VDIC MAGNETORESISTIVES RANDOM ACCESS MEMORY

VDMR4M08XS44XX1V35 USER MANUAL

Version : B1

Contents

VDIC-MRAM

HIGH-SPEED   3.3V   512K × 8bit

MAGNETORESISTIVES RANDOM ACCESS MEMORY

1. DESCRIPTION

The VDMR4M08XS44XX1V35 is a 4 , 194 , 304-bit high-speed access time, high-density Magnetoresistives

Random Access Memory device. Manufactured with VDIC Very Dense SiP technology. It is organized as one independent die of 512K x 8bit wide data interface.

The VDMR4M08XS44XX1V35 offers MRAM compatible 35ns read/write timing with unlimited endurance. Data is always non-volatile for greater than 20-years. Data is automatically protected on power loss by low-voltage inhibit circuitry to prevent writes with voltage out of specification. The VDMR4M08XS44XX4V35 is the ideal memory solution for applications that must permanently store and retrieve critical data and programs quickly.

The VDMR4M08XS44XX1V35 has one die. The die can be selected separately with dedicated #CEn. Low interconnect parasitic capacitance of the stacking technology, by reducing the connection length, allows this MRAM module to be useful for a variety of high bandwidth, high performance and high density memory system applications.

The VDMR4M08XS44XX1V35 is available in a 44-pin SOP package.

2. FEATURES

- Fast 35ns Read/Write Cycle
- SRAM Compatible Timing, Uses Existing SRAM Controllers Without Redesign
- Unlimited Read & Write Endurance
- Data Always Non-volatile for >20-years at temperature
- One Memory Replaces Flash, SRAM, EEPROM and BBSRAM in a system for simpler, more efficient design
- Stack of one 4Mbit MRAM
- Organized as one die of 512K x 8 bit memory
- One independent Die Select
- 3.3 Volt Power Supply
- Automatic Data Protection on Power Loss
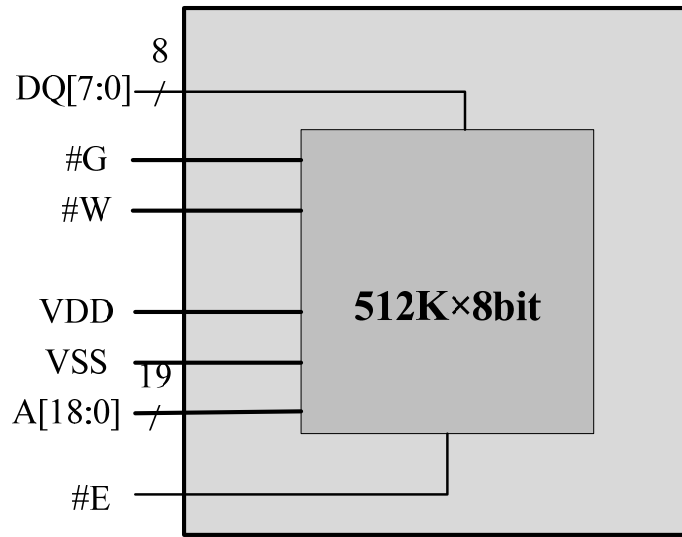- 44-lead SOP package

3. BLOCK DIAGRAM

Figure 1 Block diagram

4. PIN DESCRIPTIONS

Pin Id	Pin #		Pin Id
DC	1	44	DC
NC	2	43	NC
A0	3	42	DC
A1	4	41	A18
A2	5	40	A17
A3	6	39	A16
A4	7	38	A15
#E	8	37	#G
DQ0	9	36	DQ7
DQ1	10	35	DQ6
VDD	11	34	VSS
VSS	12	33	VDD
DQ2	13	32	DQ5
DQ3	14	31	DQ4
#W	15	30	DC
A5	16	29	A14
A6	17	28	A13
A7	18	27	A12
A8	19	26	A11
A9	20	25	A10
DC	21	24	DC
DC	22	23	DC
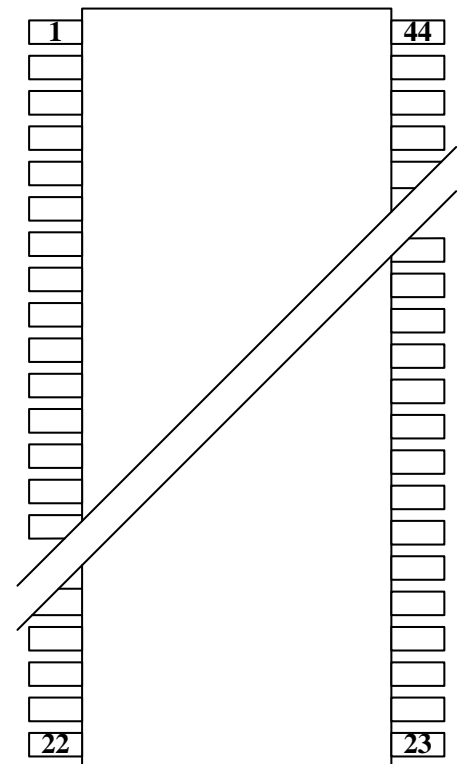
Figure 2 Pin configuration

Table 1 Pin description

Pin	Name	Function
#E	Die select	Disables or enables memory die operation
A0 ~ A18	Address	19-bit addresses
#W	Write enable	Enables write operation common to all memory dies
#G	Output enable	Enables data output common to all memory dies
DQ0~ DQ7	Data input/output	Data inputs/outputs 8-bit wide bus
V_{DD}/V_{SS}	Power supply/ground	Power and ground for the input/output buffers and core logic.
NC	No connection	These pins are recommended to be left No Connection on the device.
DC	Do not connect	These pins do not connect

5. ELECTRICAL SPECIFICATIONS

5.1. ABSOLUTE MAXIMUM RATINGS

This device contains circuitry to protect the inputs against damage caused by high static voltages or electric fields; however, it is advised that normal precautions be taken to avoid application of any voltage greater than the maximum rated voltages to these high-impedance (Hi-Z) circuits.

The device also contains protection against external magnetic fields. Precautions should be taken to avoid application of any magnetic field more intense than the maximum field intensity specified in the maximum ratings.

Table 2 Absolute maximum ratings

Characteristics	Symbol	Maximum ratings	Unit
Voltage on V_{DD} supply relative to Vss	V_{DD}	-0.5 ~ +4.0	V
Voltage on any pin relative to Vss	V_{IN}	-0.5 ~ V_{DD} +0.5	V
Power Dissipation	P_D	< 0.6	W
Operating Temperature Range	T_{OPR}	-55 ~ +95	℃
Storage Temperature Range	T_{STG}	-55 ~ +105	℃

5.2. RECOMMENDED DC OPERATING CONDITIONS

Table 3 Recommended DC operating condition

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	V_{DD}	3.0	3.3	3.6	V
Input high voltage	V_{IH}	2.2	——	V_{DD}+0.3	V
Input low voltage	V_{IL}	-0.5	——	0.8	V
Write inhibit voltage	V_{WI}	2.5	2.7	3.0	V

5.3. DC CHARACTERISTICS

Table 4 DC characteristics

Parameters	Symbol	Test Conditions	Min	Max	Unit
Output voltage low level	V_{OL}	I_{OL}= +4mA	——	0.4	V
Output voltage high level	V_{OH}	I_{OL}= -4mA	2.4	——	V

6. TYPICAL APPLICATION
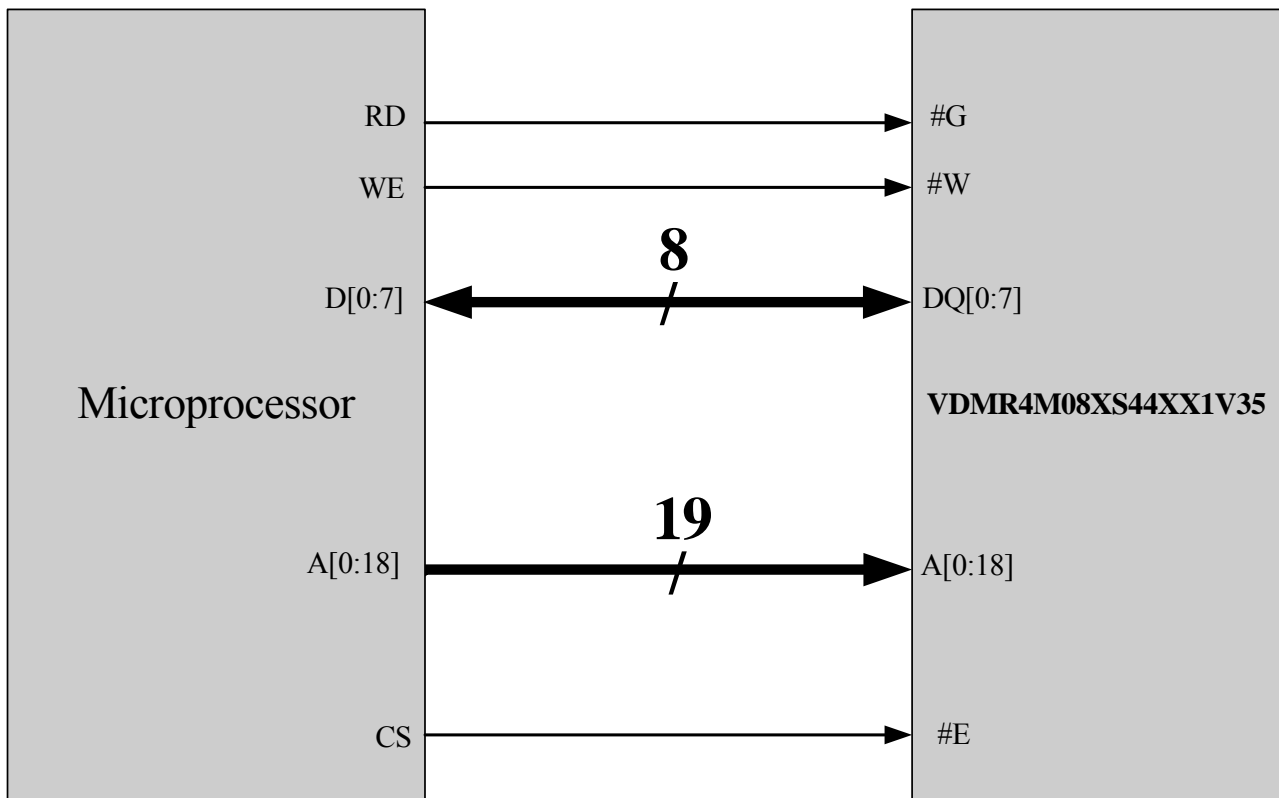
Figure 3 Typical application

7. ORDERING INFORMATION

1	2	3	4	5	6	7	8	9	10	11	12	13
VD	MR	4M	08	X	S	44	X	X	1	V	35	_

VDIC

MRAM

Capability: 4M bit

Bus Width: 8bit

R= Radiation Data Tested;
V= Generic Radiation Data Available

Package: SOP

Pin Quantity: 44 Pin

Temperature: E=0～＋70℃; I=-40～＋85℃; S=-55～＋95℃

Quality: E= Sample; B= Industry; S= Space

Stacking Layer: 1 layer

Power Supply: 3.3V

Speed: 35ns

Version: First Version

Table 5 Ordering information

Part Number	Capacity (bit)	Bus Width (bit)	Radiation			Packaging	Temperature （℃）
			TID[1]	SEL[2]	SEU[3]		
VDMR4M08VS44EE1V35	4M	8	-	-	-	SOP44	0 ～＋70
VDMR4M08VS44IB1V35	4M	8	-	-	-	SOP44	-40 ～＋85
VDMR4M08RS44SS1V35	4M	8	TBD	TBD	TBD	SOP44	-55 ～＋95

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[1] TID: Total Dose （Krads(Si)）
[2] SEL: LET Threshold （Mev.cm2/mg）
[3] SEU:SEU Threshold （Mev.cm2/mg）

8. PACKAGE DIMENSIONS
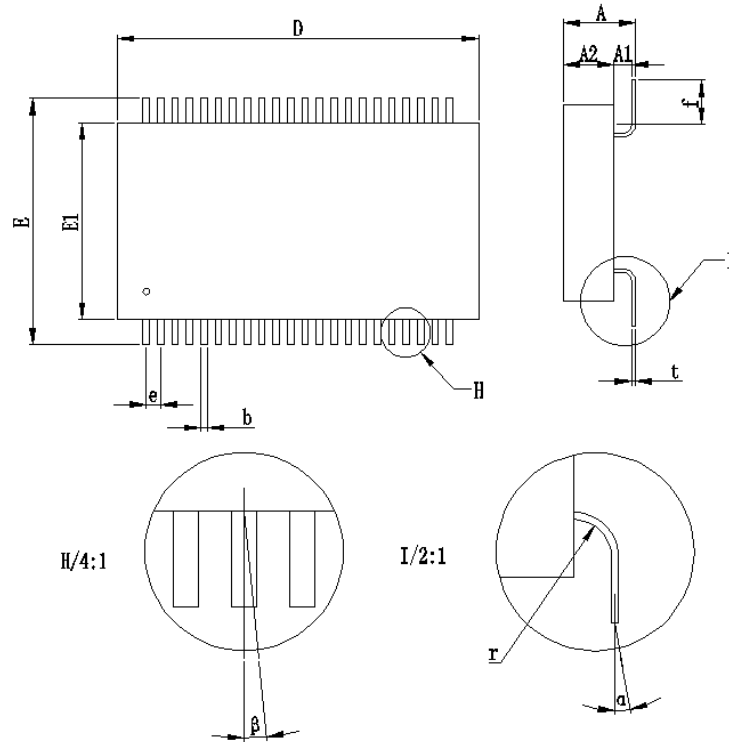
Figure 4 Package dimensions

Table 6 Dimensions information

	Min	**Max**
A	3.70	4.40
A2	2.50	3.10
D	19.80	20.20
E	13.40	13.80
E1	10.80	11.20
f	2.00	
b	0.35	
e	0.80	
r	1.00	
t	0.20	
α	≤3°	
β	≤3°	
NOTE: 1. Unit: mm 2. A1= A - A2		

9. REVISION HISTORY

Table 7 Revision history

Revision	Date	Description of Change
A0	Nov 3,2015	First Created
A1	Mar 14,2016	Modified the PIN DESCRIPTIONS
A2	Aug 23,2016	Modified the ORDERING INFORMATION
A3	Jan 9,2017	Modified the PACKAGE DIMENSIONS
A4	Oct.25,2017	Changed company's name to Zhuhai Orbita Aerospace Science & Technology Co.，Ltd
A5	Nov 10,2017	Add or reduce the chapters
B0	May 22, 2018	Modified Operating Temperature Range and Storage temperature.
B1	Mar 21,2020	Update TID and SEE