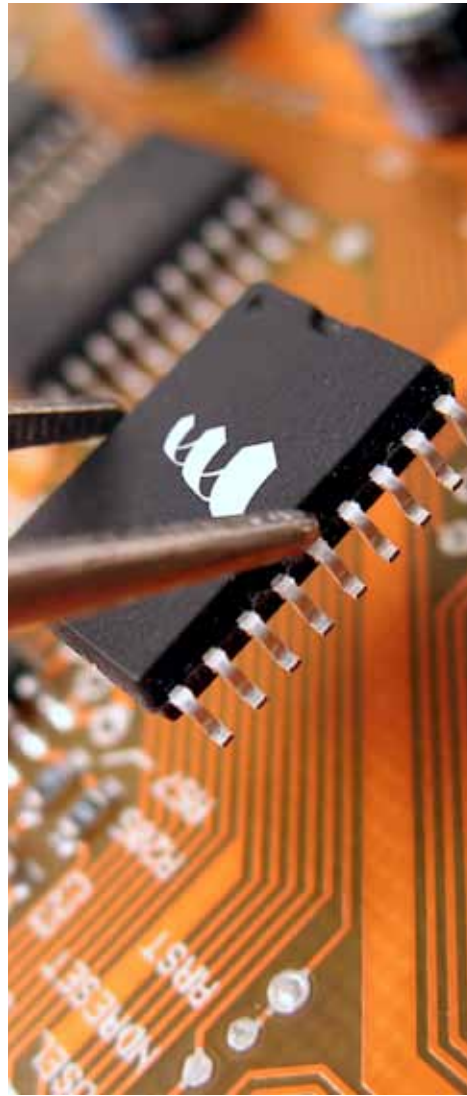


MRAM

SERIAL AND PARALLEL MEMORY PRODUCTS

FAST AND RELIABLE



THE FUTURE OF NON-VOLATILE READ/WRITE MEMORY IS MAGNETIC

Everspin MRAM Features:

- SRAM read/write cycle time
- Unlimited read/write endurance
- Non-volatile for greater than 20-years
- Commercial, industrial, extended, and automotive temperature options

Everspin MRAM Benefits:

- Small footprint—up to 16 Mb in one chip
- Fast, simple interfaces—Parallel SRAM or Serial SPI
- Cost effective—simple one transistor, one magnetic tunnel junction (1T-1MTJ) bit cell
- Best-in-class soft error rate—significantly better than other memories
- RoHS compliant—no battery, no lead (Pb)
- Replaces multiple memories—Combines functions of Flash, SRAM, EEPROM, nvRAM, BBSRAM

Everspin Technologies delivers the world's first commercial magnetoresistive random access memory (MRAM) products.

Everspin's MRAM technology revolutionizes non-volatile memory by storing data using magnetic polarization rather than electric charge.

MRAM retains data for decades while reading and writing at SRAM speed without wearout. MRAM products use small, simple cells to deliver high density and cost effective memories. With our new expanded product line, we serve a wide range of non-volatile RAM applications.

THE MRAM ADVANTAGE

Simple Interfaces

Parallel MRAMs (8 & 16-bit) have SRAM read and write cycle times and asynchronous timing interfaces that use standard SRAM controllers. Serial MRAMs have the same SPI interface as Flash and EEPROM but with fast 40 MHz clock speed and no write delays.

Small Footprint and Low Profile Packages

MRAMs are available in small footprint and low profile BGA and DFN packages that save board space in new compact designs.

Wide Temperature Range and Superior Reliability

MRAM delivers a 3-volt high-density non-volatile RAM that operates over wide temperature ranges. Data is always retained for more than 20-years after each write without backup cycles or battery backup. MRAM does not exhibit the charge storage failure modes that limit the data retention and endurance of other technologies.

Superior Soft Error Rate

Flash, SRAM, BBSRAM and nvSRAM storage technologies are increasingly susceptible to soft errors. MRAM technology is unaffected by alpha and neutron particles. This assures soft error rates two orders of magnitude better than competing non-volatile storage.

Environmentally Friendly

MRAM products are RoHS-compliant and use no lead. MRAM eliminates the need for battery-backup so there are no battery disposal or reliability issues.

Replaces Multiple Memories

MRAM performs the functions of in-system programmable memory (flash), rapid data buffers (SRAM) and non-volatile data storage (EEPROM, nvRAM or BBSRAM), to simplify your design and flatten the storage hierarchy.



May 16-18, 2007

ESEC EMBEDDED SYSTEMS EXPO



Everspin Recognized as MRAM Global Leader

- MIT Technology Review
 - Selected MRAM "Toggle" as one of the key discoveries of 2003
 - Recognized as one of the 5 Killer Patents in the May 2004 "Invention Issue"
- Named Product of the Year by Electronic Products
- Won In-Stat's Innovation Award
- Won R&D Magazine - Top 100 Inventions of 2007
- Won Design News Golden Mousetrap Award
- Named One of Business Week's Ten Most Successful Startups of 2008
- Won Red Herring North American 100 2009 Award

Award-winning MRAM Technology and Products

MRAM technology continues to gain front-page treatment as the leading non-volatile memory. As the MRAM technology pioneer and first company to offer commercial MRAM products, Everspin has collected key industry recognition.



FAST, RELIABLE SERIAL & PARALLEL NON-VOLATILE MEMORY PRODUCTS.

- Read and write at SRAM speed with unlimited endurance.
- Data is always retained for greater than 20-years without a backup cycle or batteries.
- Available In Commercial, Industrial, Extended, or Automotive Temperature Grades

16-BIT MRAM PRODUCT SELECTOR GUIDE

Part Number	Density	Configuration	Voltage	Speed Grade	Extended Temp	Package	RoHS Compliant
MR4A16	16 Mb	1Mx16	3.3 V	35 ns	C, M	54-TSOP, 48-BGA	Yes
MR2A16	4 Mb	256Kx16	3.3 V	35 ns	C, V	44-TSOPII, 48-BGA	Yes
MROA16	1 Mb	64Kx16	3.3 V	35 ns	C, V	44-TSOPII, 48-BGA	Yes

8-BIT MRAM PRODUCT SELECTOR GUIDE

Part Number	Density	Configuration	Voltage	Speed Grade	Extended Temp	Package	RoHS Compliant
MR4A08	16 Mb	2Mx8	3.3 V	35 ns	C, M	44-TSOPII, 48-BGA	Yes
MR2A08	4 Mb	512Kx8	3.3 V	35 ns	C, M	44-TSOPII, 48-BGA	Yes
MROA08	1 Mb	128Kx8	3.3 V	35 ns	C, M	44-TSOPII, 48-BGA, 32-SOIC	Yes
MR0D08	1 Mb	128Kx8	3.3 V _{DD} 1.8 V I/O	45 ns		48-BGA	Yes
MR256A08	256 Kb	32Kx8	3.3 V	35 ns	C, M	44-TSOPII, 48-BGA, 32-SOIC	Yes

SERIAL SPI MRAM PRODUCT SELECTOR GUIDE

Part Number	Density	Configuration	Voltage	Speed Grade	Extended Temp	Package	RoHS Compliant
MR25H40	4 Mb	512Kx8	2.7-3.6 V	40 MHz	C, M	8-DFN, 8-DIP	Yes
MR25H10	1 Mb	128Kx8	2.7-3.6 V	40 MHz	C, M	8-DFN	Yes
MR25H256	256 Kb	32Kx8	2.7-3.6 V	40 MHz	C, M	8-DFN	Yes

Blank: 0°C to +70°C
C: -40°C to +85°C

V: -40°C to +105°C
M: -40°C to +125°C

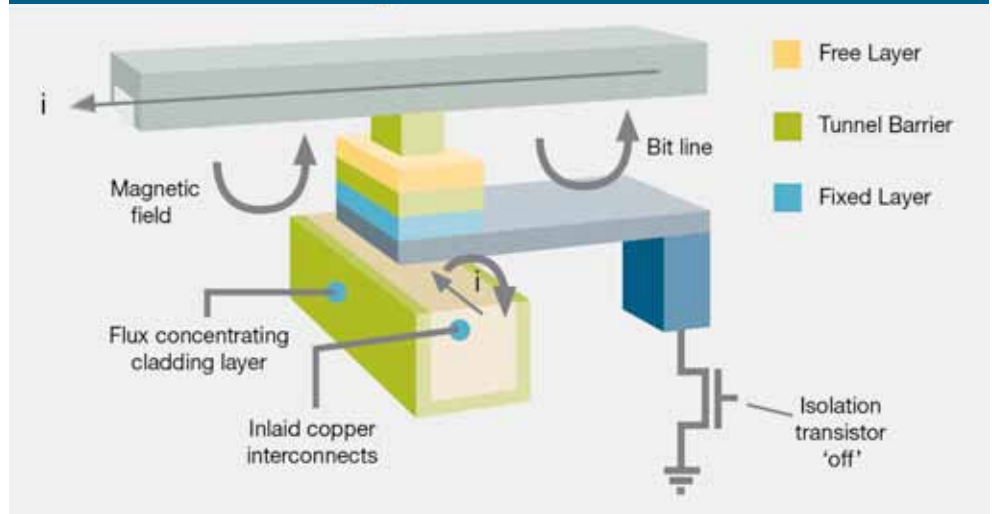
EVERSPIN MRAM TECHNOLOGY

Everspin's patented MRAM technology is based on a magnetic tunnel junction (MTJ) storage element that is deposited on top of a standard logic process. The MTJ contains a fixed layer that is always polarized in one direction, separated from a free layer by a tunnel barrier. When the free layer is polarized in the same direction as the fixed layer, the MTJ exhibits a low resistance across the tunnel barrier. When the free layer is polarized in the reverse direction, the MTJ has a high resistance. This magnetoresistive effect allows MRAM to read data quickly without altering the memory state.

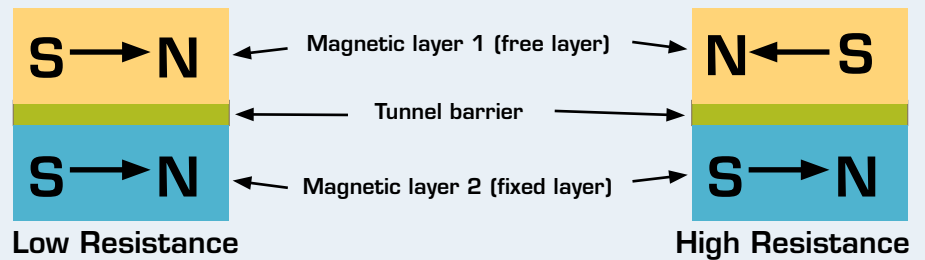
The MTJ at the cross-point of two metal lines is polarized (written) when the magnetic fields from currents flowing through two metal lines become sufficient to switch the MTJ. This is accomplished at SRAM speed.

One benefit of the MTJ storage element is magnetic polarization does not leak away like an electric charge. Data can be retained for long periods of time at extended temperatures. The second benefit is that switching the magnetic polarization between the two states does not involve actual movement of electrons or atoms, thus no known wear-out mechanism exists.

1-TRANSISTOR — 1-MTJ MEMORY CELL



MTJ STORAGE ELEMENT



EXAMPLE MRAM APPLICATIONS

RAID Storage for Servers and Storage Arrays

Critical write journals and write cache information are updated at SRAM speed and always retained during power failures.

Communications Systems

Critical system parameters and packet information are retained without backup systems.

Transportation, Military and Avionics Systems

Highly reliable system operation is ensured over extreme temperature conditions and environments.

Automatic Meters and Printers

Continuously updated customer usage data is never lost during power failure even under extreme temperatures and extended field life.

Industrial Motor Control and Robotics

Multiple axis positional data is constantly updated. Safe, rapid restarts follow any power loss.

Industrial Power and Energy Management

Reliable operation occurs under transient power conditions.

Health Care Electronics

Easy to use, highly reliable memory provided for health care instrumentation and systems.

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Sales Brochure Rev 2

