Automotive Electronics Trends
Infineon Symposium
Sept. 8th, 2010

by Claus Preuschoff
Director Business Development
Table of Contents

- Automotive Challenges
- Automotive Trends
- Value Chain Evolvement
- Summary
Key Market Drivers/Challenges

CO₂ Reduction

Communication

Safety

Affordable Car
Global CO₂ Targets

**EU Proposes steep fines to cut car CO₂ from 2012**
EU parliament Dec. 17, 2008
Cars: 120 gCO₂/km beginning 2012
+10 g credit for biofuels, tires etc.....

**EU OEM Actual**
Innovation Target incl. BioFuel
EU OEM Voluntary Target
EU Legislative Target

**It's the law: 35 mpg CAFE**
Automotive News Dec. 19th 2007
Cars: 35 mpg by 2020

Conversion table for regular gasoline engine

<table>
<thead>
<tr>
<th>gCO₂/km</th>
<th>155</th>
<th>140</th>
<th>130</th>
<th>120</th>
<th>110</th>
<th>100</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>L / 100km</td>
<td>6.72</td>
<td>6.08</td>
<td>5.65</td>
<td>5.21</td>
<td>4.78</td>
<td>4.34</td>
<td>3.91</td>
</tr>
<tr>
<td>MPG</td>
<td>35.00</td>
<td>38.69</td>
<td>41.66</td>
<td>45.13</td>
<td>49.24</td>
<td>54.16</td>
<td>60.18</td>
</tr>
</tbody>
</table>
**European Automotive CO₂ Targets**

CO₂ target for average new car of manufacturer fleet:

- **2012** → 120 g CO₂/km for 65% of fleet
- **2013** → 120 g CO₂/km for 75% of fleet
- **2014** → 120 g CO₂/km for 80% of fleet
- **2015-2019** → 120 g CO₂/km for 100% of fleet

**2020** → 95 g CO₂/km as proposal

**CO₂ penalty payment for car manufacturer (per new car):**

- 5 € for <1 g CO₂/km over target
- 15 € for <2 g CO₂/km over target
- 25 € for <3 g CO₂/km over target
- 95 € for ≥4 g CO₂/km over target

Example: penalty for 124.1 gCO₂/km = 5 + 15 + 25 + 2×95 € = 235 € per new car

Source: European Parliament Legislative Resolution, December 17, 2008
Balancing OEM added value
...but experience in automotive is limited

...and fragmented across different industries.
# Table of Contents

- **Automotive Challenges**
- **Automotive Trends**
- **Value Chain Evolvement**
- **Summary**
Trend: Consumer Electronics enter the Car

- Time to Market is important
- Quality expectation must be fulfilled
Increasing # of ECUs push the trend towards high integrated domain ECUs

- Central Chassis Controller
- Integration of central body controller and gateway
- Central Powertrain Controller
FlexRay entwickelt sich zum Mainstream.
Entwicklung BMW und weltweit.

source: BMW Ludwigsburg Congress

Weltmarkt FlexRay Transceiver

Jahr

Europe / Japan / USA Volume market

Japan / USA Premium 1st European Volume models

European Premium

Copyright © Infineon Technologies 2010. All Rights Reserved.
Ethernet bei BMW.
Roadmap.

Absicherung & Spezifikation, Wartung.

Wiederverwendung, Skalierbarkeit, Reife, Qualität

source: BMW Ludwigsburg Congress

Veränderungen in der Automobilindustrie
BMW Group
15.6.2010

Seite 18

2010
Ethernet für schnelles Flashen

2013
IP & Ethernet Teilsystem

2020
Hochintegrierte effiziente E/E Architektur

Kamera für FAS
 „Domänen-Architektur“
Activities around the globe show: The electric vehicle market is taking shape

**Electric Vehicle fitting**

- Oil Price
- Available Products
- Legislative Forcing
- Government Incentives
- Charging Infrastructure
- Battery Evolution

**Former “Tipping Point” applications**

<table>
<thead>
<tr>
<th>ESP</th>
<th>Airbag</th>
<th>ABS</th>
<th>Solar roofs</th>
<th>iPod</th>
</tr>
</thead>
</table>
### EV Vehicles on the street in the coming years
**US, EU, Japan**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i-MiEV</td>
<td>Li Ion, EV</td>
<td></td>
<td></td>
<td></td>
<td>170 units</td>
<td></td>
<td></td>
<td>T 30 (2013)</td>
</tr>
<tr>
<td>DAIKIN</td>
<td>Li Ion, EV</td>
<td></td>
<td></td>
<td>100 units</td>
<td></td>
<td></td>
<td></td>
<td>TBD</td>
</tr>
<tr>
<td>SMART EV</td>
<td>Li Ion, EV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TBD</td>
</tr>
<tr>
<td>Leaf</td>
<td>Li Ion, EV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T 50 (2011)</td>
</tr>
<tr>
<td>Z.E. Series (various)</td>
<td>Li Ion, EV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T 100 (2012)</td>
</tr>
<tr>
<td>Volt / Ampera</td>
<td>Li Ion, RE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T 60 (2011)</td>
</tr>
<tr>
<td>i-MiEV variant</td>
<td>Li Ion, EV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TBD</td>
</tr>
<tr>
<td>TOYOTA</td>
<td>Li Ion, EV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TBD</td>
</tr>
<tr>
<td>E-Mini / 1-series</td>
<td>Li Ion, EV</td>
<td>&gt;500 MINI units</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Golf</td>
<td>Li Ion, EV</td>
<td></td>
<td></td>
<td>50 units</td>
<td></td>
<td></td>
<td></td>
<td>No series</td>
</tr>
<tr>
<td>UP!</td>
<td>Li Ion, EV</td>
<td></td>
<td></td>
<td>50 units</td>
<td></td>
<td></td>
<td></td>
<td>TBD</td>
</tr>
</tbody>
</table>

**Note:** Only range extenders and EVs considered; some models not shown (e.g. Hyundai i10 Electric (2010), Subaru R1e, Audi e-tron (2012), Audi A2 (2014))

**Source:** Press research, corporate information, BCG analysis

---

Copyright © Infineon Technologies 2010. All rights reserved.
EV Vehicles on the street in the coming years
World wide but especially in China
Power semiconductors are indispensable for the electric vehicle.

Infineon has long experience in the electric drivetrain. Broadest product portfolio covering all areas.

- Power Conversion
- Power Management
- Power Distribution
- Communications

Infineon has long experience in the electric drivetrain. Broadest product portfolio covering all areas.
IFX ATV is Best-Positioned to Capitalize Market for Hybrid and Electric Cars

Automotive Semi-conductor

Perfect Match for Hybrid and Electric Cars

Power Semi-conductor

#1 2009

#1 2009
The drive for an environment friendly, low-CO$_2$ world raises the need for a new electrical grid: a Smart Grid – Infineon is the only provider offering the complete portfolio for a Smart Grid.

1. Integration of renewable energy
2. Advanced transmission
3. Grid monitoring and control
4. Energy storage and EV-charging
5. Smart metering and appliances
6. Efficient consumption
Table of Contents

- Automotive Challenges
- Automotive Trends
- Value Chain Evolvement
- Summary
OEM
Semiconductor Selection Channels

**Direct buy**
OEM purchases the part directly from Tier 2 supplier

**Directed buy**
OEM defines part, negotiates price w/T2 then “directs” T1 to use part

**Co sourcing**
OEM & T1 define part, OEM negotiates price w/T2 & requires T1 to use

**Understand/Influence Rqmts**
Working w/OEM’s to understand rqmts & promote IFX solutions

**Preferred/approved**
OEM generates a “preferred supplier” list & communicates to T1’s

**Required**
OEM requires T1 to use a specific T2 part

Design Wins
Biz case and Semi Selection channel determine involvement of OEM

OEM technical involvement

OEM commercial/legal involvement

T1 dominance

OEM dominance

Directed Buy

Direct Buy

Co-Sourcing

Required

Preferred/Approved

Understand/Influence
Table of Contents

- Automotive Challenges
- Automotive Trends
- Value Chain Evolvement
- Summary
Summary

- Innovative **semiconductor solutions** enable improved vehicle architectures and concepts.
- Close alignments between the system experts and semiconductor suppliers are the key for improvements.
- The semiconductor industry is ready to support the trend of electrification.

Thank you!
ENERGY EFFICIENCY
COMMUNICATIONS
SECURITY

Innovative semiconductor solutions for energy efficiency, communications and security.