

RENESAS HIGH PERFORMANCE MRAM FAMILY



Renesas offers the next generation magnetoresistive random-access memory (MRAM) by utilizing a new proprietary technology called perpendicular Magnetic-Tunnel-Junction STT (Spin-transfer Torque) to achieve best-in-class non-volatile memory with long data retention and a fast serial interface. With a wide range of memory densities and high operating temperatures, Renesas' MRAM is suited for applications ranging from factory automation equipment requiring fast back-up data retrieval to medical data units with long-term data storage requirements.

Key features

- High memory density from 4Mb to 16Mb (serial interface) and up to 32Mb (parallel interface)
- Low active write and read currents
- Configurable interfaces for SPI, DPI, QPI with SDR and DDR modes, up to 108MHz
- Parallel interface read and write speeds at 35ns and 45ns
- Low operating power from 1.71V to 3.6V (serial) and operating temperature from -40°C to 105°C

Target applications:

- **Industrial control and monitoring** – Storage uses include real-time data storage and fast back-up data retrieval and machine operation program code.

- **Multifunction printers** – Control code and user settings storage, usage data logs for maintenance scheduling, and cache buffer for retrieval of individual transactions.
- **Robotics** – Control codes, configuration files, and settings. In general, the larger the non-volatile memory, the greater number of instructions the robot can execute.
- **Data switches and routers** – Store system configurations, user settings, and firmware. Security and authentication settings are also stored.
- **Hearing aids** – Store different user operating settings in varying activities and acoustic responses preferred by the user. Settings preferred by the user, such as volume level and audio frequencies under different use and ambient conditions, are stored and activated.
- **Data drives** – MRAM will soon be widely implemented into solid-state drives (SSDs). It will replace DRAM memory to remove large supercapacitors that make the DRAM non-volatile, and reduce the size of drives.

RENESAS HIGH PERFORMANCE MRAM FAMILY

	SRAM	DRAM	Flash	NvSRAM	FRAM	MRAM
Non-volatile	No	No	Yes	Yes	Yes	Yes
Read Speed	Fastest	Medium	Fast	Fast	Medium	Fast
Write Speed	Fastest	Medium	Slow	Fast	Medium	Fast
Standby Power	Medium	High	Low	Low	Low	Low
Cell Density	Low	High	Medium	Low	Low	Medium
Endurance	High	High	Low	Medium	High	High
Low Voltage	Yes	Yes	Limited	Limited	Limited	Yes

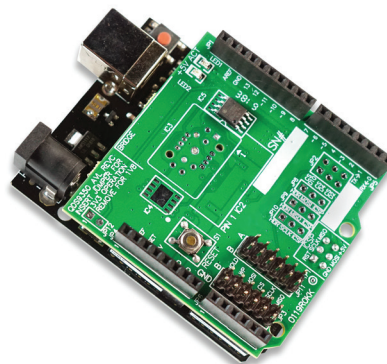
MRAM has the advantage over non-volatile memory in read and write speeds, memory density, long endurance, and low voltage. A few cost considerations when comparing to the battery-backup SRAM is not only in the battery itself, but the pain of replacement, power management firmware, and space. FRAM is similar in performance to MRAM, however Renesas' MRAM devices offer higher density and higher level of endurance.

Evaluation kit

- Evaluation board with 16Mbit MRAM (M3016) in a SOIC package
- Part name: M3016-EVK

High Performance MRAM Family

Product	Description
M1004204	Non-Volatile 4Mb High Performance MRAM, typical 1.8V
M1008204	Non-Volatile 8Mb High Performance MRAM, typical 1.8V
M1016204	Non Volatile 16Mb High Performance MRAM, typical 1.8V
M3004204	Non-Volatile 4Mb High Performance MRAM, typical 3V
M3008204	Non-Volatile 8Mb High Performance MRAM, typical 3V
M3016204	Non Volatile 16Mb High Performance MRAM, typical 3V
M3016-EVK	Evaluation Board with 16Mb MRAM (M3016) in a SOIC package
M3004316	Non-Volatile 4Mb High Performance Parallel MRAM
M3008316	Non-Volatile 8Mb High Performance Parallel MRAM
M3016316	Non-Volatile 16Mb High Performance Parallel MRAM
M3032316	Non-Volatile 32Mb High Performance Parallel MRAM



For more details, please visit [renesas.com/mram](https://www.renesas.com/mram)



Renesas Electronics America Inc. | [renesas.com](https://www.renesas.com)
1001 Murphy Ranch Road, Milpitas, CA 95035 | Phone: 1-888-468-3774

© 2021 Renesas Electronics America Inc. (REA). All rights reserved. All trademarks are the property of their respective owners. REA believes the information herein was accurate when given but assumes no risk as to its quality or use. All information is provided as-is without warranties of any kind, whether express, implied, statutory, or arising from course of dealing, usage, or trade practice, including without limitation as to merchantability, fitness for a particular purpose, or non-infringement. REA shall not be liable for any direct, indirect, special, consequential, incidental, or other damages whatsoever, arising from use of or reliance on the information herein, if advised of the possibility of such damages. REA reserves the right, without notice, to discontinue products or make changes to the design or specifications of its products or other information herein. All contents are protected by U.S. and international copyright laws. Except as specifically permitted herein, no portion of this material may be reproduced in any form, or by any means, without prior written permission from Renesas Electronics America Inc. Visitors or users are not permitted to modify, distribute, publish, transmit or create derivative works of any of this material for any public or commercial purposes.