(Process2) Developing strengths

Growth strategy of the power semiconductor business





Business environment analysis

With the achievement of carbon neutrality seen as a global challenge, the development of renewable energy and electric vehicle technologies has been progressing. This has also led to people anticipating significant growth in the semiconductor business. It is expected that both the thyristor power device market and the SiC power device market will continue to expand in the period up to 2033. In particular, the SiC semiconductor market is set to grow rapidly, and a continued increase in demand for power semiconductors is anticipated. The Sansha Electric Manufacturing Group will tap into these market trends and focus on developing new products, improving production efficiency, expanding its SiC semiconductor product line, and finding new customers.

Thyristor power device market (inverters and servo amplifiers)



(billion yen)





Source: Estimated by Sansha Electric Manufacturing based on Energy, Ogata Niji Denchi, Zairyo-no Shorai Tembo 2022 (2022 future outlook of energy, large secondary batteries, and materials) from Fuji Keizai Co., Ltd

Review of FY2023

In the first half, net sales remained strong due to orders received up to the previous fiscal year. However, net sales declined year on year in the second half because orders were weak in the fiscal year under review. Sales of power modules for inverters for industrial use and power modules for various power supply devices among other power modules increased year on year. However, sales of other products including power modules for air conditioners and FA servos declined year on year. Regarding power discrete semiconductors, sales of power discrete semiconductors for electric bidet toilet seats and other consumer products and sales of other power discrete semiconductors declined year on year.

Sales of power discrete products declined, mainly in consumer products such as hot-water toilet seats. By region, sales in China remained weak throughout the year. On the other hand, sales in Southeast Asia increased due in part to an increase in the transaction volume of wafers and chips that was a result of a change in commercial distribution. Sales in Japan declined year on year in the second half. Semiconductor sales by region (by location of sales destination)

Semiconductor sales by region (by location of sales destination)



Strengths and features

· Independently developed power semiconductors with high voltage resistance, high current and low power loss characteristics

We develop and manufacture planar power semiconductors and also semiconductors based on our original mesa technology to achieve high voltage resistance and low loss.

- · Packaging technologies for high reliability Our original chip packaging technologies suited for power semiconductors gain high marks for their long-term reliability in key industrial applications.
- Synergy with the power supply business Because we have been developing and manufacturing power supplies, we are familiar with how power semiconductors are used in power supplies. This enables us to propose solutions that best suit the operating environment and application.

Segments

- Power modules
 - Device packages combining multiple power semiconductors
- · Power discrete semiconductors Semiconductors with single functions
- Chips

Small piece of silicon substrate with electric characteristics, such as diodes and thyristors

FY2024 forecast

While customers will continue to adjust their inventories in the first half of FY2024, conditions are expected to improve in the second half due to our success in generating new demand from customers. We will recover and increase profit by developing high value-added products and strategically reducing cost. While depreciation precedes profit temporarily due to the time lag before the emergence of the effects of investments in growth, we aim to build a stable profit base over the medium to long term.

Priority measures

SiC products have high-efficiency power conversion and help reduce CO₂ emissions. Demand for these products is growing rapidly. We will institute the next set of measures based on these high-performance devices, as they make a significant contribution to energy conservation and the stable supply of power.

1 Pursuing a well-balanced industry strategy

We will newly focus on the infrastructure market (including mobility, renewable energy, energy storage, and data centers), while remaining committed to the construction-related and industrial equipment markets. We will thus aim for a well-balanced industry strategy.

The expansion into the infrastructure market, which values speed and scale, will enable us to achieve both sustainability and economic benefits. Especially in the rail and shipbuilding fields, we will streamline the supply of power and the reduction of CO₂ emissions, contributing to the development of sustainable transportation infrastructure. In renewable energy, we will improve power conversion efficiency in solar and wind power generation to help strengthen green energy infrastructure. Meanwhile, data centers require high-efficiency SiC power devices. Here, we will realize a highly reliable supply of electricity.

2 Enhancing SiC products and implementing regional strategies

We will offer a product line that is appropriate for each market segment. We aim to increase our market share mainly in the Asian market, which is expected to achieve especially high growth. We will provide optimal solutions by designing products and establishing commercial strategies that are adapted to the power infrastructure and regulations of each region. We will also strive to increase the market shares that we have with our existing modules and offer highly competitive products in key markets such as Japan, China, North America, and Europe.

We will implement these measures with the goal of increasing the ratio of sales of SiC products to total sales to 10% by FY2026. Further, we will promote automation by increasing our capital investment and redesigning products so that we can establish an efficient, sustainable production system.

	SiC	Existing modules	
	Differentiating products offered in regions based on the characteristics of products	Increasing market share	
Japan	Wireless power supply Induction heating systems Semiconductor manifacturing equipment	Inverters for industrial use	
China		Servo-related products	
Asia		Inverters for industrial use	
North America	Wireless power supply		
	 Induction heating systems 	·····	
Europe	Semiconductor manufacturing equipment	 Inverters for industrial use 	
	Hydrogen generators	 High-capacity modules 	

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Growth strategy of the power supply business



Since we developed a power supply for projectors ensuring the projection of stable images onto movie theater screens in 1933, we have been utilizing technologies that freely transform and efficiently convert electricity to develop and manufacture a wide variety of power supplies supporting the environmental and energy sectors, the infrastructure and facility equipment sectors and entertainment-related sectors.

As we engage in integrated production including development, design and manufacturing, we are ide standard products and also customized products tailored to customers' requests with short delivery lead times. After delivering products to customers, we consistently provide maintenance and other support services.



Business environment analysis

The power storage system and power supplies for water electrolysis markets are expected to expand significantly from 2024 to 2033. In response to this market expansion, the Sansha Electric Manufacturing Group will adopt strategies to increase its competitiveness, focusing its efforts on providing sustainable energy solutions and striving to develop new technologies and increase its market share.

Power storage systems (for professional/industrial use)



2024 2025 2026 2028 2033 (FY)

Source: Estimated by Sansha Electric Manufacturing based on Fuji Keizai Co., Ltd.'s Energy, Ogata Niji Denchi, Zairyo-no Shorai Tembo 2022 (2022 future outlook of energy, large secondary batteries, and materials



3.135

2023

Power supplies for water

electrolysis

(billion ven)

1.900

2026

Plan

(FY)

Source: Ministry of Economy, Trade and Industry, Suiso Kihon Senryaku-no Kobetsu Ronten-to Suiso Sangyo Senryaku-ni Tsuite 2023 (2023 individual points of basic hydroger strategy and hydrogen industry strategy) NRFL, Manufacturing Cost Analysis for PEM Water Electrolyzers 2019

Review of FY2023

In FY2023, sales of large power supplies for evaluating power conditioners to the National Institute of Advanced Industrial Science and Technology (AIST) significantly increased net sales of the business as a whole. In addition to the above, sales of power supplies for surface treatment also increased due to demand in the field of precision surface treatment. Sales of other products including inverters and small power supplies for welders, uninterruptible power supplies (UPSs), and other applications also remained strong. By region, sales increased in Japan, partly reflecting the effect of the power supplies for evaluating power conditioners. However, overseas sales decreased due to the deteriorating business confidence in China and a failure to tap into demand for large power supplies, including power supplies for material processing.

Strengths and features

- · High-efficiency power conversion technology This is a technology for converting power quickly with high precision while keeping power loss to a low level. We have developed power conditioners for fuel cells equipped with our silicon carbide (SiC) modules, power supplies for hydrogen generation, and other high-efficiency products.
- Wide range of development from small custom-made to large industrial power supplies We are ready to design and develop unique power supplies,

ranging from small embedded power supplies to large industrial power supplies, in accordance with customers' specifications.

Segments

For industries

These are high-capacity power supplies for industrial use. They are used in the production facilities of large steel, chemical, electrical machinery, and other manufacturing plants

· Power supplies for surface treatment

Surface treatment includes plating, coating and aluminum anodization. Our power supplies for surface treatment are used to manufacture smartphones, electronic components, printed circuit boards, automobiles and other products.

For light sources and dimming

Power supplies for light sources are used for projection mapping and in movie theaters, studios and other facilities. Power supplies for dimming serve the purpose of controlling power for light source lamps. They are used for stage lighting in theaters, halls. TV studios and elsewhere.

Inverters

The applications of inverters include their use in uninterruptible power supplies (UPSs), solar power generation, fuel cells, and power conditioning systems (PCSs) that can be used with storage batteries. They are used at power plants, data centers, large factories, and other facilities.

- Small power supplies Small capacity power supplies are incorporated into financial institutions' automatic teller machines (ATMs), medical equipment, communication equipment and printers.
- Other power supplies

Electric power regulators that control the temperature of electric furnaces, etc. equipment and printers.

Establishment of EM Solutions Co., Ltd., a provider of one-sto



The introduction of renewable energy is accelerating as society moves toward the achievement of carbon neutrality. With this trend, the importance of effectively utilizing distributed generation including storage batteries and the expectations for these batteries are growing. With NITTO KOGYO CORPORATION, FA Products Inc., and TOKURA CORPORATION, we have established a joint venture that is creating new value by combining the expertise of the four companies to provide comprehensive energy management solutions.

FY2024 forecast

Sales are expected to decline due to the absence of a large special project like the one in FY2023. However, we will recover and increase profit by developing high value-added products and implementing strategic cost reductions. While depreciation precedes profit temporarily due to strategic investment in future growth, we aim to build a stable profit base over the medium to lona term

Priority measures

The Sansha Electric Manufacturing Group values sustainable management and is implementing initiatives including the development of products that contribute to carbon neutrality and a reduced environmental footprint. These initiatives are aimed at increasing our competitiveness by addressing social issues while also catering to customer needs. Especially in the field of energy management, we will take steps to further consolidate our position by fully leveraging our system stabilization technologies.

1 Developing products in the new energy sector and increasing our share of the market for global power supplies for surface treatment

By developing power conditioners for storage batteries, we will provide efficient energy management solutions and sustainably expand our products to increase our market competitiveness. In particular, we will accelerate our expansion of models for overseas markets and promote the introduction of products for which we use precision surface treatment technologies.

2 Standardization

We will improve quality, cost, and delivery (QCD) by standardizing designs, manufacturing, and components of custom products as part of our efforts to increase customer satisfaction. Through this initiative, we will streamline the process from product design to manufacturing.

3 Collaborating with capital and business alliance partners

We will promote joint development projects with capital and business alliance partners to support the shift to sustainable energy and smart social infrastructure. We will provide one-stop energy management solutions, from system design to construction, to aid customers in their decarbonization efforts.

4 Developing new markets using small power supplies

Suwa Sansha Electric Co., Ltd., our subsidiary, is planning to cultivate new markets by developing small power supplies for information infrastructure, rapid chargers, semiconductor manufacturing equipment, and other fields. We will pursue this initiative with the goal of catering to diverse customer needs and creating new business opportunities

		Column		
p support for the introduction of renewable energy				
Company name	EM Solutions Co., Ltd.			
Headquarters ocation	Floor 2, Shimbashi Annex, 5-35-10 Shimbashi, Minato-ku, Tokyo			
Representatives	Takaaki Mano, Representative Director and CEO Yu Sugawara, Representative Director and COO.			
Capital	40,000,000 yen (NITTO KOGYO CORPORATION: 50.1%, Sansha Electric Manufacturing: 20.0%, FA Products: 20.0%, TOKURA CORPORATION: 9.9%)			
Start of business	March 2024			
Business description	Provision of consulting services regarding the introduction of renewable energy and development, construction, and sales			
JRL	https://emsol.co.jp/			

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