Investors Guide

October 30, 2024

Index

Overview

Chapter 1, Sales Composition

-       Semiconductor & Component Test Systems

-       Mechatronics Systems

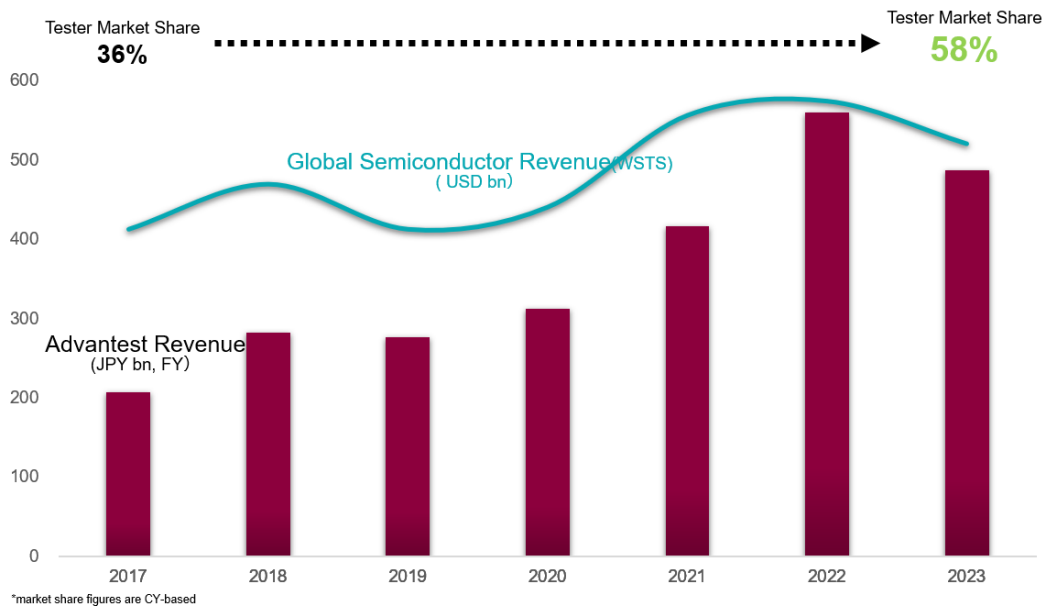-   Services, Support & Others

Chapter 2. Business Model

-       Customer Base

-       Testing Process and Tester's Role

-       Product Portfolio

Chapter 3. Competitive Environment

Chapter 4. Mid-Term Management Plan

Overview

Tester Market Share
36%

Tester Market Share
58%

Global Semiconductor Revenue(WSTS)
(USD bn)

Advantest Revenue
(JPY bn, FY)

600

500

400

300

200

100

0

| 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |

*market share figures are CY-based

The chart above shows global semiconductor sales and Advantest's consolidated sales over the past seven years. The chart indicates a correlation between the two is implied. The semiconductor and tester markets both grew significantly in the three years until 2022 due to the acceleration of digitization caused by Covid-19. However, in 2023, the semiconductor market entered a correction phase, and the tester market shrank, partly as a reaction to the elevated demand triggered by Covid-19. In the medium to long term, our sales are expected to expand along with the secular growth of the semiconductor market, while fluctuations are also to be expected. The chart above also shows the cyclical nature of the semiconductor market and our sales. Note that during this period, our global market share has risen, reaching 58% in 2023.
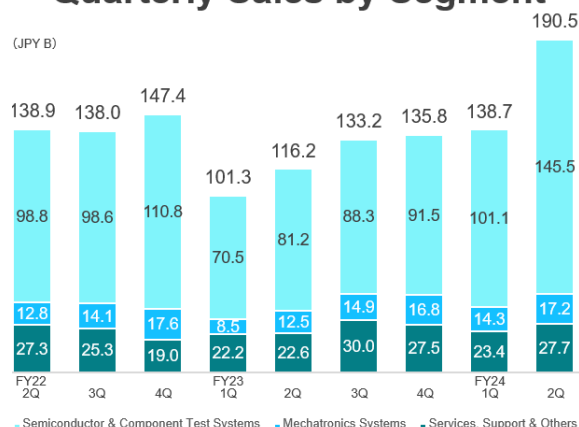
The Investors' Guide is an attempt for us to explain our sales composition, growth drivers, market characteristics, business model, competitive environment, etc.
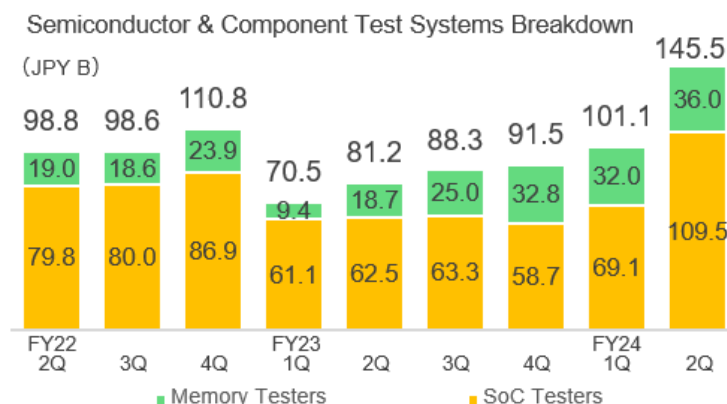
Chapter 1 Sales Composition

The Company's business segments consist of (1) Semiconductor & Component Test Systems, (2) Mechatronics Systems, and (3) Services, Support & Others. The core business is the Semiconductor & Component Test Systems business.

Historical sales by segment and segment details are as follows.

Quarterly Sales by Segment

(JPY B)

Note: Intersegment transactions have been eliminated from totals

Semiconductor & Component Test Systems

Semiconductor & Component Test Systems Breakdown

(JPY B)

The Semiconductor & Component Test Systems business, the Company's core business, is divided into two sub-segments: SoC testers and memory testers. Historically, the memory tester business had been the company's main business. However, in the 2000s, the Company began strengthening its SoC tester business, which now accounts for the majority of segment sales, thanks in part to the acquisition of Verigy in 2011. For more information on test processes in the semiconductor development and manufacturing processes, please refer to Chapter 2.

SoC Tester Business

The SoC tester business is segmented by application and disclosed mainly in two categories: "Computing and Communications" and "Automotive, Industrial, Consumer, and DDIC (display driver ICs)". The table below the sales breakdown of SoC Tester Business.

Applications	FY21	FY22	FY23	FY24e
Computing / Comms	60%	65%	60%	85%
Automotive / Industrial / Consumer / DDIC*1	40%	35%	40%	15%

*1 DDIC : Display Driver IC   Numbers are rounded to the nearest 5%

"Computing" in "Computing and Communications" mainly includes leading-edge process devices such as HPC and AI, and "Communications" include application processors for smartphones (APUs). "Automotive, Industrial, Consumer and DDIC" includes a wide range of applications for automotive, industrial and consumer markets, as well as display driver ICs (DDICs). The "Automotive, Industrial, Consumer and DDIC" category includes a wide range of automotive, industrial, and consumer applications, as well as display driver ICs (DDICs). The semiconductors tested in the Computing and Communications category are mainly high-performance semiconductors that are manufactured using leading-edge processes, while the Automotive, Industrial, Consumer, and DDIC categories are mostly commodity semiconductors that are manufactured using mature processes.
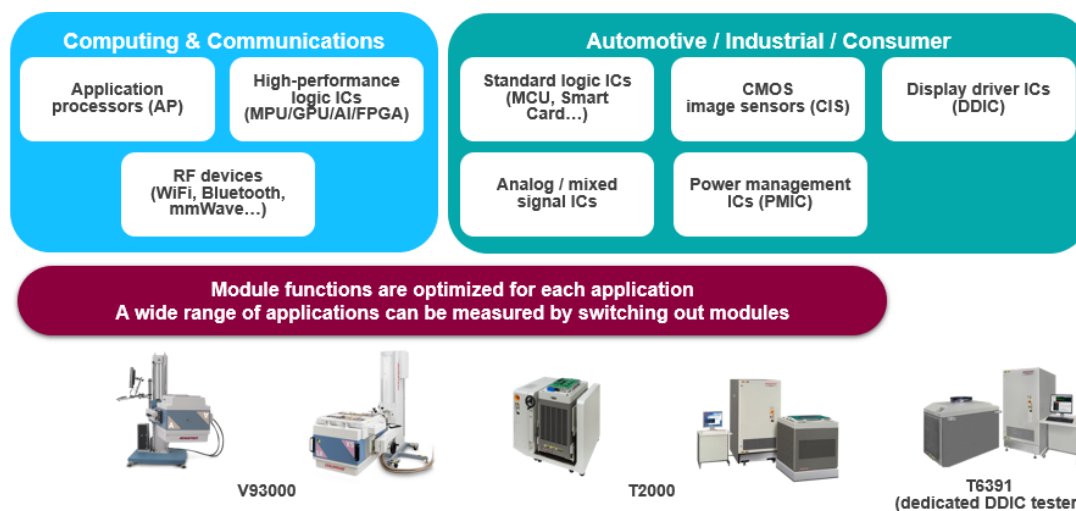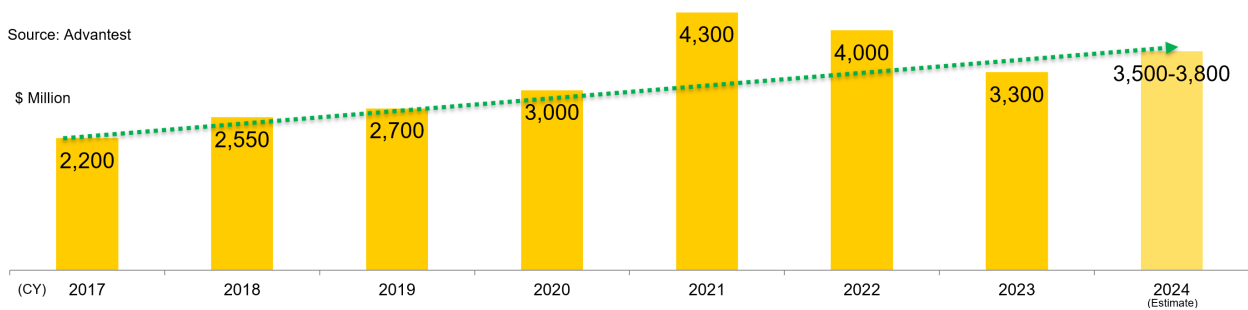

SoC Tester Market Size Trends

In the medium to long term, the SoC tester market size has been on an increasing trend albeit cyclicality.

While the SoC tester market exhibits cyclicality, depending on the amount of capital investment by customers, such cyclicality is expected to moderate as the breadth of semiconductor demand expands. The SoC market size is likely to grow over the medium to long term against the backdrop of the changes in the demand structure described below. For market share, please refer to the chapter on Competitive Environment.

As a countermeasure to the cyclical nature of the market, the Company has been working to expand its customer base as well as product portfolio and to strengthen its target applications to reduce cyclicality.
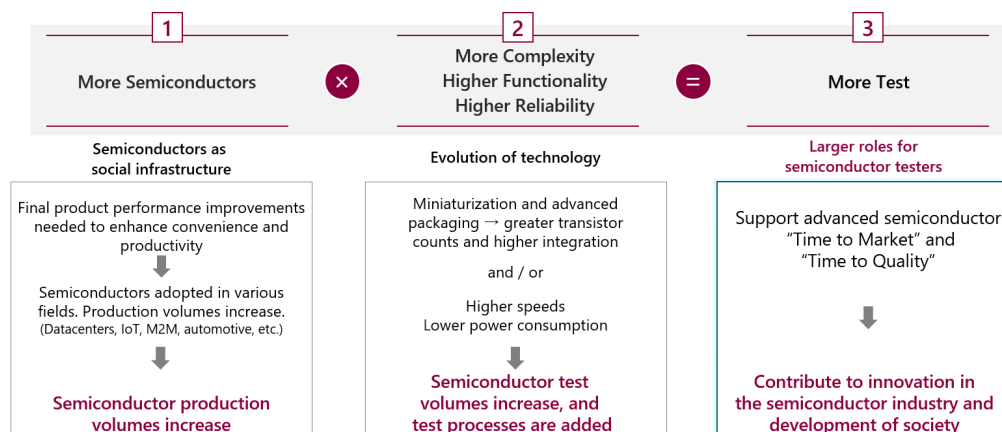
$ Million

| | 2,200 | 2,550 | 2,700 | 3,000 | 4,300 | 4,000 | 3,300 | 3,500-3,800 |

(CY) 2017　　2018　　2019　　2020　　2021　　2022　　2023　　2024 (Estimate)

SoC test demand is determined by the pace of capacity expansion (capacity buy) and the performance evolution cycle of semiconductors (technology buy). In addition to the increase in tester demand due to the broadening base of semiconductor demand, the need to ensure reliability on predicated on growing complexity is also driving test demand. In addition, the challenges associated with miniaturization, complexity, and power consumption of semiconductors are making it harder to improve test efficiency, which is also a tailwind.

The pace of capacity expansion is influenced by semiconductor manufacturers' production plans, the design and manufacturing proficiency of individual devices under test, improvements in test efficiency, and fabless companies' plans for selecting and switching test supply chains. In recent years, the trend toward localization of semiconductor production by governments against a backdrop of geopolitical risk is also a likely factor contributing to capacity buys.

On the other hand, demand for technology buys is increasing year by year against the backdrop of technological advancements such as smartphone performance improvements and HPC/AI/machine learning. These are driving semiconductor miniaturization, heterogenous integration, and complexity growth, as represented by advanced packaging. The resulting increase in transistor counts and the level of integration cause an increase in test volume and test insertions.

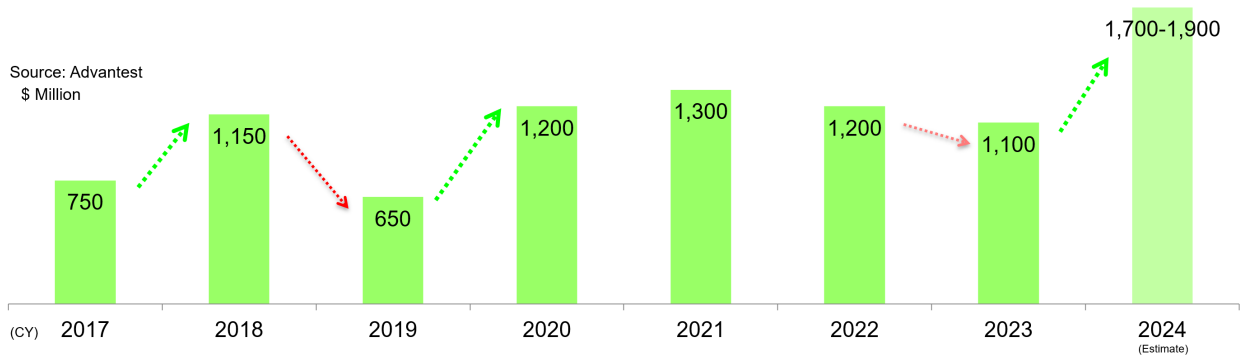| 1		2		3
More Semiconductors	×	More Complexity Higher Functionality Higher Reliability	=	More Test
Semiconductors as social infrastructure		Evolution of technology		Larger roles for semiconductor testers
Final product performance improvements needed to enhance convenience and productivity ⬇ Semiconductors adopted in various fields. Production volumes increase. (Datacenters, IoT, M2M, automotive, etc.) ⬇ **Semiconductor production volumes increase**		Miniaturization and advanced packaging → greater transistor counts and higher integration and / or Higher speeds Lower power consumption ⬇ **Semiconductor test volumes increase, and test processes are added**		Support advanced semiconductor "Time to Market" and "Time to Quality" ⬇ **Contribute to innovation in the semiconductor industry and development of society**

Memory tester business

The memory tester business is broken down by application: DRAM and non-volatile memory. The DRAM and non-volatile memory testers are further divided into front-end and back-end processes, respectively. For details on front-end and back-end processes, please refer to the section on Test Process. The table below the sales breakdown of Memory Tester Business.

Applications	FY21	FY22	FY23	FY24e
DRAM	60%	60%	90%	95%
Non-Volatile Memory	40%	40%	10%	5%

Numbers are rounded to the nearest 5%

Memory Tester Market Size Trend

The memory tester market exhibits relatively pronounced cyclicality. However, similar to the SoC tester market, a broadening range of applications is helping reduce its cyclicality. Furthermore, rising quality assurance requirements in response to technological advancements, are also lessening the magnitude of such cyclicality. For market share, please refer to the Competitive Environment section.

Source: Advantest
$ Million

							1,700-1,900

1,150 · 650 · 1,200 · 1,300 · 1,200 · 1,100

750

| (CY) | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 (Estimate) |

The demand for memory testers is essentially determined by the industry's bit growth rate and the trend in memory bandwidth (data transmission speed). This is because as bits on a chip increases, test time increases, and the increase in bandwidth drives higher speeds. In addition to higher memory density and interface speeds, the trend toward higher reliability requirement is also an important driver of demand.

Mechatronics Systems

Mechatronics Systems consists of the device interface business, the test handler business, and the nanotechnology business. Test handlers are mechatronics-applied products that handle and sort semiconductor devices. Device interfaces serve as interfaces for a device under test. Sales of tester handlers and device interfaces tend to move in tandem with sales of semiconductor testers. For nanotechnology business, the main product is CD-SEM (critical dimension-scanning electron microscope) which are based on electron beam control technology. Applications include dimensional measurement of photomask circuit patterns which are used in the semiconductor manufacturing front-end process.

Services, Support & Others

Services, Support & Others consists of Support Services and the system level testing business. The former provides the service business related to semiconductor and component test system business products and mechatronics-related business products installed at customers.

The system level test business sells test equipment that are used to test devices in final application mode. With the increasing complexity of semiconductors, there are growing needs to screen defects that escape device level tests. Therefore, the Company is working to establish and strength the system level test business through organic and inorganic efforts.

Chapter 2. Business Model

In our core business of manufacturing and selling semiconductor testers, the value we provide to our customers lies in our technical and support capabilities for supporting our customers' semiconductor development and volume production. Below we explain how we support our customers through the following explanations of our customer base, the role of testers and test processes, and our product portfolio.

Customer Base

Our customers are semiconductor manufacturers, and we supply testers primarily to IDMs (integrated device manufacturers), fabless (semiconductor design companies), foundries (wafer fabrication companies), and OSATs (outsourced semiconductor assembly and test companies). We have strong relationships with a wide variety of customers, whether they are IDMs, fabless, foundries, or OSATs. In the history of the semiconductor industry, IDMs with a vertically integrated model that handles everything from design to manufacturing to sales were main players. In the last 20 years or so, however, the rise of fabless, foundries, and OSATs has become prominent, and the disaggregated model(the fabless-foundry-OSAT model) has grown. Under the disaggregated model, the same testers selected by fabless companies for verification during device design are often used by foundries for sample evaluation and wafer testing, and by OSATs for post-assembly package testing. Therefore, decision-making by a fabless customer is an important point for tester selection in the disaggregated model.
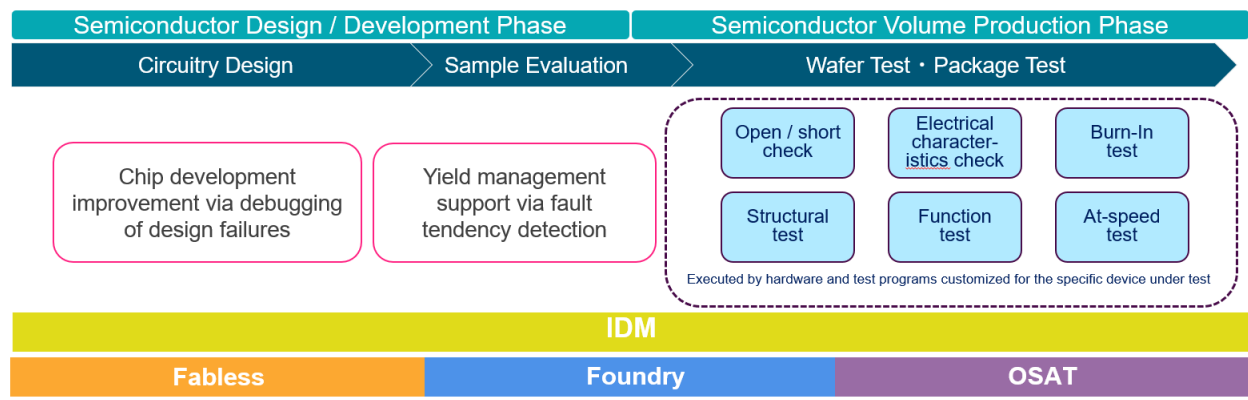

Role of testers and testing process

Semiconductor testers measure the performance of semiconductors, and their role is mainly divided into design verification and testing for volume production. Although the volume is larger for volume production, recently the volume of testers used in the design phase and sample evaluation phase have been increasing. With the growing complexity of semiconductor design, testers are helping customers shorten their development time by testing semiconductors from the design and evaluation phases, screening design defects, and providing feedback to the design.

In the volume production phase, testers are used for wafer testing and for package testing. The front-end process is for wafer fabrication, and wafer testing takes place at the very end of wafer fabrication process by testing wafers. The back-end process is to assemble and package chips which have been singulated from wafers. The package test is conducted at the final stage of the back-end process to screen defects.

Test is Essential Process Both in Front End & Back End
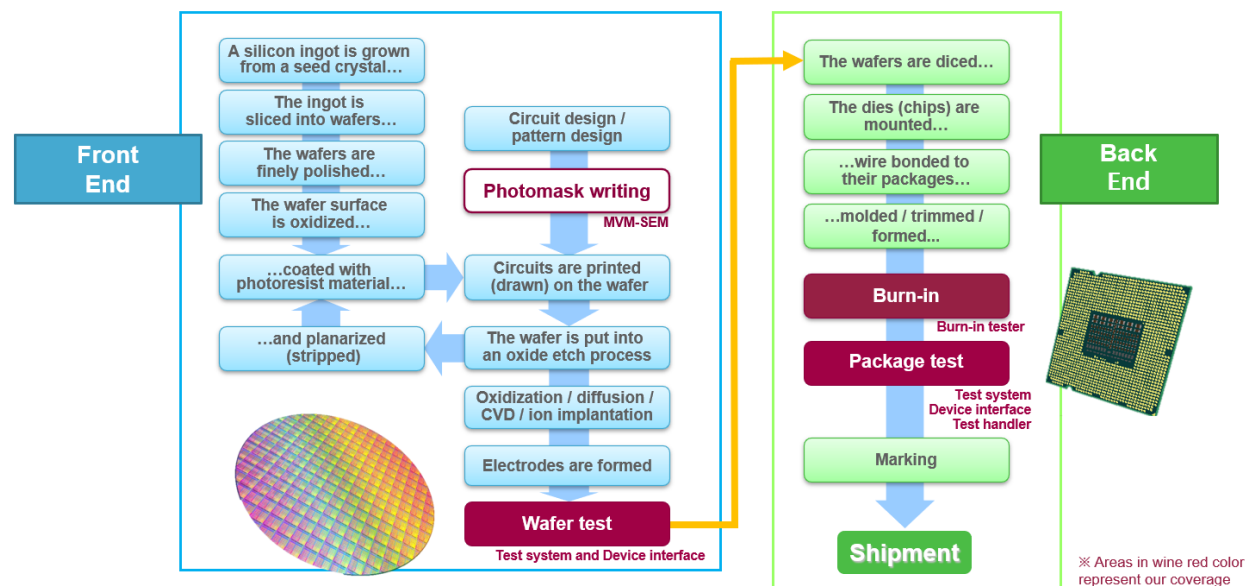
In semiconductor testing, electrical signals are applied to semiconductor devices, and the output signals are compared with reference data to determine whether the device has passed or failed. Among the 400-600 processes involved in semiconductor manufacturing, testing is the only process that handles electricity, as highly precise electric signals are analyzed to determine the quality of semiconductor.

Advantest plays a role in supporting device quality by providing seamless technical testing support from semiconductor development to volume production across a full range of customers such as IDMs, fabless, foundries, and OSATs. This long-standing commitment to advancing test solutions by overcoming technical challenges throughout the test supply chain, from fabless to foundries to OSATs, has strengthened the trust between the Company and each of the players in the supply chain.

Product Portfolio

With increasing challenges of semiconductor development and manufacturing, test challenges are also growing. These challenges are heightening an importance of providing a total test environment, as opposed to just providing a tester, in order to achieve highly accurate testing. In its product portfolio, Advantest owns difference pieces of technology that enable a total test environment setup including the contact technology necessary for measurement, test handlers with active thermal control capability, and device interfaces necessary for high-performance measurement.

Our technological capability to provide the most optimal combination of testers and peripheral equipment simultaneously enables us to speedily create the optimal measurement environment for our customers. In turn, with the optimal development and evaluation environment, our customers are able to bring their products to market faster, thereby enhancing their competitive advantage. The higher the performance of a device, the greater the importance of such comprehensive turnkey solutions. Therefore, our ability to provide a one-stop total solution has been a strength of Advantest.

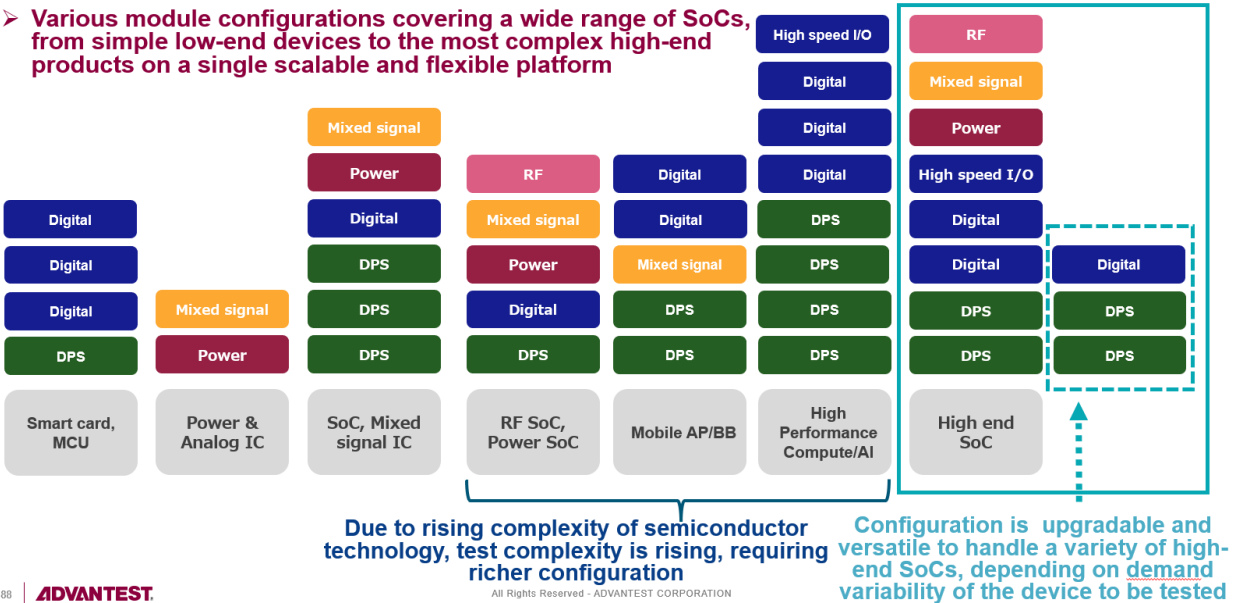Synergistic Solution Families Centered on Semiconductor Test Systems
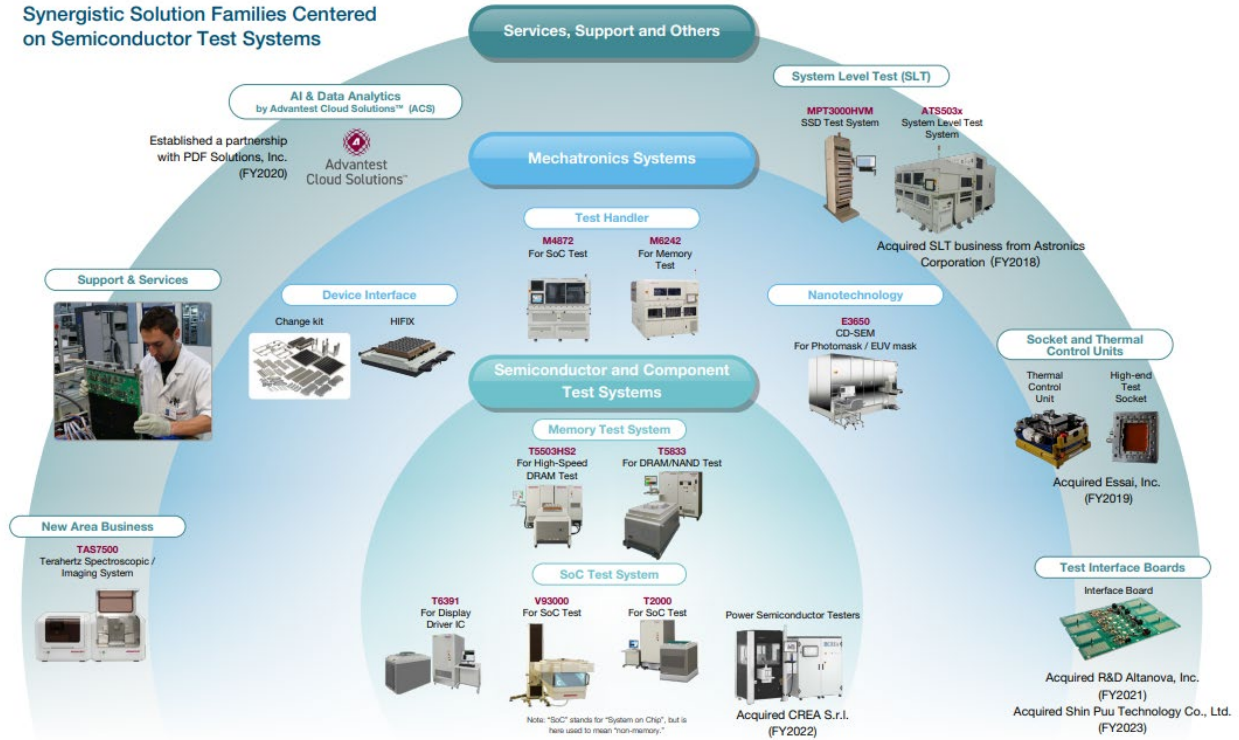
Testers are at the core of our total solutions approach. Based on our close relationships with customers, testers are developed by incorporating their technology roadmaps ahead. In other words, by anticipating future technology needs, our testers boast scalability which can withstand technological evolution over the next 10 years or so. For example, in the V93000 series, our flagship SoC tester, the current generation model, EXA Scale, was launched in the second half of 2020, but both Smart Scale and Pin Scale from previous generations are still widely used at customer sites.

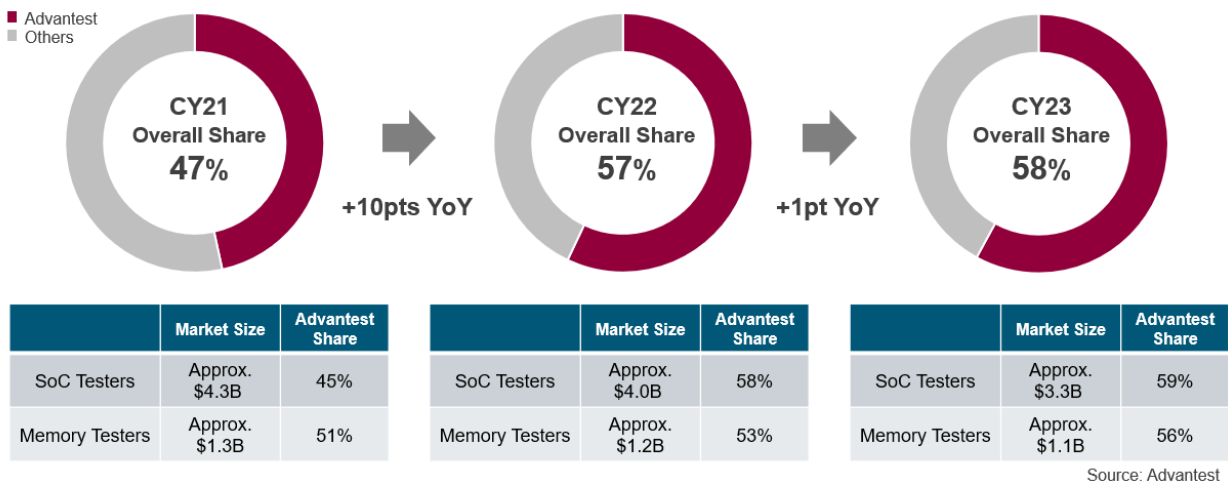## Technology Leadership by continuous Innovation
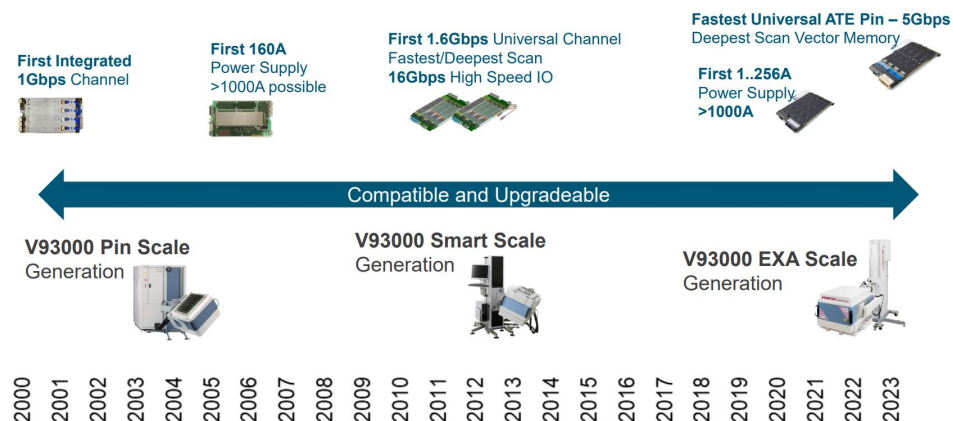
What is at the core of our tester scalability is our module architecture approach. For SoC devices, in particular, the module architecture helps customers secure return on their tester investment. This is because for devices such as SoCs that boast a large number of devices and fast device upgrade cycle, the ability to flexibly reconfigure tester configurations through module architecture, in which necessary functions can be reconfigured in modules according to the application, leads to higher return on investment for customers. As shown in the table below, by preparing a wide range of modules, including digital, analog, and power-mixed signal, technological advancements can be followed flexibly.

Adding Value to SoC Test: Module Architecture

➢ **Various module configurations covering a wide range of SoCs, from simple low-end devices to the most complex high-end products on a single scalable and flexible platform**

Smart card, MCU	Power & Analog IC	SoC, Mixed signal IC	RF SoC, Power SoC	Mobile AP/BB	High Performance Compute/AI	High end SoC	
					High speed I/O	RF	
					Digital	Mixed signal	
					Digital	Power	
		Mixed signal			Digital	High speed I/O	
		Power	RF	Digital	Digital	Digital	
Digital		Digital	Mixed signal	Digital	DPS	Digital	Digital
Digital		DPS	Power	Mixed signal	DPS	Digital	Digital
Digital	Mixed signal	DPS	Digital	DPS	DPS	DPS	DPS
DPS	Power	DPS	DPS	DPS	DPS	DPS	DPS

Due to rising complexity of semiconductor technology, test complexity is rising, requiring richer configuration

Configuration is upgradable and versatile to handle a variety of high-end SoCs, depending on demand variability of the device to be tested

ADVANTEST

Chapter 3. Competitive Environment

Advantest and Teradyne combined have about 80% of the tester market share. Looking back over the past five years, our market share has been gradually increasing, especially in the SoC tester market. In terms of competitive advantage, our customer base and product portfolio, mentioned in the Business Model section, are differentiating factors for the Company.

■ Advantest
■ Others

	CY21 Overall Share 47%		CY22 Overall Share 57%		CY23 Overall Share 58%

+10pts YoY   +1pt YoY

	Market Size	Advantest Share
SoC Testers	Approx. $4.3B	45%
Memory Testers	Approx. $1.3B	51%

	Market Size	Advantest Share
SoC Testers	Approx. $4.0B	58%
Memory Testers	Approx. $1.2B	53%

	Market Size	Advantest Share
SoC Testers	Approx. $3.3B	59%
Memory Testers	Approx. $1.1B	56%

Source: Advantest

The customer base is characterized by the low sales concentration of the top customers. In other words, the customer base is well-diversified, and especially in the last few years, there has been a marked increase in the number of new customers. This can be regarded as evidence that the company's track record is highly regarded by new customers entering the semiconductor market.

Traditional Computation IC Market   **Future Computation IC Market**

|	
PC/Server CPU (x86) Several Players	**PC/Server CPU (x86)** Several Players
	PC/Server (ARM, RISC-V) Several Players + Many Startups in China / **PC/Server (ARM, RISC-V)** Many New Players Hyperscalers System Companies China
PC Graphics Several Players	**PC Graphics** Several Players established Players + China Startups
Mobile APU/Modem Several Players	**Mobile APU/Modem** Several Established Players New Players in China / **Mobile APU/Modem** Phone Makers System Providers

The expansion of the customer base creates a virtuous cycle and can also a starting point for the next growth cycle. This is because by leveraging our customer base for marketing purposes, we can more effectively identify the needs of the next generation tester development, which in turn reduces risk and improves the efficiency of R&D projects and increases the value of the solutions we provide. By continuing the process of feeding test trends gathered from our expanded customer base back into next-generation tester development, we have evolved to serve a broader range of applications.

As for our product portfolio, the increasing complexity of devices is working to further increase the importance of our broad portfolio. The fact that we hold a dominant position in the high-end of the market, where test technology is most tested, is proof that the breadth of our product portfolio differentiates us. A concrete example of this is advanced packaging. While circuit integration in semiconductors has traditionally been pursued in the 2D(planar) direction, development in the 2.5D and 3D directions is accelerating due to workload and power consumption requirements. Such technological advancement is necessitating a re-evaluation of test methodologies, and our broad product portfolio and test coverage are contributing to the need for test advancement and enhanced customer quality assurance.
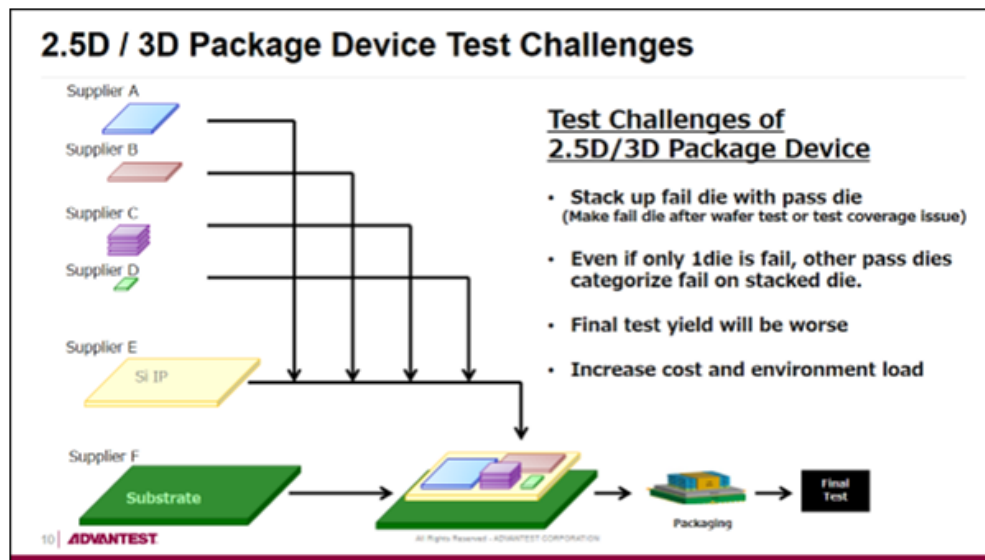
In light of the two competitive advantages mentioned above, it is likely that our market share will remain stable in the future. Testers are important equipment that are responsible for quality assurance of customers' devices. Changing tester selection is synonymous with customers having to reconstruct their entire environment for device development, evaluation, and volume production, and it also entails significant additional costs for customers. Once testers are selected, customers are highly dependent and are highly cautious about switching. These signify that hurdles for switching are high. This means that our market share is unlikely to fluctuate significantly in the short term. In addition, the expansion of our customer base and our product portfolio not only differentiates us from competition but also helps reduce cyclicality of our earnings.

Chapter 4. Mid-Term Management Plan

The Third Mid-Term Management Plan (MTP3, FY24-26), announced in June 2024, promotes four strategies and aims to achieve the following five management metrics.

	MTP2 Results (FY21-23 Avg.)		MTP3 Targets (FY24-26 Avg.)
Sales	¥487.9B	▶▶	¥560 - 700B
Operating Profit Margin	24.7%	▶▶	22 - 28%
Net Income	¥93.3B	▶▶	¥93 - 147B
ROIC	25.5%	▶▶	18 - 28%
EPS	¥124	▶▶	¥127 - 202

*MTP3 financial targets are based on exchange rate assumptions of 140 yen to the US dollar and 155 yen to the Euro
*Return on Invested Capital = NOPAT / Invested capital (average at beginning and end of period). NOPAT = Operating income x (1 - tax ratio 25%).
Invested Capital = Borrowings + Corporate bonds + Total equity, with excluding Lease liabilities.

① Outpace the growth in our core market: In the past, the semiconductor tester (ATE) market has overwhelmingly been the main market that Advantest focused on. However, from MTP3 onwards, while ATE will remain the central axis, the Company will aim for further growth based on a larger footprint enabled by past efforts it has made related to that axis. Future growth opportunities are expected to arise from increased semiconductor production volume, higher performance semiconductors, and the increasing complexity of semiconductors. To address these opportunities, Advantest will not only improve the performance of individual test solutions, but also create new value for its customers through "Automation of Test," – specifically, by improving the efficiency of semiconductor testing, by organically integrating its diverse portfolio of products and solutions, and by collaborating with external partners. Through these efforts, the Company will continue to grow faster than its core market.


Address the Industry Issues by "Automation of Test"
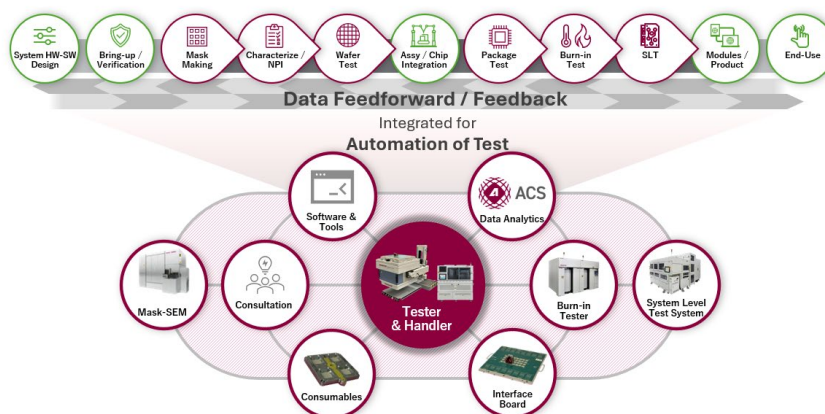
② Expand adjacently / new businesses: As semiconductors continue to become more high-performance and complex, there is a demand for broader and more integrated test solutions. Advantest has been expanding its business into system level test and test peripherals, and will

continue this initiative to further increase the value it provides to customers. More specifically, the Company will work to leverage its installed base of products to promote its field services and Advantest Cloud Solutions™ to create business opportunities.

Further Differentiation and Create New Business Opportunity
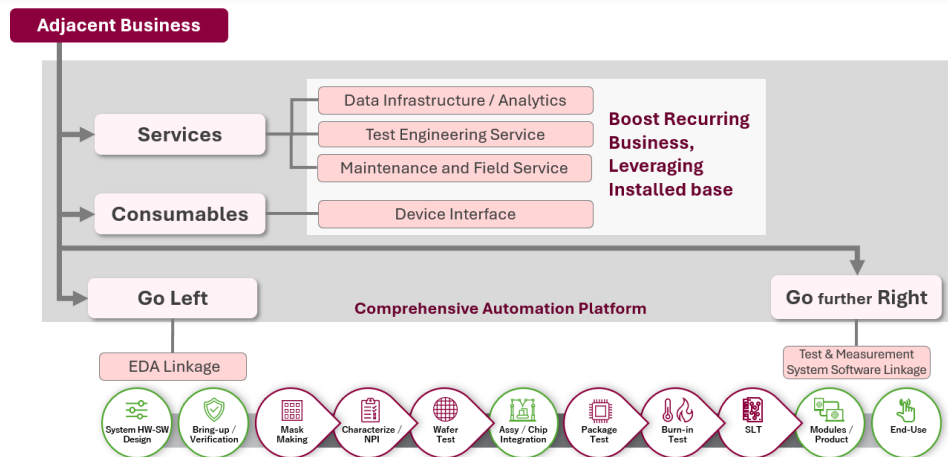
③ Drive operational excellence: Advantest will solve testing issues in the semiconductor industry by leveraging in-house technology on a cross-functional basis. In addition, in order to improve not only the excellence of its products and technologies, but also the efficiency and effectiveness of all of its operations, the Company is committed to accelerating internal operation and streamlining manpower by using DX (digital transformation), building a resilient supply chain, strengthening its human capital through recruiting competent talents and expanding employee training, and improving internal productivity through the use of AI and data analytics.

④ Enhance sustainability: Advantest will further strengthen its foundation for enhancing corporate value through proactive and positive action on sustainability issues such as climate change and human rights, the execution of responsible business activities, including legal compliance and adherence to ethical business practices, and the reinforcement of risk management and enhancement of corporate governance. Advantest will also strive to cultivate and instill a common culture and shared values within the company, as these are the starting point for promoting initiatives related to sustainability.