foundries: ASMC, Chartered, TSMC and ZMD**



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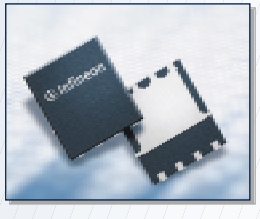
# Package Development and Manufacturing Core Competence

## Power

**Plants**
- Malacca

**Main Products**
- Power discretes
- ICs and multi-chip packages



## Discretes

**Plants**
- Malacca
- Wuxi
- Regensburg

**Main Products**
- Transistors
- Diodes

## Sensors

**Plants**
- Regensburg
- Malacca
- Skoppum

**Main Products**
- Hall sensors
- Temp. sensors
- Pressure sensors
- Rotational sensors

## High Power

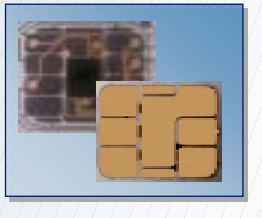
**Plants**
- Warstein
- Cegléd

**Main Products**
- IGBT modules
- IHM/IHV mod.
- Diodes/Thyrist.
- Stacks
- Driver Boards

## Chip Card

**Plants**
- Regensburg
- Wuxi

**Main Products**
- Contact-based Chipcards
- Contactless Chipcards
- Security ICs





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# Site Development AIM Manufacturing Landscape
# Continued Consolidation from 6" to 8"

**Drs**
CMOS Logic

**Kulim**

**Rgb**

**Vih**

**Mch P**

8" – 220nm

8" – 90nm

8" – 130nm

8"

8"

6"

8"

8"

5"

6"

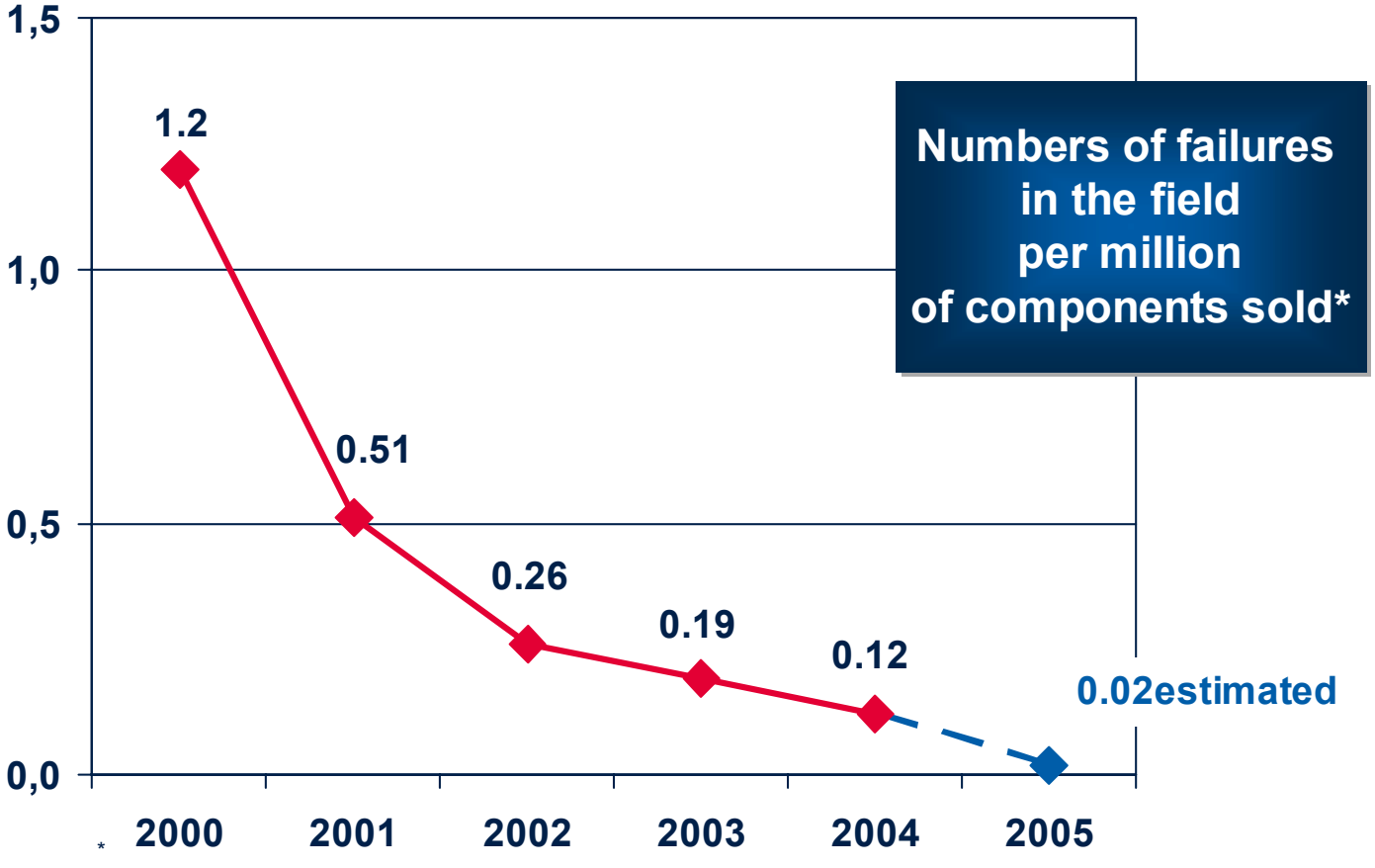
6"

2000 | 2002 | 2004 | Today | 2008

Europe

Europe + SE Asia

# AIMs Automotive Excellence Program Drives Strong Quality Focus




* IFX AIM - internal data

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# Examples of Recent Customer Appreciation

**Supplier of the Year 2004 Award**
for Quality, Logistics, Flexibility.
First semiconductor company ever receiving this award.

**Best Supplier Award 2005**
for Technology, Quality, Response time, Delivery and Cost among 153 suppliers.

**Best Supplier Award**
for Quality, Price, Logistics, Innovations.

**Certificate of Recognition**
for Support of the Astec Zero Defect Plan in 2004.

**Preferred Supplier Award 2005**
for Logistics, Innovation, Price and Customer Relations.



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# Cornerstones of the AIM Strategy

| | |
|---|---|
| **Productivity** | ■ All fabs state-of-the-art in 8“; streamlined mix of processes<br>■ Closure of Perlach; new fab in Kulim, Malaysia<br>■ Company-wide gross margin improvement program |
| **Technology** | ■ IGBT technology leadership<br>■ Unique SiC and CoolMOS (high voltage MOSFET) technologies<br>■ First company with 130nm eFlash in volume |
| **Quality & Logistics** | ■ Strong focus on quality and logistics pays off<br>■ Best quality of all non-Japanese suppliers<br>■ Customers confirmed performance |
| **Strong Segments** | ■ Continuous investment in segments with strong growth<br>■ Increased R&D spending in core business |
| **Future Businesses** | ■ Build up new and promising businesses, e. g. Hybrid, Radar, TPMS, MEMS, 88 family, HV-CMOS, 32-bit µC with eFlash |

**AIM**



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- Global Trends
- Automotive Business
- Industrial Business
- Chipcard & Security ICs Business
- Technology, Manufacturing, Customer Focus
- **Questions & Answers**



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