TOSHIBA

Toshiba Group IR Day 2022

Business Strategy of Device Co.

February 8, 2022

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Toshiba Corporation

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- Unless otherwise noted, all figures are 12-month totals on a consolidated basis.
- Results in segments have been reclassified to reflect the current organizational structure, unless stated otherwise.
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- Depending on the applicable laws and regulations (including securities listing regulations and U.S. laws and regulations), developments in the application, revision and enforcement of various regulatory regimes including tax regulations, interpretations by the relevant authorities, further considerations in the future and other factors, the implementation of the Reorganization may take longer than expected and there may be changes in the structure of the reorganization.

Today's Agenda

01 Device Co. Growth Plan

02 Semiconductor Business Strategy

03 Storage Business Strategy

04 NuFlare Technology Business Strategy

05 Technologies and Products to support Device Co.

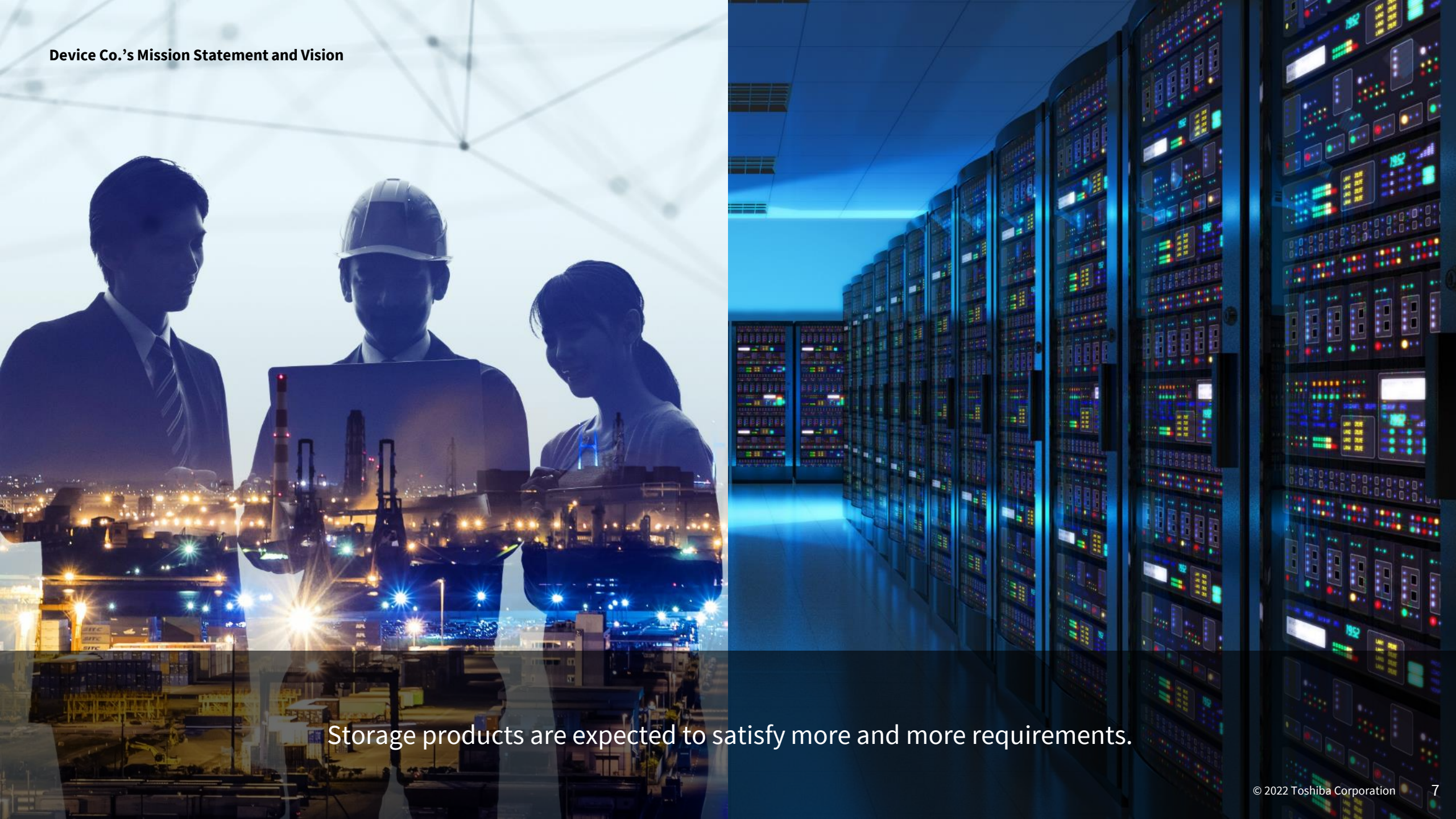
Appendix

01

Device Co. Growth Plan

The world must unite and work together to achieve a sustainable future.

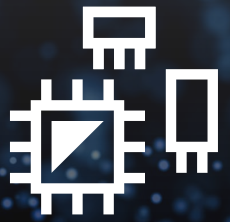
Power semiconductors have huge potential to reduce energy consumption, and to tackle energy issues.



Storage products are expected to satisfy more and more requirements.

Advances in social and information infrastructure, push for sustainability and digitalization

Semiconductors



Storage Products

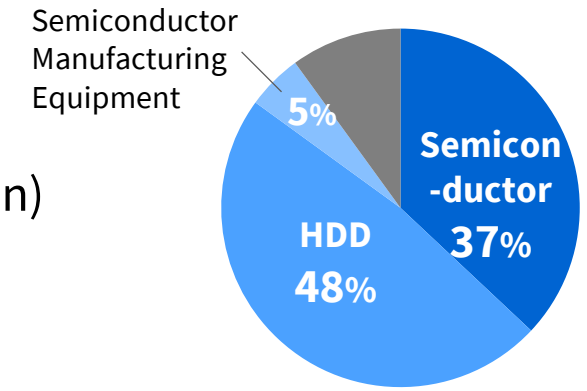
Semiconductor Manufacturing Equipment

Device Co. focuses on semiconductors, storage products and manufacturing equipment for advanced semiconductors, and to contribute to attractive and sustainable society.

Toshiba Electronic Devices & Storage Overview

Trade Name	Toshiba Electronic Devices & Storage Corporation
Date of succession	July 1, 2017
President & CEO	Hiroyuki Sato
Headquarters office	Kawasaki, Japan (Registered principal office: Tokyo, Japan)
Capital stock	10 billion yen
Main products	Semiconductors, HDDs, Semiconductor manufacturing equipment (NuFlare Technology) Materials & Devices (Toshiba Materials, Toshiba Hokuto Electronics)
Net sales	860 billion yen (consolidated FY21 forecast, as of Feb, 2022)
Employees	23,100 (consolidated, Japan: 9,200; overseas 13,900) as of Sep 30, 2021
Major Sites	Kawasaki (Semiconductor), Yokohama (HDD, Semiconductor manufacturing equipment)
Consolidated subsidiaries	Japan: 12; overseas: 14; total: 26
Production sites	Semiconductor - Japan: 6, Thailand HDD - Philippines, Semiconductor manufacturing equipment - Japan
Sales offices	Japan: 3; overseas: 39; total: 42

FY21 Sales revenue (forecast)

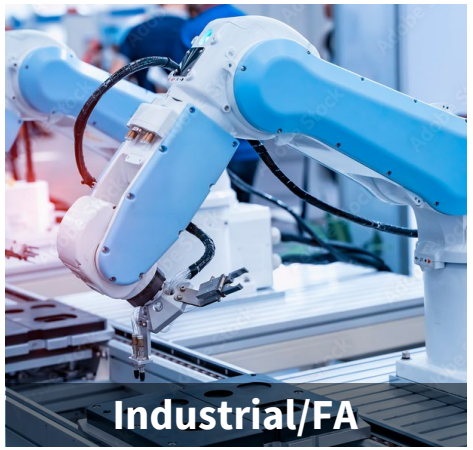


Business Scopes

Investments in push for sustainability and digitalization continue to increase

xEV
(production volume)
+186% *1
(2021→25)

*1: Source: Strategy Analytics
"Global xEV Semiconductor Demand Forecast 2019 to 2028"



FA equipment
(shipment amount)
+27% *2
(2021→25)

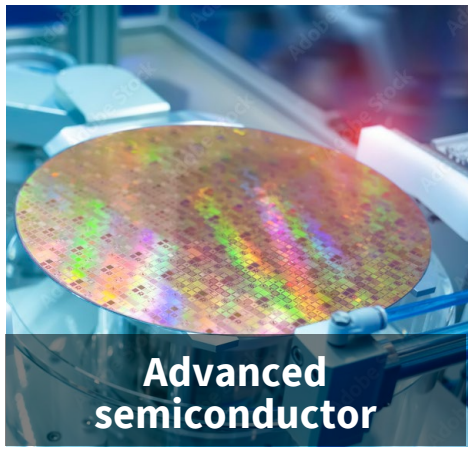
*2: Source: Toshiba forecast based on Omdia
"Industrial Automation Equipment Market Tracker 3Q21 Data"

Mobile terminals
(shipment volume)
+12% *3
(2021→25)

*3: Source: Gartner "Forecast: PCs, Ultramobiles and Mobile Phones, Worldwide, 2019-2025, 4Q21 Update" , Ranjit Atwal et al., 17 December 2021,
Mobile terminals = Traditional PC + Ultramobile + Smartphone, Units basis.

Large Data Centers
(Number of Active sites)
+13% *4
(2021→25)

*4: Source: Gartner
"Forecast: Data Centers, Worldwide, 2018-2025, 2021 Update" , Adrian O'Connell, 1 December 2021,Site Class＝Large DC

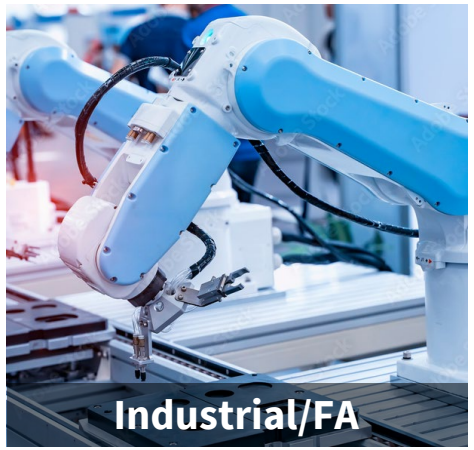


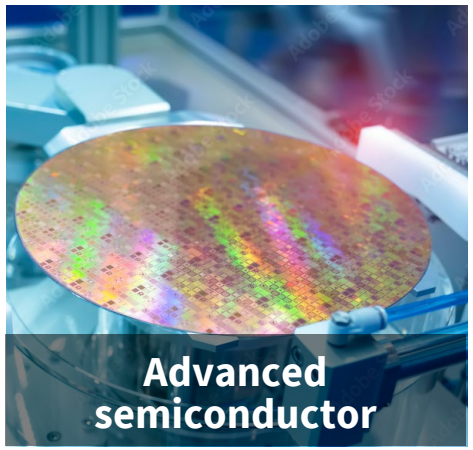
Advanced photo masks
(pieces)
+119% *5
20nm or beyond (2021→25)

*5: Source: VLSI Research powered by TechInsights "Worldwide Demand for Reticles" October 2021

Focus Markets

Offer key devices and components that lead progress in social/information infrastructure





Semiconductor

- ✓ Motor driver IC
- ✓ Power device (MOSFET, IGBT)
- ✓ Optocoupler
- ✓ Interface bridge IC

- ✓ Power device (MOSFET, SiC)
- ✓ Optocoupler
- ✓ MCU, MCD
- ✓ Linear image sensor

- ✓ Consumer HDD (for mobile, Gaming)
- ✓ Power device (low voltage MOSFET, IGBT)
- ✓ MCU, MCD

HDD

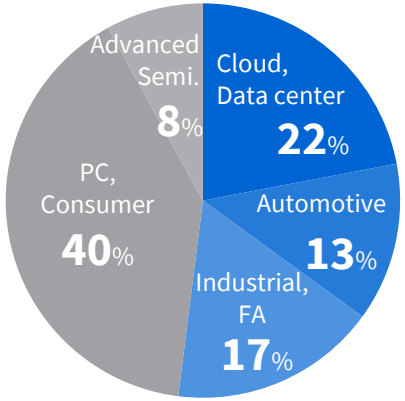
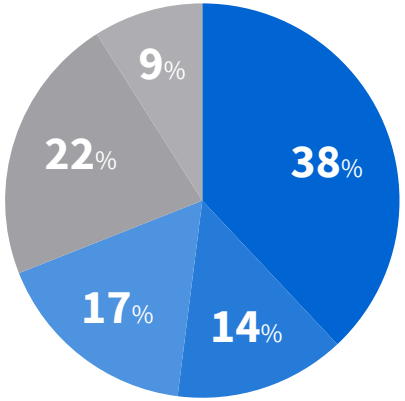
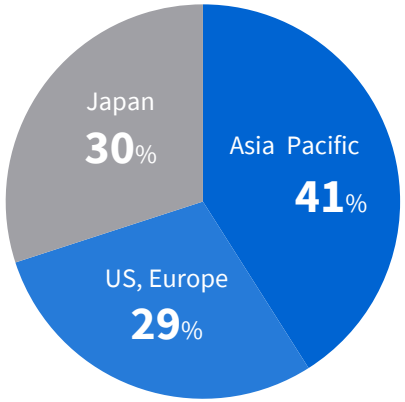
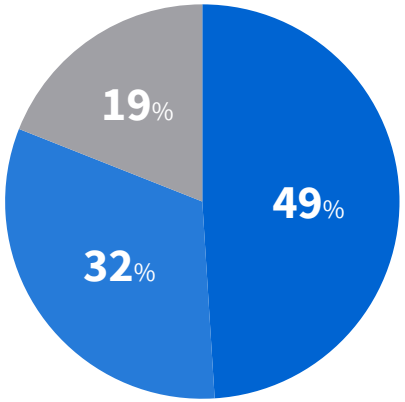
- ✓ Large capacity nearline HDD (for cloud & enterprise)
- ✓ Power device (low voltage MOSFET, IGBT)
- ✓ Diode

Semiconductor Manufacturing Equipment

- ✓ Electron beam mask writer
- ✓ Epitaxial growth system
- ✓ Mask inspection system

Customer Base

Work actively worldwide; offer values to global customers

	FY20		FY25
Sales by application		Ratio of Data center, Automotive and Industrial **52% to 69%** ▶▶▶	
Sales by region		Ratio of overseas **70% to 81%** ▶▶▶	

Sales channels

- **Sales offices**
  Japan: 3 sites
  Asia Pacific: 23 sites
  US/Europe: 16 sites
- **Partner sales channels**
  Domestic and overseas: 100+
  Sales agents
  Contracted distributors (incl. on-line)

Number of products (Semiconductor/Storage)

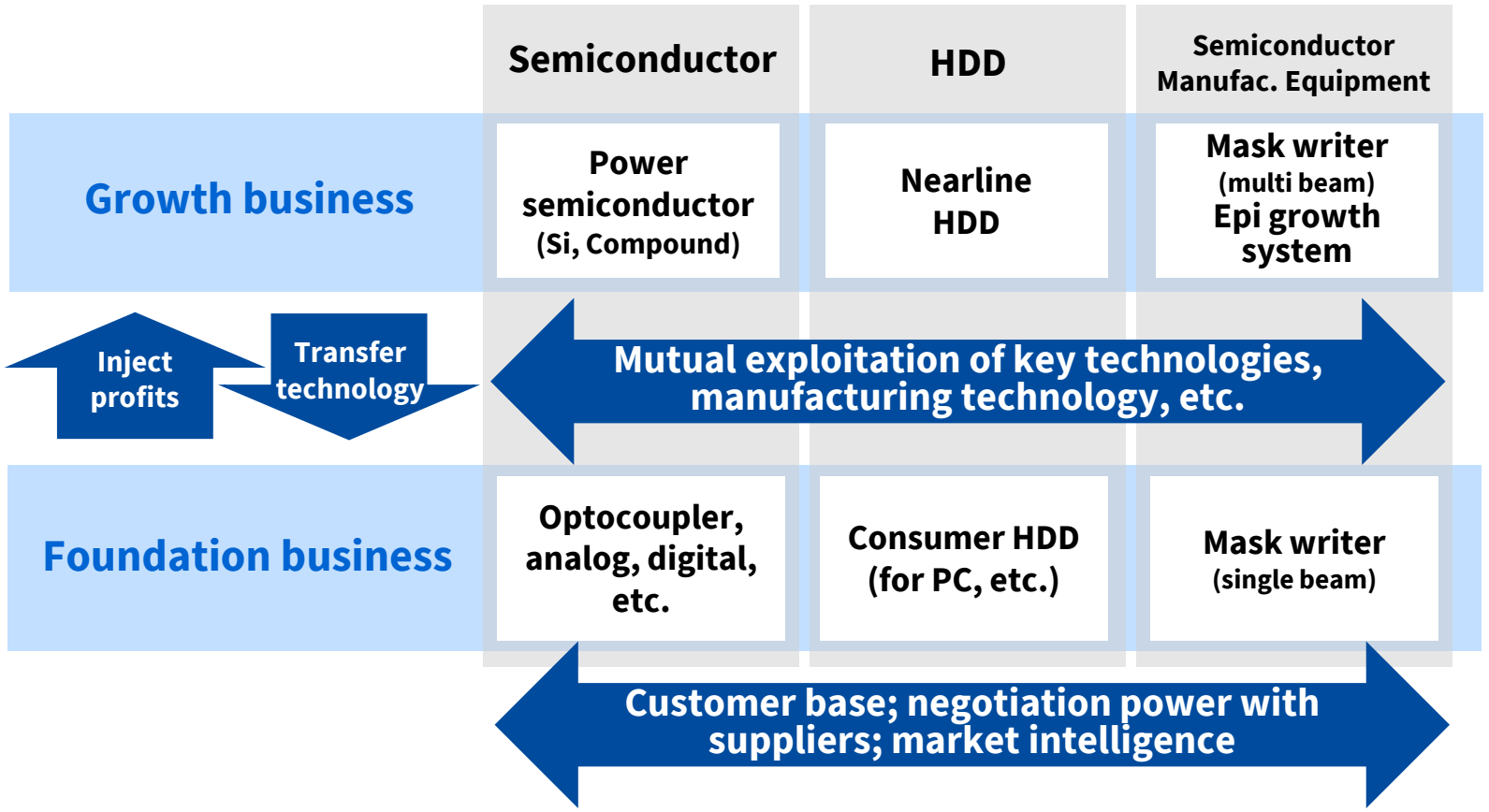
- **Item # about 40,000**
- **Volume 60 million+ pcs/day**

(excl. non-promotional items)

Business Portfolio

Enhance growth potential and efficiency through synergies in the group

Image of business portfolio



Aggressive investment in growth businesses

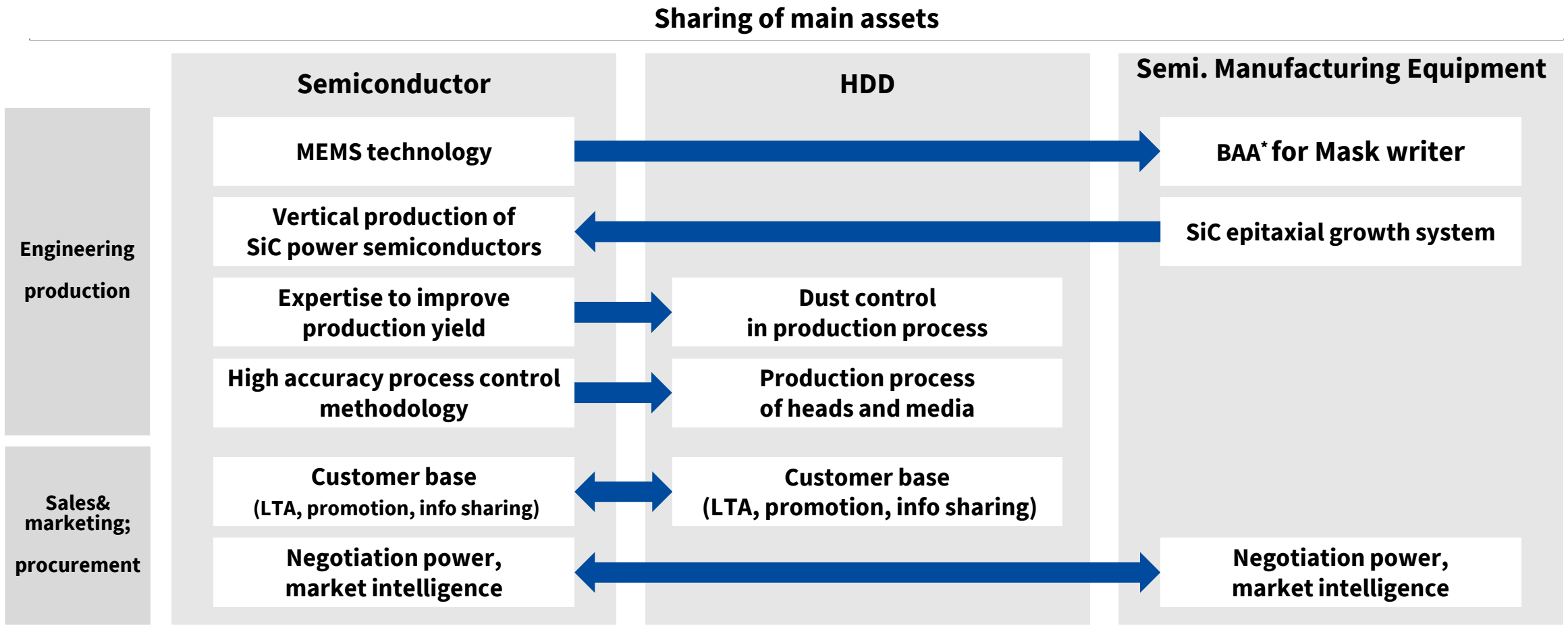
- Make agile business decisions, to aggressively invest in growth areas
- Inject profits generated in foundation businesses in growth businesses to help them grow efficiently

Utilize resources efficiently

- Utilize mutual key technology and manufacturing technology
- Utilize sales power and procurement power

Efficient Resource Utilization through Intra-Group Collaboration

Share technology and customer assets cultivated by each business



*BAA: Blanking Aperture Array
Semiconductor device to control multi beams independently

Resilient Supply Chains

Continue increasing production capacity and securing stable supply chain to cope with global tight semiconductor supply-demand balance and increasing storage demand

Increase production capacity

Capex (FY21-25, commitment base)	Production capacity (vs FY20)	
About 260 billion yen	Semi.	Si power semiconductor* about 1.7x
	HDD	Nearline HDD about 2x

Strategies

Semi.	Bring forward 300mm line operation (FY23/1H to FY22/2H)
Semi.	Secure room for increased production in the new clean room
Semi.	Convert Si 200mm line to compound device production
HDD	Continuous investment in Philippines and China production Site
Semi. Mfq. Equip.	Expand production space in Yokohama, Japan

Secure stable supply chain

Ratio of long-term agreement	Ratio of multi sourcing
80%	70%

(Major materials for semiconductors)

Common	Early response to issues in BCP system Enhance collaboration with suppliers
Semi.	Long-term agreement, advanced ordering
HDD	Strengthen supply chain with suppliers from development stage
Semi. Mfq. Equip.	Pursue new suppliers

*: Production capacity of 200mm and 300mm lines (200mm wafer equivalent)

Actions to Tackle Climate Change

Market an increasing number of products that contribute to carbon neutrality; Achieve Renewable Energy 100%

End users — Utilization

Customers (set makers) — Development, Production

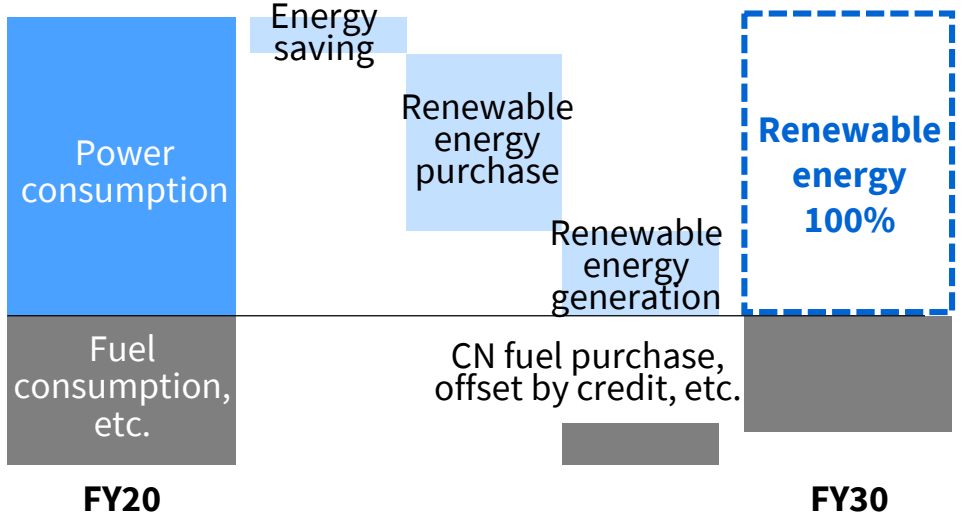
Device Co. — Development, Production

Suppliers — Procurement

Market an increasing number of products that contribute to carbon neutrality

Achieve RE100 (renewable energy 100%) by FY30

- Achieve renewable energy 100% at Oita[*1] and Kaga[*2] 300mm clean room by FY26
- Promote shift to renewable energy generated at our facilities (on-site PPA model)



Achieve a carbon neutrality in the entire value chain by reduction of CO_2 emissions in collaboration with suppliers and subcontractors

*1: Japan Semiconductor Oita Operations, *2: Kaga Toshiba Electronics

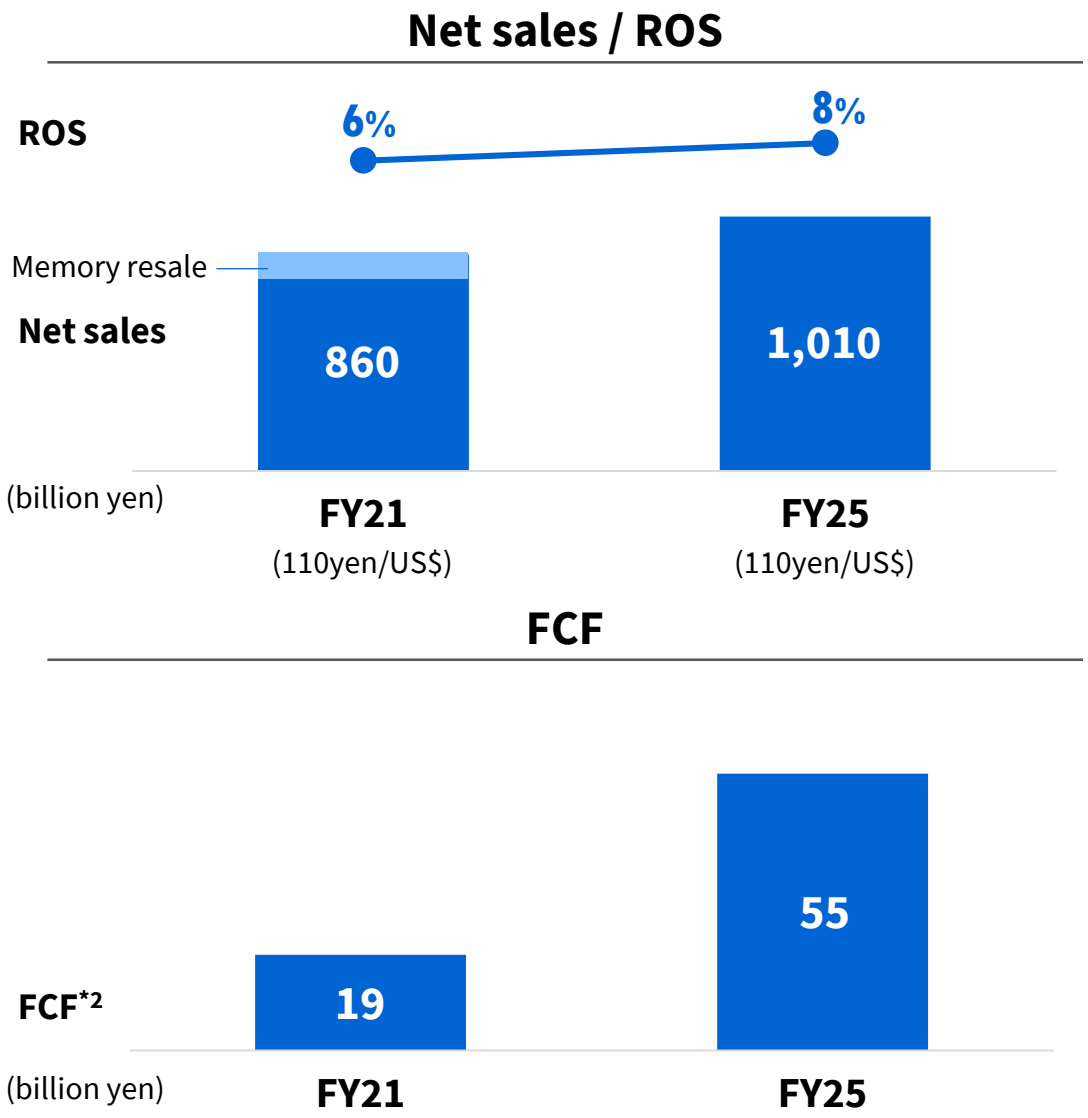
Device Co.’s Capital Allocation Strategy

Inject 500+ billion yen in five years in focus and growth areas

	Investments (FY21-25 total)		Main items
Capex*1	**260 billion yen**	**Silicon power**	New 300mm line, increase in 200 mm line
		Compound semi.	Equipment for SiC/GaN development (increase capacity, bigger diameter)
		Nearline HDD	Increase in production capacity, enhance BCP
R&D	**310 billion yen**	**Silicon power**	Wider lineup, higher efficiency package
		Compound semi.	High-voltage SiC, GaN devices
		Nearline HDD	New drives (next gen assist recording, multi-stacking)
		Mask writer	Next generation multi beam writer
Total	**570 billion yen**		

*1: Excluding costs such as capex for contacted manufacturing in the Philippines

Device Co. Growth Plan *1



Net sales

- ✓ 300mm line investment starts to bear fruits in FY24
- ✓ Consider bringing forward production start to maximize sales

ROS

- ✓ Marginal profit rate improves +2pt thanks to cost improvement, etc.
- ✓ Increase R&D investments by1.3x (FY21 to 25)

FCF

- ✓ Continue approx. 50 billion yen/Y capex
- ✓ Cumulative total of FCF in FY21 to 25: 140 billion yen

  Cumulative total of CF from operating activities 420 billion yen
  Cumulative total of CF from investment activities ▲280 billion yen

*1: Figures are initial Proforma based on the assumptions of separating corporate functions, and will be revised during detailed review process.
*2: Free cash flows

Financial Policy (Plan as of February, 2022)

Maximize corporate value by strengthening profitability and investments for growth

Capital allocation	● Strengthen earning power; aggressively invest for growth ● Inject cash generated in the foundation area into the growth area
Balance sheet	● Maintain net cash position; flexibly study utilization of debts to improve capital efficiency and invest for growth to capture growth opportunities
Shareholder return	● Aim at 30%+ average consolidated dividend payout ratio ● Prioritize investment for growth; unused free cash flows, if no qualified investments, should be paid to shareholders via dividends or share buyback ● Improve capital efficiency from a mid- to long-term perspective and aim at four-year average *1 15%+ ROE

*1: Average of FY22 to FY25

Objectives of “Spin-off”

Realize sustainable, profitable growth and enhance corporate value with highly professional and agile management most suited to the industry

Growth	**Make agile management decisions including invests and M&A** in the fast changing business and technological environments to grow faster than competitors
Costs	**Carefully review costs and investments and inject resources directly, in a timely manner** from Device Co.’s viewpoint; increase freedom and cost control
KPI	**Decide KPIs focused** on market dynamics and business characteristics, and **disclose business and financial information and strategies more frequently**
Human resources	Promote **personnel management systems most suitable to the industry** : recruit and retain professional and excellent human resources

02

Semiconductor Business Strategy

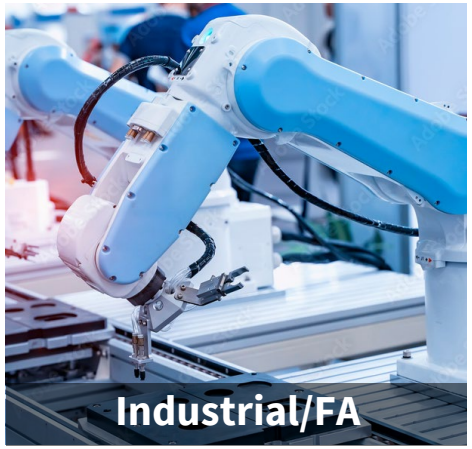
Focused Markets for Semiconductor Business

Market expansion by increasing investment in push for sustainability and digitalization

Automotive

xEV
(production volume)
+186% *1
(2021→25)

*1: Source: :Strategy Analytics
"Global xEV Semiconductor Demand Forecast 2019 to 2028"



Industrial/FA

FA equipment
(shipment amount)
+27% *2
(2021→25)

*2: Source: Toshiba forecast based on Omdia
"Industrial Automation Equipment Market Tracker 3Q21 Data"

PC/Consumer

Mobile terminals
(shipment volume)
+12% *3
(2021→25)

*3: Source: Gartner "Forecast: PCs, Ultramobiles and Mobile Phones, Worldwide, 2019-2025, 4Q21 Update" , Ranjit Atwal et al., 17 December 2021,
Mobile terminals = Traditional PC + Ultramobile + Smartphone, Units basis.

Data center

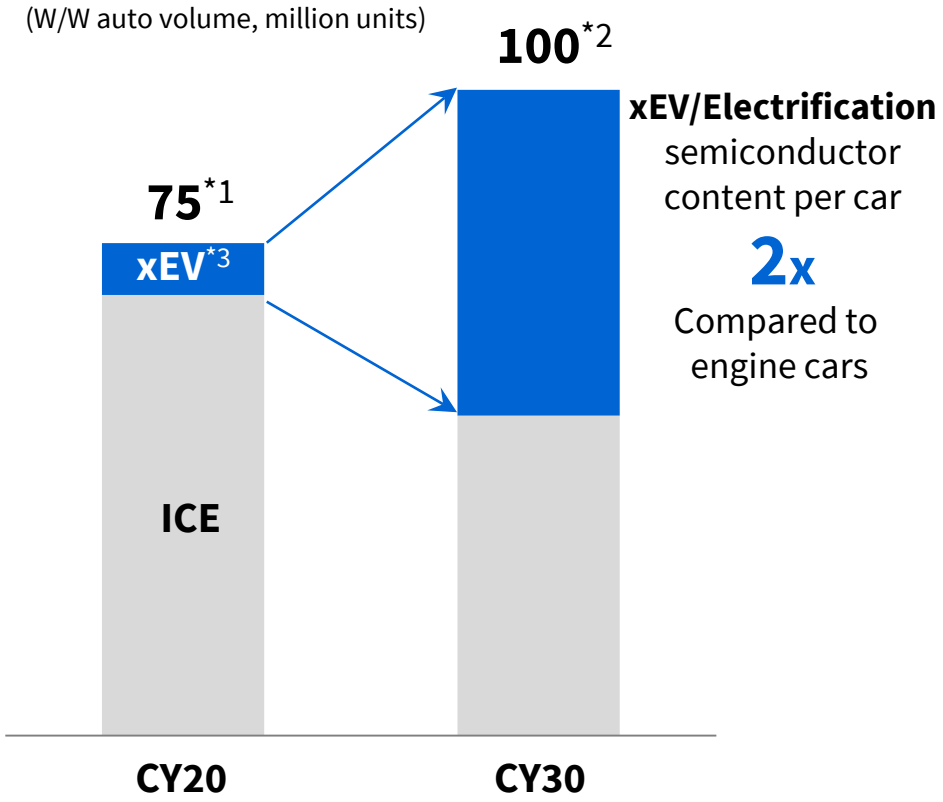
Large Data Centers
(Number of Active sites)
+13% *4
(2021→25)

*4: Source: Gartner
"Forecast: Data Centers, Worldwide, 2018-2025, 2021 Update" , Adrian O'Connell, 1 December 2021,Site Class＝Large DC

Automotive Market

Demand for semiconductors is steadily expanding with electrification

Outlook for demand of xEV and Electrification



Trends of xEV and Electrification

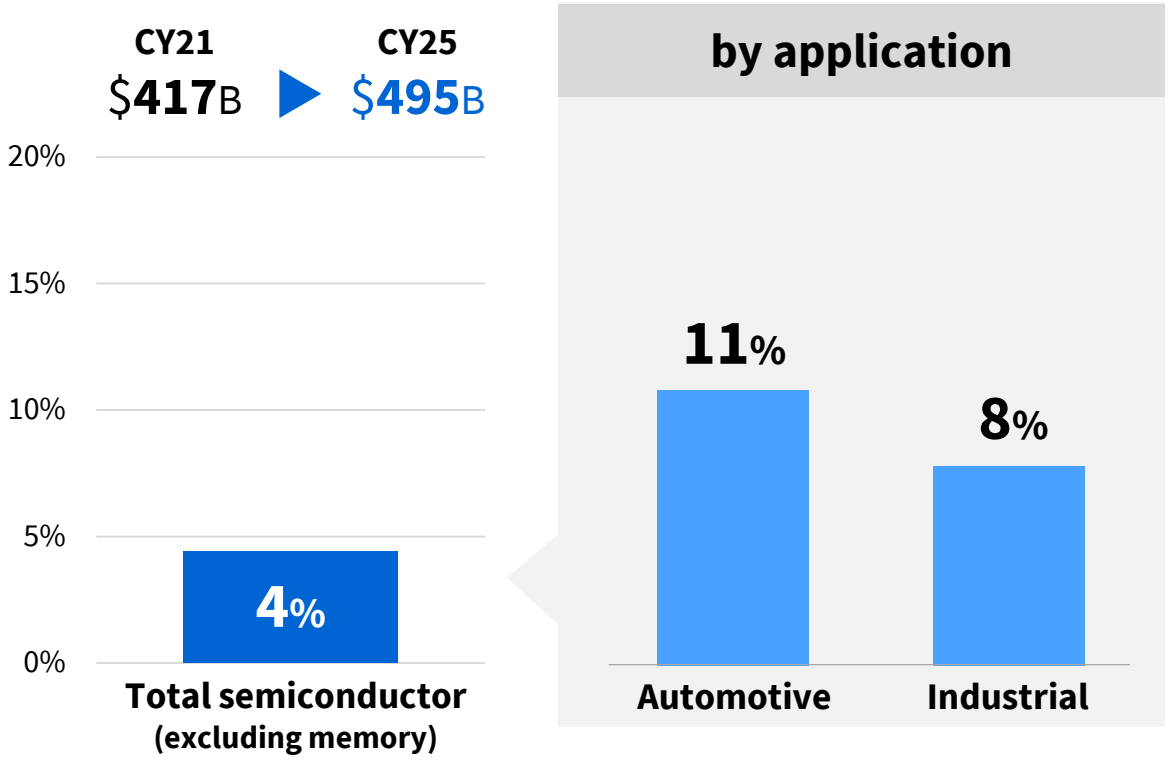
- ✓ **Tightened sales regulation for Internal combustion engines, with worldwide concerns for carbon neutrality**
  - ➢ Market growth of xEV, electric motor system and etc. become more realistic
- ✓ **Demand for weight saving and extended mileage will increase**
  - ➢ Increase demand for low power and high efficiency in inverter, battery management systems and motor controls etc.
- ✓ **Request for cost reduction and shorter development TAT**
  - ➢ Reduce development costs and TAT while ensuring quality through platformization and modularization

*1: Source: Strategy Analytics, “Automotive Electronics System Demand 2019 to 2028 Updated Jan 2022”
*2: Source: Yano Research Institute Ltd, “xEV key Devices & Components Market 2021”, Sales Forecast 31/08/21
*3: xEV： EV, FCV, HEV, PHEV

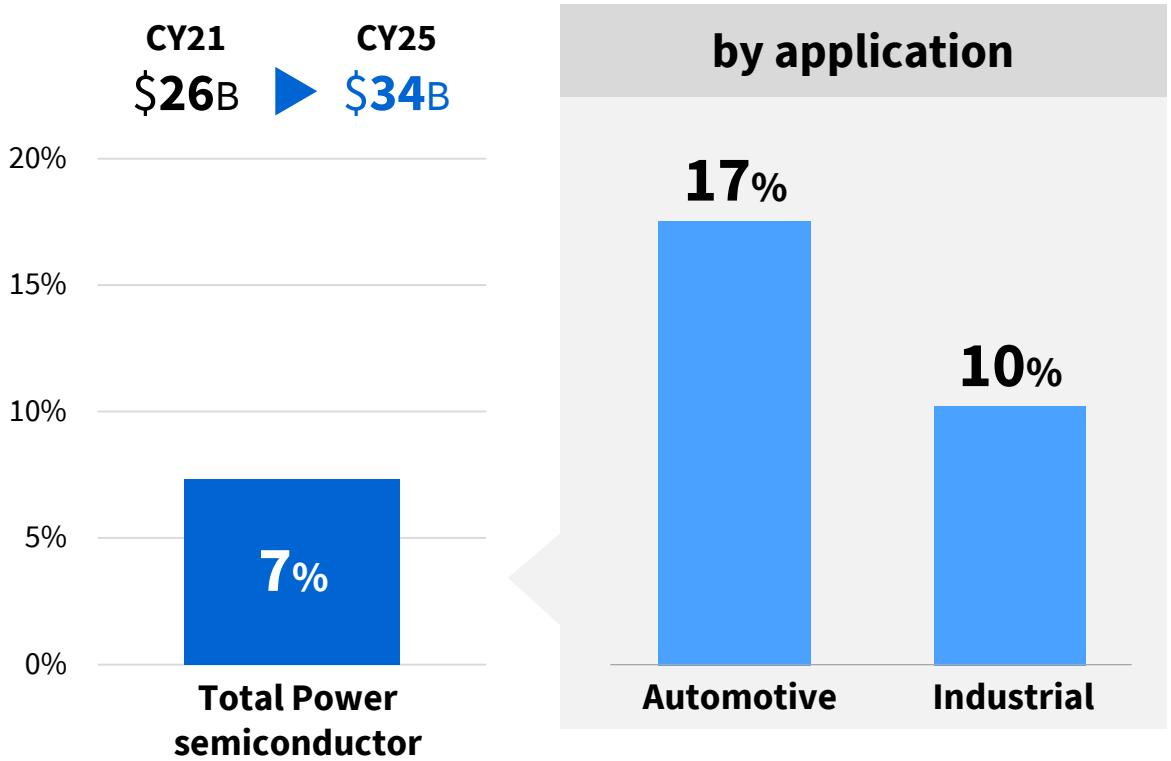
Outlook for Semiconductor Market

Automotive, industrial and infrastructure will drive Semiconductors growth, especially power semiconductor market

CAGR of semiconductor market (excluding memory)*1



CAGR of Power semiconductor market*2

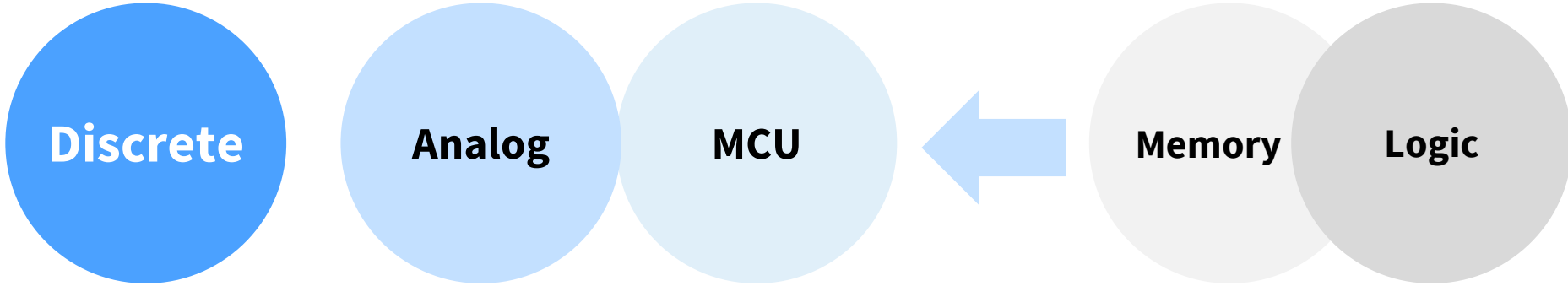


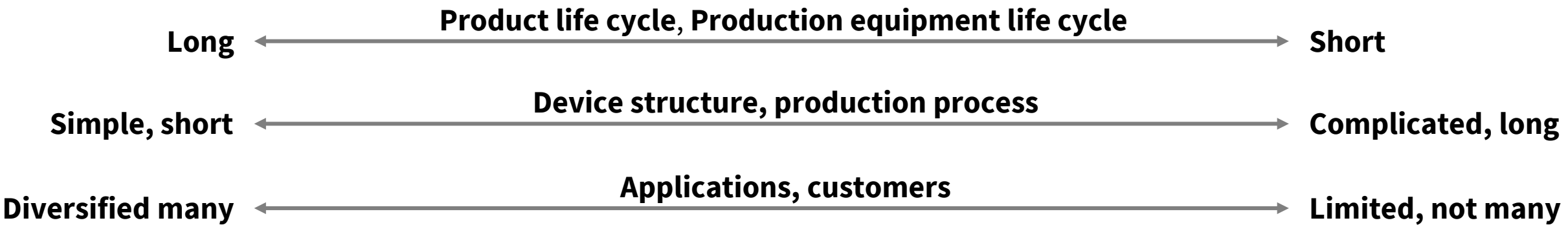
*1: Source: Gartner, “Semiconductor Forecast Database, Worldwide, 4Q21 Update”, Ben Lee et al., 23 December 2021
Sum of Final Device Forecast(Semiconductor) excluding Total Memory.
Automotive ＝Factory-Fitted -Automotive + Aftermarket , Industrial = Industrial Electronics,
Chart created by Toshiba Electronic Devices & Storage Corporation based on Gartner research. Device Forecast, Revenue basis.

*1: Source: Omdia “Power Discrete and Module Market Tracker – 2020 Database_Dec2021”

Device Co.’s Semiconductor Business Fields

Focus on areas that are not heavily dependent on business environments, require lower capex





Business Model

Realize sustainable growth through balanced business portfolio

Intensive and continual **Investment**

- R&D
- Capex

- Production capacity
- Technological superiority

Utilization

Business growth

Power Semiconductors

GaN　SiC

MOSFET　IGBT, IEGT

- Electric pump
- Electric power steering
- Battery management
- Power supply for communication base station
- Power supply for server

- Wide-range of product coverage
- Solid relations with customers & suppliers

Strengthen business bases

Optocoupler

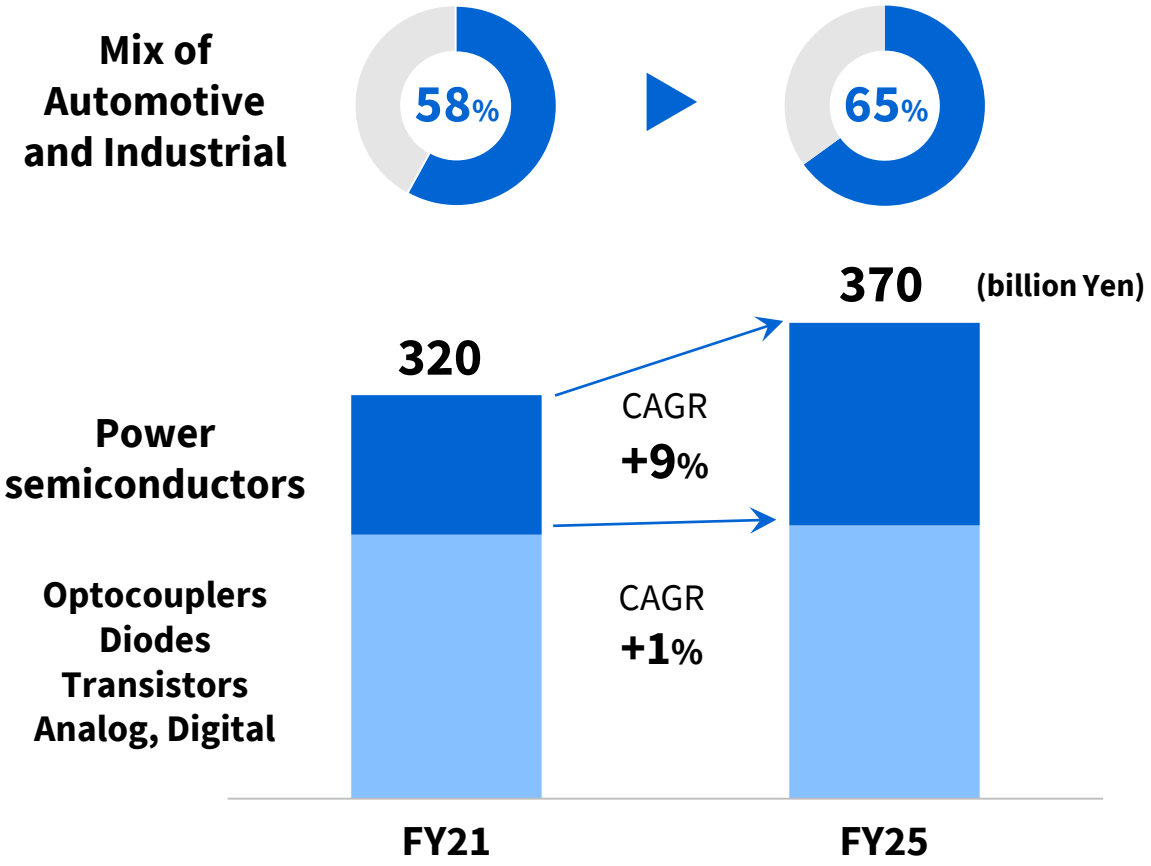
Diode　Transistor

Analog　MCU

Semiconductor Business Targets

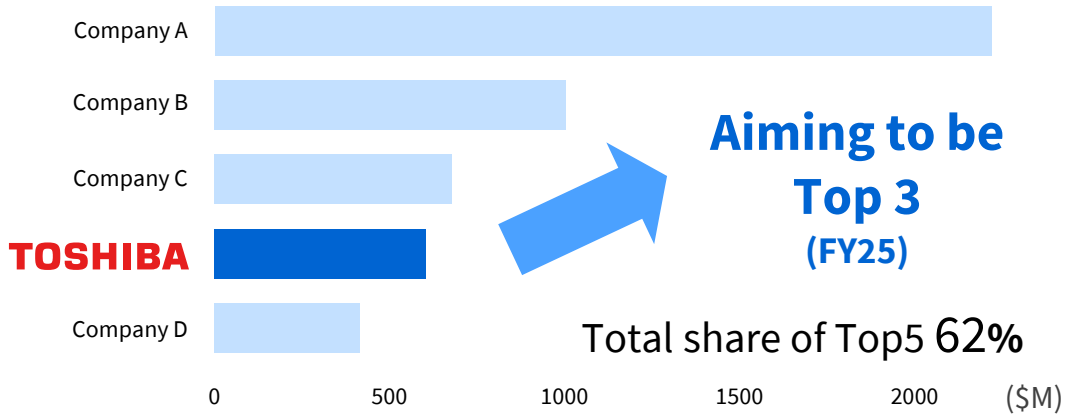
Expand the power semiconductor business, mainly in the automotive and industrial fields

Semiconductor business revenue plan



Market position of power semiconductor*1

- Top 6 in power semiconductor (CY20)
- Top 4 in power MOSFET (CY20)

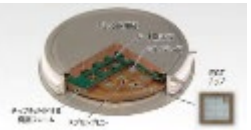
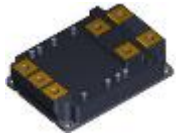


1. Accelerate development of technologically advanced products
2. Strengthen relationships with major customers
3. Agile decision to increase production capacity

*1: Source: Omdia, "Competitive Landscaping Tool CLT, Annual –3Q21"

1. Accelerate Development of Technologically Advanced Products

Double R&D for Power semiconductor from FY21 to 25, strengthen technological superiority and accelerate product development

	Power MOSFET	High voltage Power devices
Customer demands	**Solutions for various use (voltage)** 	**Custom products for customer-required performance**  High power module (PPI)*2   SiC module (iXPLV)*3 
Our superiority	**High efficiency characteristics suitable for use of automotive and server** • World's best in class*1 product (ON-resistance) • Wide lineup of voltages (20 to 650V) • Packages that allow selection for all uses • Quality for in-vehicle use • New material compound semiconductors provide high efficiency and volume reduction	**Excellent quality suitable for use in power transmission, railways, infrastructure** • Established technologies for high reliability, high heat radiation, high weather resistance (Market share of IEGT for DC transmission in China: 25%*4 Toshiba Electronic Devices & Storage estimates) • Supply SiC modules for railways (supplied All-SiC inverter to railway vehicles) • Developing HV-MCP*5 as successor to PPI ➢Small and High performance with stack-less design

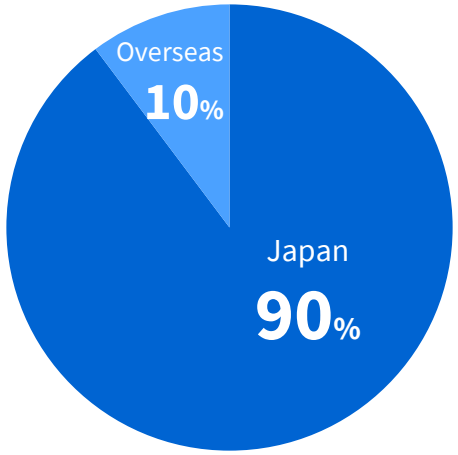
*1: As to 80V N channel power MOSFET, compared its On-resistance × Switching characteristics (Ron×Qoss) among product with the same rating, as of January, 2022. Toshiba survey.
*2: PPI(Press Pack IEGT)：Hermetically sealed, pressure contact module *3: iXPLV(intelligent fleXible Package Low Voltage)：package for SiC module *4: Source: Toshiba estimates
*5: HV-MCP(Highvoltage multi chip package)：New package technology with stack-less design

2. Strengthen Relationships with Major Customers

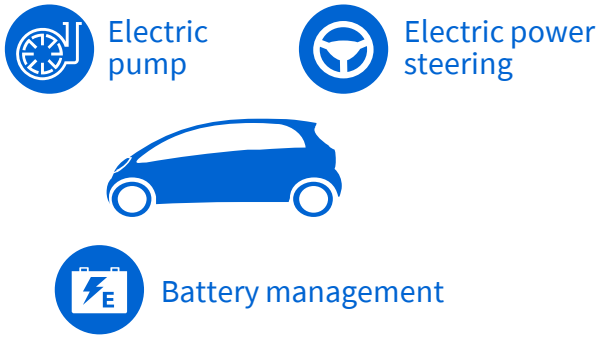
Maintain and strengthen domestic customer base, accelerate overseas sales promotion utilizing the achievement Japanese No.1 vendor*1

Automotive market

Sales mix of our power semiconductors for automotive in FY20



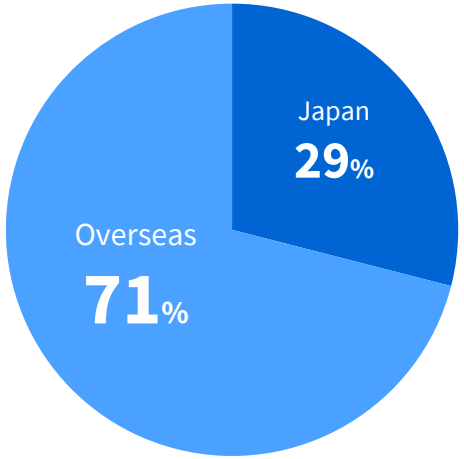
Many major customers in Japan market



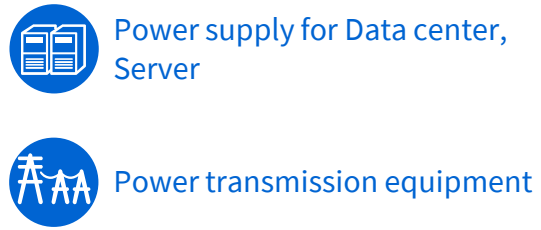
- ✓ Further strengthen relationships with domestic customers by offering better solutions
- ✓ Make full-scale entry into the overseas xEV market with the achievements cultivated in Japan
  - ➢ increase the number of FAE*2 in overseas and strengthen quality support system
  - ➢ strengthen development system for automotive with MBD*3

Industrial market

Sales mix of our power semiconductors for industrial in FY20



Major power supply customers in and out of Japan, infrastructure system equipment customers and so on



- ✓ Strengthen relationships with major industrial power supply customers
- ✓ Offer 5G infrastructure customers better solutions
- ✓ Strengthen development system for customized product suitable to customer requirement in railways and power transmission equipment of domestic and foreign market

*1: Source: Omdia “Competitive Landscaping Tool CLT, Annual -3Q21”
*2: Field Application Engineer *3: Model Based Development

3. Agile Decision to Increase Production Capacity

Install advanced production lines and ensure capacity for future expansion

Kaga Toshiba Electronics Co., Ltd.
Artist's impression of Second line (new building)

300mm First Line (existing bldg.)
Mass Production : second half of FY22

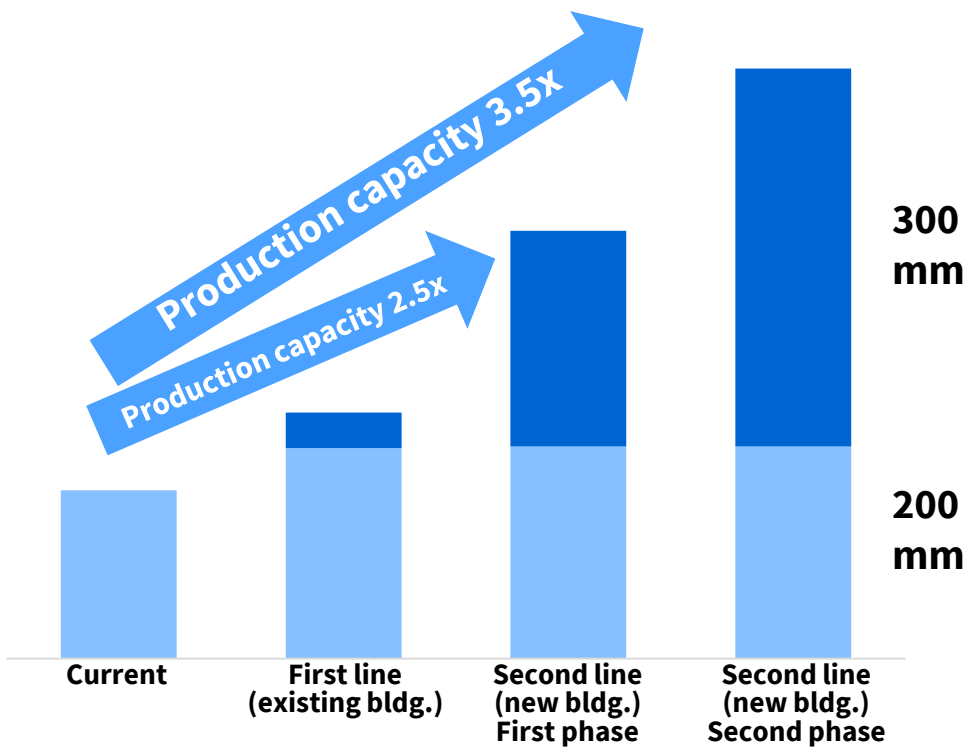
300mm Second Line (New bldg.)
Mass Production : FY24

- **Major product**
  - ✓ MOSFET
  - ✓ IGBT
- **RE100**
  - ✓ Energy-saving manufacturing equipment
  - ✓ Energy-saving procurement
- **BCP**
  - ✓ Vibration-isolated structure
  - ✓ Duplex power supply
- **High production quality/efficiency**
  - ✓ AI
  - ✓ Automatic guided vehicle

3. Flexible Increase in Production Capacity

Double capital expenditure*1, construct and start mass production of Japan's first*2 300mm line for manufacturing silicon power semiconductor

Capacity plan for silicon power devices*3



*1: Cumulative capital expenditure of semiconductor business for 5 years, comparison FY16-20 to FY21-25
*2: Source: Toshiba, as of Feb, 2022
*3: Capacity of 200mm and 300mm line (200mm wafer equivalent)
*4: Kaga Toshiba Electronics

Production strategies for construction of 300mm line

First line — **Establish technology and contribute to early mass production by utilizing existing building**

✓ 300mm line is under construction in an existing clean room at Kaga Toshiba*4
- Bring forward mass production schedule to 2H/FY22 (original plan was 1H/FY23)

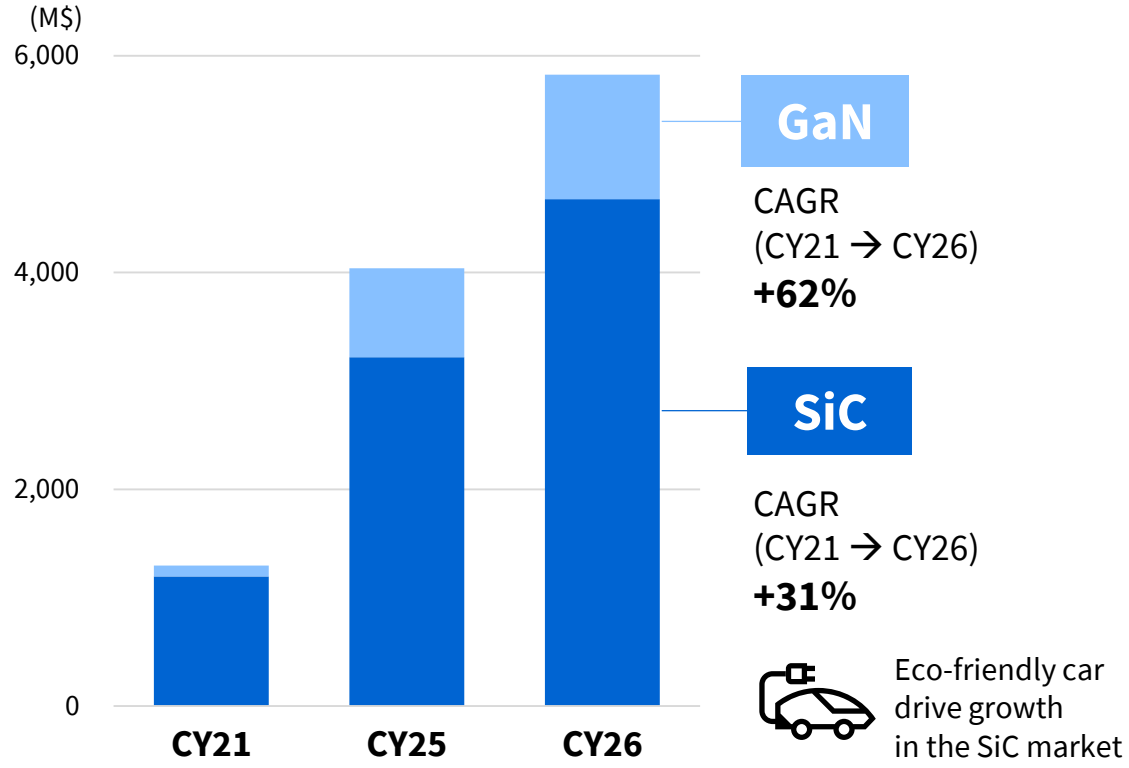
Second line — **Expanding production capacity and improving productivity by building new fabrication facility**

✓ Decided to build new 300mm wafer fabrication facility at Kaga Toshiba
- Mass production will start in FY24
- Pursue production efficiency by designing exclusively for the 300mm wafer
- New fab will achieve use of 100% renewable energy

Initiatives for Compound Semiconductors (SiC & GaN)

Contribute to the realization of carbon neutrality with the technology and assets cultivated by Toshiba Group

Outlook for SiC & GaN markets*1



*1: Source: Yole Developpement, "Compound Semiconductor Quarterly Market Monitor Module1 Q42021"

Application and our initiatives

SiC Railways
Energy saving,
Weight saving

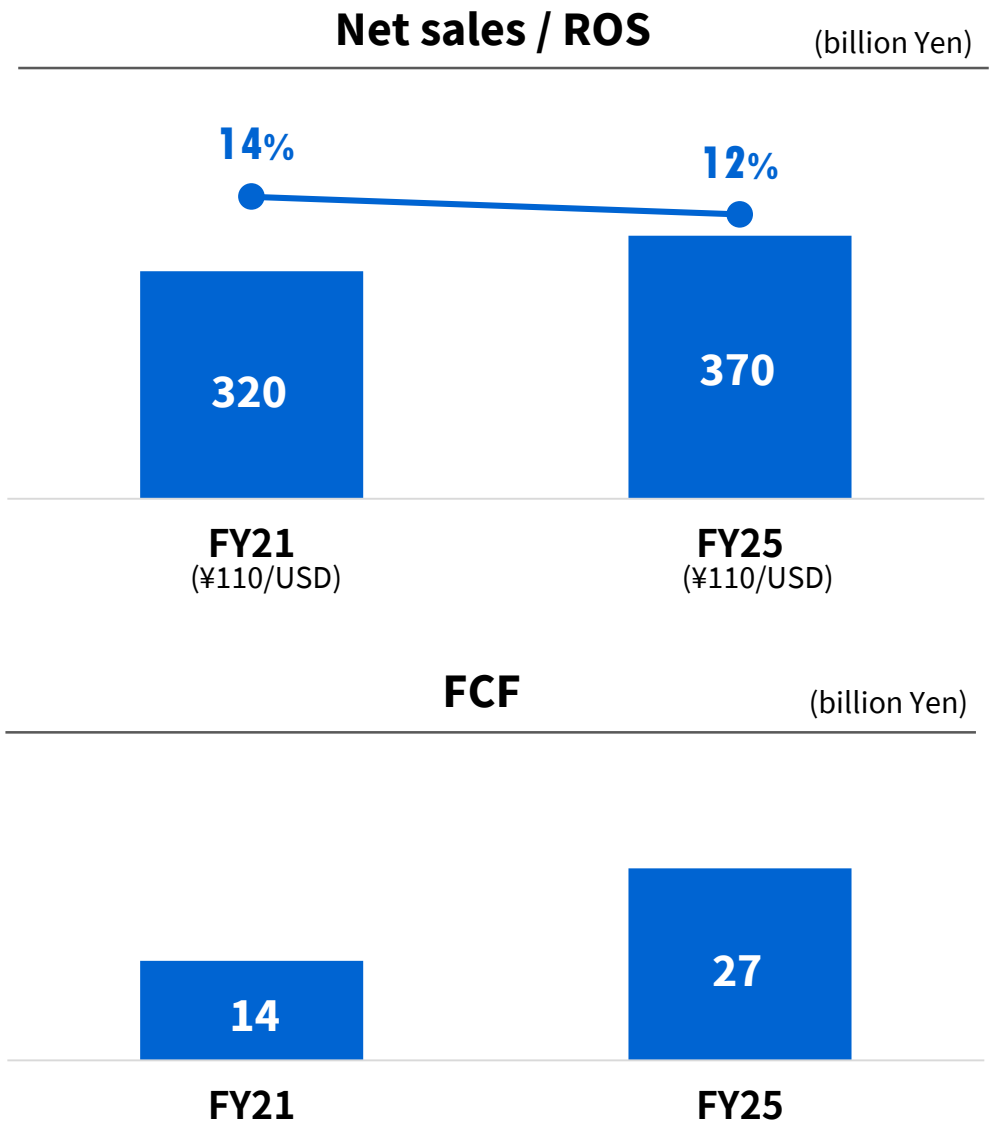
SiC xEV
Weight saving
Extended mileage

SiC Wind power
Conversion loss reduction,
Weight saving

SiC GaN Data center
Enlarge capacity,
Miniaturization, Relief construction requirement

- ✓ **Technology : Apply know-how cultivated in high-voltage SiC for railways to automotive products**
- ✓ **Accelerate development: Fully utilize NuFlare's epitaxial growth system**
- ✓ **Large-diameter : Accelerate to launch 200mm wafer line**
- ✓ **Key material : LTA with wafer maker**

Semiconductor Growth Plan



Net Sales

- ✓ Expect 50 billion yen increase (FY21→25)
- ✓ Structure to expand product capacity flexibly with the new 300mm clean room

ROS

- ✓ Expect 2% improvement in marginal profits (FY21→25) by shifting to higher value added products and cost reductions
- ✓ Increase R&D investments by 1.4x (FY21→25) mainly for power semiconductors

FCF

- ✓ Expect 13 billion yen increase with sales increase (FY21→25)
- ✓ Generate 70 billion yen FCF (FY21→25 cumulative total)
  Cumulative total of CF from operating activities 240 billion yen
  Cumulative total of CF from investment activities ▲170 billion yen

03

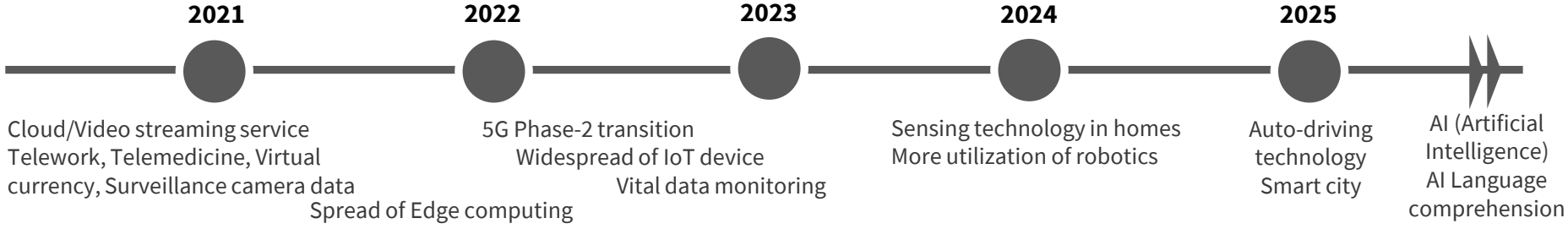
Storage Business Strategy

Storage Business Environment Trends

Data storage is critical to a society where all information and people are connected

Evolution of data oriented society

Solving issues with integration of ICT/AI technology and human society



CSP(Cloud Service Provider) leading industry growth

Storage requirements

Data Accumulation (Cyber Space)
Higher areal density products
(For increasing data storage needs)

Environmental Burdens
Lower energy consumption, Efficient production
(CO_2/Waste reduction)

Data Storage Costs
Lower bit cost, Lower TCO*1 products

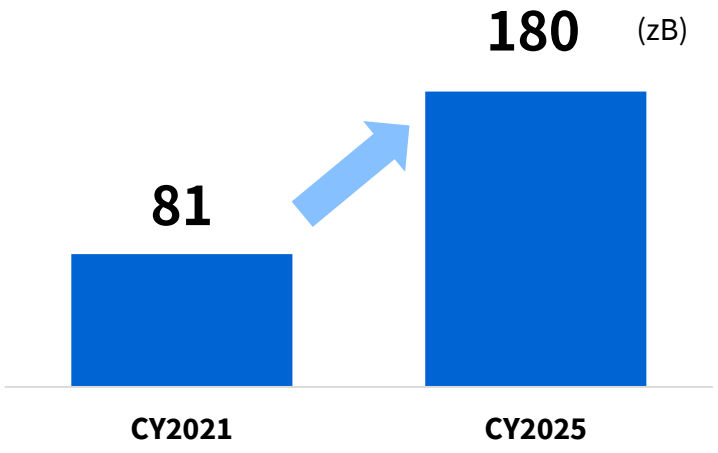
Information Security
Data encryption
(Collaboration with data centers with safer data managing capability)

*1: TCO: Total Cost of Ownership （Total cost required from system installation to disposal）

Storage Market Forecast

The 2020's is decade of data; data creation boosts storage demand

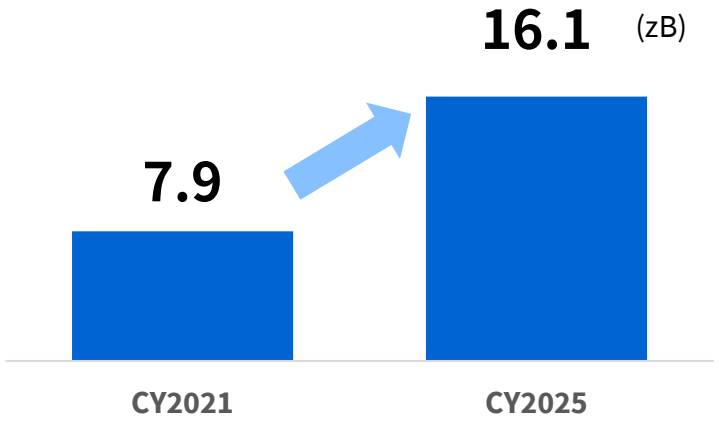
Data Creation



In 4 years

2.2x *1

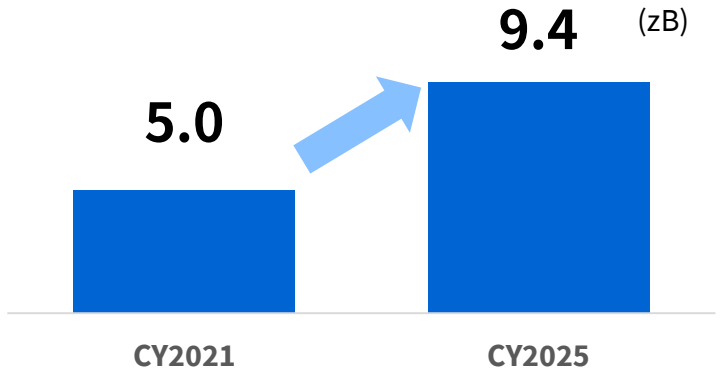
Storage Capacity
(Installed Base)



In 4 years

2.0x *2

HDD Capacity
(Installed Base)



In 4 years

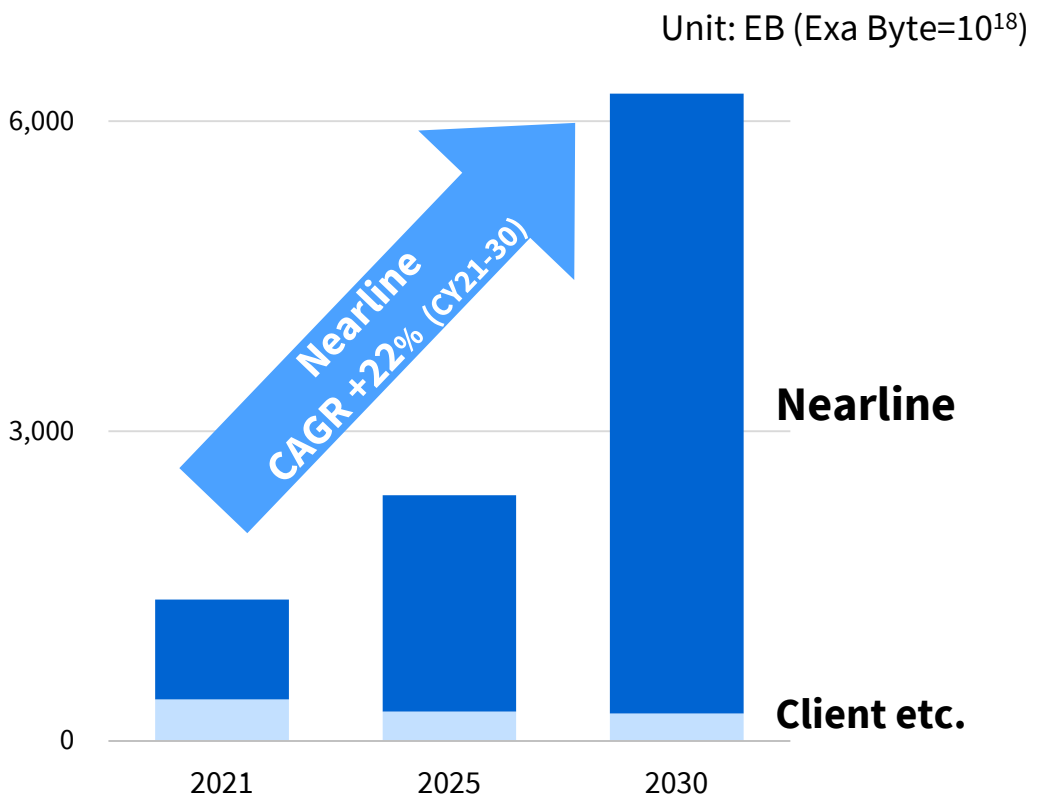
1.9x *2

*1: Source: IDC Worldwide Global DataSphere Forecast, 2021–2025 March, 2021
*2: Source: IDC Worldwide Global StorageSphere Forecast, 2021–2025 March, 2021

Nearline HDD for Data Center and CSP

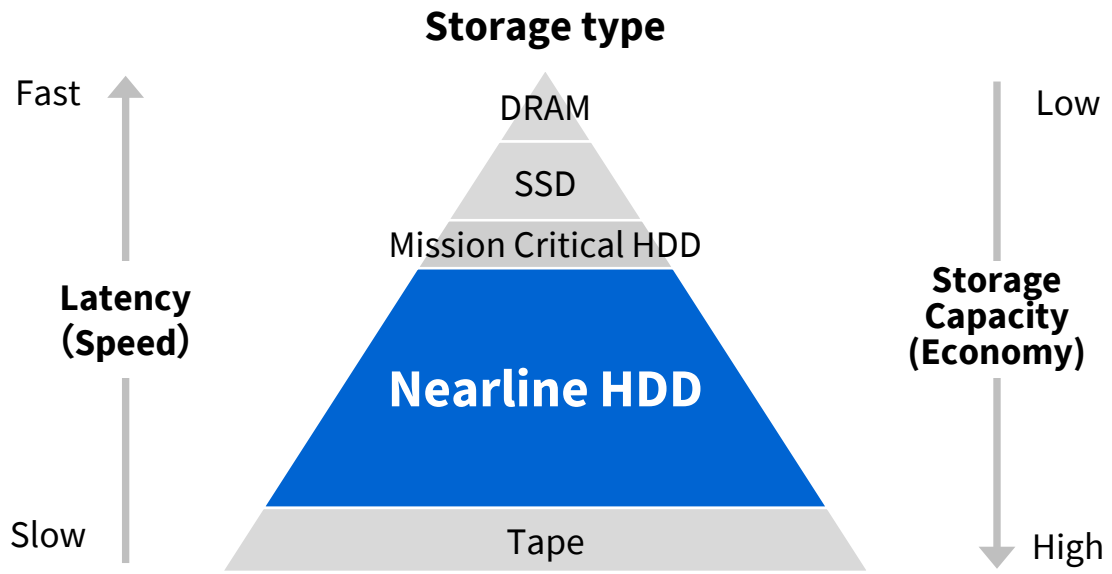
Strong Mass storage needs continue to grow Nearline HDD market

Global HDD Demand (Bytes Shipped)*1



*1: Source: Techno System Research Co., Ltd. HDD Market Trend (Annual) Dec. 2021

Mass capacity storage type & features *2



- HDD: for areas where large data is stored economically
- Tape: for disaster recovery, system failure backup

*2: Source: Toshiba

Nearline HDD Customer Recording Needs

HDD achieves both mass capacity storing and bit cost balance

Creating CSP Customer Value

Performance requirements for HDD

Store ever increasing data efficiently & economically

- Higher Capacity - Area density improvement with technology breakthrough
- Economical Efficiency - Low power consumption (HDD is superior in mass storage)
- Durability - 24/365 continuous operation

Higher Storage Capacity

Accelerate development of higher capacity products

- Capacity increase, multi stacking
- Assist recording technology

Data Storage Cost

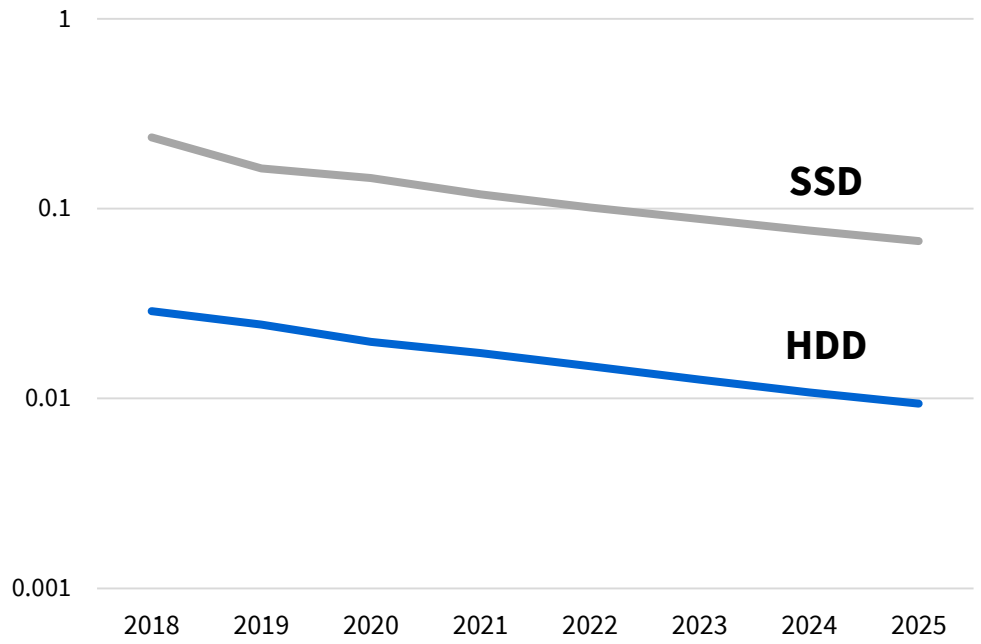
Product planning with total cost perspective

- Lower storage system installation fees
- HDD operation cost improvement

HDD/SSD bit cost comparison*1

Unit: $/GB

HDD bit cost is 1/7 of SSD

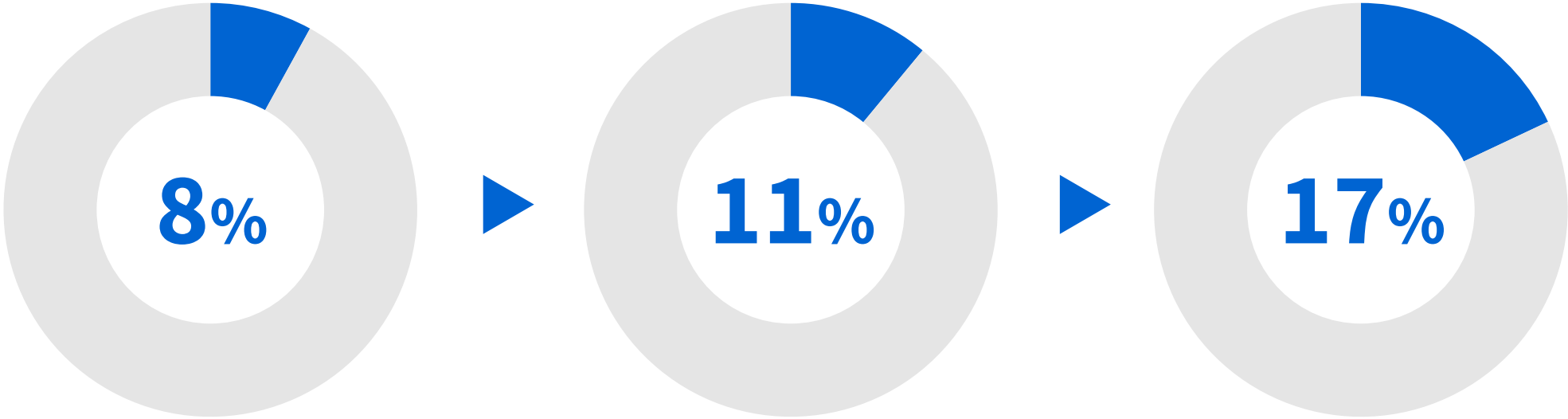


*1: Source: Techno System Research Co., Ltd. HDD/SSD Market Trend(Annual) Dec. 2021

Nearline HDD Market Share (Unit Base)

Increasing share with enhanced lineup and major CSP engagement

Launched World first “9 Platter 14TB HDD” in 2017



FY16 *1 ▶ **FY19** *1 ▶ **FY21/Q4** *2

*1: Source: IDC Storage Mechanisms: Disk quarterly forecast data, 2021
*2: Source: Toshiba

Nearline HDD Growth Strategy

Provide greater customer values in expanding Nearline HDD market

1. Higher Capacity Technology

- ✓ Leading technology products
  (Multi stacking, Assist technology)
- ✓ Technical R&D collaboration with key suppliers

2. Customer Relations

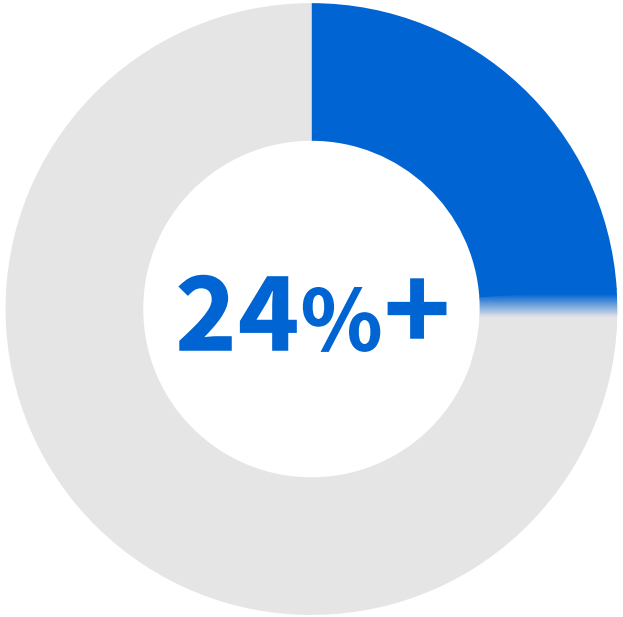
- ✓ Local technical support enhancement, analysis TAT*1 improvement
- ✓ Further customer portfolio expansion through sales organization enhancement

3. Production Capacity Expansion

- ✓ Continuous investment to Philippines factory
- ✓ Start Nearline HDD production at 2nd factory in China

*1: Turn Around Time

Nearline HDD Market share (Unit Base)

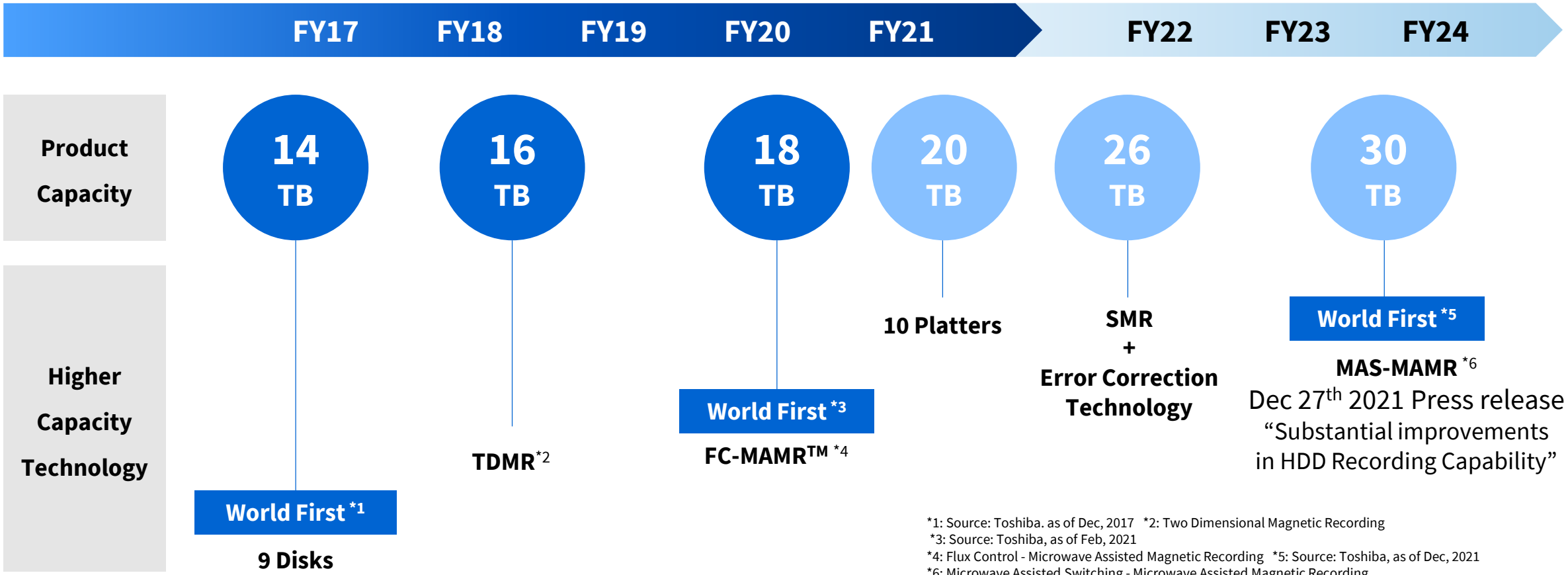


FY25 (Plan)

1. Higher Capacity Technology

Proposing vast capacity increases and TCO reductions through technology breakthroughs

Product Roadmap and Higher Capacity Technology



*1: Source: Toshiba. as of Dec, 2017 *2: Two Dimensional Magnetic Recording
*3: Source: Toshiba, as of Feb, 2021
*4: Flux Control - Microwave Assisted Magnetic Recording *5: Source: Toshiba, as of Dec, 2021
*6: Microwave Assisted Switching - Microwave Assisted Magnetic Recording

2. Customer Relations

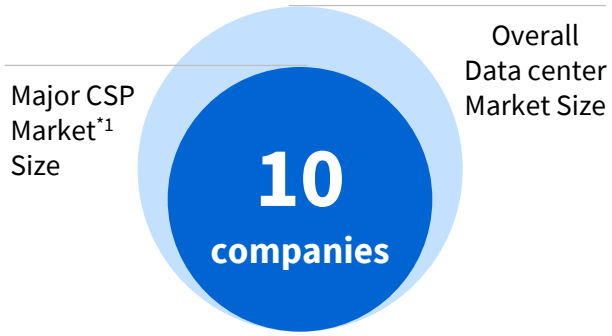
Firmly engaging an increasing number of major CSP companies by building solid supply record of high capacity products

Achievement

- ✓ Major CSP engagement with high capacity products
- ✓ Built credibility by demonstrating high quality
- ✓ Expand production capacity to support growing Nearline demand
- ✓ Signed long term agreements

Engagement with Major 10 CSPs

Nearline Market size (Unit)



Toshiba CSP engagement

4co ▶ 8co

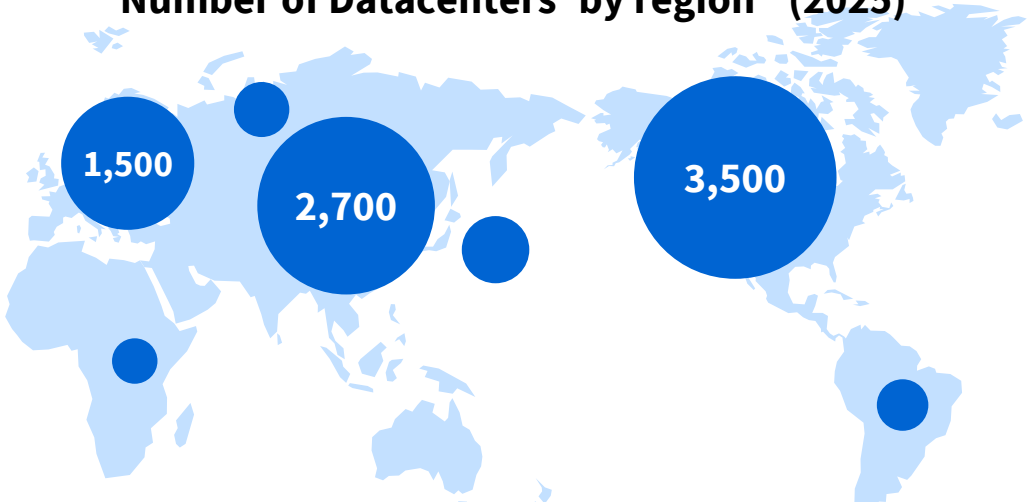
FY19 FY21

*1: Source: Toshiba

Future Plan

- ✓ Local technical collaboration enhancement and analysis TAT improvement
- ✓ Customer expansion with salesforce increase

Number of Datacenters* by region (2025)** *2



*2: Source: Gartner, Forecast: Data Centers, Worldwide, 2018-2025, 2021 Update, Adrian O'Connell, 1 Dec 2021
* Number of Datacenters : Added up Enterprise DC and Large DC from Single, Rack/Computer room, Midsize DC, Enterprise DC and Large DC
** Region: Asia/Pacific, Eastern Europe, Japan, Latin America, Middle East & Africa, North America and Western Europe
Chart created by Toshiba Electronic Devices & Storage Corporation based on Gartner research. Device Forecast, Revenue basis

3. Production Capacity Expansion

Continuous production capacity investment to support vastly increasing high capacity Nearline demand

Continuous production capacity expansion

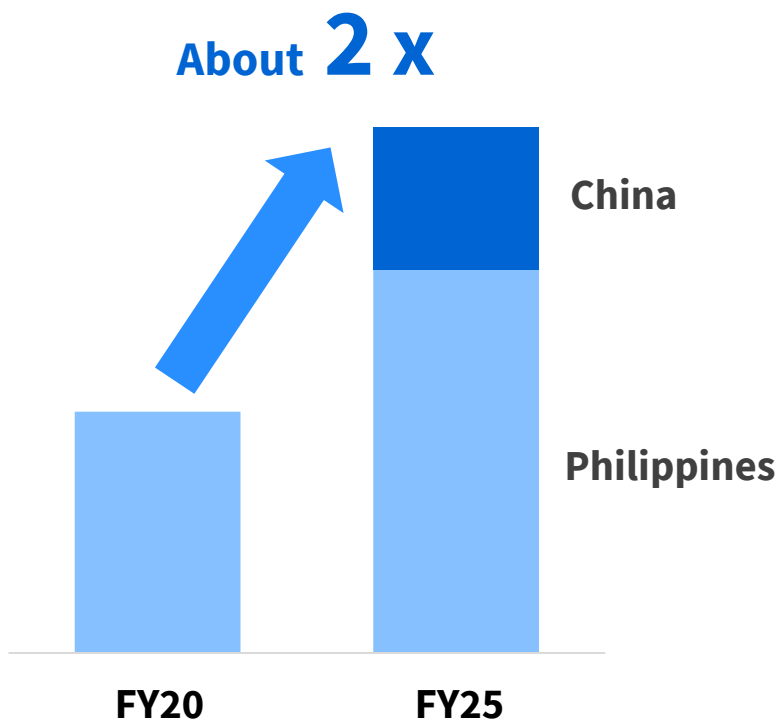
- **Philippines continuous investment**
- **Opening Nearline HDD 2nd factory in China**

Advantage of Nearline HDD production at 2nd factory (China)

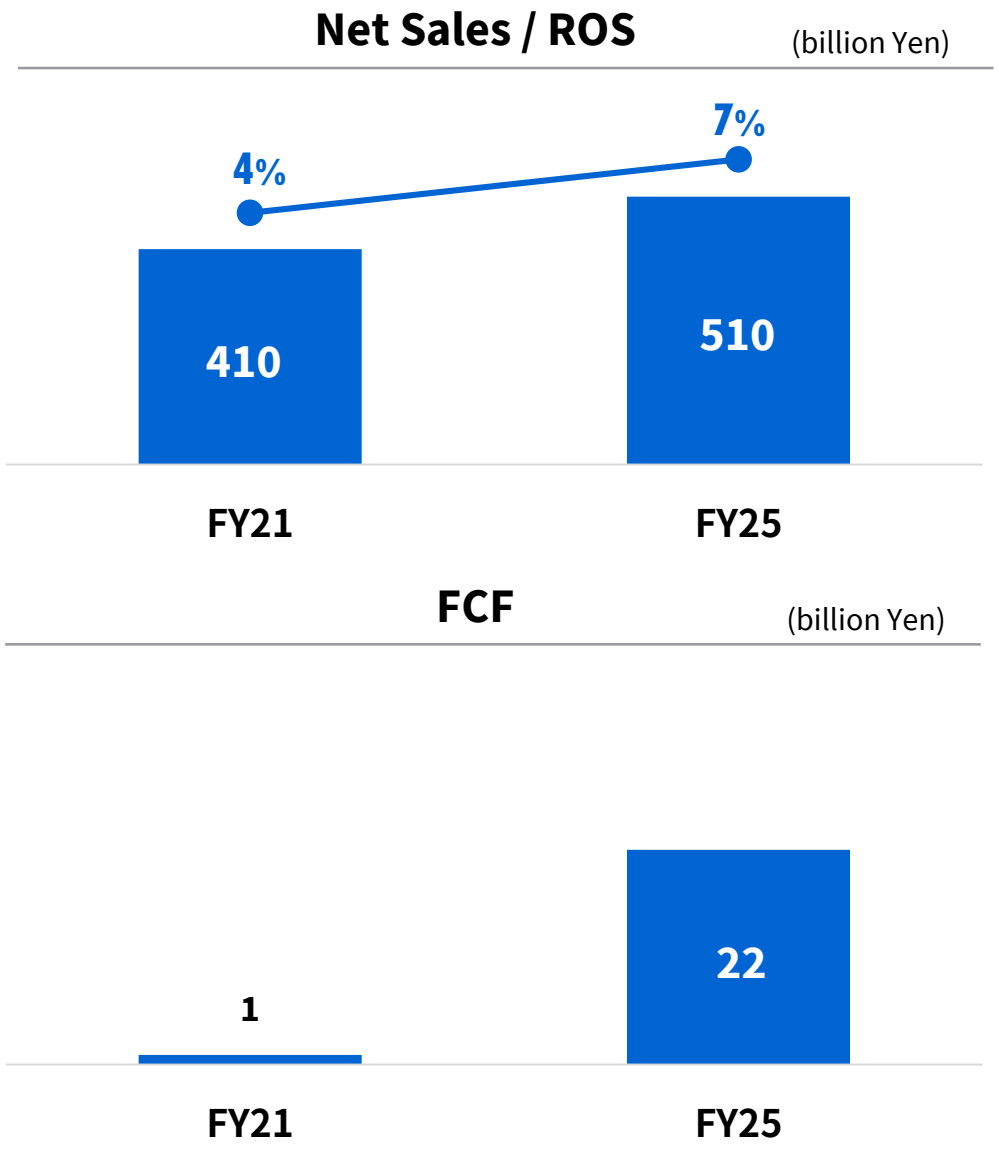
- ✓ BCP reinforcement by multi-country production
- ✓ Logistics cost reductions for Chinese customers
- ✓ Enhanced collaboration with Chinese head supplier

Toshiba HDD business model

Nearline HDD production capacity



HDD Growth Plan



Net Sales

✓ Expect sales increase by 100 billion yen (FY21→25)

- Sales decline in Mobile HDD, sales increase in Nearline HDD

ROS

✓ Improve marginal profit ratio +2% (FY21→25)

- Improved product mix in Nearline HDD, cost reduction

FCF

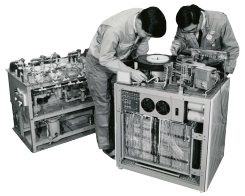
✓ Secure +22 billion yen (+21 billion yen compared to FY21)

- Continue stable investment to increase production capacity
- Improve operating CF thanks to sales increase and improved profitability

Toshiba HDD Business History: Products & Technology

Supporting industry needs with leading-edge HDDs since 1967

1967 — Market entry with 14-inch



1991 — Industry 1st*1 Glass Media

1998 — Industry 1st*1 GMR:*2 head 2.5-inch

2004 — Guinness World Record*3 World smallest 0.85-inch

2005 — Industry 1st*1 Perpendicular Magnetic Recording 1.8-inch 80GB

2010 — Launched Enterprise SSD

2015 — Industry largest Capacity*1 2.5-inch 3TB

2017 — Industry largest Capacity*1 9 platter 3.5-inch 14TB

2021 — World 1st*1 FC-MAMR™*4 3.5-inch 18TB

2022 — FC-MAMR™ 10 platter 3.5-inch 20TB

2023 — Next Generation Microwave Assisted Magnetic Recording MAS-MAMR*5 3.5-inch 30TB

From 2021, united entire section in a single location, Yokohama Complex, covering production, sales and engineering.
Creating greater customer value with strengthened product offering capabilities (performance, quality, supply).

*1: Source: Toshiba, at the times of press releases
*2: GMR: Giant Magneto Resistive
*3: Guinness World Records is registered trademark of Guinness World Records Ltd.
*4: FC-MAMR™: Flux Control - Microwave Assisted Magnetic Recording
*5: MAS-MAMR: Microwave Assisted Switching - Microwave Assisted Magnetic Recording

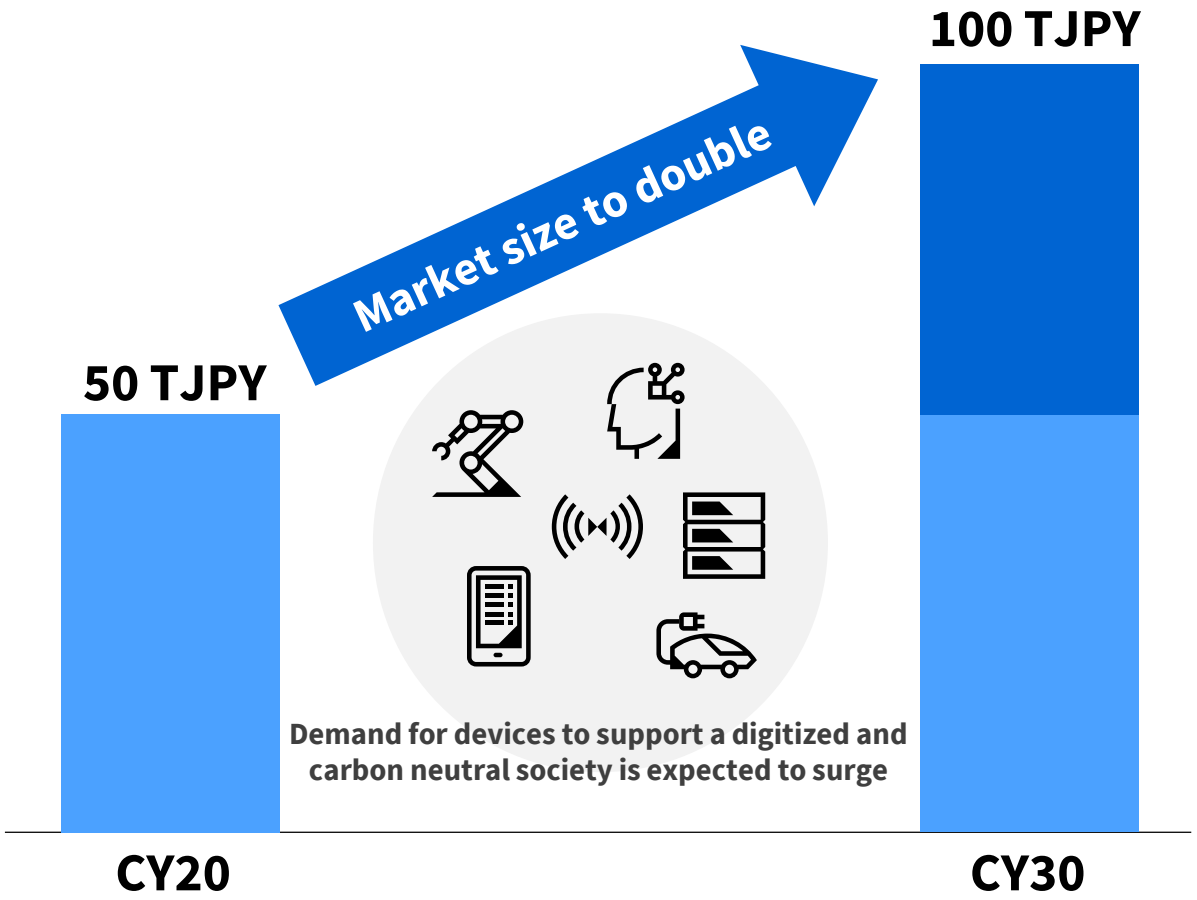
04

NuFlare Technology Business Strategy

Semiconductor Market

Semiconductor market drives the progress of social and information infrastructure

Semiconductor market size



* Source: METI, 4th Semiconductor and Digital Industry Strategy Review Conference "Progress and outlook of semiconductor strategy"

- ✓ The semiconductor market, an industry that supports the progress of social and information infrastructure, is expected to reach 100 trillion JPY in CY30, creating an additional 50 trillion JPY sized market.
- ✓ In particular, demand for leading edge semiconductors and high efficiency compound semiconductors, the driving forces of digitalization and carbon neutrality, is expected to surge.

Semiconductor Manufacturing Equipment

NuFlare specializes in mask related and epitaxial growth equipment

NuFlare's main semiconductor manuf. equipment

Electron beam mask writer

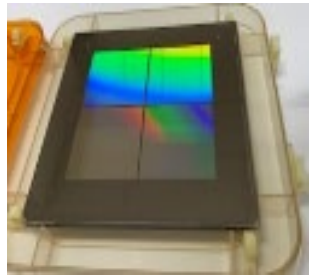
Manufacturing equipment for photomasks, plates of semiconductor circuit patterns that are projected onto wafers

Epitaxial growth system

Equipment for forming single crystal thin films with aligned orientation onto wafers

Customers

- Memory and leading-edge logic manufacturers
- Foundries
- Merchant mask shops

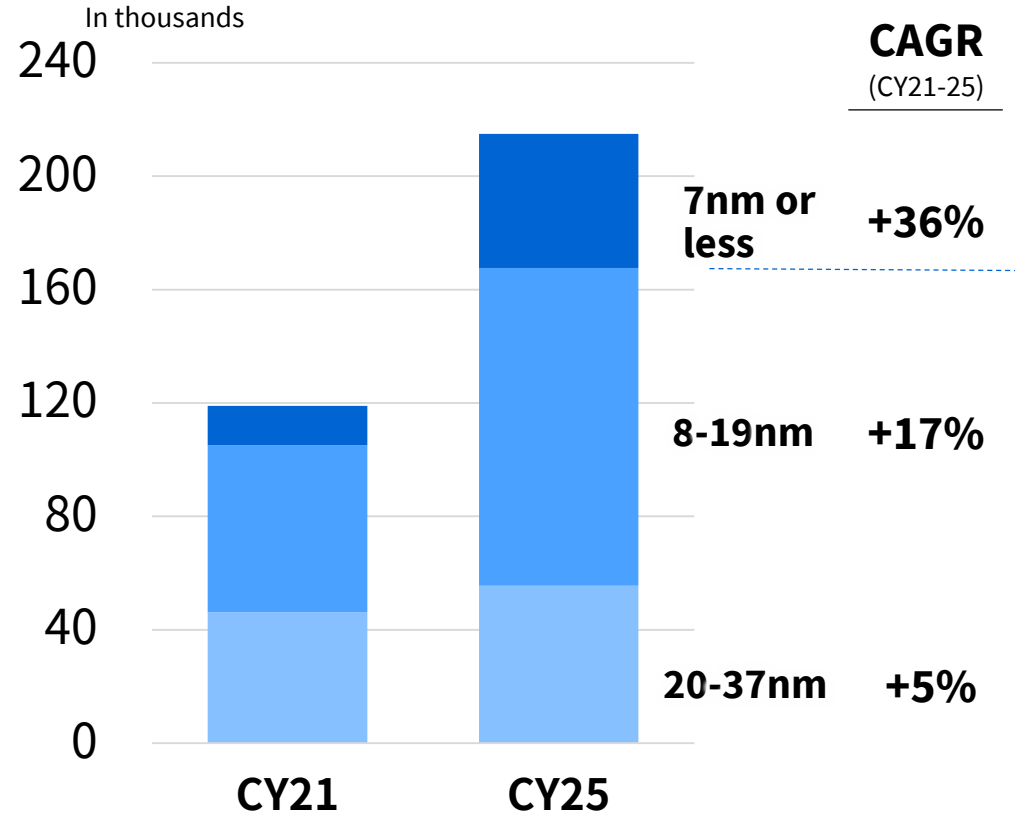


- Semiconductor wafer manufacturers
- Epi wafer manufacturers
- Semiconductor device manufacturers

Mask Writer Market

New demand for multi beam and single beam mask writers is expanding on semiconductor scaling and increase in production volumes

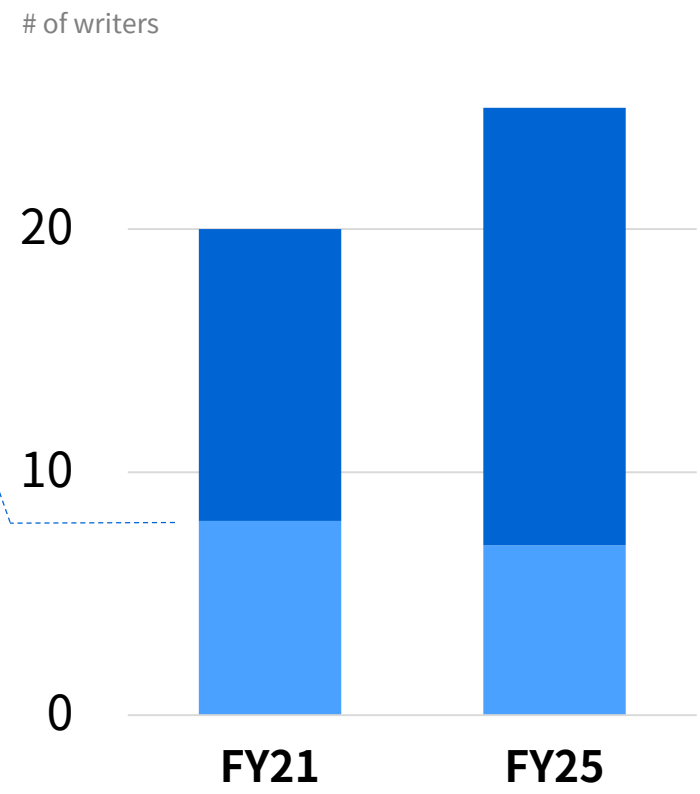
Photomask demand (37nm or less) *1



Multi beam mask writer
Increase in demand due to miniaturization

Single beam mask writer
Increase in demand due to increase in products

Electron beam mask writer demand *2



*1: Source: VLSI Research powered by TechInsights "Worldwide Demand for Reticles" October 2021

*2: Source: Toshiba

Mask Writers

Expand multi beam mask writer share by leveraging the relationship with customers and technology fostered by marketing the single beam writer

Single beam mask writer

EBM-9500PLUS

100% market share

Current mainstream leading edge electron beam mask writers for 20nm or less
(As of Dec.2021, according to our research)

- ✓ Good relations with major semiconductor manufacturers
- ✓ High productivity and reliability
- ✓ On site support at customer sites (US, EU, Taiwan, Korea, China, Japan)
- ✓ Expansion of support and maintenance; recurring revenues

Multi beam mask writer

MBM™-2000

Installation start and revenue recognition in FY21

Several writers to be shipped to customers in Asia and US in FY22

50% share in FY23
(target)

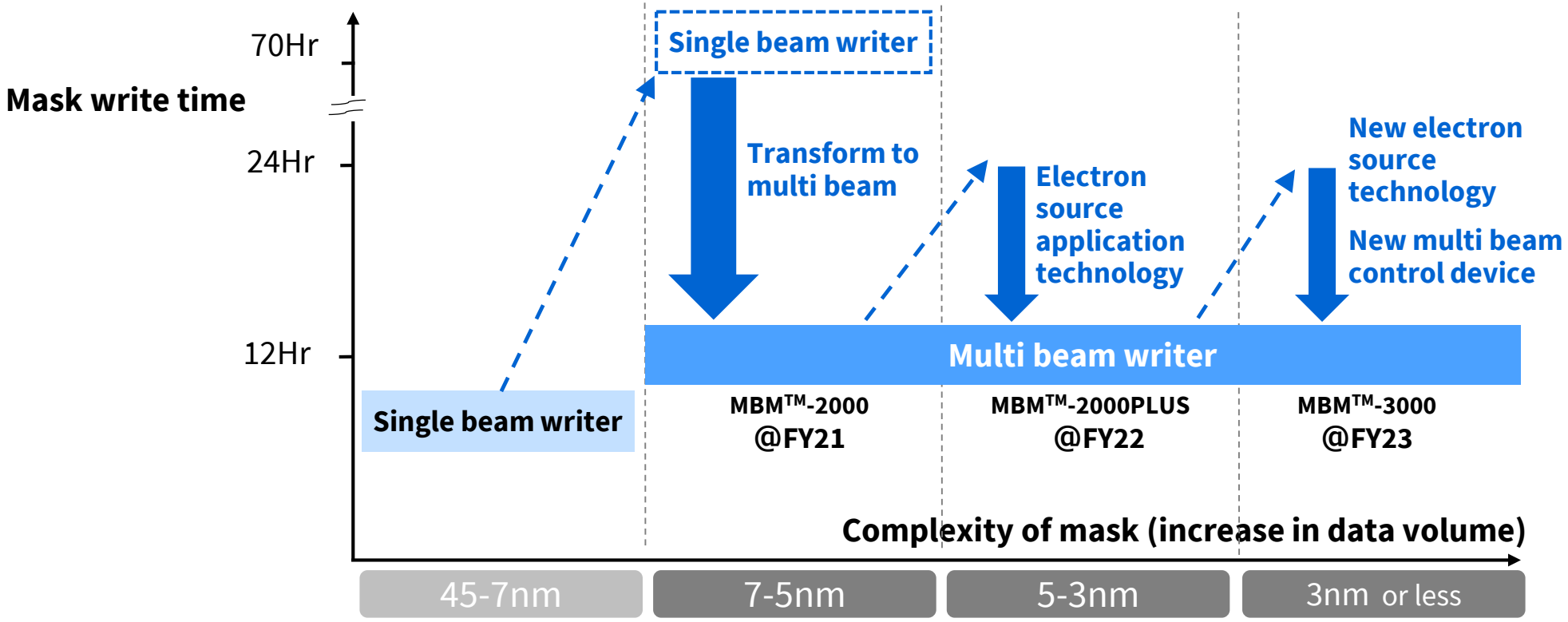
- ✓ Good relations and trust from customers fostered by the single beam mask writer business
- ✓ Key components developed by technological expertise within company group. (BAA*)
- ✓ High productivity and reliability

* BAA: Blanking Aperture Array
Semiconductor device to switch on/off of each beamlet in multi beam

Advantages of the Multi Beam Mask Writer Over Competitor

Contribute to customers' productivity by combining original technology with foundational mask writing technology fostered by developing the single beam

- Mask pattern data volume increases dramatically as scaling progresses
- Contributes to customers' productivity by using NuFlare's unique technology to write masks within a predetermined time

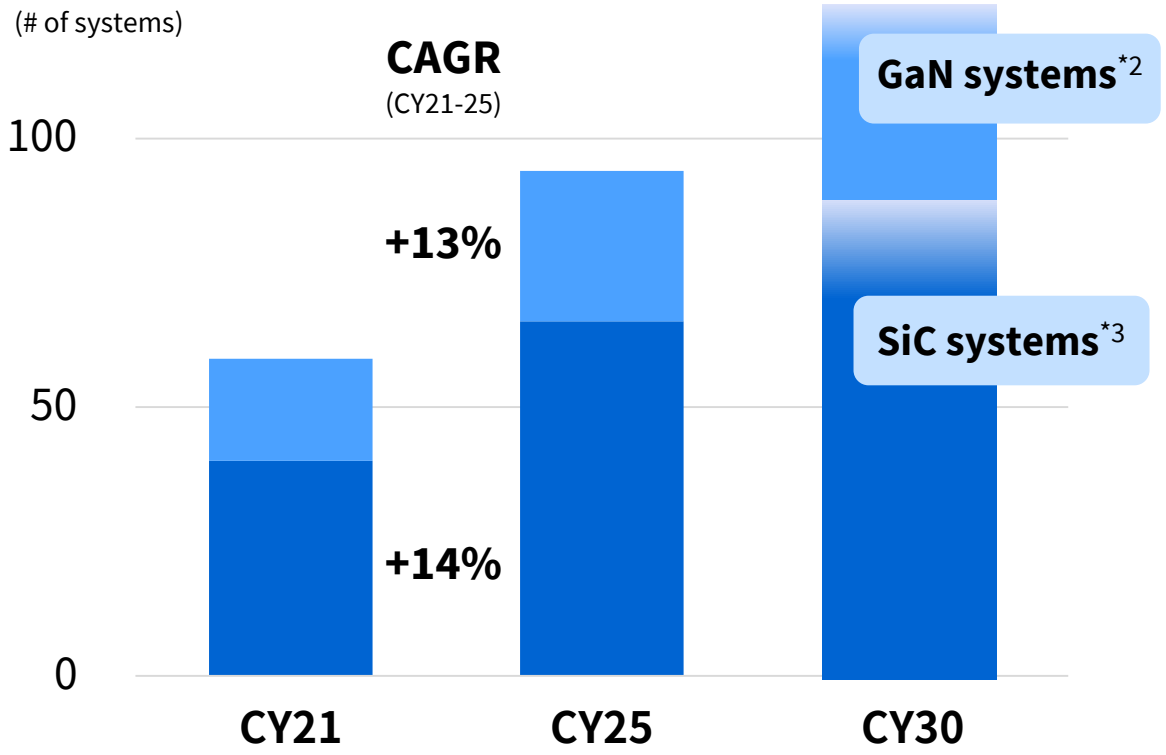


Multi beam writer
MBM™-2000

Epitaxial Growth System Market

SiC, GaN market expected to surge on demand for high breakdown voltage and high frequency power semiconductors in xEV and next generation communications standards

Epitaxial growth system demand (compound semiconductor)[*1]



- ✓ In addition to 150mm wafers, 200mm wafers are currently marketed.
- ✓ Demand expected to increase for high efficiency power sources to advance carbon neutrality.

- ✓ 150mm wafers are the mainstream.
- ✓ Demand for systems is expected to grow further due to demand in xEV and shift towards larger, 200mm wafers.

FY	20	21	22	23	24	25
150mm	Production					
200mm		Development			Production	

*1: Source: Fuji Keizai Co., Ltd. "2021 edition: current status and future prospects of mechatronics market for next generation power devices & power electronics" CY21 is forecast, CY25 and CY30 are projections
*2: GaN systems: GaN MOCVD
*3: SiC systems: SiC epitaxial growth system for power devices

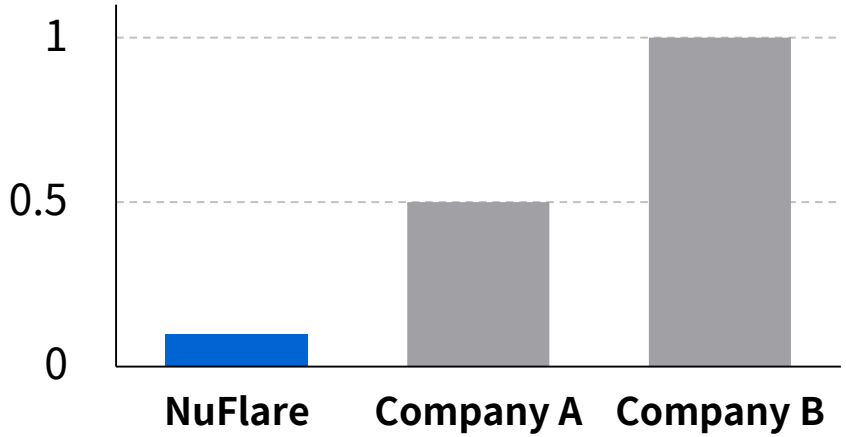
Advantages of Epitaxial Growth System over Competitors

Contribute to improving productivity in the compound semicon industry by providing film formation technology that is faster, more uniform, capable of processing larger wafers

Capable of forming high quality film with low defect density

NuFlare's advantage	✓ Reduced surface defects during film formation ✓ Good surface uniformity

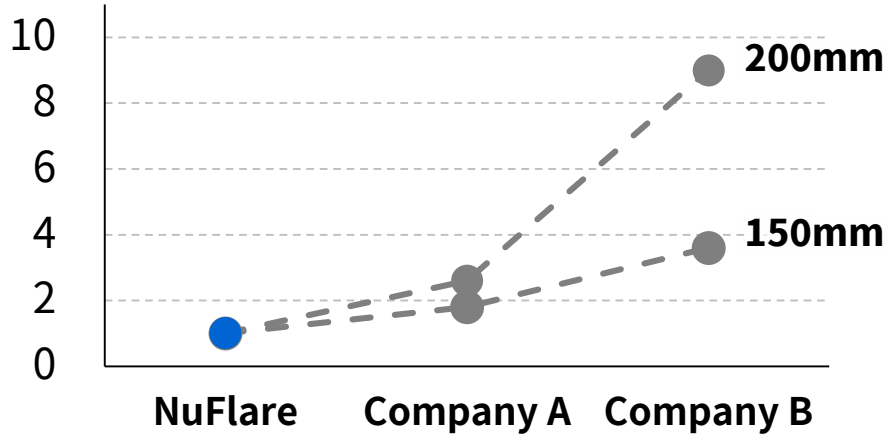
Defect density (defects/cm^2) of epitaxial growth system (SiC) * According to our research



Allows rapid process while maintaining high quality even with high speed rotation

NuFlare's advantage	✓ High throughput by high speed rotation ✓ Allows support of both 150mm and 200mm wafer with same reactor

Process time (index) of epitaxial growth system (SiC) * According to our research

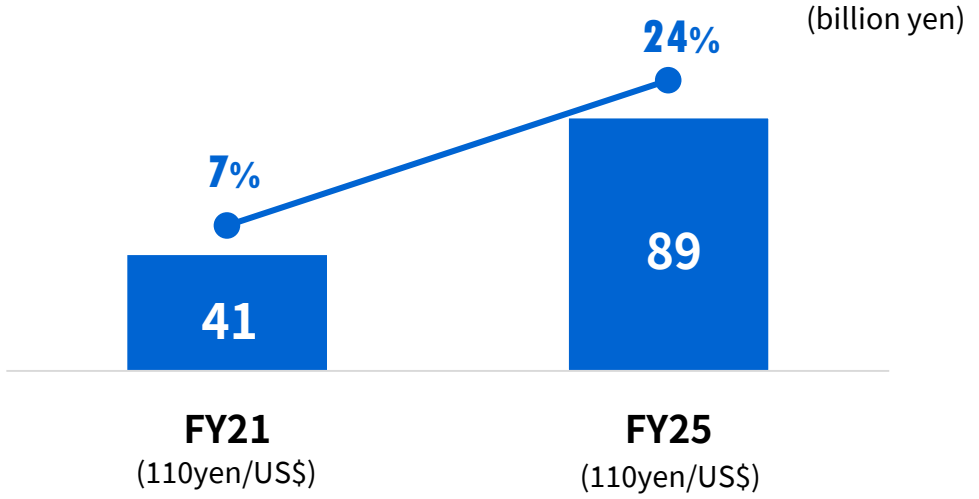


Advantage over competitors
Received excellent reviews from customers at demonstrations

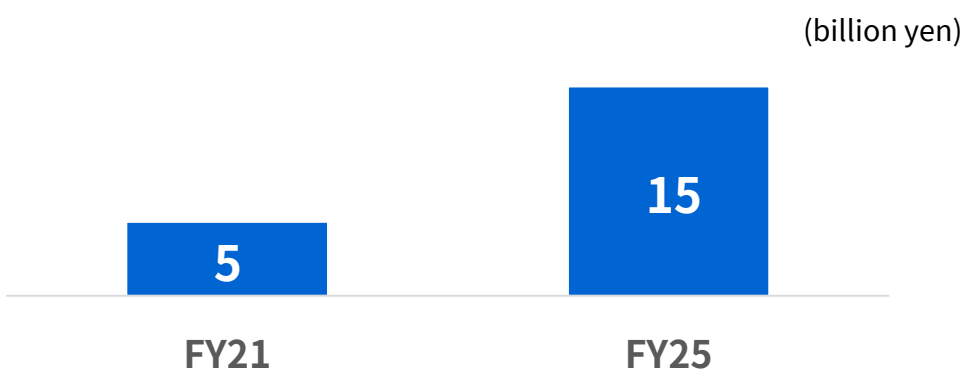
Share (target) **10%** (FY20) ➡ **30%+** (FY25)

NuFlare Growth Plan

Net Sales / ROS



FCF



Net Sales

✓ Increase sales by +48 billion yen as a result of sales increase in multi beam mask writers and epitaxial growth systems (FY21→25)

ROS

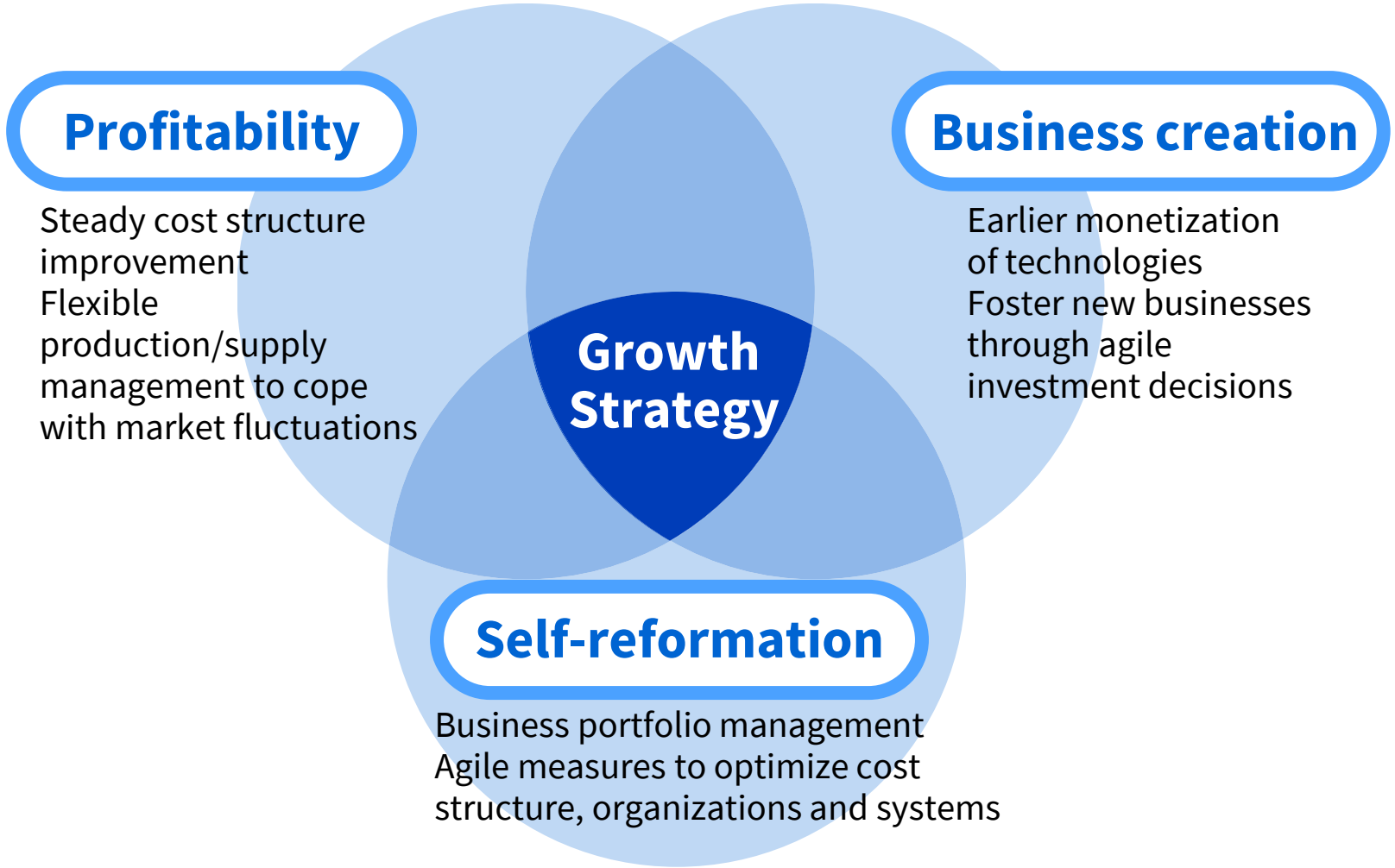
✓ Expect 24% as profitability improves as increased Net sales and cost reductions.

FCF

✓ FCF increases to 15 billion yen thanks to increased profits, etc. (+10 billion yen compared to FY21)

Driving Growth

Promote growth by grasping changes in global customers needs with technologies accumulated over many decades



05

Technologies and Products to support Device Co.

Enhance Device Co.'s R&D Strategy

Establish new R&D center leveraging combined capabilities of two R&D resources.

Before Spin-off (Current Status)

Toshiba Corporate Lab.

- **Advanced / Common Basic technologies for Toshiba/Infrastructure Service Co.**
- **Advanced / Common Basic technologies for Device Co.**

Toshiba Electronic Devices & Storage

- **Device & Storage R&D Center**

Integrate

After Spin-off

Device Co.

Newly established Advanced development including advanced basic R&D

R&D Center for Semiconductor & Storage (tentative)

- Aim to increase personnel by **3.5 times**
- Strengthen advanced technologies development **aligned with Device Co. product development roadmap**
- **Invest in R&D more flexibly** to enhance advanced fundamental research environment
- Optimally reallocate engineers to strengthen two divisions' R&D activities

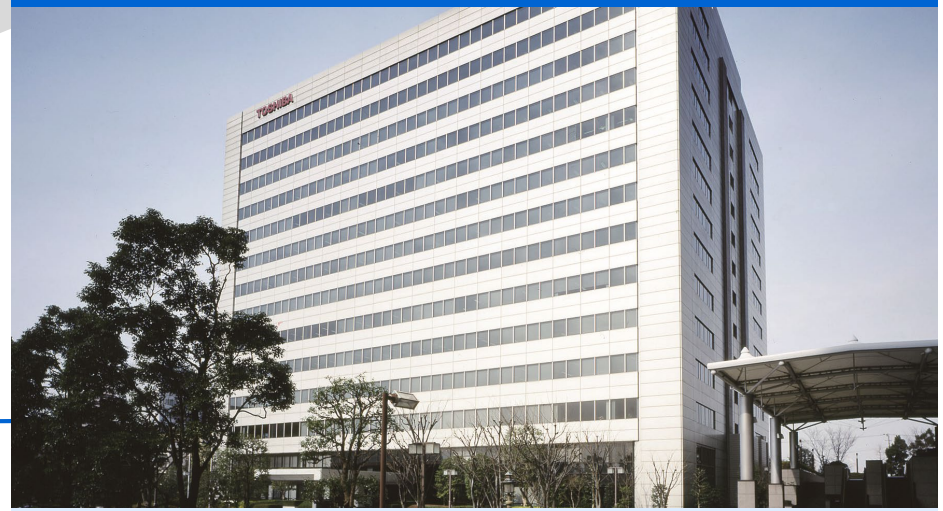
Contract common basic technologies including AI algorithm and production efficiency technology to Toshiba/Infrastructure Service Co. Lab.

R&D Sites for Device Co.

Kaga, Japan

- Advanced Semiconductor Device Development Center

Kawasaki, Japan



- R&D Center for Semiconductor &Storage (tentative)
- Semiconductor Division

Yokohama, Japan

- Storage Products Division
- NuFlare Technology

a clean room for advanced basic R&D for power semiconductors under consideration

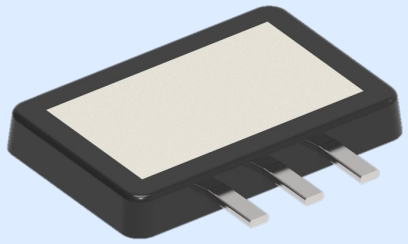
Provide Strategic Products for Infrastructure Business

Maintain collaboration with Toshiba/Infrastructure Service Co. in development and provide core parts

Device Co.

SiC Module

Pressure welding type high power module



High voltage Multi-chip package
(under development)

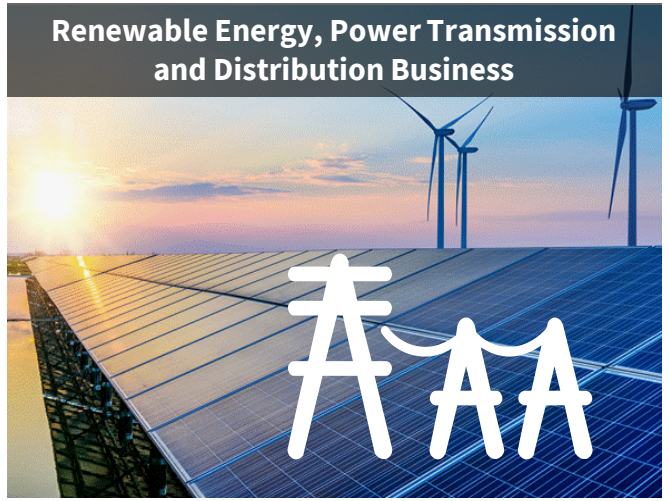
Toshiba/Infrastructure Service Co.

All-SiC
VVVF Inverter*1

HVDC Converter
(DC power transmission)

Automotive & Industrial Customer

Application



*1: VVVF: Variable Voltage Variable Frequency control

Device Co.’s Businesses in Global Trends

Committed to offering key devices to contribute to a carbon neutrality and accelerated digitalization

Carbon neutrality

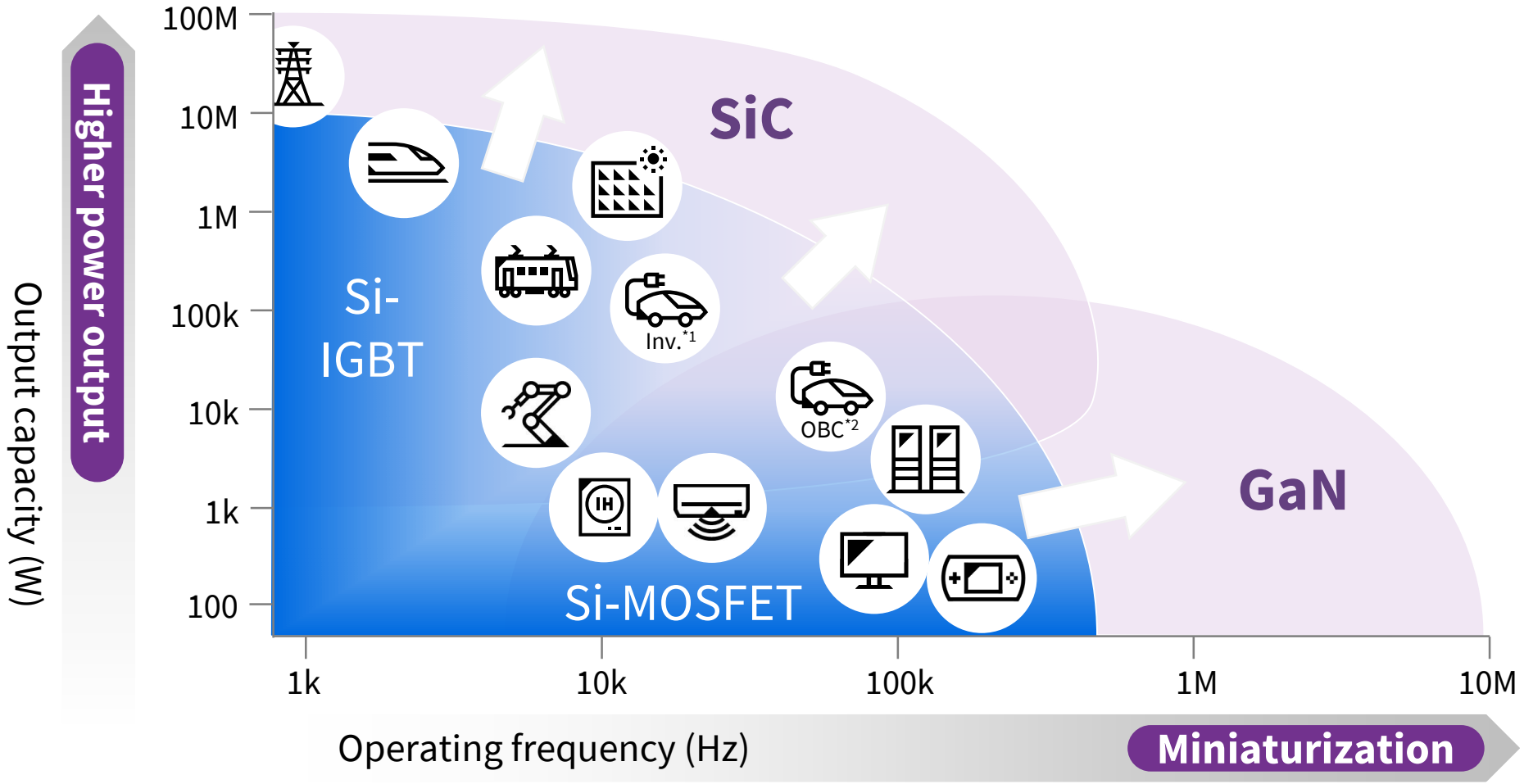
- Power semiconductor
- Analog semiconductor for motor control
- Semiconductor manufacturing equipment
- Fine ceramics

Accelerating digitalization

- HDD
- Power semiconductor

Types & Features of Power Semiconductor Devices

**Major products include low-to medium voltage Si-MOSFET & high voltage IGBT.
In future, compound semiconductor devices such as SiC and GaN are expected to be popular for high power output and miniaturization respectively**



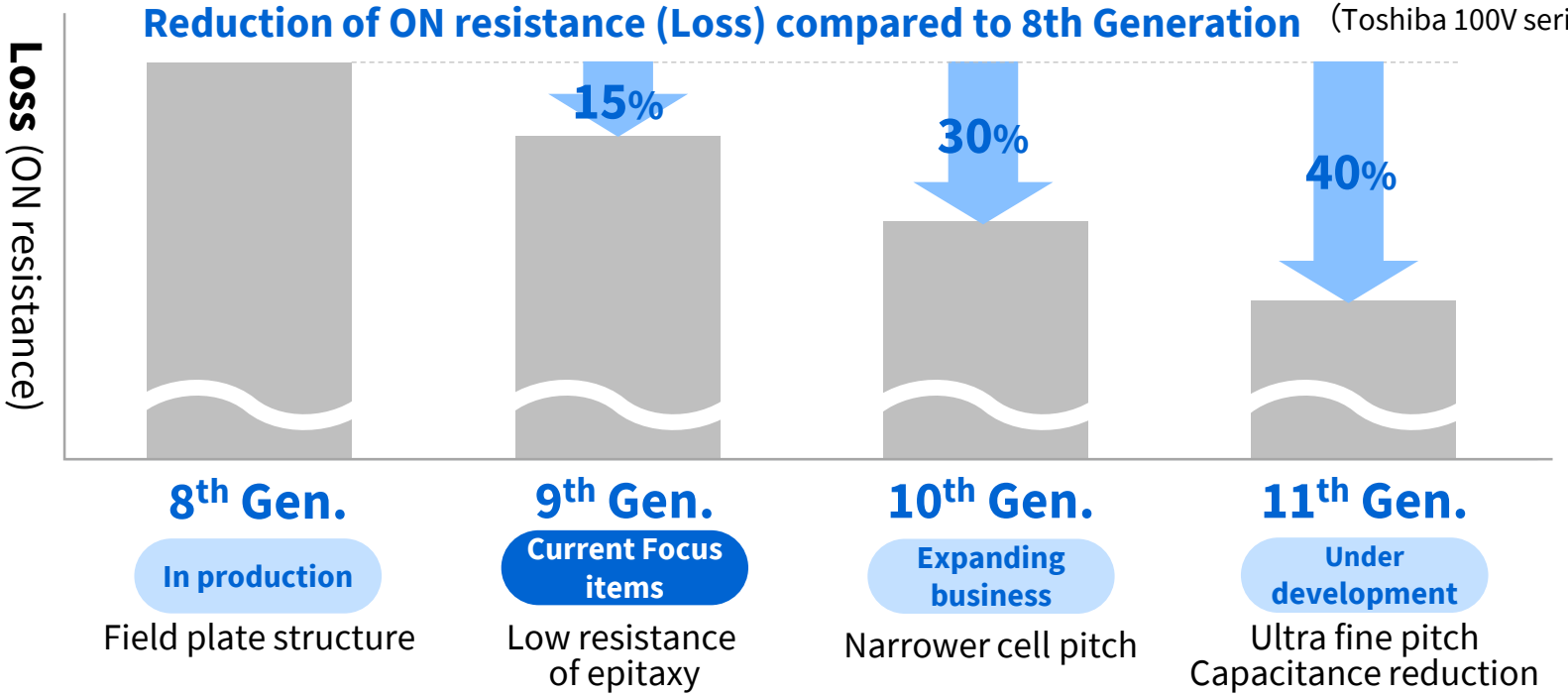
*1: Inv.: Inverter *2: OBC: On Board Charger

Power Semiconductor: MOSFET

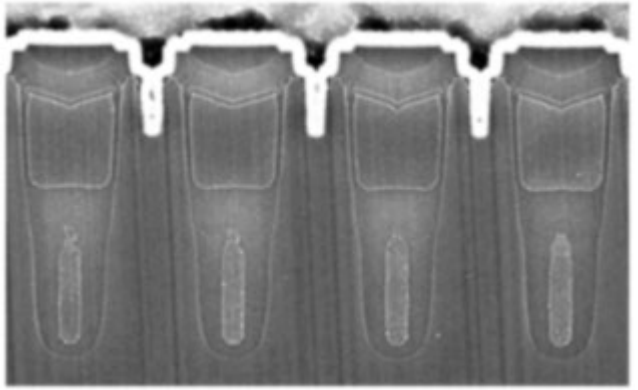
Launch world's top class products by continuously developing next-generation products

Best in class high performance[*1] : Low ON resistance & switching loss

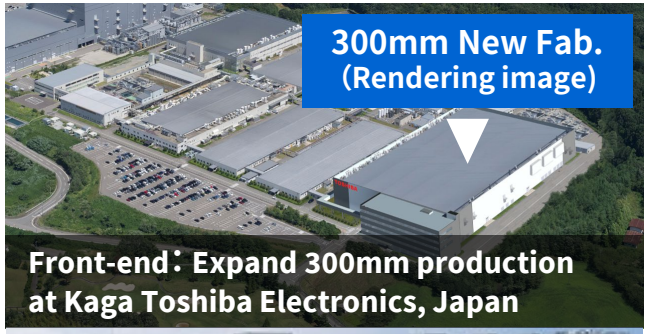
Reduction of ON resistance (Loss) compared to 8th Generation (Toshiba 100V series)



- Offer an extensive portfolio from 20V to 650V for automotive, industrial and consumer applications.
- Strengthen product development to double line up of products in FY23 (packaging, specifications)
- Front-end : Expand 300mm capacity;
  Back-end : Further expand Thailand production to significantly increase supply



Cross section of 300mm-based prototype



Front-end: Expand 300mm production at Kaga Toshiba Electronics, Japan

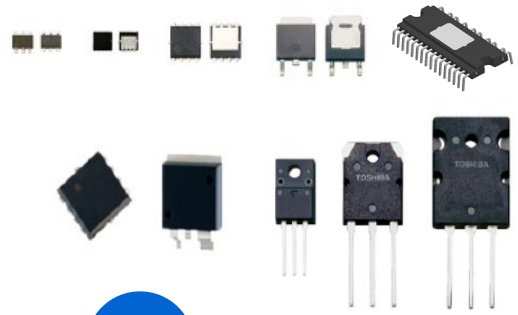
Back-End: Expand power semiconductor production for consumer and industrial applications in Thailand

*1: As to 80V N-channel power MOSFET, compared its On-resistance x switching characteristics (Ron x Qoss) among product with the same rating, as of January, 2022. Toshiba survey.

Si Power MOSFET : Wide Product Offering for Various Applications

Automotive high quality packaging

Produce diverse highly heat-dissipating reliable products under strict quality control in Japan



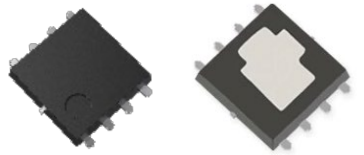
Electric Pump

Electronic power Steering

Battery management

High-Speed Switching Devices (150V, 650V)

World's best in class*1 low ON resistance devices with lifetime control technology to realize high speed operations

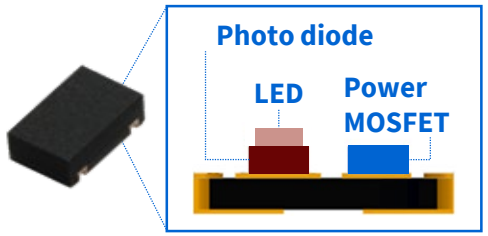


Power supply for base stations

Power supply for servers

Photo relay (insulation device)

Implement power MOSFET in a package fully utilizing world's top share optocoupler technology

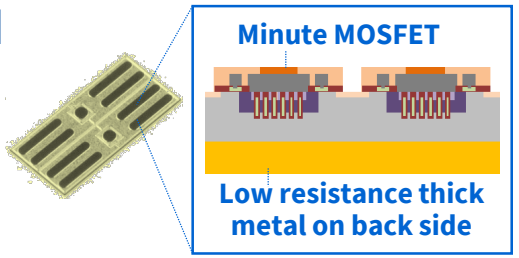


Semiconductor testers

Battery management for EVs

MOSFET for Li-ion battery protection circuit

Low On-resistance Die and packaging technology for fast charging for mobile devices



Wearables

Mobile

Gaming

*1: As to 650V power MOSFET, compared its On-resistance × switching characteristics (Ron×Qgd) among product with the same rating, as of January, 2022. Toshiba survey.

Automotive Power Semiconductors : IGBT and SiC Power MOSFET for xEV

Si-IGBT : Develop integrated device with diode; expand 300mm line-up
SiC-MOSFET : Focus development for miniaturizing inverter & on-board charger

2020	2021	2022	2023	2024	2025	2026	~	2030

Si-IGBT

- Low cost
- High productivity

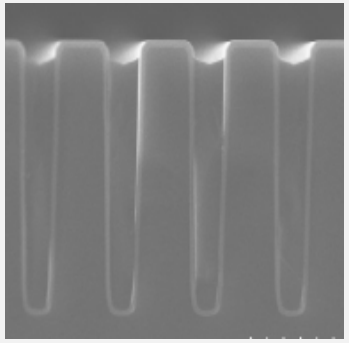
750V & 1.2kV (For inverters)

1.2kV (For inverters)

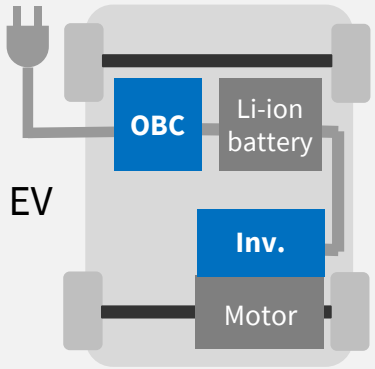
IGBT + diode integration type
1st generation
* Diode can improve inerter performance together with IGBT

Integration type
2nd generation(300mm-based)

1.2kV (For inverters)



IGBT in the process of 300mm wafer production



OBC：On-Board Charger
Inv.：Inverter

SiC-MOSFET

- Miniaturization
- High efficiency

650V & 1.2kV (For on-board chargers)

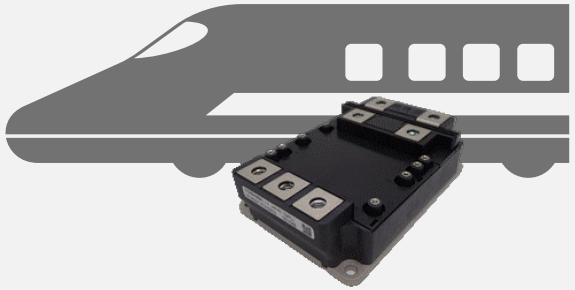
1.2kV (For inverters)

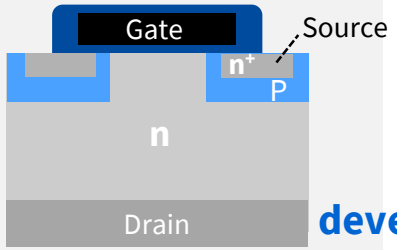
SiC Device Development : Expand Business by Utilizing Advanced Technologies

Penetrate automotive, renewable energy and power T&D markets based on high voltage technologies over 3kV (for railways, etc)

3.3kV module for railways

In production





Technologies to manage deficits, high voltage, high current

Device structure | **Inspection technology**

Using Showa Denko's high grade epitaxial wafers (HGE GEN.2)

LTA signed in September 2021

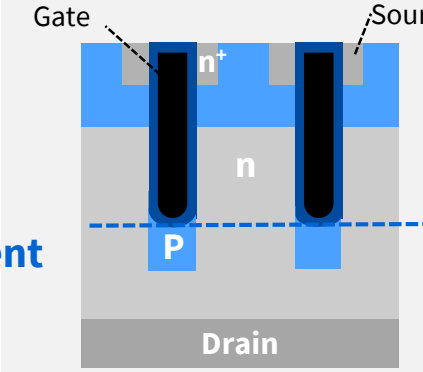
Expand businesses fully utilizing above technical advantages

650V, 1.2kV : MOSFET (discrete)

Sample shipment started for industrial use incl. power supply in 2021. Devices for automotive under dev.

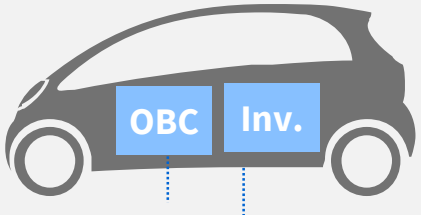
New development

Up to 1.2kV: high quality/reliability device for automotive

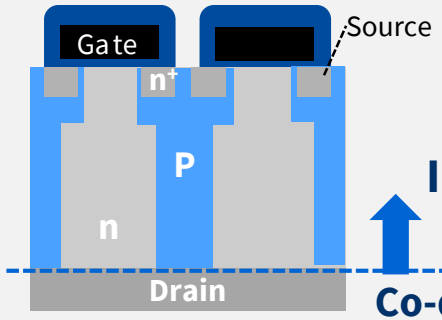


In-process epitaxial

Co-development with Nuflare

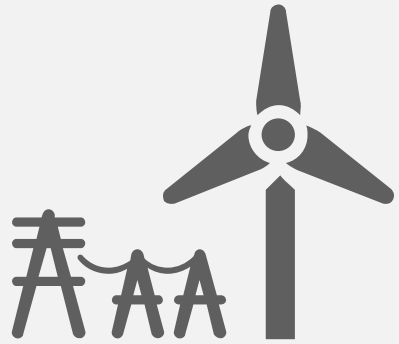


Higher than 3.3kV: higher voltage, lower loss with super junction structure; suitable for renewable energy, HVDC, etc.



In-process epitaxial

Co-development with Nuflare

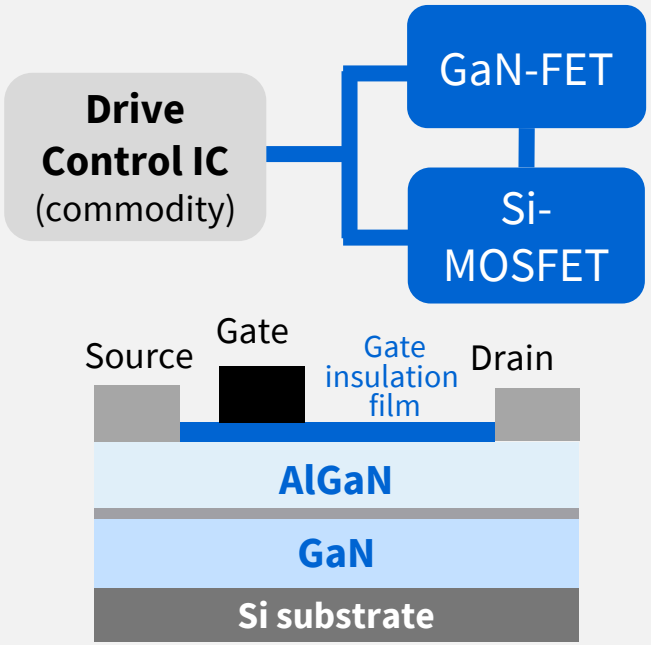


GaN-FET: Aim to Downsize Power Supply by Developing New Structure Device

Develop 2nd generation GaN power device with new structure that contributes to higher efficiency & miniaturization.; Offer them to customers with optimized control IC

1st Generation (CY23)

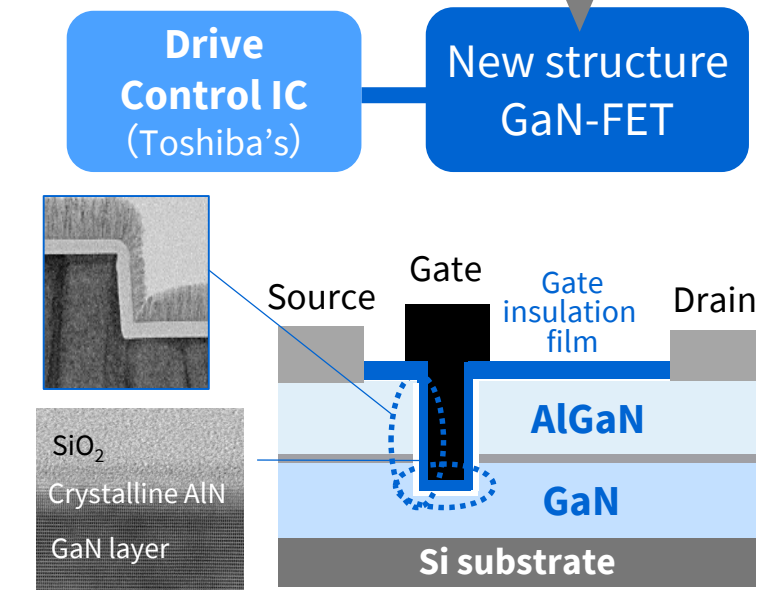
▲50% loss reduction compared to silicon



2nd Generation (from CY26)

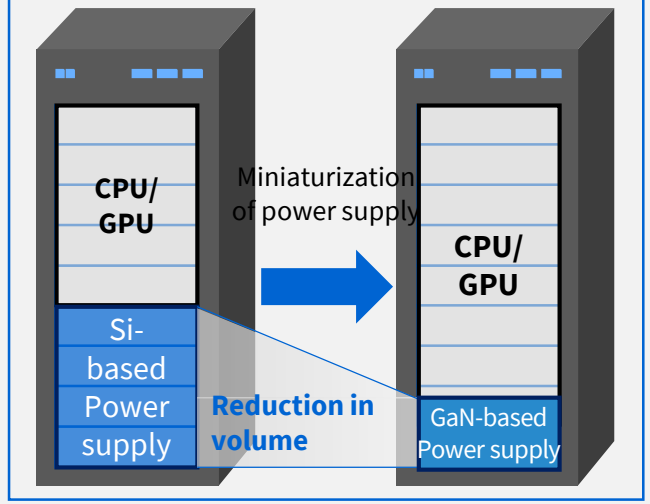
▲60% volume reduction of power supply compared to silicon

<New structure under development at CL*>
Accelerate development by gathering at Device Co.



- 1MHz high speed switching
  → Miniaturization of parts

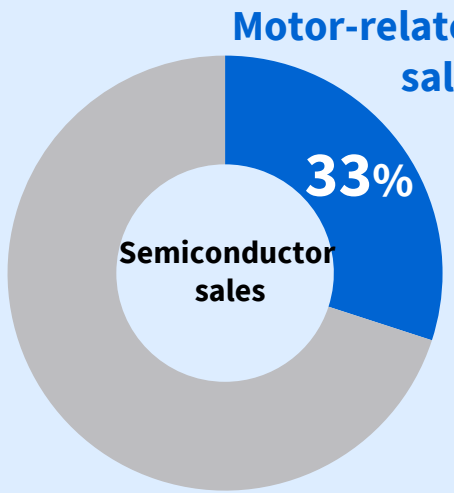
Example of power supply for server



* CL: Corporate Lab.

Motor Area: Proactively Support MCU, Analog and Power Semiconductors

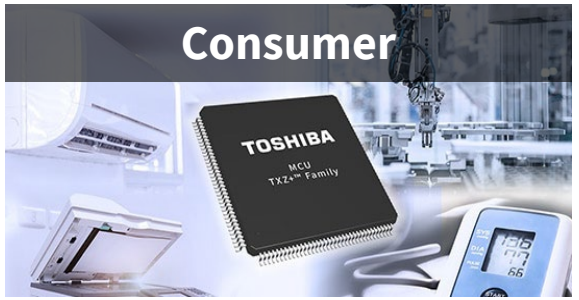
Offer highly efficient systems for various motor-related applications; Realize low noise and low heat dissipation with vector control technology and automatic adjustment function, etc



1/3 of semiconductor sales is driven by motor control-related products

(MCU, MCD, IPD*, power semiconductor, etc.)

* MCU: Micro Controller Unit, MCD: Motor Control Driver
IPD: Intelligent Power Device

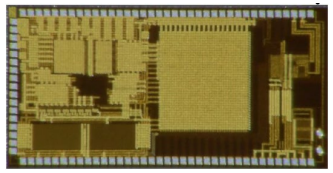


Motor control
MCU

- **TXZ+™ Family**
  - Arm® 32bit CPU
  - Vector control engine
  - Large capacity flash memory
  - Advanced control by AI

Drive control
Analog semiconductors

- **Motor driver IC**
- **Gate driver IC**



Gate driver IC development (example)
(Toshiba R&D Center's presentation at IEEE ECCE2021)

Motor Drive
Power semiconductors

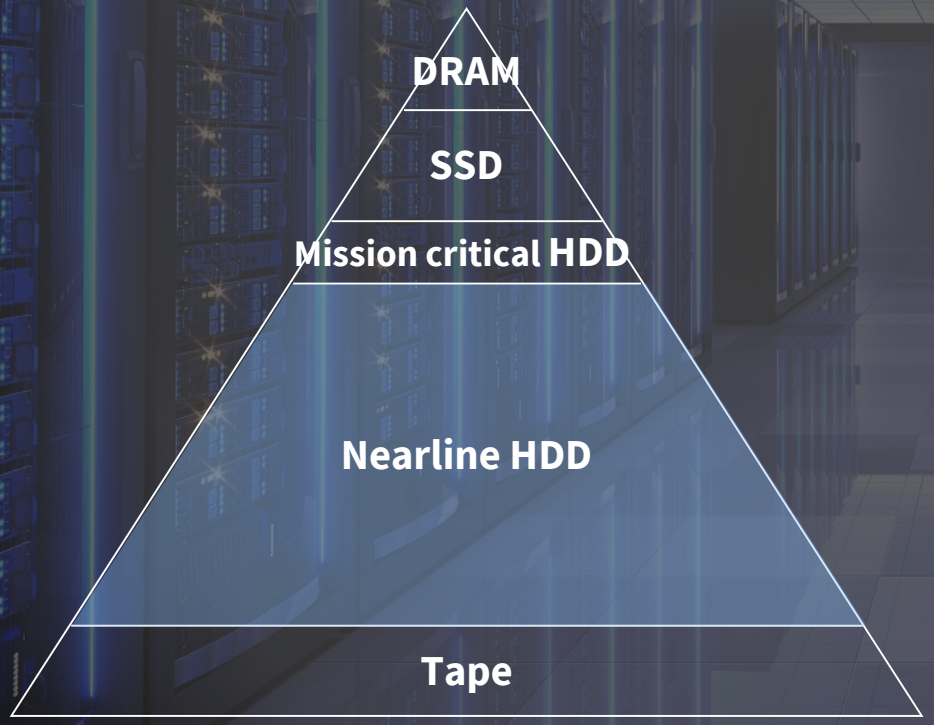
- **Si-MOSFET**
- **Si-IGBT**
- **SiC**
- **GaN**
- **IPD**

Production facilities of analog semiconductors

Storage Devices Supporting Data Centers

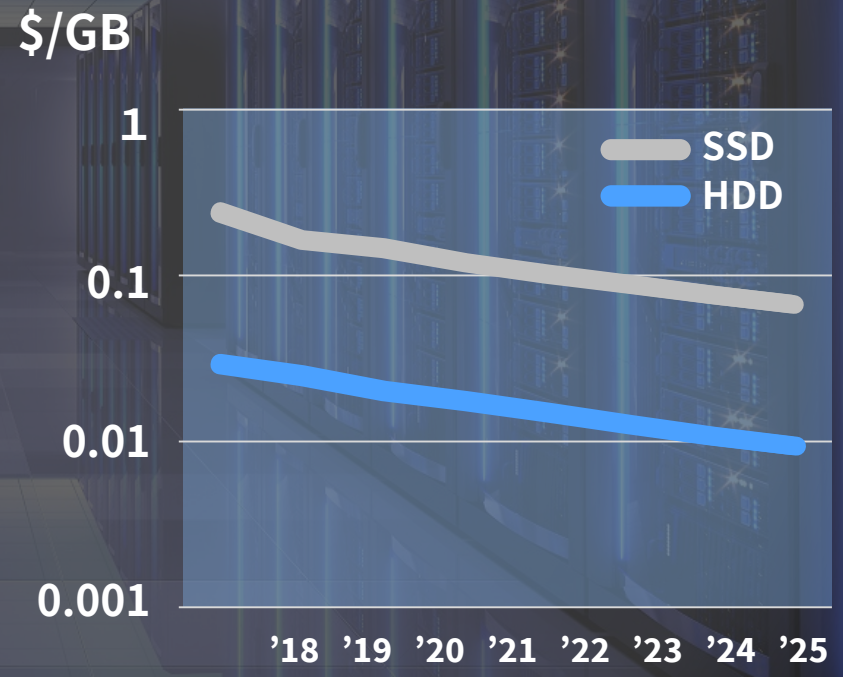
Nearline HDDs, a core of data centers, remain as a key storage product; Continue to share the market with SSDs by playing a different role

Hierarchical structure of storage for Data centers



* Source: Toshiba

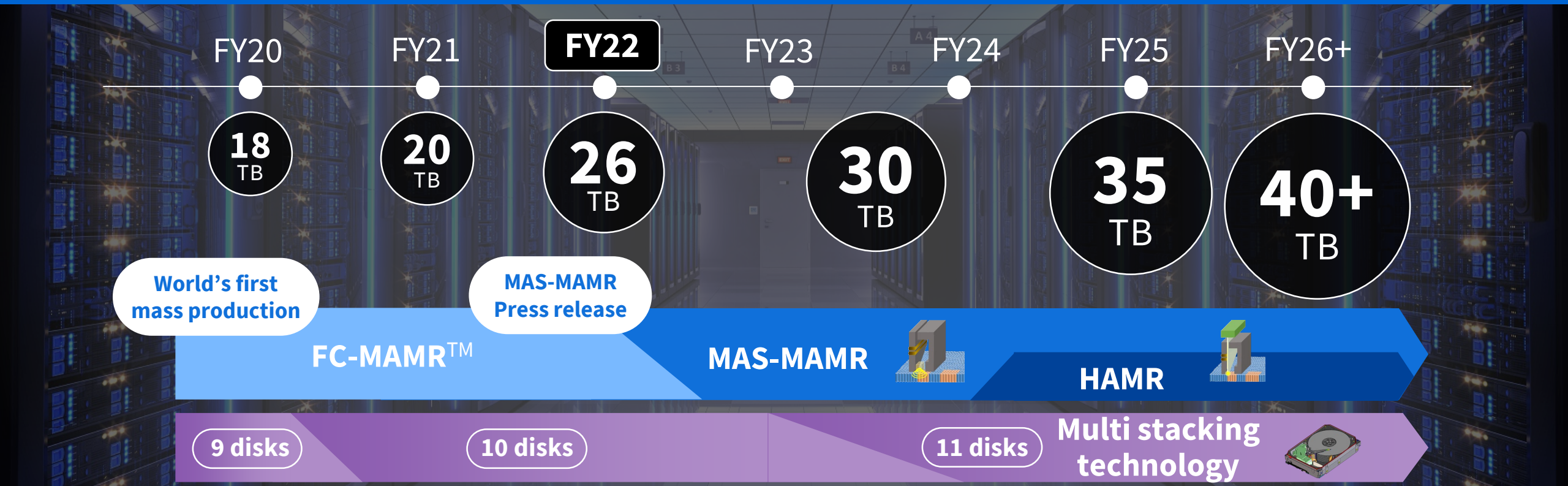
Comparison of bit costs



* Source: Techno System Research Co., Ltd. HDD/SSD Market Trend (Annual) Dec, 2021

Roadmap of Larger Capacity HDDs for Data Centers

Continue to launch advanced, new generation-technologies to promote larger storage capacity

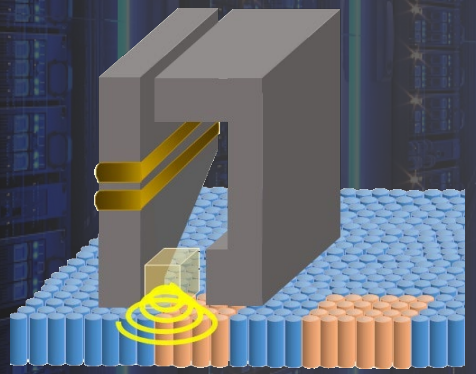


* FC-MAMR™ : Flux Control-Microwave Assisted Magnetic Recording
* MAS-MAMR: Microwave Assisted Switching - Microwave Assisted Magnetic Recording
  (Press release on December 27, 2021: https://www.global.toshiba/jp/technology/corporate/rdc/rd/topics/21/2112-04.html)
* HAMR: Heat Assisted Magnetic Recording
* Source: Toshiba, as of Feb, 2021, in Nearline HDDs

HDD Capacity Enhancement Technologies

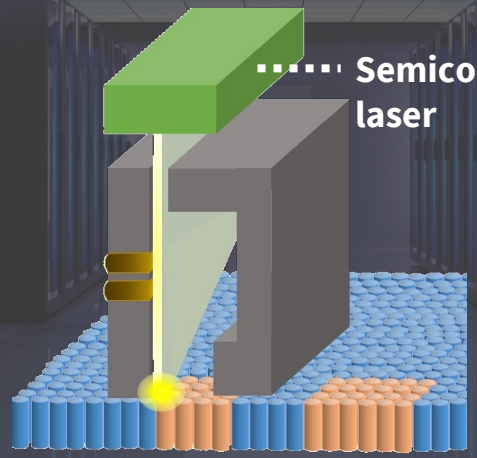
Unique assist magnetic recording technologies to achieve higher density; Technologies to allow more disks to achieve higher capacity

MAMR



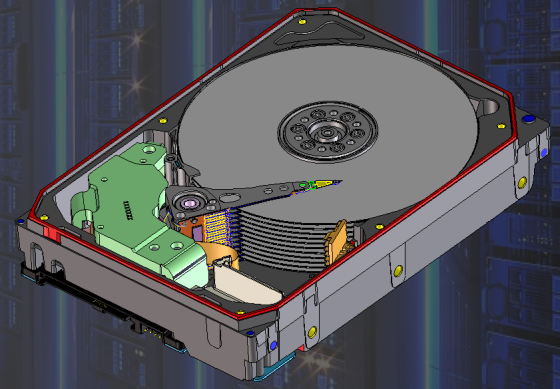
- FC-MAMR™: in Mass Production
- MAS-MAMR: 30TB drive to be qualified in FY23, shift to mass production in FY24
- Close development collaboration with TDK and Showa Denko

HAMR



- Basic R&D is ongoing
- Prototype drive to be available within FY24

Multi stacking technology



- Development of 10-disk drive already completed, mass production to start in FY22
- 11-disk drive under development

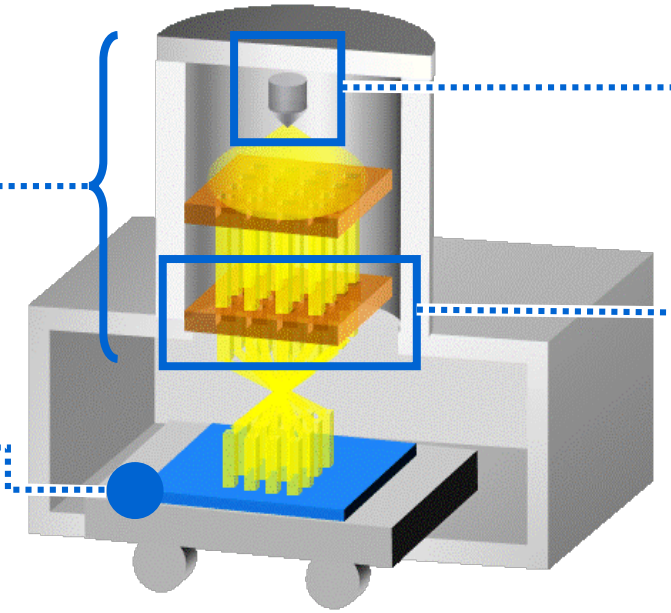
NuFlare Technology : Electron Beam Mask Writer

Launching the multi beam mask writer, combining NuFlare's equipment technology and Toshiba's device technology; Will respond to customers' needs by continuing to develop key technologies for next generation equipment

Multi beam mask writer

Foundational technologies to realize high accuracy and productivity

MBM™-2000



- High reliability electron optics system
- High reliability stage mechanics
- High speed data control technology
- Various writing accuracy correction technology

High brightness electron source (1.5x brighter than competitor's)

- Unique technology fostered by developing single beam writer
- Realizes overwhelmingly higher throughput than competitor
- Developing new electron source for MBM™-3000

Aperture for controlling multi beam (BAA*)

- Realizes high performance control of 260,000 beams using Toshiba's device technology
- Realizes high accuracy and high stability by electron optics of 50kV one-stage acceleration and robust BAA device
- Developing higher resolution and larger scale BAA device for MBM™-3000

* BAA: Blanking Aperture Array

Demonstrates effectiveness in writing leading edge semiconductor EUV masks by the writer's high accuracy and high productivity

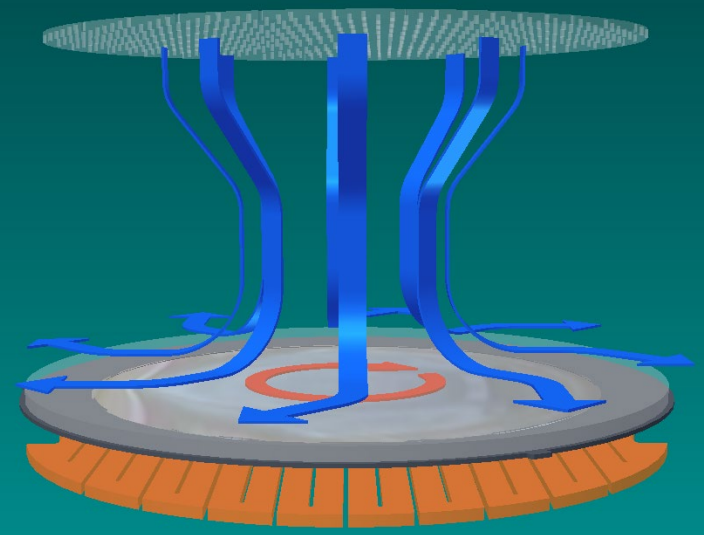
NuFlare Technology : Epitaxial Growth System

Expects surging compound power semiconductor market; low defect, high grade film is formed with high throughput; positive reviews from customers worldwide with a steady flow of orders

High performance epitaxial growth system

The EPIREVO™ series system realizes high speed film growth and high uniformity by rotating the wafer at high speed; positive reviews from the compound semiconductor market

- **Vertical Gas Flow reduces surface defects**
- **Uniform Gas Concentration realizes high uniformity**
- **High Speed Wafer Rotation realizes high speed growth; easily adaptable to larger wafer**



Developing a system with a gas spec for Toshiba, for GaN film formation

EPIREVO™ S6/S8

SiC epitaxial growth system

EPIREVO™ G8

GaN epitaxial growth system

Summary: Toward Device Co's Growth

Semicon-ductor	● Grow business by aggressively investing in development and production of power semiconductors; the market is expected to expand significantly thanks to carbon neutrality
HDD	● Focus on storage products for Data Centers; the market expands significantly ● Aim at 24%+ market share in FY25, 30%+ in the near term by launching larger capacity drives
Semicon Manufac. Equipment	● Further enhance position in the market with very competitive mask writers and epitaxial growth systems; grow as a highly profitable business

Our Semiconductor and Storage products will always be a driving force to change the world

Toshiba Electronic Devices and Storage, together with our customers, will accelerate our future journey.

We aim to be a company that will be chosen for our pioneering technology and spirit embedded in our products.

TOSHIBA

APPENDIX

Device Co. Mid-Term Plan

FY25 Forecast : Net Sales 1.01 T-yen, ROS 7.9%, Operating income 80bil. yen

	FY22 Forecast	FY23 Forecast	FY25 Forecast
Net Sales	**860** bil. yen	**910** bil. yen	**1.01** T-yen
Operating Income (ROS%)	**56** bil. yen (6.5%)	**60** bil. yen (6.6%)	**80** bil. yen (7.9%)
EBITDA[*1]	**88** bil. yen	**98** bil. yen	**125** bil. yen
ROE	**Average of FY22 to FY25 15%+**		
FCF[*2]	**5** bil. yen	**29** bil. yen	**55** bil. yen

*1 EBITDA＝Operating income + Depreciation expense　*2 Free Cash Flow