



Infineon Power IC and HV Transistors

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2024-10



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Energy demand is increasing exponentially!

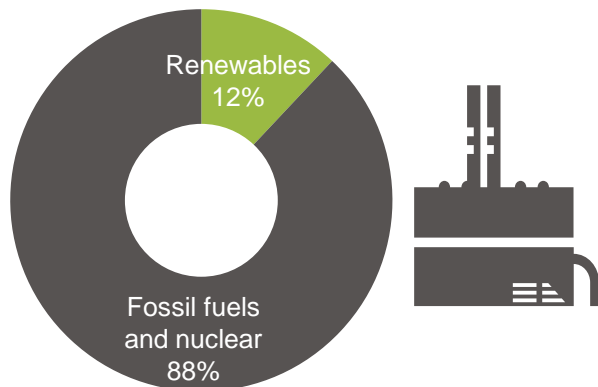
CO₂ target requires new and innovative approaches

- Increase share of renewables energies
- Greater efficiency from production to consumption
- Tighter requirements in demanding applications

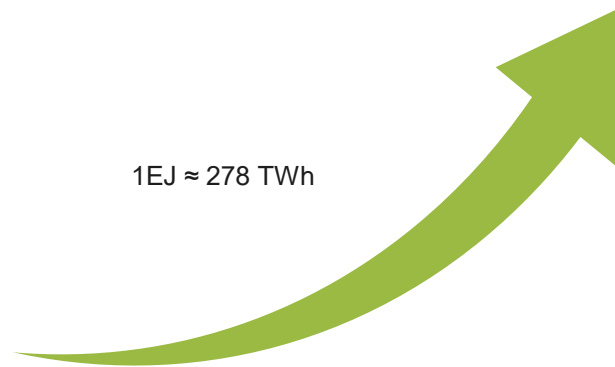


**More power at higher efficiency
in less space**

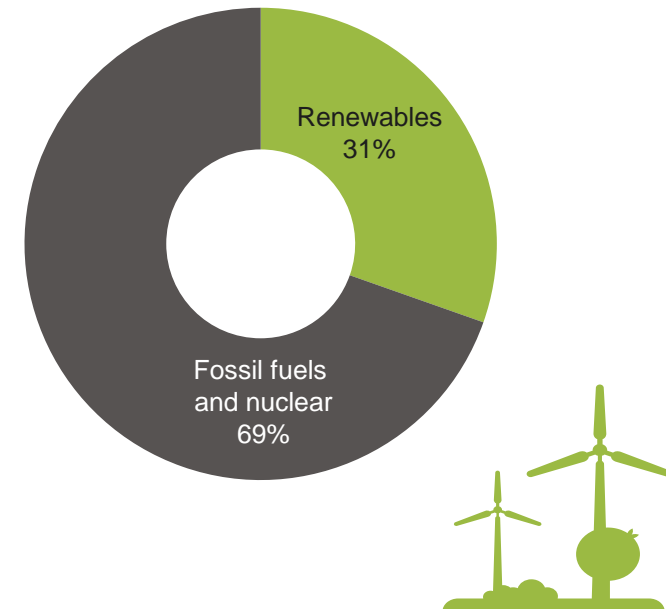
Energy Supply 2022
~ 632 EJ



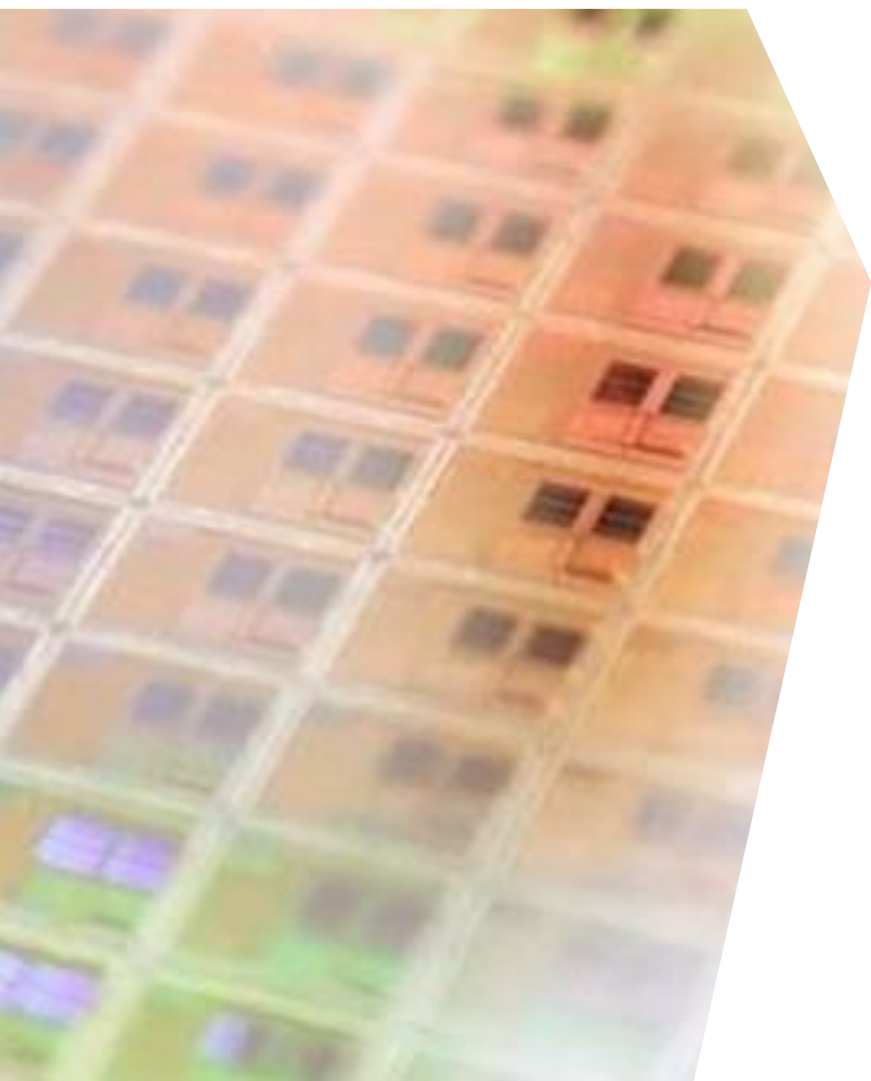
1EJ ≈ 278 TWh



**Energy Supply 2050
(Stated Policies)**
~ 725 EJ



Semiconductors – a key lever for electrification and CO₂ reduction



Green energy

Replacement of fossil fuels in power generation with renewable, clean and secure sources.



Digitalization of conversion chain

Optimization of the entire energy chain through connectivity and smart control.



Clean electrification

Electrification of consumption areas previously dominated by fossil fuels – with renewable energies.



Energy efficiency

Promoting of energy efficiency technologies like wide-bandgap for higher power density and lower losses.



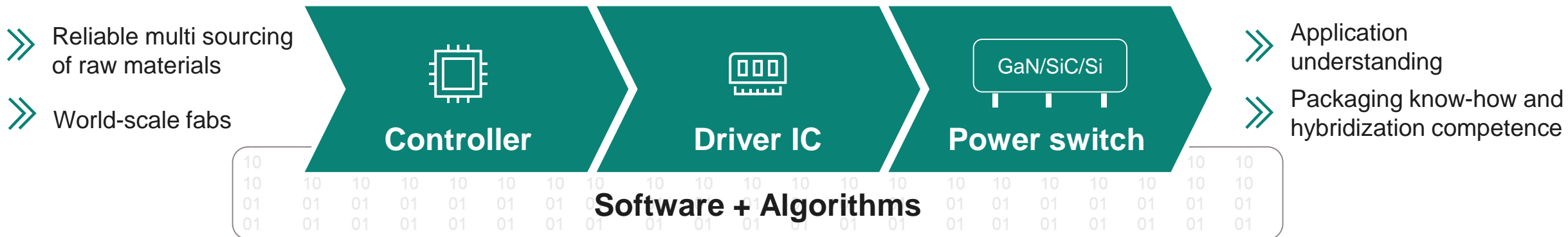
Telecom



Server

Decarbonization

Infineon leading in power systems – mastering all three key materials



Leadership in Power Systems across all materials and technologies

Gallium nitride

HEMT – Driver



Silicon carbide

Diode – MOSFET



Silicon

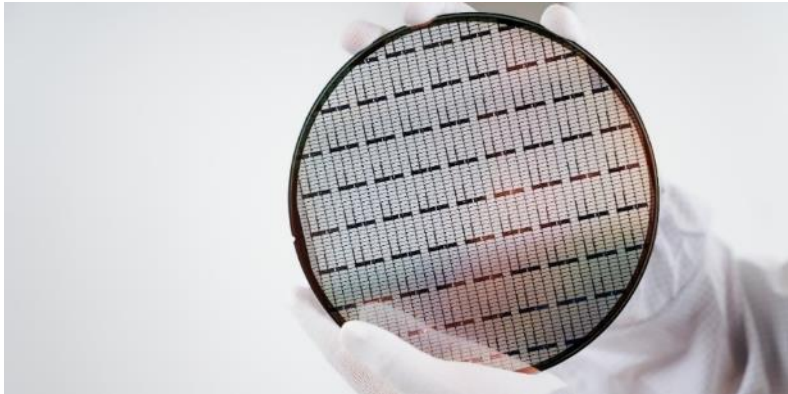
Diode – MOSFET – IGBT – Driver – Controller



Controller



MCU



Power Controller

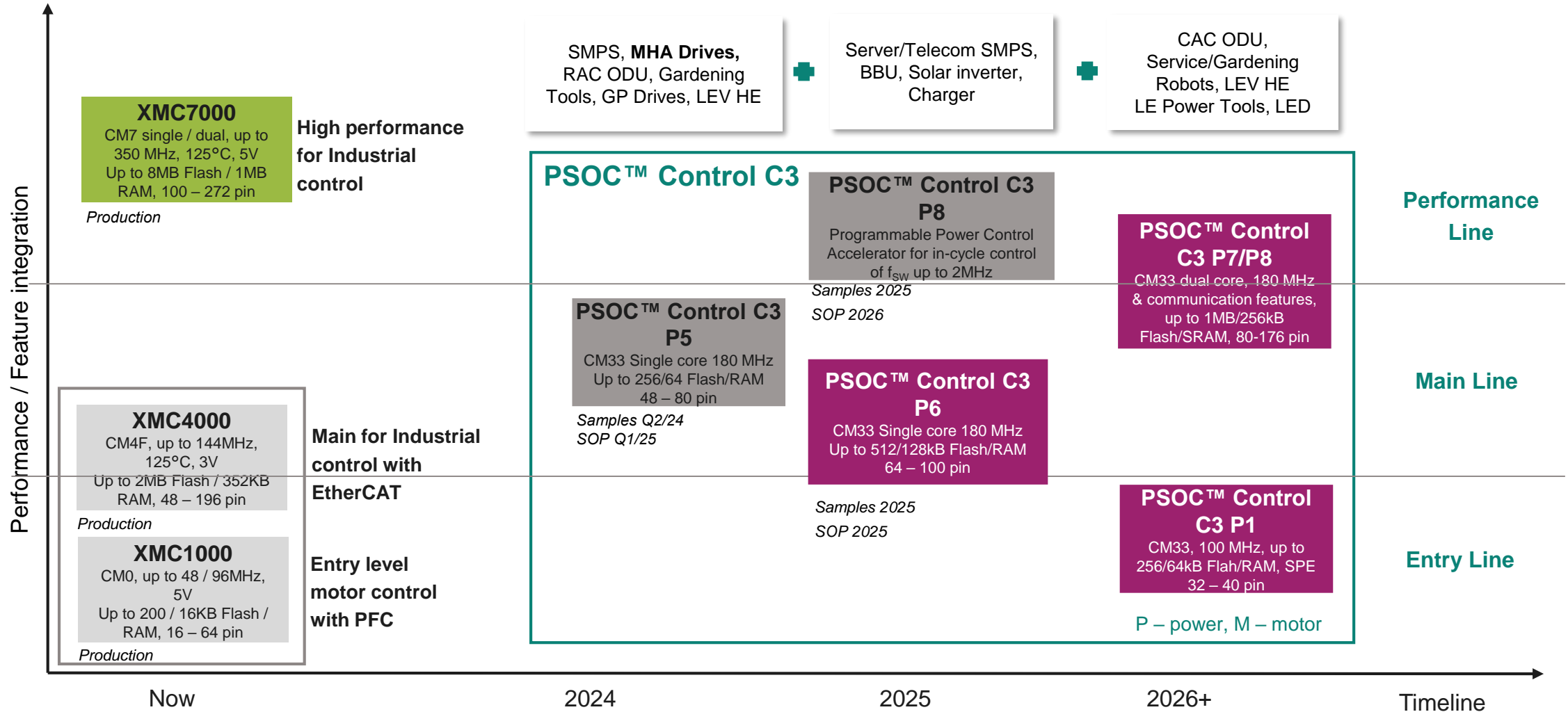


Auxiliary Supplies

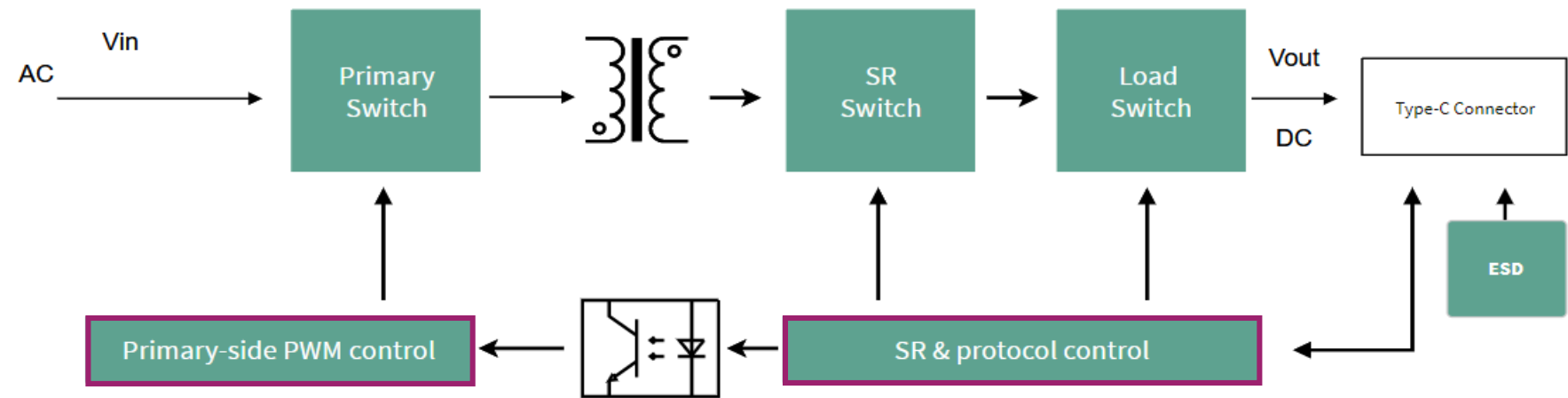


Industrial Microcontroller Roadmap

Motor Control, Power Control and Industrial Communication MCUs



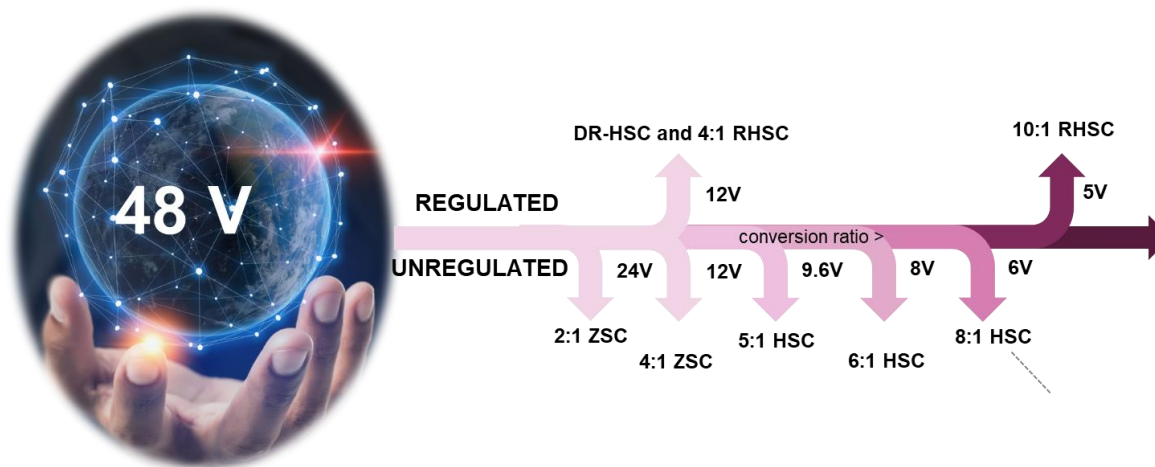
XDP™ and EZ-PD™ PWM / USB-PD / SR controller for charger & adapter



Solution offering	PWM controller
– QR flyback topology	– EZ-PD™ PAG1P
– QR ZVS & ACF topology	– EZ-PD™ PAG2P
– Hybrid flyback topology	– XDP™ digital power XDPS2221
– Hybrid flyback topology multiport	– XDP™ digital power XDPS2221
– Hybrid flyback topology multiport	– XDP™ digital power XDPS2222

SR controller	PD controller
– EZ-PD™ PAG1S (programmable)	
– EZ-PD™ PAG2S (programmable)	
– EZ-PD™ PAG2S (programmable)	
– 3 rd party	– EZ-PD™ CCG3PA (programmable)
– 3 rd party	– EZ-PD™ CCG7DC&SC (programmable)

XDP™ Digital DCDC and Protection Controllers



Digital DCDC Power Controllers

XDPP1100
XDPP114x

- › Industry's most **mature & advanced** controller technology with best-in-class **transient response**
- › **Flexibility** with ARM Cortex™ M0 microcontroller (software defined digital controller) for faster design cycle & tailored performance
- › Industry's **smallest digital power controllers** enable higher power density

Protection Controllers

XDP7xx

- › Industry's first wide voltage range hot-swap controller with a programmable digital SOA control for system
- › Superior current reporting **accuracy** ($<\pm 1\%$)
- › Boost Mode control technology for safer turn ON of high capacitance always ON systems

CoolSET™ Auxiliary Supplies

Features

- Isolated / non-isolated Flyback and Buck
- Quasi-resonant & Fixed-frequency
- Integrated 700V – 950V CoolMOS™
- **Integrated 1700V CoolSiC™ ES in Q4 2024**
- Available in 65 kHz, 100 kHz, and 125 kHz
- Up to **70W** (next generation > **100W**)

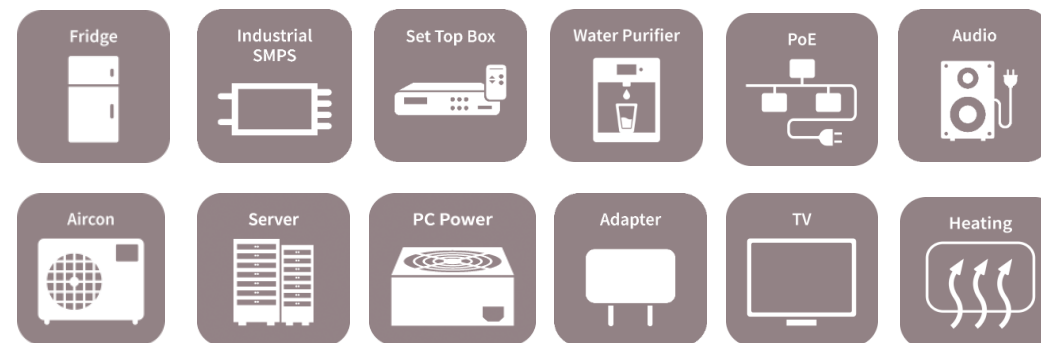
Benefits

- **High efficiency** at light to mid load and low standby
- **950V options** for unstable grid environments
- **Protection, fast and robust start-up**
- **Pin-to-pin compatible portfolio** for design scaling

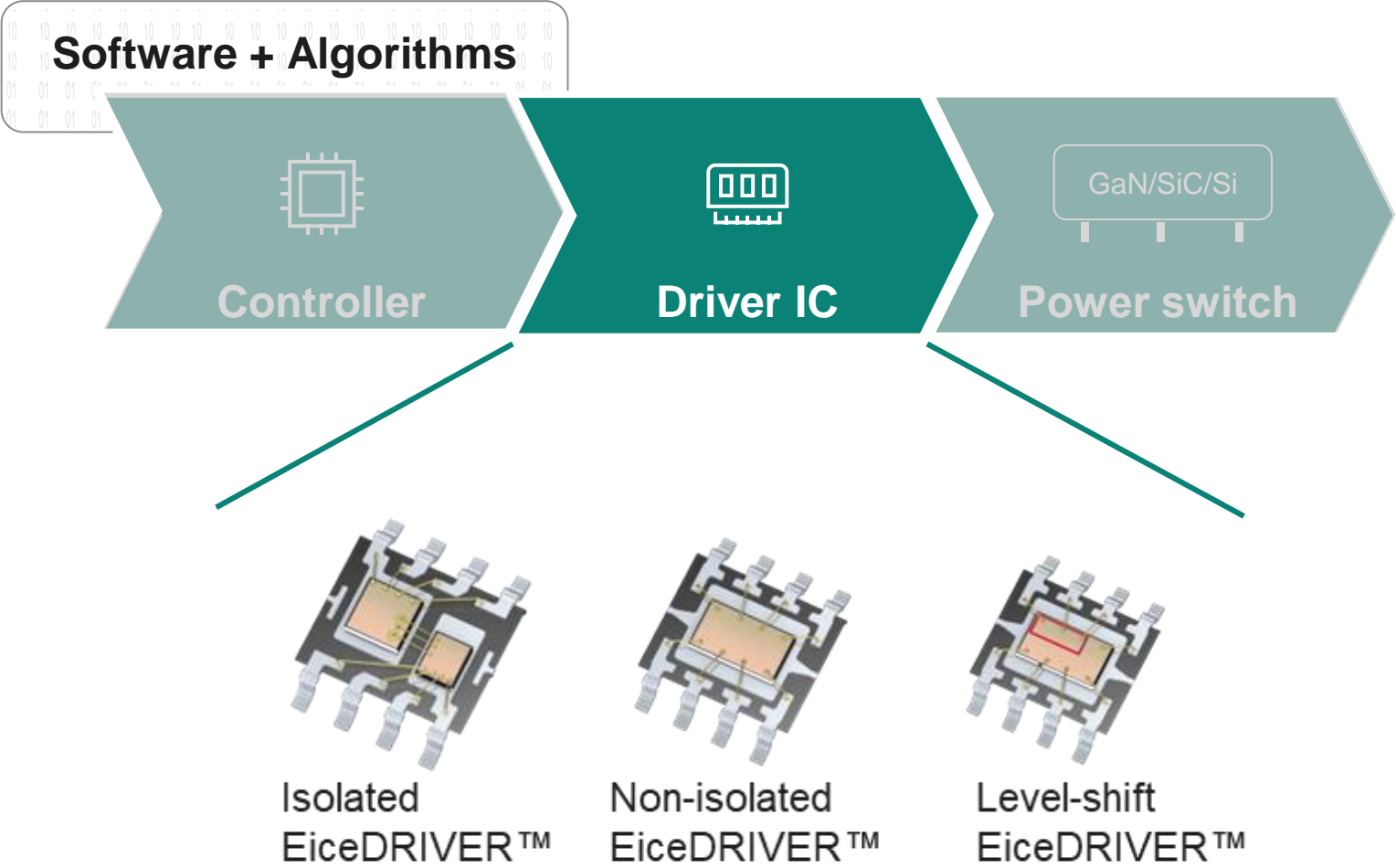
Concept



Applications



Driver ICs



EiceDRIVER™ Gate Drivers

Safety component certifications

Due to proven isolation technology

Extended service life

Due to tailored protections

Operation in harsh environments

Due to wide temperature range

Design flexibility and Ease-of-use

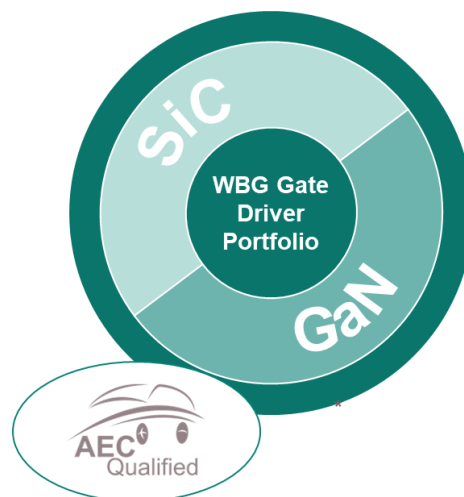
Due to wide driving voltage

Highest efficiency at nominal and light load

Due to accurate timing specs

Reliable system operation

Due to high CMTI robustness



Gate Drivers (WBG only)

1-Channel

1EDN-TDI Family

Truly Differential Inputs



4A / 8A

SOT23-6

TSNP-6

1EDN Family



4A / 8A

SOT23-5

SOT23-6

WSN-6

1EDi-GaN



DSO-16 300mil

DSO-16 150mil

LGA-13 5x5

1EDB-Family

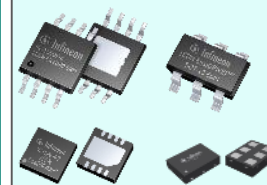


6A / 10A

DSO-8 150mil

2-Channels

2EDN Family



4A/4A, 5A/5A

DSO-8

TSSOP-8

WSN-8

SOT23-6

TSNP-6

2EDi Family



1A/2A, 5A/9A

DSO-16/14 300mil

DSO-16/14 150mil

LGA-13 5x5 / 4x4

Non-Isolated

Galvanic Isolated

Power Switches



Gallium nitride



Silicon carbide

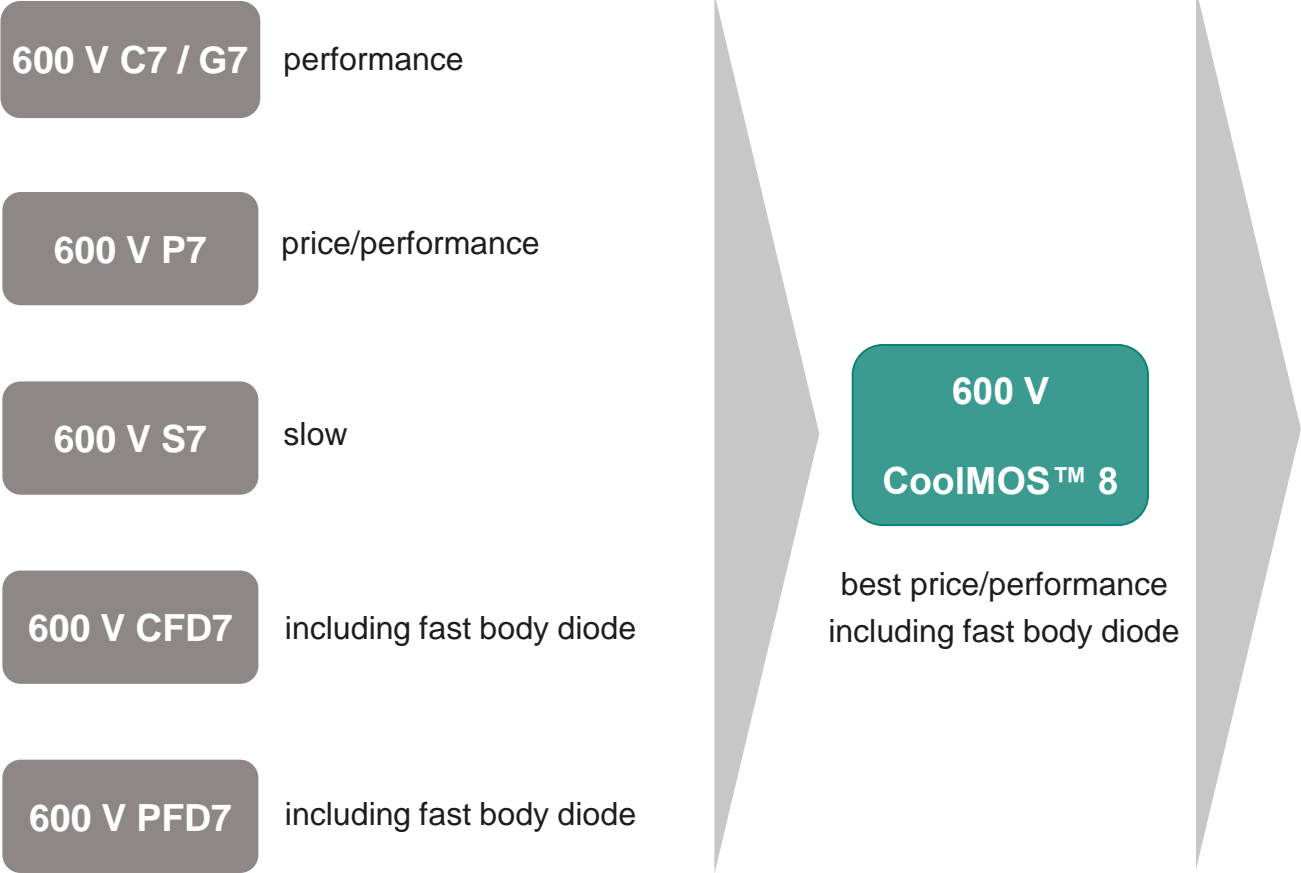








Silicon



600 V CoolMOS™ 8

enhancing best price/performance alternative to WBG offering



Key features		Benefits
	Best-In-Class SJ Mosfet Performance	0.1% efficiency improvement over C7, and 0.17% over P7
	Integrated fast body diode	Enable multiple topologies
	Address broad hard and soft switching applications	Ease of use and shorter design in cycle
	Simplified product portfolio	Easy selection and leverage economy of scale
	.XT interconnect technology	14-42% lower R _{th} for improved thermal performance
	Gradual portfolio including BiC 7mΩ and TSC packages	Enables system level innovation

The price performance 600 V CoolMOS™ 8 is an all-in-one Mosfet brings simplified product offering



Power Switches



Gallium nitride



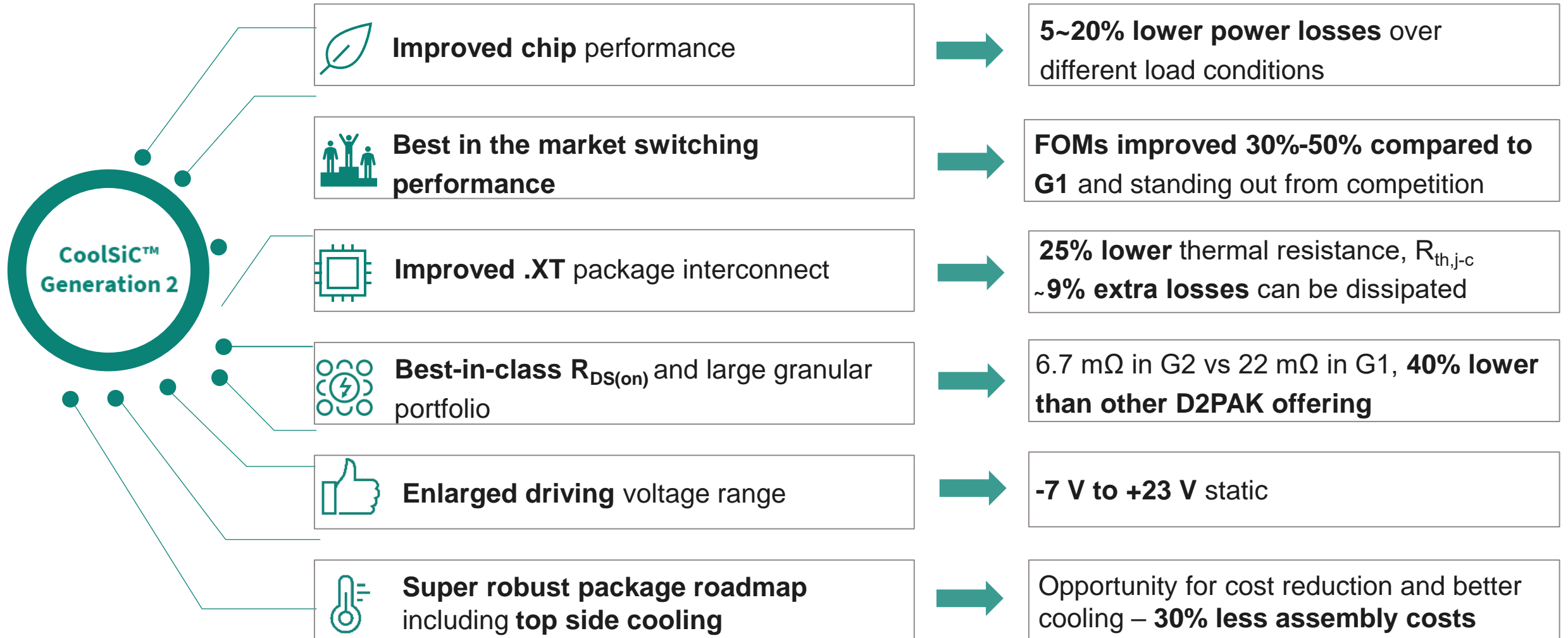
Silicon carbide



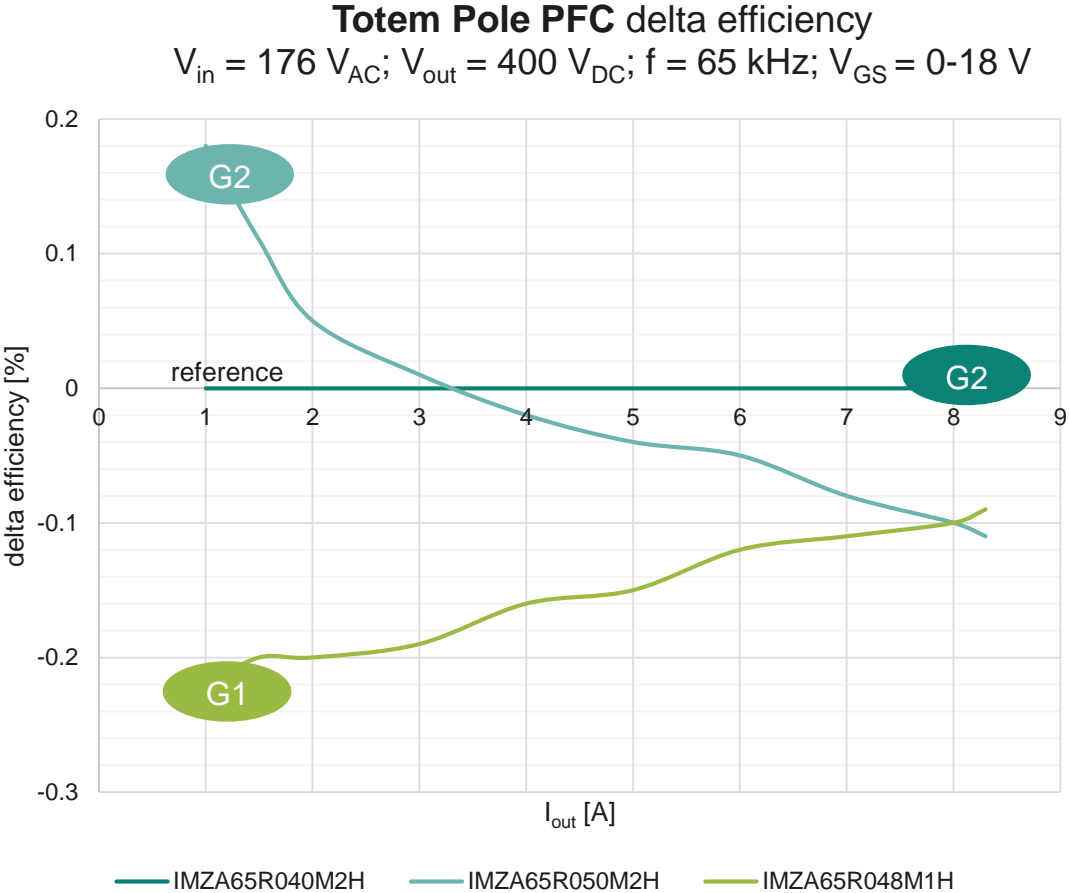
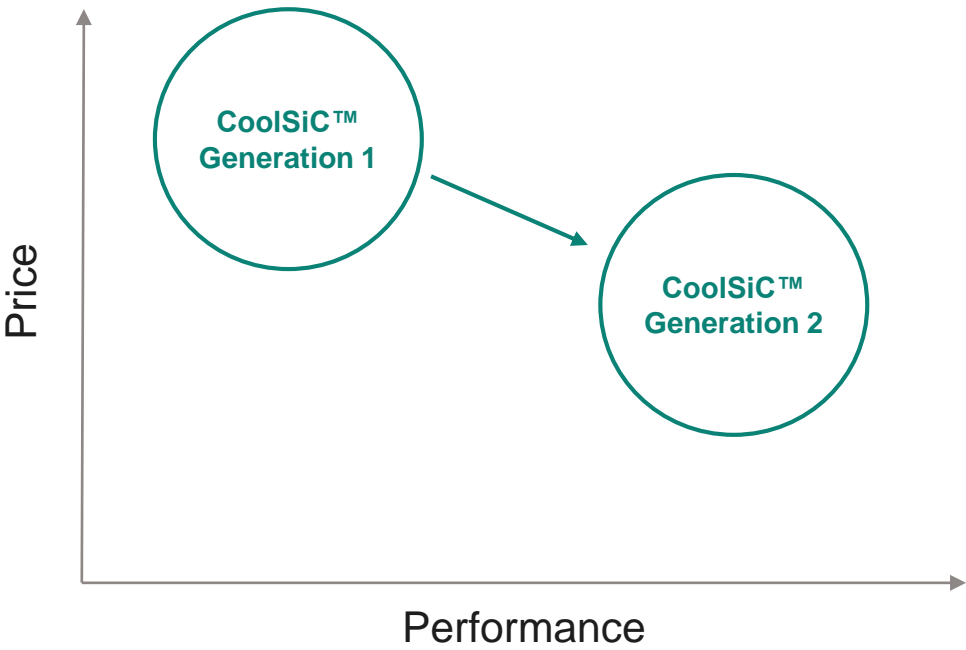
Silicon



CoolSiC™ Generation 2



CoolSiC™ MOSFET G2: higher system performance per \$ invested in SiC



Power Switches



Gallium nitride



Silicon carbide

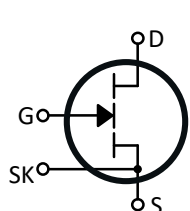


Silicon

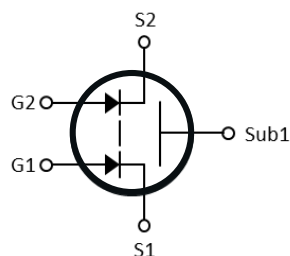


CoolGaN™ Transistor

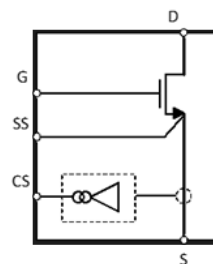
Infinion's CoolGaN™ power transistor family are normally-off transistors. They range from 60 V up to 700 V. The CoolGaN™ Transistor technology is derived from years of Infineon innovation resulting in the industries largest intellectual property portfolio.

CoolGaN™
BDS

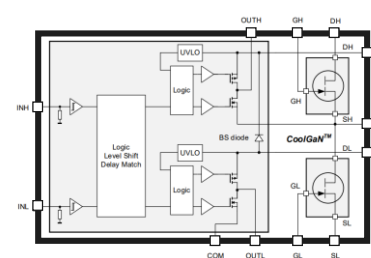
Family of monolithic bi-directional switch (BDS) devices based on Infineon CoolGaN™ transistor technology. The devices are normally-off Gate Injection Transistor (GIT) with two gates having independent isolated control. The BDS device blocks voltages in both directions.

CoolGaN™
Smart

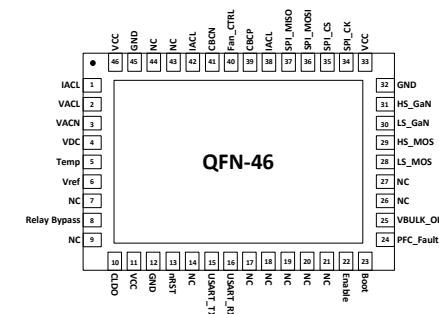
Family of CoolGaN™ transistors with industry leading integrated functions and features such as lossless current sense and protection functions.

CoolGaN™
Drive

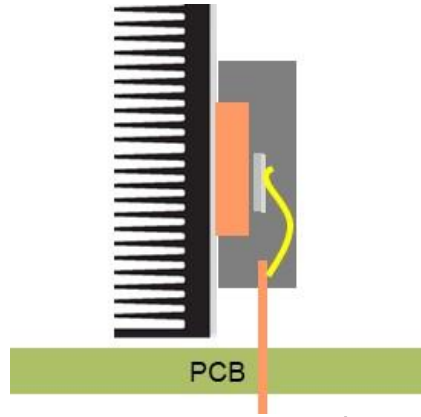
Infinion's CoolGaN™ Drive family of single-side and half-bridge solutions consist of integrated high performance CoolGaN™ transistors with intelligent gate drivers in a variety of package options resulting in a robust, high-performing portfolio.

CoolGaN™
Control

Infinion's CoolGaN™ Control family of power IC solutions feature industry-leading CoolGaN™ transistors combined with Infineon's EZ-PD™ controllers resulting in maximum efficiency and power density while reducing manufacturing complexity and total system cost.



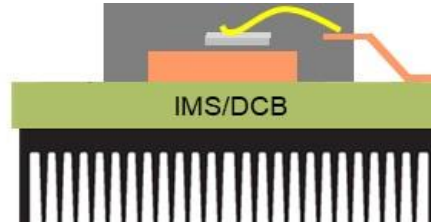
Infinion industrializes top-side cooling with the most robust roadmap in the market → Enabler for high power and density



TO-247

THD – Through Hole Device

- Robust thermal performance
- **High package inductance**



ThinPAK
8x8 / 5x6

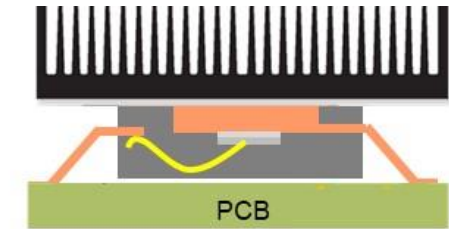
TOLL

DSO-20
BS

D2PAK

SMD Bottom-side cooling

- **Medium thermal performance**
- Low package inductance



DDPAK

TOLT

QDPAK

DSO-20

SMD top-side cooling

- **Optimal** thermal performance
- **Optimal** loop inductance and PCB design

Si, SiC and GaN capacity expansion to respond to fast growing demand

New fully automated chip factory

Total building area: ~ 60,000 m²

Volume of investment: ~ € 1.6 bn€

> 2 bn€ WBG invest

Villach, Austria



- › Si 300 mm manufacturing
- › SiC capacity secured in Villach
- › GaN scaling-up to volume manufacturing

Frontend fab to **expand market leadership in power semiconductors**

Kulim, Malaysia



- › Products based on silicon carbide and gallium nitride
- › Ready for equipment in the summer of 2024

The **world's first** high-volume production site for power semiconductors on **300mm wafers**

Dresden, Germany



> 5 bn€ Power invest

- › 200mm and 300mm wafer, especially **Automotive grade**
- › Clean room area: 40,000 m²

Infineon's **largest assembly and test facility** (123,500 m²)

Melaka, Malaysia



- › **Expansion plan** includes a new 12,000 m² fab
- › Facility focusing on megatrend technologies for energy efficiency and **automotive industries**



Support

Collaterals and brochures

- Product briefs
- Selection guides
- Application brochures
- Presentations
- Press releases, ads

Technical material

- Application notes
- Technical articles
- Simulation models
- Datasheets, MCDS files
- PCB design data

Evaluation boards

- Evaluation boards
- Demoboards
- Reference designs

Videos

- Technical videos
- Product information videos

“Infineon Power and sensing selection guide” in www.infineon.com

- www.infineon.com/cms/en/product/power/mosfet/n-channel/500v-950v/
- www.infineon.com/cms/en/product/power/mosfet/silicon-carbide/
- www.infineon.com/cms/en/product/power/diodes-thyristors/cool-sic-schottky-diodes/
- <https://www.infineon.com/cms/en/product/power/ac-dc-power-conversion/>
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