### 2015 global market shares

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>Delta</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NXP (incl. FSL)</td>
<td>13.3%</td>
<td>+0.9%</td>
</tr>
<tr>
<td>2</td>
<td>Infineon</td>
<td><strong>10.5</strong>%</td>
<td>-0.1%</td>
</tr>
<tr>
<td>3</td>
<td>Renesas</td>
<td>12.0%</td>
<td>-1.7%</td>
</tr>
<tr>
<td>4</td>
<td>STMicro</td>
<td>7.8%</td>
<td>-0.1%</td>
</tr>
<tr>
<td>5</td>
<td>TI</td>
<td>6.1%</td>
<td>+0.9%</td>
</tr>
<tr>
<td>6</td>
<td>Bosch</td>
<td>6.2%</td>
<td>-0.8%</td>
</tr>
</tbody>
</table>

### 2015 market shares by product category

#### Power

- **Infineon +0.4%pt**
- Toshiba: 3.6%
- Renesas: 5.6%
- TI: 7.4%
- ST: 8.6%
- Bosch: 9.1%
- NXP (incl. FSL): 14.5%
- Others: 25.8%

#### Sensors

- **Infineon +0.4%pt**
- Bosch: 18.1%
- NXP (incl. FSL): 7.6%
- Allegro: 8.9%
- ADI: 6.7%
- Melexis: 7.0%
- On Semi: 4.7%
- TI: 8.5%
- Microchip: 5.4%
- nVidia: 3.5%
- Others: 9.7%

#### Microcontrollers

- **Infineon -0.1%pt**
- TI: 8.6%
- Bosch: 26.6%
- NXP (incl. FSL): 26.6%
- Microchip: 5.4%
- nVidia: 3.5%
- On Semi: 4.9%
- Others: 9.7%

Four megatrends are shaping the automotive market, significantly increasing the semi content per vehicle:

### ADAS/Autonomous driving
- From ADAS to semi-automated and finally autonomous driving
- Every world region is striving for “0-accident”
- Advanced connectivity is driven by making the car part of the Internet
- The car will be fully connected (V2I, V2V, in-vehicle)

### xEV/eMobility
- Mandated CO₂ reductions make electrification of powertrain inevitable
- Increased connectivity and software content increase risk exposure to hackers
- Internal/external connectivity must be secured

---

**Connectivity**

**Advanced security**
ADAS system overview

Sense
- Camera Inside
- LIDAR
- Radar
- Camera Outside
- Ultrasonic

Compute
- Graphics Processor
- Powertrain Domain Controller
- Sensor Fusion µC
- Safety Domain Controller

Actuate
- Transmission
- Engine
- Braking (ABS)
- Steering
More sensors required for each automation level – sensor “cocoon” in level 4/5

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Front looking camera</td>
<td>0.5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Front looking radar</td>
<td>0.5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Front looking lidar</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>Surround camera</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>4</td>
</tr>
<tr>
<td>Corner radar</td>
<td>–</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Surround radar</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>6</td>
</tr>
<tr>
<td>Rear looking camera</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Rear looking radar</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>Driver monitoring Camera</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>V2X sensor</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>Parking aid</td>
<td>Up to 12 ultrasonic sensors per car</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automated parking</td>
<td>Potential future replacement by RF CMOS radar</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Up to 12 SiGe radars per vehicle (24/77 GHz)

* Euro-NCAP is focusing on collision avoidance, requirements are increasing over time
Infineon market leader in radar; 20m sensor chips sold; \( \sim 50\% \) CAGR\(_{16-21}\) based on design wins*

2015 radar sensor market share**

<table>
<thead>
<tr>
<th>Brand</th>
<th>Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infineon</td>
<td>43%</td>
</tr>
<tr>
<td>STM</td>
<td>36%</td>
</tr>
<tr>
<td>NXP</td>
<td>21%</td>
</tr>
</tbody>
</table>

Vision Zero + Autonomous Driving

next gen. of mid- and long-range radar
AURIX™ 3rd gen., power supply

mid- & long-range radar
Dual Chip System solution + power supply

short- to mid-range radar
CMOS solution

ACC radar
1st SiGe 77 GHz transceiver

mid-range radar
1st radar product eWLB package

Blind Spot Detection
(24 GHz)

2009

Today

Tomorrow

* Refers to 77 GHz radar sensor chip market
Depending on test cases, AEB will be either BiCMOS or CMOS

<table>
<thead>
<tr>
<th>Feature</th>
<th>SiGe BiCMOS</th>
<th>CMOS (&lt; 40 nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>77 GHz performance</td>
<td>excellent</td>
<td>ok</td>
</tr>
<tr>
<td>$f_{\text{max}}$</td>
<td>$&gt; 400$ GHz</td>
<td>$&gt; 300$ GHz</td>
</tr>
<tr>
<td>Noise</td>
<td>1x</td>
<td>2x .. 3x</td>
</tr>
<tr>
<td>System-on-chip capabilities</td>
<td>good</td>
<td>excellent</td>
</tr>
<tr>
<td>77 GHz automotive-qualified product</td>
<td>in high volume production</td>
<td>not yet available</td>
</tr>
<tr>
<td>Application</td>
<td>ACC, Highway Assist</td>
<td>AEB</td>
</tr>
<tr>
<td></td>
<td>Parking Assist, Blind Spot Detection</td>
<td></td>
</tr>
</tbody>
</table>

Today, SiGe is state of the art.
Beyond 2020, CMOS will find its sweet spot in 360° applications.
Infineon’s automotive offering in ADAS camera systems

**Driver monitoring**

- Most robust detection of head position, head orientation and eye closure
- Observe the state of the driver and passengers
- Optimize head-up displays and augmented reality to driver’s head position

**Front camera**

- AURIX™ microcontroller is today the reference for safety allowing ASIL-D systems
- The safe & secure microcontroller is represented in most of today’s camera systems
- OEMs prefer software on AURIX™

Kostal camera system

REAL3™ sensor

Image processor e.g.

Infineon safe & secure μC
Secure µCs from Infineon offer the required safety and necessary scalability

Sensor fusion
AURIX™ as main or host controller

Radar & camera
AURIX™ as main* or host controller

Computational unit
AURIX™ as hard-realtime main processor

Connectivity gateway
AURIX™ as hard-realtime main controller

Always-on connectivity
AURIX™ as host controller

Safety, Security, Automotive Quality

Domain control

* for radar
Infineon AURIX™ microcontrollers make autonomous driving reliable

The central driver assistance ECU ("zFAS*") is the core of future systems for piloted driving for Audi

Key components from Infineon, designed for reliability:

› AURIX™ controller as decision maker and interface to the car architecture
› DC-DC – safety system supply

Strategic cooperation with TTTech to enable zFAS* based architecture and position Infineon as leading supplier

* zFAS = zentrales Fahrerassistenzsystem
30%+ higher BoM on fail operational systems in level 3-compliant vehicles

Electric power steering as an example for Infineon’s P2S* approach

System

Electric motor

Electronic control unit

Courtesy: ZF Lenksysteme

Sense

Compute

1. 2 independent dies
2. multicore

Safe power supply

Actuate

multi-phase control

Infineon with 100% BoM coverage

*Product to System (P2S): The shift from product thinking to system understanding is the core element of Infineon’s strategy.
ADAS semi growth driven by radar and camera sensor modules

Average ADAS semiconductor content per level of automation

<table>
<thead>
<tr>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="camera" alt="Sensor" /> 40%</td>
<td><img src="camera" alt="Sensor" /> 45%</td>
<td><img src="camera" alt="Sensor" /> 35%</td>
</tr>
<tr>
<td><img src="radar" alt="Radar" /> 60%</td>
<td><img src="radar" alt="Radar" /> 35%</td>
<td><img src="radar" alt="Radar" /> 30%</td>
</tr>
<tr>
<td><img src="lidar" alt="Lidar" /> 0%</td>
<td><img src="lidar" alt="Lidar" /> 0%</td>
<td><img src="lidar" alt="Lidar" /> 5%</td>
</tr>
<tr>
<td>![Sensor Fusion](sensor fusion) 0%</td>
<td>![Sensor Fusion](sensor fusion) 12%</td>
<td>![Sensor Fusion](sensor fusion) 20%</td>
</tr>
<tr>
<td><img src="actuators" alt="Actuators" /> $100</td>
<td><img src="actuators" alt="Actuators" /> $400</td>
<td><img src="actuators" alt="Actuators" /> $550</td>
</tr>
<tr>
<td>![Total BoM](total bom)</td>
<td>![Total BoM](total bom)</td>
<td>![Total BoM](total bom)</td>
</tr>
</tbody>
</table>

- **Market take-off:** 2015-2020 (up to 30m vehicles p.a.)
  - **Key market driver:** NCAP, Automatic Emergency Brake, Blindspot Detection

- **Market take-off:** 2020-2025 (up to 10m vehicles p.a.)
  - **Key market driver:** Automated Driving in specific situations (e.g. parking, highway)

- **Market take-off:** 2025-2030 (up to 5m vehicles p.a.)
  - **Key market driver:** Autonomous Driving
Four megatrends are shaping the automotive market, significantly increasing the semi content per vehicle.

<table>
<thead>
<tr>
<th>ADAS/Autonomous driving</th>
<th>xEV/eMobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>› From ADAS to semi-automated and finally autonomous driving</td>
<td></td>
</tr>
<tr>
<td>› Every world region is striving for “0-accident”</td>
<td></td>
</tr>
<tr>
<td>› Advanced connectivity is driven by making the car part of the Internet</td>
<td></td>
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<tr>
<td>› The car will be fully connected (V2I, V2V, in-vehicle)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Connectivity</th>
<th>Advanced security</th>
</tr>
</thead>
<tbody>
<tr>
<td>› Increased connectivity and software content increase risk exposure to hackers</td>
<td></td>
</tr>
<tr>
<td>› Internal/external connectivity must be secured</td>
<td></td>
</tr>
</tbody>
</table>
Infineon is well positioned globally to benefit over-proportionally from xEV boom

SOP = Start of production
We will experience a shift from Si IGBT to SiC MoSFET

Independently from the voltage class, HEV subsystems are not in the sweet spot of GaN technology
## xEV growth driven by power semis

### Average xEV semiconductor content by degree of electrification

<table>
<thead>
<tr>
<th></th>
<th>48 V</th>
<th>HEV / PHEV</th>
<th>EV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adder for DCDC and starter/generator</td>
<td>$414</td>
<td>Adder for DC-DC, inverter, onboard charger</td>
<td>Others $704</td>
</tr>
<tr>
<td>ICE</td>
<td>$338</td>
<td>Power $709</td>
<td>Others $387</td>
</tr>
<tr>
<td></td>
<td>$47</td>
<td>$372</td>
<td>$190</td>
</tr>
<tr>
<td></td>
<td>$29</td>
<td>$76</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$282</td>
<td>$15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$47</td>
<td>$60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$47</td>
<td>$15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$60</td>
<td>$15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$76</td>
<td>Others</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$76</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICE</td>
<td>$338</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2020: 1.6m*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
|                | high growth for 48 V (not even including 48 V auxiliaries nor mild hybrid) | 2020: 3.5m HEVs*                           | 2020: 1.4m EVs*
|                |                                            | 1.9m PEHs*                                |                                        |
|                |                                            | PHEV to overtake HEV after 2020, especially in Europe | strong growth driven by Chinese OEMs   |
|                |                                            |                                            |                                        |

* Source: IHS Markit, “Alternative Propulsion Forecast”, January 16, expected number of vehicles
The expected big expansion of PHEV model line-up from premium OEMs will boost Infineon revenues.
Four megatrends are shaping the automotive market, significantly increasing the semi content per vehicle.

**ADAS/Autonomous driving**
- From ADAS to semi-automated and finally autonomous driving
- Every world region is striving for “0-accident”
- Advanced connectivity is driven by making the car part of the Internet
- The car will be fully connected (V2I, V2V, in-vehicle)

**xEV/eMobility**
- Mandated CO₂ reductions make electrification of powertrain inevitable
- Increased connectivity and software content increase risk exposure to hackers
- Internal/external connectivity must be secured

**Connectivity**

**Advanced security**
The connected car and move to open systems offer many use cases for our customers.
Various security tools have to be added on the way to a secure architecture

- Basic protection of single ECUs (immobilizer & access)
- Firewall & gateway
- Sandboxing
- Secure on-board communication

**Domains:**
- Driving Domain
- ADAS Domain
- Body & Comfort Domain
- Infotainment Domain

**Components:**
- Transmission
- Dynamics Control
- Energy Management
- Radar
- Camera
- Lidar
- HVAC
- Lighting
- Immobilizer
- Head Unit
- E-Call
- Connectivity
Various security tools have to be added on the way to a secure architecture

**Trust anchors**
Protected Execution Environments hosting
› Key storage and related cryptographic operation
› Security applications

**Integrated on MCU**
› High speed
› Secure onboard communication
› Logical security

**Discrete Security Controller**
› External communication
› Protecting high value
› By certified hardware security

Enabling the root of trust for internal and external communication
Infineon is ideally positioned to benefit most from megatrends ADAS, xEV, and security

**ADAS/autonomous driving semi market**

- **2015**: $1,801 (30%)
- **2020**: $3,827 (40%)
- **2025**: $6,700 (45%)

Higher market coverage driven by radar penetration, AURIX™ penetration and actuators

**xEV/e-mobility semi market**

- **2015**: $1,380 (~80%)
- **2020**: $3,050 (~80%)
- **2025**: $4,740 (~80%)

High market coverage already in 2015 will be kept with ramp-up of new power products

**Security**

- **2015**: $15
- **2020**: $200 (100%)
- **2025**: $700

Key enabler for secure connectivity

Addressed by Infineon

Not addressed by Infineon

Source: IHS Markit, Strategy Analytics, Infineon estimations
ADAS, CO₂ reduction and adoption of premium features drive Infineon growth

Vehicle production

Drivers for semiconductor content per car

<table>
<thead>
<tr>
<th>CO₂ reduction</th>
<th>Advanced safety</th>
<th>Comfort, premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>~2% growth p.a.</td>
<td>Driven by legislation</td>
<td>Current: crash avoidance</td>
</tr>
<tr>
<td>Further growth in Western Europe, China, and ASEAN</td>
<td>Improvements of ICE (e.g. electric steering, electric pumps and motors)</td>
<td>Next: assisted driving</td>
</tr>
<tr>
<td>Electro-mobility gaining momentum, especially in China</td>
<td>Adoption of EV/HEV</td>
<td>Future: autonomous driving</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Premium cars are early adopters of high-end comfort and safety features</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trickling down to mid-range</td>
</tr>
</tbody>
</table>

~8% p.a. through-cycle growth
Infineon automotive financials at a glance

Revenue and segment result development

[EUR m]

FY12: 1,660 → FY13: 1,714 → FY14: 1,965 → FY15: 2,351 → FY16

+3% → +15% → +20% → + low teens %

0% 5% 10% 15% 20% 25%

Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3
FY12 FY13 FY14 FY15 FY16

ATV revenue [lhs]  ATV SR  SR margin [rhs]
Infineon automotive is excellently positioned in the top growth applications of today

<table>
<thead>
<tr>
<th>Automotive market</th>
<th>Infineon’s value proposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>› 50% of Infineon automotive market growth driven by ADAS/xEV</td>
<td>1. Infineon enables assisted, automated and autonomous driving by a system approach covering sense, compute, and actuate</td>
</tr>
<tr>
<td>› Infineon addresses</td>
<td>2. Our products are based on technologies which enhance xEV cost–performance</td>
</tr>
<tr>
<td>› up to 80% of xEV BoM and</td>
<td>3. Infineon provides innovative products for a secure car architecture and thus offers an appropriate level of protection</td>
</tr>
<tr>
<td>› 40% of ADAS BoM</td>
<td></td>
</tr>
<tr>
<td>› 100% of security BoM</td>
<td></td>
</tr>
</tbody>
</table>

Infineon automotive

- #2 automotive semiconductor
- #1 power semiconductors
- #2 sensor semiconductors
- #3 microcontrollers
Part of your life. Part of tomorrow.

infineon