

FRAM



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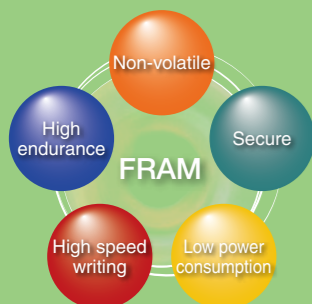
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FRAM, for your system innovation



FRAM (Ferroelectric RAM) is a non-volatile memory that can retain data even with the power off and also a random access memory (RAM). FRAM has the superior performance as compared with conventional non-volatile memories in high-speed write and high endurance.

Fujitsu carries out from R&D through to mass production of FRAM. Since the introduction of FRAM products in 1999, Fujitsu has been the top supplier in the world. FRAM products are produced in Fujitsu and group companies. Fujitsu can stably supply high quality of FRAM products.



FRAM

FRAM combines the advantages of ROM and RAM into a single package.

FRAM = ROM + RAM









FRAM Advantage

- Non-volatile
- High endurance
- High speed writing
- Low power consumption

Features of FRAM compared with other memory products

	FRAM	E ² PROM	Flash	SRAM
Memory type	Non-volatile	Non-volatile	Non-volatile	Volatile
Data rewrite method	Overwrite	Erase + Write	Sector erase + Write	Overwrite
Write cycle time	150ns	5ms	10μs	55ns
Endurance	10 ¹⁰ to 10 ¹⁵	10 ⁶	10 ⁵	Unlimited
Charge pump circuit	No-need	Need	Need	No-need

Example of Applications

 OA equipment Counter, parameter data storage	 SSD Logging management, cache memory
 Amusement Resume and parameter data storage	 ATM Transaction history, logging management
 Audio, AV equipment Resume and parameter data storage	 Communication equipment Communicating resume and logging management
 Measurement and Analyzing device Measuring data and revised data storage	 FA Parameter data storage, logging management

Stand alone FRAM Memory

Serial Memory

I²C Interface

Fully compliant with the world standard, I²C BUS. Controls every functions with two ports, Serial Clock (SCL) and Serial Data (SDA).

Part number	Memory capacity	Power supply voltage	Operating frequency (MAX)	Operating temperature	Write/erase cycle	Data retention guarantee	Package
MB85RC128	128Kbit	2.7 to 3.6V	400KHz	-40 to +85°C	10 billion times	10 years	SOP-8
MB85RC64	64Kbit	2.7 to 3.6V	400KHz	-40 to +85°C	10 billion times	10 years	SOP-8
MB85RC16	16Kbit	2.7 to 3.6V	1MHz	-40 to +85°C	10 billion times	10 years	SOP-8

SPI Interface

The maximum clock performance speed is at 25MHz(max.).

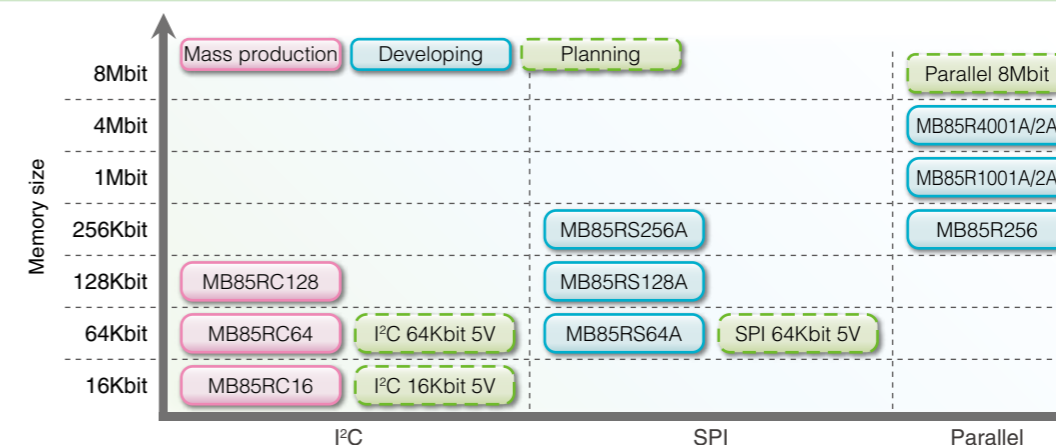
Part number	Memory capacity	Power supply voltage	Operating frequency (MAX)	Operating temperature	Write/erase cycle	Data retention guarantee	Package
MB85RS256A	256Kbit	3.0 to 3.6V	25MHz	-40 to +85°C	10 billion times	10 years	SOP-8
MB85RS128A	128Kbit	3.0 to 3.6V	25MHz	-40 to +85°C	10 billion times	10 years	SOP-8
MB85RS64A	64Kbit	3.0 to 3.6V	25MHz	-40 to +85°C	10 billion times	10 years	SOP-8

Parallel Memory

Parallel reading and writing is available like SRAM.

Part number	Memory capacity	Power supply voltage	Write cycle time	Operating temperature	Write/erase cycle	Data retention guarantee	Package
MB85R4001A	4Mbit (512K×8bit)	3.0 to 3.6V	150ns	-40 to +85°C	10 billion times	10 years	TSOP-48
MB85R4002A	4Mbit (256K×16bit)	3.0 to 3.6V	150ns	-40 to +85°C	10 billion times	10 years	TSOP-48
MB85R1001A	1Mbit (128K×8bit)	3.0 to 3.6V	150ns	-40 to +85°C	10 billion times	10 years	TSOP-48
MB85R1002A	1Mbit (64K×16bit)	3.0 to 3.6V	150ns	-40 to +85°C	10 billion times	10 years	TSOP-48
MB85R256	256Kbit	3.0 to 3.6V	150ns	-40 to +85°C	10 billion times	10 years	SOP-28/ TSOP-28

Product line up



FRAM RFID LSI

FRAM RFID LSI is widely used as data carrier RFID for both HF(High-Frequency:13.56 MHz) and UHF(Ultra High-Frequency:860 to 960 MHz).

FRAM RFID LSI has the following advantages compared to E²PROM RFID LSI.

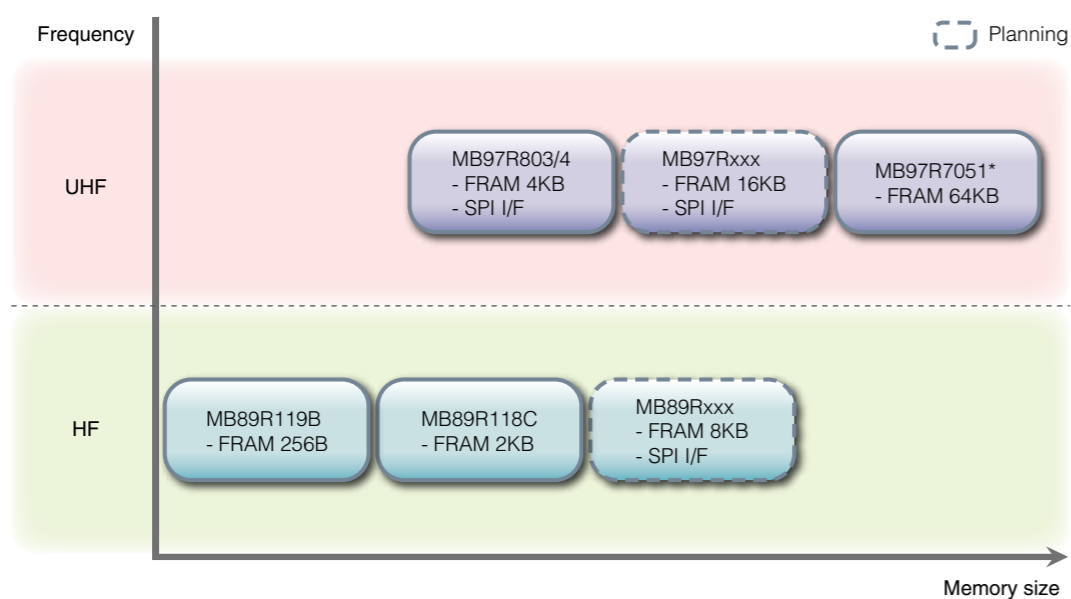
Advantages of FRAM RFID

- Fast write speed
- Large size of Memory for data carrier (traceability, maintenance)
- High endurance for frequent memory access and reuse
- Stable read/write communication distance because of low power writing
- Data is survived after sterilization
- SPI interface for embedded solution with sensors, electronic papers, etc.

LSI for FRAM RFID Tag

Part number	Frequency	Interface	Modulation method	Memory size
MB89R118C	13.56MHz	ISO/IEC 15693, 18000-3	ASK 10%/100%	2Kbyte
MB89R119B	13.56MHz	ISO/IEC 15693, 18000-3	ASK 10%/100%	256byte
MB97R803/4	860-960MHz	ISO/IEC 18000-6C	DSB/SSB/PR-ASK	4Kbyte

Product line up



*: Contact our sales for the available use.

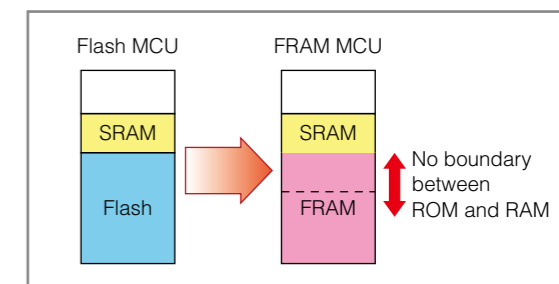
FRAM MCU

FRAM MCU adopts the nonvolatile memory "FRAM" for its embedded memory.

FRAM MCU has the following advantages compared to Flash MCU.

Advantages of FRAM MCU

- Faster write speed than conventional Flash MCU
- Data overwritten by Byte is available without erase operation
- Lower power consumption is available when data rewrite operation, not required high-voltage being applied
- FRAM memory area is available for both data storage and code storage

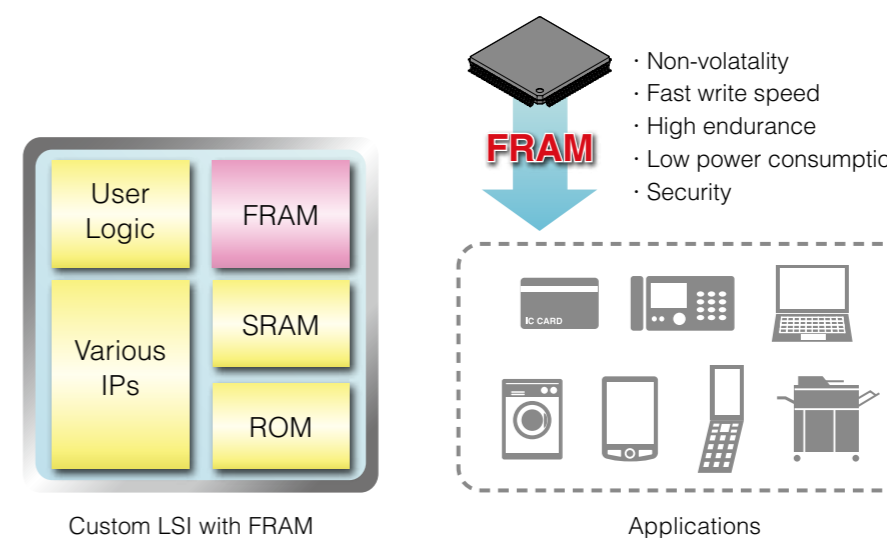


FRAM MCU

Part number	CPU	FRAM	RAM	Operation voltage	Peripherals
MB95R203A	8bit F ² MC-8FX	8Kbyte	496byte	1.8 to 3.6V	A/D converter : 6ch, Composite timer, UART/SIO : 1ch, I/O port : 16

Custom LSI with FRAM

FRAM is suitable for one-chip solution with logic and analog circuit. Fujitsu can customize LSI for RFID and FRAM MCU, or provide the customized LSI with FRAM according to your request.



Applications