

MR4A16B – 1M x 16 MRAM

VHDL Model Readme File

Introduction

This is the VHDL model of the MR4A16B – a 1M x 16 MRAM Product from Everspin. This is a high level abstraction of this product.

Device Summary

The **MR4A16B** is a 16M-bit magnetoresistive random access memory (MRAM) device organized as 1,048,576 words of 16 bits. This device offers SRAM Compatible 35ns read/write operation and every data bit written into the memory is automatically protected in the MRAM array. Data retention of greater than 20 years is guaranteed. This device is offered in a 44 Pin TSOP II package and a 48 0.75mm Pitch BGA package.

Model Release Notes

Product Datasheet: http://www.everspin.com/PDF/EST_MR4A16B_prod.pdf

Model Revision: 1.0

Model Release Data: August 2010

Model Test Tools: Mentor Graphics ModelSim, Symphony Sonata

Files

- | | |
|------------------------|---|
| 1. Readme_MR4A16B | - This File |
| 2. MR4A16B.vhdl | - Device Model |
| 3. Package_Utility | - Standard Conversion Utilities |
| 4. Benchtest.vhdl | - Top Level Test Bench |
| 5. MR4A16B_Driver.vhdl | - Sample Test Vectors used for the Verification |
| 6. MR4A16B.txt | - Memory Initialization File |

VHDL Model

MR4A16B.vhdl is the abstracted model of the 1M x 16 MRAM. The model is setup for 35ns operation.

Test Bench

Benchtest.vhdl and MR4A16B_driver.vhdl form the example test bench used to verify this model. This is not a complete test bench and has been provided to give information on model usage.

Memory Initialization

MR4A16B.txt is used to initialize the memory on startup. This file is updated on every memory write depending on the state of the MemoryWrite Flag. The MemoryWrite flag can be turned off to improve simulation speed or when data written into the MRAM array need not be saved.

The memory initialization file has the following format

```
FFFF FFFF FFFF FFFF .....FFFFF
FFFF FFFF FFFF FFFF .....FFFFF
```

Each row in the file has 1024 words (x16 each) of data. The MR4A16B.txt has 1024 rows.

Warning: These VHDL models are provided “as is” without warranty of any kind, including, but not limited to, any implied warranty of merchantability and fitness for a particular purpose.

Revision History

| Date | Revision | Changes |
|----------|----------|-----------------------------|
| 8/4/2010 | 1.0 | New Model – Initial Release |

How to Reach Us:

Home Page:

www.everspin.com

E-Mail:

support@everspin.com

orders@everspin.com

sales@everspin.com

USA/Asia/Pacific

Everspin Technologies

1300 N. Alma School Road, CH-409

Chandler, Arizona 85224

+1-877-347-MRAM (6726)

+1-480-347-1111

Europe, Middle East and Africa

support.europe@everspin.com

Wokingham, United Kingdom

+44 (0)118 907 6155

Japan

support.japan@everspin.com

Yokohama, Japan

+81 (0) 45-846-6299

Document Number:

MR4A16B VHDL Model, Revision 1, 8/2010

Information in this document is provided solely to enable system and software implementers to use Everspin Technologies products. There are no express or implied licenses granted hereunder to design or fabricate any integrated circuit or circuits based on the information in this document. Everspin Technologies reserves the right to make changes without further notice to any products herein. Everspin makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Everspin Technologies assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters, which may be provided in Everspin Technologies data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters including "Typicals" must be validated for each customer application by customer's technical experts. Everspin Technologies does not convey any license under its patent rights nor the rights of others. Everspin Technologies products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Everspin Technologies product could create a situation where personal injury or death may occur. Should Buyer purchase or use Everspin Technologies products for any such unintended or unauthorized application, Buyer shall indemnify and hold Everspin Technologies and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Everspin Technologies was negligent regarding the design or manufacture of the part. Everspin™ and the Everspin logo are trademarks of Everspin Technologies, Inc. All other product or service names are the property of their respective owners.