



How Semiconductors are enabling Electric Vehicle revolution

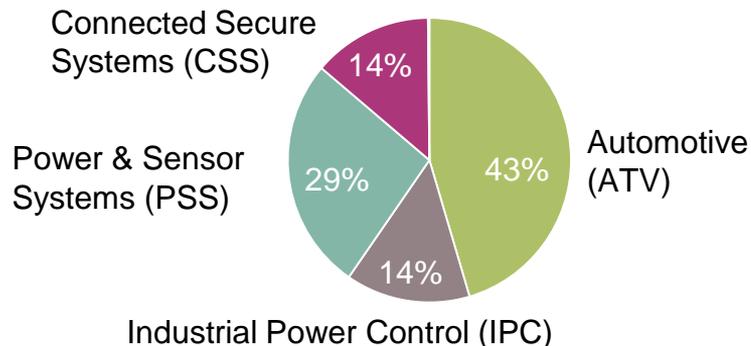
SIA Webinar, June 8th, 2021

Sayed Ahmed - Senior Director, Vehicle Motion

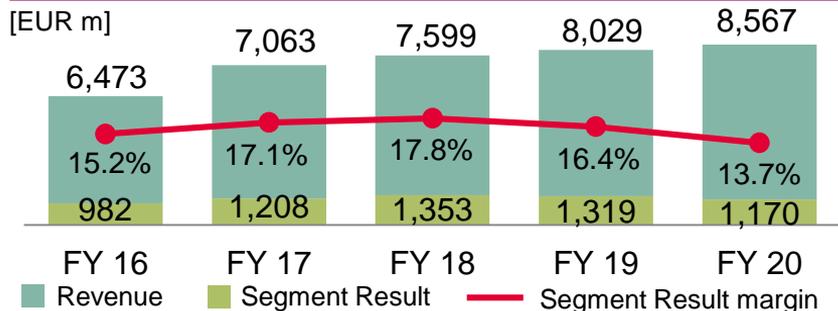


Infineon at a glance

Business Segments Revenue*



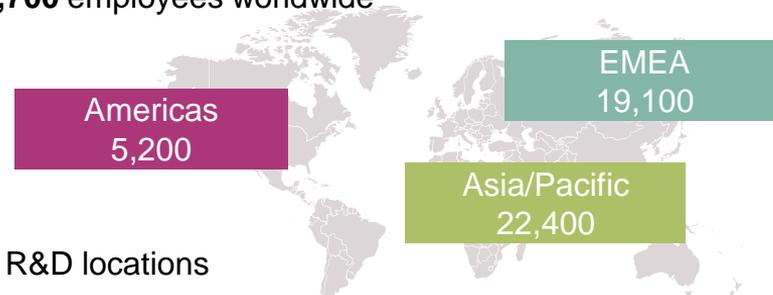
Financials



*Fiscal Year 2020 (as of 30 September 2020)

Employees

46,700 employees worldwide



54 R&D locations

21 manufacturing locations

Market Position



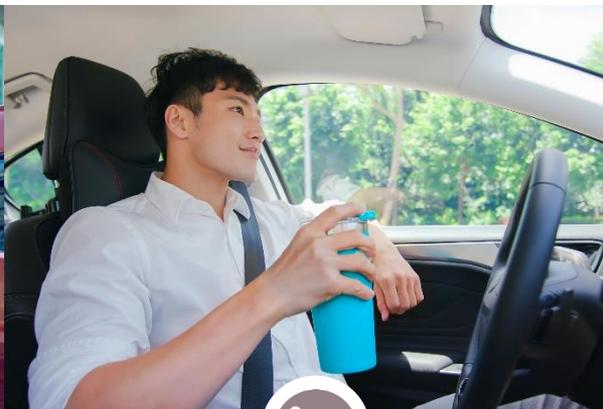
**based on the combined market share 2019 of Infineon and Cypress based on their individual figures

For further information: [Infineon Annual Report 2020](#)

Our core beliefs reflect the automotive megatrends as cars become cleaner, safer and smarter



Zero CO₂ becomes real



A driver becomes a passenger



A car becomes a smarter car

Three essential ingredients for enabling the EV revolution

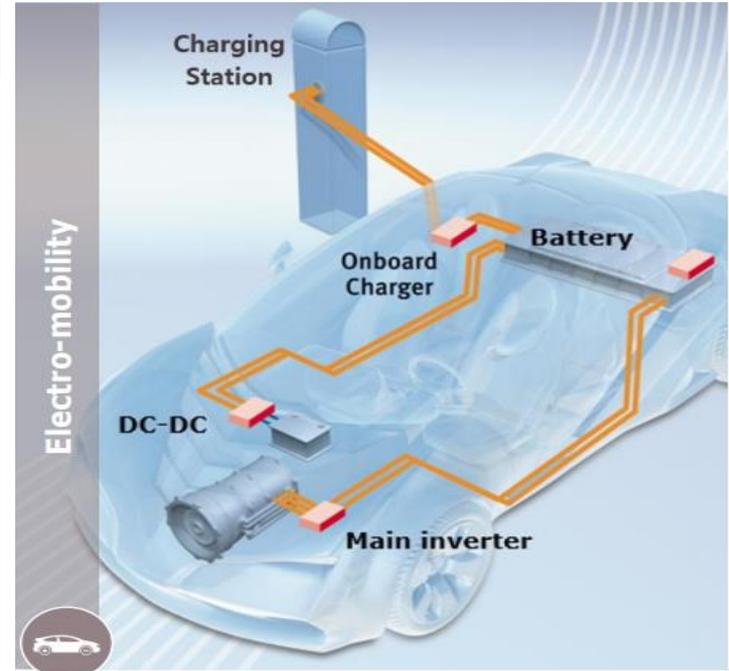


High Voltage Inverter for EV

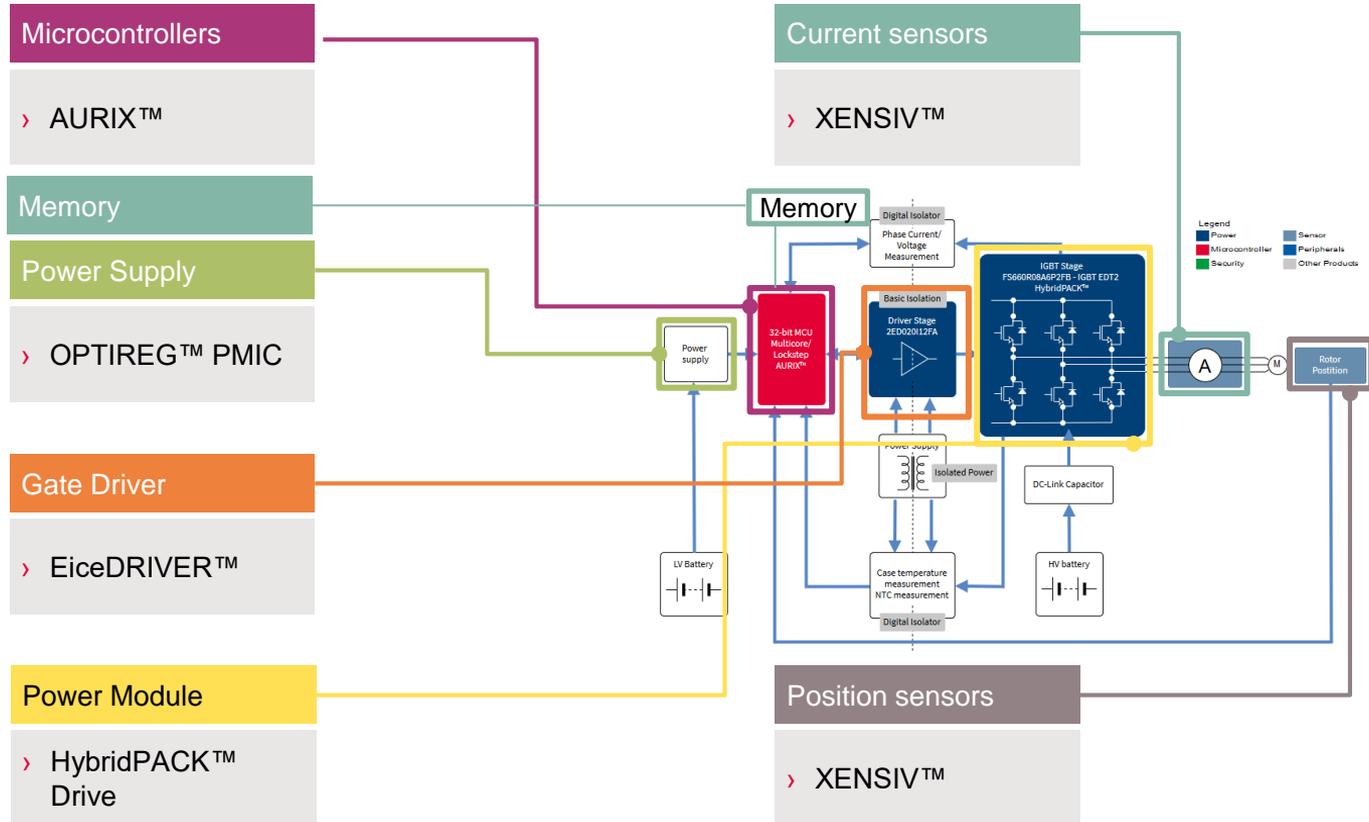
Application Scope

Main Inverter enables the bi-directional power conversion between HV battery and e-motor:

- › **DC** from HV battery → **AC** for e-motor
- › Regenerative braking → power back to battery
- › Enable vehicle motion upon torque request



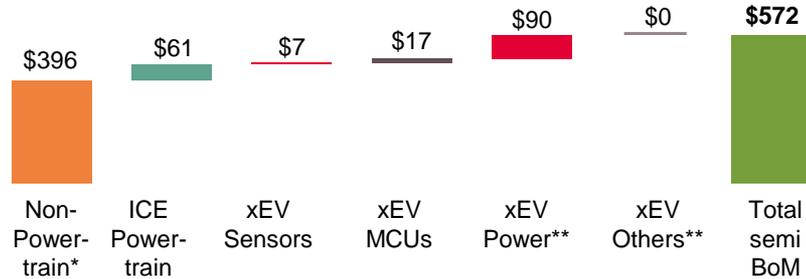
Infineon offers **key components** for inverters → System cost focus



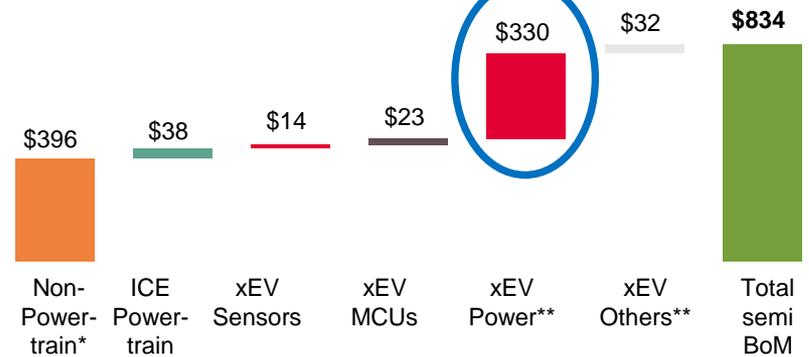
Market development → Power is over 80% of an EV inverter BOM

2020 average xEV semiconductor content by degree of electrification

48 V / Mild Hybrids



Full & Plug-in Hybrids and Battery Electric Vehicles



2020	2.3m vehicles	6.1m vehicles
2022e	5.8m vehicles	12.2m vehicles
2025e	18.8m vehicles	21.0m vehicles
2030e	27.3m vehicles	32.0m vehicles

* Non-Powertrain: average semiconductor content in body, chassis, safety and infotainment application segments

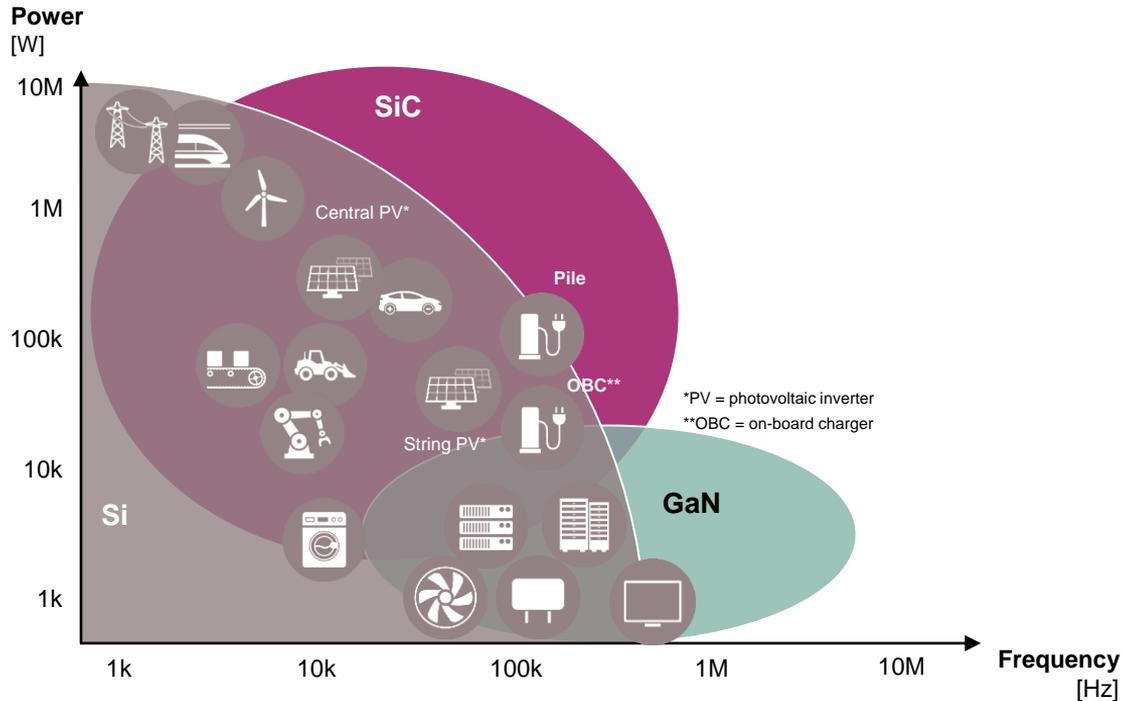
** "power" includes voltage regulators and ASIC; "others" include opto, small signal discretes, memory

Sources: 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

All power technologies are available in-house

Comparison of technologies



Si

- › Si remains the mainstream technology
- › Targeting 25 V – 6.5 kV
- › Suitable from low to high power

SiC

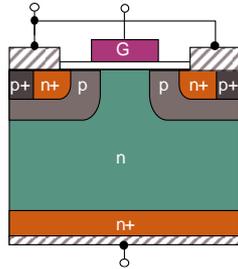
- › SiC complements Si in many applications and enables new solutions
- › Targeting 650 V – 3.3 kV
- › High power – high switching frequency

GaN

- › GaN enables new horizons in power supply applications and audio fidelity
- › Targeting 80 V – 650 V
- › Medium power – highest switching frequency

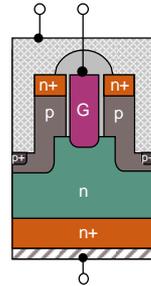
System cost reduction → Infineon SiC Trench technology

SiC Planar



- ✓ Low complexity process
- ✓ Good shielding of oxide possible

SiC Trench



- ✓ Low channel resistance
- ✓ Shrink potential higher than in planar DMOS

Infineon Trench



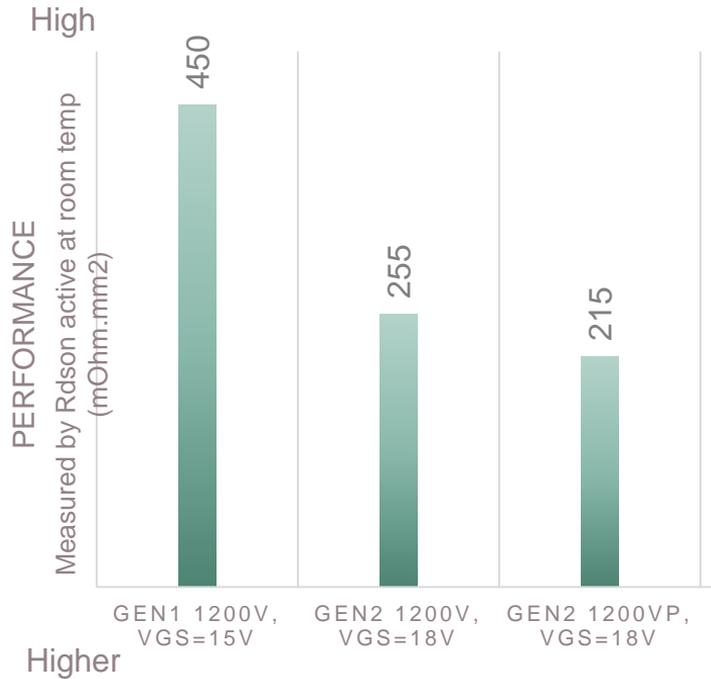
- ✓ Low channel resistance
- ✓ Shrink potential higher than in planar DMOS
- ✓ Oxide corners shielded by folded double trench
- ✓ Long experience in trench know-how

- Sophisticated process know-how needed

- x Very low channel mobility
- x Limited shrink options

- x Protection of oxide corners needed

System cost reduction → Reduce chip size by superior technology

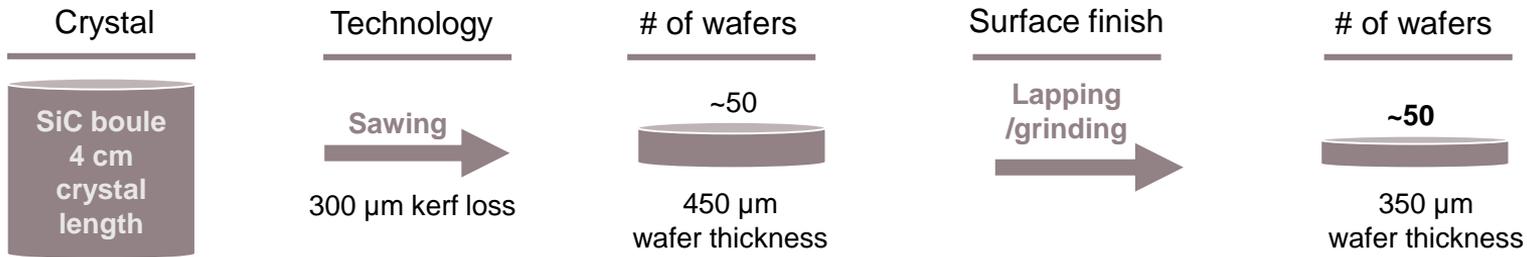


Source: Infineon internal assessment, Oct. 2020

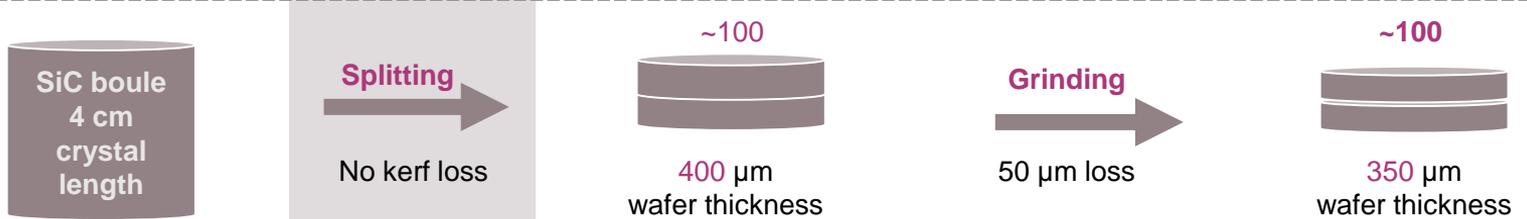


System cost reduction → More chips/Boule by manufacturing technology

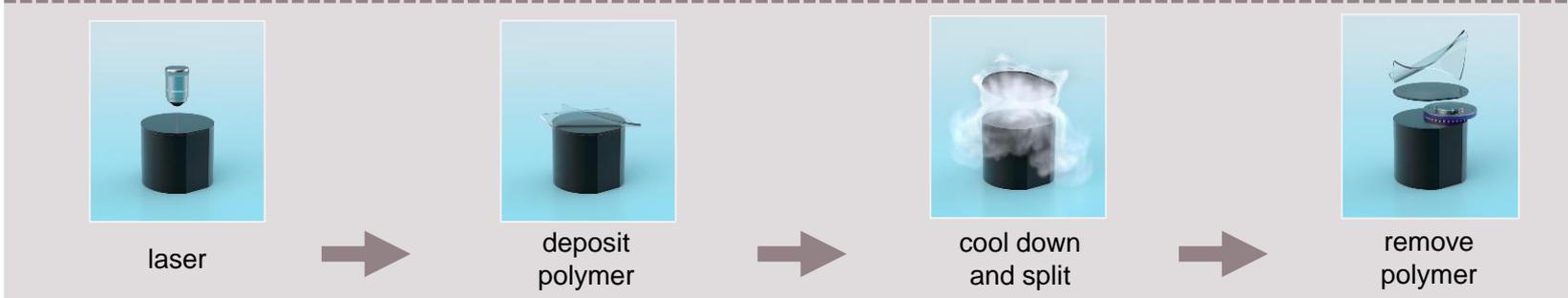
Today



2023



Cold split

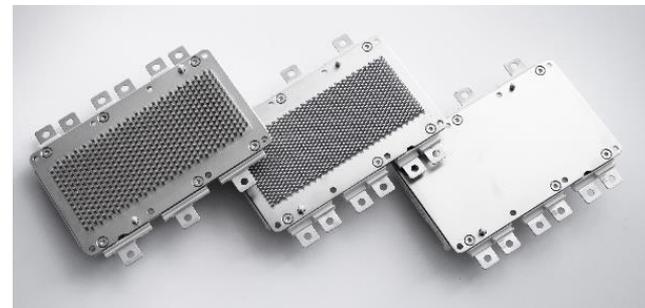


Faster time to market → Field experience and scalable portfolio

- › Field Experience: > 20 BEV platforms in production
 - › 17 out of 25 top selling EVs use Infineon Power device
 - › Shipped 18M power modules/packages → no field failures



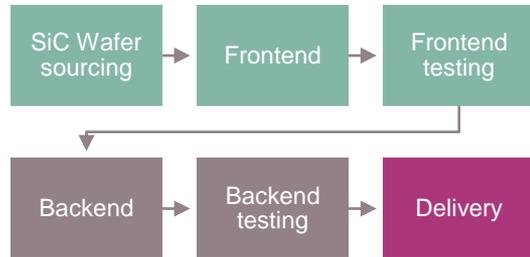
- › Scalable portfolio: Offer same package with power range from 120kW to 250kW
 - › Migration from Si to SiC is convenient
 - › 400V or 800V Bus voltage



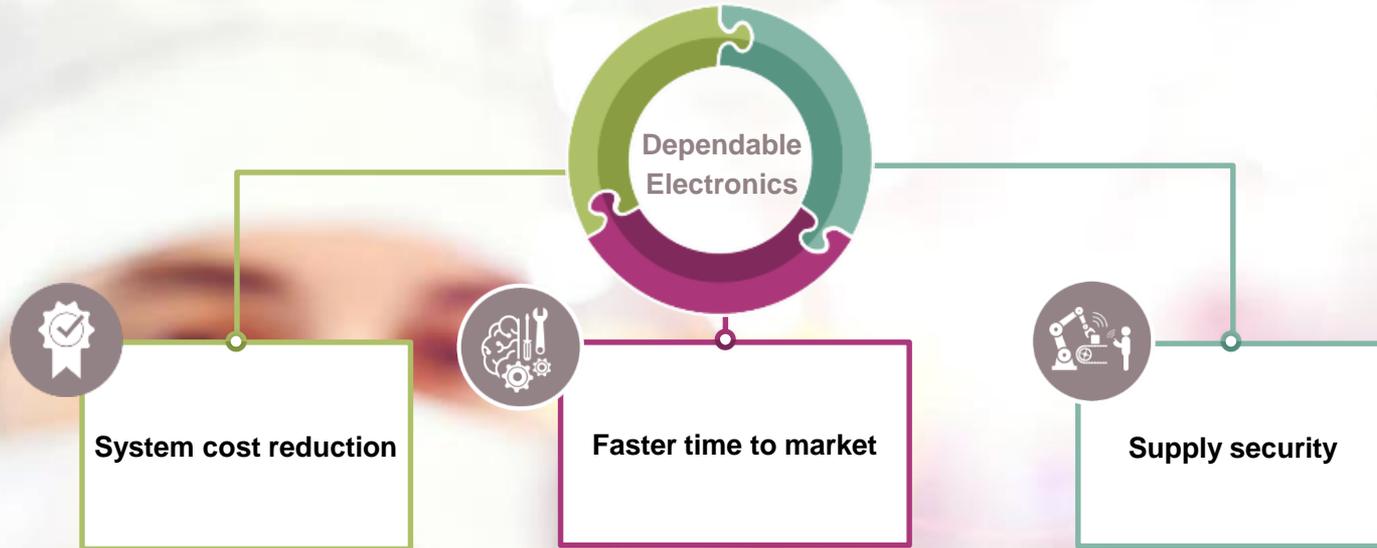
Supply security → Full control of supply chain



- › Global multi-sourcing strategy for SiC Wafers in place
- › Major investment in In-house Frontend & Backend manufacturing
- › Dual front and back-end site provide robust supply
- › 40+ years experience in manufacturing power devices



Infineon's dependable electronics enables the EV revolution



✓ Innovation & technology focus

✓ Field experience & superior quality

✓ In-house manufacturing

✓ Broad product portfolio

✓ Scalable products

✓ Dual front and back-end