

# INDUSTRIAL, INFRASTRUCTURE AND IOT STRATEGY UPDATE

SEPTEMBER 29, 2021

SAILESH CHITTIPEDDI, EXECUTIVE VICE PRESIDENT AND GENERAL MANAGER

CHRIS ALLEXANDRE, SENIOR VICE PRESIDENT

ROGER WENDELKEN, SENIOR VICE PRESIDENT

IOT AND INFRASTRUCTURE BUSINESS UNIT

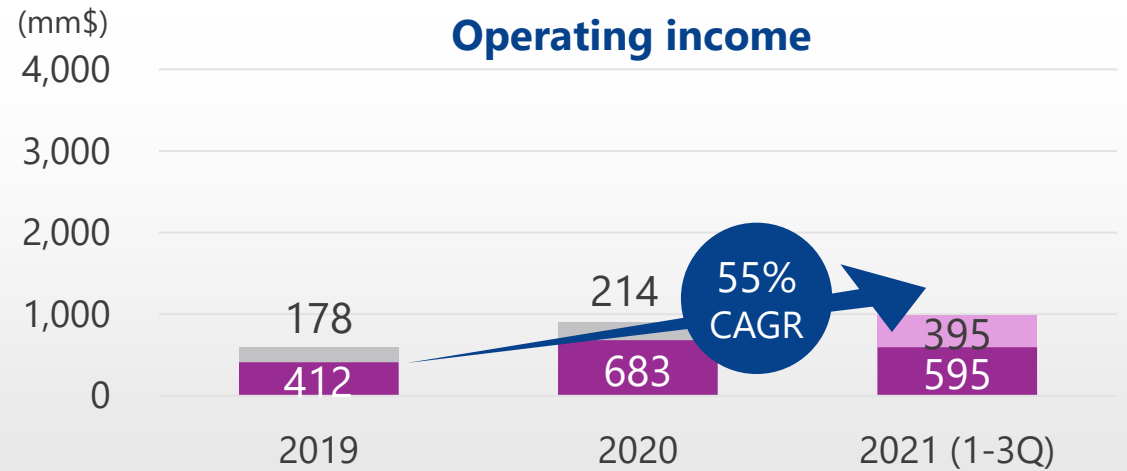
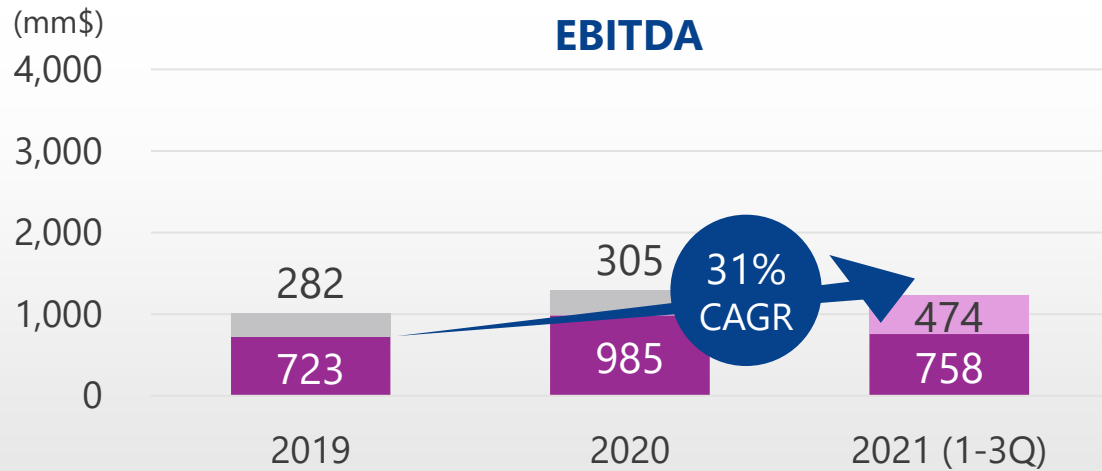
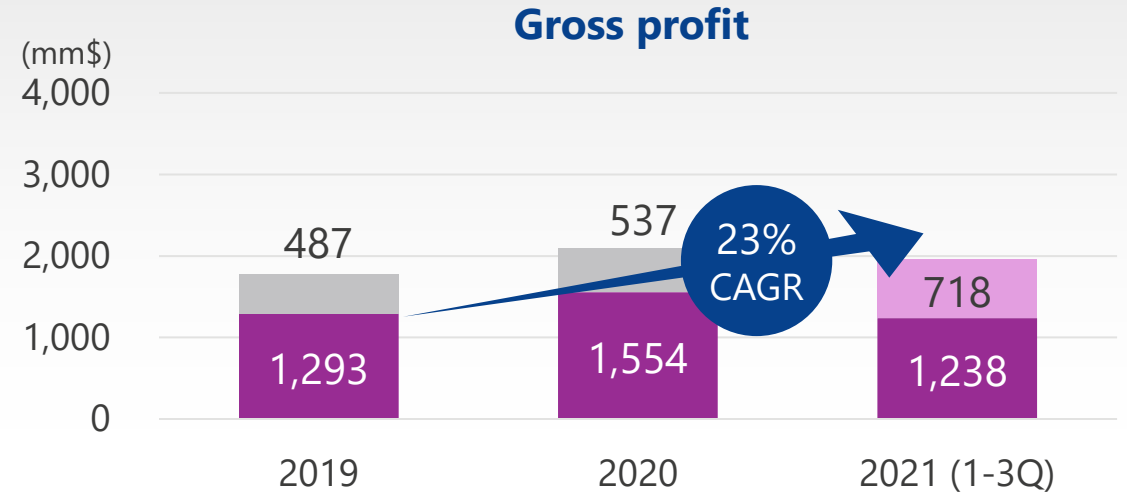
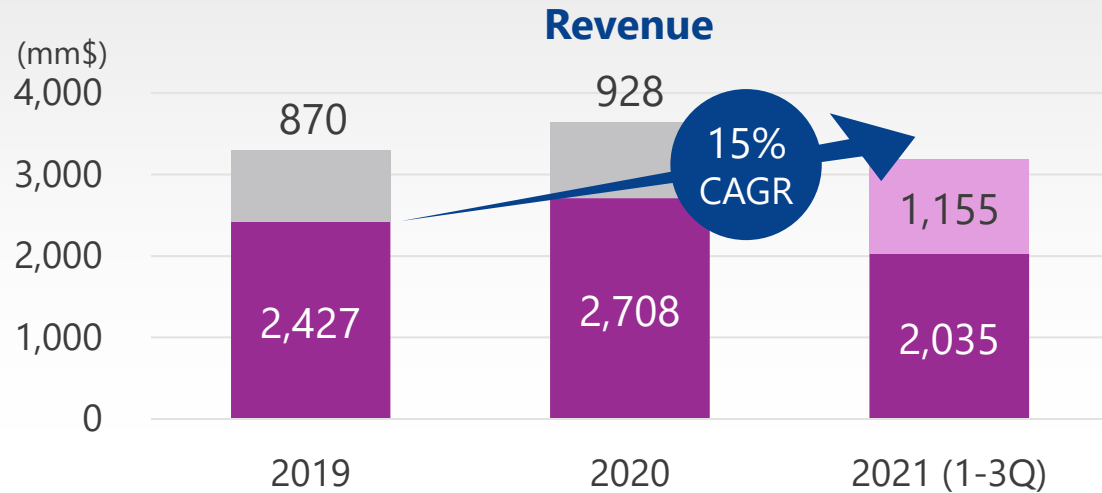
RENESAS ELECTRONICS CORPORATION

# AGENDA

- Industrial, Infrastructure and IoT: Driving Growth and Operational Leverage for Renesas  
Sailesh Chittipeddi
- Sales Strategy & Outlook  
Chris Allexandre
- Major Technology Trends and Product Portfolio Update  
Sailesh Chittipeddi
- Update on Areas Highlighted at Previous Analyst Day
  - MCU  
Roger Wendelken
  - MPU, Industrial Analog & Power, Memory Interface, ORAN  
Sailesh Chittipeddi
- Targeting New Verticals for Growth
- Updated LT Financial Model for IIBU
- Summary

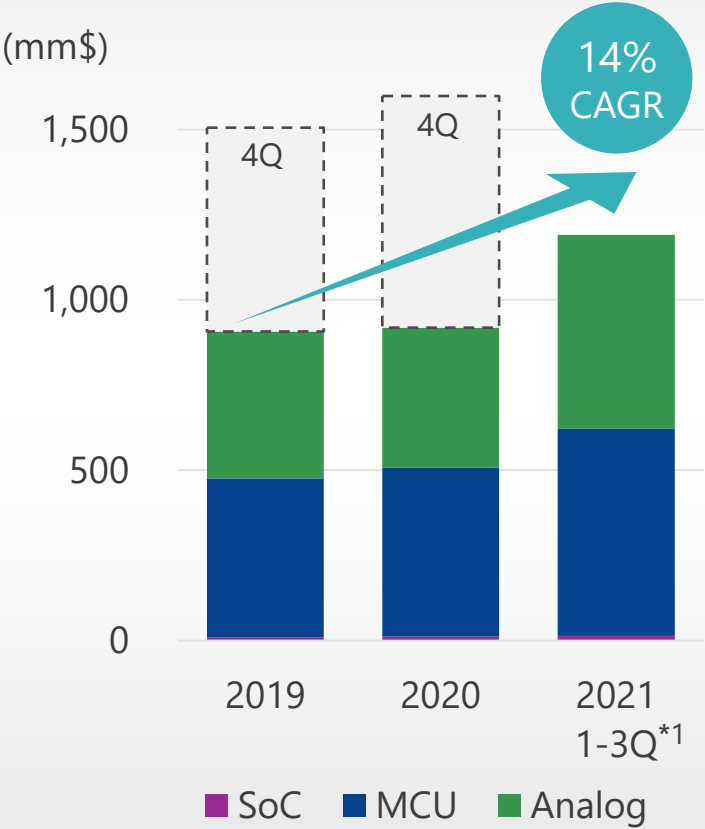
# IIBU FINANCIAL TRENDS AT A GLANCE

2019, 2021: ■ 1Q – 3Q Act, ■ 4Q Act | 2021: ■ 1Q – 2Q Act, ■ 3Q guidance

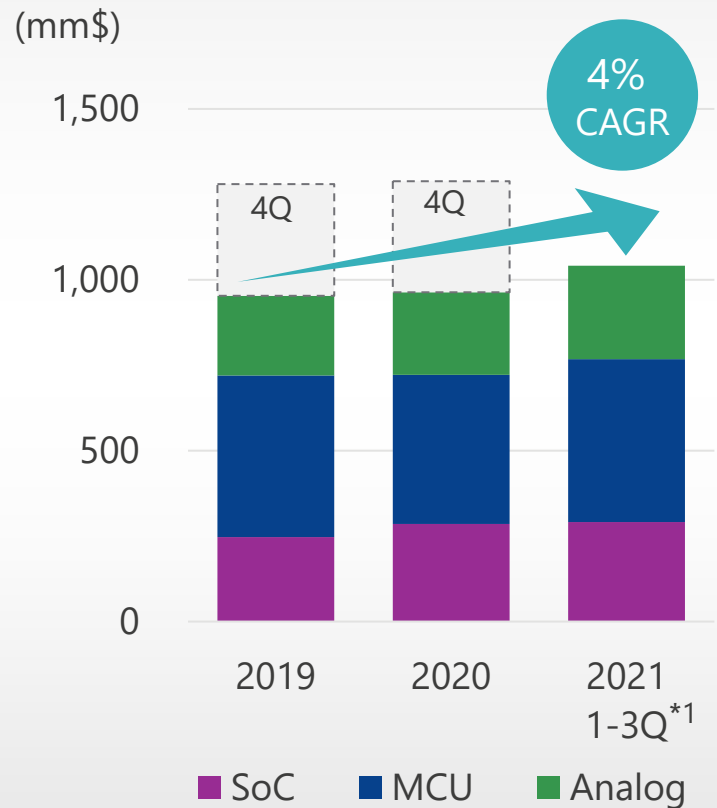


# IIBU GROWTH A SNAPSHOT 2019-2021

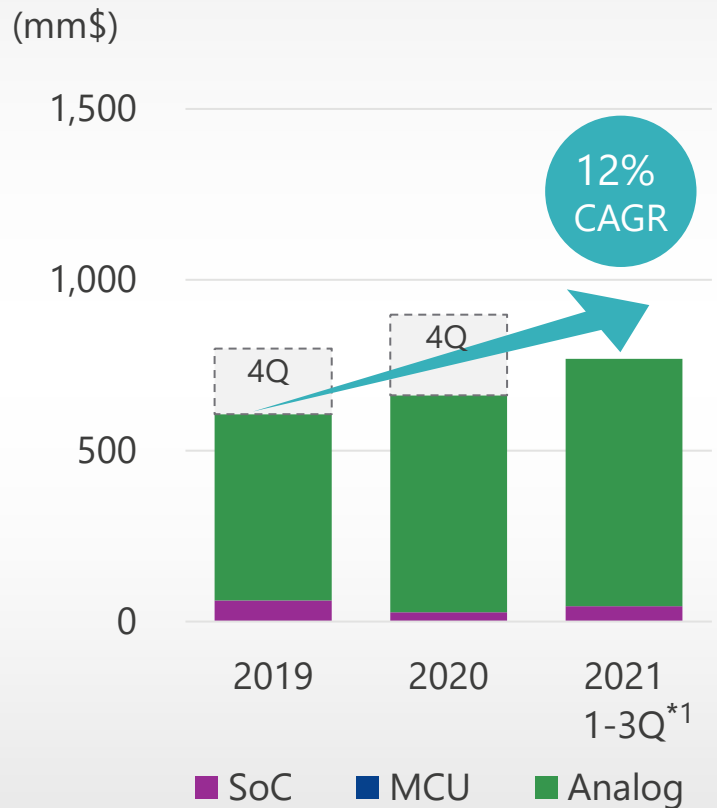
## IoT



## Industrial



## Infrastructure



\*1: 2021 Revenue /1Q-2Q actual and 3Q guidance

# SALES STRATEGY & OUTLOOK

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# HOW IIBU WINS

**MORE** MCU/MPU



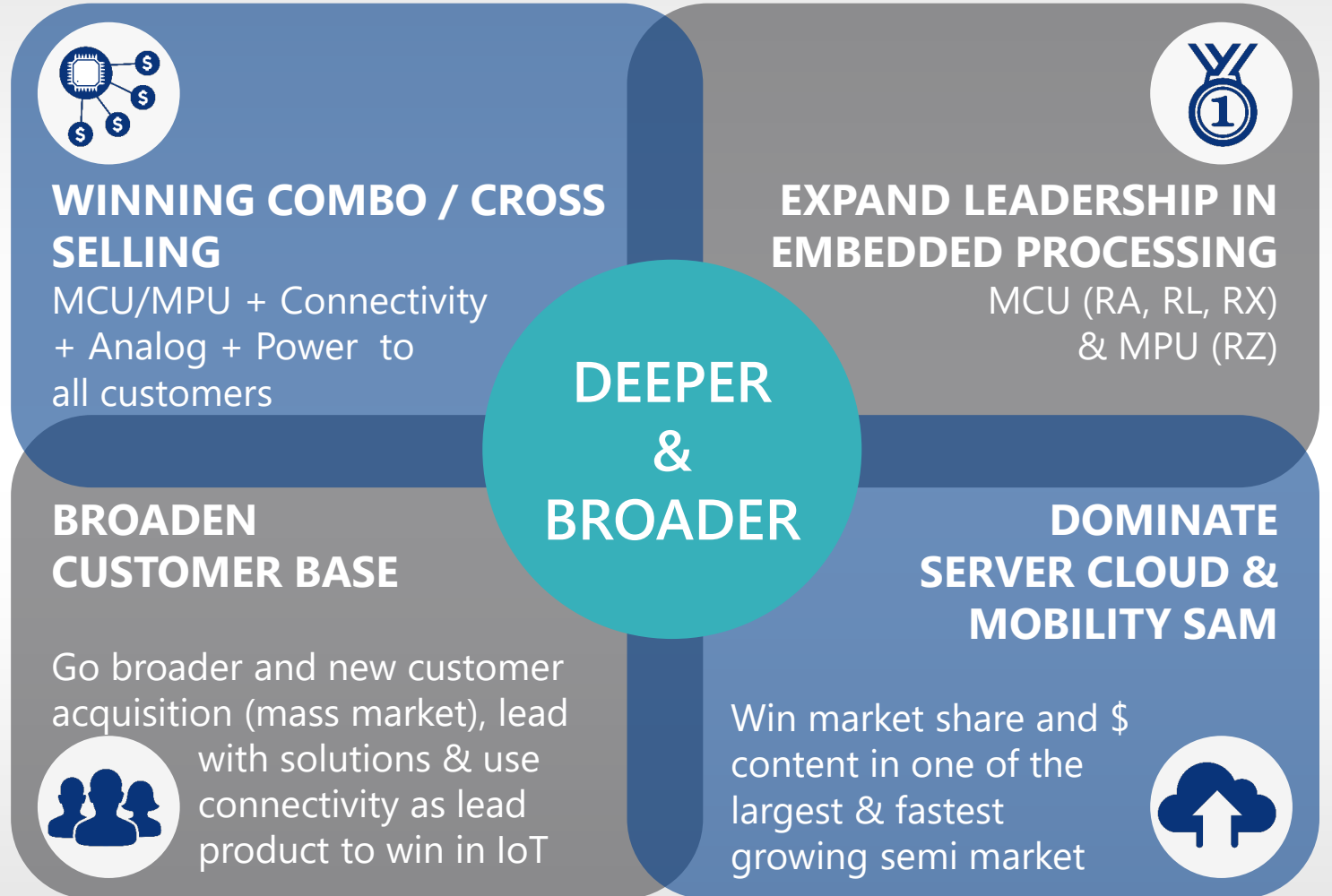
**MORE** ANALOG & POWER &  
CONNECTIVITY \$ CONTENT  
ATTACHED



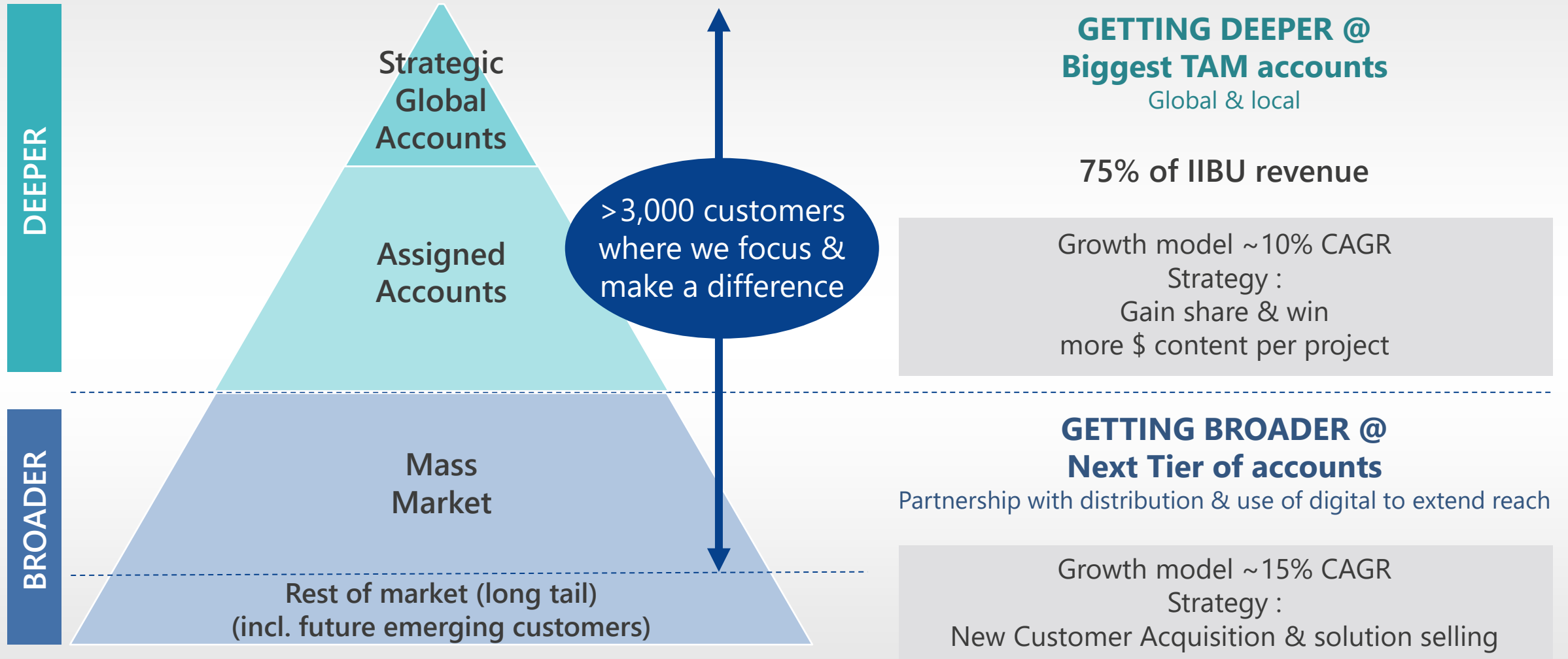
**MORE** CUSTOMERS



**MORE** GROWTH  
**MORE** PROFIT

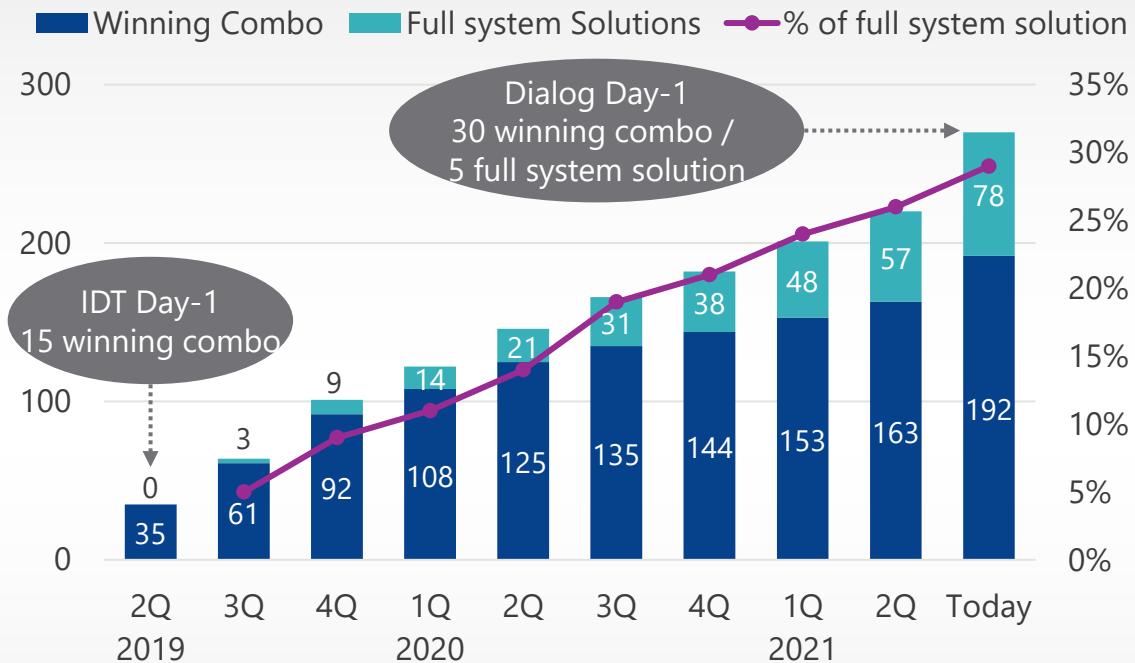


# IIBU GO TO MARKET TO WIN – SALES DEPLOYMENT



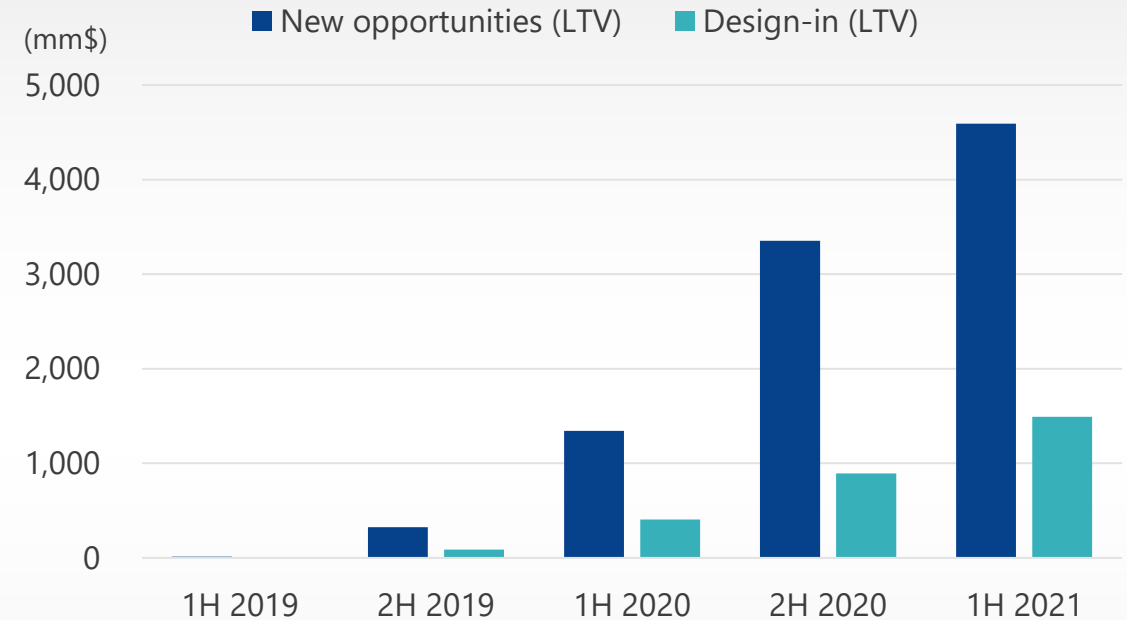
# RENESAS SOLUTION SELLING WIDER PORTFOLIO, MORE COMPLEX SOLUTIONS

## Number of Winning Combo & full system solutions



- More winning combo - Product sell to solution sell
- More complete solutions (HW+SW)
- Going Modularization

## Combo sell pipeline



- Accelerating opportunities in more applications
- Strong Design-in momentum ~\$1.5B Design-in to date (LTV)
- Increase # of devices per board



# GROWTH BY ACCOUNT TYPES

Demand plan (unconstrained)

Account Type	1H 2021 to 2H 2021	2021 to 2022	Comments
<b>Assigned Accounts</b>  <b>GO DEEPER</b>	++	+++	<ul style="list-style-type: none"> <li>▪ Sales force scale</li> <li>▪ Full portfolio sell, winning combo</li> <li>▪ vertical success in Cloud &amp; Server and Industrial</li> </ul>
<b>Mass Market Accounts</b>  <b>GO BROADER</b>	+	++	<ul style="list-style-type: none"> <li>▪ Lowest channel inventory ever (~7 WOI)</li> <li>▪ New distribution network, winning combo</li> <li>▪ Acceleration of digital access to more customers</li> </ul>

- Assigned Accounts & Go deeper growth driver – accelerating into 2022 with Industrial & Infrastructures
- Mass Market & Go broader building stronger momentum

# GROWTH BY MARKET SEGMENTS

Demand plan (unconstrained)

Market Segment	1H 2021 to 2H 2021	2021 to 2022	Comments
<b>Industrial</b>	++	+++	<ul style="list-style-type: none"> <li>▪ Tier1 – gaining MCU/MPU + Analog/Power cross sell</li> <li>▪ More customers – success at emerging China Industrial</li> </ul>
<b>Infrastructure</b>	+	++	<ul style="list-style-type: none"> <li>▪ Cloud &amp; Server</li> <li>▪ 5G roll out</li> </ul>
<b>IoT</b>	++	+++	<ul style="list-style-type: none"> <li>▪ MCU RA/RL to more customers – Go broader</li> <li>▪ Computing &amp; Mobility</li> </ul>

# MAJOR TECHNOLOGY TRENDS & PRODUCT PORTFOLIO REVIEW

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# MEGA TRENDS

DRIVING GROWTH FOR INDUSTRIAL, INFRA AND IOT BUSINESS UNIT

## Enabling Intelligence From The Cloud To The End-Point Sustainably



### DATA-CENTER DISAGGREGATION

- **Longer-term growth despite typical memory cyclicality**
- Memory, storage, CPU clustering, SW dominance
- Rise of data-centric computing



### 5G RAMP

- **Picking up pace after slow start**
- ~40% content expansion from 4G to 5G
- Timing, RF, Power
- Sub-6GHz / mmWave
- SatCom market growth



### INTELLIGENCE MOVING TO ENDPOINT

- **1T connected IoT devices**
- Industry 4.0
- ~34% IoT sensors long-term growth forecast
- e-AI & tiny ML drive growth



### SUSTAINABILITY

- **Increased power efficiency across portfolio**
- Hybrid topologies for low-power optimization
- Global warming driving demand for efficient cooling

# MEGA TRENDS

DRIVING GROWTH FOR INDUSTRIAL, INFRA AND IOT BUSINESS UNIT

## Enabling Intelligence From The Cloud To The End-Point Sustainably

Timing  
Core Power  
Memory Interface

### DATA-CENTER DISAGGREGATION

- **Longer-term growth despite typical memory cyclicity**
- Memory, storage, CPU clustering, SW dominance
- Rise of data-centric computing

Timing  
Power  
RF

### 5G RAMP

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- SatCom market growth

MCU/MPU/e-AI  
Power  
Connectivity  
IA/FA/BA  
AMS solutions & CMIC

### INTELLIGENCE MOVING TO ENDPOINT

- **1T connected IoT devices**
- Industry 4.0
- ~34% IoT sensors long-term growth forecast
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Ultra-Low Power  
PMIC & Connectivity  
Energy Harvesting MCU  
Environmental Sensors  
Power Efficiency focus  
across portfolio

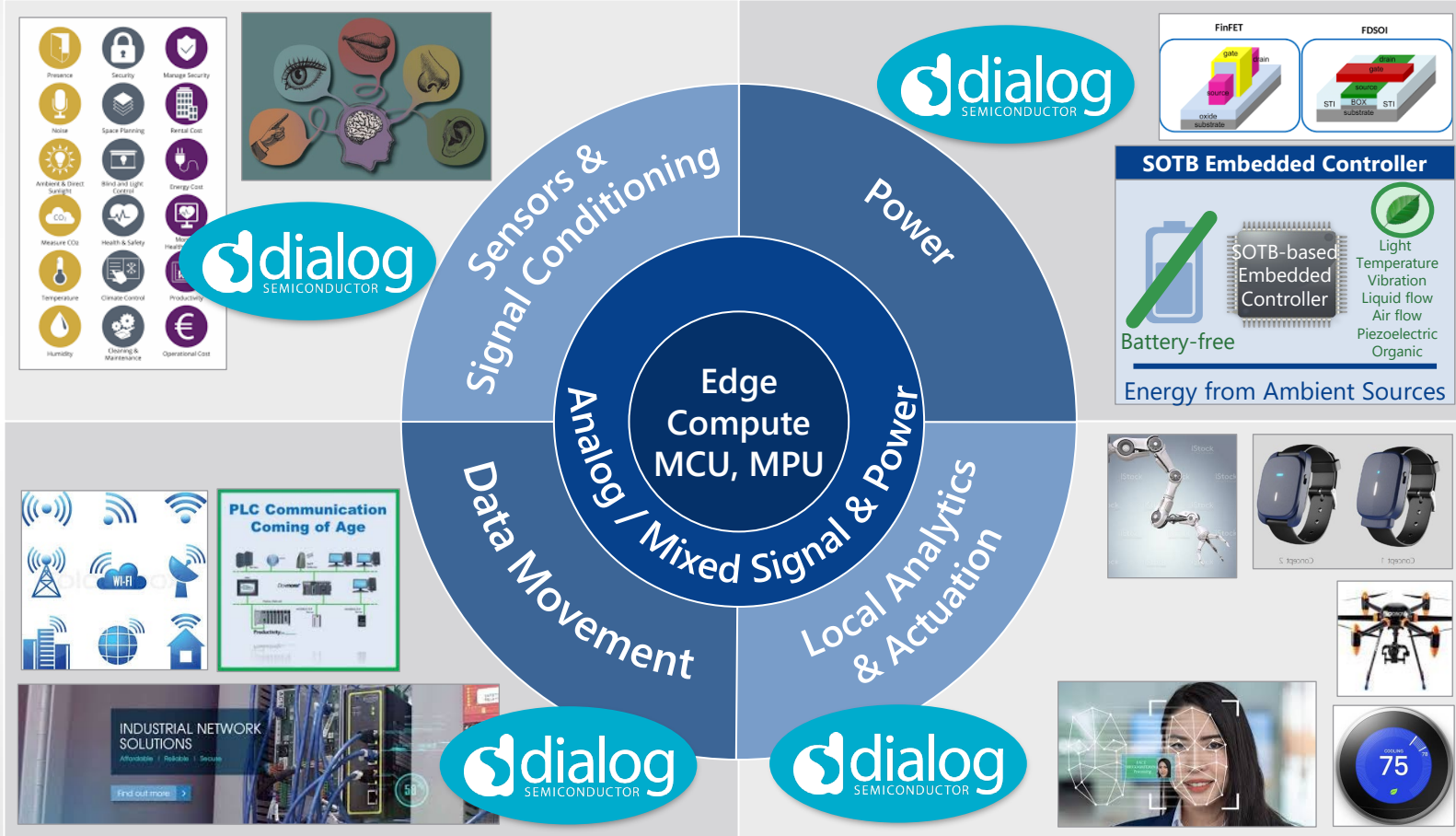
### SUSTAINABILITY

- **Increased power efficiency across portfolio**
- Hybrid topologies for low-power optimization
- Global warming driving demand for efficient cooling

# MCU, MPU + ANALOG/POWER SOLUTIONS

## DIVERSIFIED PRODUCTS FOR OUR CUSTOMERS

### Traditional Elements for Differentiation



### System Differentiation

#### Interfaces & e-AI

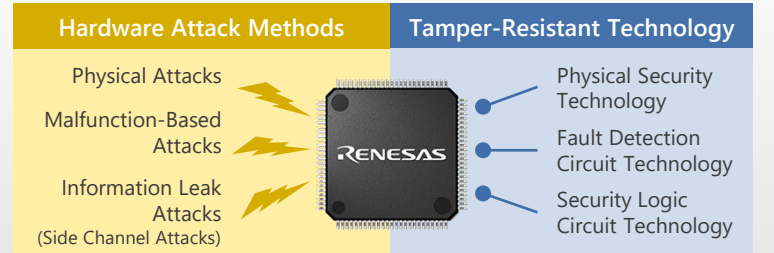
Renesas RX65N Cloud Kit & Amazon FreeRTOS  
Make Quick Cloud Connections Easy



#### Software Tool Chain Ecosystem



#### Security



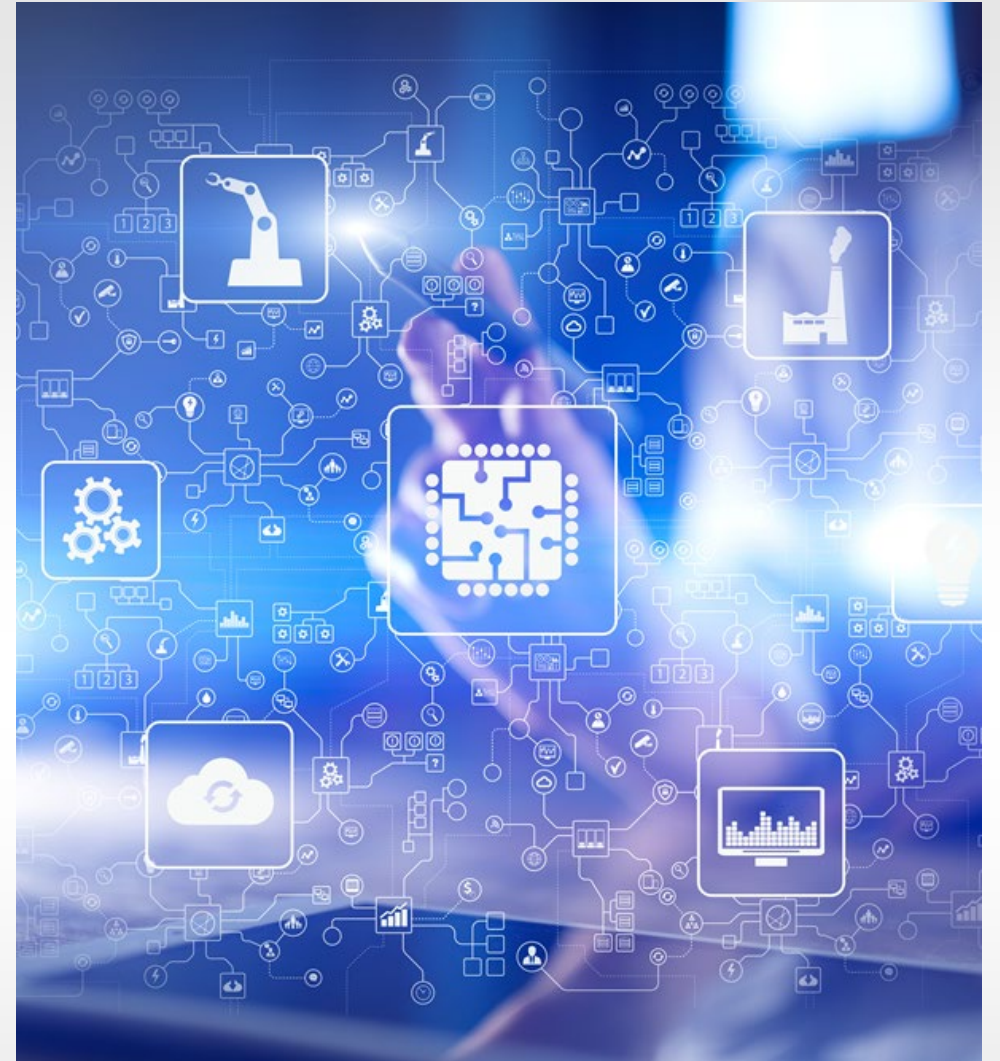
# CORE BUSINESS GROWTH: UPDATE OF LAST A-DAY PRESENTATION

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- MCU: IoT & Industrial
- MPU: IoT & Industrial
- Industrial Analog & Power
- Infrastructure
  - Data-Center: Memory Interface Products
  - 5G: O-RAN

# MCU UPDATE

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# RENESAS DIFFERENTIATION

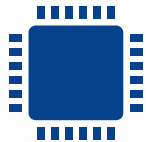
NO.1 MCU SUPPLIER IN THE WORLD\*1



Low Power



Low Cost



Tiny Footprint



Broadest Portfolio



Performance



Industry Leading Performance



Motor control



Industrial Interfaces



Security



Top Security Implementation



Flexible SW Packages & Ecosystem



Enhanced Cap-Touch

Renesas Synergy™

Platform



Complete SW&HW Solution



Cloud-Integrated



Short Time to market



E- Harvesting



Energy Harvesting IP included



Renesas Patent Process Technology



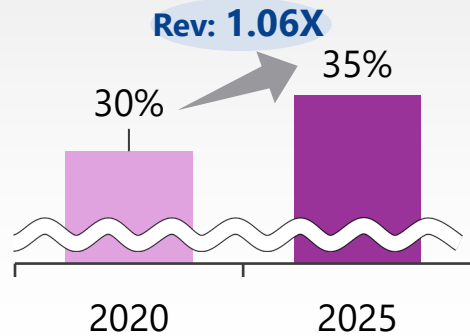
Ultra Low Power

\*1 Source: Gartner, "Market Share: Semiconductors by End Market, Worldwide, 2020", Andrew Norwood et al., Mar 31, 2021, Total Microcontroller

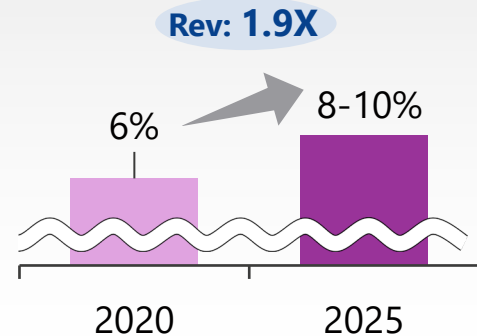
# GROWING NON AUTO MCU BUSINESS

## Growing MCU Market Share

16 bit MCU Revenue/Share\*1



32 bit MCU Revenue/Share\*1

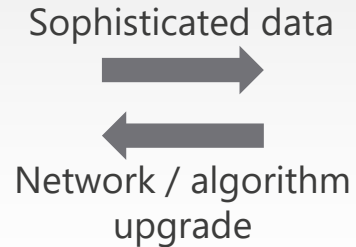


## Leading Cloud-Native Endpoint Computing

Endpoint  
(e.g. Wearable Devices)



Inference at endpoints



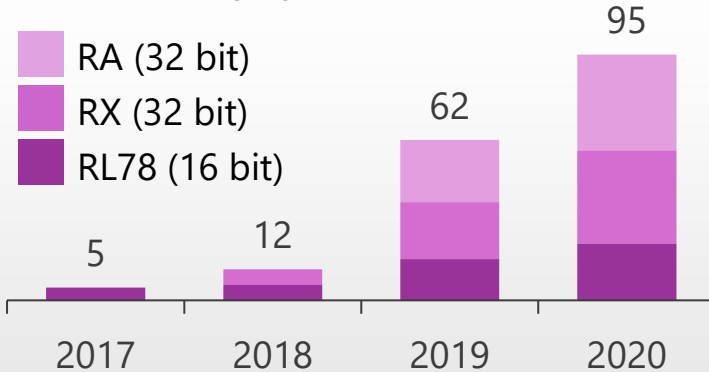
Cloud



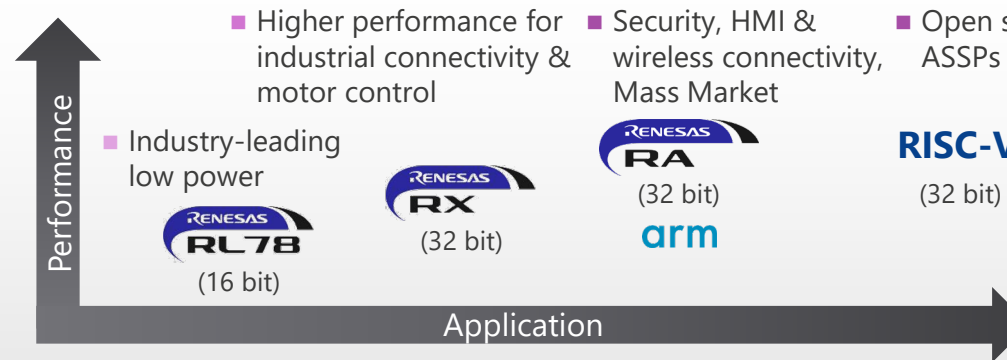
Analytics / training using big data

## New Product Release, Product Offering Expansion and Cost Reduction to Grow MCU Revenue

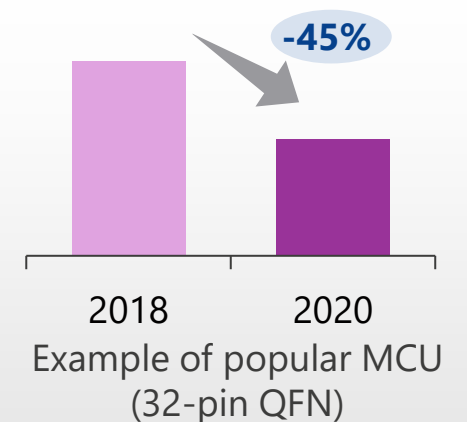
Cumulative New Product Release  
by Type since 2017



Product Offering Expansion



Cost Reduction\*2



\*1: Estimated by Renesas \*2: Renesas' management accounting basis

# RL78: REJUVENATING 16-BIT MCU MARKET



Targeting at upgrade path for 8 bit MCU

Market Size ~ \$3.5B\*1

## Lowest System Power

Down to 45.5uA/MHz, Snooze mode

## Broad Scalability

1000+ Devices with complete choice

## Intelligent & Cost Optimized

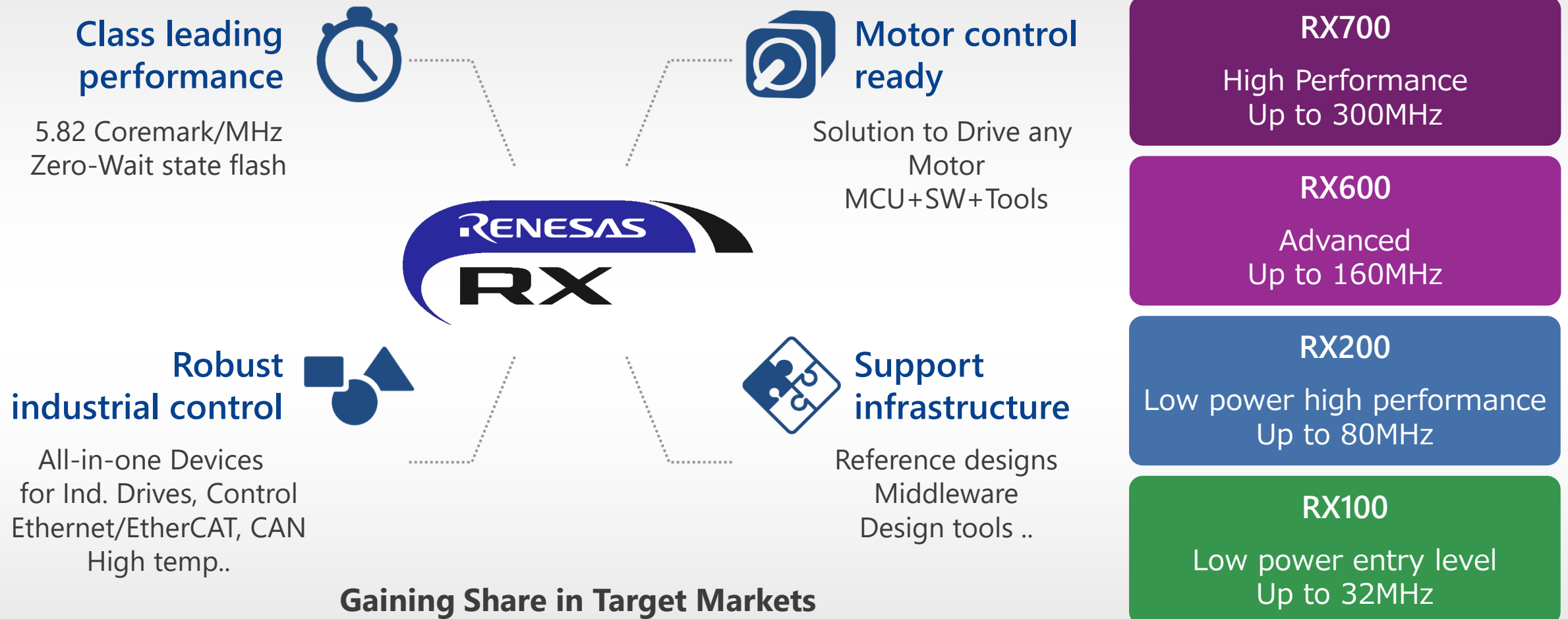
1%On-Chip-Oscillator, Temp sensor, LVD, POR

## Roadmap to Address New Applications

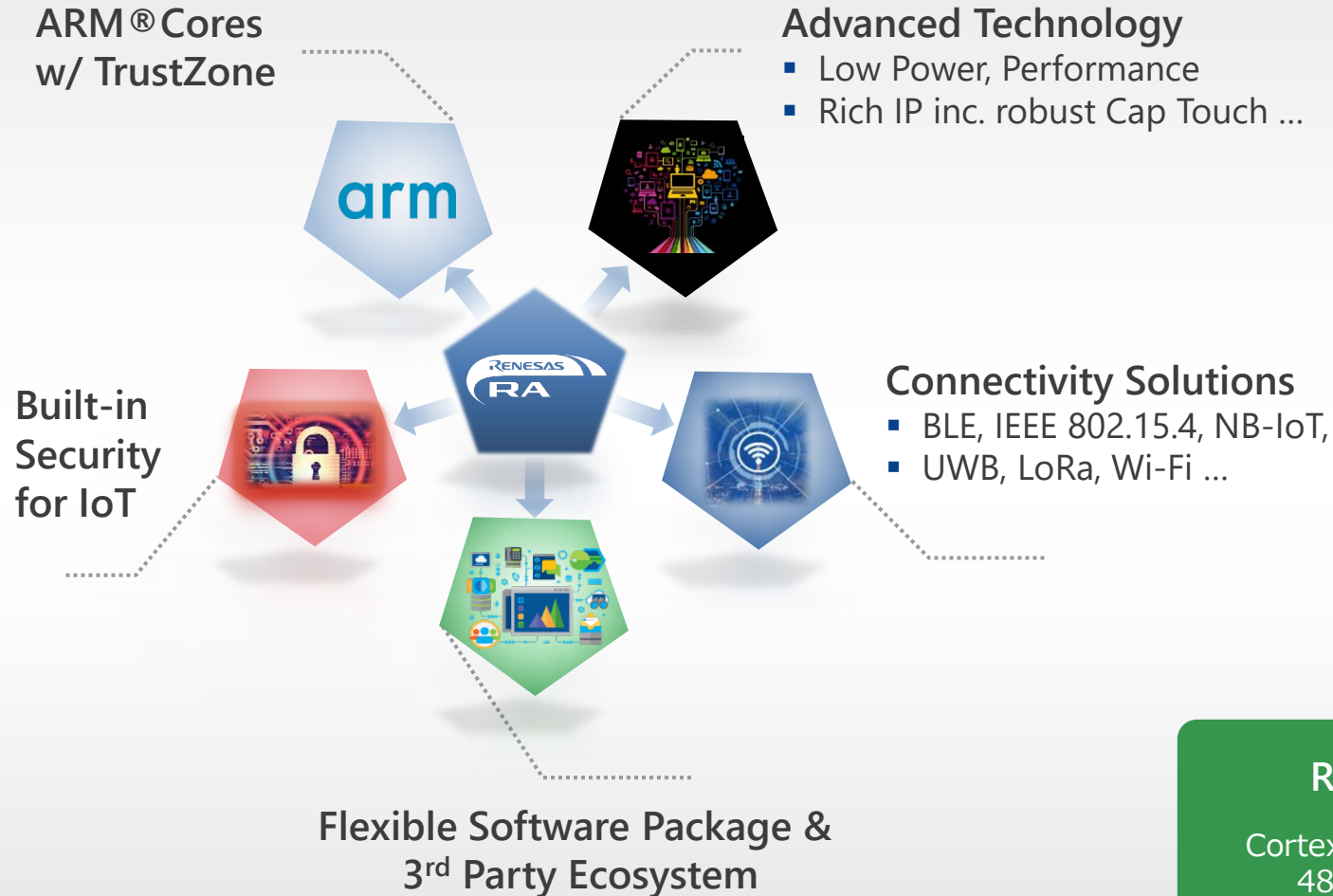
Lowest pincount, Power, Security, Touch

\*1: Source: Gartner, "Market Share: Semiconductors by End Market, Worldwide, 2020", Andrew Norwood et al., Mar 31, 2021, Vendor Revenue basis, Total Microcontroller 8-bit excluding Automotive

# RX: PERFORMANCE MARKET LEADER



# RA: LEADING THE IOT REVOLUTION



## Comprehensive Roadmap

100s of devices & extensive application coverage

## Winning Every Socket

record speed of new wins with funnel crossing \$2B

## Ready Ecosystem

100s of technology solution blocks covering AI, Security, HMI, Safety Cloud, REF, Sensing & much more

**RA2**

Cortex®-M23  
48MHz

**RA4**

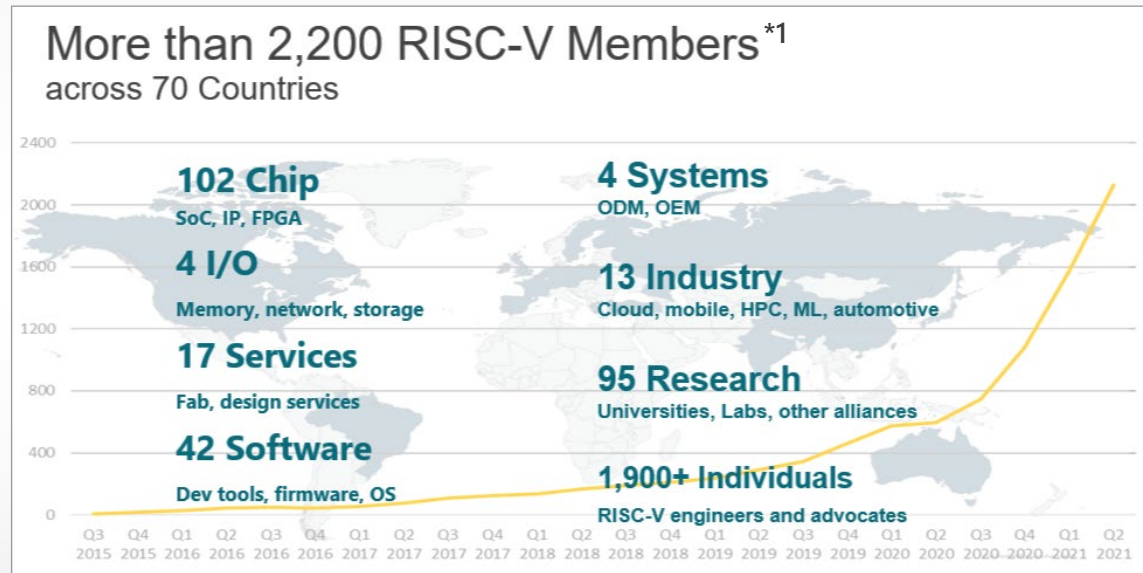
Cortex®-M4 & M33  
48 ~ 100MHz

**RA6**

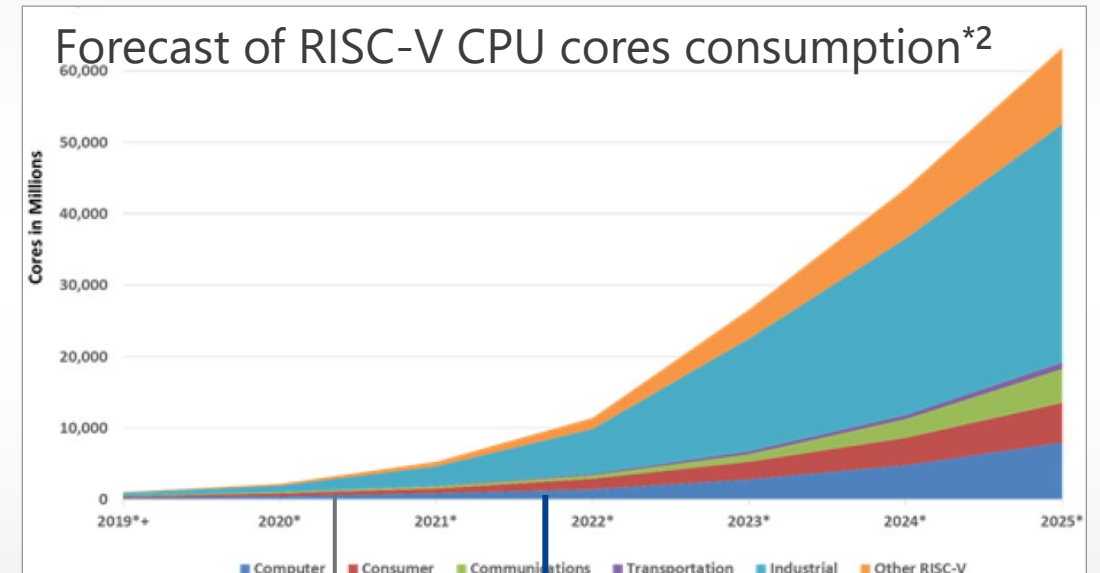
Cortex®-M4 & M33  
100 ~ 200MHz

# RISC-V ECOSYSTEM RISING FAST: RENESAS ON THE WAY

- RISC-V foundation membership growing fast



- Chip market forecast of \$62.4B RISC-V CPUs in the market by 2025, 26% of it in industrial area\*<sup>2</sup>
  - Computer, consumer, communication, transportation, industrial markets foresee average 146.2% CAGR in 2018-25

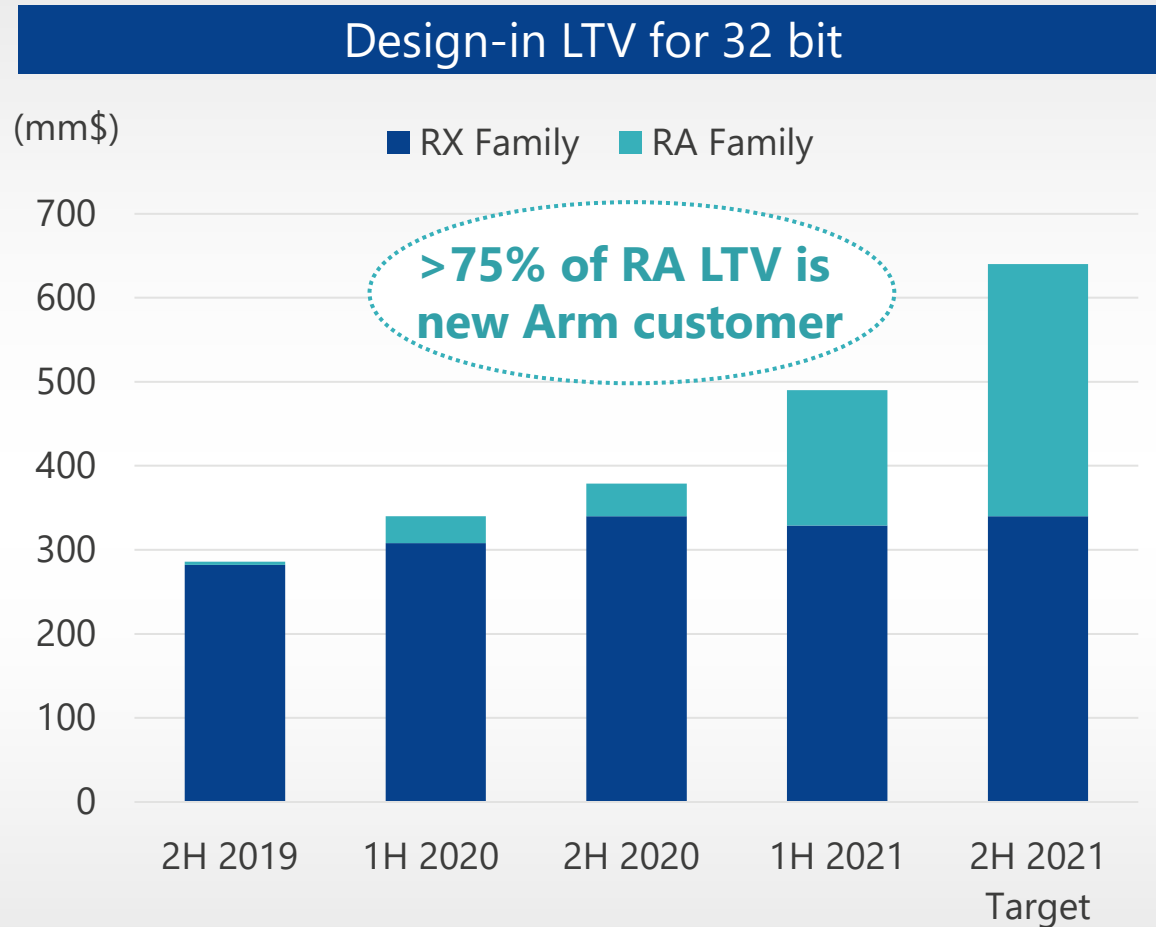


May 2020  
10 years  
RISC-V anniversary

2021 2H  
Renesas will sample  
1st RISC-V MCUs

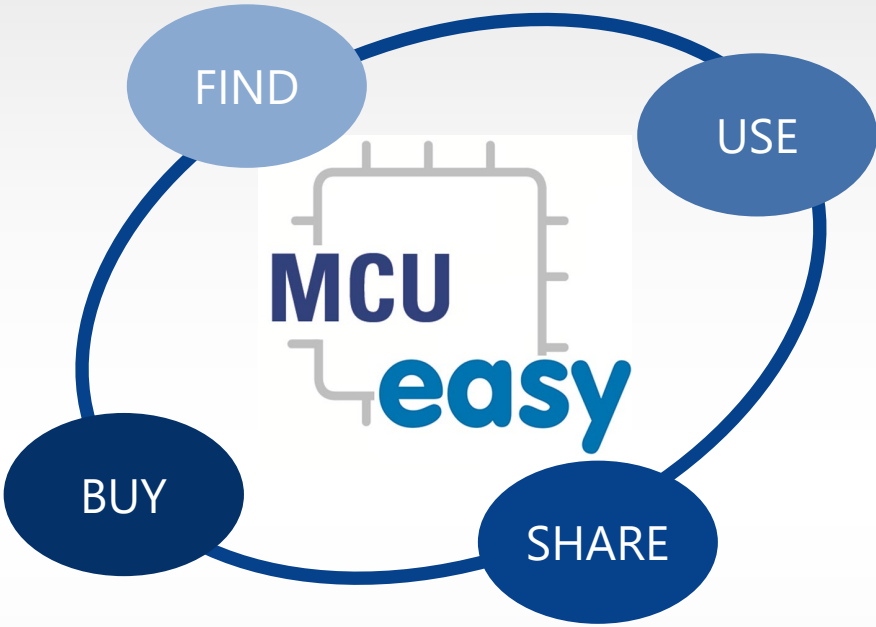
\*1 Source: RISC-V Foundation, \*2 Source: Semico Research Corp

# 32 BIT DESIGN-IN MOMENTUM ACCELERATING



- RA is incremental share gain
- RX set Design-in Record in 2H 2020, nearly topped again in 1H 2021 even with Naka fire impact
- Product velocity increasing with several new Product Introductions on the horizon
- RA adding new SAM with low cost 32 bit and future high performance M7 ARM core class performance devices
- RX gaining share in target markets, especially Home Appliance and Building Automation
- Does not include future RISC-V products.....

# CREATING A BETTER USER EXPERIENCE FOR CUSTOMERS

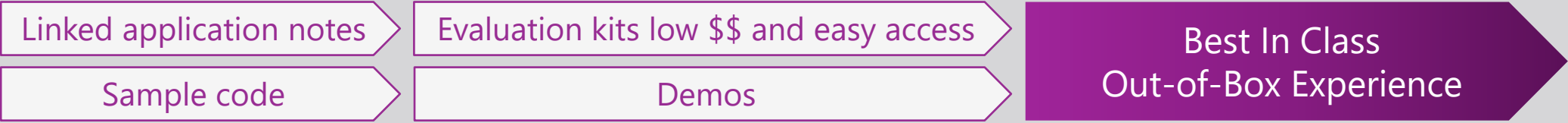


## Easy to use MCU Guide app



- All core product families
- Block diagrams
- Instant datasheet
- Comparison data tables
- Part number search
- Parametric search
- Link to ordering site
- Access to communities

### How to address the “New Engineer” – DIY





# CORE BUSINESS GROWTH: UPDATE OF LAST A-DAY PRESENTATION

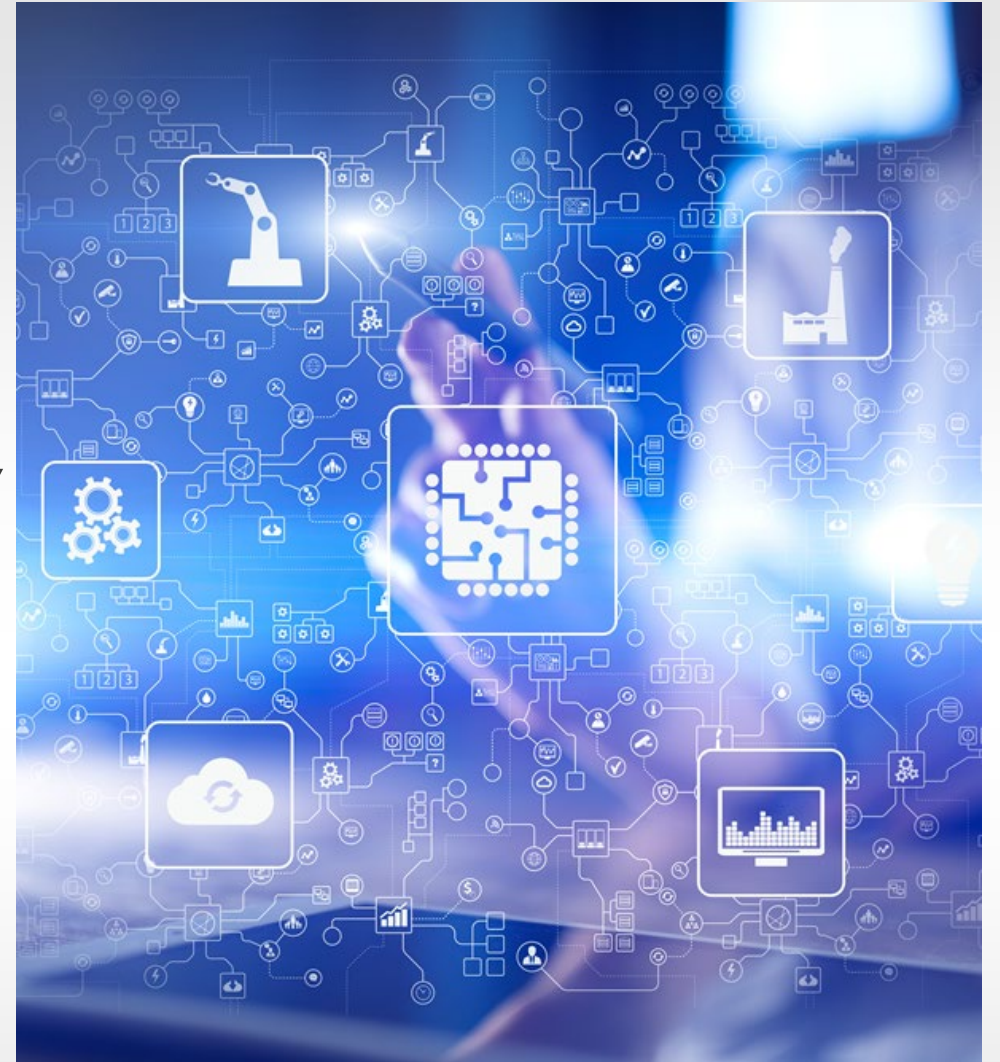
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- MCU: IoT & Industrial
- MPU: IoT & Industrial
- Industrial Analog & Power
- Infrastructure
  - Data-Center: Memory Interface Products
  - 5G: O-RAN

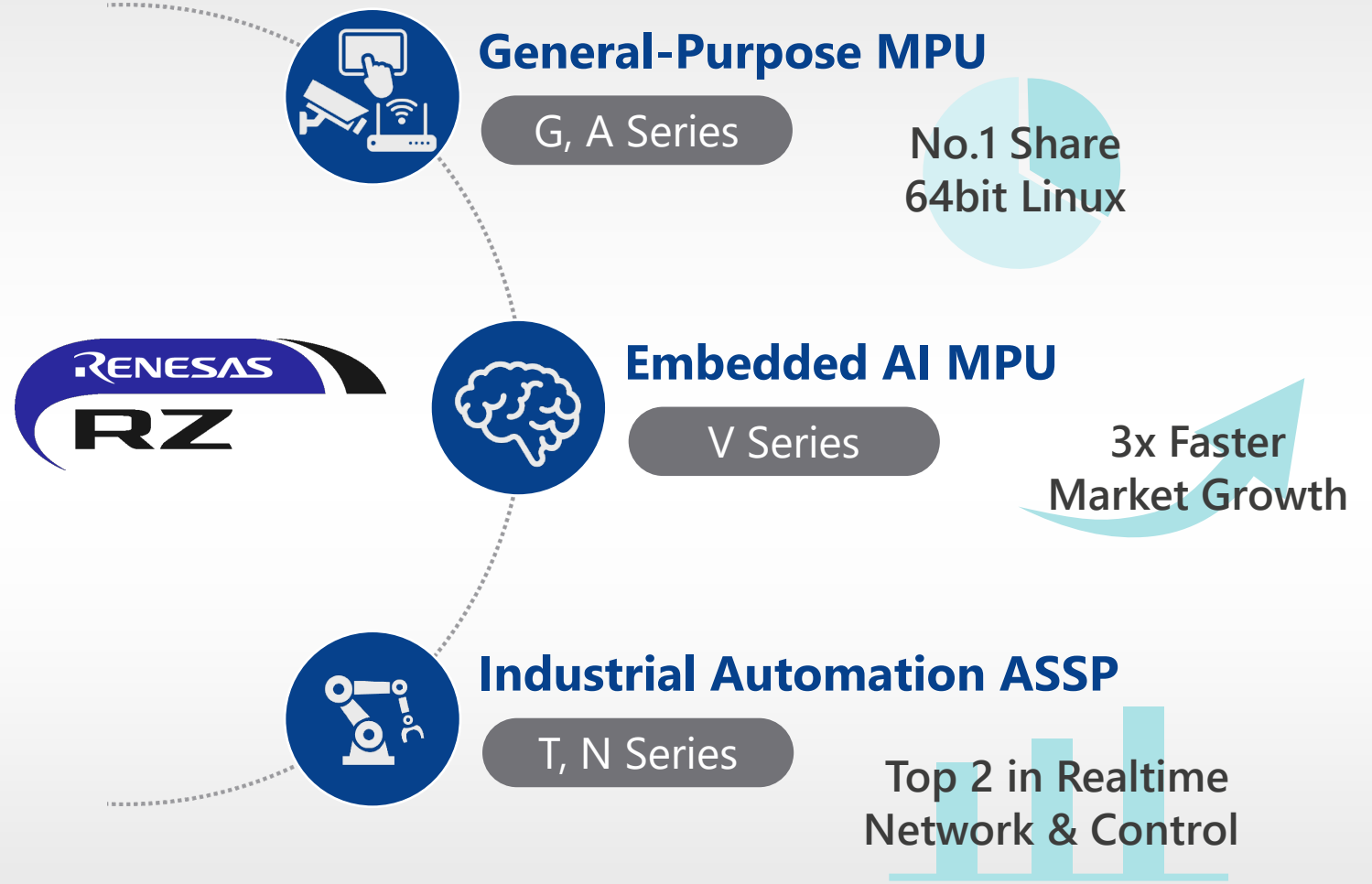
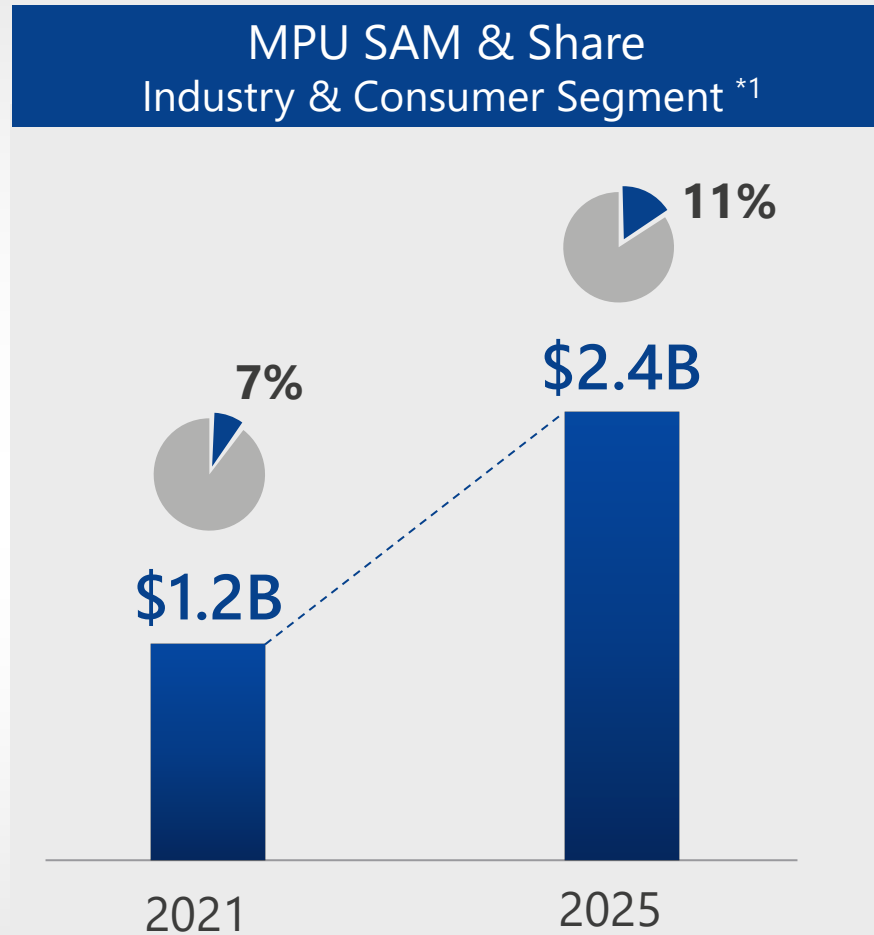
# INDUSTRIAL: MPU PORTFOLIO

## DRIVING IMPROVED PERFORMANCE & SUSTAINABILITY

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# RENESAS MPU MARKET POSITION ESTIMATE 2025



\*1: Estimated by Renesas. Except Windows based application

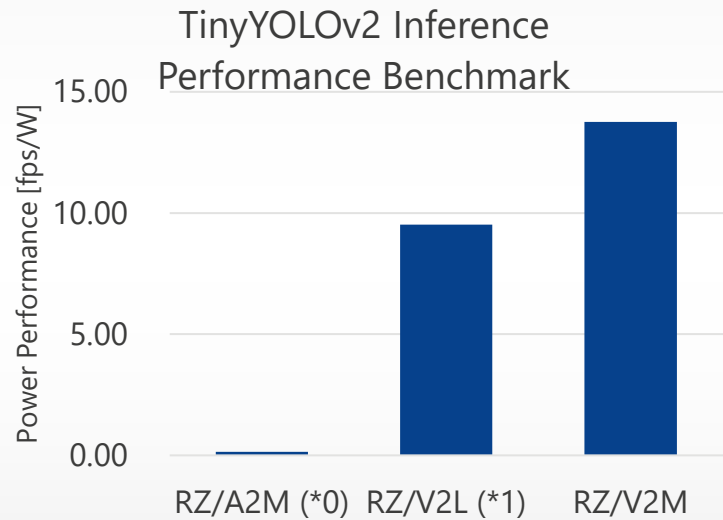
# DRIVING EFFICIENCY & SUSTAINABILITY IN VISION AI & IA

Driving  
Sustainability

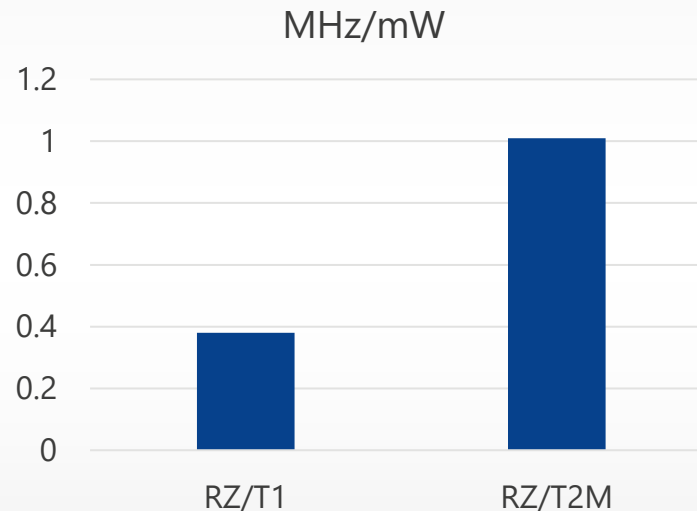


Gaining Share

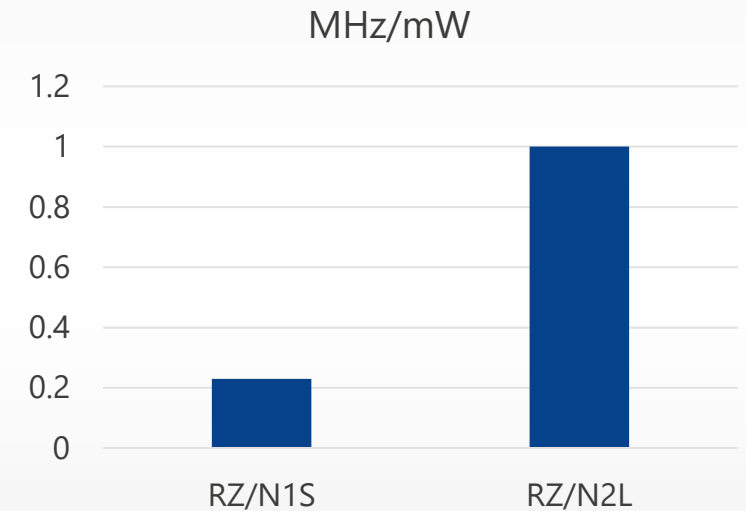
## Vision AI Solutions



## Real-Time IA Solutions



## Networking IA Solutions

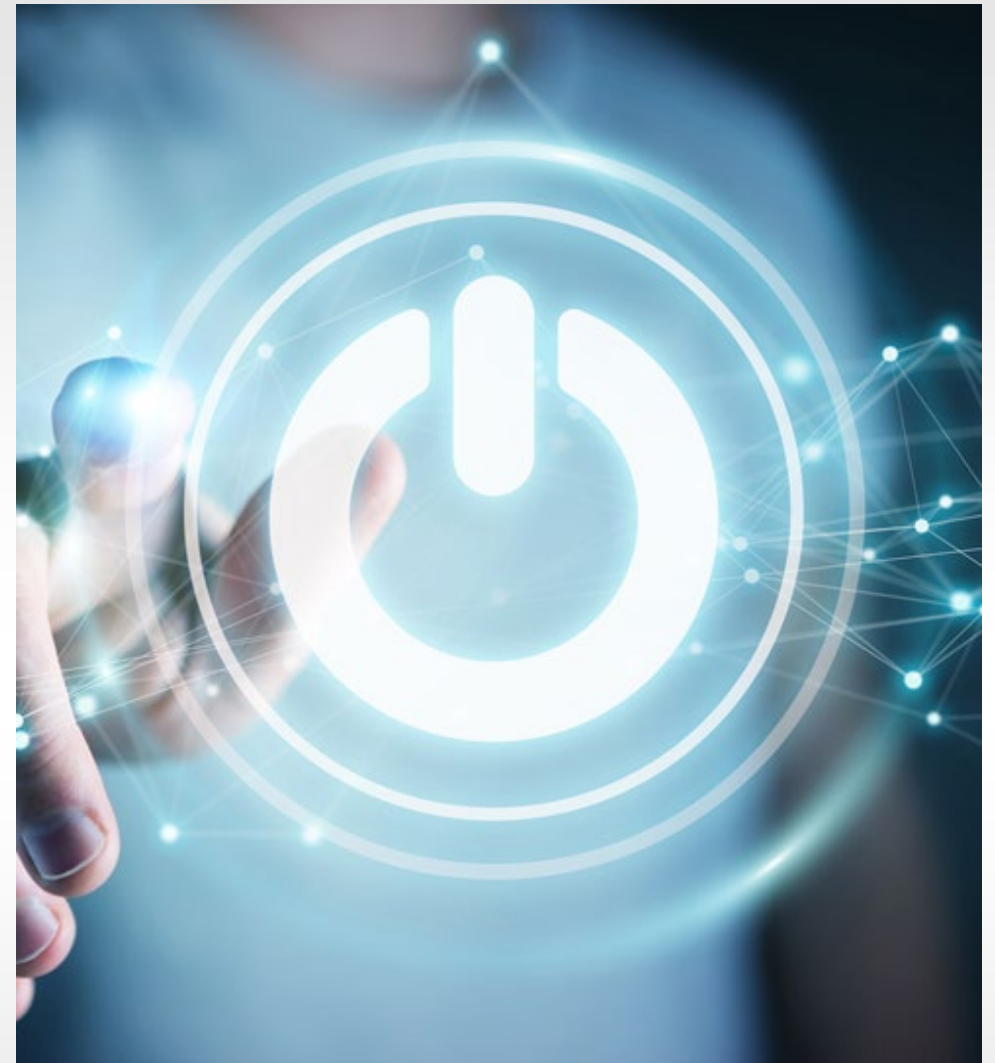


**RENESAS OFFERS IMPROVEMENT IN PERFORMANCE/POWER WITH EACH GENERATION OF INDUSTRY LEADING VISION AI & IA APPLICATIONS**

\*0: Rough Estimation using GMACS Performance (A2M/DRP:1.2GMACS, V2L/DRP-AI:245GMACS), \*1: RZ/V2L is under evaluation. Power consumption is estimation.

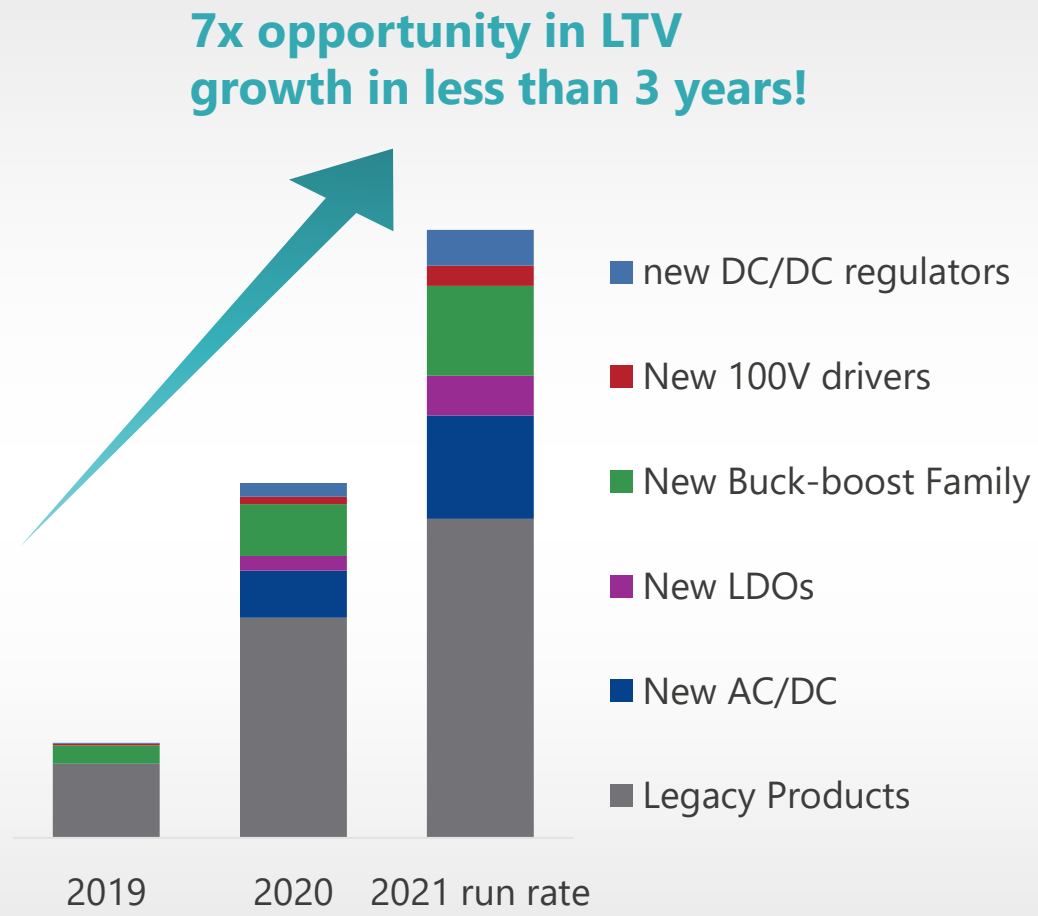
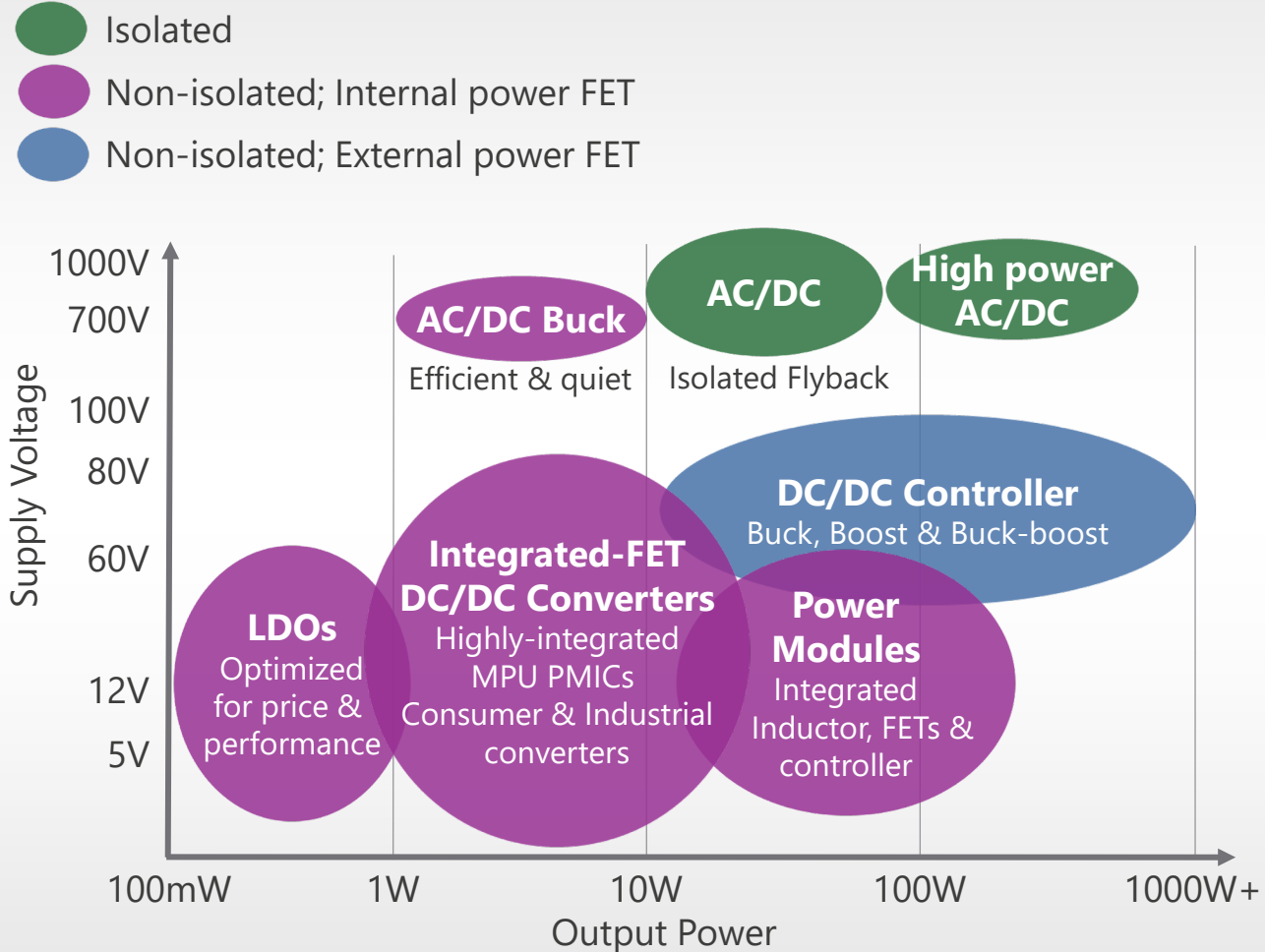
# DRIVING SECULAR GROWTH INDUSTRIAL: INDUSTRIAL ANALOG & POWER

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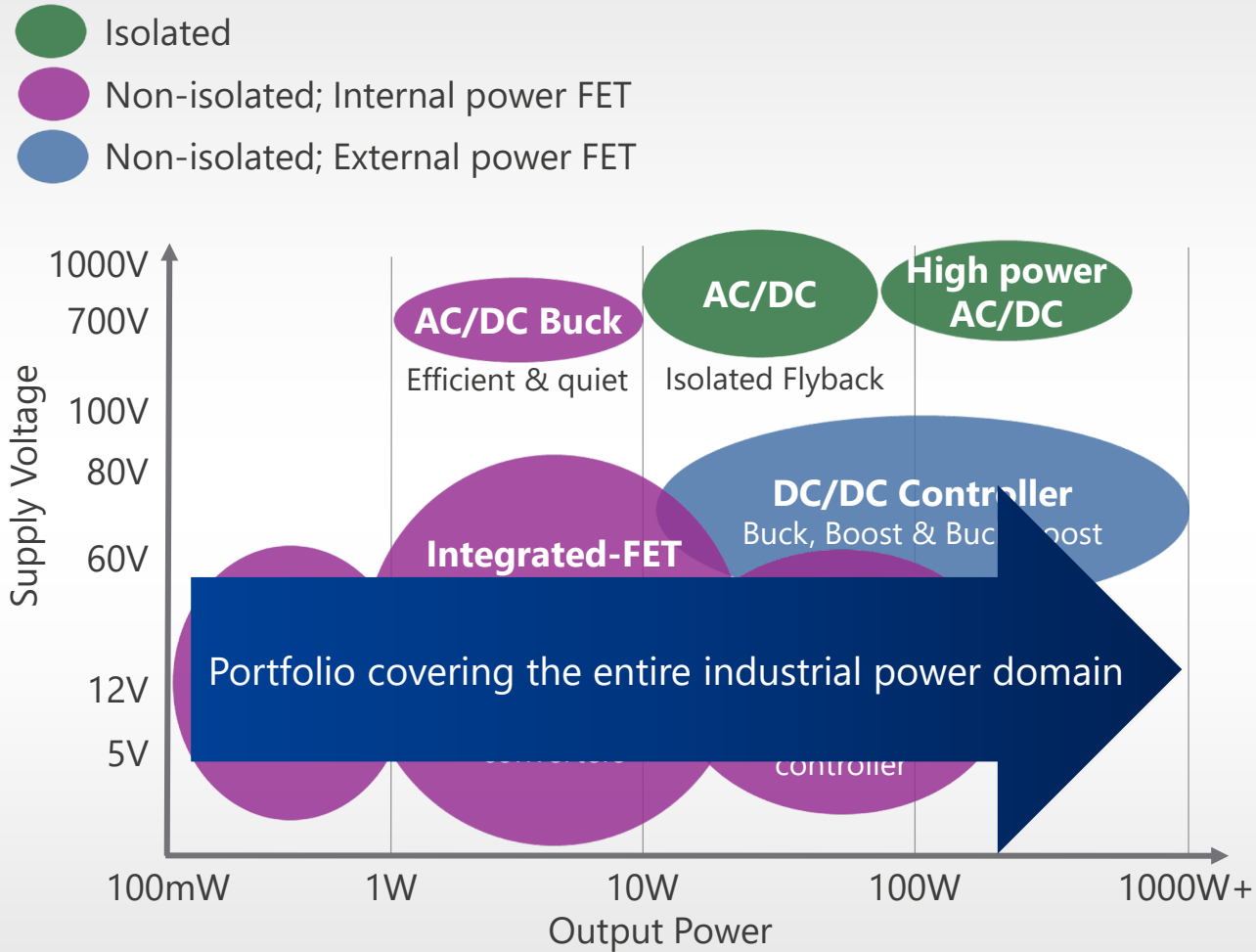
# DRIVING SECULAR GROWTH: INDUSTRIAL ANALOG & POWER SOLUTIONS

## WINNING IN TARGET MARKETS, AND GOING BROADER

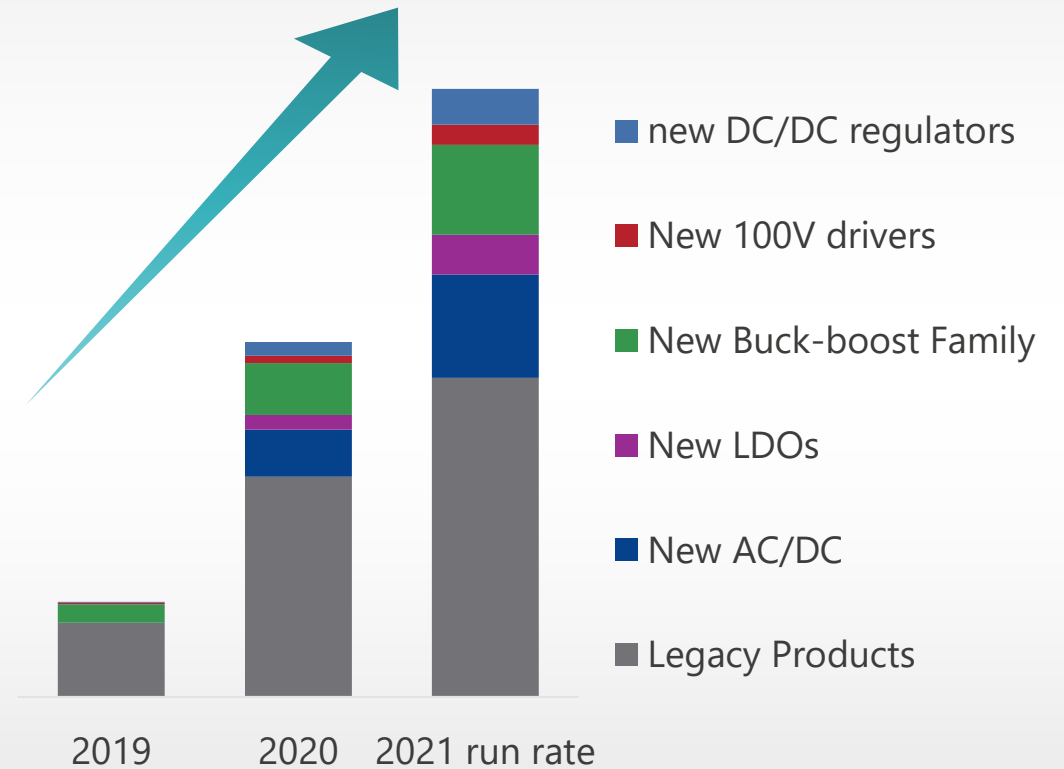


# DRIVING SECULAR GROWTH: INDUSTRIAL ANALOG & POWER SOLUTIONS

## WINNING IN TARGET MARKETS, AND GOING BROADER



**7x opportunity in LTV growth in less than 3 years!**



# INDUSTRIAL POWER IS GOING DEEPER

## EXPANDING IN EXISTING MARKETS

### Home automation

No audible power supply noise reduces product returns



somfy®

DELTA  
DORE  
Smart is the new power

legrand®

### Energy management

High-efficiency battery backup solutions enables smaller batteries



Landis+Gyr

WASION

Jackery  
POWER OUTDOORS

### Home appliances

Near-zero standby power saves energy



PHILIPS



Electrolux

### Industrial automation

Rugged fault tolerance and high reliability for long product lifetime



PHENIX  
CONTACT

GRUNDFOS

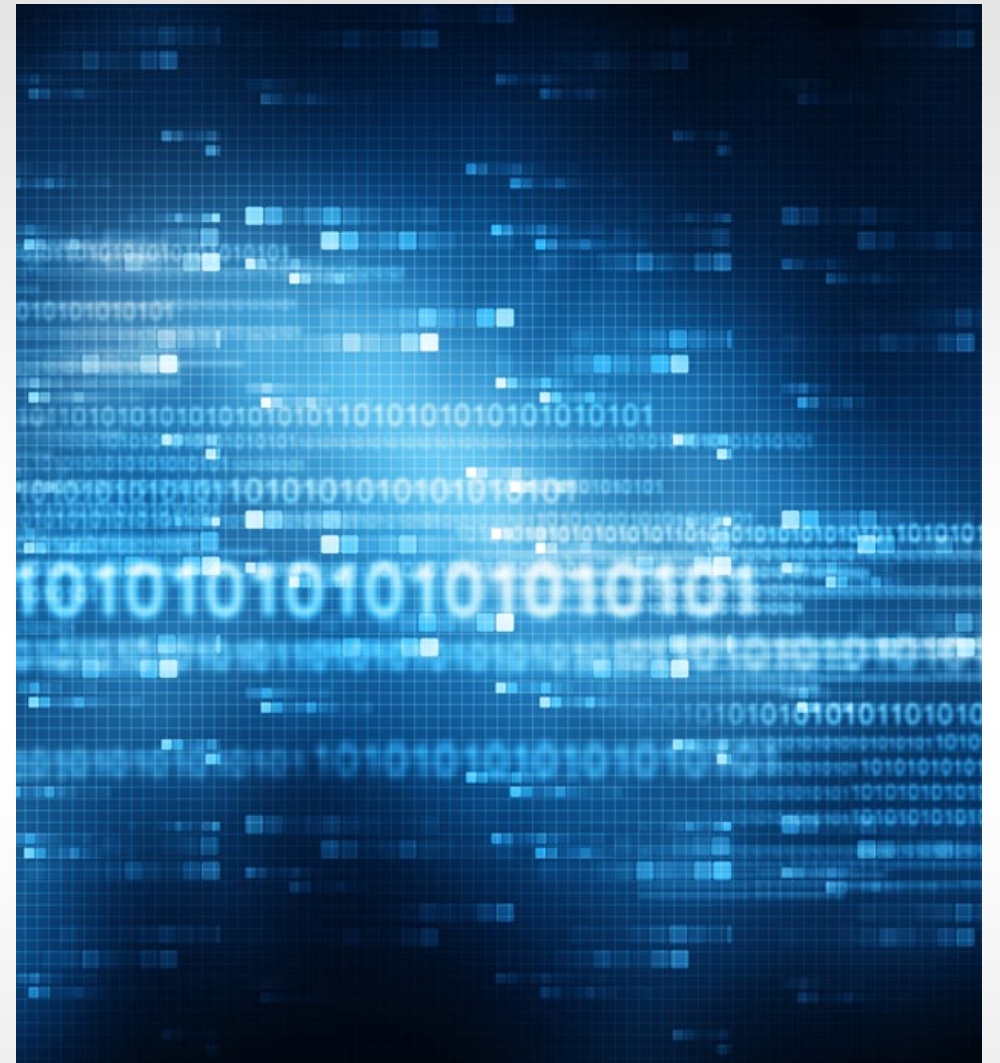
doraboot



# INFRASTRUCTURE: LEVERAGING MEMORY & CPU TRANSITIONS

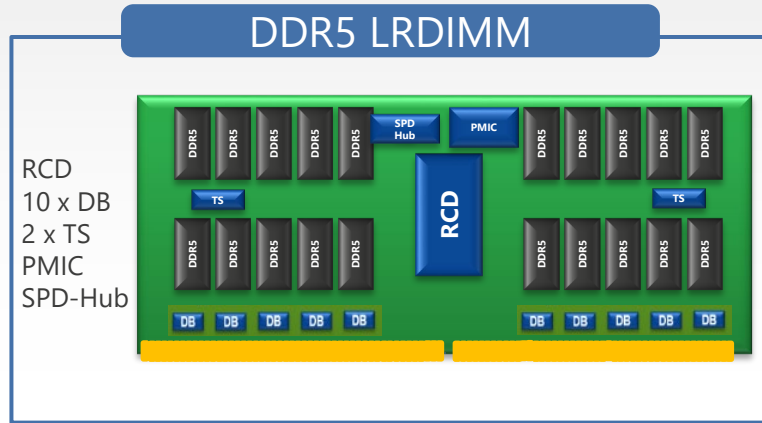
INTELLIGENCE FROM CLOUD TO EDGE SUSTAINABLY  
WITH MEMORY INTERFACE PRODUCTS

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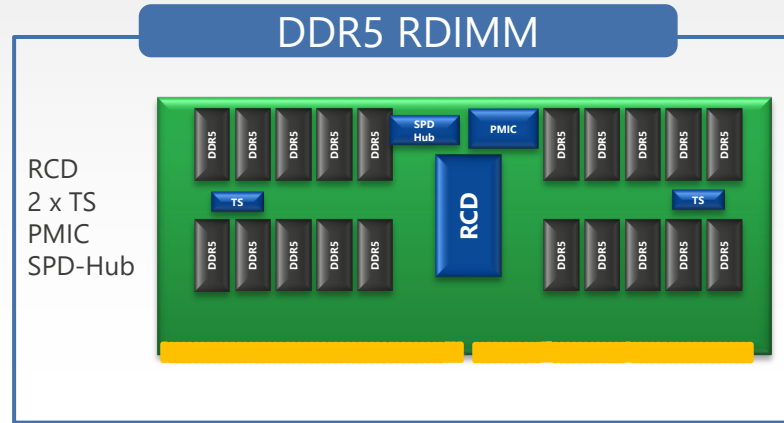


# MEMORY INTERFACE CONTENT EXPANSION: DDR5 FROM SERVER TO CLIENT

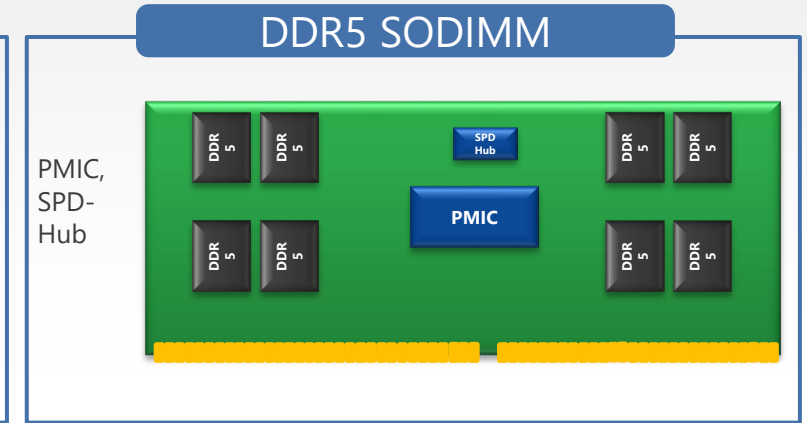
## High Performance Server



## Mainstream Server



## Laptop/Desktop/Embedded



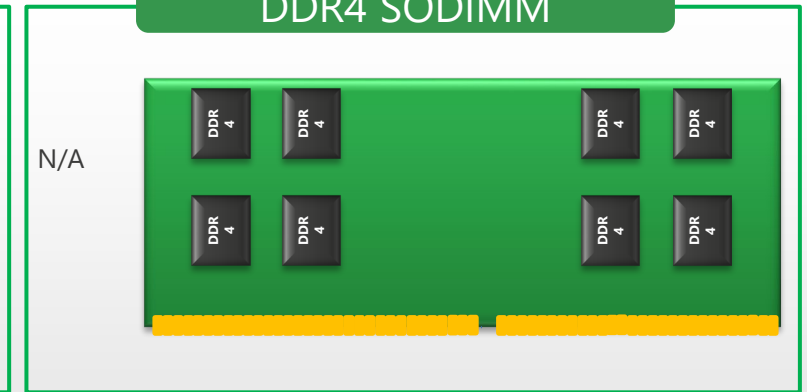
## DDR4 LRDIMM



## DDR4 RDIMM

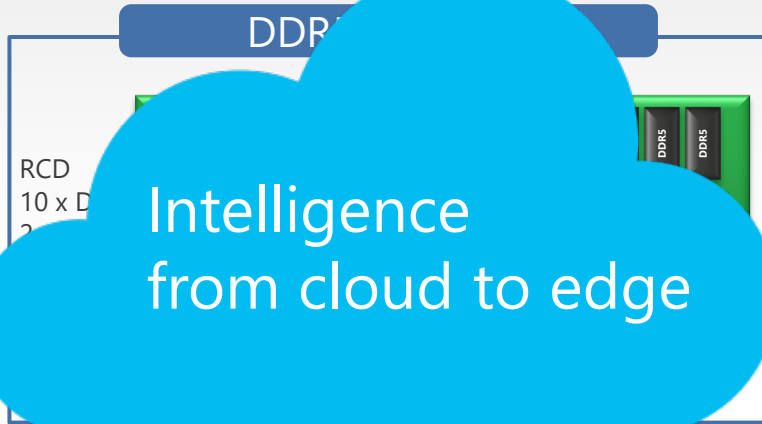


## DDR4 SODIMM

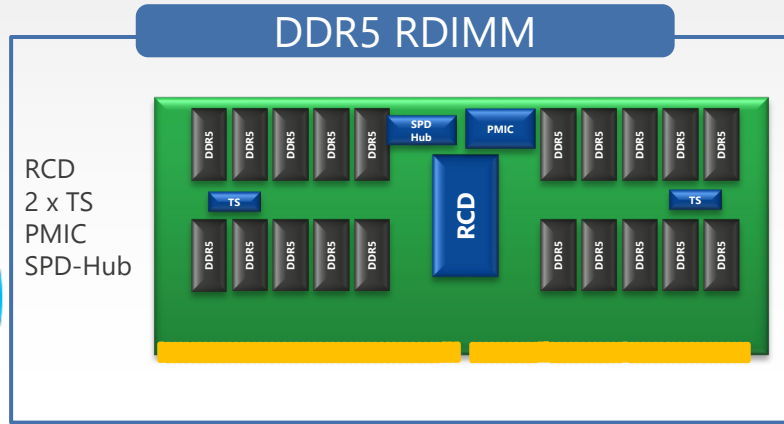


# MEMORY INTERFACE CONTENT EXPANSION: DDR5 FROM SERVER TO CLIENT

## High Performance Server



## Mainstream Server



## Laptop/Desktop/Embedded



## DDR4 LRDIMM



## DDR4 RDIMM

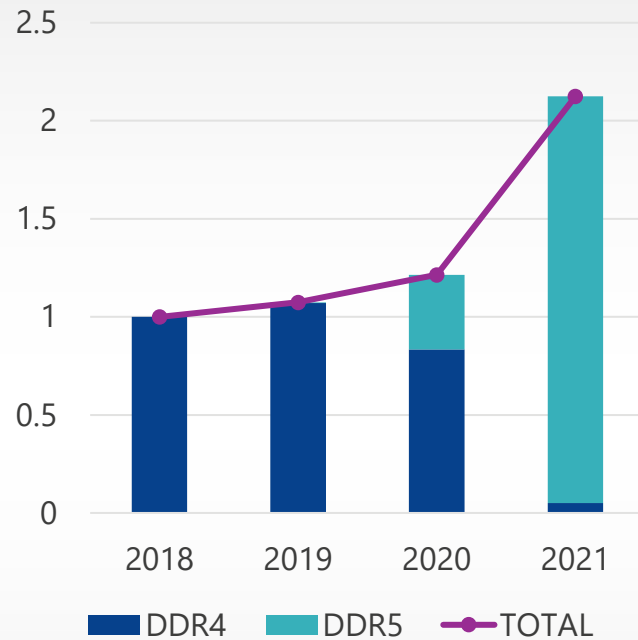


## DDR4 SODIMM

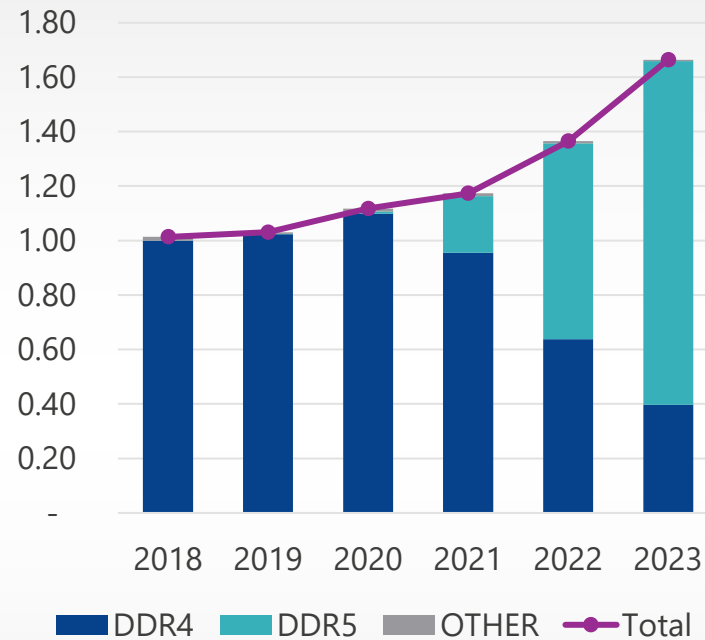


# MEMORY INTERFACE –DRIVING GROWTH & SUSTAINABILITY

Memory Interface Design-in



Memory Interface Revenue Projection



Power & Efficiency Savings DDR4->DDR5

Voltage regulation Benefit	Power Savings DDR4-> DDR5
Total Losses	~22W saving w/VR on DIMM
Memory sub-system Power comparison	Bandwidth Efficiency DDR4 ->DDR5
Bandwidth (GB/s) / Watt (w)	16% improvement in bandwidth efficiency

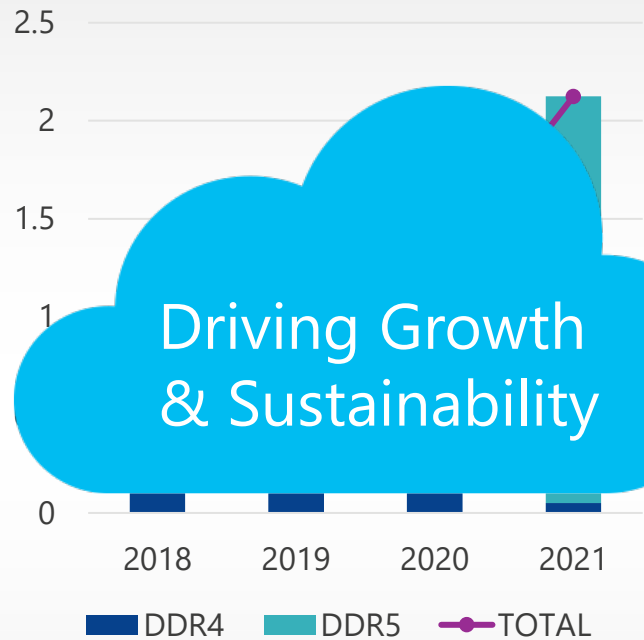
**1% efficiency improvement across data centers is 1TW of power.= 1000 Nuclear Plants**

Memory Interface Products driving the transition from DRR4

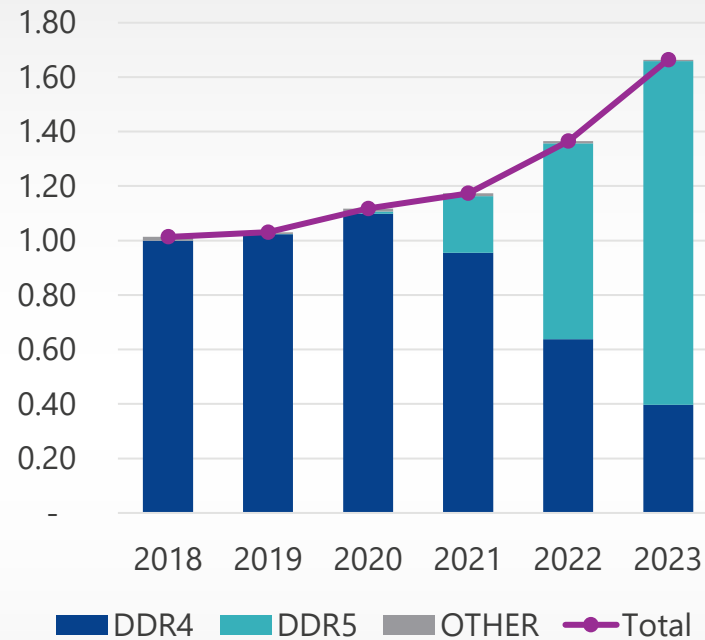
→ DDR5 with improved power efficiency and addressing new markets from High-Performance to Client Computing

# MEMORY INTERFACE –DRIVING GROWTH & SUSTAINABILITY

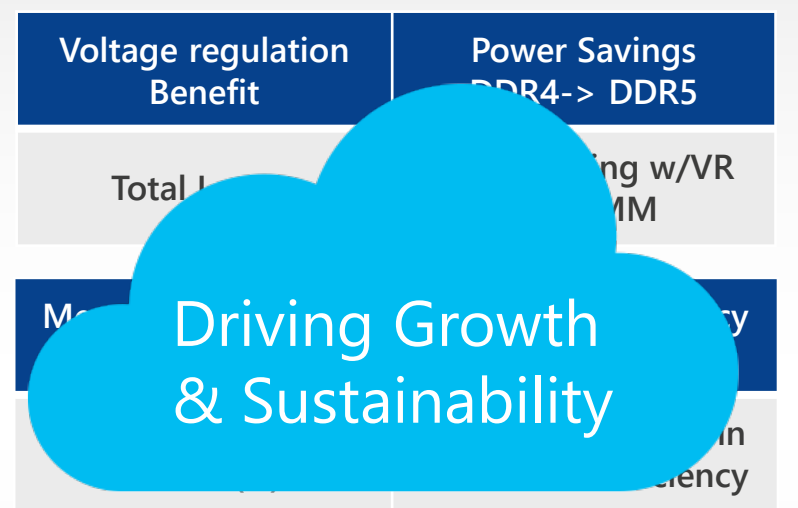
Memory Interface Design-in



Memory Interface Revenue Projection



Power & Efficiency Savings DDR4->DDR5



**1% efficiency improvement across data centers is 1TW of power.= 1000 Nuclear Plants**

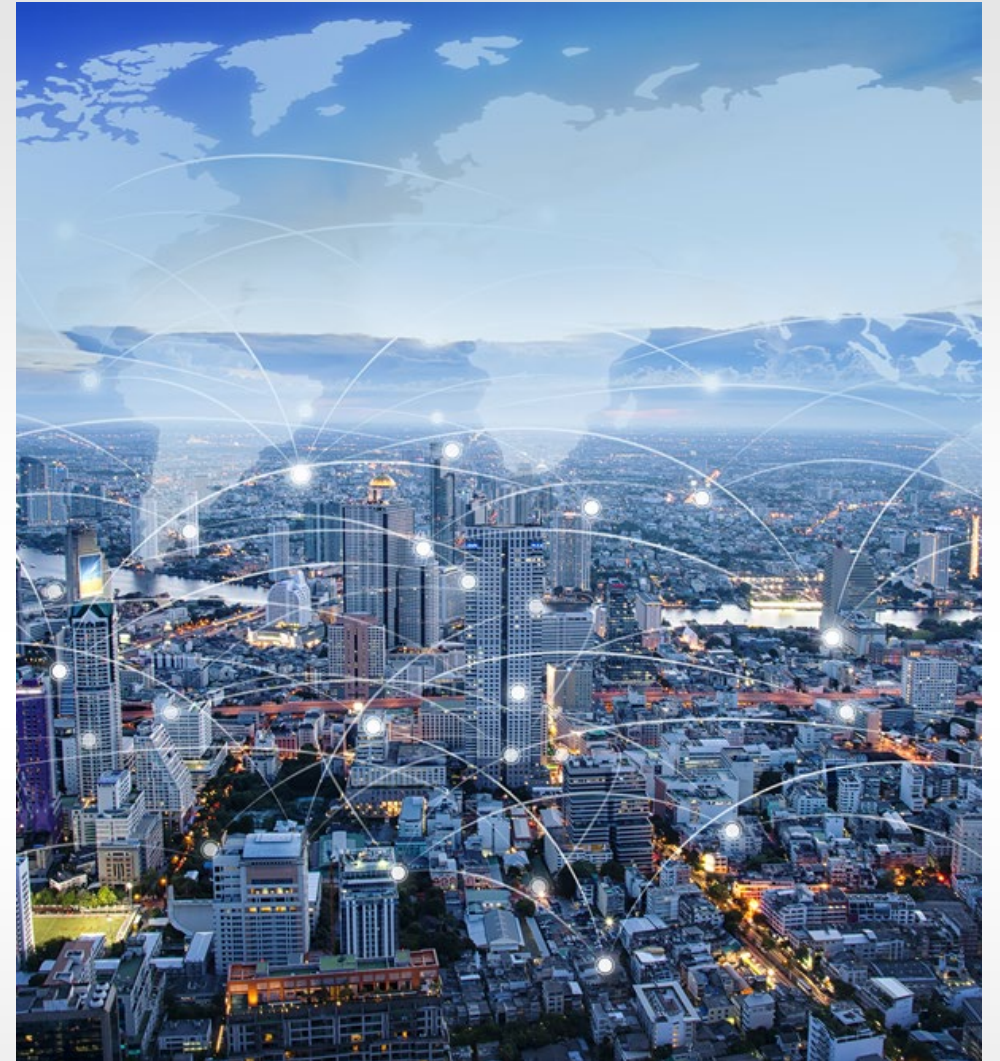
Memory Interface Products driving the transition from DDR4

→ DDR5 with improved power efficiency and addressing new markets from High-Performance to Client Computing

# INFRASTRUCTURE: O-RAN

## LEVERAGING DISRUPTION IN 5G SPACE

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# O-RAN: ENABLING DISRUPTIVE GROWTH IN 5G COMMUNICATIONS INFRASTRUCTURE

- O-RAN is an operator-led alliance, O-RAN has grown to 29 operators & 220+ contributing members
- Renesas is engaged with >50 O-RAN ecosystem partners & customers

Partnership with SOC/CPU partners with numerous reference designs



Significant traction and Design-in with top OEMs & ODMs



## O-RU ~ \$200M SAM

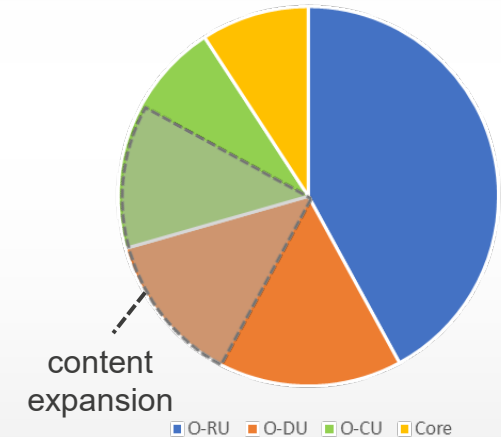
Similar content as traditional WI



## O-CLOUD ~ \$250M SAM

2X content \$ due to proliferation of server arch with merchant silicon

→ Higher MPU, power, timing & memory IO



## CORE ~ \$50M SAM

Similar content as traditional WI



# DRIVING NEW SEGMENT GROWTH WITH COMPREHENSIVE SOLUTIONS

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# DRIVING NEW SEGMENT GROWTH

WITH COMPREHENSIVE SOLUTIONS TO BE ADDRESSED AT UPCOMING ANALYST DAY

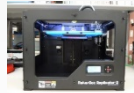


## ■ Industrial

– Robotics



– 3-D Printing



– Test & Measurements



## ■ IoT

– Drones



## ■ Infrastructure

– ARM CPU Servers



– Digital power in telecom



# REVISED FINANCIAL MODEL

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# LONG TERM FINANCIAL MODEL UPDATE

## Current Model

- ✓ Grow @SAM+
- ✓ GM 55-60%
- ✓ OM 25-30%



## New Model (including Dialog)

- ✓ Grow @SAM++
- ✓ GM ≈60%
- ✓ OM 30-35%

# SUMMARY

- IIBU product and technology strategy showing solid traction
- Our core businesses are growing
- Expect to see strong growth with our Sales strategy of going broader and deeper
- Our investments in RA (32-bit MCU) are gaining traction
- Share gain in our 64-bit General Purpose MPU's and e-AI/ DRP solutions
- Our power, analog and mixed-signal strengths being leveraged broadly
- Updated financial model reflecting strength

[Renesas.com](https://www.renesas.com)