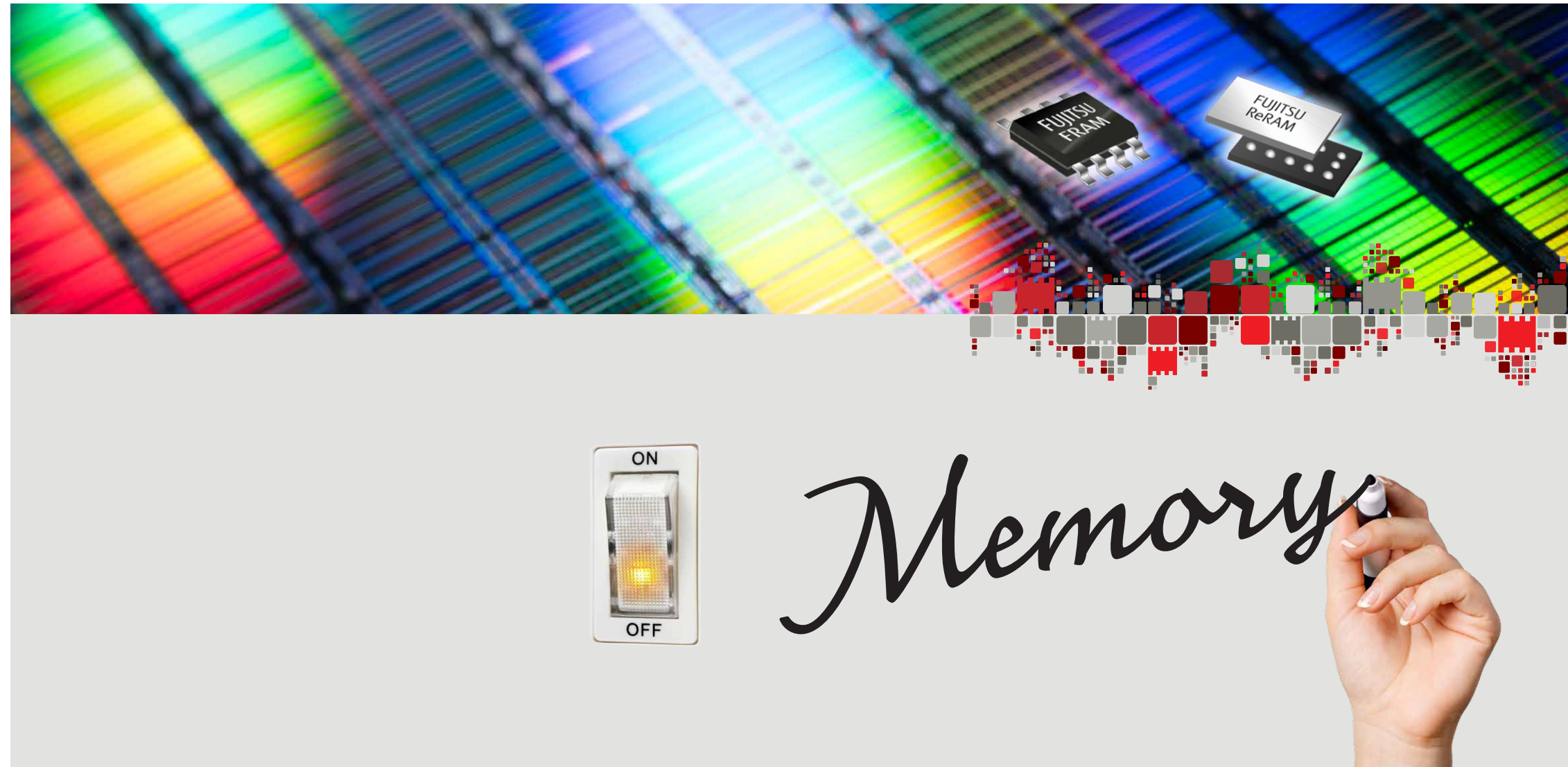


FUJITSU
SEMICONDUCTOR
MEMORY SOLUTION
PROFILE



FUJITSU SEMICONDUCTOR
MEMORY SOLUTION LIMITED

Shin-Yokohama TECH Building, 3-9-1 Shin-Yokohama,
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<https://www.fujitsu.com/jp/fsm/en/>

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Printed in Japan
February 2021

shaping tomorrow with you



Our Technology is There to Support You

Toward Creating New Value

Fujitsu Semiconductor Memory Solution offers memory products and various solutions centered on Ferroelectric Random Access Memories (FRAMs), a high-quality and highly reliable non-volatile memory, to customers. Fujitsu's semiconductor division began mass production of FRAMs in 1999, and FRAMs have been attaining favorable reputations from customers as memory products which provide non-volatility, which retain stored data even when the power is turned off, as well as random access. Compared to conventional types of non-volatile memories, such as EEPROMs and flash memories, FRAMs have unique features, including higher write speeds, greater read/write cycle endurance and lower power consumption. FRAMs are used in a wide range of applications, such as IC cards, RFID tags, electric meters and industrial machinery and they are also best suited for wearable devices and sensor networks. We have also started mass producing ReRAM as the next generation of memory, which consumes less power to read data and is best suited for compact wearable devices. Additionally, we have been advancing the development of NRAM, a non-volatile memory utilizing carbon nanotubes as new materials and new technology. Fujitsu Semiconductor Memory Solution was established in March 2020 as a spin-off from Fujitsu Semiconductor. As a member of Fujitsu group, we determine "to make the world more sustainably by building trust in society through innovation" as "Our Purpose" (see note) and will contribute proactively to the transformation of society by delivering technology-based value to customers. We will continue to develop our business under the motto, "Our Technology is There to Support You," to deliver high-quality semiconductor products and services, as well as to create and provide new value and optimal services to our customers.

Note
"Our Purpose" represents why Fujitsu exists in society. Fujitsu group renewed the Fujitsu Way after 12 years. It comprises three parts, "Our Purpose", "Our Values" and "Code of Conduct" and it is a compass for every person of Fujitsu in promoting our business and achieving "Our Purpose."

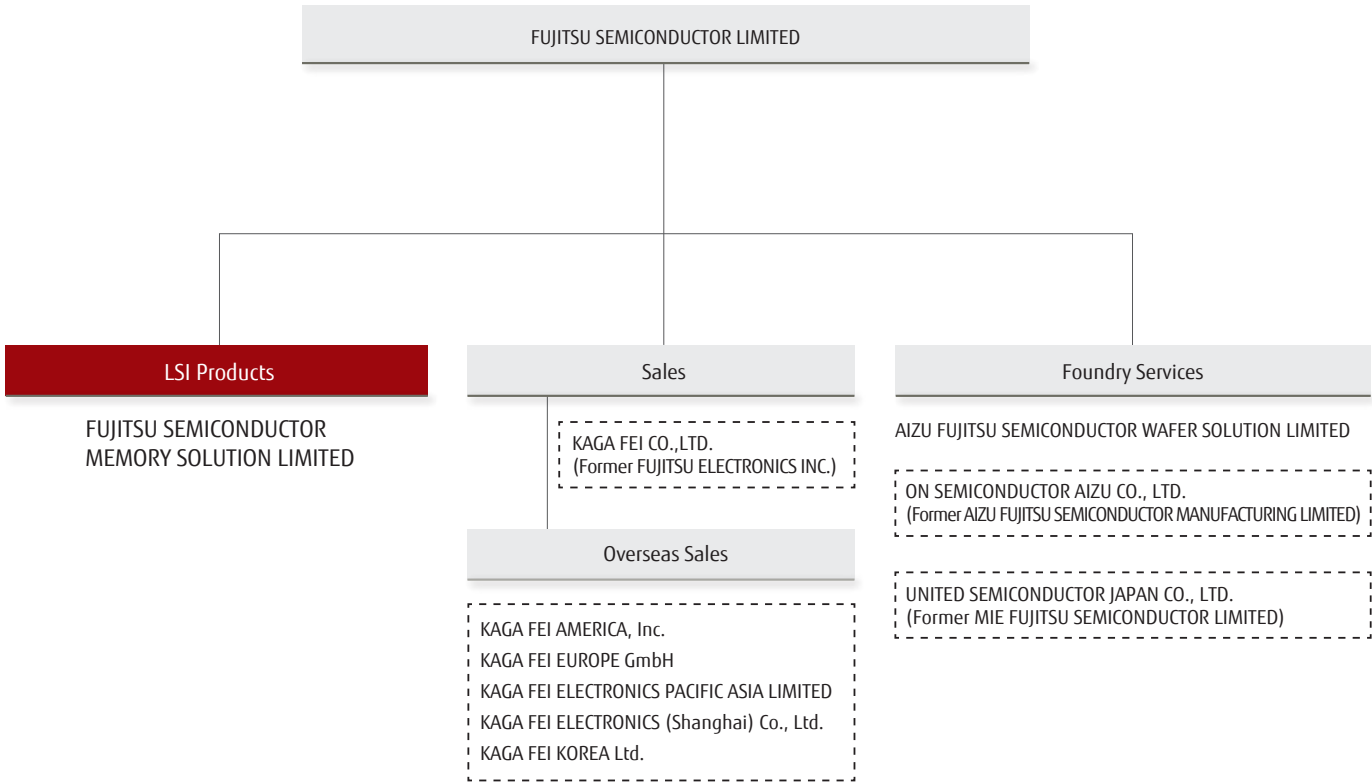


Kagemasa Magaribuchi
President

FUJITSU SEMICONDUCTOR
MEMORY SOLUTION LIMITED

Corporate Profile

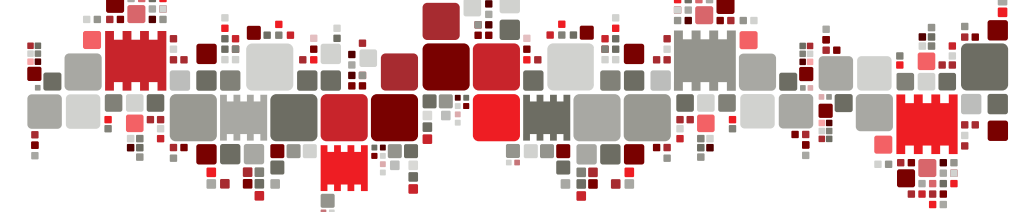
Company name:	FUJITSU SEMICONDUCTOR MEMORY SOLUTION LIMITED
Location of head office:	Shin-Yokohama TECH Building, 3-9-1 Shin-Yokohama, Kohoku-Ku, Yokohama, Kanagawa, Japan
Capital:	450 Million Yen
Date of establishment:	March 31, 2020
Business description:	Design, development and sales of memory products and solutions
Shareholders:	Fujitsu Semiconductor Limited, 100% shareholder
Representatives:	Kagemasa Magaribuchi President and Representative Director
URL:	https://www.fujitsu.com/jp/fsm/en/



Business

Quickly Responding to Fast-Changing Customer Needs

We are offering the high quality and high performance LSI memory products, which are essential for enhanced digital applications, through its manufacturing and development over many years. In addition to offering LSI memory products for the greater miniaturization, higher performance, and lower power consumption in recent years, we also propose the best solutions combined with memory to meet customers' needs.



LSI Products

Our Memory Products and Memory Solutions

FRAM

Our FRAM is a non-volatile memory and guarantees 10 trillion read/write endurance which enables real-time data logging. It needs no power supply from batteries to retain data and has specific features of fast writing speed operation, higher read/write endurance and lower power consumption compared to other existing non-volatile memories. Due to these advantages, FRAM is used in applications requiring continuous data logging, real-time recording of three-dimensional positions information and data protection from sudden power outage. We provide 2M bit FRAM which guarantees to operate up to 125°C for applications requiring reliability in high temperature environments such as automobiles and industrial robots.

ReRAM

Resistive Random Access Memory (ReRAM), a form of non-volatile memory, has a structure that memorizes data by changes in resistance. In 2019, its 8 M bit products have started to be provided. Using an extremely low read current, ReRAM is best suited for battery-operated wearable devices such as hearing aids and Smart Watch.

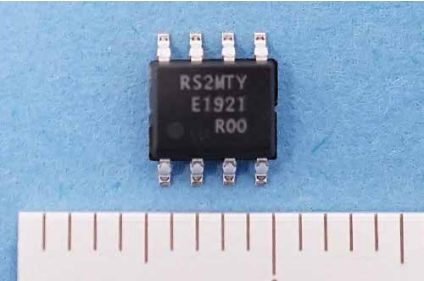
NRAM

NRAM is a non-volatile memory created by using cutting-edge carbon nanotubes technology and materials. Currently, we are working together with U.S.-based Nantero, Inc. to develop the memory into new products. In addition to the same features as FRAM, fast writing speed, high read/write endurance and lower power consumption, NRAM is expected to demonstrate excellent memory performance of increased memory density and high thermal resistance (makes it relatively easy to guarantee operation at a high temperature).

*: NRAM is a registered trademark.

Battery-less solutions

We provide FRAM-embedded wireless LSI for battery-less solutions, an electronic component to realize battery-less operations in parts of logistics and retail systems. For example, our wireless LSI is used for electronic paper that operates without a battery. This technology, which operates electronic paper by wireless power supply that uses radio wave, can be realized only because FRAM, which consumes extremely low power to operate, is used as memory. It is expected that use of electronic paper for recording work and display work will increase in the future due to labor shortages, and our FRAMs will contribute to battery-less applications in such various fields.



2 Mbit FRAM Guaranteed to Operate up to 125°C



8 Mbit ReRAM Package

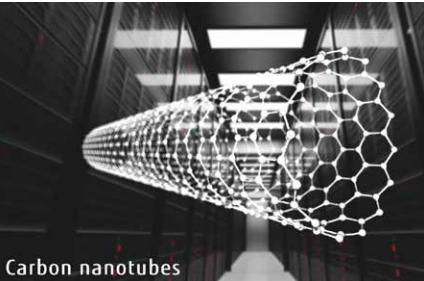


Illustration of Carbon Nanotubes consisting of NRAM



Electronic Paper Using FRAM embedded LSI

Non-Volatile Memory Devices Required to Build IoT

5G

When the fifth generation wireless technology for digital cellular networks (5G) starts to be fully commercialized in the 2020s, not only the amount of data, but also data transmission frequency will increase dramatically with respect to information transmitted via the Internet of Things (IoT). Therefore, in order to record information in real time, memory device is required to have high read/write endurance with physical robustness that enables data to be written without error even at an extremely high rewrite cycles.

Edge Computing

Recently edge computing in IoT is advancing by increasing mobile devices with artificial intelligence (AI) and many sensing data or parameters are frequently rewritten to memory installed on such devices. Faster IoT leads to increasing frequency of data updates, therefore, memory with high read/write endurance is also required here.

Robots

These days, robots—from industrial robots to entertainment robots—are widely employed in all kinds of fields. The three major elements of robots are intelligence (computer control), actuators and sensors. In order to precisely control actuators such as robot arms, memory that can record 3D position information from sensors in real time is required. In the event of a power outage or instantaneous interruption, memory featuring fast writing speed is essential to record the position information at that moment.

ADAS(Advanced Driver Assistance System)

Intense competition among leading IT companies as well as other mobility companies is taking place around the world to develop ADAS for autonomous driving. In order to ensure the safety of autonomous driving and to record the situation in the event of an accident, in particular, it is necessary to continuously record the situations of a traveling vehicle as data. Here again, memory with high read/write endurance is required.

In this way, as high-speed data communication advances and data is transmitted more frequently, the need for non-volatile memory that can withstand such frequent data recording operation increases. In addition, faster writing speed that enables data to be recorded without error even in the event of sudden power outage by an accident is required for memory. Our FRAM is one of memory devices with the performance required in this new era of IoT.



Image of 5G High-Speed Communication



Edge Computing in IoT



Robots Requiring Positioning Data Logging



Autonomous Driving in an Evolving Mobility Society

Environmental Activities

Contributing to the Global Environment with Products with High Environmental Performance

Fujitsu Semiconductor Memory Solution positions "Environment" as an important management issue, and promotes environmental activities based on the Fujitsu Group Environmental Action Plan and the Fujitsu Semiconductor Group Environmental Policy.

Fujitsu Semiconductor Group Environmental Policy

Philosophy

With our customers, we contribute to the protection of a rich global environment, using state-of-the-art technology to provide semiconductor devices with superior environmental characteristics.

Operational Principles

By applying the following principles, we work to prevent pollution of the global environment and reduce the environmental burden of our products throughout their lifecycles, including development, procurement, manufacture, sales, usage, and disposal :

1. We develop products with outstanding environmental characteristics.
2. We promote proper management of chemical substances contained in products, packaging materials, etc.
3. We promote measures to counteract global warming, effective utilization of water and resources, and proper management of wastes.
4. We promote proper management of chemical substances to prevent pollution of the global environment.
5. We conform to environmental regulations around the world and keep our promises to customers.
6. We promote activities to make environmental and social contributions, and to preserve biodiversity.
7. We effectively and continually improve our environmental management system, and work hard to improve our environmental performance.

Contributing to the achievement of the SDGs through development and provision of environmentally conscious devices and solutions

The following introduces the examples of Fujitsu Semiconductor Memory Solution products that contribute to achieving the SDGs.



Contribution to “Goals7: Affordable and clean energy” by providing system memory products

Our opportunities to use information and electronics equipment have increased, and accordingly, the amount of power consumed by such equipment is trending upward. Under these circumstances, we have been striving to provide devices and solutions that reduce power consumption while supporting the evolving of information and electronics equipment.

Related products:
Non-volatile memory "FRAM", Non-volatile memory "ReRAM"



Contribution to “Goals12: Responsible consumption, production” by providing Battery-less solutions

For keyboards, remote controllers, sensors, electronic paper, display, and so on, many batteries are used and then discarded. By replacing such batteries with the battery-less solution, we can contribute to not only saving energy, but also reducing factors adversely affecting the environment due to disposing batteries and the like.

Related solutions:
"Battery-less solution"

ISO14001 Certificate

Fujitsu Semiconductor acquired the certification of ISO14001 which is the international standard for Environmental Management System (EMS).

ISO14001 of Fujitsu Semiconductor Memory Solution Limited
<https://www.fujitsu.com/jp/fsm/en/about/environment/>



Regulatory Authority: Japan Audit and Certification Organization for Environment and Quality (JACO)
Registration number: EC98J2005
Certified on: September 12, 1995

Quality and Reliability

Incorporating Quality and Reliability through the Ability to Integrate People, Processes, and Products

Fujitsu Semiconductor Memory Solution’s LSIs are used in a variety of fields and play an important role in our customers’ products. We place the highest priority on product quality and reliability, and we are known for high quality and reliability worldwide. We are working to improve quality and reliability even further in terms of people, processes, and products while strengthening cooperation with manufacturing partner companies.

People — Producing high quality through education of personnel

Not only are our staff members highly skilled in various aspects, they are also dedicated to achieving the highest standards of quality and reliability. We realize this by our educational programs which make each employee to acknowledge the importance of achieving the quality and reliability of end products.

Process — High quality built in at every stage

Maintaining optimal conditions during the processes of product planning, design and development, delivery and after-sales support is the key point to stably supplying high-yield and high-quality LSIs. We perform thorough checks based on strict quality standards at every stage of the process to attain these targets.

Product — High quality suitable for all sectors of society

Our extensive expertise as a leading provider of IoT equipment and service solutions enables us to develop FRAMs and other advanced non-volatile memories that meet a variety of customer needs. We seek to contribute to diverse segments of society by providing highly reliable products created from highly reliable semiconductor devices.

ISO9001 Certificate

Fujitsu Semiconductor acquired the certification of ISO9001 which is the international standard for Quality Management System (QMS).

ISO9001 of Fujitsu Semiconductor*
<https://www.fujitsu.com/jp/fsm/en/support/quality/>

Regulatory Authority: DQS Japan Inc.
Registration number: 50300315QM
Certified on: June 19, 2012

*About the ISO9001 certification
The listed ISO9001 certificate was obtained by our former company, from which we took over the business, which was audited for continuing assessment under the former name.
We plan to change from the former company name to the current name (Fujitsu Semiconductor Memory Solution Limited) at the next certification renewal.



FUJITSU SEMICONDUCTOR LIMITED
Headquarters
ISO9001
50300315QM