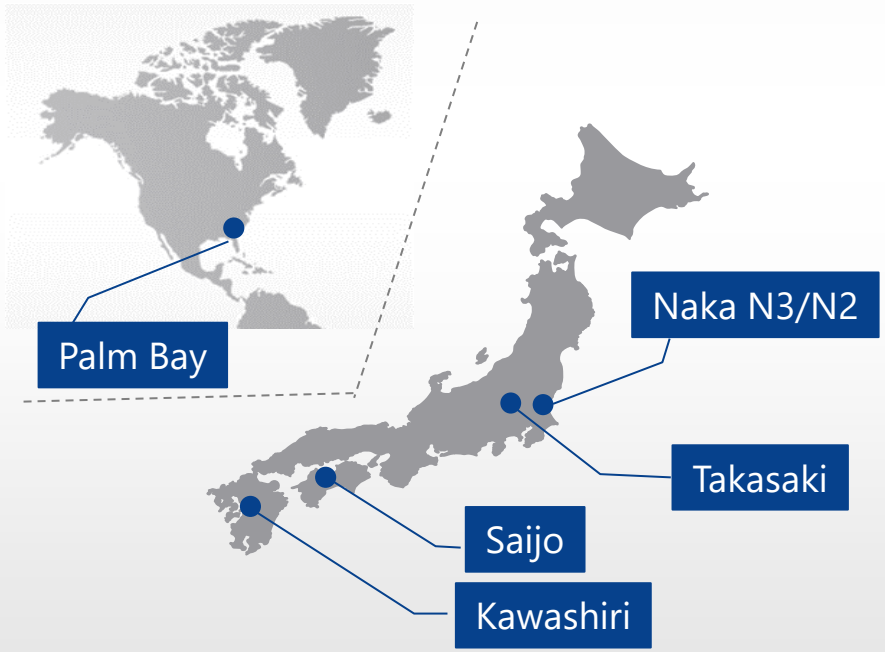
PRODUCTION STRATEGY
STRENGTHEN PRODUCTION RESILIENCE

SEPTEMBER 29, 2021
MASAHIKO NOZAKI
EXECUTIVE VICE PRESIDENT
PRODUCTION & TECHNOLOGY UNIT
RENESAS ELECTRONICS CORPORATION

PRODUCTION STRATEGY (1)

- Keep fab-light strategy
  - Focus area: Analog, PMOS (IGBT) and High-end/Low-end MCU
- Inhouse fab : Process conversion to focus devices
- Outsource : Increase Renesas share by strengthening partnership

Inhouse front-end fab footprint



Fab	Existing main products	Focus devices
Naka N3	MCU, SOC	**IGBT, Analog (incl. Dialog device) High-End MCU**
Naka N2	MCU, PMOS	**PMOS, IGBT**
Saijo	MCU, Analog, IGBT	**Low-end MCU PMOS (IGBT & Switching devices)**
Kawashiri	MCU	**Low-End MCU (incl. Dialog device)**
Takasaki	PMOS, Analog	**IGBT**
Palm Bay	High-Rel. Products	**High-Rel. Products**

PRODUCTION STRATEGY (2)

Inhouse back-end fab footprint

Fab	Existing main products	Focus devices
Yonezawa	Auto High-End MCU (BGA)	**High-End MCU**
Oita	SoC (FCBGA)	**SoC/R-Car**
Nishiki	Auto High-End MCU (LQFP)	**High-End MCU**
RSC	Auto High-End MCU (LQFP)	**High-End MCU**
RSB	Non-Auto Low-End MCU (LQFP)	**Low-End MCU (non-Auto)**
RSKL	Auto Low-End MCU (LQFP)	**Low-End MCU (Auto)**
RSM	Auto PMOS, Analog	**Analog**
REPG	Non-Auto Analog, SoC (only test)	**Analog**

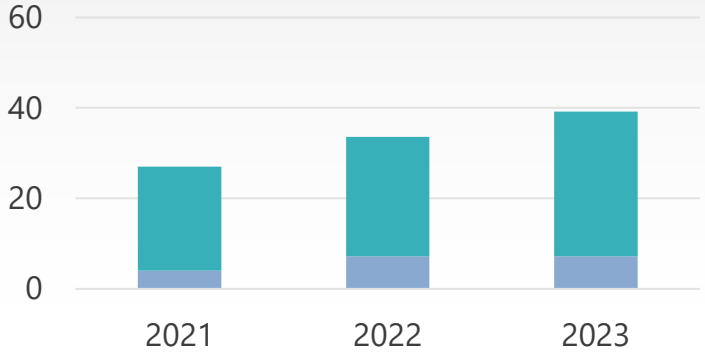
INHOUSE PRODUCTION CAPACITY EXPANSION(1)

Front-End

Unit: K wafer (Φ8 basis) /month

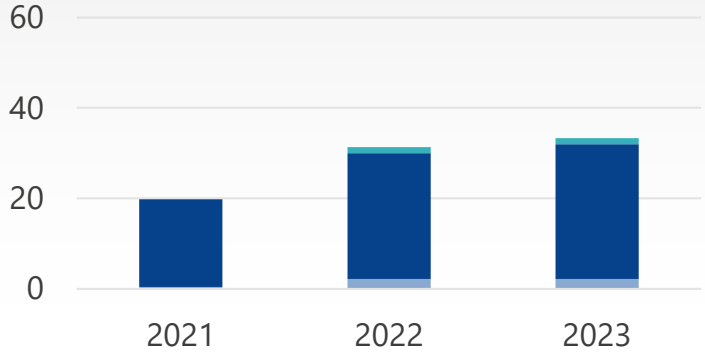
High-End MCU / RV40F+RV28F

Increase Renesas share in OS



Low-End MCU / MF4+MF3

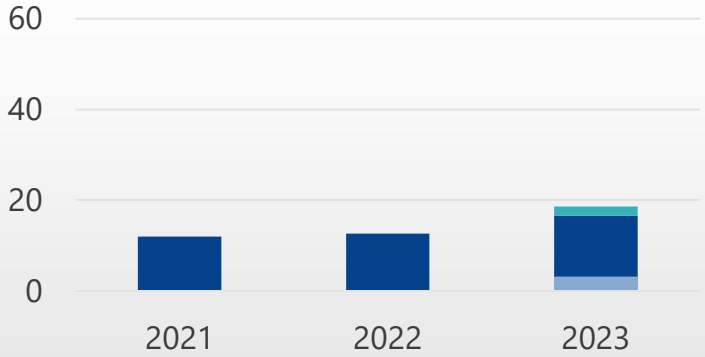
Inv. items: Diff. Furnace*1, CVD*2, Coater/Dev.*3 etc.



Outsource
Inhouse Φ8
Inhouse Φ12

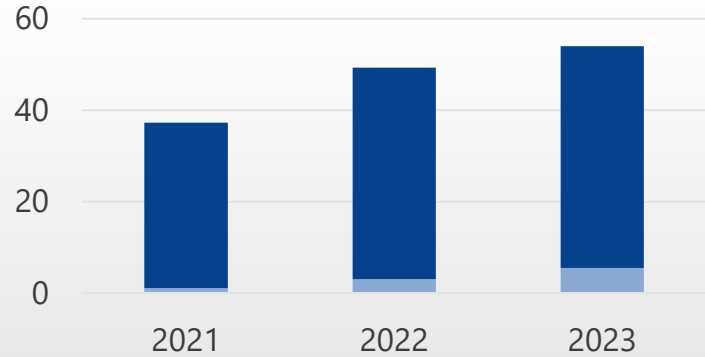
IGBT

Inv. items: Grinding, RTP*4, PVD*5, Diff.Furnace, etc.



Analog+ Power / BCD + PMOS

Inv. items: Epi. Growth*6, CVD, Diff. Furnace, etc.



*1:Diffusion Furnace *2:Chemical Vapor Deposition , *3: Coater Developer , *4 Rapid Thermal Processing *5 Physical Vapor Deposition, *6 Epitaxial Cristal Growth Furnace

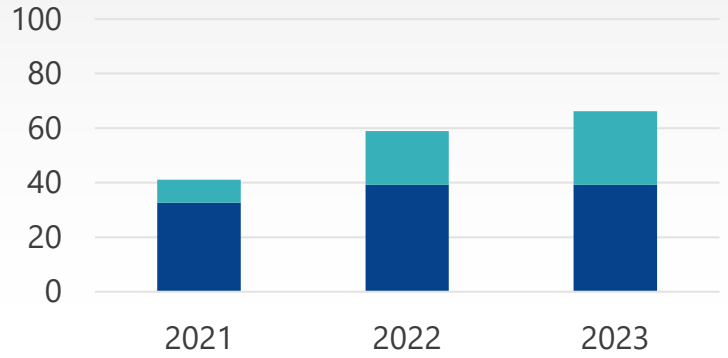
INHOUSE PRODUCTION CAPACITY EXPANSION(2)

Back-End

Unit: M pcs/month

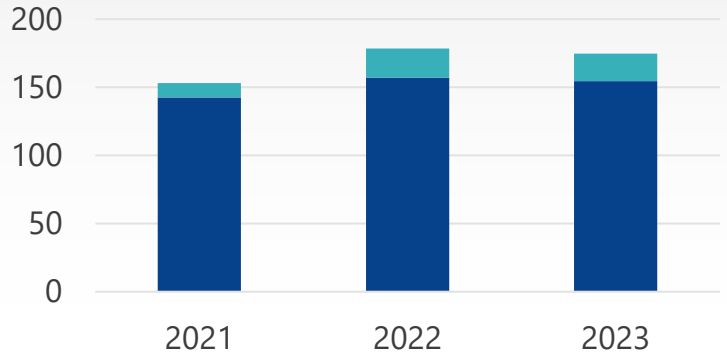
High-End MCU / RH850

Inv. Items: est Wire bond, Die bond, Mold mc, etc.



Low-End MCU / RL78+RA

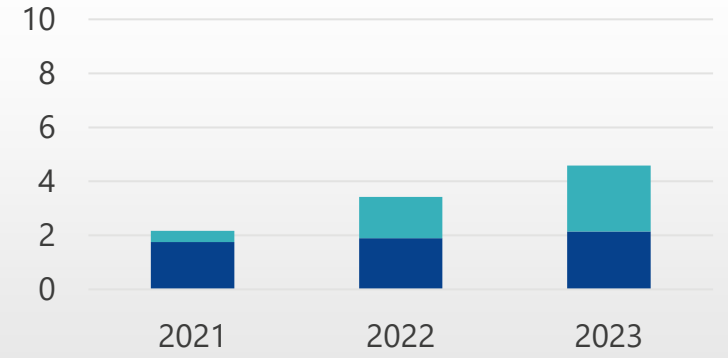
Inv. Items: Wire bond, Die bond, Mold mc, etc.



Outsource
Inhouse

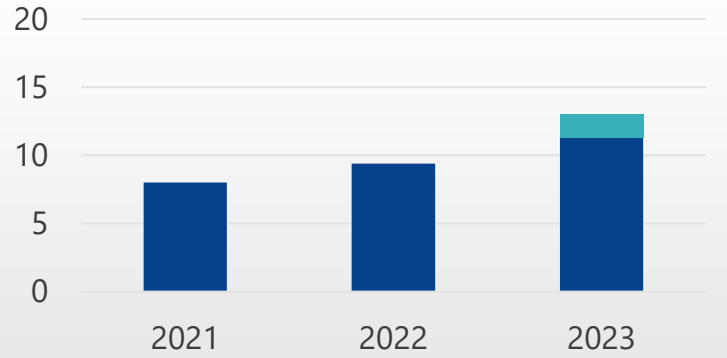
SoC / R-Car

Inv. Items: Surface Mount, Tester, etc.



Analog

Inv. Items: Tester, Wire bond, Die bond, etc.



IMPROVING RESILIENCE OF INHOUSE FABS (1)

To keep stable delivery to customers

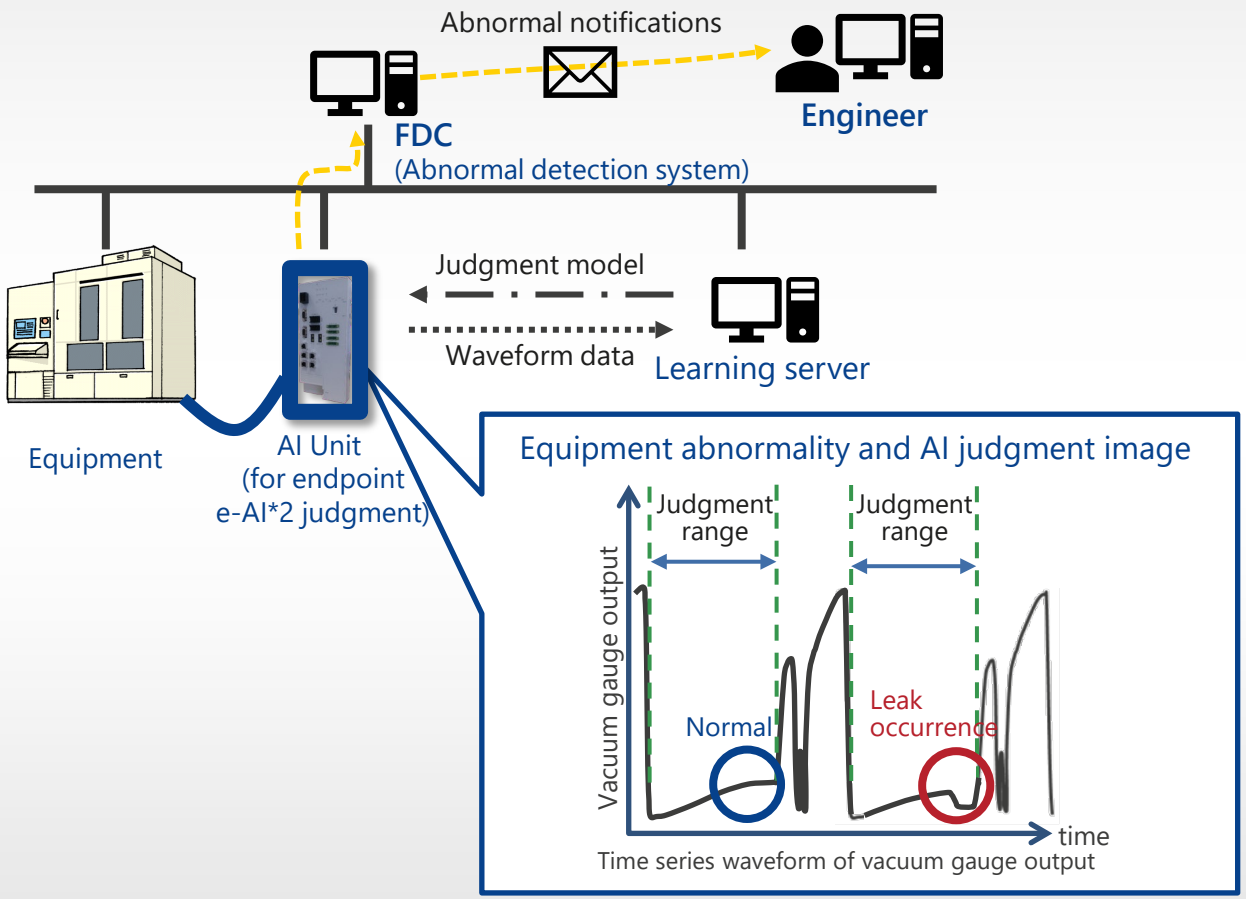
Disaster-Resistant Factories > Continuous Improvement

Fire incident	▪ Early detection (Install High-sensitivity smoke detectors) ▪ Early extinguishing (Install sprinklers to domestic fabs in Japan)
Natural disaster	▪ Continuous measures based on the latest hazard maps ex) Re-Plan measures against 3m high flood in Kawashiri, Takasaki and Yonezawa
Pandemic	▪ Thorough implementation of infection prevention measures ▪ Horizontal deployment of one experience to others: ex) Cluster in Saijo
Material procurement crisis	▪ Build a search system that directly links all materials to all products ▪ Optimization of material inventory and promotion of multi-sourcing

IMPROVING RESILIENCE OF INHOUSE FABS (2)

High productivity and high-quality factories

FDC*1 system with e-AI



- 2,000+ monitoring functions have been already installed in Renesas factories since 2017.
- Achieved a loss cost reduction of 320 million yen in last year by preventing quality issues.
- Over the next four years, another 2,000 monitoring functions is planned to be implemented (total of c. 4,000).
- Expect to achieve an additional loss cost reduction of 320 million yen.

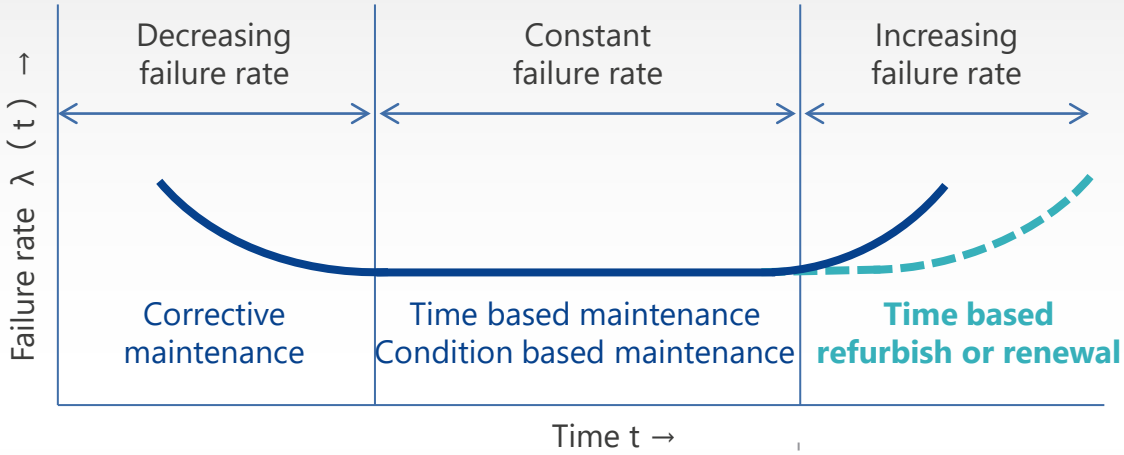
*1 FDC: Failure Detection Classification, *2 e-AI: embedded-Artificial Intelligence

IMPROVING RESILIENCE OF INHOUSE FABS (3)

High productivity and high-quality factories

Stable operation of production equipment

Bathtub curve



Efforts to achieve zero equipment failure

Previously

- Promote standard work based on 5S*1
- **Selection of appropriate maintenance methods based on failure rate and age (bathtub curve)**
- Strengthen the ability to pursue the root cause
- Improvement of individual skill levels

New Phase

- Time based refurbish or renewal (e.g. Exposure machine, CVD,CMP @N3)
- Promote predictive maintenance using endpoint e-AI
- Strengthen company-wide implementation of standard work based on 5S

*1 5S: Sort out, Set-in-order, Shine, Standardize, Sustain

IMPROVING RESILIENCE OF INHOUSE FABS (4)

To keep stable delivery to customers

Autonomous Learning Fabs

- Communicate incidents to the company immediately
- Concentrate resources and authority for early recovery

- A mechanism for sharing the experience of a single factory within inhouse Fabs
- Learning and training

- Feedback system using internal audit and survey
- Ranking system among fabs

- Growth through benchmarking with other companies

SUSTAINABILITY INITIATIVE

Greenhouse gas emissions

- Disclosed the Scope 1-3 GHG emission data
- Set the target for GHG emissions
  - **2050 Carbon Neutral (Scope 1+2)**
  - **2030 GHG -60% vs 2013**
- Submitted the commitment letter for SBT

Water resource

- Disclosed water usage, withdrawal, discharge data
- Identified the water-stressed regions / facilities
- Updated the water management policy
- 2H 2021 Set the target and plan for the water usage
- 1H 2022 Third-party verification on water data
- 2H 2022 Join the global initiative

Renesas.com