Automotive Power Supply Solutions OPTIREG™ & Transceivers

Infineon Automotive Division

Q1 2025

Infineon at a glance

Infineon at a glance

Addressing long-term high-growth trends

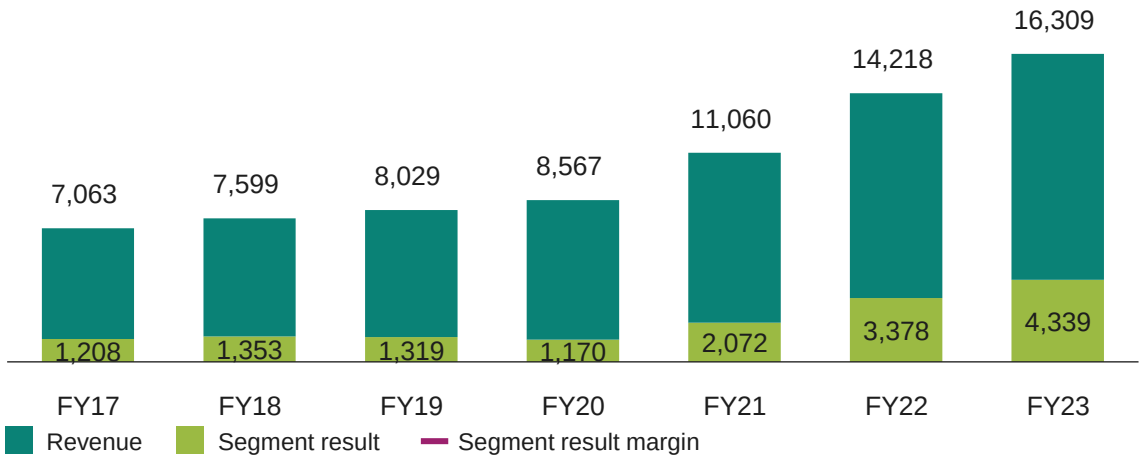
Energy
green and efficient

Mobility
clean and safe

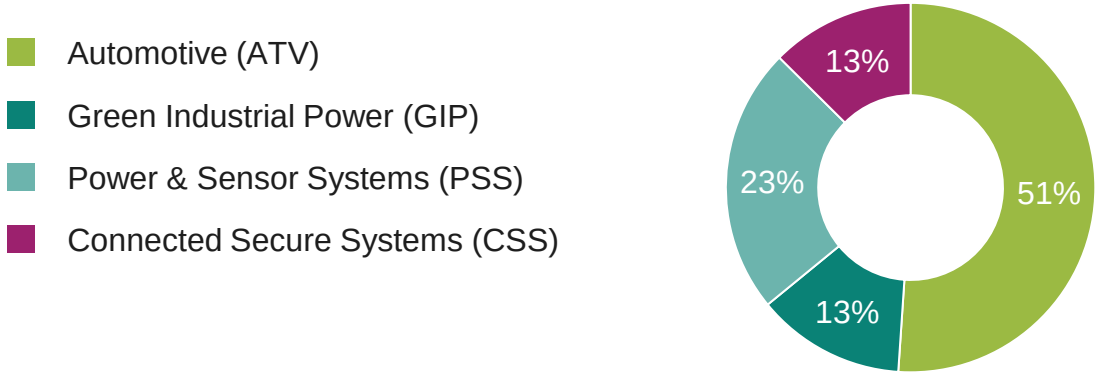
IoT
smart and secure

Financials

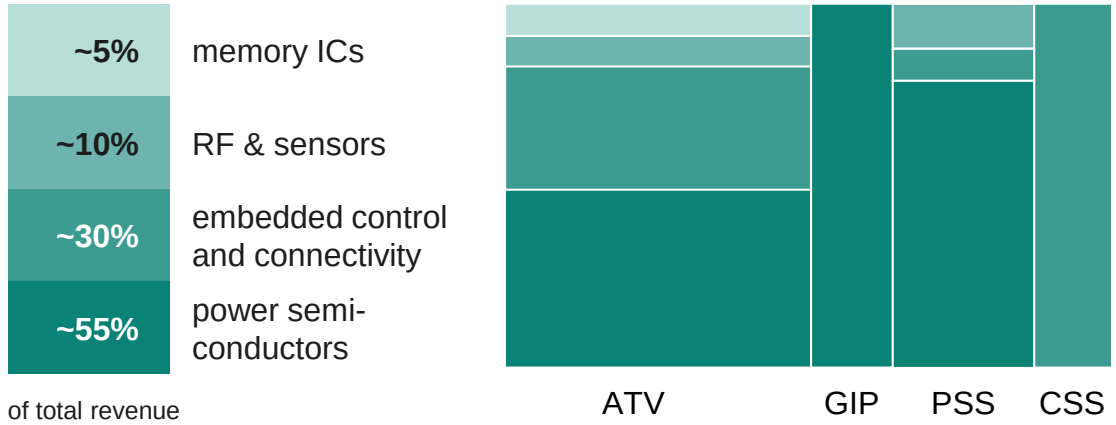
[EUR m]



FY23 revenue by segment



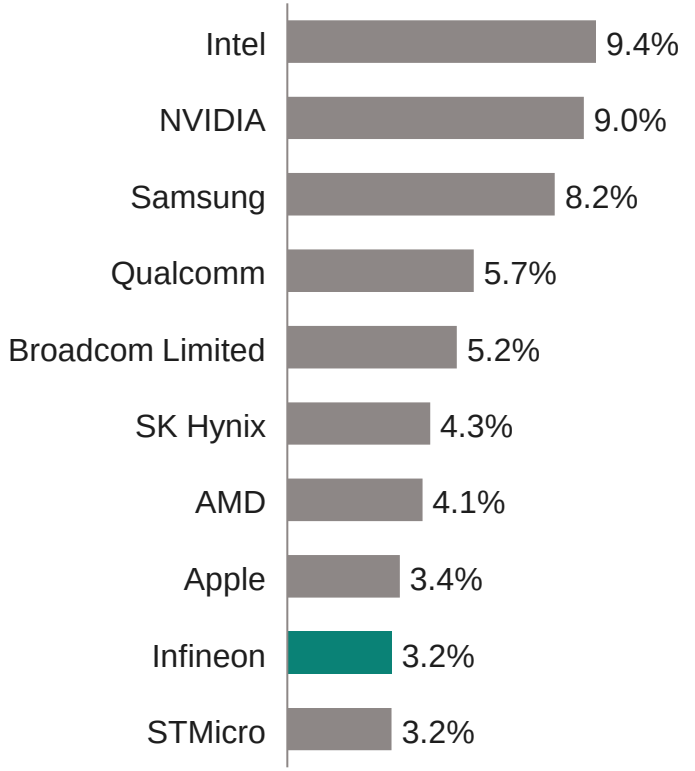
FY23 revenue by product category



Infineon is a global player, clear #1 in power semiconductors, and ranked #2 in the overall microcontroller market

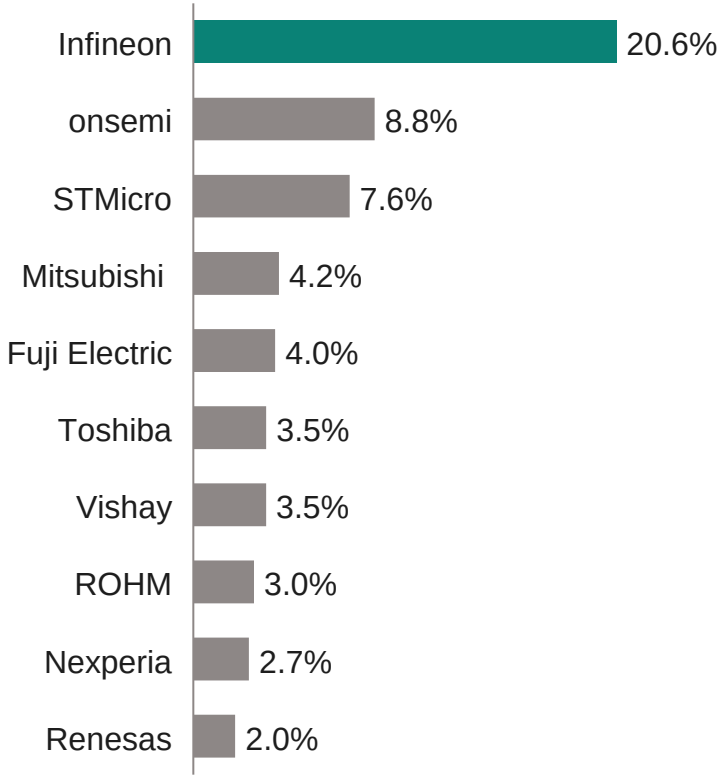
Semiconductor suppliers

2023 total global market: USD 544bn[1]



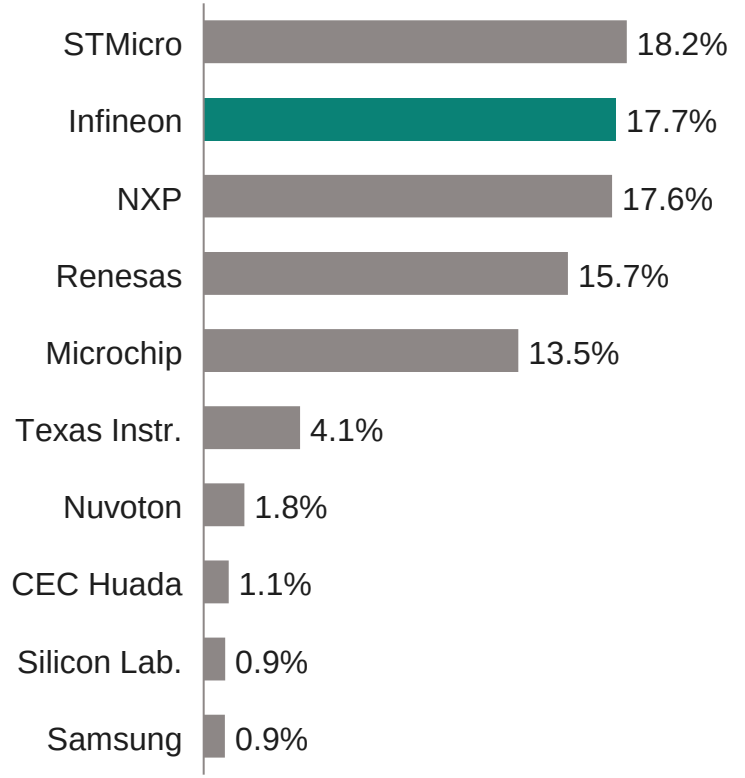
Power discretes and modules

2022 total global market: USD 30.9bn[2]



Microcontroller suppliers

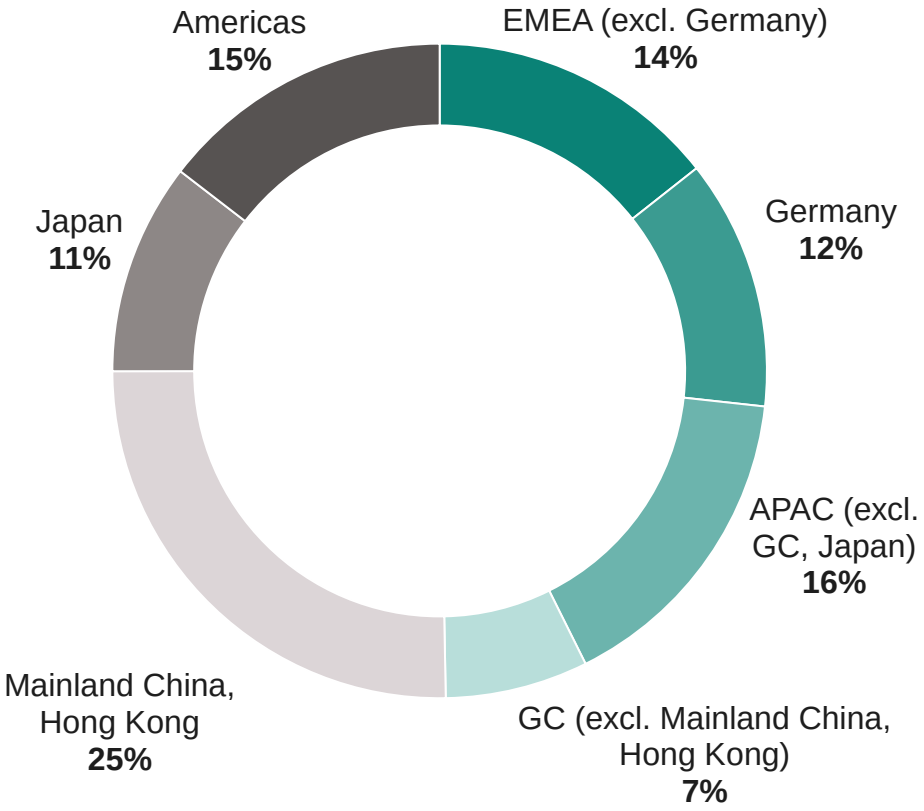
2023 total global market: USD 28.1bn[1]



1 Based on or includes research from Omdia: *Annual 2001-2023 Semiconductor Market Share Competitive Landscaping Tool – 1Q24.* May 2024. | **2** Based on or includes research from Omdia: *Power Semiconductor Market Share Database – 2022.* September 2023. Results are not an endorsement of Infineon Technologies AG. Any reliance on these results is at the third party's own risk.

Strong presence in all regions; well-balanced customer portfolio; no customer represents more than 10% of total sales

FY23 revenue by region



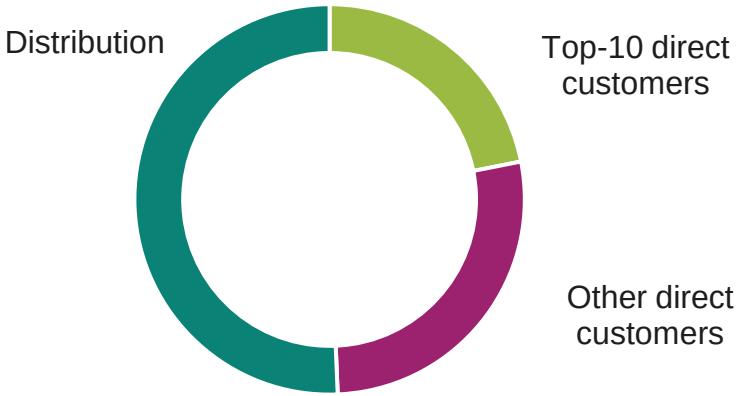
Revenue by sales channel

Distribution partners[1]

Arrow, Avnet, Future Electronics, intron 英恒, Jingchuan, Macnica, Marubun, NEXTY Electronics, 威健 WEIKENG, wpg

Top-10 direct customers[1]

APTIV, BOSCH, Continental, DELTA, DENSO, HYUNDAI MOTOR GROUP, SIEMENS, Valeo, vitesco TECHNOLOGIES, ZF



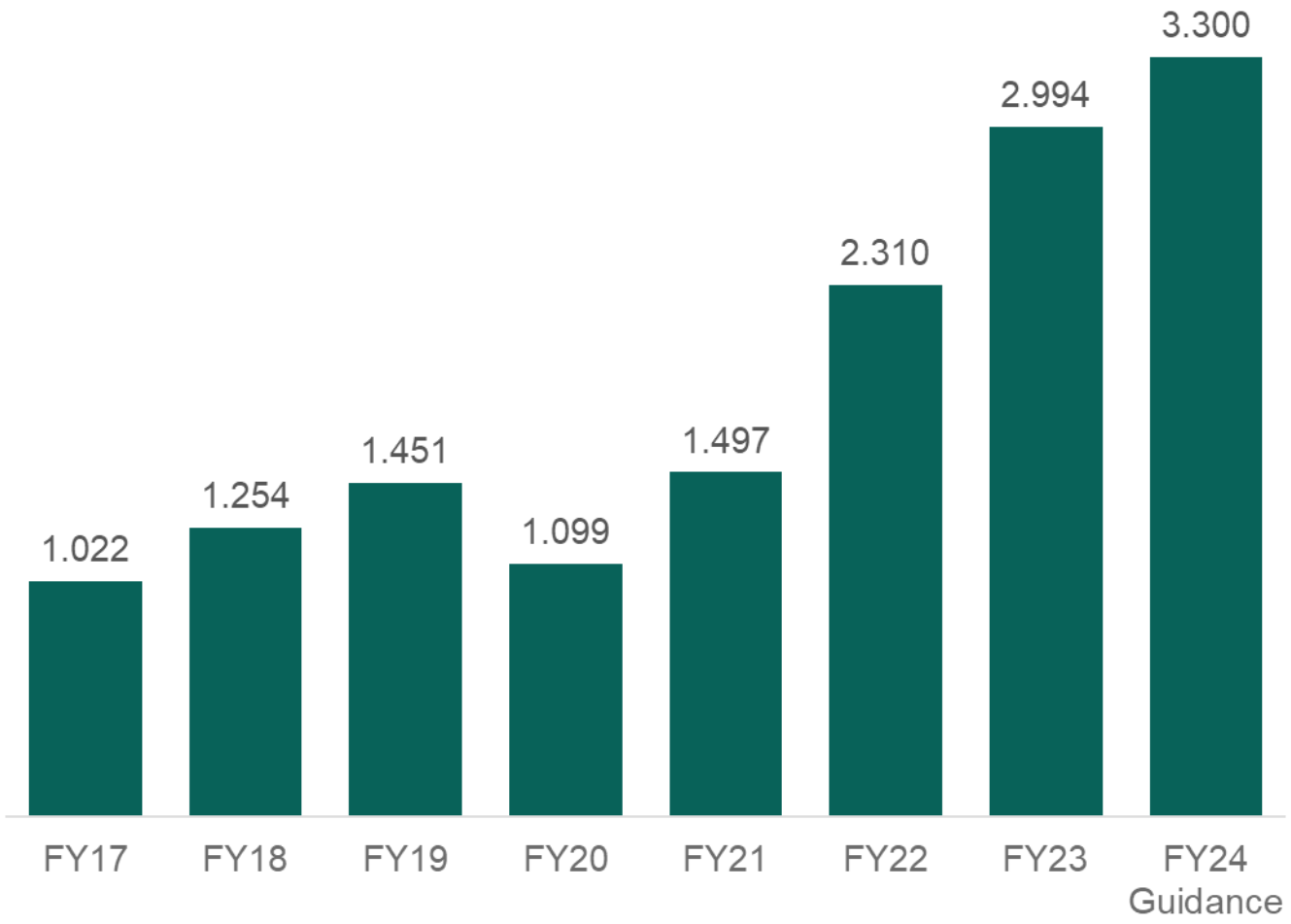
EMS partners[1]

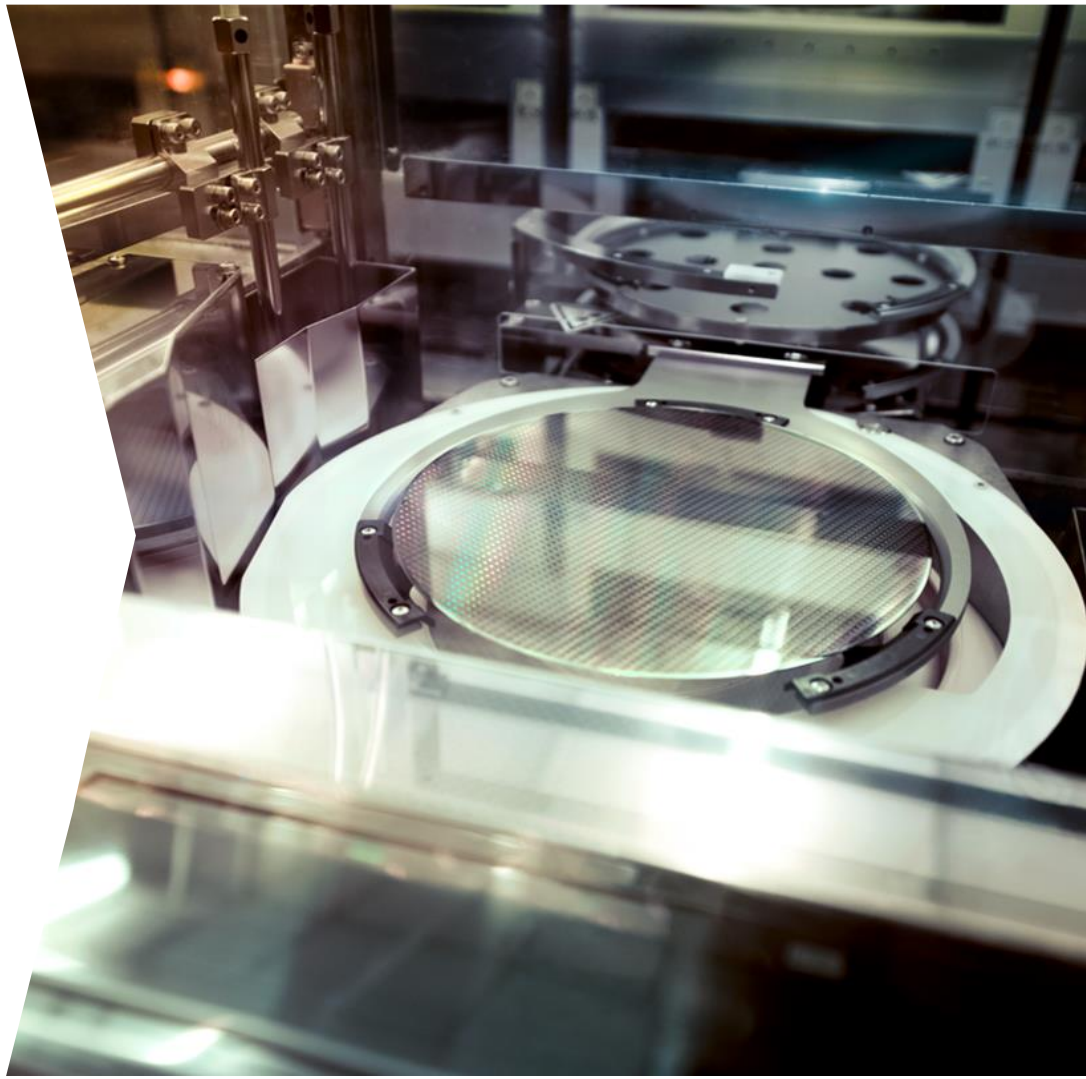
flex, JABIL

1 In alphabetical order

Infineon investments securing your supply

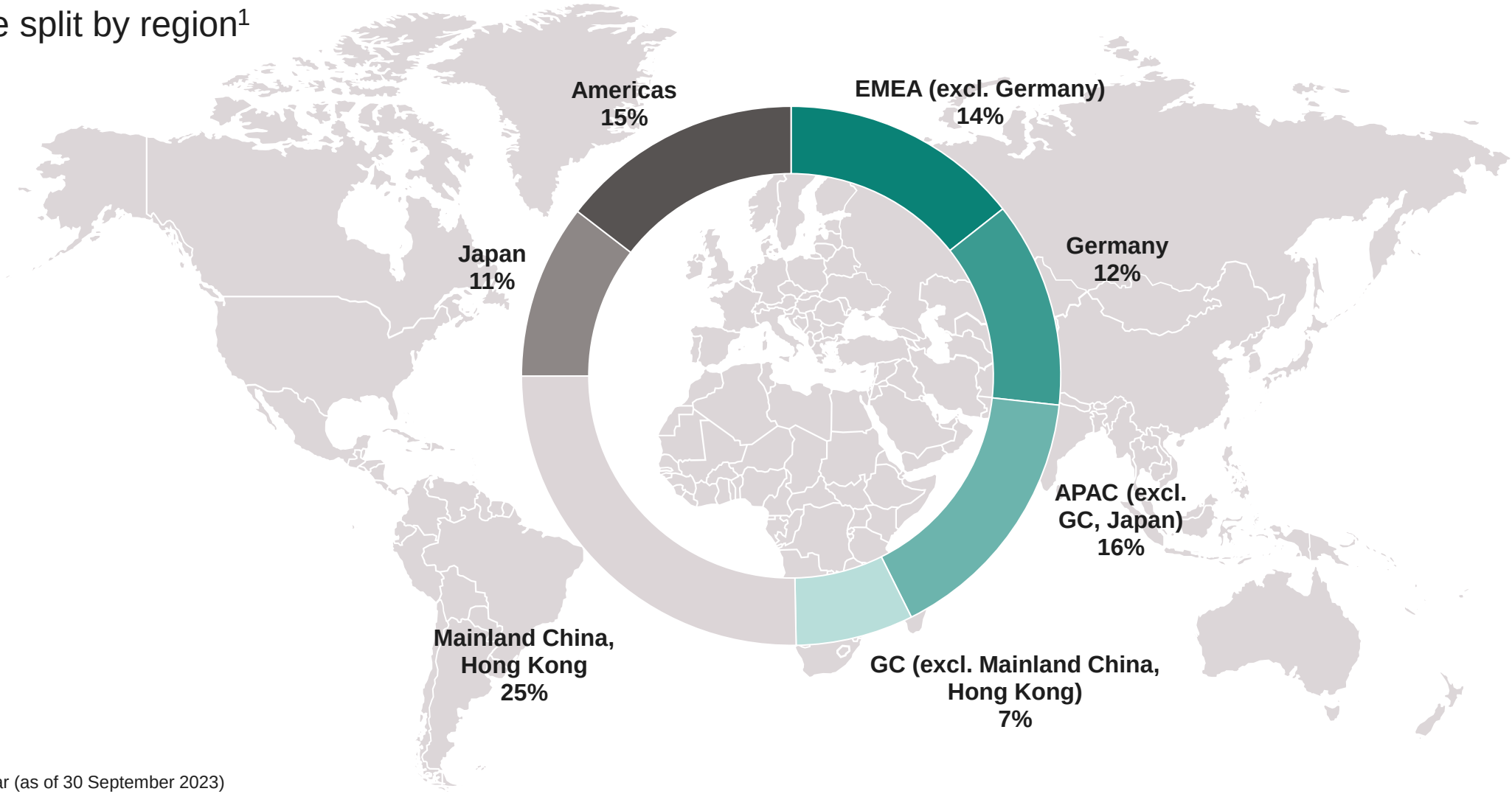
Investments [EUR m]





Infineon is operating in all major regions of the world

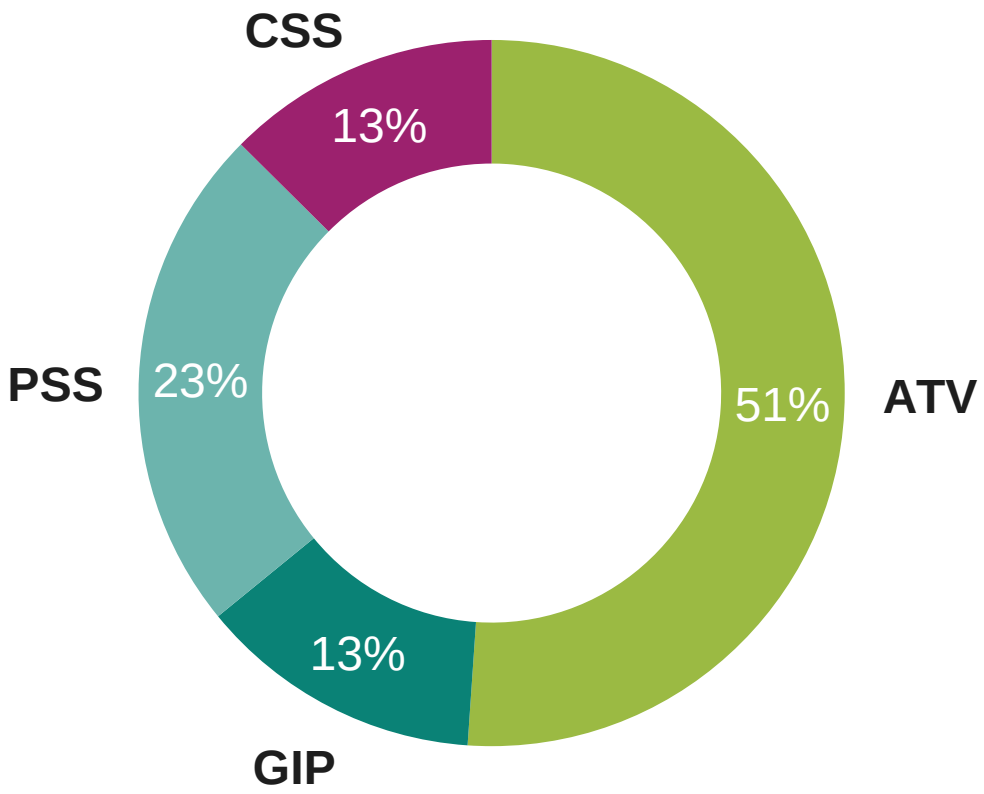
Revenue split by region[1]

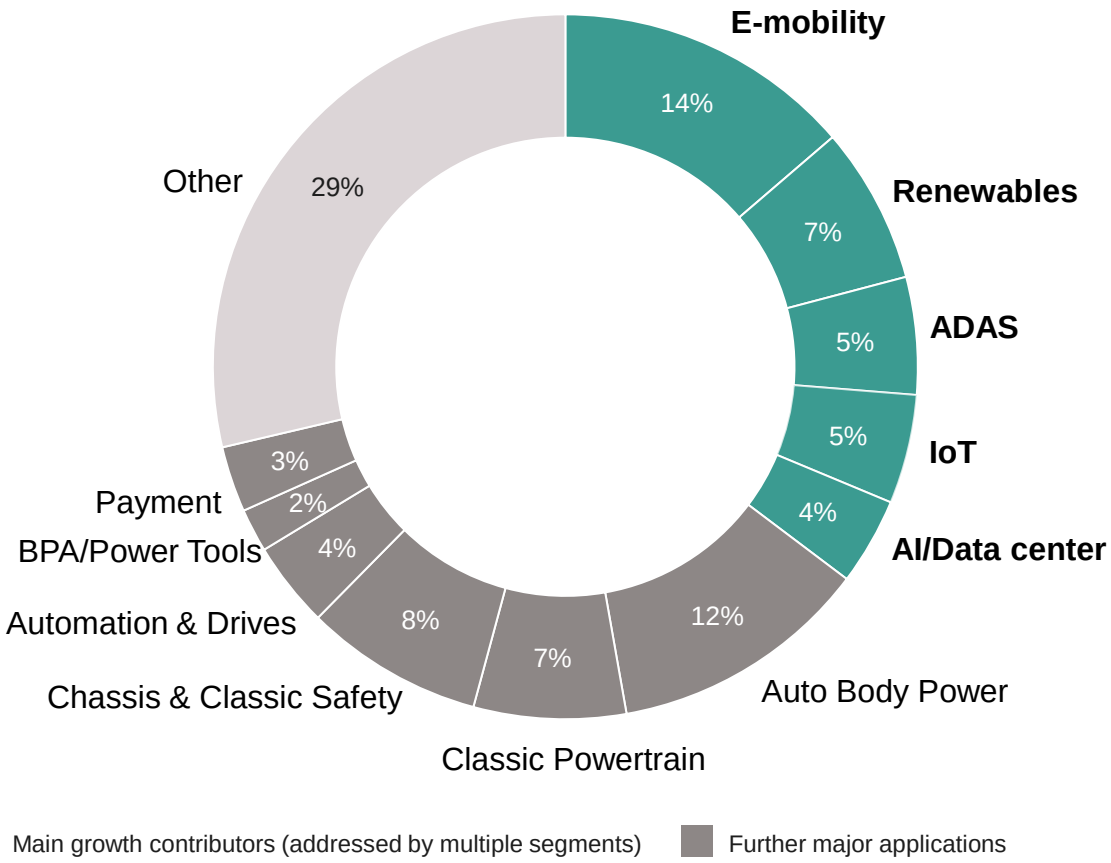


[1] 2023 Fiscal year (as of 30 September 2023)

Well-balanced portfolio among segments and key applications, highest growth coming from Decarbonization and Digitalization

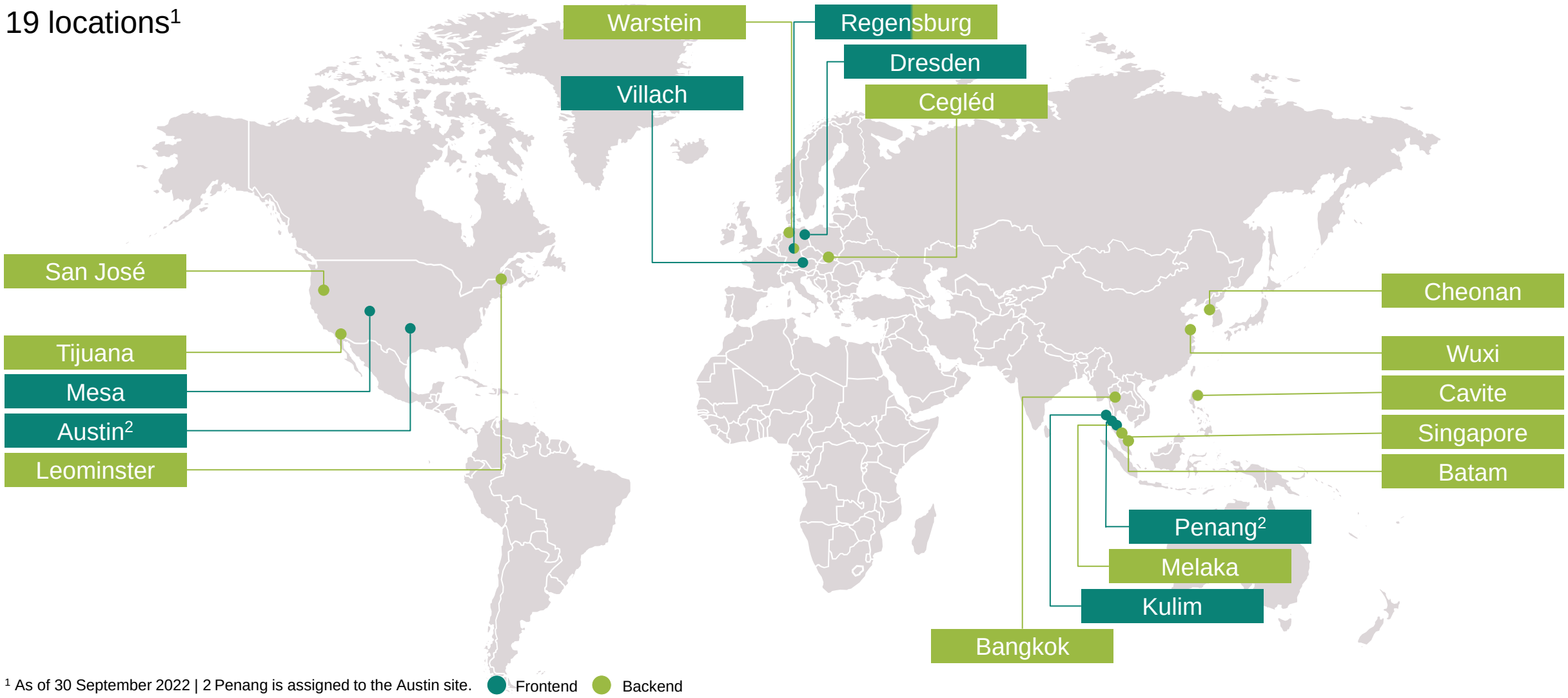
FY23 revenue of €16,309m by segment and key application





Infineon is globally positioned with its network of Frontend and Backend manufacturing facilities

19 locations[1]



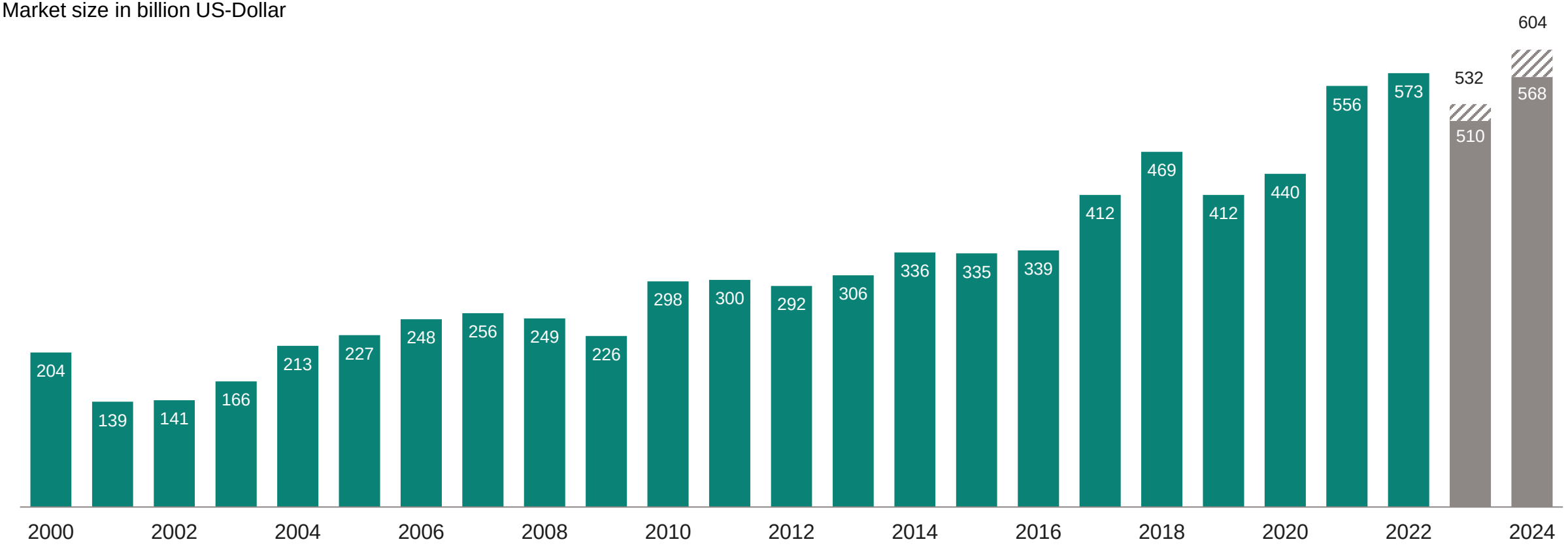
[1] As of 30 September 2022 | 2 Penang is assigned to the Austin site.

Frontend Backend

Semiconductor market forecasts predict a slowdown for 2023, followed by a recovery in 2024

Global Semiconductor Market

Market size in billion US-Dollar



Market size (revenue) Forecast revenue range

Source: WSTS for historical data.| **Forecast:** of WSTS, Omdia, Gartner, TechInsights (former VLSI Research and IC Insights); last update 3 February 2023.

Automotive Division (ATV)

We shape the future of mobility
with microelectronics
enabling clean, safe, smart cars.

Semiconductors are essential to realize the automotive megatrends

Infineon enables clean, safe, smart cars

Green Mobility

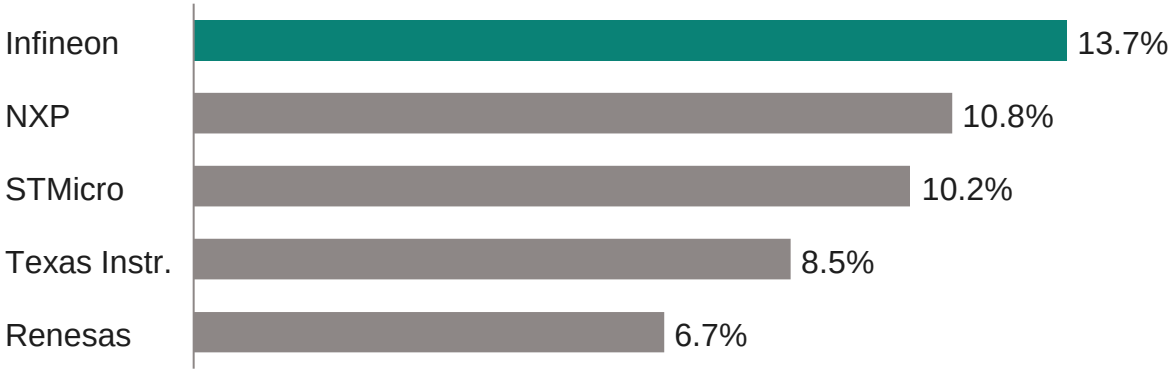
Automated Driving

Connectivity

Advanced Security

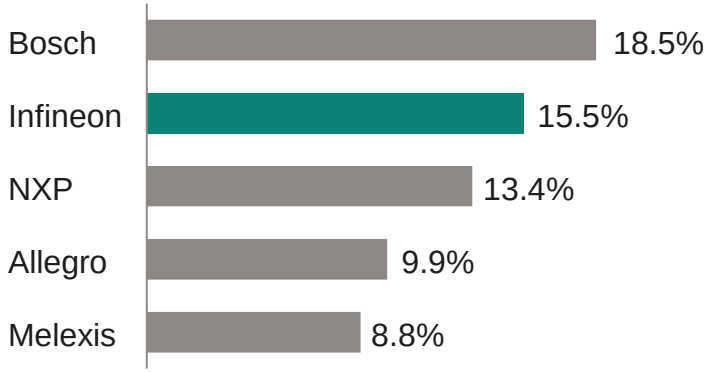
Infineon's top market position is built on system competence based on an industry-leading product portfolio

Automotive semiconductors (2023 total market: $69.2bn; +16.5% y-y)

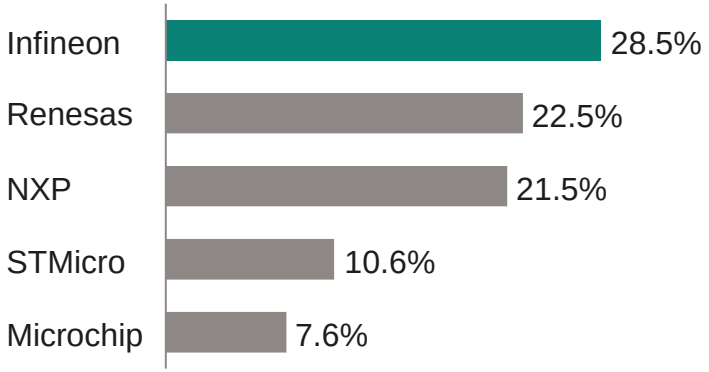


- Infineon grew by 26% y-y, gaining 1.0%-pts of market share to 13.7%, the highest level ever
- Infineon outgrew the market in all regions
- In MCUs, Infineon grew by 44% y-y (about twice as fast as the market), becoming the new #1
- Continuing #1 position in power semiconductors based on industry's broadest product portfolio
- Undisputed #1 in automotive NOR Flash memory ICs

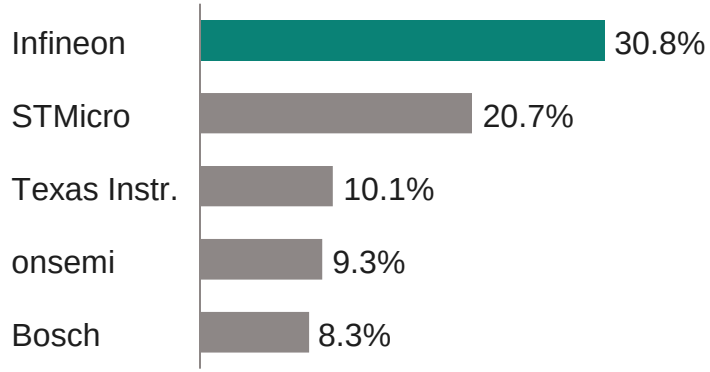
Sensors



MCUs



Power semiconductors



TechInsights: *Automotive Semiconductor Vendor Market Shares*. March 2024. Sensors: S&P Global: *Automotive Semiconductor Market Share Database*. April 2024.

Comprehensive product offering of automotive semiconductors based on dedicated technologies

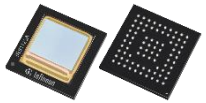
Software, Tools and Services

Secured

Sense

Radar (24 GHz, 60 GHz, 77 GHz)

3D Image/
ToF Camera REAL3™



Magnetic

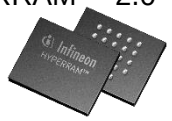
Pressure

Current

Compute and Store

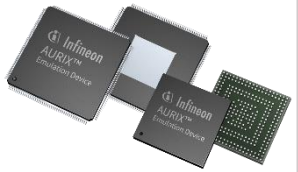
SEMPER™
NOR Flash

HYPERRAM™ 2.0



TRAVEO™ T2G

AURIX™



EXCELON™
F-RAM

PSoC™
Automotive

TriCore™

Connectivity ICs

Transceivers

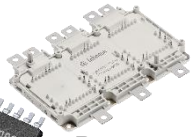
System Basis
Chips

XENSIV™
MEMS microphone

MERUS™
audio amplifier

Automotive Power ICs

Power Semiconductors, MOSFETs,
Intelligent Power Devices
PROFET™, SPOC™

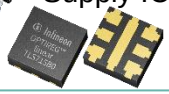


Power
Supply ICs

MOTIX™ Motor Control

LITIX™ LED

BMS IC



AURIX™
2nd generation

TRAVEO™ T2G

SLI37
SLS37 V2X

OPTIGA™ TPM

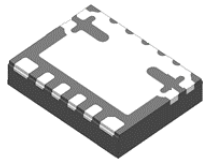
SEMPER™ Secure
NOR Flash

Sense
Compute
Store
Connect
Power
Secured
Software

Infineon offers the most comprehensive system solutions addressing all xEV segments: pure EVs and all types of hybrids

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

Rotor position sensor



Current sensors, magnetic sensors

Sensors

AURIX™

MCUs

High-voltage gate driver

Driver ICs

Drivers

SiC and IGBT

for high-voltage battery in FHEV, PHEV, BEV

Bare die

Discretes

Modules

MOSFETs

for 48 V MHEV

Bare die

Discretes

Chip embedding

Power semiconductors

Power supply and communication

Power supply IC

Board network transceivers

Introduction to Infineon OPTIREG™ Automotive Powersupply Solutions

Smart Power is THE broad liner in the market with 1300 active products addressing a multitude of fast-growing applications

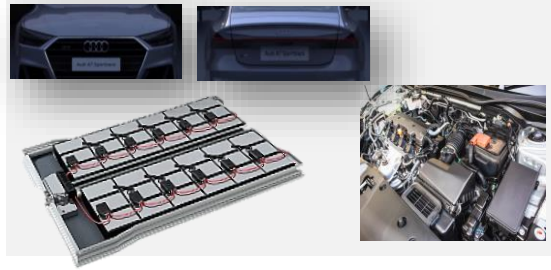
SP – Smart Power

APS
ATV Power Supply Solutions

MCS
Motor Control Solutions

IPD
Intelligent Power Distribution

LDS
LED & Drivetrain Solutions



Product Portfolio

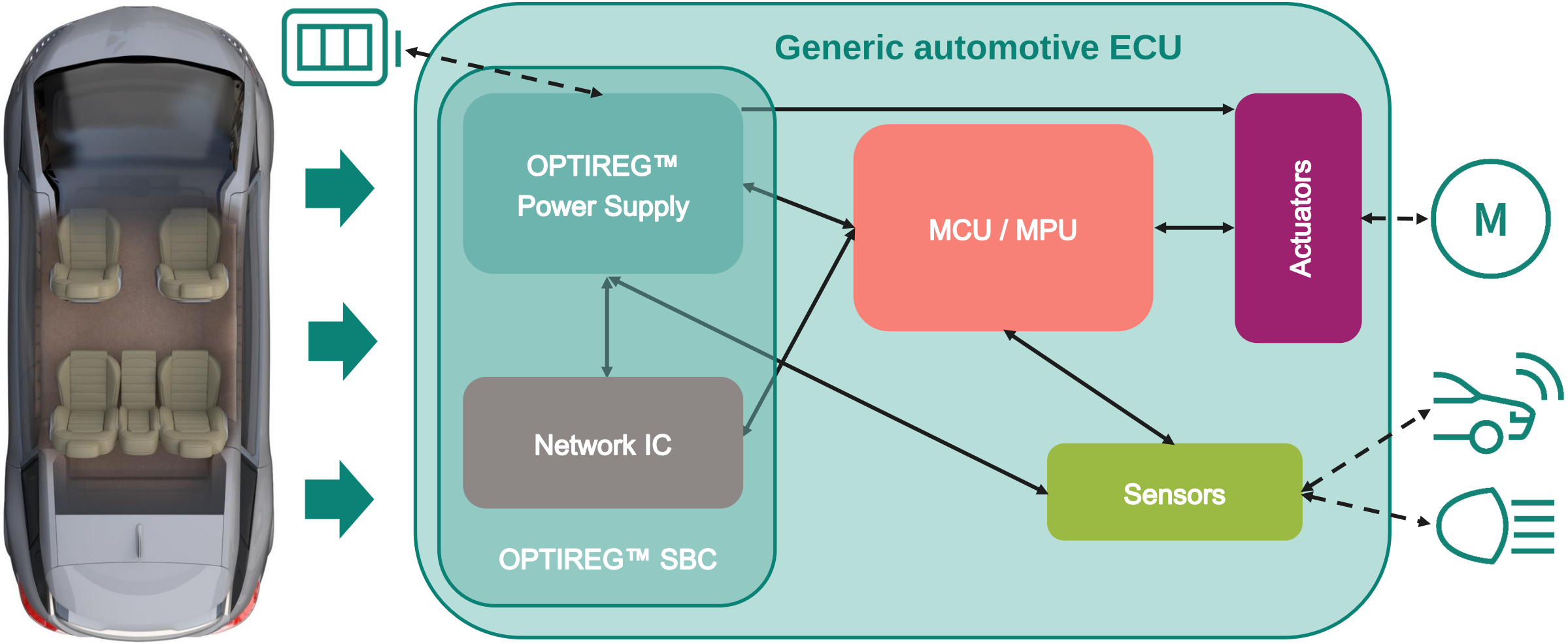
- **OPTIREG™**
  - OPTIREG™ SBC
  - OPTIREG™ PMIC
  - OPTIREG™ linear
  - OPTIREG™ switcher
- **Transceiver**
  - LIN
  - CAN

- **MOTIX™**
  - Bridge – integr.half bridges
  - Driver – MOSFET driver
  - SBC – Motor system ICs
  - MCU – Embedded Power ICs
  - Software & Tools
- **EiceDRIVER™ AMC**
  High Voltage Gate Driver - Automotive Motor Control

- **PROFET™**
  Intelligent High-Side Switch
- **SPOC™**
  Intelligent High-Side Switch w/ SPI
- **HITFET™**
  Intelligent Low-Side Switch
- **EiceDRIVER™ APD**
  Intelligent Gate Driver

- **LITIX™:** Linear, Basic/Basic+, Power/ Power Flex
- **SPIDER, SPIDER+**
  Relais and LED driver w/SPI
- **Battery Management IC**
- **Conventional Drivetrain Solutions**
  (Alternator, Transmission, Engine Mgt 2/4wheeler, …)

OPTIREG™ automotive power supply ICs are the right fit for supplying any automotive ECU



Infineon OPTIREG™ Automotive Power-supply Solutions
Your partner for success

We are your #1 partner in automotive power supply solutions!

> 1,000,000,000 (Billion) parts to date
OPTIREG™ SBC & PMIC sold in Automotive Quality!

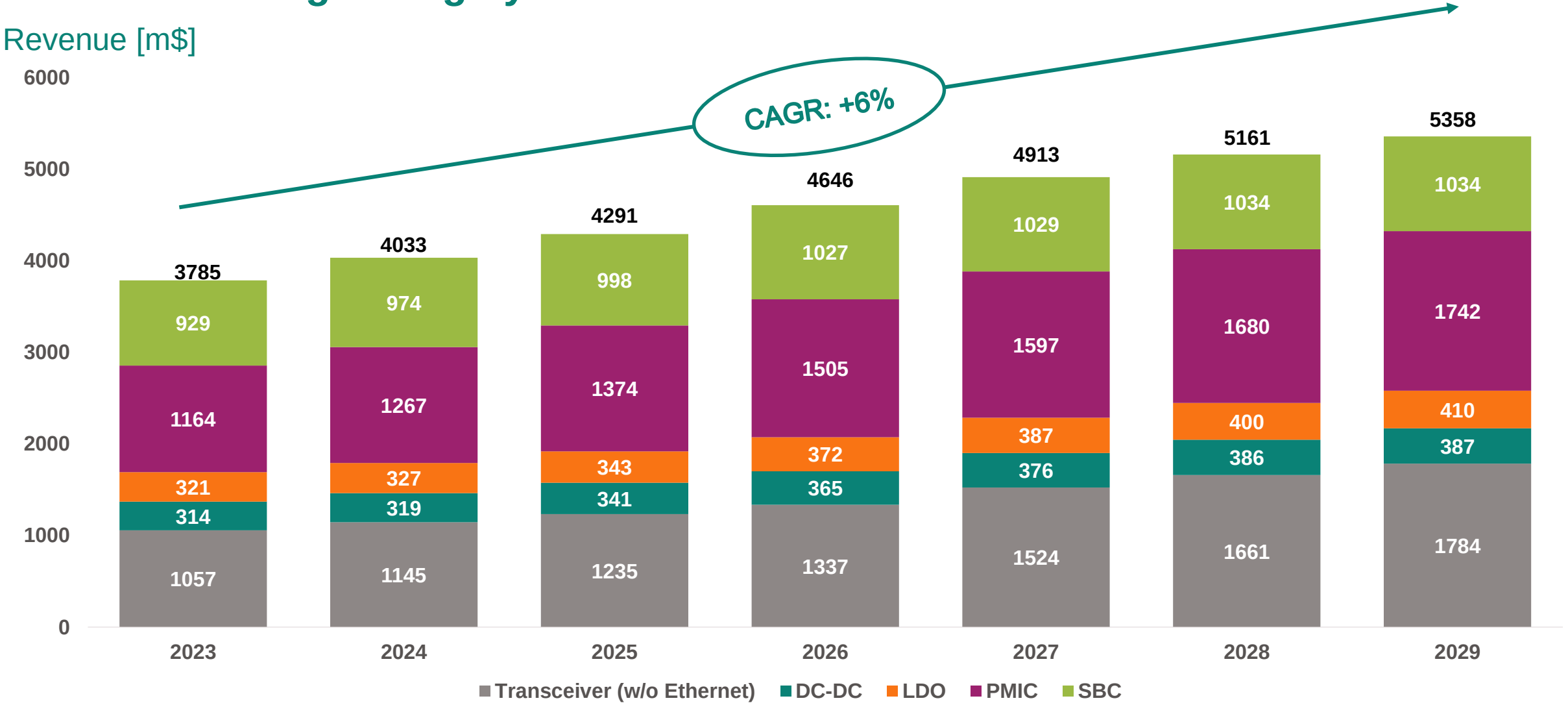
Dedication to Safety applications

Strongly committed to long term business with strong invest in R&D

Manufacturing roadmap to meet automotive market requirements wrt. quality, cost, secure supply and long-term availability

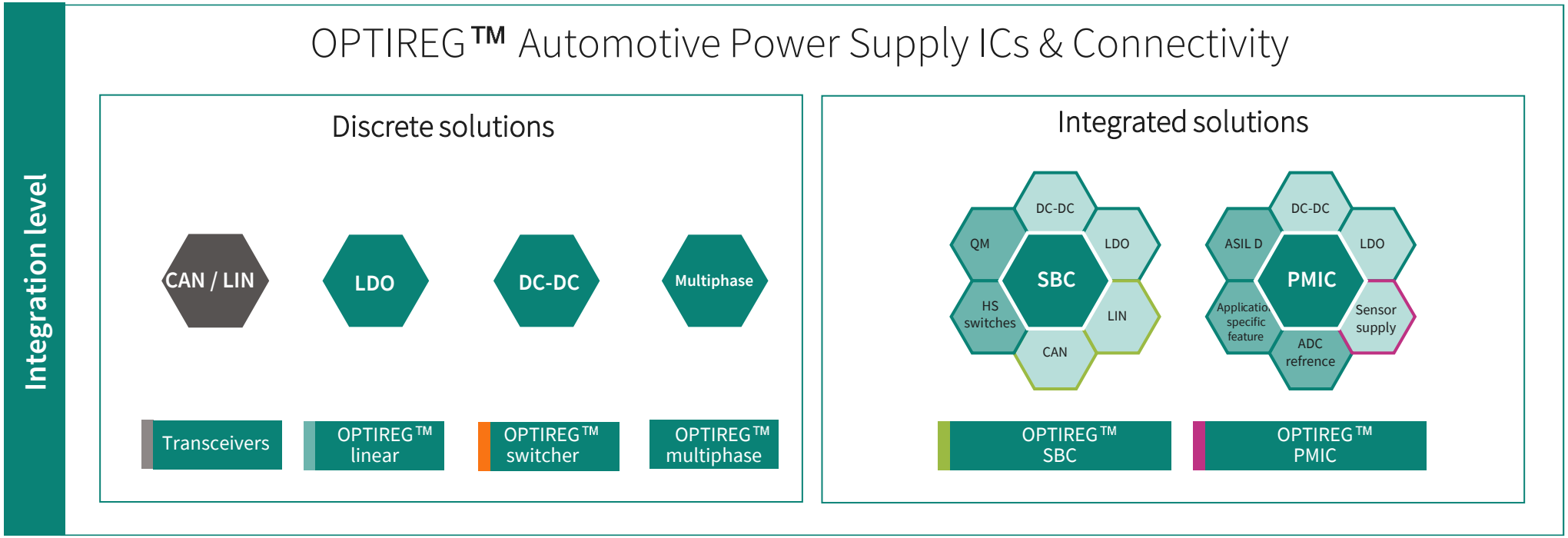
Long-term partnerships with major customers, suppliers and partners worldwide

Automotive semiconductor market for voltage regulators and network ICs is growing by over 40% until 2029



Source: S&P Global – Automotive Semiconductor Market Tracker July 2023

OPTIREG™ Automotive Power Supply ICs



Application level

Body & Power Distribution

- BCM
- HVAC
- Display
- Dashboard
- Power distribution
- Car access
- Zone control
- 48V/12V DC-DC Converter

Chassis/ADAS

- ADAS
- EPS
- Camera
- Braking
- Park assist
- Sensor fusion
- In cabin monitoring
- Radar

Infotainment

- Navigation
- USB
- Cockpit
- Cluster head unit
- Telematics
- Multimedia

Powertrain

- BMS
- EMS
- Transmission
- Inverter

Electric Drivetrain

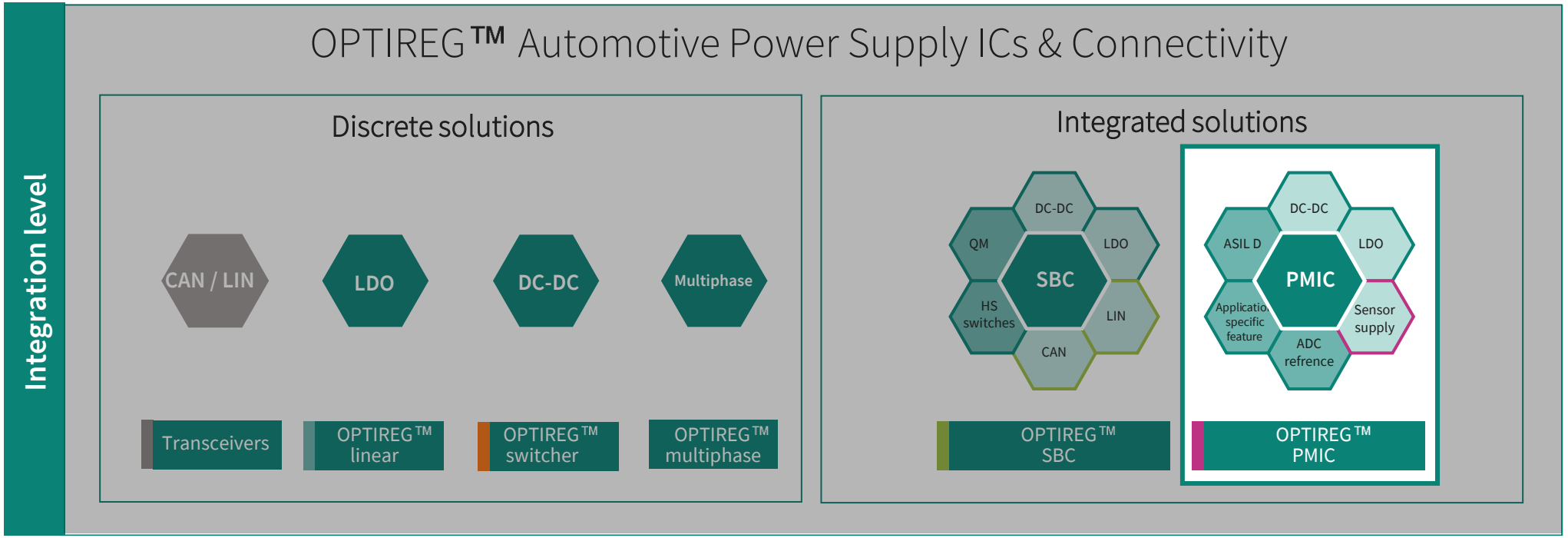
- BMS
- EV traction inverter
- EV / HEV OBC
- Fuel-cell

LED lighting

- Front light system
- Rear light system

OPTIREG™ PMIC & AS-PMIC

OPTIREG™ PMIC



Application level

Body & Power Distribution	Chassis/ADAS	Infotainment	Powertrain	Electric Drivetrain	LED lighting
– BCM	– ADAS	– Navigation	– BMS	– BMS	– Front light system
– HVAC	– EPS	– USB	– EMS	– EV traction inverter	– Rear light system
– Display	– Camera	– Cockpit	– Transmission	– EV / HEV OBC	
– Dashboard	– Braking	– Cluster head unit	– Inverter	– Fuel-cell	
– Power distribution	– Park assist	– Telematics			
– Car access	– Sensor fusion	– Multimedia			
– Zone control	– In cabin monitoring				
– 48V/12V DC-DC Converter	– Radar				

AURIX™ µC & OPTIREG™ PMIC teaming up for functional safety in the focus automotive applications

Conventional powertrain

Electric drivetrain

48 V

Safety / ADAS

Body

Chassis

OPTIREG™ PMIC:
The #1 power supply solution for AURIX™ µC family

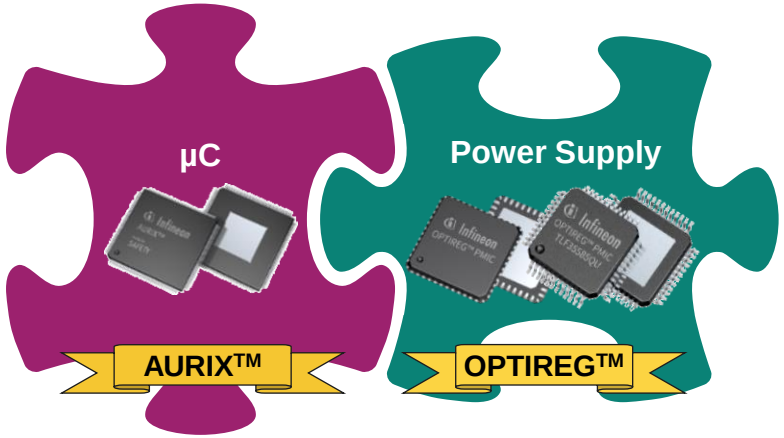
General Purpose AURIX™ TC2x/3x PMICs

ISO26262 compliant

In Production **TLF35584 & TLF35585** In Production

- Scalable general purpose PMIC for AURIX™ TC2x/3x
- ISO26262 compliant, supporting ASIL D classified systems

- Extended performance by using TLF11251, improving supply efficiency by up to 25%



AURIX™ µC & OPTIREG™ PMIC

Application Specific PMICs

ADAS PMIC
TLF30682QV

In Production

- ✓ Powerful buck and post-regulator for MCU core
- ✓ Int. & ext. OV/UV monitoring
- ✓ Multiple bandgaps

Transmission PMIC
TLE9243QK

ISO26262 compliant

In Production

- ✓ Safety Switch Control
- ✓ Reverse Polarity Protection
- ✓ Wheel Speed Sensor Interface

OPTIREG™ PMIC Portfolio Overview

SOP	General Purpose PMICs	Application Specific PMIC
2019		TLF30682QV
2020	ISO26262 TLF35584QKVSx; ISO26262 TLF35584QVVSx	ISO26262 TLE9243QK
2021	ISO26262 TLF35584QVHSx	
2024	ISO26262 TLF35585 QV/QU S01/S02	
2025		

In Production

OPTIREG™ PMIC TLF35585QUS0x/QVS0x

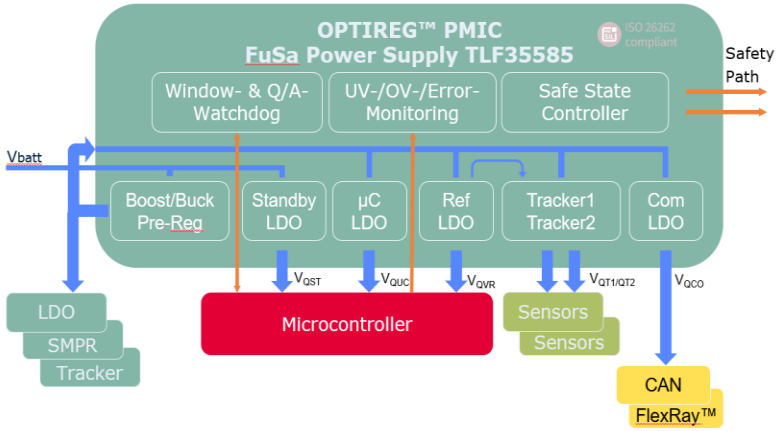
Main Features

- Adjustable switching speed of the step-down regulator.
- **Grade 0 and ASIL-D** enabled by default.
- **Functional Safety**: ISO 26262 compliance (safety goal target ASIL-D).
- Increased buck converter current capability.
- **Lower Quiescent current** in STANDBY with Standby-LDO active.
- Microcontroller Programming Support (MPS) control via **SPI.**

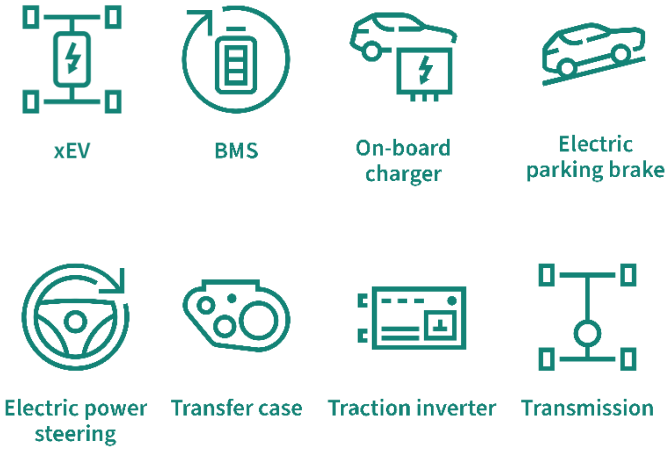
Key Benefits

- Flexibility in the **optimization of efficiency and EMC** performance.
- Address applications requiring **tj >150°C**, extended lifetime and highest degree of **FuSa.**
- Support **high end AURIX™ 2G (TC38/39)** covering more applications.
- Support tighter stand-by currents.
- Easier debugging.

Block Diagram



Applications



Timeline

Part is available.

OPTIREG™ PMIC – Summary

- **#1** Functional Safety **supply for AURIX™**
- **>100Mpcs** already shipped worldwide
- **>300 projects** secured at all major OEMs
- **>30 different applications**

  (xEV, Chassis, Safety, ADAS, Body)
- **High scalability** over the entire **AURIX™**

  portfolio (high HW & SW re-use)
- Product-to-System : **full interoperability**

  between OPTIREG™ PMIC & AURIX™
- Functional Safety: **ISO 26262 compliance**

  (safety goal target ASIL-D).
- AEC-Q100 - **Grade 0** (Tj > 150°C)

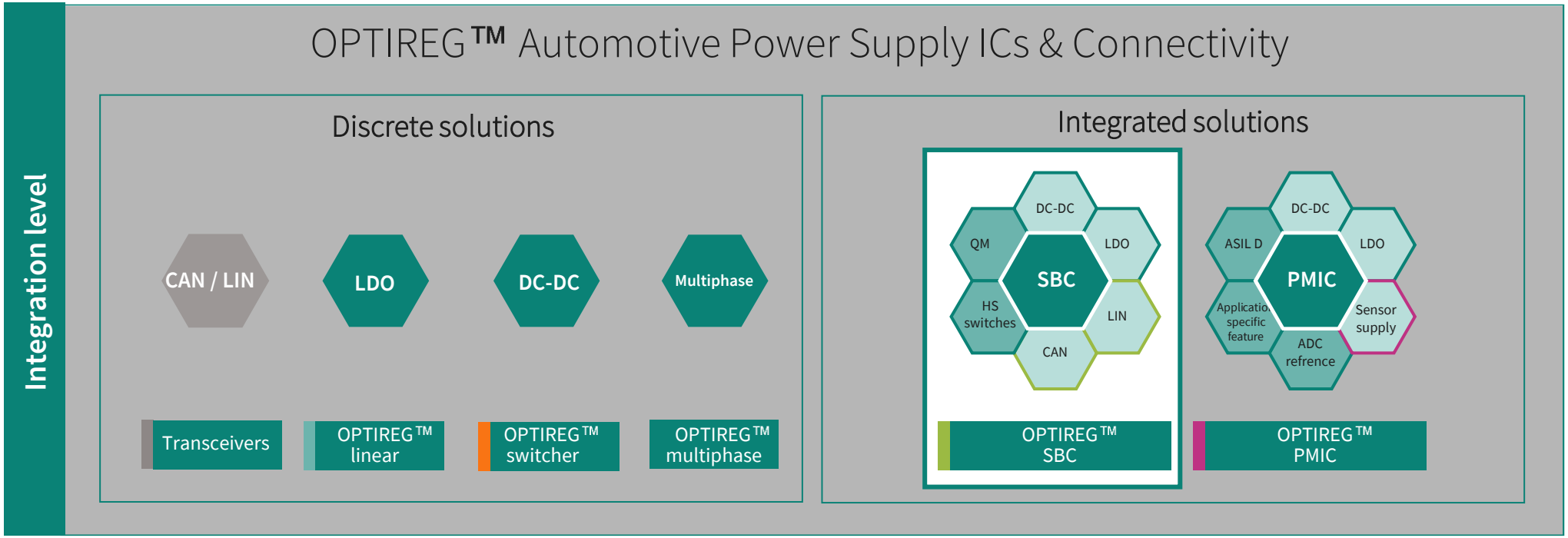
	General Purpose PMIC	Application Specific PMIC
In Production	TLF35584	TLF30682QV
In Production		TLE9243QK
In Production	TLF35585	

Customer Advantages

- Optimized Bill of Material
- Smaller PCB size
- Centralized power management
- Hardware reuse
- System protection against critical voltage surges and misbehavior
- Extended Lifetime in harsh environment
- Long term availability and Business Continuity Plan

OPTIREG™ SBC

OPTIREG™ SBC



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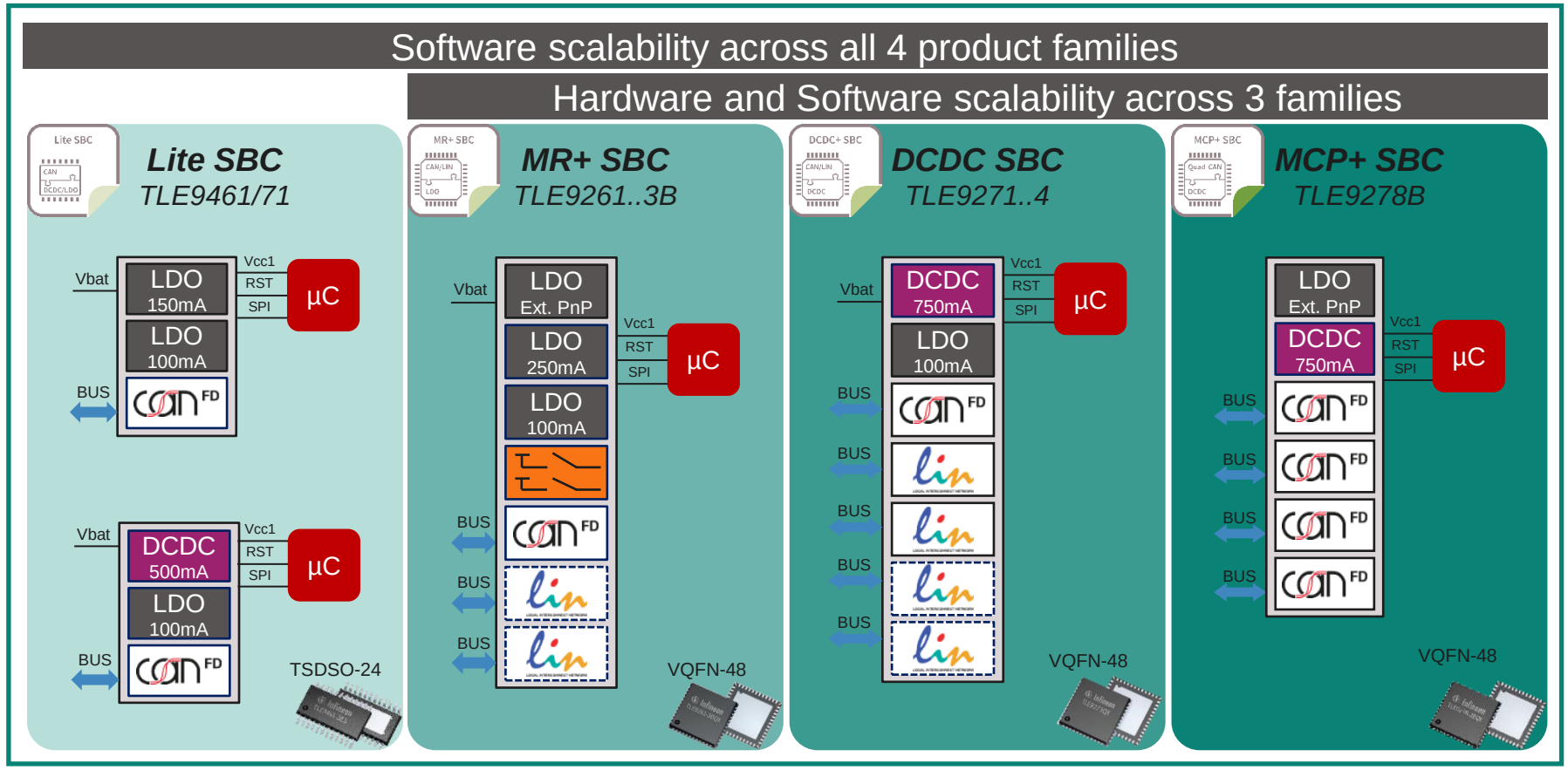
– Dashboard	– Braking	– Cluster head unit	– Inverter	– Fuel-cell	
– Power distribution	– Park assist	– Telematics			
– Car access	– Sensor fusion	– Multimedia			
– Zone control	– In cabin monitoring				
– 48V/12V DC-DC Converter	– Radar				

Infineon OPTIREG™ SBCs offer most complete portfolio and key differentiated USPs

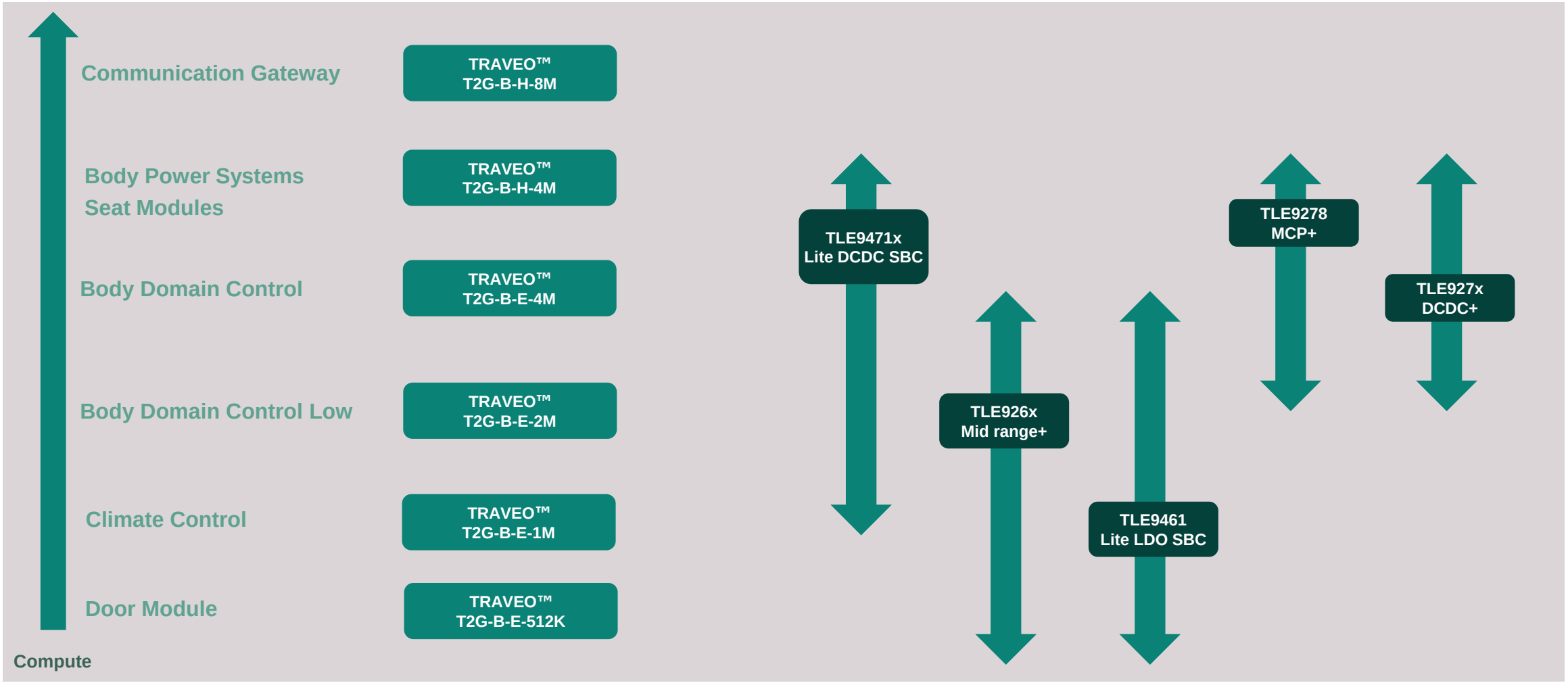


Unparalleled scalability across Product Families for fast time-to-market

Supports **latest networking standards** CAN FD up to 5Mbps (soon: CAN FD SIC) & CAN PN

Component releases at all major OEMs

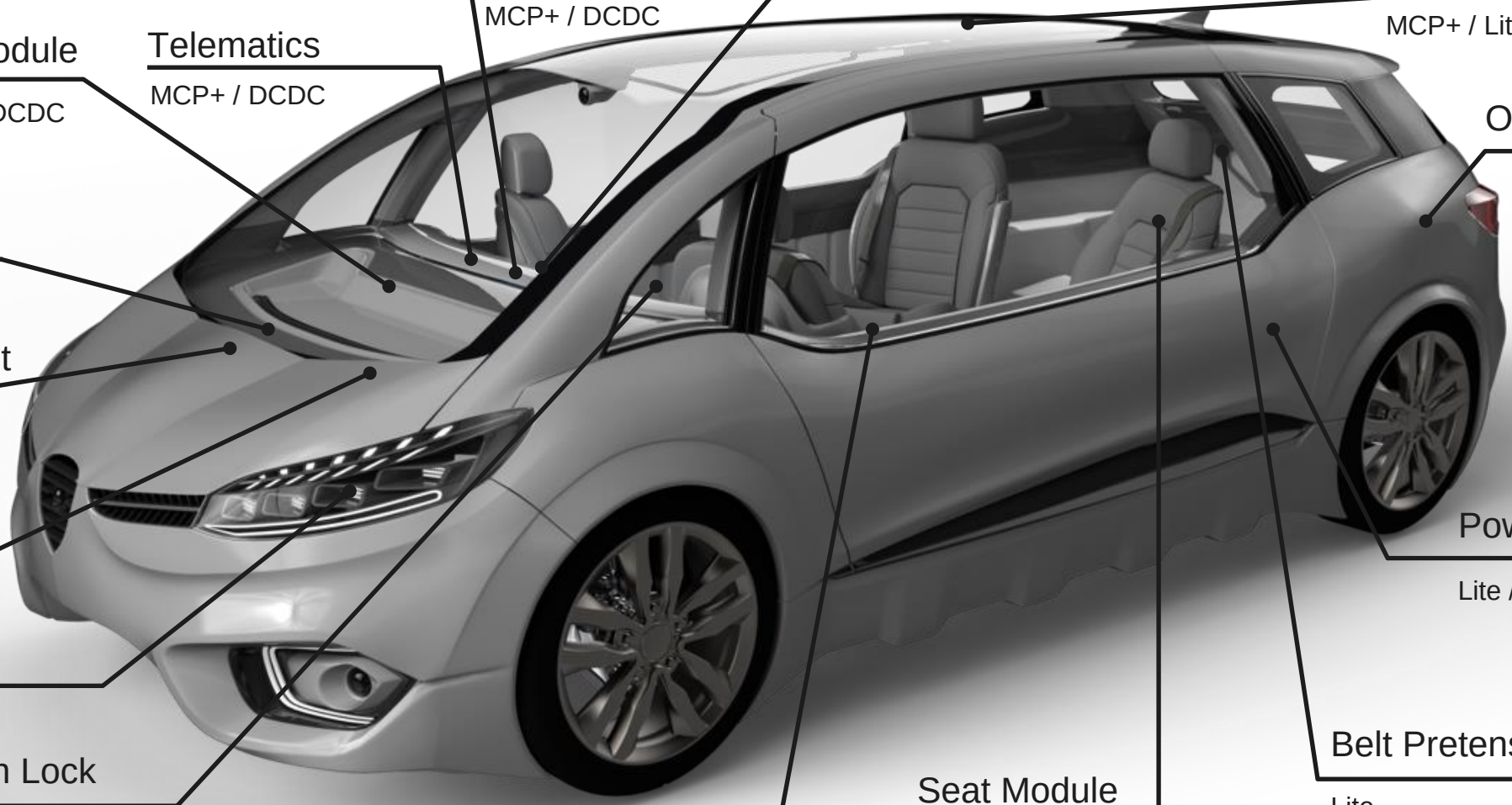
Fully scalable & flexible
OPTIREG™ SBC solution for TRAVEO™ T2Gx family



OPTIREG™ System Basis Chip Portfolio (SBC) overview

SOP	150mA	250mA	500mA	750mA
2013		Mid-Range SBC 2xLDO, 1xCAN, up to 2xLIN VQFN-48		DCDC SBC 1xDCDC, 1xLDO, 1xCAN FD, up to 4xLIN VQFN-48
2015				Multi-CAN Power SBC 1xDCDC, 1xLDO, 4xCAN VQFN-48
2017		Mid-Range+ SBC CAN FD enhancement VQFN-48		
2018	Lite SBC 2xLDO, 1xCAN FD TSDSO-24		Lite SBC DCDC, LDO, 1xCAN FD TSDSO-24	Multi-CAN Power+ SBC CAN FD enhancement VQFN-48

OPTIREG™ SBC application examples



Gear Shifter
MCP+ / Lite

Gateway
MCP+ / DCDC

Sunroof Module
MCP+ / Lite

Body Control Module
Lite / MR+ / MCP+ / DCDC

Telematics
MCP+ / DCDC

On-board Charger
Lite / MR+

Chassis Domain
MCP+

HVAC Unit
Lite / MR+

Power Door
Lite / MR+

Transfer Case
Lite / MR+

Light Control Unit
Lite / MR+

Belt Pretensionioner
Lite

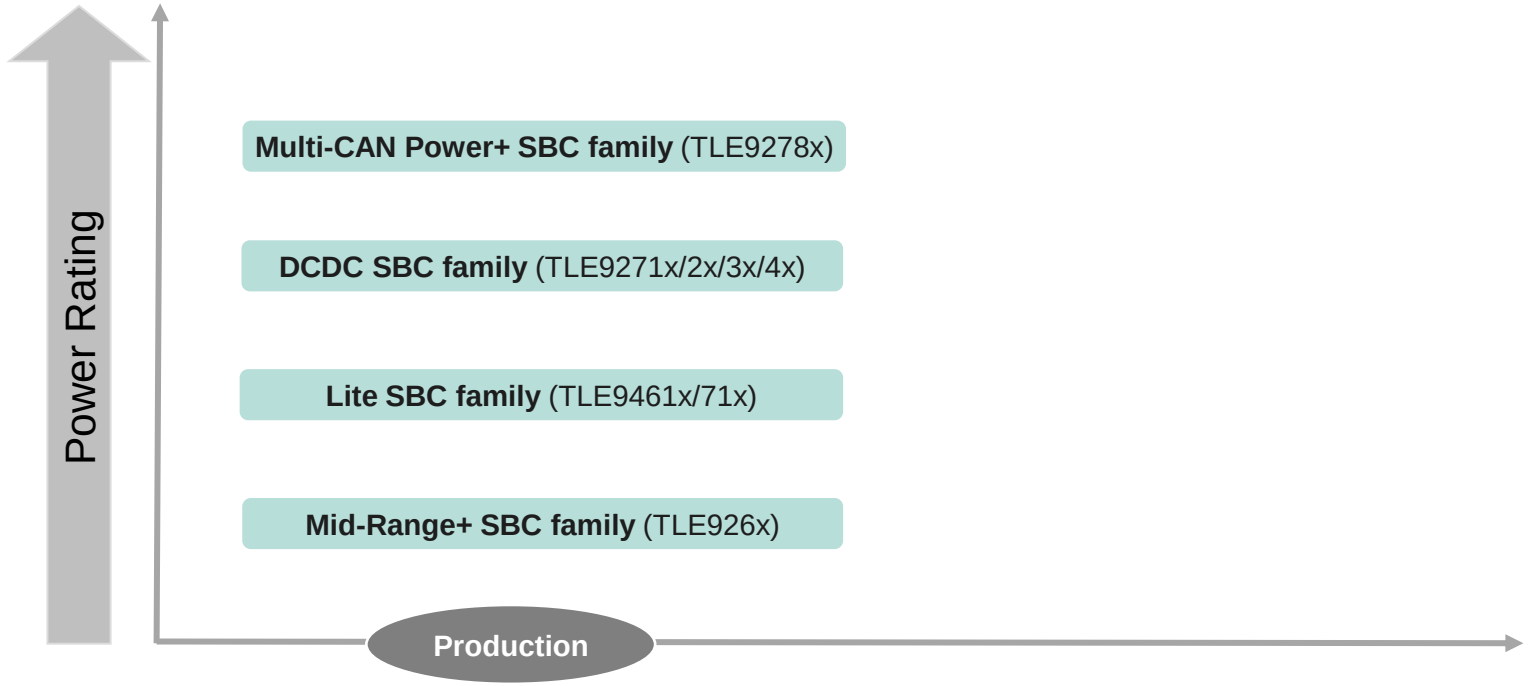
Steering Column Lock
Lite / MR+

Seat Module
MR+

Wireless In-cabin Charger
Lite

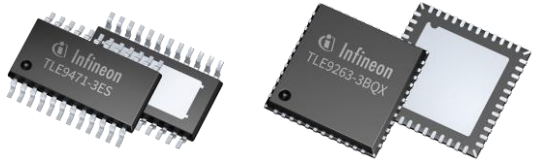
OPTIREG™ System Basis Chip – Summary

- **OPTIREG™ SBC** shipped **>800 M units**
- Components **released** @ all major **OEMs**
- SBC **portfolio > 30 product variants**
- High level of **compatibility** and **re-usability**
- **Power Efficiency** over **entire load range**
- **CAN FD** transceiver
- **AEC-Q100 Grade 1**
  (Ta ≤ 125 °C)



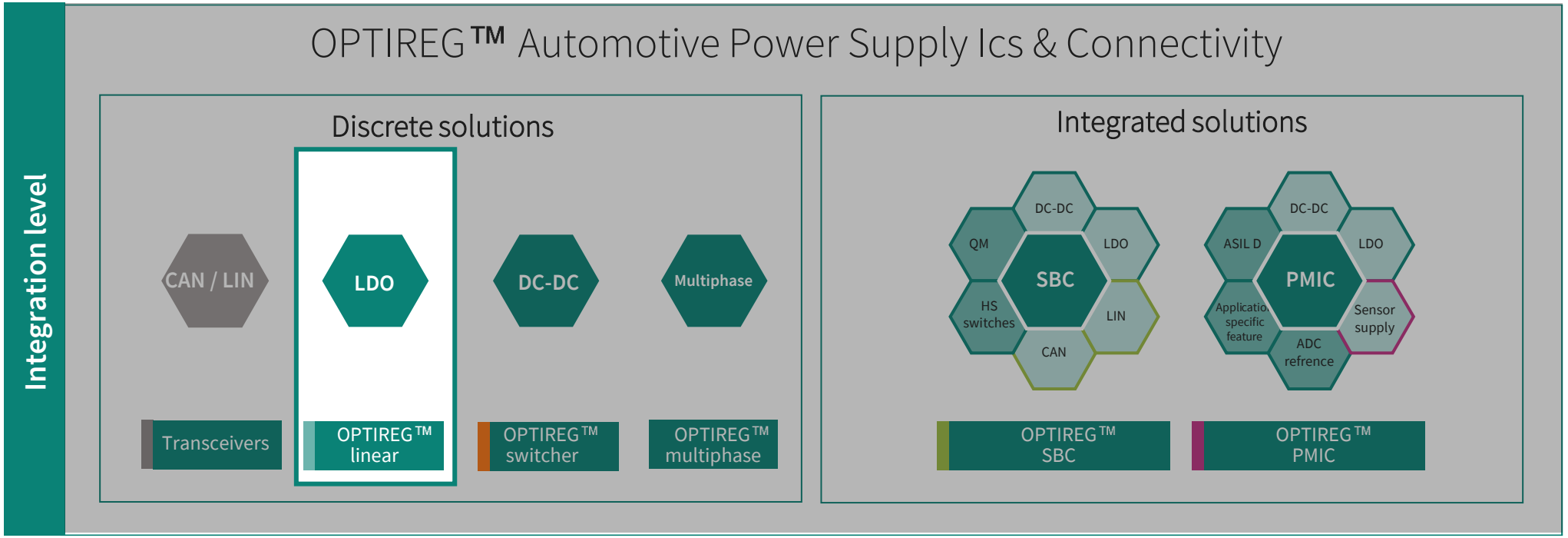
OPTIREG™ TLE926x/TLE927x/TLE946/71 families

- ✓ Power efficiency
- ✓ CAN FD
- ✓ QM



OPTIREG™ linear
Linear Voltage Regulators (LDO)

OPTIREG™ linear



Application level

Body & Power Distribution
- BCM
- HVAC
- Display
- Dashboard
- Power distribution
- Car access
- Zone control
- 48V/12V DC-DC Converter

Chassis/ADAS
- ADAS
- EPS
- Camera
- Braking
- Park assist
- Sensor fusion
- In cabin monitoring
- Radar

Infotainment
- Navigation
- USB
- Cockpit
- Cluster head unit
- Telematics
- Multimedia

Powertrain
- BMS
- EMS
- Transmission
- Inverter

Electric Drivetrain
- BMS
- EV traction inverter
- EV / HEV OBC
- Fuel-cell

LED lighting
- Front light system
- Rear light system

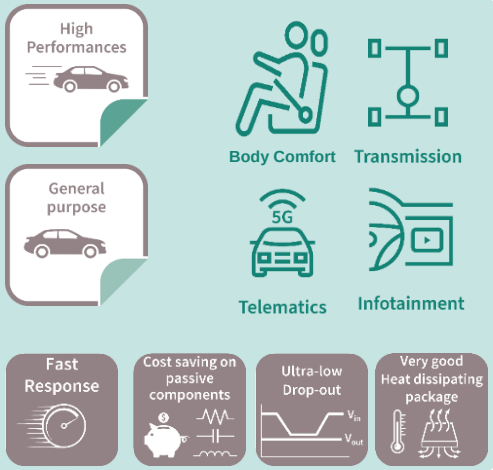
OPTIREG™ linear: Suitable linear voltage regulator (LDO) for every application

LDO

High Performance General Purpose

Best suited for supplying :

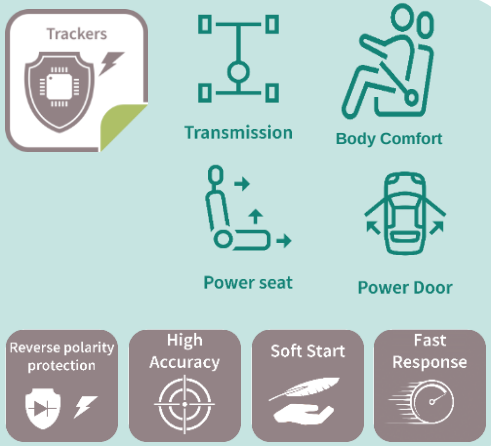
- **Microcontrollers**
- **Transceivers (CAN,LIN,…)**
- **Sensors (on-board)**
- **Actuator ICs**
- **Stand-by supply**
- **Low-load LEDs**
- **Microphones**



Trackers

Best suited for supplying :

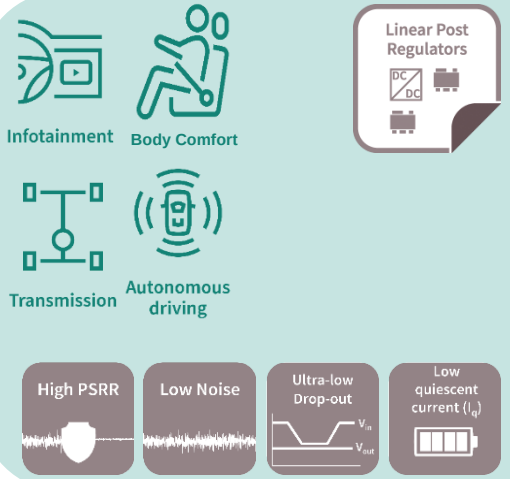
- **Sensors**
- **Microphones**
- **Satellite ECUs (off-board)**
- **Small lamps (LED)**
- **Protected loads**



Post Regulators

Best suited for supplying :

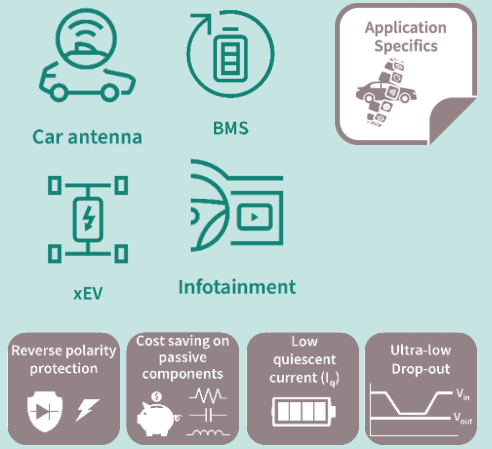
- **Radar (MMIC)**
- **Flash Memory**
- **RAM Memory**
- **Camera**
- **SoC core supply**
- **I/O supply**
- **Ethernet PHY**
- **Cluster supply**
- **Low noise supply**



Application Specific

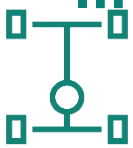
Best suited for supplying :

- **Antenna (with current Sense)**
- **Surround-view Camera**
- **Battery Monitoring/Management**
- **24V Standby supply**
- **Monitoring IC**



OPTIREG™ linear Portfolio Overview

LDO


Transmission

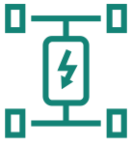
Telematics


Body Comfort


Infotainment


Car antenna


Truck


xEV


BMS


Autonomous driving

SOP	General Purpose	High Performance	Application Specific	Trackers	Post Regulators
< 2012	TLE7xx		WD TLE44xx RS EN; WD TLE42xx RS	ADJ EN TLE425xx PG FB	
2012	TLF49xx	TLS8xx WD Iq			TLF19x ADJ
2014					TLS2xx AO EN
2015		TLS8xxBxx Iq			
2016	TLE427xx; TLE428xx				
2017			TLT8xx EN		
2018	TLE429xx				
2019	TLS7xx			TLS1xxx Iq	
2020		TLS850C2 AO Iq	TLF1125xx	TLT1xx	
			TLF4277xx ADJ		
2021	TLE426xx				
2023		TLS8xxF3xx WD Iq	TLF4477-3LA Iq		
2024		TLS8x0A4xx Iq			
2026	TLE4263-2GS/GM				

In Production

ADJ: Reference Voltage **AO**: Always On **Iq**: low quiescent current **EN**: Enable **WD**: Watchdog **PG**: Power Good **FB**: Feedback **RS**: Reset

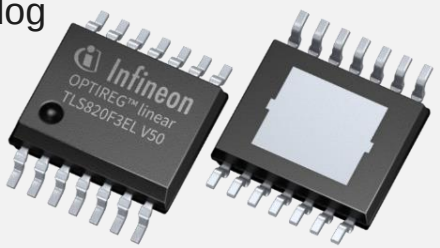
Newest OPTIREG™ linear high performance LDO with Reset and Watchdog

LDO

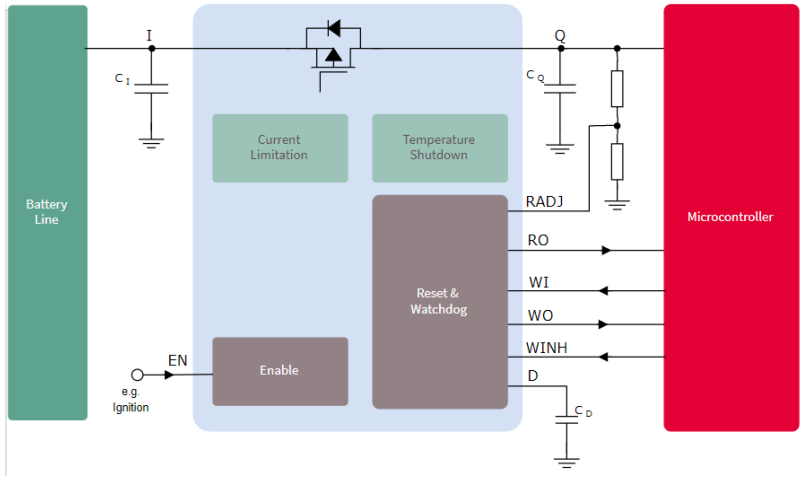
Main Features

TLS820F3EL V50

- Output voltage 5 V ±2%
- Current capability **200 mA**
- Input voltage range from 3 V to 42 V, suitable for cranking condition.
- Stable with 1 µF ceramic output capacitor → **cost saving on a system level**
- **Ultra low current consumption**, typically **26 µA** ,Power saving for battery
- Very low drop-out voltage typically 100 mV at 100 mA
- Watchdog circuit for monitoring a microprocessor
- More **accurate watchdog** timing
- Output voltage **supervision** by **reset** circuit
- Programmable undervoltage reset threshold: minimum 2.5 V
- **Programmable delay time**
- **Separate outputs** for reset and watchdog
- **Tracking** mode
- **Smaller die** area
- Output **current limitation**
- Overtemperature shutdown



Block Diagram



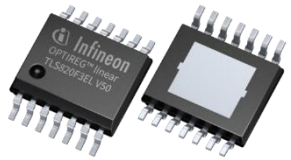
Applications

Family overview

TLS850F3TU V50

TLS820F3EL V33

TLS850F3TU V33



TLS820F3EL V50

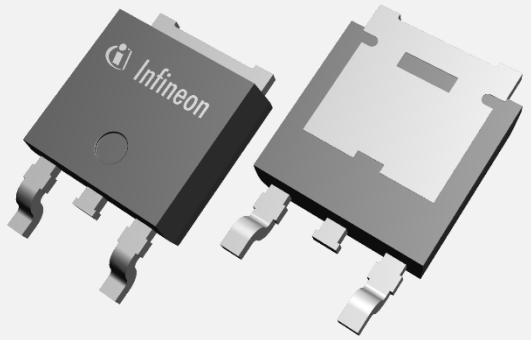
Newest OPTIREG™ linear high performance no feature LDO with ultra-low quiescent current

LDO

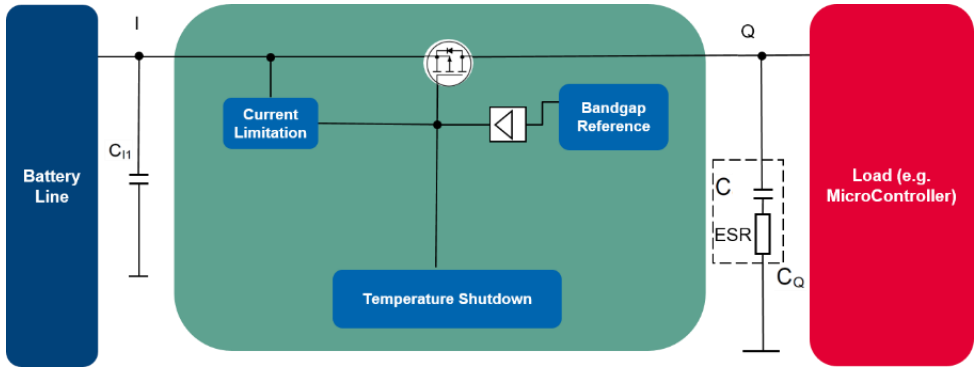
Main Features

TLS850A4TEV50

- **Ultra low quiescent current**, typically **4.3 µA** at light loads
- Wide input voltage range from 3.7 V to 40 V
- Output voltage 5 V
- Output voltage accuracy ±2%
- Output current capability up to 500 mA
- **Low dropout voltage**, typically 190 mV at output current <100 mA
- **Stable with a ceramic output capacitor of 4.7 µF**
- Overtemperature shutdown
- Output **current limitation**
- Wide temperature range
- Green Product (RoHS compliant)

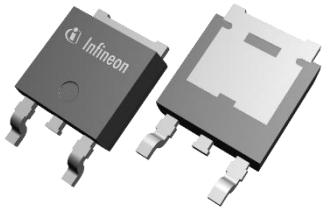


Block Diagram

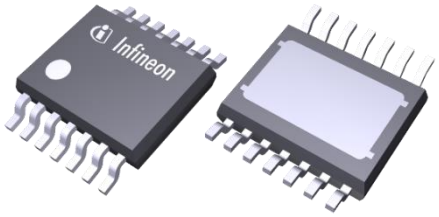


Applications

Family overview



TLS850A4TEV50



TLS830A4EPV50

OPTIREG™ linear voltage regulator - TLE4263-2GS

A monolithic integrated very low dropout voltage regulator with watchdog.

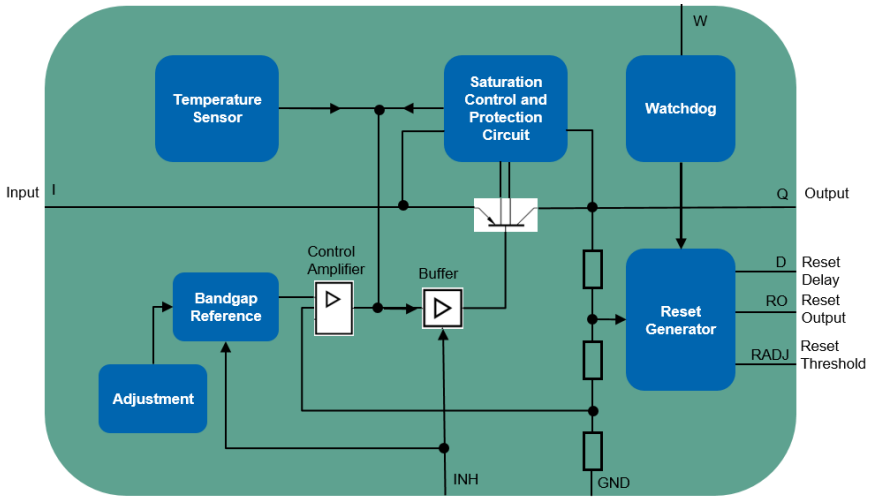
Successor for TLE4263GS

OPTIREG™ Linear

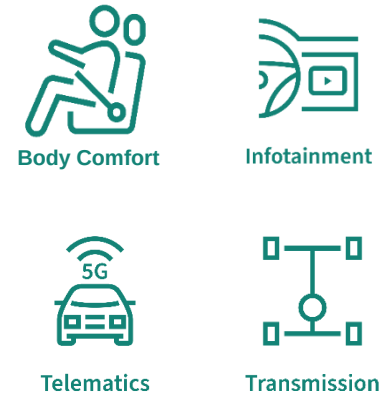
Main Features

- Inhibit input: can be switched off, reducing the current consumption to typically **0 mA**.
- Wide input voltage range up to 45 V
- Output voltage 5V
- Output voltage tolerance ≤ ±2%
- 180 mA output current capability
- **Low-drop voltage**
- Very low standby current consumption
- Overtemperature **protection**
- Reverse polarity **protection**
- Short-circuit proof
- Adjustable reset threshold
- **Watchdog** for monitoring microprocessor
- Power-on and undervoltage reset with programmable delay time
- Reset low down to VQ = 1V

Block Diagram



Applications



Key Benefits

- Robust Protection Features
- Wide Input Operation and Temperature Range

OPTIREG™ linear voltage regulator - TLE4263-2GM

A monolithic integrated very low dropout voltage regulator with watchdog.

Successor for TLE4263GM

OPTIREG™ Linear

Main Features

- Inhibit input: can be switched off, reducing the current consumption to typically **0 mA**.
- Wide input voltage range up to 45 V
- Output voltage 5V
- Output voltage tolerance ≤ ±2%
- 180 mA output current capability
- **Low-drop voltage**
- Very low standby current consumption
- Overtemperature **protection**
- Reverse polarity **protection**
- Short-circuit proof
- Adjustable reset threshold
- **Watchdog** for monitoring microprocessor
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- Reset low down to VQ = 1V

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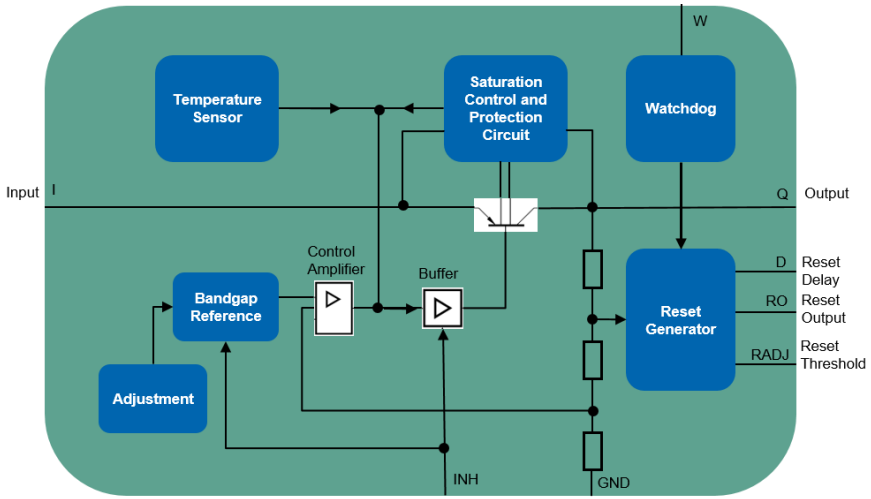
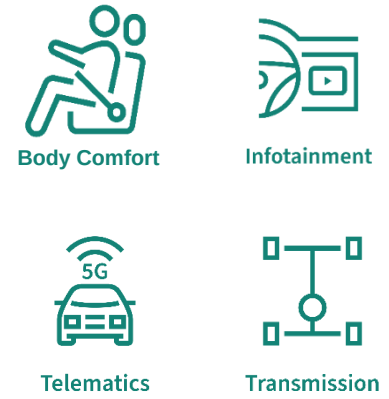
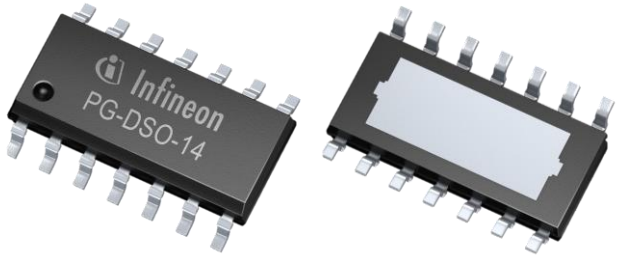


Applications



Key Benefits

- Robust Protection Features
- Wide Input Operation and Temperature Range



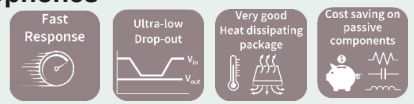
OPTIREG™ linear – Summary

- More than **75k IFX LDO** are shipped **every hour!**
- IFX LDOs are **released** @ all major **OEMs**
- **OPTIREG™ linear** portfolio has over **200 product variants** to suit all **your specific needs**
- **OPTIREG™ linear** portfolio offers a wide spectrum of features such as:
  - Watchdog
  - Enable
  - Reset
  - Reverse polarity protection
- **OPTIREG™ linear** portfolio serves your needs to supply among others:
  - MCU along Transceiver
  - MCU along Sensor (Analog/Digital, On-board/Off-board)
  - Voltage rail in post-regulator topology
  - Antennas

High Performance General Purpose

Best suited for supplying :

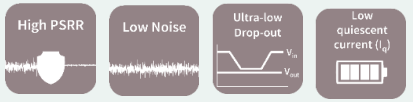
- **Microcontrollers**
- **Transceivers (CAN,LIN,…)**
- **Sensors (on-board)**
- **Actuator ICs**
- **Stand-by supply**
- **Low-load LEDs**
- **Microphones**



Post Regulators

Best suited for supplying :

- **Radar (MMIC)**
- **Flash Memory**
- **RAM Memory**
- **Camera**
- **SoC core supply**
- **I/O supply**
- **Ethernet PHY**
- **Cluster supply**
- **Low noise supply**



Trackers

Best suited for supplying :

- **Sensors**
- **Microphones**
- **Satellite ECUs (off-board)**
- **Small lamps (LED)**
- **Protected loads**

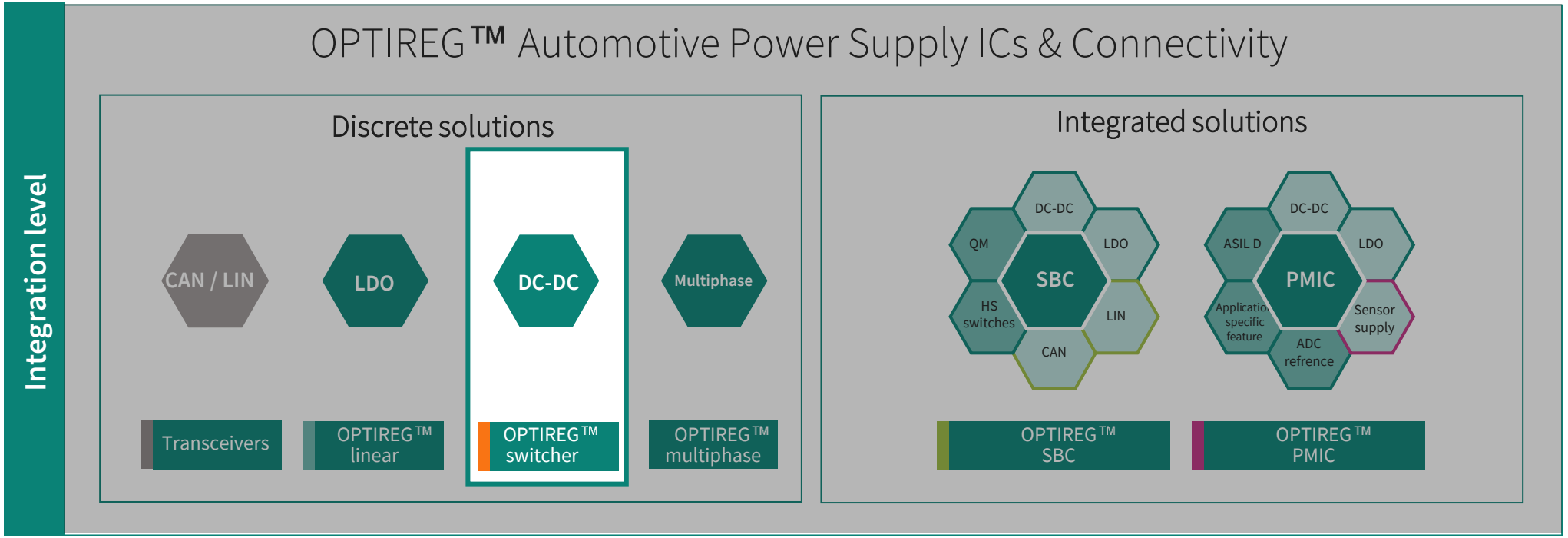
Application Specific

Best suited for supplying :

- **Antenna (with current Sense)**
- **Surround-view Camera**
- **Battery Monitoring/Management**
- **24V Standby supply**
- **Monitoring IC**

OPTIREG™ switcher (DC-DC)

OPTIREG™ switcher



Application level

Body & Power Distribution

- BCM
- HVAC
- Display
- Dashboard
- Power distribution
- Car access
- Zone control
- 48V/12V DC-DC Converter

Chassis/ADAS

- ADAS
- EPS
- Camera
- Braking
- Park assist
- Sensor fusion
- In cabin monitoring
- Radar

Infotainment

- Navigation
- USB
- Cockpit
- Cluster head unit
- Telematics
- Multimedia

Powertrain

- BMS
- EMS
- Transmission
- Inverter

Electric Drivetrain

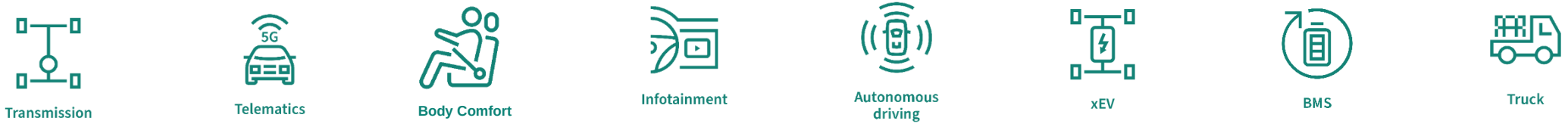
- BMS
- EV traction inverter
- EV / HEV OBC
- Fuel-cell

LED lighting

- Front light system
- Rear light system

OPTIREG™ switcher Portfolio Overview

DC-DC



SOP	Buck Converter	Boost Controller	Buck Controller
2009	TLE8366E V50 TLE8366EV TLE8366E V33		
2010		TLE8386-2EL	
2013	TLF50251EL TLF50241EL TLF50201EL TLF50211EL TLF50281EL		TLF51801ELV
2020	TLS4120D0EP V33 TLS4125D0EP V50		

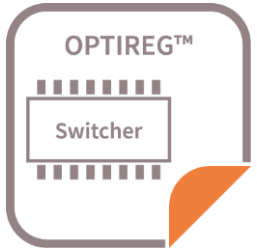
In Production

OPTIREG™ switcher: Suitable power supply for every application

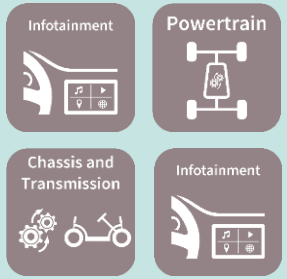
OPTIREG™ Switcher

Advantages and Key Features:

- Includes Buck Converter, Boost Controller, and Buck Controller options
- Wide supply voltage operation range
- Low current consumption
- Current limitation and overtemperature protection
- Integrated soft start, sync features
- Green products are RoHS compliant
- Robust design for long-term performance



Boost Controller



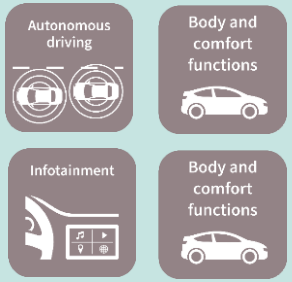
Best suited for supplying:

- Cold-cranking
- Powertrain: GDI, piezo injection
- LED driver
- PTC-heater
- E-compressor
- Remote Camera systems power (power over LVDS)
- Infotainment

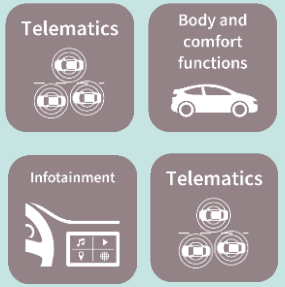
Buck Converter

Best suited for supplying:

- Body
- Cluster
- Infotainment
- Automotive general ECUs
- BCM,
- Gateway
- Camera, Radar,
- Telematics
- Infotainment
- ADAS, radar
- Telematics,
- EMS



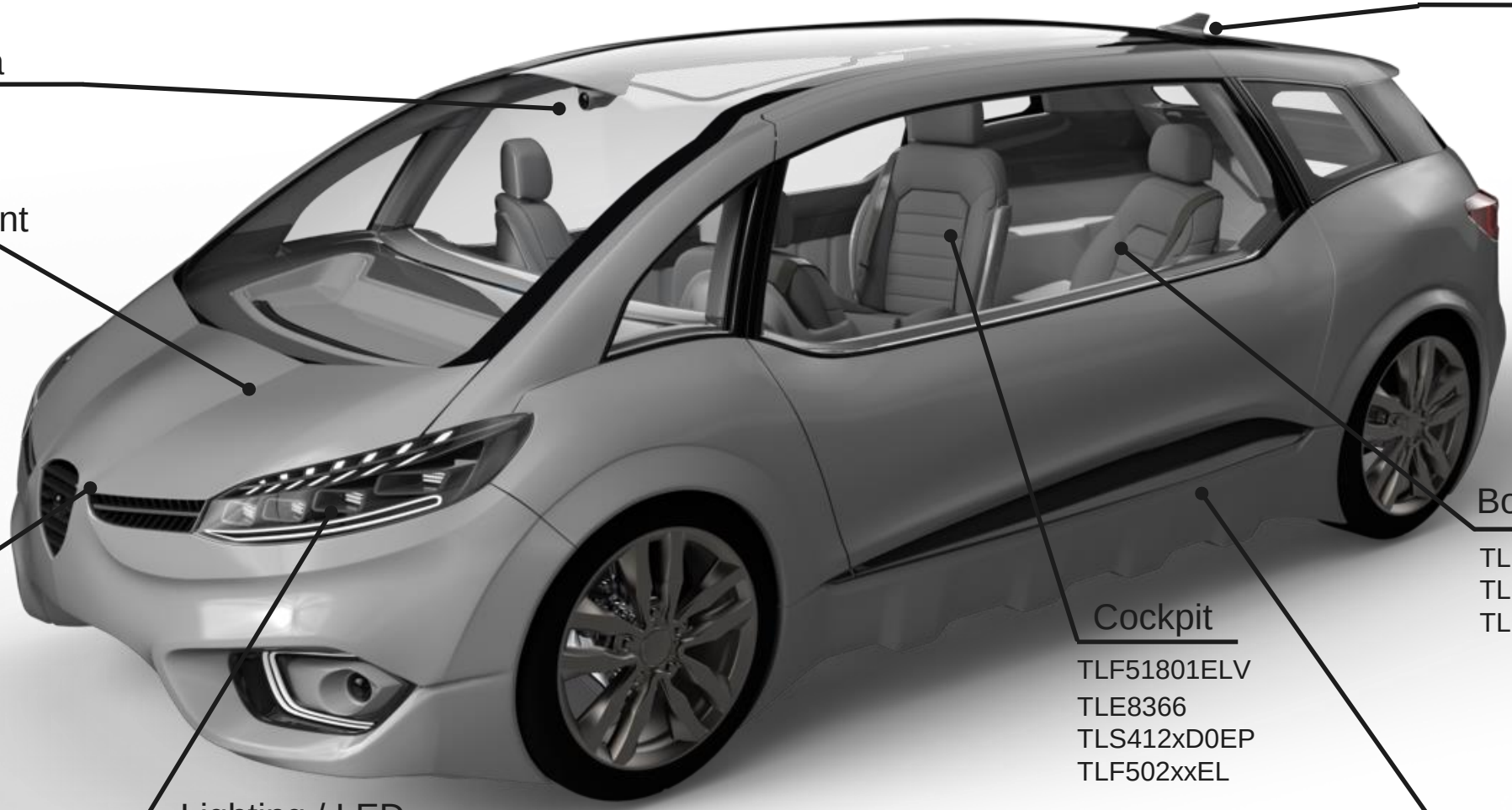
Buck Controller



Best suited for supplying:

- Display
- USB Charger
- Camera pre-regulator
- Infotainment
- Telematics
- Rear-Lighting
- Fog lighting module
- Mobile wireless charger
- High End Cluster, or Dashboard

OPTIREG™ switcher application examples



Telematics
TLF51801ELV
TLE8366
TLS412xD0EP
TLF502xxEL

Remote Camera
TLE8386-2EL

Engine Management
TLE8366
TLS412xD0EP
TLF502xxEL

Body Control
TLE8366
TLS412xD0EP
TLF502xxEL

Radar
TLE8366
TLS412xD0EP
TLF502xxEL

Cockpit
TLF51801ELV
TLE8366
TLS412xD0EP
TLF502xxEL

Lighting / LED
TLE8386-2EL

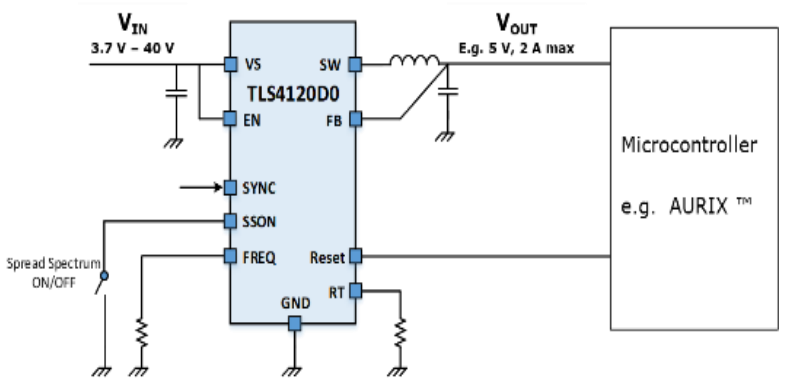
Transmission
TLE8386-2EL

Newest OPTIREG™ switcher TLS412xD0EP – Now Available!

Main Features

- VIN : 3.7V .. 40V
- VOUT : 5V, 3.3
- Wide Switching Frequency 320kHz .. 2.8MHz
- **100% duty cycle**
- Current mode with PWM and PFM, Internal compensation
- EN, PGOOD, Spread Spectrum
- Over-Voltage / Under-voltage monitoring
- Current consumption : 33 µA (ON mode)
- Efficiency : up-to 94%
- Package: TSDSO14
- Integrated compensation, sync rectification
- Suitable for cranking application
- Low noise / EMC optimized

Block Diagram

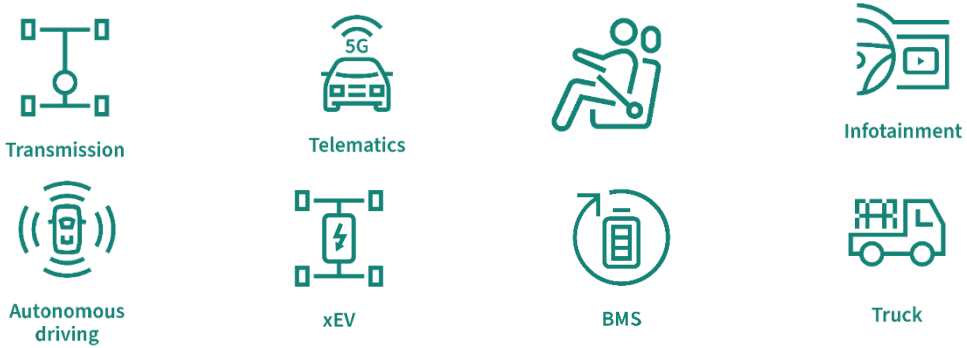


Family overview

TLS4120D0EPV33

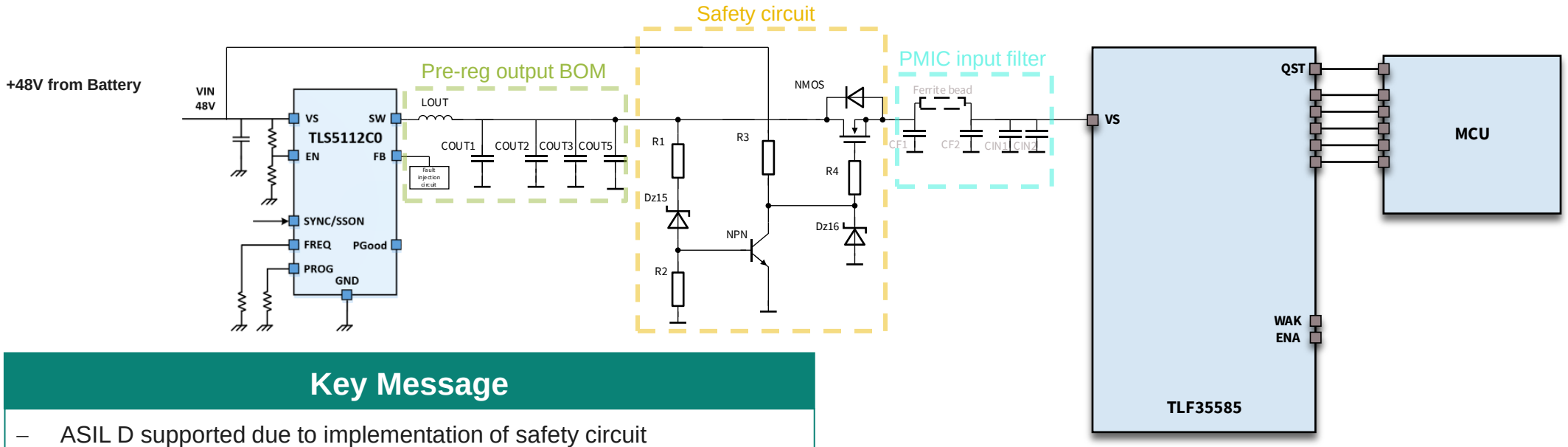
TLS4125D0EPV50

Applications



Example of 48V Fail Safe EPS: safety circuit TLS5112EPV + TLF35585 for ASIL D applications

Block Diagram



Key Message

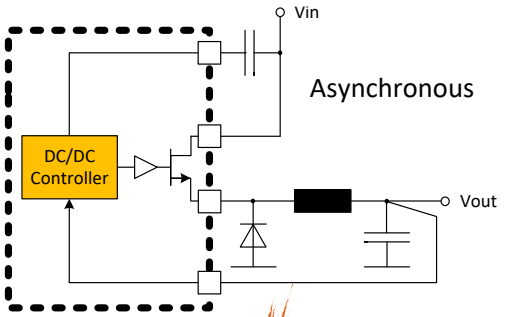
- ASIL D supported due to implementation of safety circuit
- Fast reaction of the safety circuit: timing is critical (supply of the PMIC is opened before the voltage increases above the absolute maximum rating)
- Low complexity solution: Straight forward safety argumentation according to ISO 26262 clause 8-13
- Safety solution based on hardware: low-cost external components (Zener diode + NMOS/PMOS +NPN/PNP)

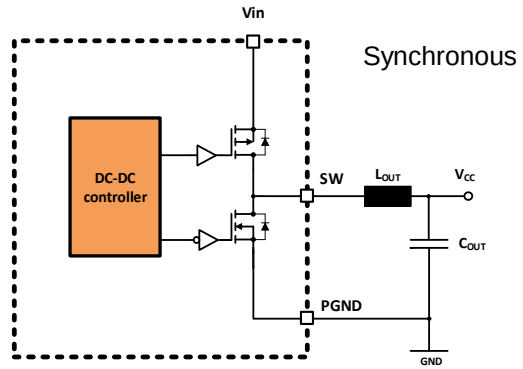
OPTIREG™ Synchronous Switcher – Summary

TLS4120D0EPV33 & TLS4125D0EPV50

- Minimal External Components
- Integrated Compensation
- Overvoltage detection for simple ADAS applications
- Low quiescent current operation
- Low noise / EMC optimized
- Auto Spread Spectrum
- Wide Switching Range
- High Efficiency
- Zero Defect Strategy

Synchronous & integrated topology helps reduce components and increase efficiency

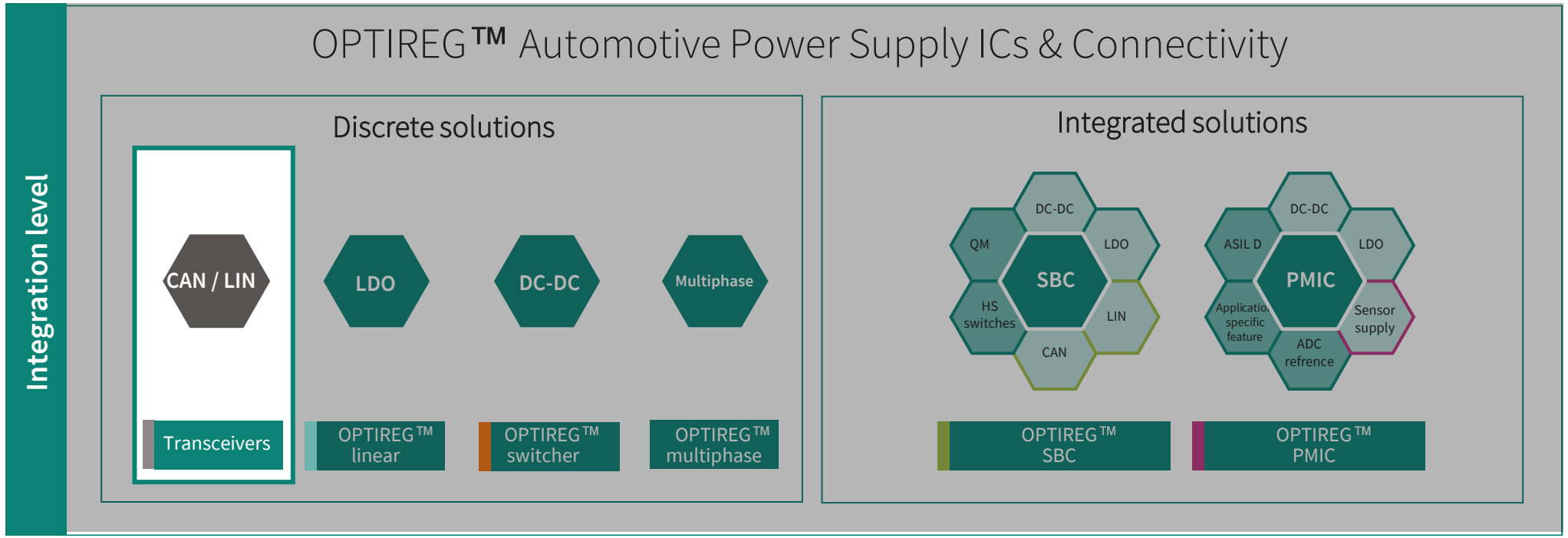




CAN / LIN

Transceiver

Transceiver



Application level

Body & Power Distribution

- BCM
- HVAC
- Display
- Dashboard
- Power distribution
- Car access
- Zone control
- 48V/12V DC-DC Converter

Chassis/ADAS

- ADAS
- EPS
- Camera
- Braking
- Park assist
- Sensor fusion
- In cabin monitoring
- Radar

Infotainment

- Navigation
- USB
- Cockpit
- Cluster head unit
- Telematics
- Multimedia

Powertrain

- BMS
- EMS
- Transmission
- Inverter

Electric Drivetrain

- BMS
- EV traction inverter
- EV / HEV OBC
- Fuel-cell

LED lighting

- Front light system
- Rear light system

Infineon Automotive Transceiver – addressing changing market needs

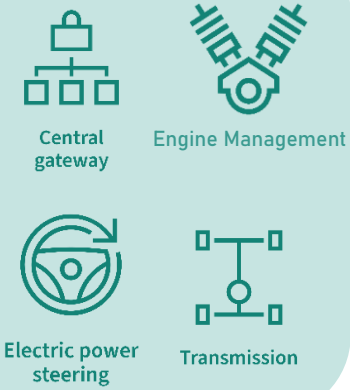
CAN / LIN

- High Performance (with fast programming mode & local wake)
- Reduced layout efforts (Compatibility between Single LIN vs Dual LIN=two LIN transceivers in one package)
- Pinout compatibility with main competitors
- OEM release w/o ESD protection diode

CAN 5Mbits FD

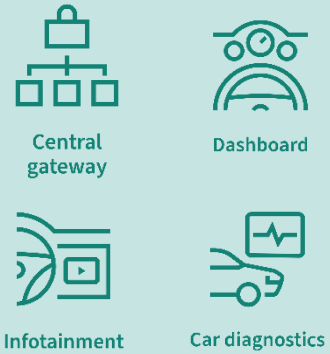
CAN PN

- CAN FD 5MB fulfill latest ISO incl. wake up filter time
- Best in Class CAN FD with Partial Networking
- First CAN FD family with Grade “0+” available
- Backward compatible with CAN 1MBit/s and CAN 2MBit/s



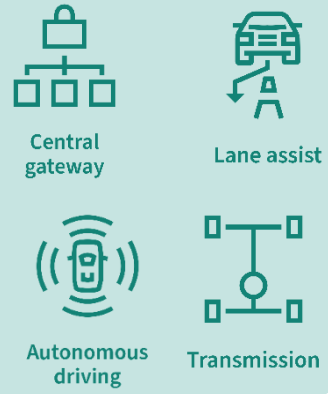
CAN 1MBit/s

- Worldwide release with OEMs
- First non – Japanese supplier to win Toyota’s highest Q-Award
- ISO 11898-2 ed. 2016 compliant
- With and without bus wake up
- Pin out compatible with main competitors



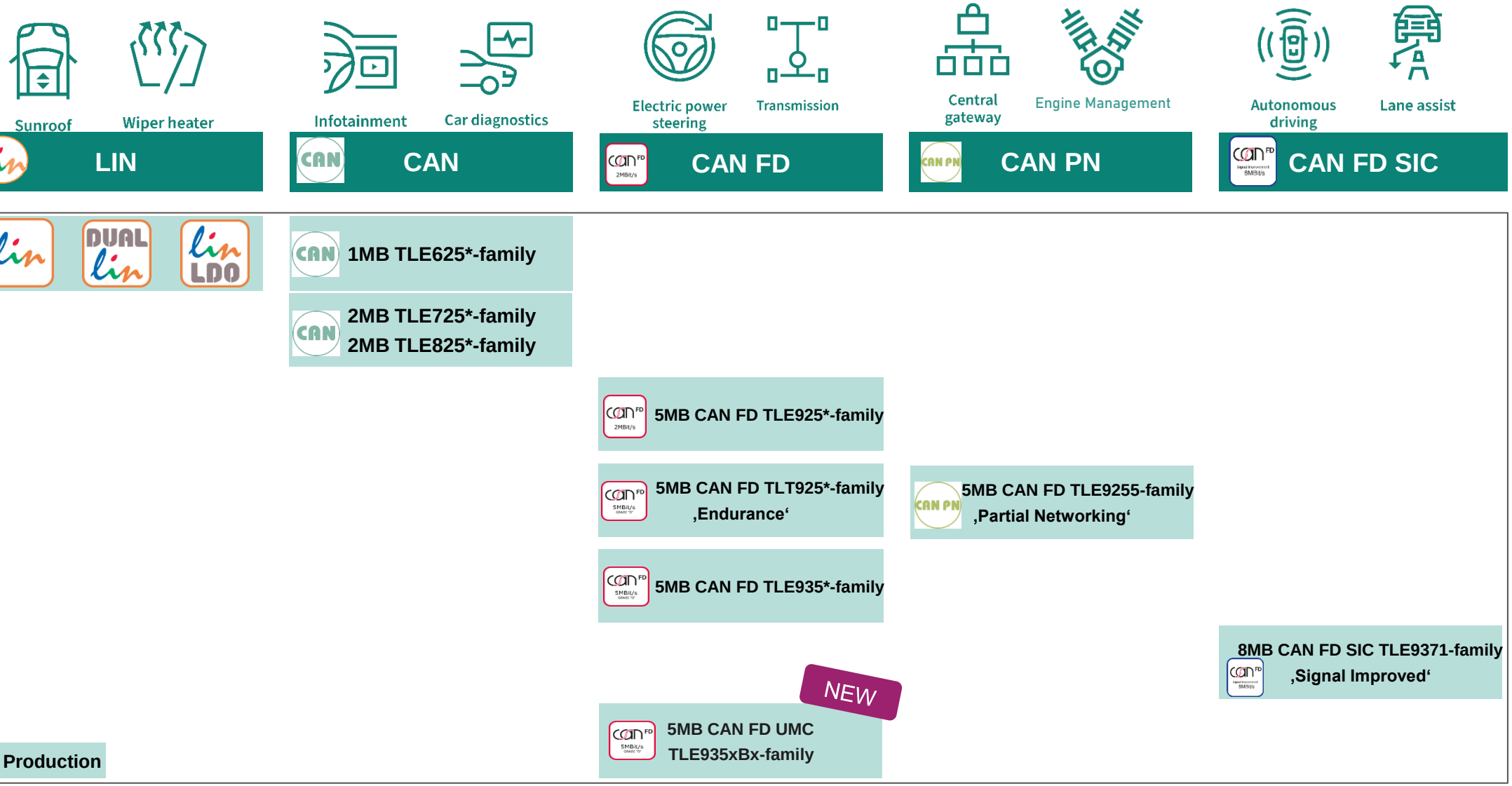
CAN FD SIC

- Next CAN Generation with Signal Improvement for stable high data transmission
- Fully pin to pin compatible with existing CAN FD devices (TLE9251x and TLE935x)
- addressing complex topologies
- Reduced wire harness

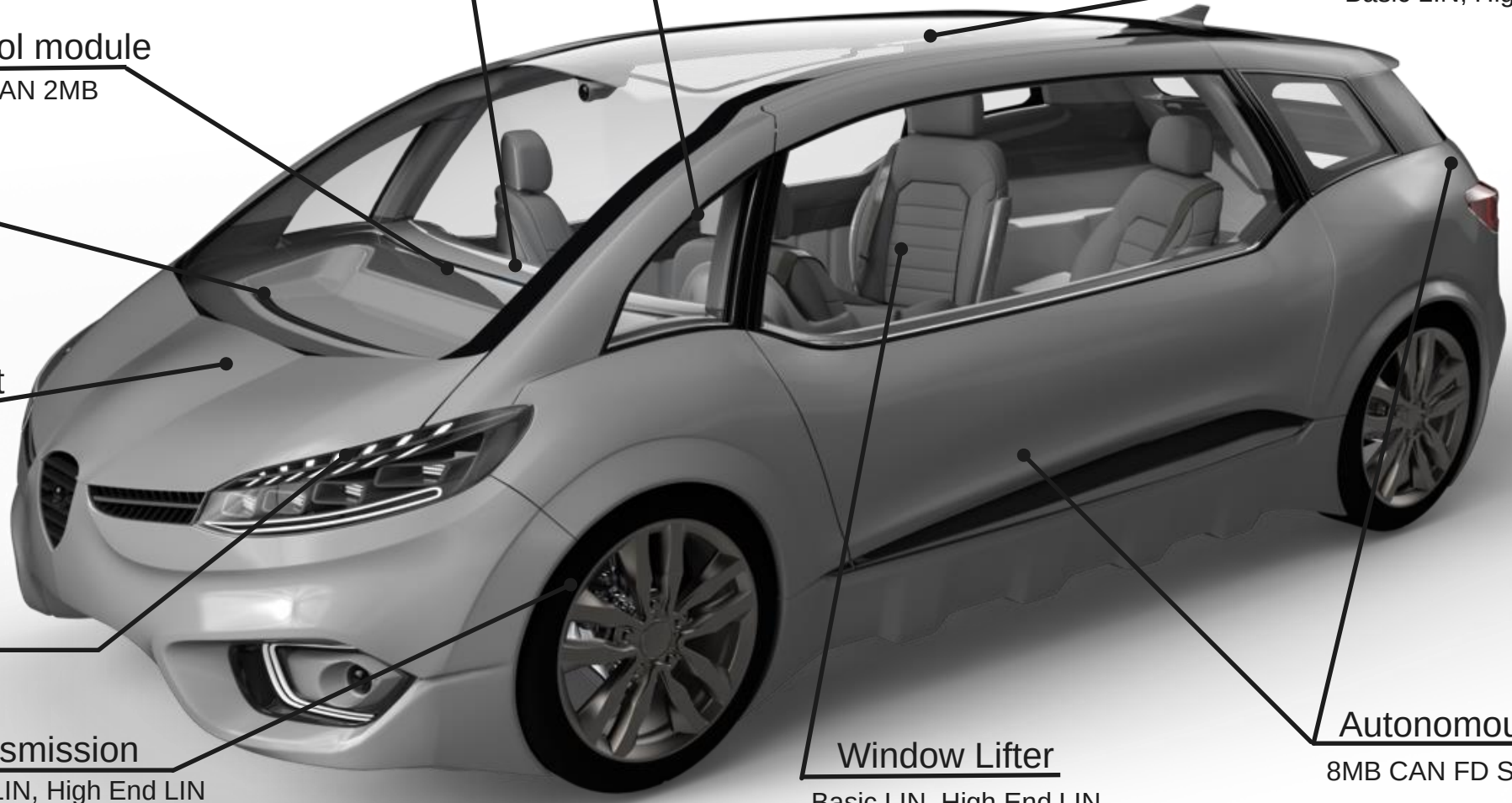


Transceivers Portfolio (LIN and CAN) overview

CAN / LIN



Transceivers application examples



Dashboard
CAN 1MB, CAN 2MB

Electric Power Steering
CAN FD

Sunroof Module
Basic LIN, High-end LIN

Body control module
CAN 1MB, CAN 2MB

Chassis Domain
Basic LIN, High End LIN

Engine Management
5MB CAN FD/CAN PN
8MB CAN FD SIC

Light Control Unit
Dual LIN, High End LIN

Transmission
Dual LIN, High End LIN

Window Lifter
Basic LIN, High End LIN

Autonomous Driving
8MB CAN FD SIC

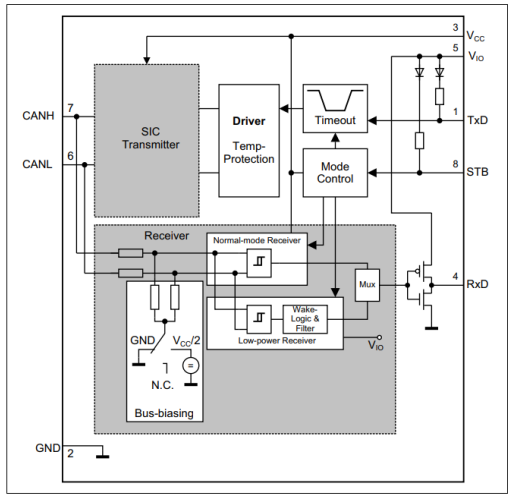
CAN FD SIC (Signal Improved Capability) TLE9371SJ/TLE9371VSJ

CAN / LIN

Main Features

- 2 modes of operation: Normal operating and stand-by mode
- Available in DSO-8
- VIO input for voltage adaption to the microcontroller interface (3.3 V or 5 V)
- Two voltage options of 3.3V and 5V
- Lowest current consumption in the stand-by mode

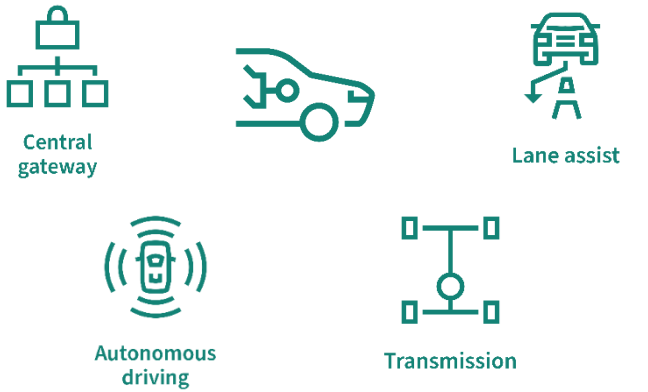
Block Diagram

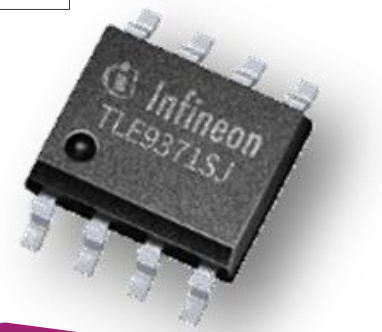


Key Benefits

- Connection of more nodes with more functions possible, high accuracy of data transmission, data rate up to 8Mbit/s, use in complex networks
- Supports new comfort features in body applications
- Dedicated low-power modes, like Stand-by Mode with very low quiescent current while the device is powered up
- Simple wire harness & costs; more positive CO2 balance

Applications





In production

CAN FD TLE935*B-family

CAN / LIN

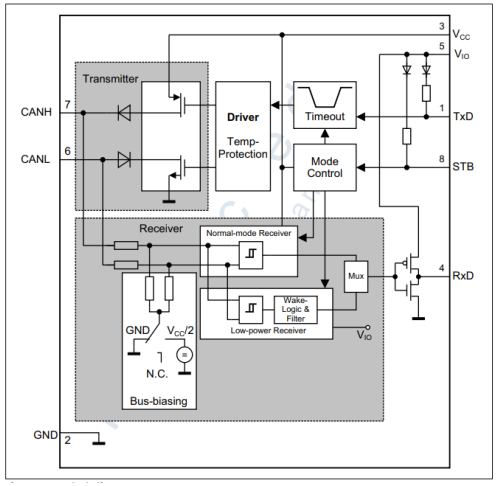
Main Features

- Loop delay symmetry for CAN FD data frames up to 5 Mbit/s
- Standby mode with minimized quiescent current
- Available in DSO-8
- VIO input for voltage adaption to the microcontroller interface (3.3 V or 5 V)
- Lowest current consumption in the stand-by mode
- Very low CAN bus leakage current in power-down state
- Bus wake-up pattern (WUP) function with optimized filter time for worldwide OEM usage

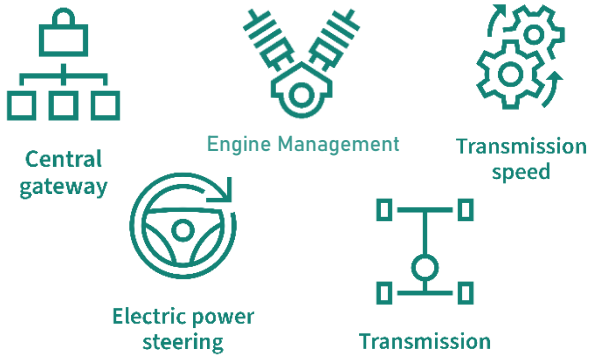
Key Benefits

- Protection of the microcontroller against interferences generated inside the network
- Support in new comfort features in body applications
- Use in automotive applications without additional protection devices, such as suppressor diodes or common mode chokes
- very low level of electromagnetic emission (EME) within a wide frequency range

Block Diagram



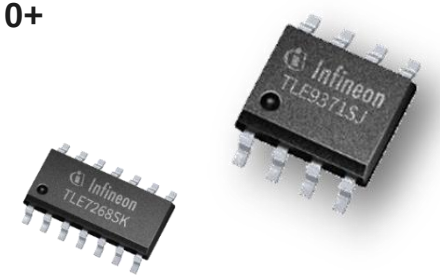
Applications

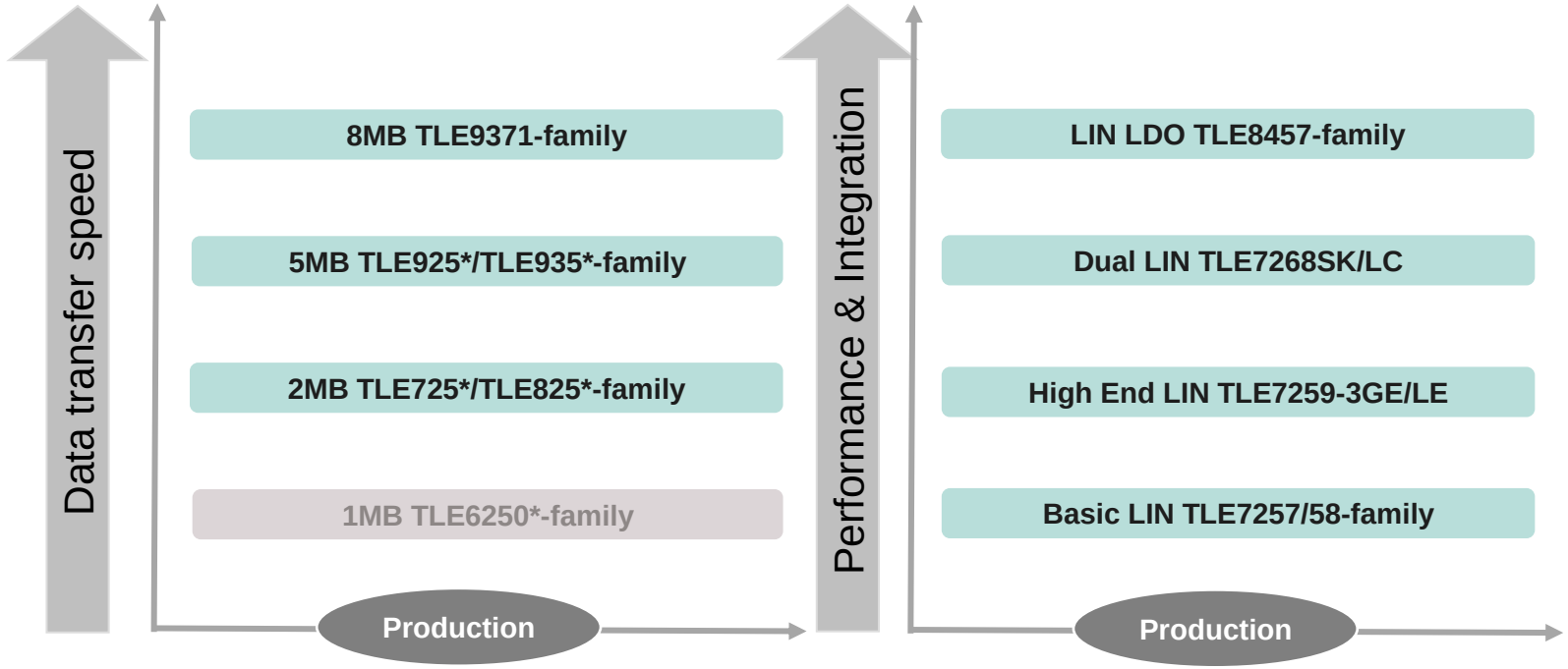


In production

CAN and LIN transceiver – Summary

- **Total LIN** shipped **>1,2B units** & **CAN** shipped **>2,7B units**
- Components **released** @ all major **OEMs**
- LIN and CAN **portfolio with > 90 product variants**
- Successor products backward **compatible**
- **Excellent EMC** and **ESD** robustness
- **CAN FD** transceiver w/ **Signal Improvement Capability (SIC)** up to **8 Mbit/s**
- **Compliant to Toyota conformance test (VeLIO)**
- **AEC-Q100 Grade 0+** (Ta ≤ 150 °C)





CAN transceivers

- ✓ Best power efficiency
- ✓ available also as partial networking or for harsh environment
- ✓ CAN FD SIC with signal improvement for large topologies

LIN transceivers

- ✓ Power efficiency
- ✓ Pin-to-pin compatible with competitor's devices
- ✓ Ultralow quiescent current

Find the right OPTIREG™ for your microcontroller in just a few clicks!

→ Click here: Link

Navigation Table

Home

CLICK !

OPTIREG™	Infineon AURIX™ TC2x	Infineon AURIX™ TC3x	Infineon Traveo™ I	Infineon Traveo™ II	Infineon PSoC®	Texas Instruments Piccolo™/ Delfino™	NXP S32K	Renesas RH850	ST Micro SPC5x
PMIC	◎	◎	◎	◎	N/A	◎	◎	◎	◎
Linear	◎	◎	◎	◎	◎	◎	◎	N/A	N/A
Switcher	◎	◎	◎	◎	N/A	◎	◎	N/A	N/A
SBC	◎	◎	◎	◎	◎	◎	◎	◎	◎


Infineon