Automotive Division Call

hosted by Liberum

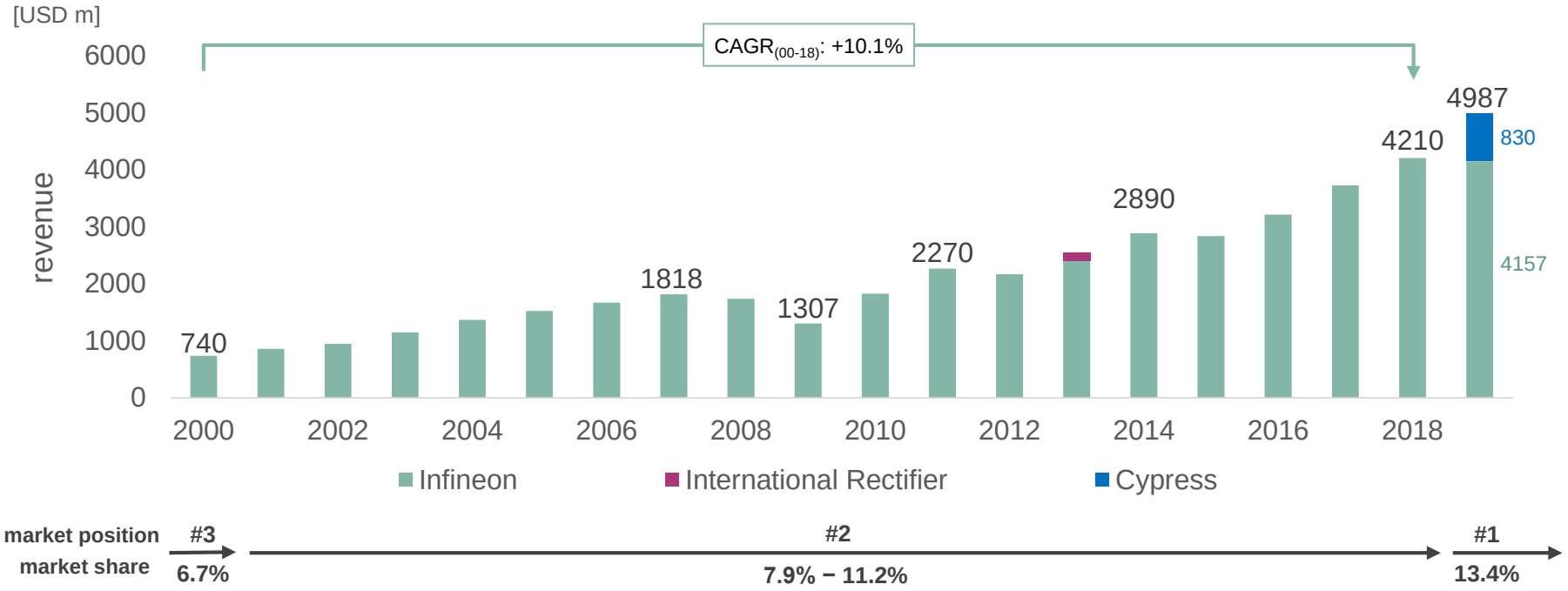
Peter Schiefer, Division President Automotive (ATV)

5 October 2020

Market position and short- and mid-term outlook

Infineon has been growing by 10% p.a. in automotive semis over the last two decades and hence steadily gaining market share

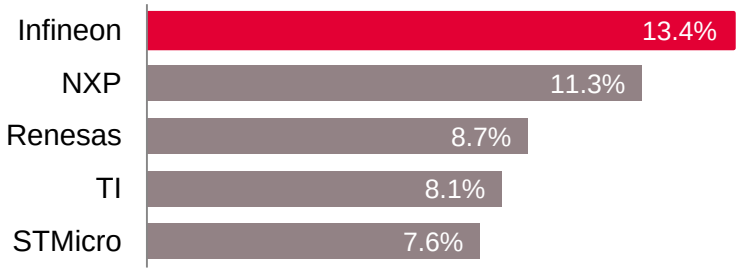
Infineon's automotive semiconductor revenue (in USD for CY; based on market figures by Strategy Analytics)



Source: Strategy Analytics: *Automotive Semiconductor Vendor Market Shares*. 2001 through 2020

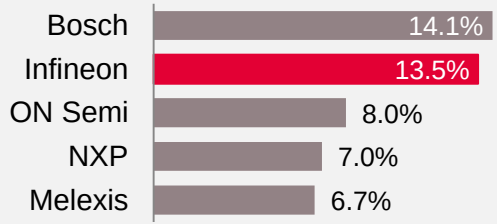
Infineon's top market position is built on system competence based on an industry-leading product portfolio

Automotive semiconductors (2019 total market: $37.2bn)

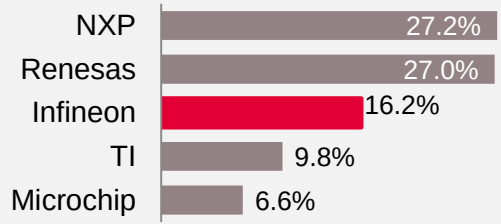


- New #1 in the total market post acquisition of Cypress
- Solid #1 in power despite xEV subsidies cut in China in H2 CY19
- Undisputed #1 in automotive NOR Flash memory
- Fostering #2 in sensors (from $10.4\%_{CY12}$ to $13.5\%_{CY19}$)
- Significant market share gain in microcontroller – both organically (strong demand for AURIX™) and via Cypress acquisition

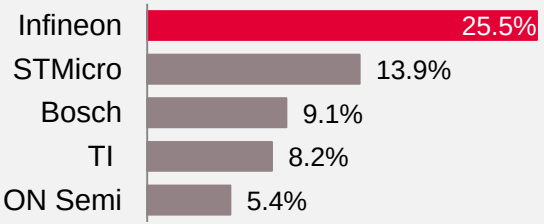
Sensors



Microcontrollers



Power semiconductors



Source: Strategy Analytics: *Automotive Semiconductor Vendor Market Shares v2*. May 2020. The market shares shown here are the combined market shares of Infineon and Cypress based on their individual figures.

Market recovery expected to continue across all regions; high demand for xEV in Europe; L1/L2/L2+ penetration on schedule

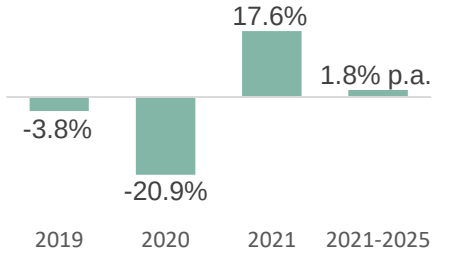
	Market Outlook for Q4 CY20	Market Outlook for CY21
 Car units	› Continued recovery of car sales and production	› Y-Y recovery with unit growth at mid-teens %
 xEV	› Strong momentum in Europe › Some recovery in the US and China	› Incentives and CO_2 regulations should keep demand high; especially in Europe › Improving consumer sentiment around sustainability theme › Steady investments in EV charging infra-structure further lowering reservation towards EVs
 ADAS/AD	› No major change in OEMs' plans in near-term › L2 growth to continue	› Further increase in L2 penetration expected › L2+ shipments at low volumes

Source: Infineon; based on or includes content supplied by IHS Markit, Automotive Group: *Light Vehicle Production Forecast*. September 2020.

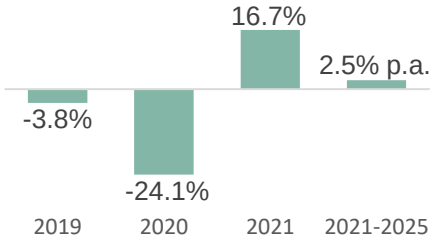
After nearly 20% y-y decline globally in CY20 due to COVID-19, all regions are forecast to snap back in CY21

Light vehicle production (year-over-year growth)

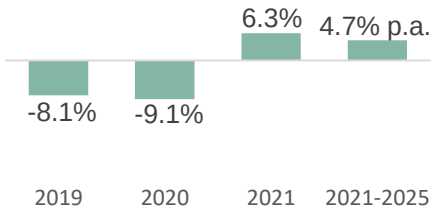
North America (16.3m units in 2019)



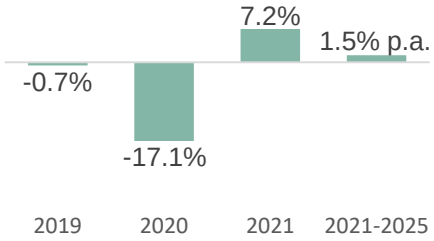
Europe (21.1m units in 2019)



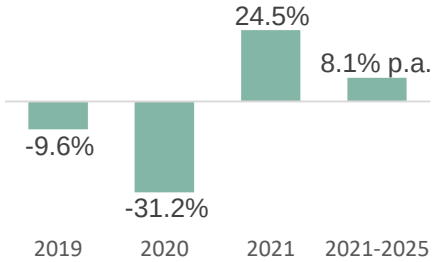
Greater China (24.7m units in 2019)



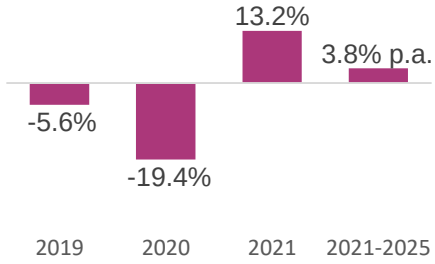
Japan / Korea (13.1m units in 2019)



RoW (13.7m units in 2019)



World (88.9m units in 2019)

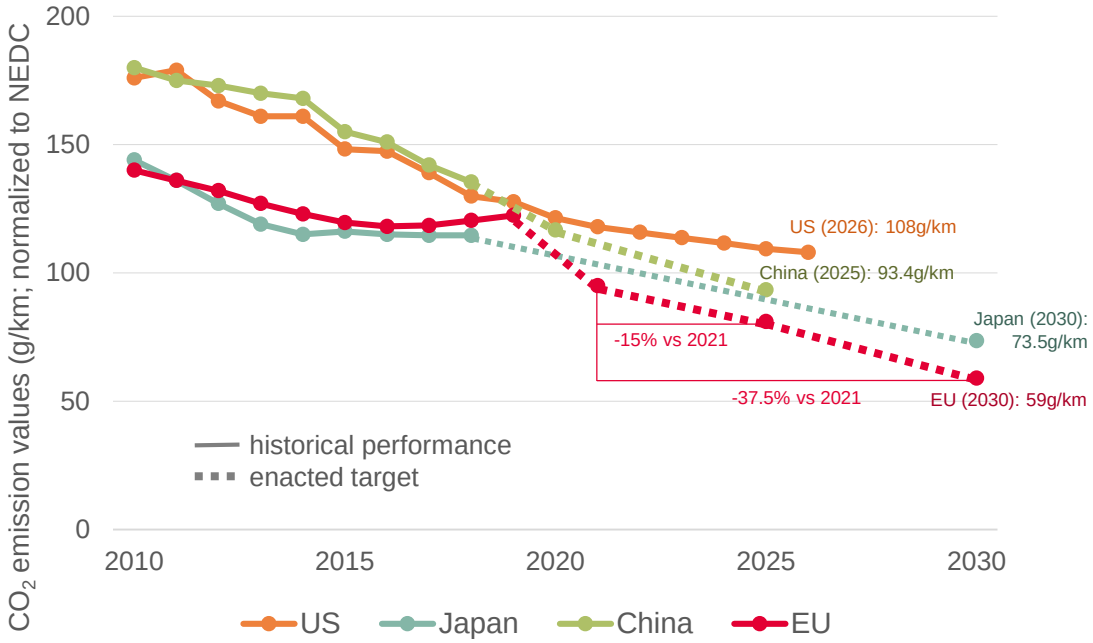


Source: Based on or includes content supplied by IHS Markit, Automotive Group: *Light Vehicle Production Forecast*. September 2020.

Electro-mobility

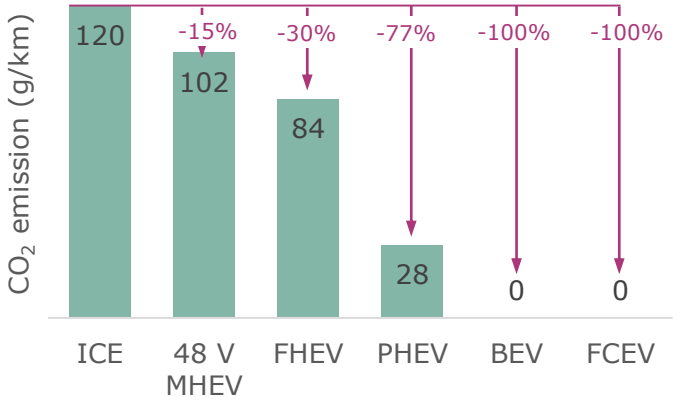
Trends toward electrification of cars remain unchanged; driven by more stringent legal guidelines

Passenger car CO_2 emission development and regional regulations



CO_2 emission by degree of electrification

CO_2 emission: Tank-to-wheel

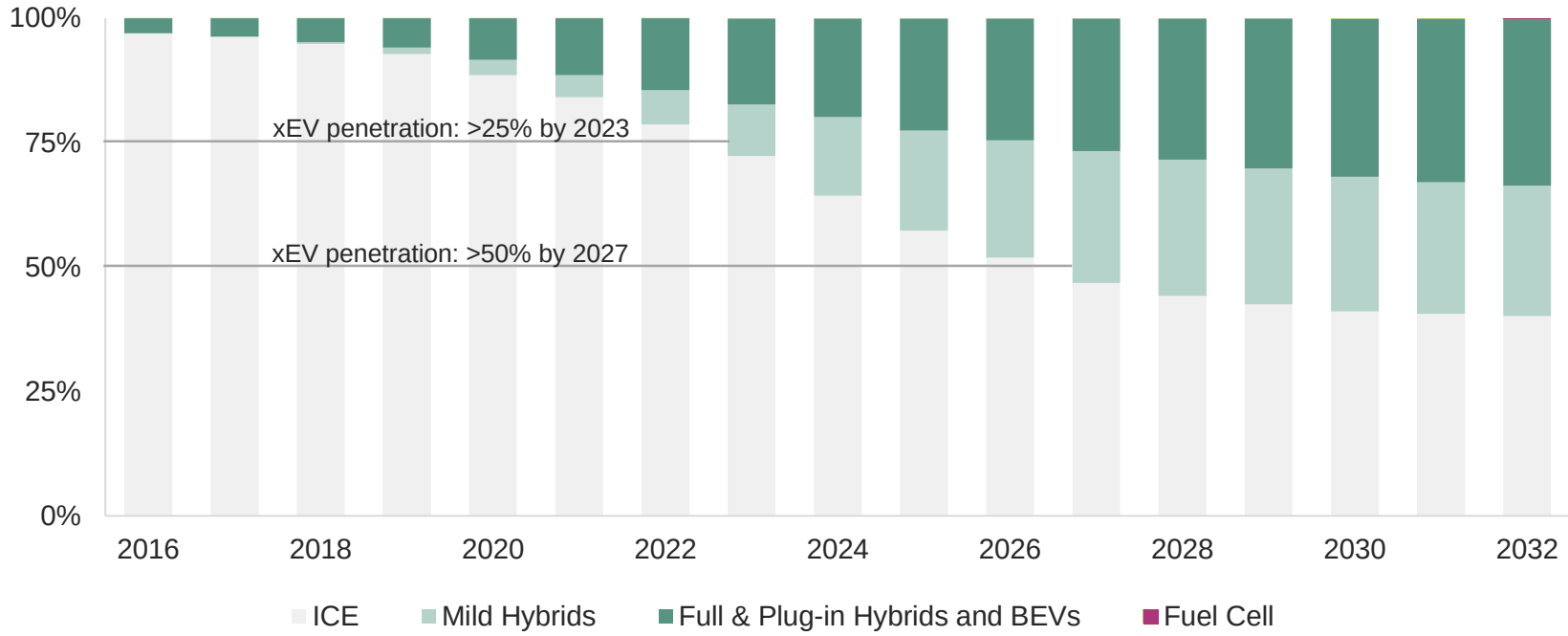


- EU continues towards stringent emission standards
- Recently, the governor of California signed an executive order mandating that all new cars to be sold in California from 2035 must be zero-emission vehicles

Source: The International Council on Clean Transportation (ICCT): *Passenger vehicle fuel economy.* May 2020.

The longer-term trend towards xEV is unchanged; most likely even accelerating due to incentive programs and green deals

Car production by fuel type

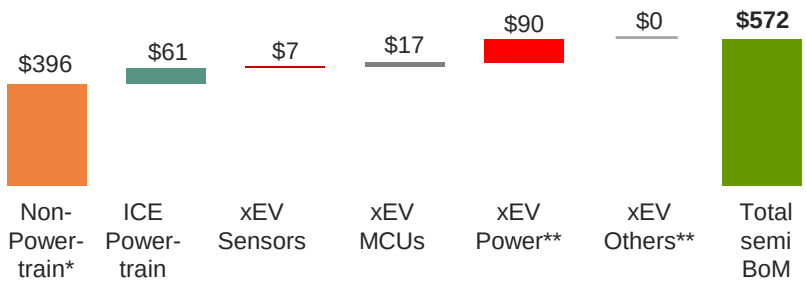


Source: Based on or includes content supplied by IHS Markit, Automotive Group: *Alternative propulsion forecast.* July 2020.

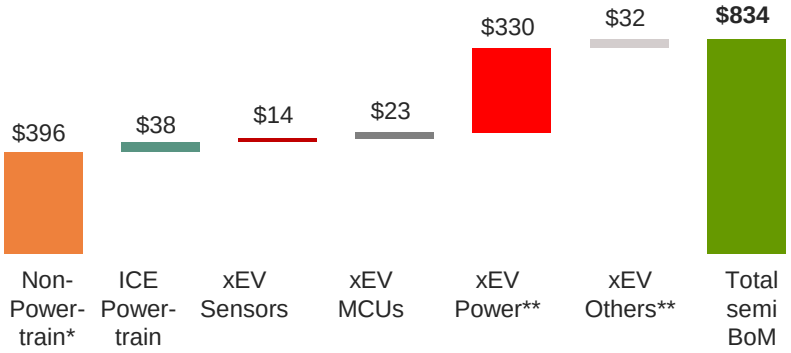
The incremental content of power semiconductors in xEV is a significant opportunity for Infineon

2020 average xEV semiconductor content by degree of electrification

48 V / Mild Hybrids



Full & Plug-in Hybrids and Battery Electric Vehicles



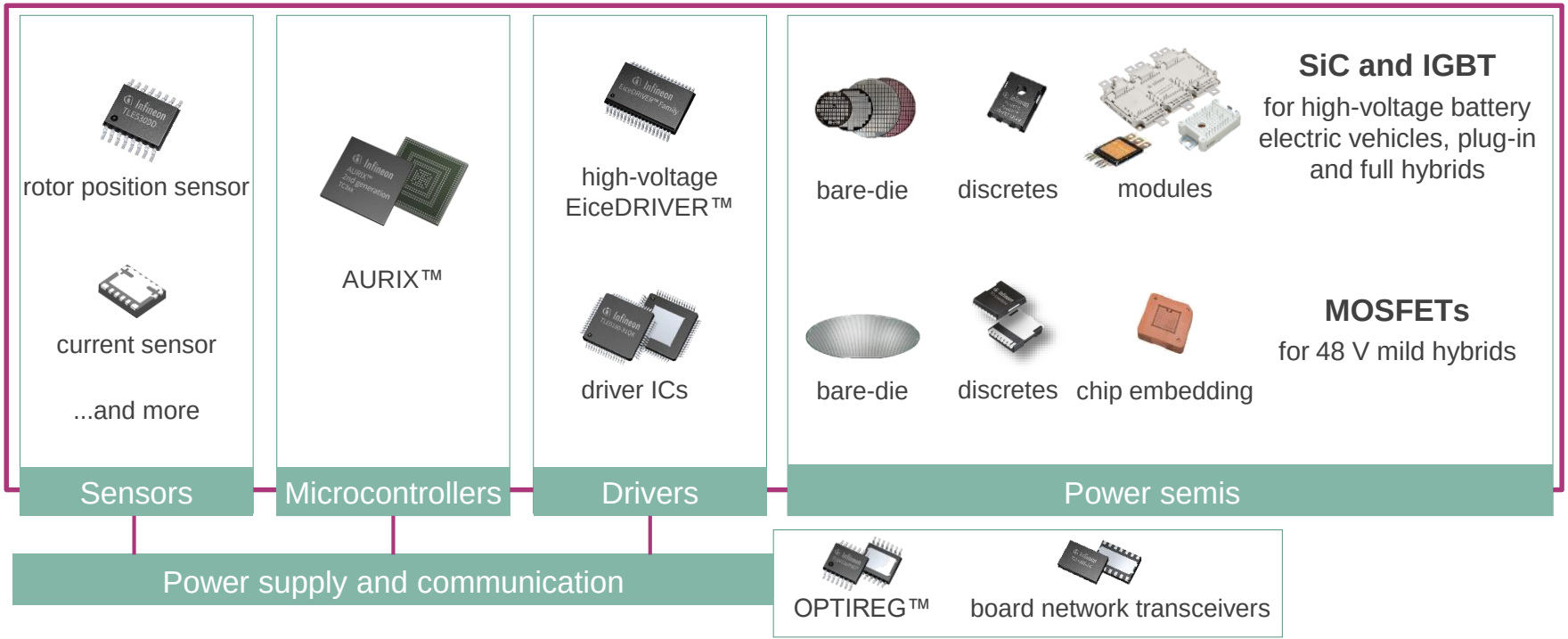
2020	2.1m vehicles	5.8m vehicles
2022	5.8m vehicles	12.2m vehicles
2025	18.8m vehicles	21.0m vehicles
2030	27.3m vehicles	32.0m vehicles

* Non-Powertrain: average semiconductor content in body, chassis, safety and infotainment application segments
** "power" includes voltage regulators and ASIC; "others" include opto, small signal discretes, memory

Source: Infineon; based on or includes content supplied by IHS Markit, Automotive Group: *Alternative Propulsion Forecast.* July 2020; Strategy Analytics: *Automotive Semiconductor Demand Forecast 2018-2027* and *Automotive Sensor Demand 2018-2027.* July 2020

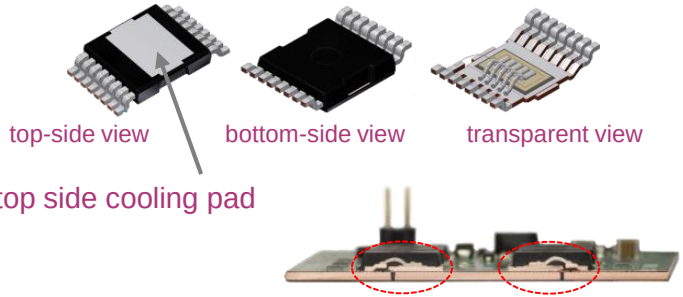
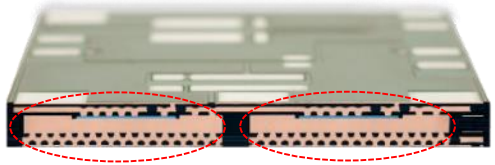
Infineon offers full system solutions addressing all xEV segments: pure EV and all types of hybrid EVs

Infineon offers full portfolio for the control loop of an electric car



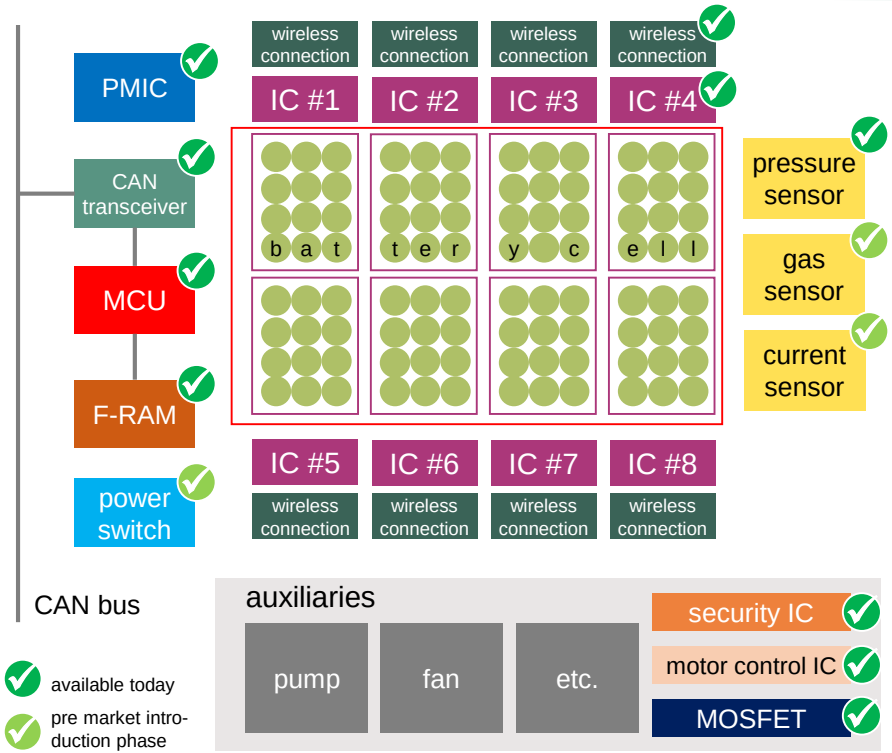
Key package innovations complement Infineon's leading position in chip technologies for 48 V systems

Key package innovations driving growth for the xEV business

	Top-side cooling package	Power chip embedding
Technology	 MOSFET soldered traditionally on the PCB but more efficient cooling from the top	 Chip embedding technology (jointly with Schweizer Electronic): Infineon MOSFET integrated within the PCB
Customer benefits	Significantly improved thermal management	Increase of power density, energy efficiency and reliability: up to 60% performance improvement compared to traditionally designed system
Success	Major European tier-1 awarded Infineon with a triple-digit million Euro design-win	Vitesco first player to adopt the technology

Besides main inverter and on-board charger, battery management is a good example for Infineon's system solution competence

Infineon offers basically all components of a complete battery management system (BMS)



8x..12x	›	multi-channel battery monitoring and balancing system ICs covering cell charge balancing, cell voltage and temperature measurement
8x..12x	›	wireless controll ICs
1x	›	PMIC
1x..2x	›	CAN transceivers for robust communication between cells and battery main controller
1x..2x	›	MCU with scalable processing performance, connectivity and embedded hardware security
1x	›	F-RAM for data logging and mission profile
1x..3x	›	high-voltage power MOSFET replacing relay and pyro fuse
8x	›	low-power pressure sensors
1x	›	gas sensor (H_2 or HCO_3)
1x	›	current sensor; type depending on cell topology
1x..3x	›	trusted security solutions to support battery identification, functional safety and IP protection
1x	›	embedded motor control ICs for various motor types
1x..4x	›	standard power MOSFETs

total BoM for 48 V BMS: $30 – $70
total BoM for high-voltage BMS: $50 – $160

To meet best cost-performance ratio in xEV drivetrain, IGBT and SiC technologies will co-exist

Selected examples of IGBT versus SiC

Example: All-wheel drive BEV

Axle 1 — Axle 2

- Focus on
  - Range: **SiC**
  - Cost
    - Large battery: **SiC**
    - Small battery: **IGBT**

Focus on cost only: **IGBT**

Example: Axle split PHEV

Axle 1 — Axle 2

Focus on cost only: **IGBT**

Focus on range: **Internal Combustion Engine**

Source: Infineon

Technology and market development

Choice of power semiconductor technology in main inverter

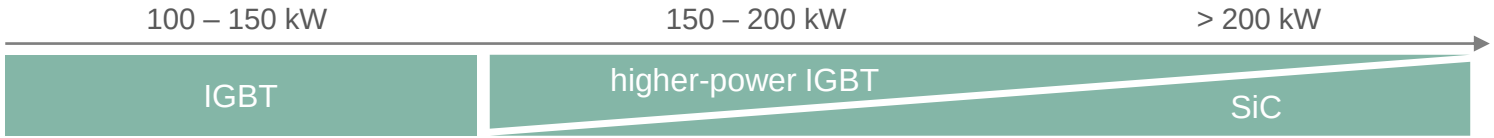
- More and more OEMs are considering SiC as an alternative to IGBTs
- OEMs' choice of main inverter technology depends on the choice of
  - range versus cost, and
  - size/cost of the battery

Market development

- Higher-volume platforms to be launched in ~2025 are being awarded over the next quarters
- To address range anxiety, OEMs shift focus to sufficient reach (for mid- to high-end cars preferably)
- To improve their CO_2 footprint online retailers need to operate fully electrified delivery vehicles

When OEMs will introduce SiC-based car models to increase their fleet offering, Infineon can leverage its huge IGBT customer base

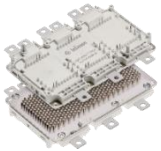
Infineon offers a seamless and cost-effective upgrade path across the entire power range



Scalability:

Same package for all power ranges

Si IGBT-based HybridPACK™



Si IGBT-based HybridPACK™

SiC MOSFET-based CoolSiC™ HybridPACK™

Same driver ICs for all power ranges

EiceDRIVER™ family

Infineon has an excellent position to win upcoming SiC-based xEV platforms

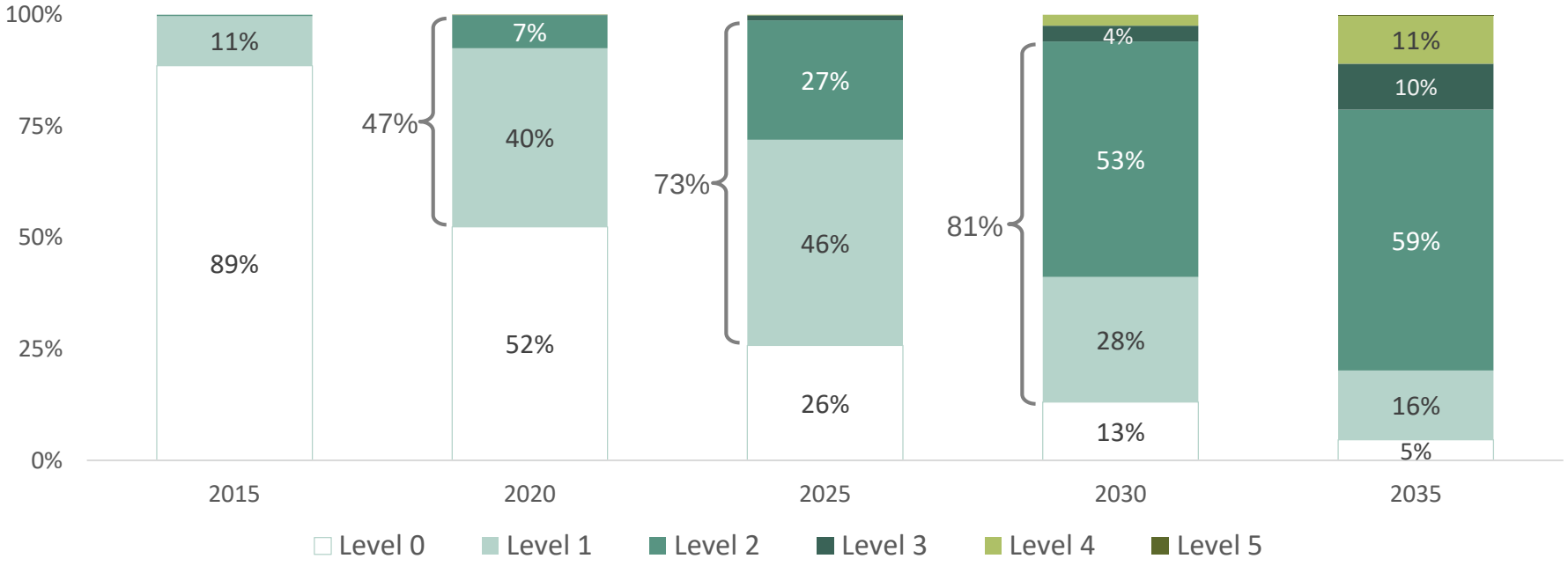
Infineon's leverage in SiC

Technology leverage	› Infineon is addressing the xEV market with its growing portfolio of SiC-based components optimized for automotive applications
Leverage of customer base	› Infineon's large IGBT customer base is an essential asset for the transition to SiC
Scalability	› Scalable portfolio of Infineon allows for easy and seamless upgrade from IGBT-based inverters to SiC-based inverters › Existing customers can beef-up their platform performance while sticking to the same module form factor

Automated Driving

The growth of L1/L2/L2+ is the main driver of ADAS semi content until 2030; low near-term impact from L3/L4/L5

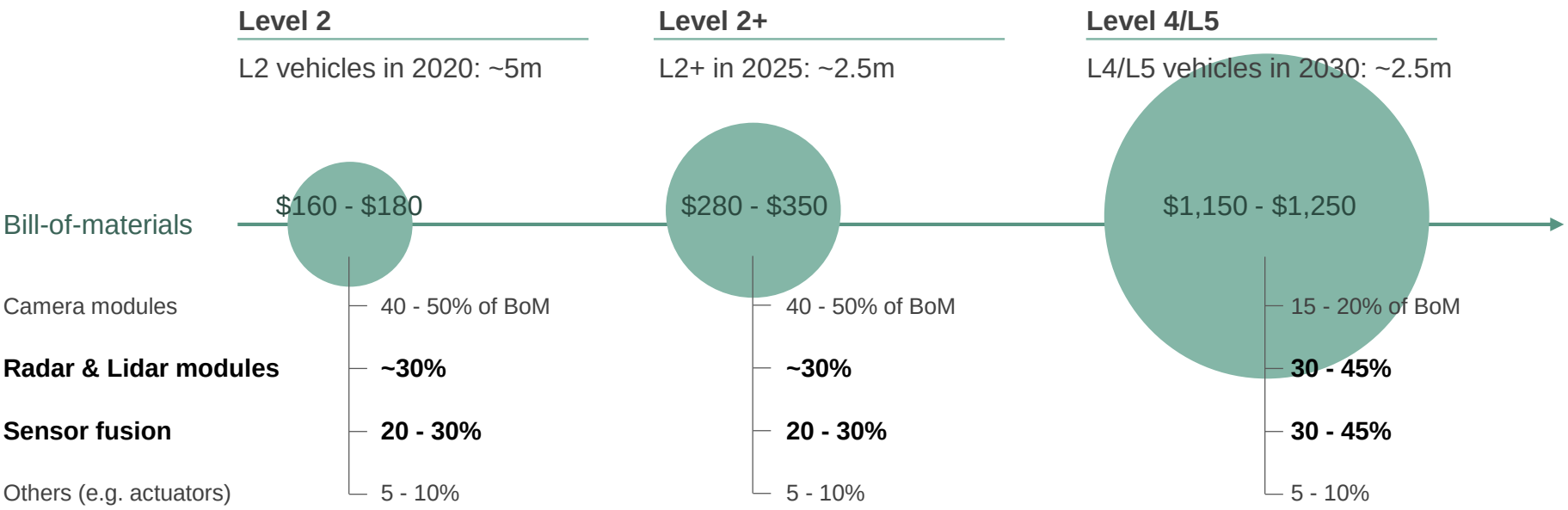
Car production by degree of automation



Source: Strategy Analytics: *Metrix Live.* December 2019; L2 includes L2 and L2+

Radar/Lidar modules and sensor fusion will grab the lion's share of semiconductor BoM in ADAS/AD-equipped cars

Incremental average semiconductor content per car by level of automation at the given years



Source: Strategy Analytics: *Automated Driving Semiconductor Market Estimate.* August 2020; Infineon
BoM contains all type of semiconductors (e.g. radar modules include µC); sensor fusion does not include memory.
BoM are projected figures for the respective time frame.

Infineon will roughly double its BoM content in upcoming high-volume radar systems by offering an optimized system portfolio

Infineon's increasing offering in 77 GHz radar system solutions

Past

- Radar sensor (SiGe)

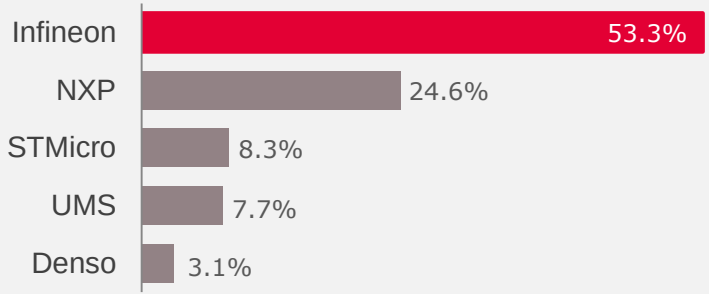
Current

- Radar sensor (SiGe)
- AURIX™ 2G (2nd gen) Microcontroller

Upcoming

- Power supply
- Radar sensor (28nm CMOS, SiGe)
- AURIX™ 3G (3rd gen) Microcontroller

2019 automotive radar sensor IC market (77 / 24 GHz)



› Dedicated AURIX™ microcontrollers with hardware-coded radar signal preprocessing will roughly double Infineon's semiconductor content

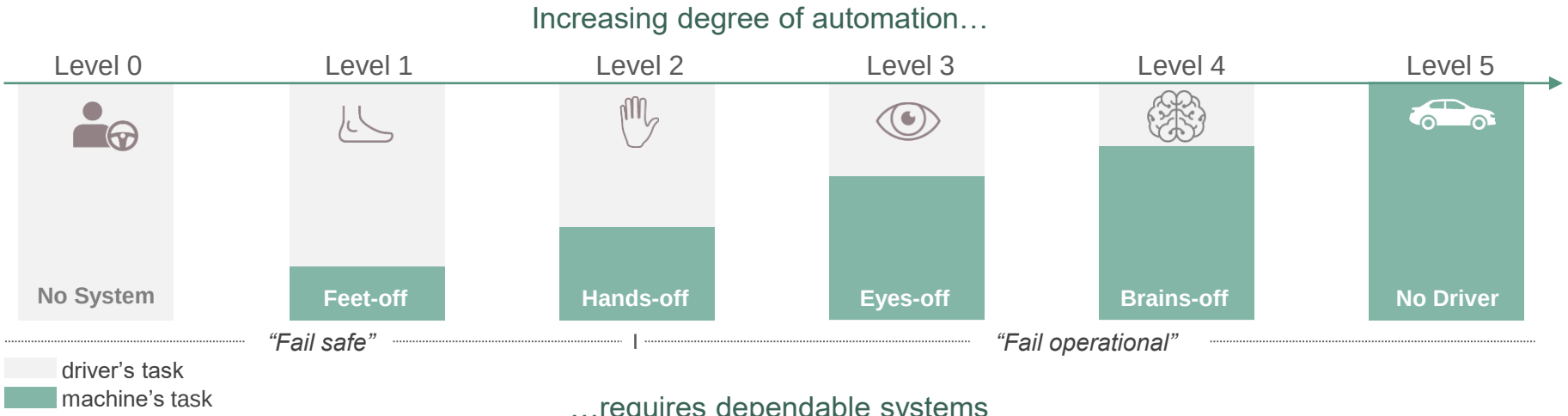
› System-level offering combining radar sensor ICs, micro-controllers and power supply

› Major advantages for customers:
- interoperability
- shorter development time
- faster time-to-market

Source: Yole Developpement: *Status of the Radar Industry.* May 2020.

Higher levels of automated driving require trust via solutions that one can depend on

The need for dependable systems per degree of automation



…requires dependable systems

Dependable Sensing ✓ + Dependable Computing ✓ + Secure Communication ✓ + Dependable Actuation ✓ + Dependable Power Supply ✓ + Dependable Memory ✓

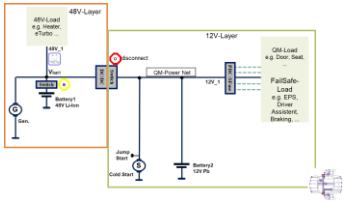
✓ = Infineon's field of competence

The need for dependability will drive demand for semiconductors; example: intelligent power switches

Example: Power distribution architecture in a car by degree of automation

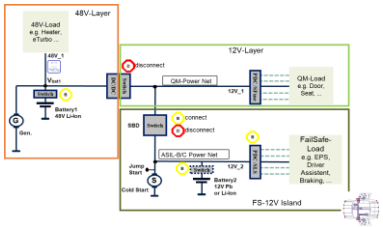
Level 2

Today's reference architecture



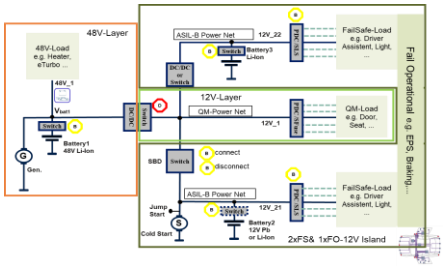
Level 2+

Dedicated protected branches for critical loads



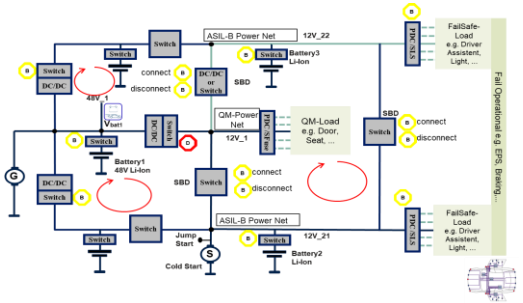
Level 3

Redundancy for critical loads



Level 4/5

Sophisticated "dependability" concept



1x — 1.3x — 2x — >3x

Number of intelligent power switches

Source: Infineon

Infineon's NOR Flash business is another beneficiary of the need for dependability

Structural growth drivers for NOR Flash in general

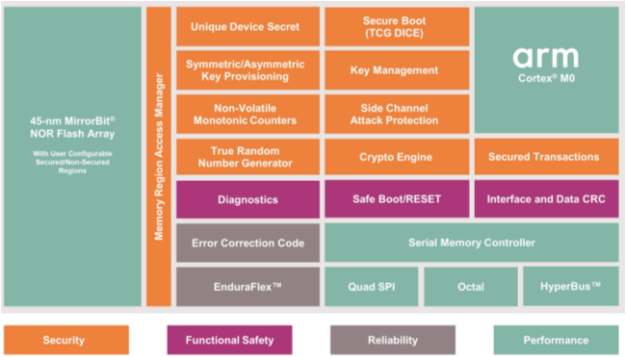
- increasing system complexity drives demand for higher off-chip code storage
- growing number of applications based on high-performance processing units:
  - code and parameter storage for MCUs, GPUs, MPUs, and other SoCs
  - configuration data for FPGAs

Automotive applications of NOR Flash

- ADAS/AD
- instrument clusters
- navigation systems
- Software-over-the-air (SOTA) updates

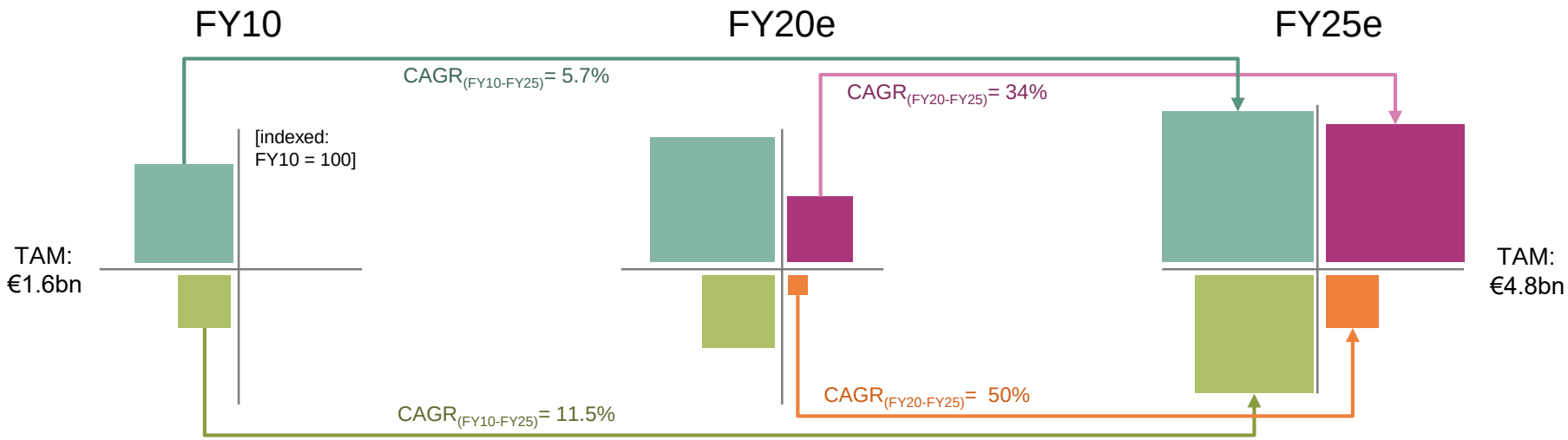
Infineon's unique offering: Semper™ Secure NOR Flash

- Infineon Semper™ Secure NOR Flash is the first memory solution to combine security and functional safety in a single NOR Flash device
- Infineon Semper™ Secure NOR Flash delivers the security, safety, and reliability required for the most advanced connected automotive systems



The Infineon AURIX™ µC family has become the first-choice automotive architecture for high-growth and safety-critical applications

Infineon AURIX™ revenue development over time



- **powertrain**
  - ICE engine management
  - ICE transmission
  - xEV motor control
- **classical safety**
  - power steering
  - braking
  - airbag
- **ADAS/AD**
  - camera host control
  - sensor fusion host control
  - radar signal pre-processing
- **domain and zone control**
  - drive domain
  - body & convenience domain
  - zone control

Source: Infineon; Strategy Analytics: *Automotive Semiconductor Demand Forecast*. February 2020. Covering Infineon target markets; excl. body, comfort, infotainment.

Strong microcontroller footprint in next-generation high-volume platforms

OEM platform #1:

- 14 MCUs (+ NOR Flash + Wi-Fi)
- start of production: end of CY20

Engine control module AURIX™ TC38x	Braking AURIX™ TC39x	AD fusion standard AURIX™ TC39x	Instrument cluster NOR Flash S26KS512
Drivetrain control module AURIX™ TC23x	Airbag AURIX™ TC23x	AD fusion high-end AURIX™ TC39x	Infotainment module 89359 (Wi-Fi / Bluetooth)
Transmission control module AURIX™ TC27x	Electric power steering AURIX™ TC27x	Central AD decision module AURIX™ TC39x	Central AD module NOR Flash S70FL01G S25FL512 S25FS512
Automatic gear shifter module AURIX™ TC23x	Automatic sway bar AURIX™ TC23x	Secure gateway module AURIX™ TC39x	
Electronic slip differential AURIX™ TC23x	Map driver assistance AURIX™ TC39x		

OEM platform #2:

- 20 MCUs
- start of production: CY22

Engine management AURIX™ TC38x	Braking AURIX™ TC38x	AD fusion standard AURIX™ TC39x	Cluster TFT module FCR4 MB9DF125
Diesel engine management AURIX™ TC39x	Airbag AURIX™ TC37x	AD fusion high-end AURIX™ TC39x	8” rear-seat entertainment TrueTouch TMA78
Transmission control module AURIX™ TC38x	Electric power steering AURIX™ TC36x	Front camera AURIX™ TC37x	10” navigation module TrueTouch TMA1036
Inverter PHEV AURIX™ TC38x	Suspension CVC AURIX™ TC38x	Radar domain processing AURIX™ TC39x	Climate, gearshift MMI FR CY91xxx
Door module FR MB91520	Alarm system module FR MB91F520	Digital instrument cluster Traveo I S6J332	Head light module FR MB91F525

Infineon heritage | Cypress heritage

Take aways

- In 2021, the automotive market is expected to snap back
- Growth of xEV is accelerated by incentive programs and green deals

- Infineon is very well positioned to win upcoming SiC-based xEV platforms:
  - due to its scalable product offering
  - by leveraging its huge IGBT customer base

- For ADAS/AD, dependability is a must and is a key driver of semiconductor content growth
- Infineon offers an unmatched portfolio for dependable systems

- AURIX™ has become the first-choice microcontroller for high-growth applications

Part of your life. Part of tomorrow.

Glossary

AC-DC	alternating current - direct current
AD	automated driving
ADAS	advanced driver assistance system
BEV	battery electric vehicle
BMS	battery management system
BoM	bill of material
CAN	controller area network
CMOS	complementary metal-oxid semiconductor
CPU	central processing unit
CVC	California vehicle code
DC-DC	direct current - direct current
ECU	electronic control unit
EPS	electric power steering
EV	electric vehicle
FCEV	fuel cell electric vehicle
FHEV	full-hybrid electric vehicle
FPGA	field programmable gate array
GaN	gallium nitride
GPU	graphics processing unit
HSM	hardware security module
HV	high-voltage
HW	hardware
IC	integrated circuit
ICE	internal combustion engine
IGBT	insulated gate bipolar transistor
IVN	in-vehicle networking
MCU	microcontroller unit
µC	microcontroller

MHEV, mild-hybrid	mild-hybrid electric vehicle; vehicles using start-stop systems, recuperation, DC-DC conversion, e-motor
micro-hybrid	vehicles using start-stop systems and limited recuperation
mild-hybrid	vehicles using start-stop systems, recuperation, DC-DC conversion, e-motor
MOSFET	metal-oxide silicon field-effect transistor
MPU	microprocessor unit
NEDC	new European drive cycle
OBC	on-board charger
OEM	original equipment manufacturer
PCB	printed circuit board
PHEV	plug-in hybrid electric vehicle
PMIC	power management IC
PT	powertrain
RF	radio frequency
RoW	rest of world
Si	silicon
SiC	silicon carbide
SiGe	silicon germanium
SoC	system-on-chip
SOTA	software over-the-air
SW	software
TAM	total addressable market
ToF	time-of-flight
V2X	vehicle-to-everything communication
xEV	all degrees of vehicle electrification (EV, FHEV, HEV, PHEV)

Disclaimer

Disclaimer

This presentation contains forward-looking statements about the business, financial condition and earnings performance of the Infineon Group.
These statements are based on assumptions and projections resting upon currently available information and present estimates. They are subject to a multitude of uncertainties and risks.
Actual business development may therefore differ materially from what has been expected.
Beyond disclosure requirements stipulated by law, Infineon does not undertake any obligation to update forward-looking statements.

Specific disclaimer for IHS Markit – reports, data and information referenced in this document:

The IHS Markit reports, data and information referenced herein (the "IHS Markit Materials") are the copyrighted property of IHS Markit Ltd. and its subsidiaries ("IHS Markit") and represent data, research, opinions or viewpoints published by IHS Markit, and are not representations of fact. The IHS Markit Materials speak as of the original publication date thereof and not as of the date of this document. The information and opinions expressed in the IHS Markit Materials are subject to change without notice and neither IHS Markit nor, as a consequence, Infineon have any duty or responsibility to update the IHS Markit Materials or this publication. Moreover, while the IHS Markit Materials reproduced herein are from sources considered reliable, the accuracy and completeness thereof are not warranted, nor are the opinions and analyses which are based upon it. IHS Markit and the trademarks used in the Data, if any, are trademarks of IHS Markit. Other trademarks appearing in the IHS Markit Materials are the property of IHS Markit or their respective owners.

Peter Schiefer
Division President Automotive

- since 2016: Division President Automotive
- Sep 2012: Head of Infineon worldwide Operations, responsible for chip production, assembly and testing, as well as process technology development, supply chain and purchasing
- Jan 2012: Division President Power Management & Multimarket
- since 2018: Member and Vice Chairman of the Board of Directors of the JV SIAPM (SAIC Infineon Automotive Power Modules (Shanghai) Co. Ltd.)
- 2013 – 2016: Member of the Supervisory Board of Infineon Technologies Austria
- since 2012: Member of the Supervisory Board of Infineon Technologies Dresden

- Peter Schiefer was born in Munich, Germany, in 1965. He holds a Diploma in Electrical Engineering from the University of Applied Sciences in Munich.
- He joined Infineon (Siemens AG until 1999) in 1990.