

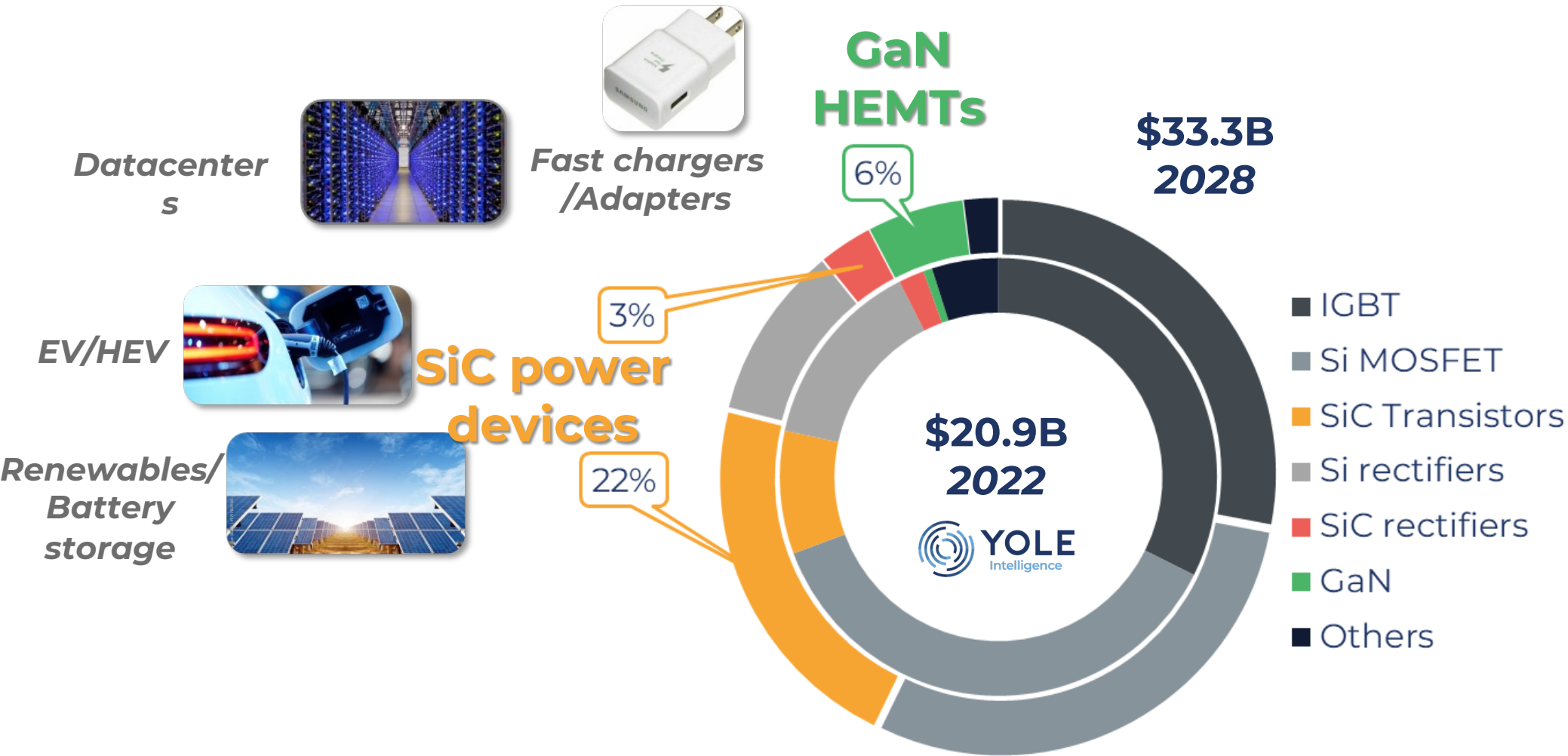
The Power Play : Unveiling Capacity Challenges in SiC and GaN Industries

Ezgi DOGMUS, PhD
April 17th, 2024





SIC AND GAN : MORE THAN 30% OF THE POWER MARKET IN VALUE BY 2028 !

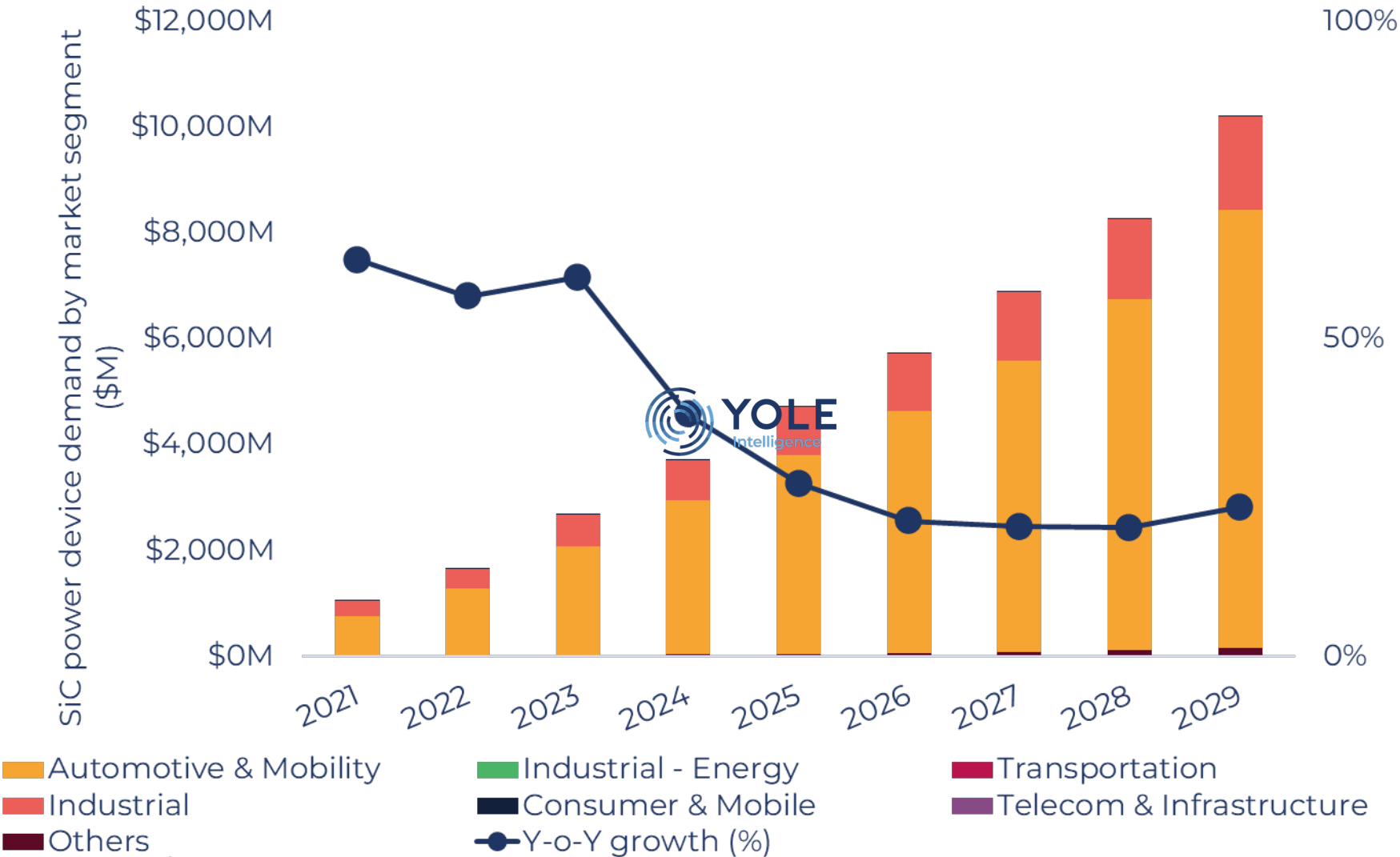


Source: Status of Power Electronics Industry 2023
*Total market includes power discrete and modules.

SIC DEVICE MARKET TO REACH BEYOND \$10B BY END OF THIS DECADE



Despite a global EV market slowdown in 2023-24, SiC market growth is mainly fueled by EVs, expected to represent over 75% of the SiC device market by 2029.



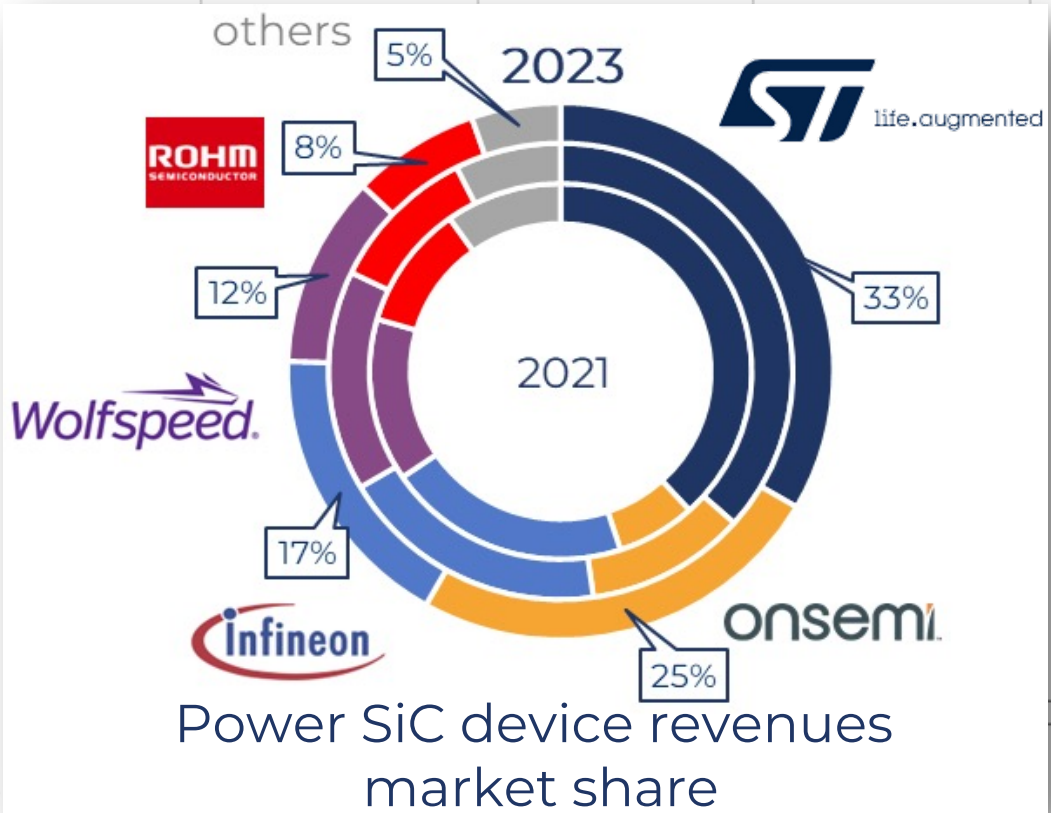
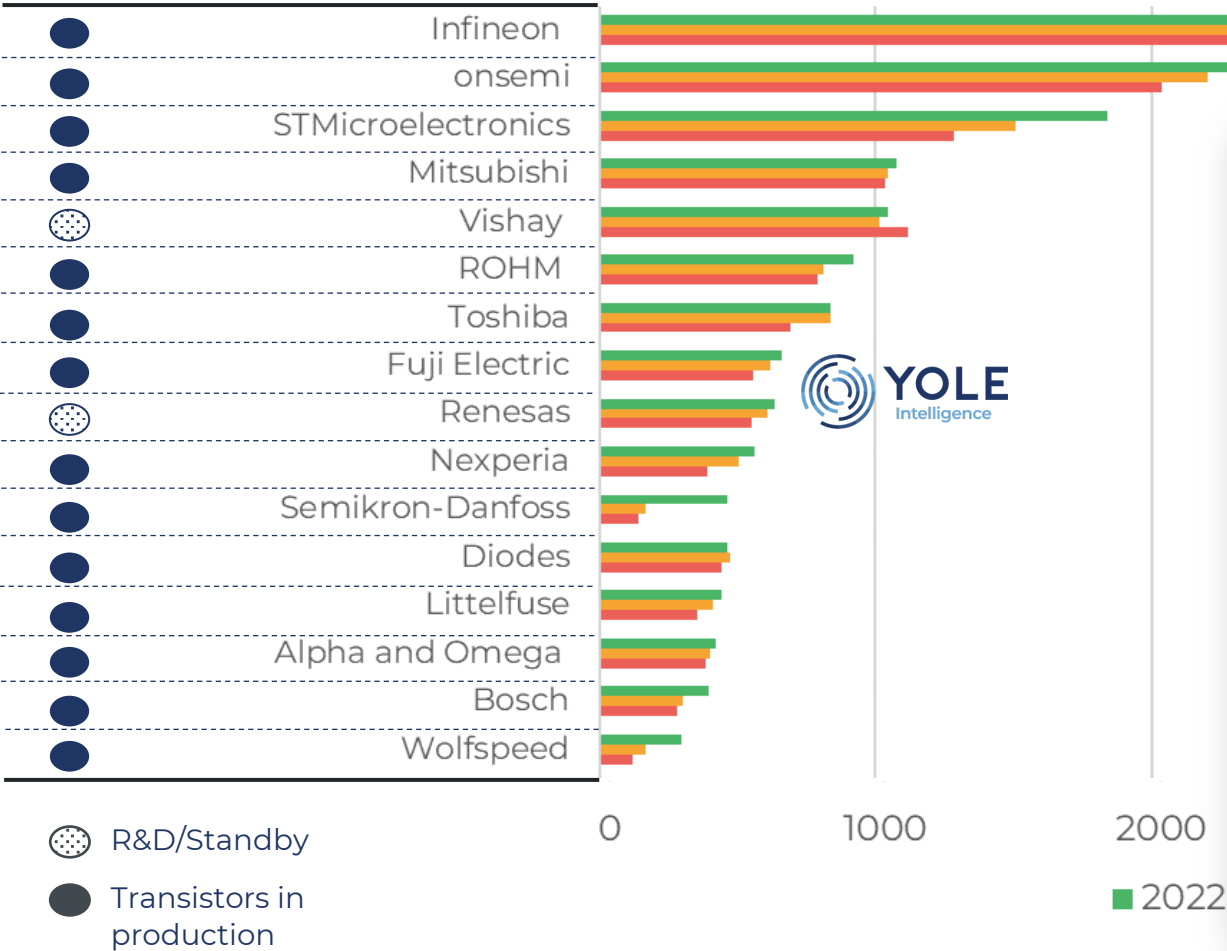
Source: Power SiC/GaN Compound Semiconductor Quarterly Market Monitor – Q1-2024

WHO IS LEADING POWER DEVICE MARKET ? (SILICON + SIC + GAN)

Revenues significantly boosted thanks to SiC lately!

SiC

Power device revenue evolution - 2020-2021-2022



SIC IS BECOMING MAINSTREAM IN EV POWER CONVERSION FOR 800V

But Silicon is still around!



SiC



Si IGBT

Rear / Front inverter (DC-AC)



★ IONIQ
HYUNDAI MOBIS infineon

★ Front and Rear 800V inverters in Hyundai Ioniq 5



★ BYD

608V inverter in BYD's 8 in 1 Powertrain

DC-DC converter



★ DENSO
Crafting the Core

Denso Fuel Cell Converter for Toyota Mirai 2



★ BOSCH

DC-DC Converter for VW ID.3

On-Board charger (AC/DC & DC/DC)



★ IONIQ
HYUNDAI MOBIS

Hyundai Ioniq 5



★ SHINRY

Xpeng G6 2-in-1 OBC and DC/DC*



★ LEAR CORPORATION

OBC in Polestar 2

Source: Automotive Teardown Tracks with BoM analysis, Yole SystemPlus

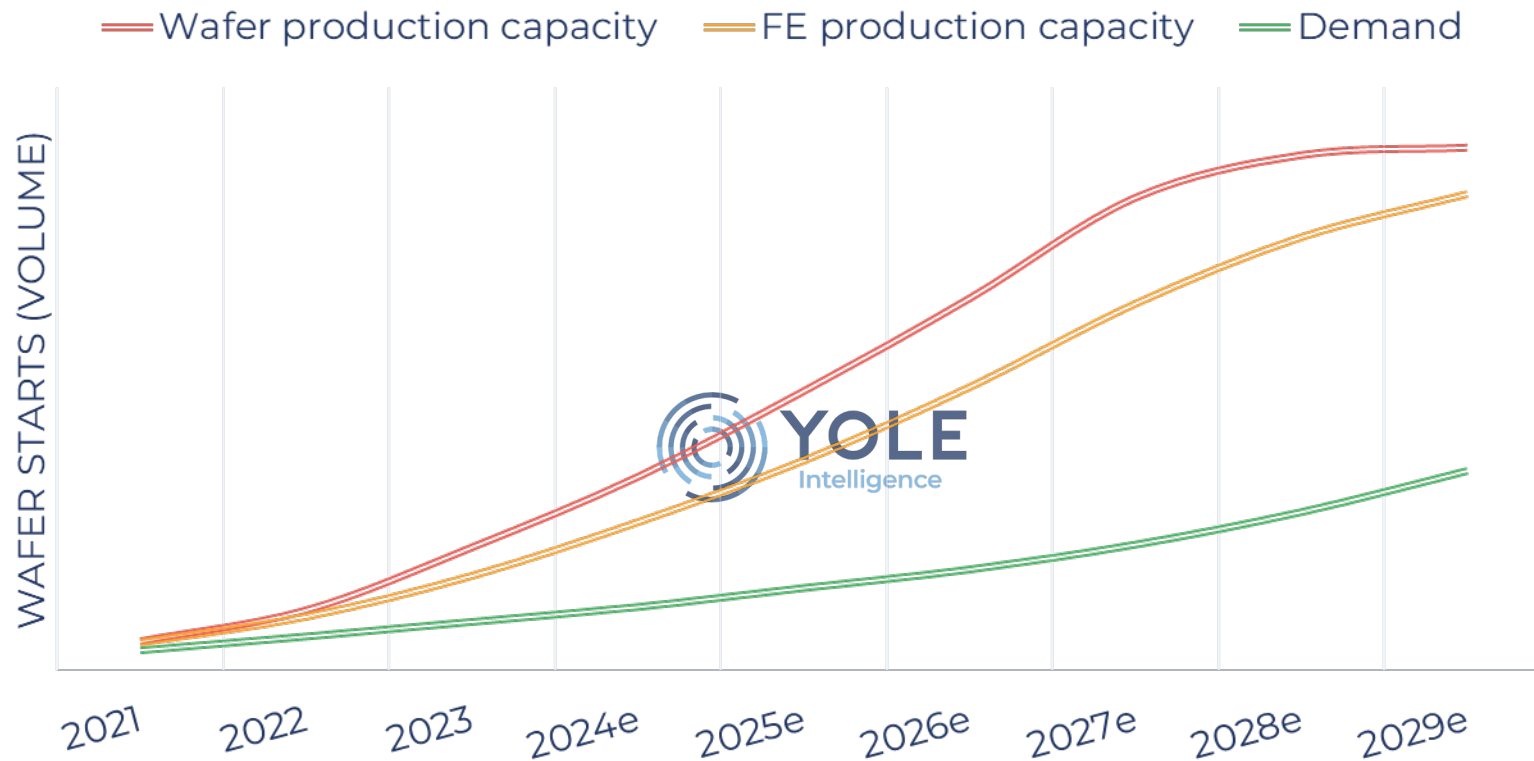
*Upcoming analysis on SiC from Xpeng G6 OBC/DC-DC system

POWER SiC WAFER BUSINESS IS GOING TO OVER CAPACITY

Massive investments in wafer production, especially in China



GLOBAL POWER SiC WAFER DEMAND VS. CAPACITY



What could be the outcomes?

- More confidence in SiC technology & supply!
- Lower SiC wafer pricing, potential for device pricing erosion?
- Proliferation in non-automotive segments

Source: Power SiC Manufacturing Report – available in mid Q2-2024

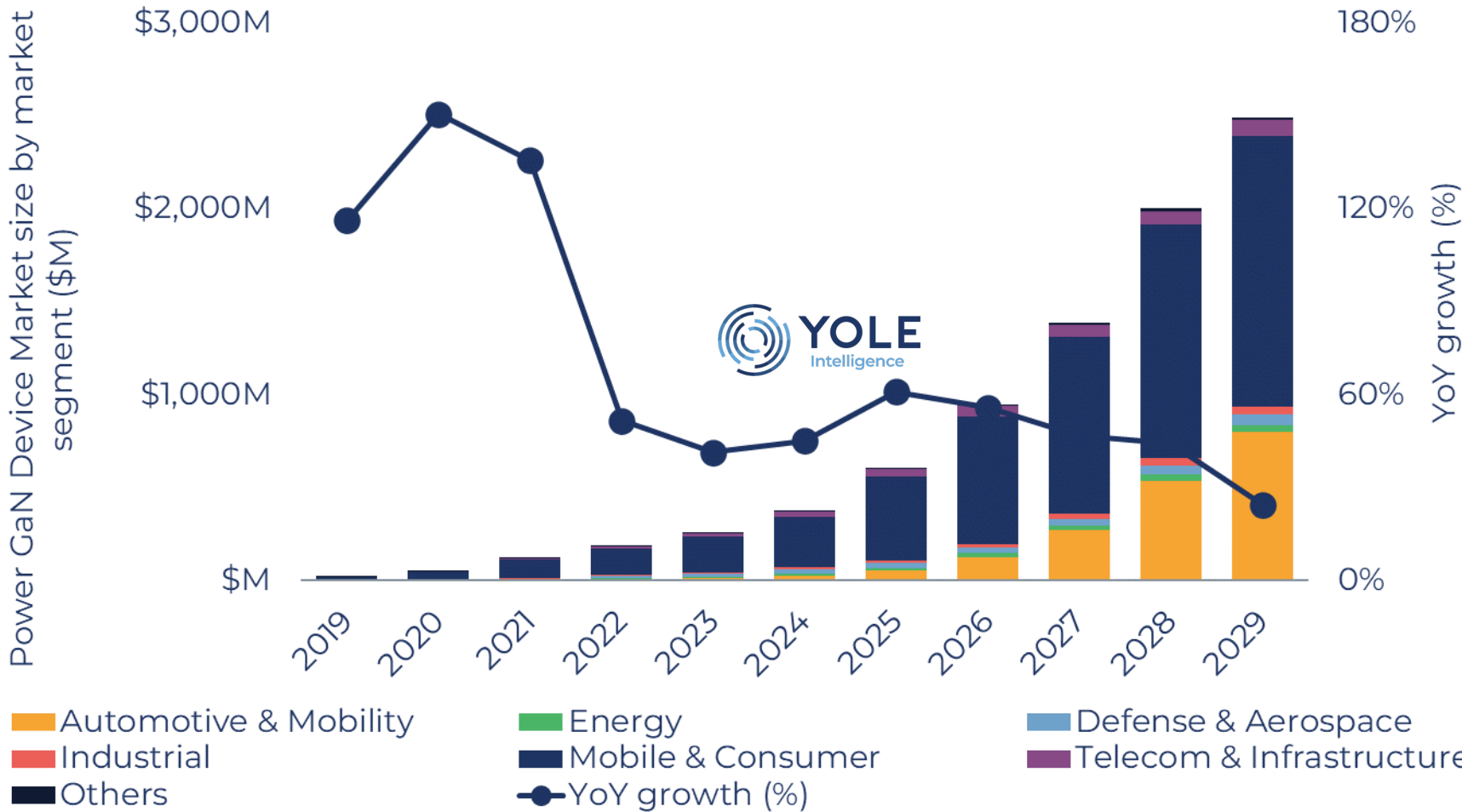


What about the other strategic WBG, GaN?

POWER GAN DEVICE MARKET IS EXPECTED TO REACH BEYOND \$2B IN 2028



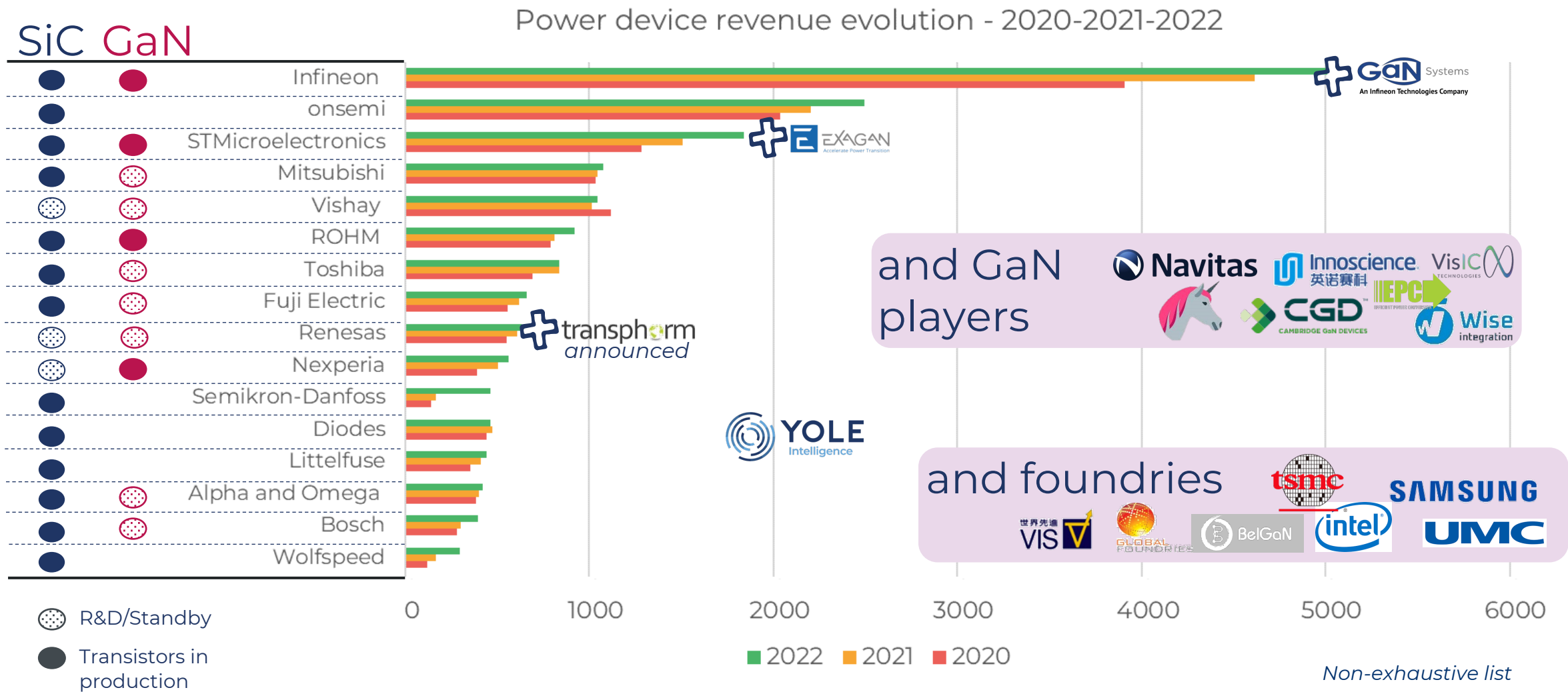
Driven by consumer fact charger and datacom power supply applications, Power GaN device market will grow with CAGR > 45% in 2023-29.



Source: Power SiC/GaN Compound Semiconductor Quarterly Market Monitor – Q1-2024

LEADING POWER DEVICE PLAYERS (SILICON + SIC + GAN)

More GaN activities unveiled





KEY TAKE AWAYS

Ongoing investments in all fronts

Si IGBT & MOSFETs

- Transition to 300-mm
- Existing site expansion in both FE and BE



SiC

- Securing wafer supply
- Strategic acquisitions and partnerships
- Transition to 200-mm
- Massive capacity expansion, especially with green field investments



GaN

- Transition to 200-mm
- Strategic acquisitions
- Potential new entrants
- Leveraging existing Si fabs



> \$20B+

Stay Tuned!

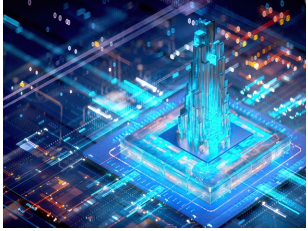
> \$4.5B+

Non-exhaustive list



YOLE GROUP RELATED PRODUCTS

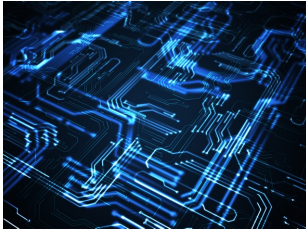
Quarterly Updated Monitor Services – Unlimited access to analysts



Power SiC/GaN Compound Semiconductor Market Monitor



Wafer Fab Equipment Market Monitor



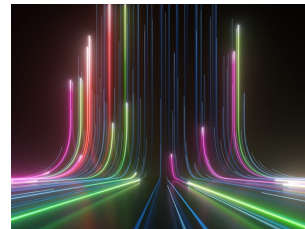
RF GaN Compound Semiconductor Market Monitor



Semiconductor Equipment Subsystems Market Monitor



Photonics GaAs/InP Compound Semiconductor Market Monitor



Wafer Data Monitor

YOLE GROUP RELATED MARKET & TECHNOLOGY REPORTS

From Power Electronics & Semiconductor perspectives



Power Electronics for e-Mobility 2023 – Focus on passenger & light commercial vehicles



Status of the Power Electronics Industry 2023



DC Charging for Automotive 2023



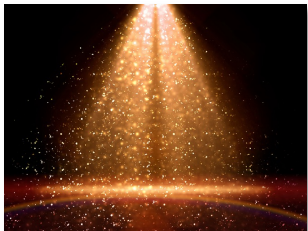
Power SiC Manufacturing 2024



Status of the Power Module Packaging Industry 2023



Power SiC 2023



Status of the Compound Semiconductor Industry 2024



Power GaN 2023

YOLE GROUP RELATED PRODUCTS

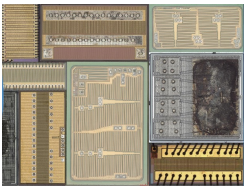
Teardown Reports and Tracks



BYD 8-in-1 Powertrain Domain Controller for Denza D9 Front Drive



SiC MOSFET Discretes and Module Performance Comparison Analysis 2024



GaN Power Transistor Comparison 2023



SiC Transistor Comparison 2023



AUTOMOTIVE
Electrification

Automotive - Electrification



AUTOMOTIVE
ADAS

Automotive - ADAS



AUTOMOTIVE
Infotainment

Automotive - Infotainment



AUTOMOTIVE
Telematics

Automotive - Telematics

THANKS! ANY QUESTIONS?



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Find us in the 3 programs & meet us on our booth #49 !

