

POWER



MAY 16, 2024
CHRIS ALEXANDRE
SVP AND GM OF POWER PRODUCT GROUP
RENESAS ELECTRONICS CORPORATION

AT A GLANCE

POWER

Our products and technologies



Power Management Integrated Circuit (PMIC)



Computing Power



Discrete & Wide Bandgap

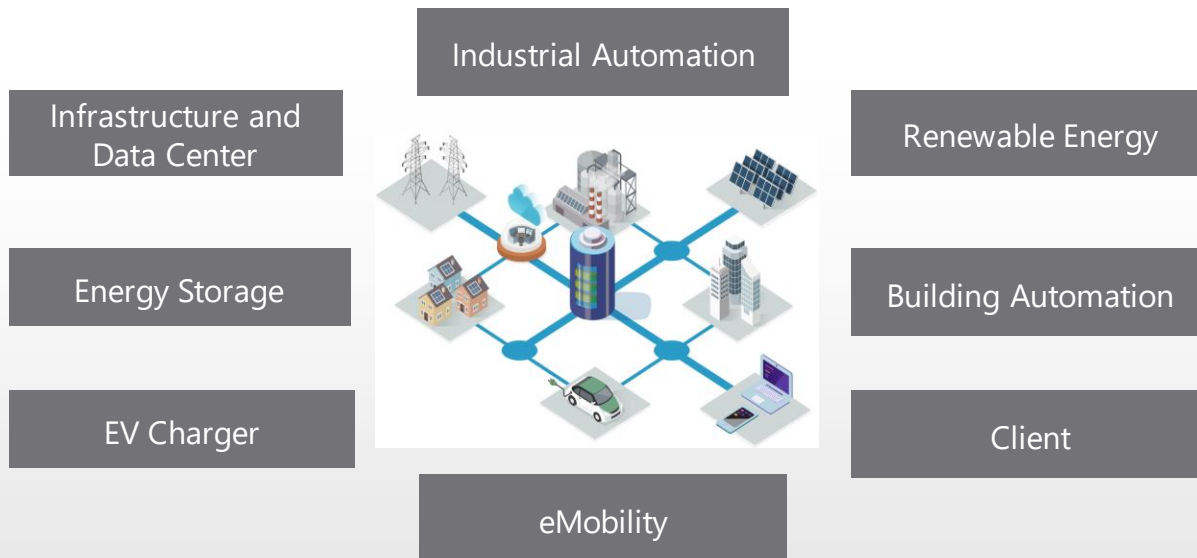


Catalog Power Management



Battery Management System (BMS)

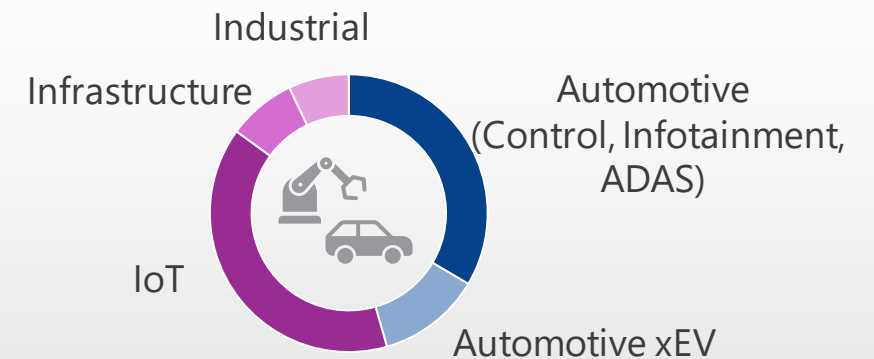
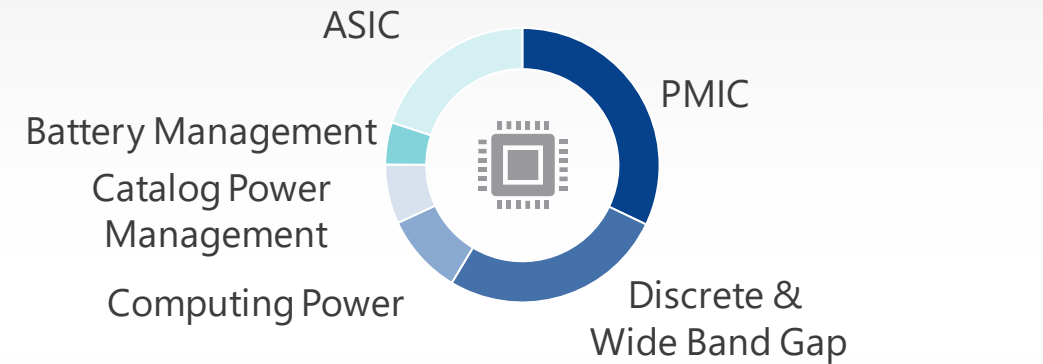
Diversified portfolio serving key segments & megatrends



PMIC: Power Management Integrated Circuit

* Catalog Power Management includes products such as Intelligent Power Devices, drivers & gate controllers, & catalog DC/DC

2023 Revenue



EXPANDING POWER PORTFOLIO WITH GaN

ACCELERATING POWER GROWTH BY BROADENING OFFERING
ACCESSING ADDITIONAL SAM

RENESAS

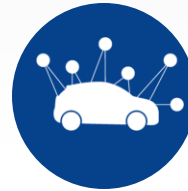
+

transphorm

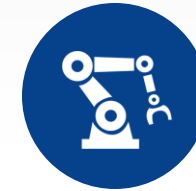
expanding \$13B* SAM in



Infrastructure & Computing



xEV / eMobility



Industrial

Attached to drivers and controllers = solutions enabling full end-to end power ecosystem

2H 2024



140W/240W USB PD3.1



350W 2-Wheeler OBC



1.8kW Server Power Supply



2-4kW Storage bi-directional charger

Source Yole, Wall Street Research
* Estimated SAM in 2030

POWER STRATEGY AND SEGMENT FOCUS

Focus areas



Infrastructure / AI & Computing



AI infrastructure



Other server & Cloud



Client (AI on the edge)



Automotive



Automotive xEV



Other automotive



Industrial

Strategy

Vertical approach

- Laser focus on fast growing SAM with tailored solutions for each market
- Dedicated engineering & segment teams (Sales/FAE & BU) - Center of application expertise
- Strategic / lead customers engagement, and duplication to more customers through winning combinations

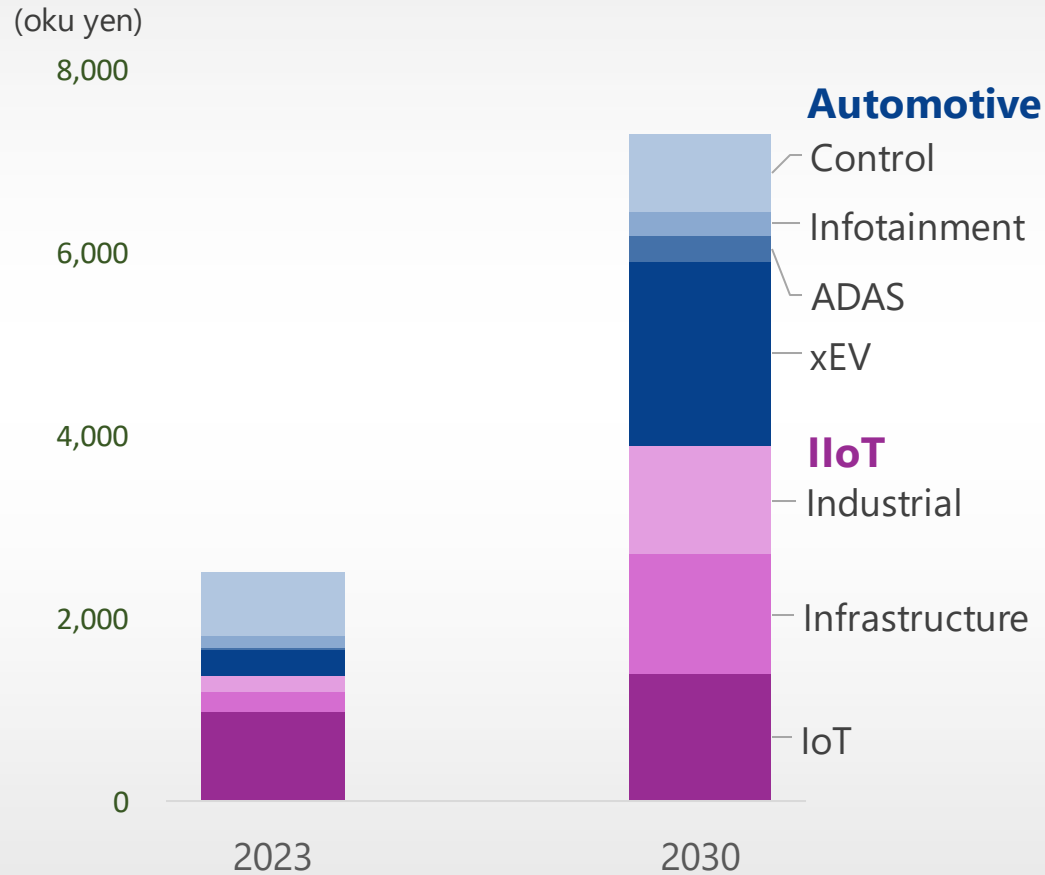
Solution & attach approach

- Full BOM focus with more products per systems (IC + Discrete)
- Solution and attach play :
 - Power attached to Renesas Digital footprint (MCU, MPU, SoC)
 - Attach to Power products (power tree)
- Expansion of catalog portfolio to deliver power tree

GROWTH DRIVERS






POWER

Revenue



* FX \$1 = 100yen, €1 = 120yen

Growth drivers

	Infrastructure & AI	➤	Compute Power Power discrete & Wide Bandgap Catalog Power
	Automotive xEV	➤	Power discrete & Wide Bandgap Battery Management System Catalog Power
	Industrial	➤	PMIC attach to SoC/MPU/MCU Catalog Power Power discrete & Wide Bandgap Battery Management System
	Other Automotive	➤	PMIC attach to SoC/MPU/MCU Catalog Power Compute Power
	IoT & Client	➤	PMIC (Client) Battery Management System Catalog Power

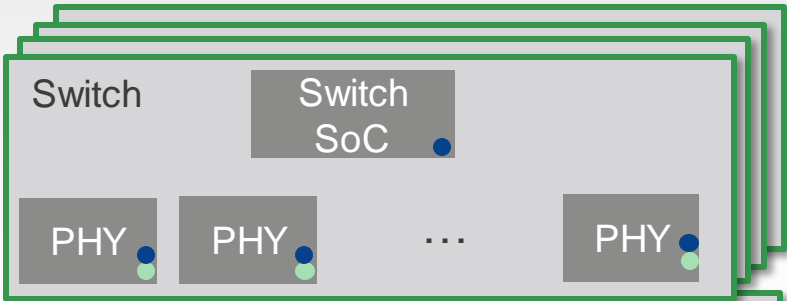
Wide Bandgap: SiC / GaN

POWER PORTFOLIO FUELING LARGE OPPORTUNITY

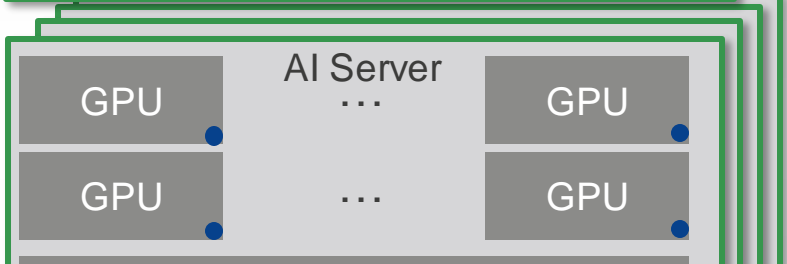
COMPREHENSIVE PRODUCTS PORTFOLIO FOR APPLICATION IN AI & DATACENTER SERVERS

**\$700-\$2,200
Power Content
per Rack**

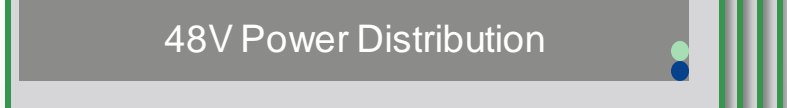
\$100-\$200



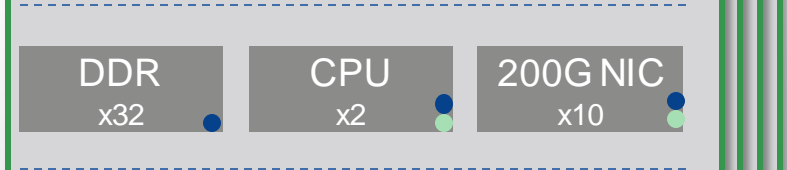
\$250-\$1,000



\$80-\$400



\$180-\$300

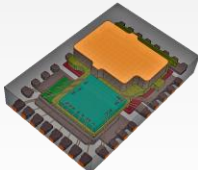


\$120-\$400



Source: Renesas estimates

● Renesas existing products & content



4th Gen Digital Multiphase Controllers
3rd Gen Smart Power Stages



48V IBC



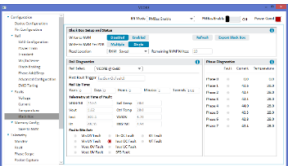
Vertical Power
High Density Modules
(own + partners)



DDR5 PMIC



Custom Performance
Testing Tools



Performance
Optimization
Software

● Renesas new products & opportunity

PoL, e-Fuse
MOSFETs, GaN FETs
Controllers & Drivers

BROAD ADOPTION ACROSS DIVERSE APPLICATIONS

TOP RANKED AND ESTABLISHED SUPPLIER ACROSS ALL KEY PLAYERS

Renesas' differentiating factors



Digital controller leadership

- Innovative 4th gen. high performance solution
- Flexible & fully programmable controller
- Optimized with high efficiency power stage



Hyperscale CSP focused design

- Native support
- Custom tools, software, and modeling support



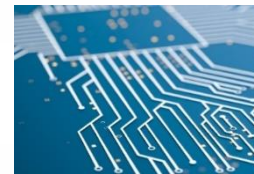
Tier-1, Reliable quality Supplier

- > 2.5Bu Smart Power Stages Shipped
- > 300Mu Digital Controllers Shipped

Renesas adoption



- All top 7 cloud providers x64 platforms



- Current and next-gen reference design wins for top 2 CPU suppliers



- All major infrastructure OEMs
- All mobile computing OEMs
- All major xPU suppliers

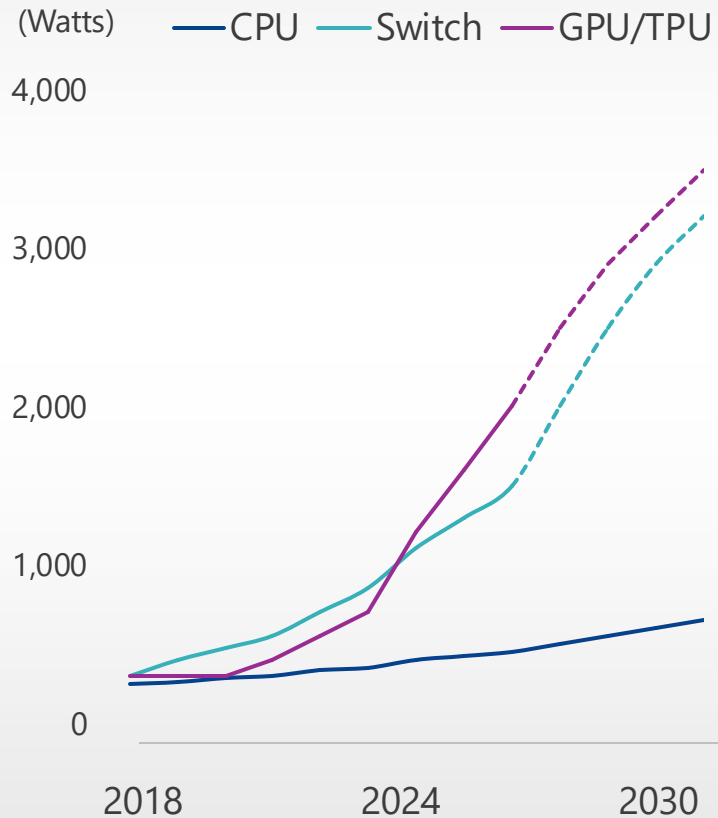


- 3 of 3 US CSP ARM platforms
- 2 of 2 US AI SoC suppliers
- 3 of 4 US CSP AI platforms
- 2 top networking customers

AI SYSTEM POWER SAM IS GROWING EXPONENTIALLY

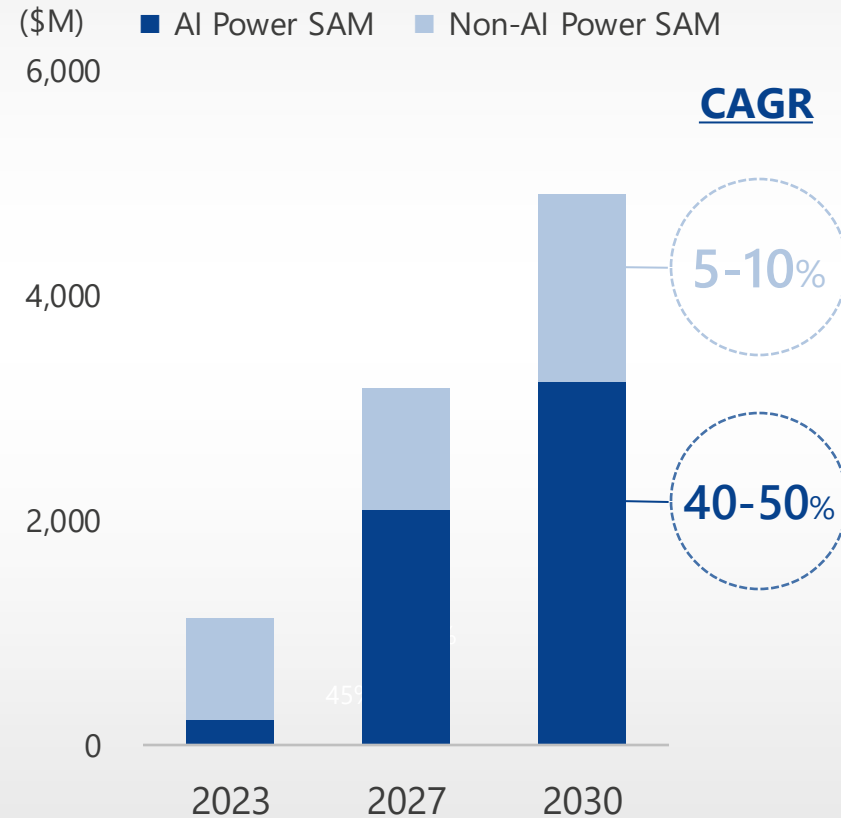
DRIVEN BY POWER CONTENT, POWER ASP, AND SYSTEM UNIT VOLUMES

Power consumption per SoC



Source: Renesas estimates with confidential customer forecast

Compute Power SAM



Source: Renesas estimates with confidential customer forecast

Growth Drivers

Higher power content per SoC

3x to 5x more sockets for power
 CPU: \$20-\$40 power per SoC
 AI: \$75-\$200+ power per SoC

Higher selling price per Amp

Vertical and Modular Power
 Lateral Power (CPU) \$/phase: 1x
 Vertical/Modular Power \$/phase: 3.5x-6x

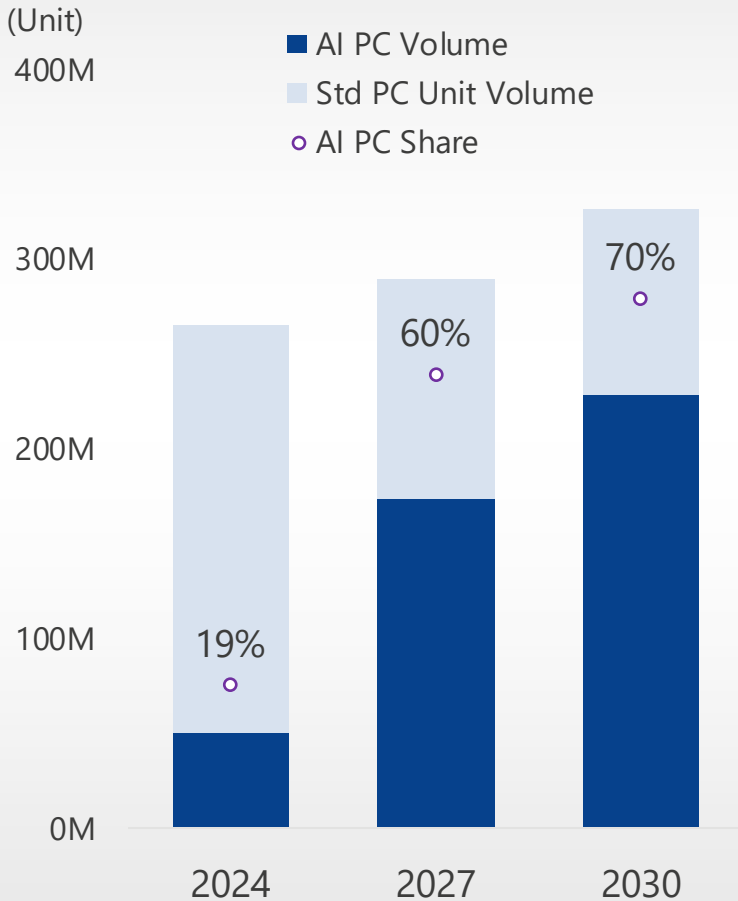
AI SoC volume growth

2023: 2.5M SoCs
 2030: 15M SoCs
 > 20% CAGR

RENESAS POWERS EDGE / CLIENT AI

EDGE / CLIENT AI ACHIEVES SCALE

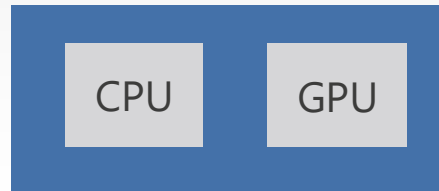
PC shipment forecast



Source: Canalis, PC Analysis Sept 2023, with Renesas estimates

AI PC contents increase

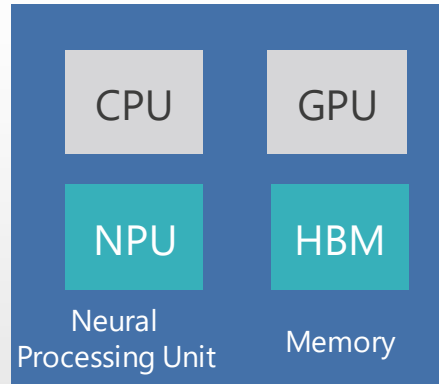
Standard PC



\$3+ content



AI PC



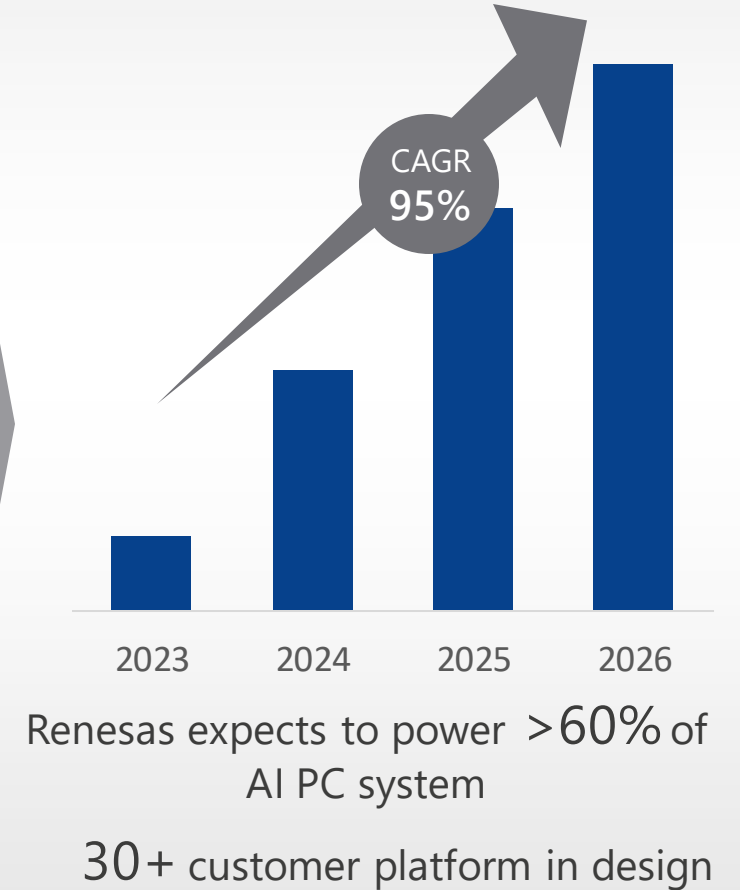
\$7+ content



+




AI PC-based power revenue



Source: Renesas estimates with confidential customer forecast

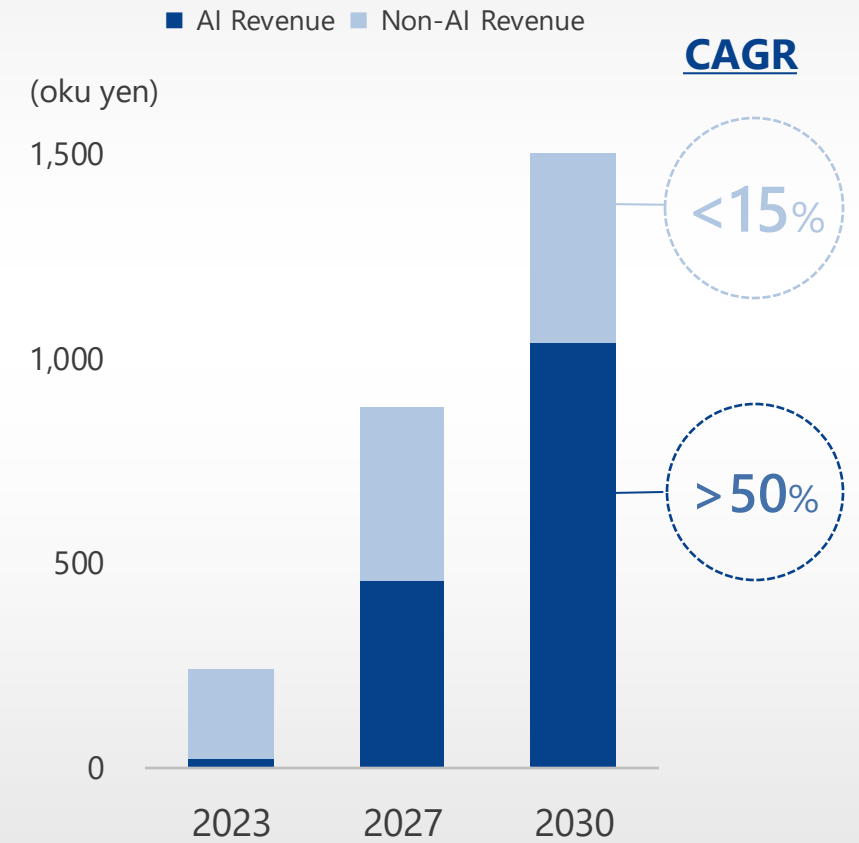
AI WILL ACCELERATE REVENUE GROWTH THROUGH 2030

GROWTH DRIVERS ACROSS AI CLIENT, AI INFRASTRUCTURES AND SERVER & CLOUD

	Existing business	In active design with Renesas	Expected business
 AI client \$/SoC	\$3	\$7+	
 AI infrastructure \$/SoC	US CSP1: 2 platforms US CSP2: 1 platform US xPU1: 1 platform	US CSP1: 1 platform US CSP3: 2 platforms US xPU1: 4 platforms US xPU2: 4 platforms	US CSP4: 2 platforms US xPU3: 2 platforms
 Other server & Cloud \$/SoC	~25% Market Share \$30-\$45	~35% Market share by 2025 \$40-\$60	\$175



Computing power Renesas revenue



Source: Renesas estimates with confidential customer forecast

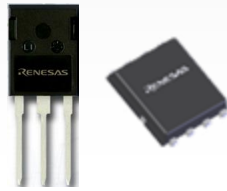
PORTFOLIO SERVING ALL AUTOMOTIVE MARKET

MORE CONTENT IN ALL CARS, ACCELERATION WITH xEV

DC/DC, OBC

Si MOSFET, SiC,
IGBT and GaN

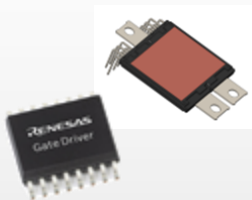
Faster charging



Inverter, Battery Management

IGBT, SiC, Driver
BMS

More range



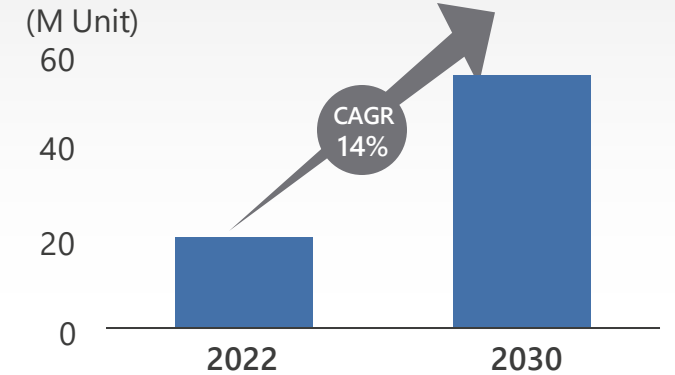
Other body and chassis applications

Functional safety PMIC
Catalog products & solutions

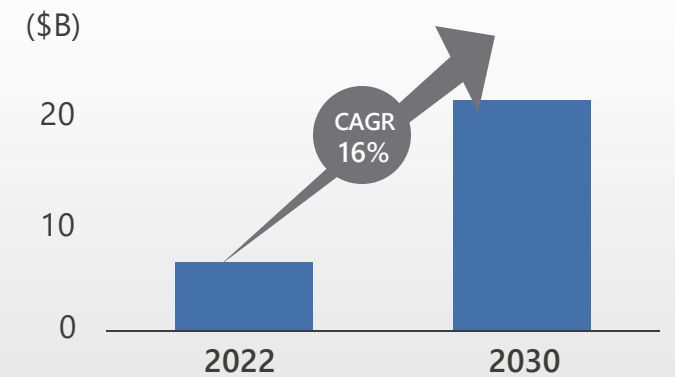
Scalable platform



Global xEV production



PWR TAM of semiconductor in xEV



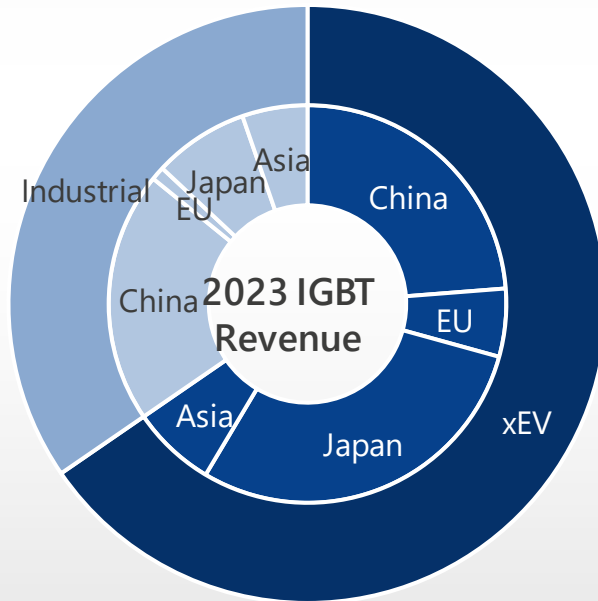
Source: TechInsight Jan 2024

DISCRETE & WIDE BANDGAP BUSINESS UPDATE

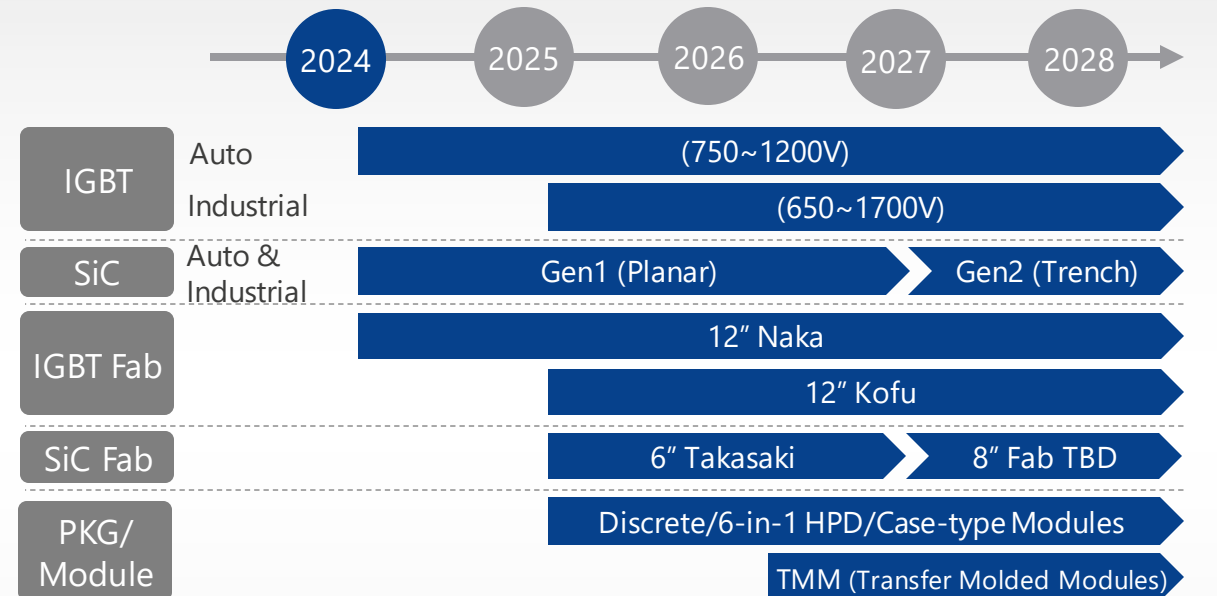
EXPANDING BUSINESS BEYOND AUTOMOTIVE & DIVERSIFICATION OF CUSTOMER BASE

High voltage product business

- Moving to include Industrial package / module in addition to Auto bare die
- Expanding to North America, Europe, India, and South Korea



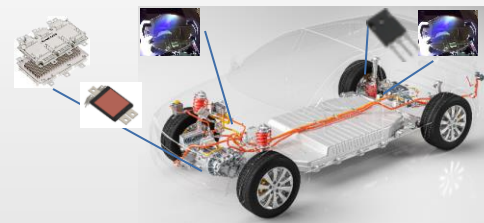
New products road map



Traction inverter, DC/DC

On-Board Charger

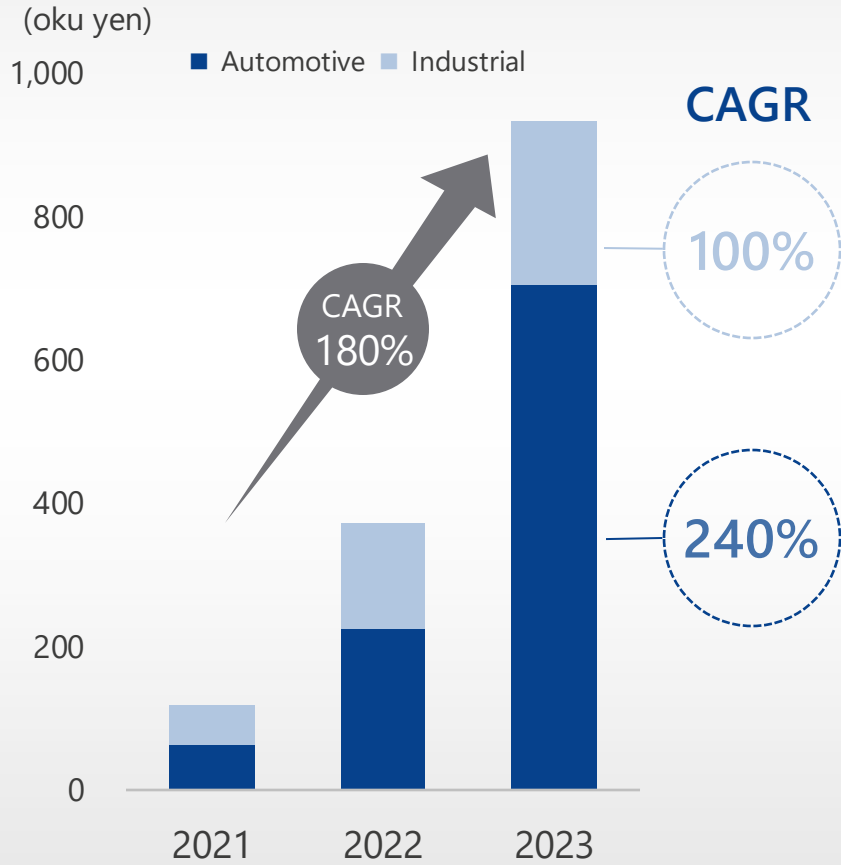
PV, ESS, Charging Station, UPS



NEAR TERM IGBT OUTLOOK

FOCUS ON DIVERSIFICATION TO ENABLE SUSTAINABLE AND CONSISTENT GROWTH

IGBT design-in momentum



Recent Engagement / D-Ins



Automotive

- 2 x Europe Tier 2 (TR)
- South Korea Tier 1 (TR)
- Japan Tier 1 (TR)
- Europe Tier 1 (Exciter)

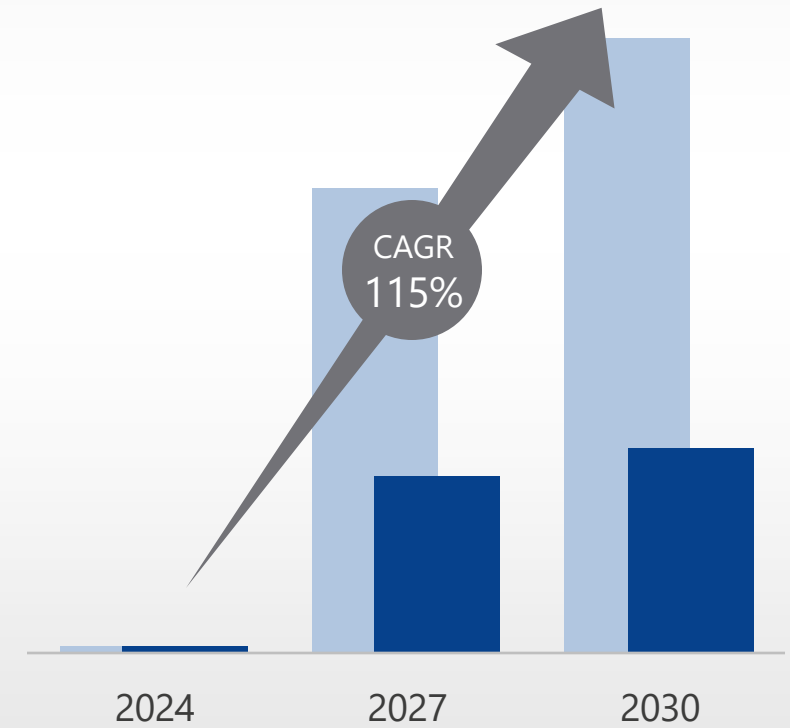


Industrial

- 2 x Japan HVAC OEM
- Multiple China PV manufacturers
- Europe Tier 1 for wind power
- Major Japan home appliance OEM

New business – volume forecast

Confirmed D-ins Active Opportunities



SiC DEVELOPMENT UPDATE

PROGRESS IN TECHNOLOGY DEVELOPMENT, GETTING READY FOR LAUNCH

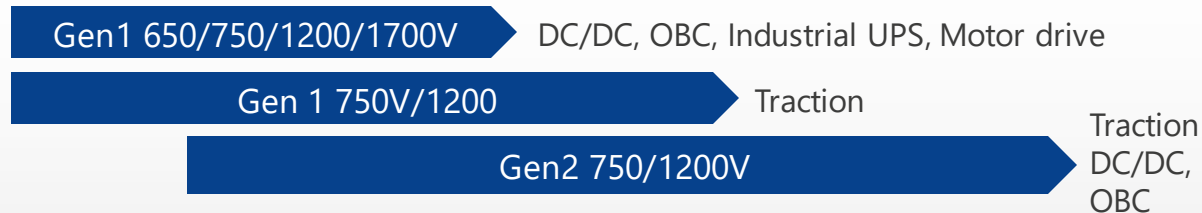
High performance, Ruggedness, Quality & Supply Assurance

SiC family development plan

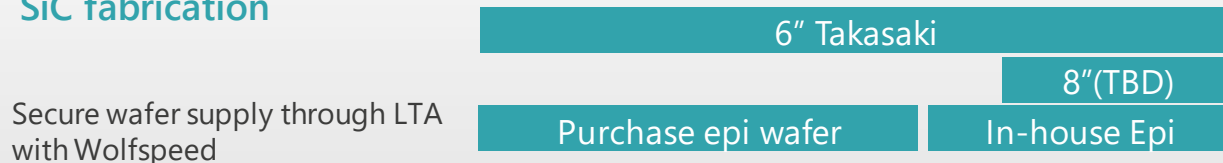
- Fab launch on track for 2H/2024
- 6" Gen 1 SiC MOS: **MP start from 2025**
- 8" SiC fab identified for Gen 2 MP



SiC MOSFET development

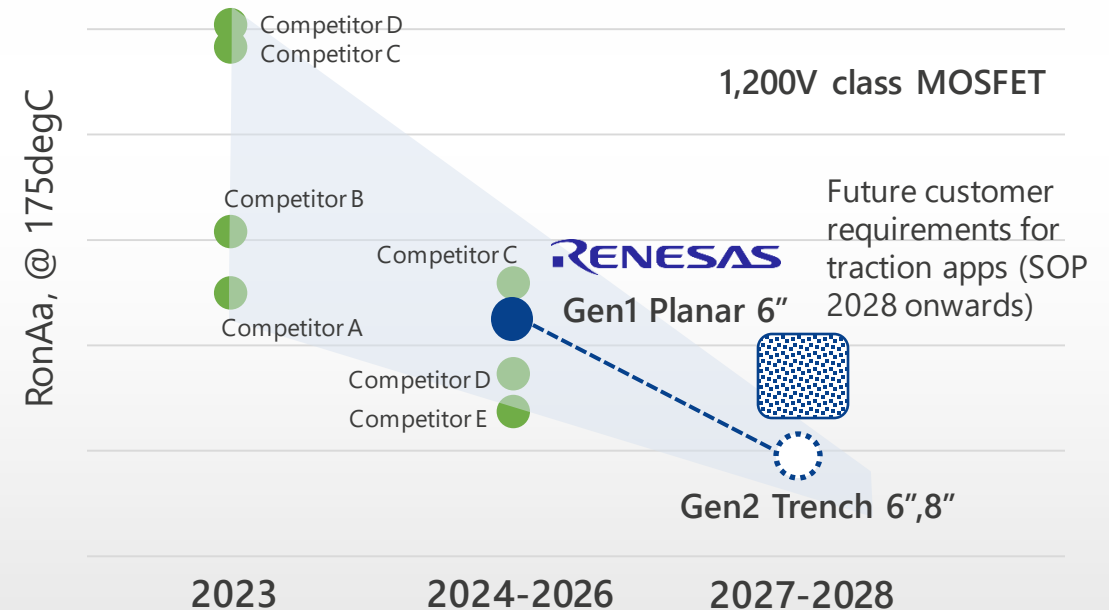


SiC fabrication



Performance benchmarking

- Gen 1 ready to go for programs ramping in 2025-2026
- Accelerated improvements with Gen 2



POWER SOLUTION SELL STRATEGY TO SCALE

LEVERAGE RENESAS STRENGTH AND FOOTPRINT IN DIGITAL AND IN ANY MARKETS

~\$3B SAM in 2024 for attach with Renesas digital and power
SAM growing ~10% CAGR to 2030

Growing Catalog revenue
CAGR > 15%
through increased attach

Power attach with
Renesas digital



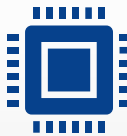
SoC/MCU/MPU

Shipping ~4B unit/year
5,000+ customers



Power Tree
(PMIC, DC-DC,
Switches, e-Fuse)

Power attach with
Renesas power



Server AI power

Shipping ~400M unit/year
50+ of customers



Power Tree
(DC-DC, e-Fuse)



IGBT/FET (SiC/GaN)

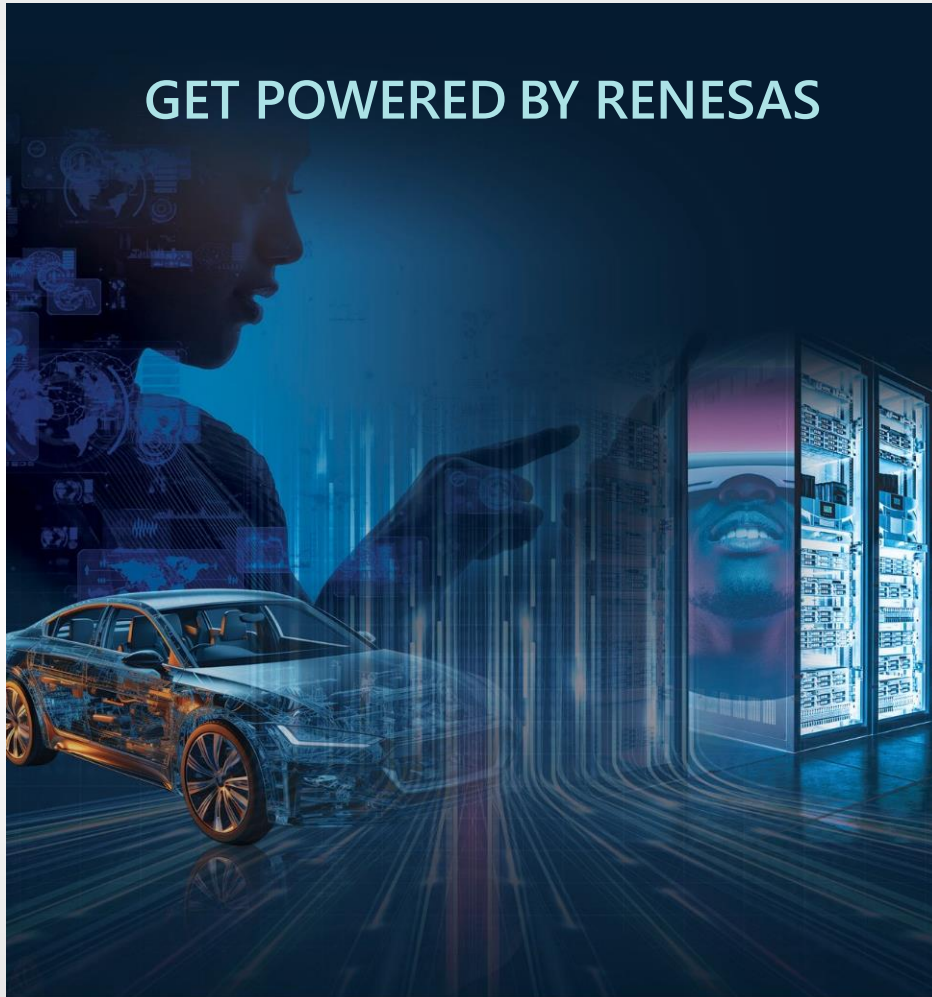
Shipping ~2B unit/year
100+ customers



Gate Drivers
Controllers (GaN)

- Saving time to market for customers by delivering proven and validated solutions
- Delivering more power efficient and greener solutions
- Extending Renesas quality into power attach solutions

SUMMARY



GET POWERED BY RENESAS

Comprehensive power portfolio and strong IP

Clear path to steep growth & diversified revenue profile with a vertical segment focus and solution strategy

Accelerated growth in AI infrastructure and edge AI

Increasing presence in high voltage business. Capitalize on Automotive content expansion, accelerate with xEV

Hyper-focus on solution sell to Renesas existing footprint, both digital and power



THANK YOU

(FORWARD-LOOKING STATEMENTS)

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