



IFX Day 2018

Andreas Urschitz

Division President Power Management & Multimarket

London, 12 June 2018



PMM's growth is built on many applications from different sectors in power and non-power



PMM

Computing



- > Data Center
- > PC, Notebook
- > Peripherals



Industrial



- > Power supplies
- > EV on-board charger
- > PV inverter
- > Power tools
- > Lighting
- > Industry 4.0
- > Internet of Things



Consumer / Misc



- > eBikes
- > Multicopter
- > Aviation
- > LSEV
- > Space
- > Gaming
- > Smart home



Communications



- > Handsets
- > Wearables
- > 5G massive MIMO



● AC-DC ● DC-DC ● RF and sensors (non-power)



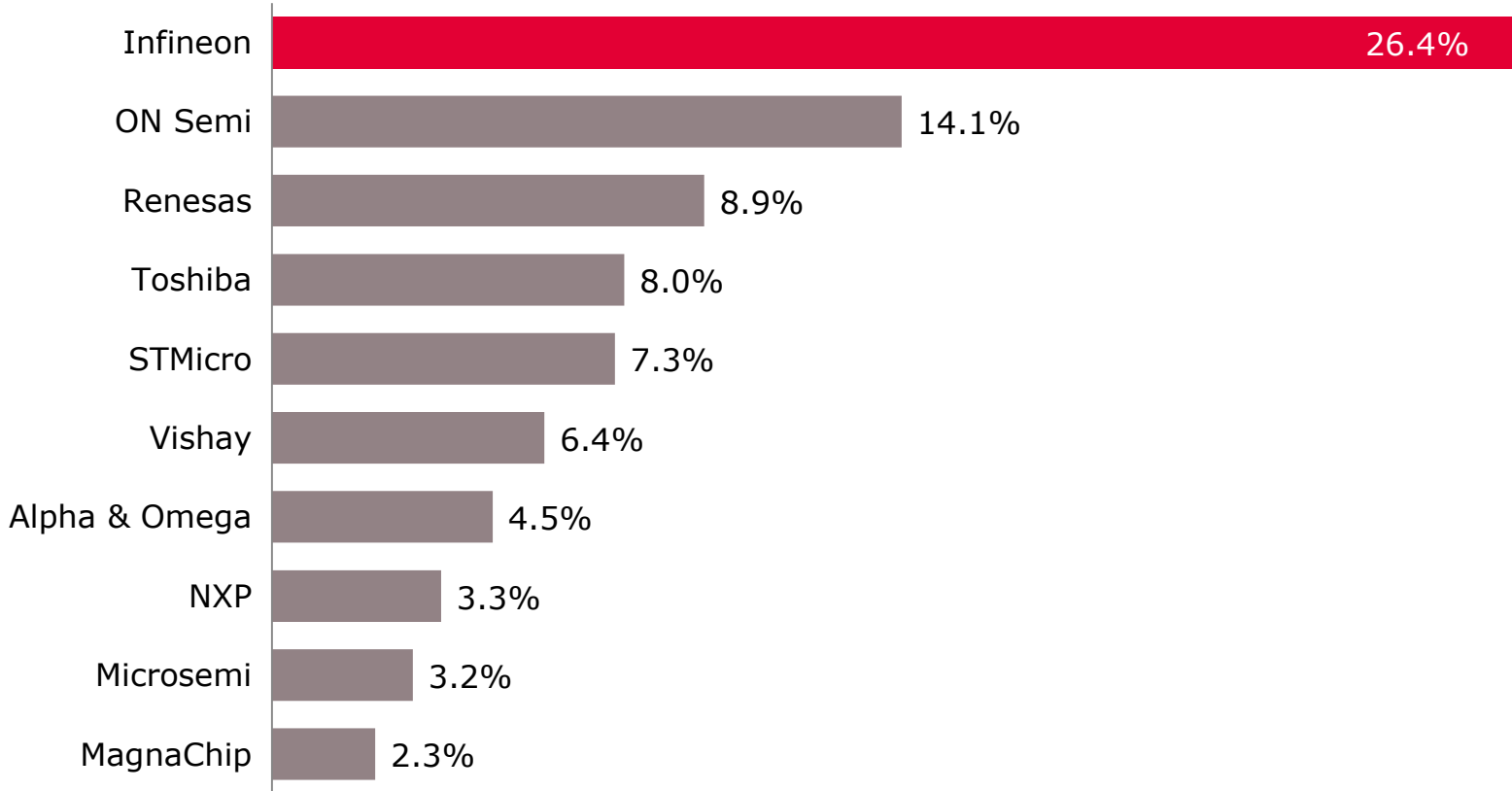
PMM – Power



PMM is the undisputed market leader in power MOSFETs



Discrete power MOSFETs market shares total market in 2016: \$5.78bn



Source: Based on or includes content supplied by IHS Markit, Technology Group, "Power Semiconductor Discretets & Modules Report", August 2017; incl. automotive MOSFETs

Three strategic levers to outgrow the power semiconductor market



Strengthen core

- › Complement technology leadership and #1 position in CoolMOS™ and OptiMOS™ with next-generation WBG power semis (CoolGaN™, CoolSiC™)
- › Continuously increase scale leadership with 300 mm
- › Exploit scale in R&D



Grow in adjacent fields

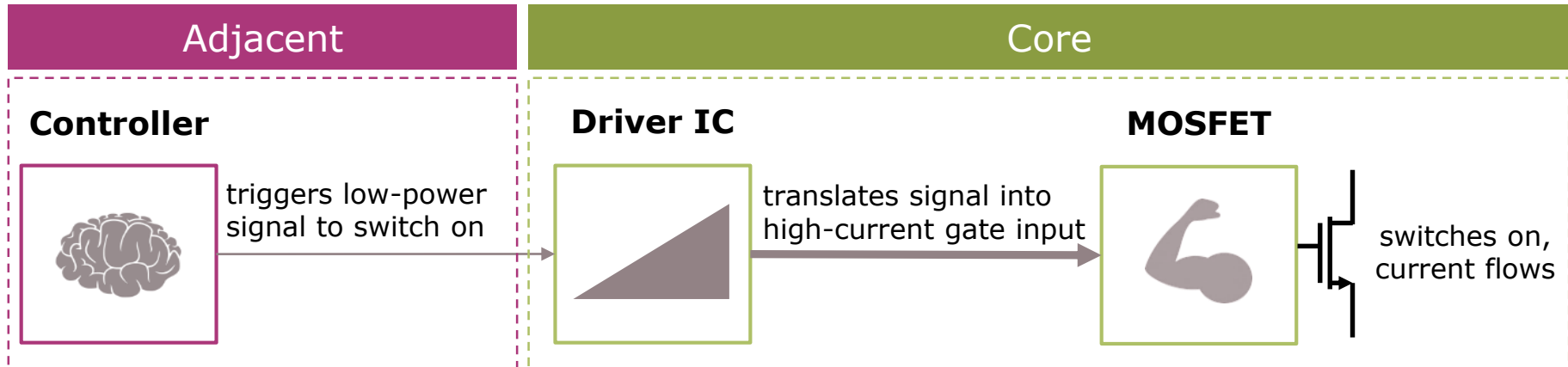
- › Complement core (= switch and driver ICs) by adding further (digital) power management ICs
- › Grow into adjacent markets such as class D audio amplifiers or PoL in telecom and data center



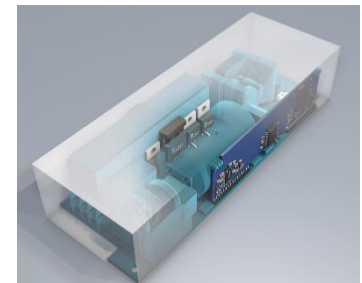
Broaden scope to new applications

- › System understanding and strong R&D force allow us to enter emerging power applications like AI data center, wireless power, EV on-board charger, infrastructure and LSEV

Technology leadership in MOSFETs and digital power: highest efficiency and power density



Power management solutions reduce TCO



More efficient semiconductors

- > lower power consumption
- > lower opex

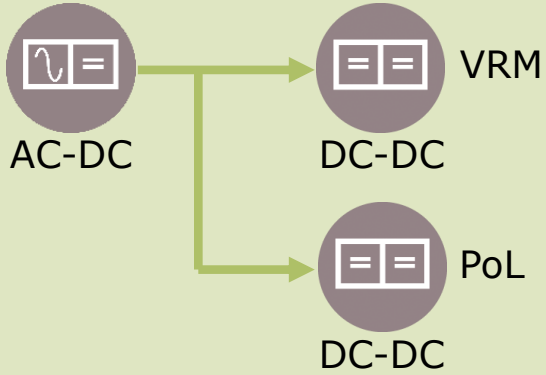
Higher power-density

- > more compact system designs
- > lower capex

Highly differentiating solution for data center enables significant opex and capex reduction



Powerflow (schematic)



Customer benefit

- > reducing opex and capex by >10%
- > saving >3bn kWh annually for US data centers
- > doubling compute power per server rack



Infineon-enabled optimization of data center powerflow – examples:



AC-DC

CoolGaN™ allows for 2x output power in a given slot size and thus frees up space for the backup battery in more efficient architecture.



DC-DC

Benchmark **digital power solutions** including fully integrated PoL devices: highest efficiency, highest power density; supporting latest processor technologies.

AC-DC power supply by Eltek using CoolGaN™



Eltek "Flatpack2 SHE"

- > 3 kW / 48 V
- > Fixed and wireless telecom applications
- > Size: 4.25 x 1.61 x 13 inch³
- > Weight: 4.5 lbs
- > High power density: 33 W/inch³

98%

efficiency

-50%

reduction in power loss

> -6%

proven operational cost reduction

Infineon content per device

- > 2x **CoolGaN™** 600 V
- > 2x **CoolMOS™** C7
- > 2x **CoolMOS™** CFD7
- > 4x **OptiMOS™** 150 V
- > Gate driver

~ US\$30

Server eco-system is supported by PMM's various DC-DC solutions



Data center market trends

Increasing memory and processing power

Adoption of AI drives high-end analytics and data management

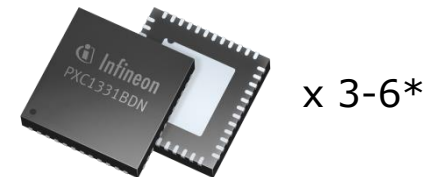
Expanding CPU supplier base: AMD, IBM, NVIDIA, ARM, Intel etc.

Hyperscale users invest in proprietary processor designs (e.g. Google)

Saving space is a key requirement and a focus of product development



Digital controllers
with flexible communications interface



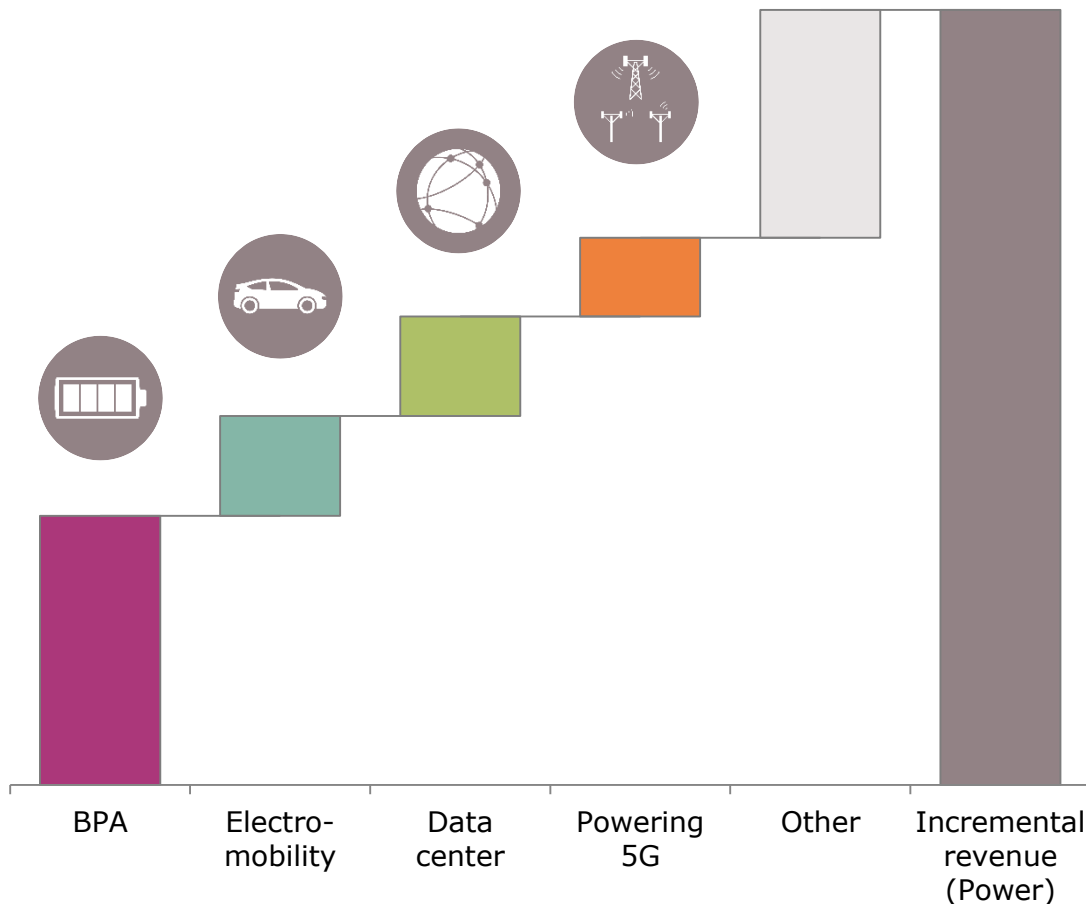
Integrated power stages and iPoL
for high power density



* devices per server

PMM's mid-term growth in power is strongly driven by several high-growth applications

Composition of incremental € revenue over five year planning horizon by application



Battery-powered applications

E.g. power tools, consumer devices, robots and drones

xEV and LSEV

Densification of charging infrastructure; power semis for OBC and battery switch (CoolMOS™)

Data center

Classical data centers and high-computing data centers for AI

Powering 5G

Densification of infrastructure; massive MIMO to drive power MOSFET content by a factor of 5 (to >250 pieces per system)

PMM power's trendline growth:

~9%

Key take-aways – PMM Power

A close-up, slightly blurred photograph of a circular microchip die, showing a grid of small, colorful square components in shades of yellow, orange, and blue.

PMM is the undisputed market and technology leader in power MOSFETs and will **leverage scale advantages** in R&D and manufacturing.

PMM will **unlock further growth potential** with digital power management ICs and by addressing adjacent power applications.

PMM is excellently positioned in future-proof trends and will **continue to outgrow the market** going forward.



PMM – RF and Sensing

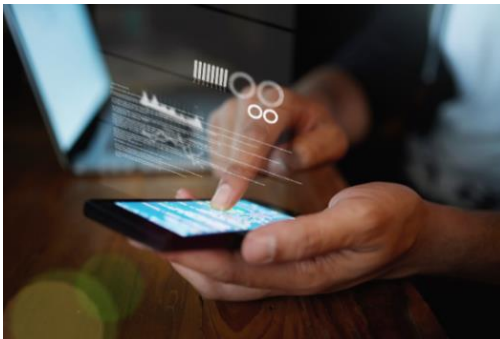
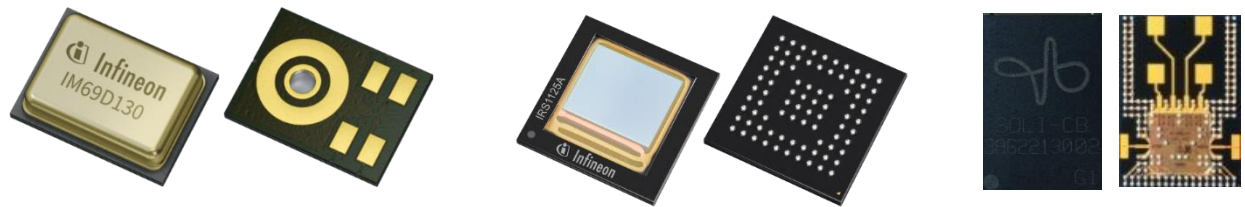


RF and Sensing: Existing core competencies help seize additional growth opportunities



Strengthen core

- › Technology leadership in key sensing technologies:
 - MEMS: XENSIV™ silicon microphone
 - 3D ToF imaging: REAL3™
 - RF: 60 GHz radar for gesture sensing



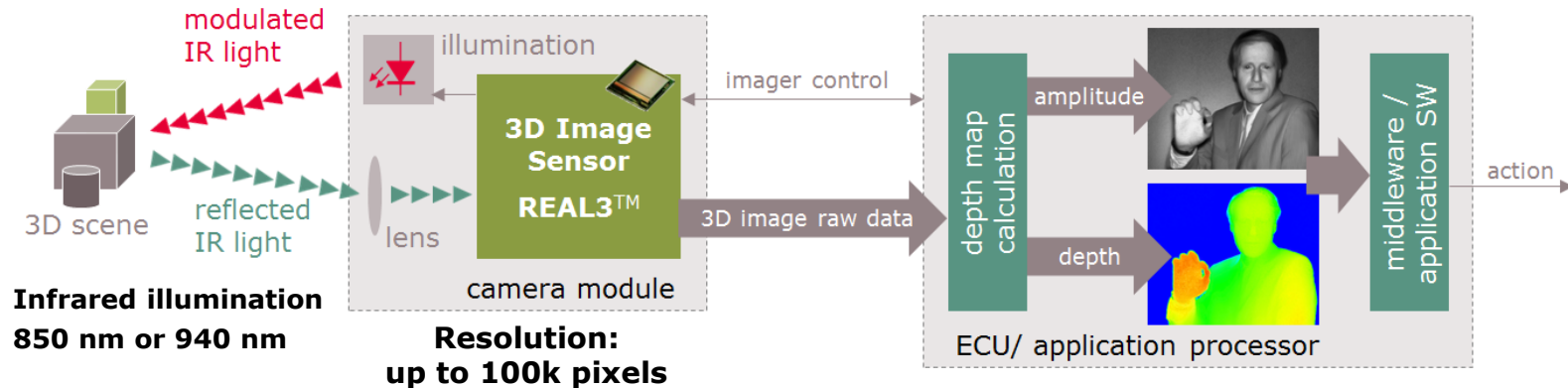
Grow in adjacent fields and address new markets

- › Leverage technological capabilities to tap into adjacent sensor use cases (e.g. MEMS-based pressure sensors)
- › Address new markets with high growth potential
 - Human-machine interaction
 - 3D face recognition
 - 5G mmWave and sub-6-GHz for user equipment and basestations

Leading base technologies for sensor solutions: Time-of-Flight

Time-of-Flight

Time-of-Flight: Modulated infrared-light is emitted and reflected by objects. Phase-shift of returned light is measured in each pixel of the image sensor.



Examples of uses cases enabled by Time-of-Flight technology

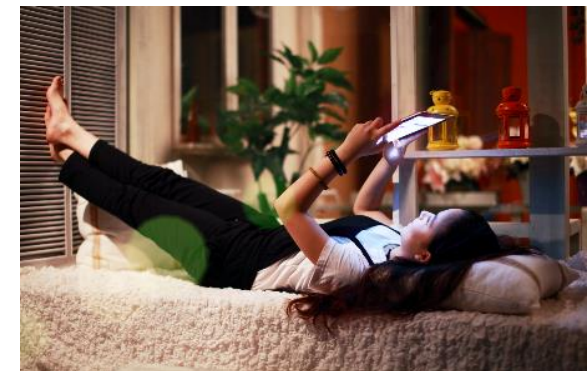
3D scanning



AR / VR / gaming



Secure face recognition



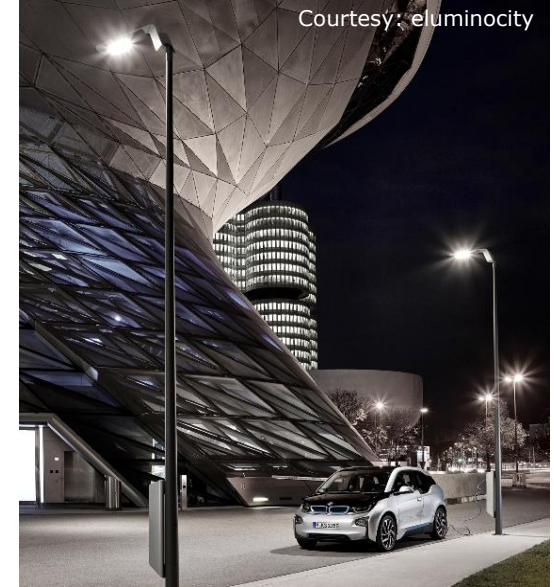
RF and Sensing devices enable new services and will shape the way we live and work



Augmented Reality



Voice-controlled devices



Smart streetlights



Commercial and consumer multicopters



Gesture control



Industrial robotics

Various use cases are enabled by a small set of versatile core technologies

Key take-aways – PMM RF and Sensing

PMM will **leverage its technology leadership** in MEMS microphones and broaden the success in smartphones to new emerging applications.

Strong core in MEMS is complemented by leading 3D Time-of-Flight imaging and radar technology, enabling **leadership in intuitive sensing and HMI**.

PMM's sensor portfolio emulates human senses, thus enabling attractive new uses cases with **significant revenue potential**.

PMM RFS is set to deliver **~9% revenue CAGR** over five year planning horizon.

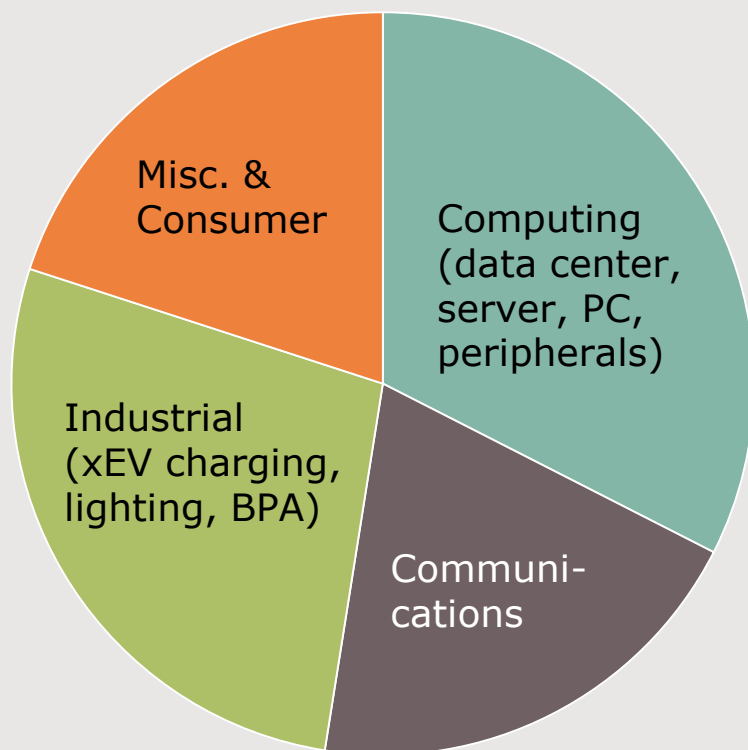


Part of your life. Part of tomorrow.

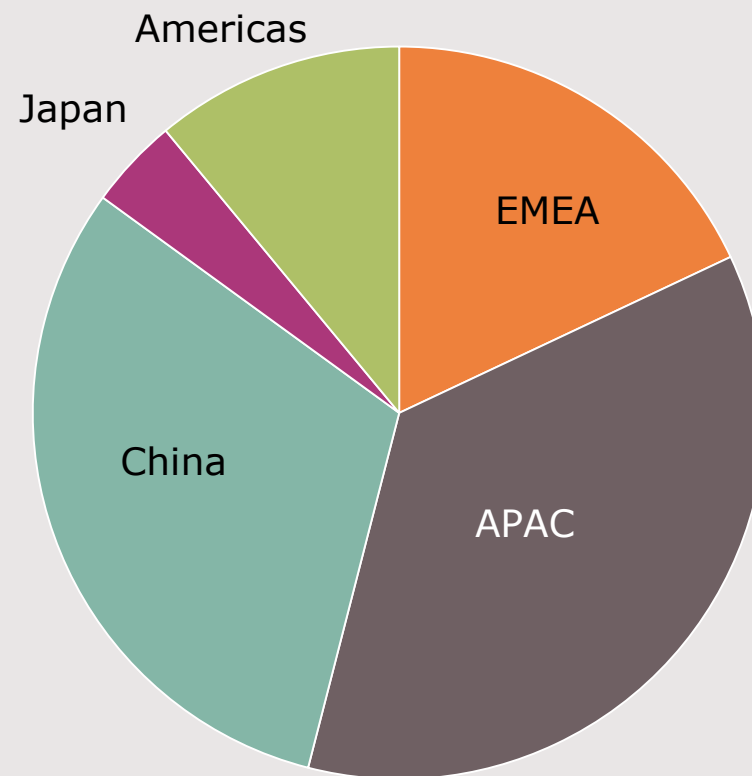


Dashboard

PMM FY17 revenue by application

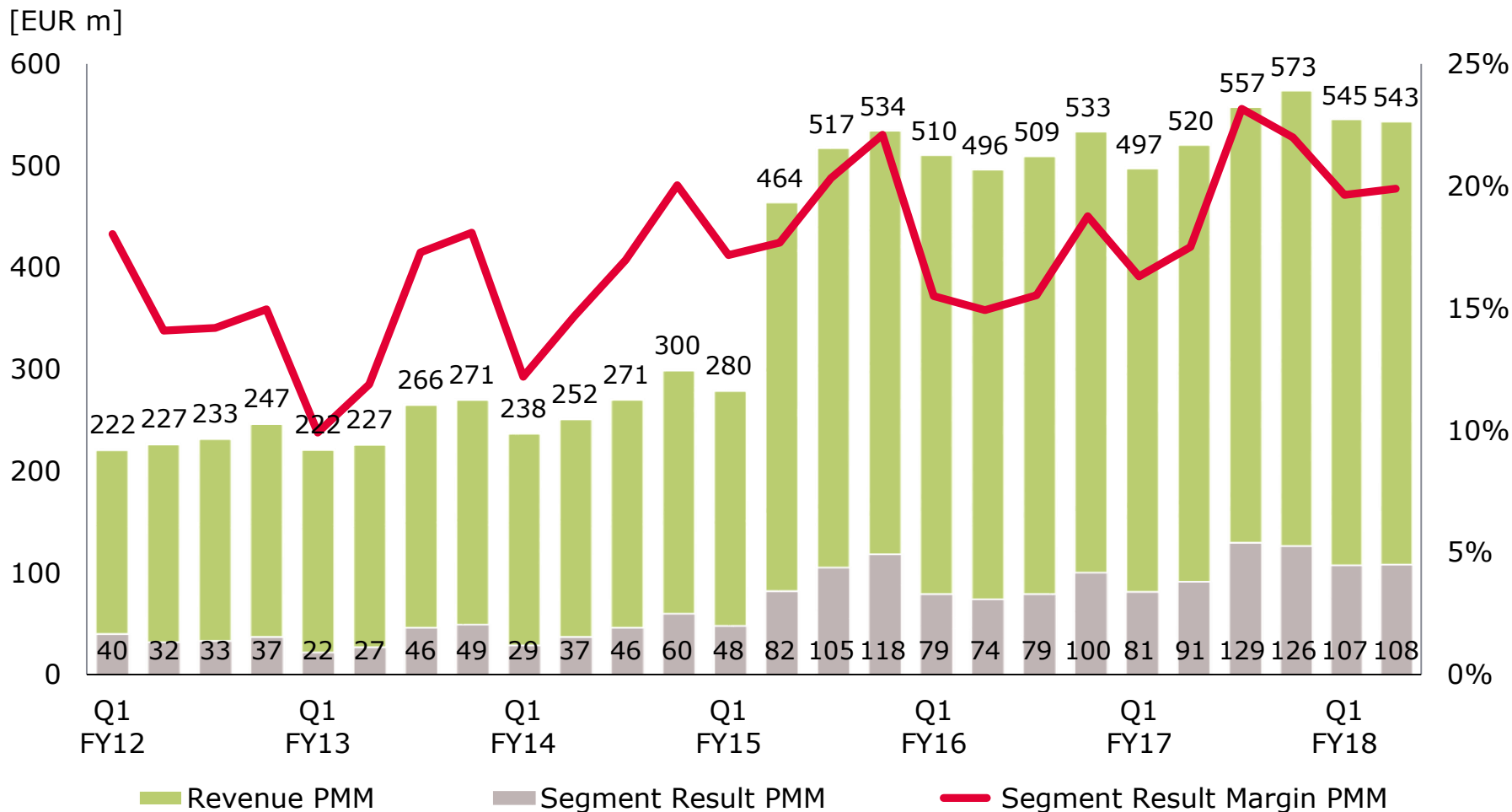


PMM FY17 revenue by region



PMM historic financial figures

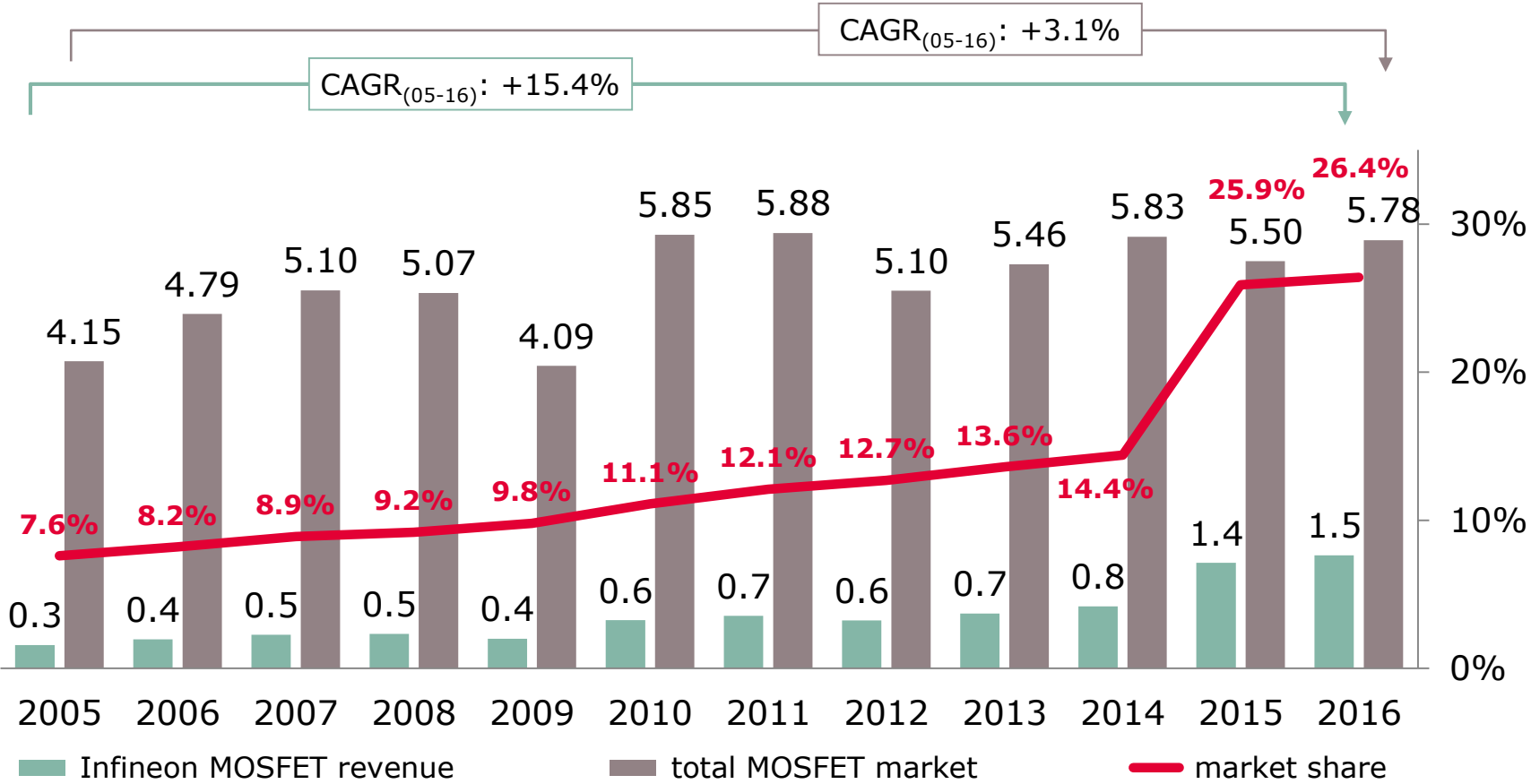
Revenue and segment result development



Continuous gain in market share in standard MOSFETs



Infineon's historic market share development 2005 - 2016



Source: Based on or includes content supplied by IHS Markit, Technology Group, several reports from 2004 through 2015 and 2017
 Note: No backward revision of market shares and market sizes; except for year 2015

Glossary

3D	three dimensional	MOSFET	metal-oxide silicon field-effect transistor
5G	fifth generation of cellular infrastructure standard	nm	nanometer
AC-DC	alternating current – direct current	OBC	on-board computer
AI	artificial intelligence	opex	operational expenditure
AR	augmented reality	PoL	point-of-load
capex	capital expenditure	PV	photovoltaic
CPU	central processing unit	RF	radio frequency
DC-DC	direct current – direct current	Rx	receiver
ECU	electronic control unit	Si	silicon
EV	electric vehicle	SW	software
IC	integrated circuit	TCO	total cost of operations
iPoL	image processing line	ToF	time of light
IR	infrared	Tx	transmitter
kWh	kilowatt hour	VR	virtual reality
LSEV	low-speed electric vehicle	VRM	voltage regulator module
MEMS	micro electro-mechanical systems	WBG	wide bandgap material
MIMO	multiple input, multiple output	xEv	all degrees of vehicle electrification (EV, FHEV, PHEV)
mmWave	millimeter wave		

Andreas Urschitz, Division President Power Management & Multimarket



- › since 2012: Division President Power Management & Multimarket (PMM)
- › 2011: Head of Distribution of the PMM Division
- › 2001 – 2011: several management positions within PMM Division

- › Andreas Urschitz was born in Klagenfurt, Austria, in 1972. He holds a master's degree in Commercial Science from the Vienna University of Economics and Business.
- › He joined Infineon (Siemens AG until 1999) in 1995.

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 a duty or responsibility to update the IHS Markit Materials or this presentation. 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.