

VDIC MAGNETORESISTIVES RANDOM ACCESS MEMORY

VDMR4M16XS44XX1V35 USER MANUAL

Version : B0

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Zhuhai Orbita Aerospace Science & Technology Co., Ltd.
Add: Orbita Tech Park, NO.1 Baisha Road, Tangjia Dong `an,
Zhuhai, Guangdong, China 519080
Tel: +86-756-3391979 Fax: +86-756-3391980

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VDIC-MRAM

HIGH-SPEED 3.3V 256K × 16bit

MAGNETORESISTIVES RANDOM ACCESS MEMORY

1. DESCRIPTION

The VDMR4M16XS44XX1V35 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 256K x 16bit wide data interface.

The VDMR4M16XS44XX1V35 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 VDMR4M16XS44XX1V35 is the ideal memory solution for applications that must permanently store and retrieve critical data and programs quickly.

The VDMR4M16XS44XX1V35 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 VDMR4M16XS44XX1V35 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 storage 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 256 x 16 bit memory
- One independent Die Select
- 3.3 Volt Power Supply
- Automatic Data Protection on Power Loss
- Industrial, Automotive Temperatures
- 44-lead SOP package

3. BLOCK DIAGRAM

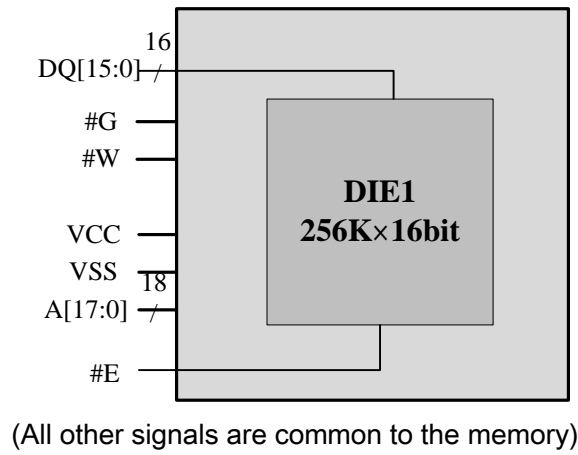


Figure 1 Block diagram

4. PIN DESCRIPTIONS

Pin Id	Pin #		Pin Id
A0	1	44	A17
A1	2	43	A16
A2	3	42	A15
A3	4	41	#G
A4	5	40	#UB
#E	6	39	#LB
DQ0	7	38	DQU15
DQ1	8	37	DQU14
DQ2	9	36	DQU13
DQ3	10	35	DQU12
VDD	11	34	VSS
VSS	12	33	VDD
DQ4	13	32	DQ11
DQ5	14	31	DQ10
DQ6	15	30	DQ9
DQ7	16	29	DQ8
#W	17	28	DC
A5	18	27	A14
A6	19	26	A13
A7	20	25	A12
A8	21	24	A11
A9	22	23	A10

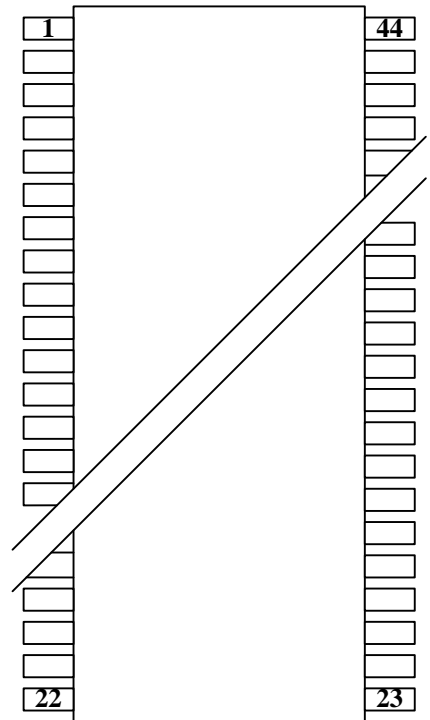


Figure 2 Pin configuration

Table 1 Pin description

Pin	Name	Function
#E	Die select	Disables or enables memory die operation
A0 ~ A17	Address	18-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~ DQ15	Data input/output	Data inputs/outputs 16-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	Maxinmum ratings	Unit
Voltage on V _{DD} supply relative to V _{SS}	V _{DD}	-0.5 to +4.0	V
Voltage on any pin relative to V _{SS}	V _{IN}	-0.5 to V _{DD} +0.5	V
Power Dissipation	P _D	< 0.6	W
Operating Temperature Range	T _{OPR}	-45~ +95	°C

Characteristics	Symbol	Maximum ratings	Unit
Storage Temperature Range	T _{STG}	-55 to +150	°C

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

5.3. DC ELECTRICAL 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

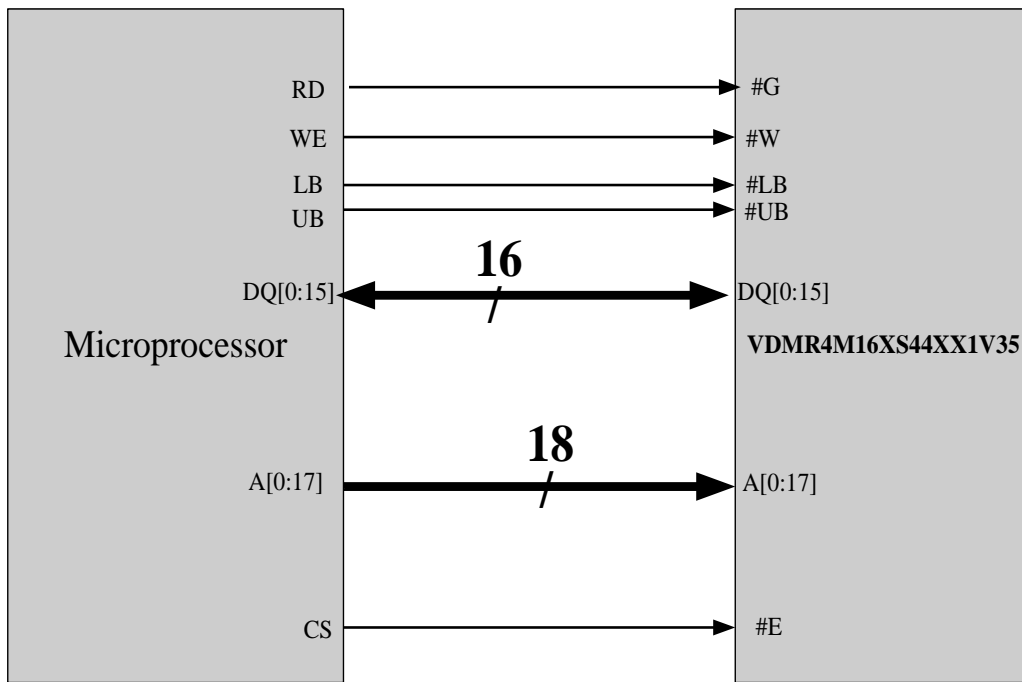


Figure 3 Typical application

7. ORDERING INFORMATION

1	2	3	4	5	6	7	8	9	10	11	12	13
<u>VD</u>	<u>MR</u>	<u>4M</u>	<u>16</u>	<u>V</u>	<u>S</u>	<u>44</u>	<u>E</u>	<u>E</u>	<u>1</u>	<u>V</u>	<u>35</u>	-
VDIC												
MRAM												
Capability: 4M bit												
Bus Width: 16bit												
R= Radiation Data Tested; V= Generic Radiation Data Available												
Package: S=SOP												
44=44 Pin												
Temperature::E=0~70°C;I=-40~85°C;S=Specific												
Quality: E= Sample; B= Industry; S= Space												
Stacking Layer:1=1layer												
Power Supply :V=3.3V												
Speed:35= 35ns												
-I、-K or blank space=First Version												

table 5 Ordering information

Part Number	Capacity (bit)	Bus Width (bit)	Radiation			Packaging	Temperature (°C)
			TID ¹	SEL ²	SEU ³		
VDMR4M16VS44EE1V35	4M	16	-	-	-	SOP44	0 ~ + 70
VDMR4M16VS44IB1V35	4M	16	-	-	-	SOP44	-40 ~ + 85
VDMR4M16RS44SS1V35	4M	16	>60	<40	>37	SOP44	-45 ~ + 95

¹ TID: Total Dose (Krad(Si))

² SEL: LET Threshold (Mev.cm²/mg)

³ SEU:SEU Threshold (Mev.cm²/mg)

8. PACKAGE DIMENSIONS

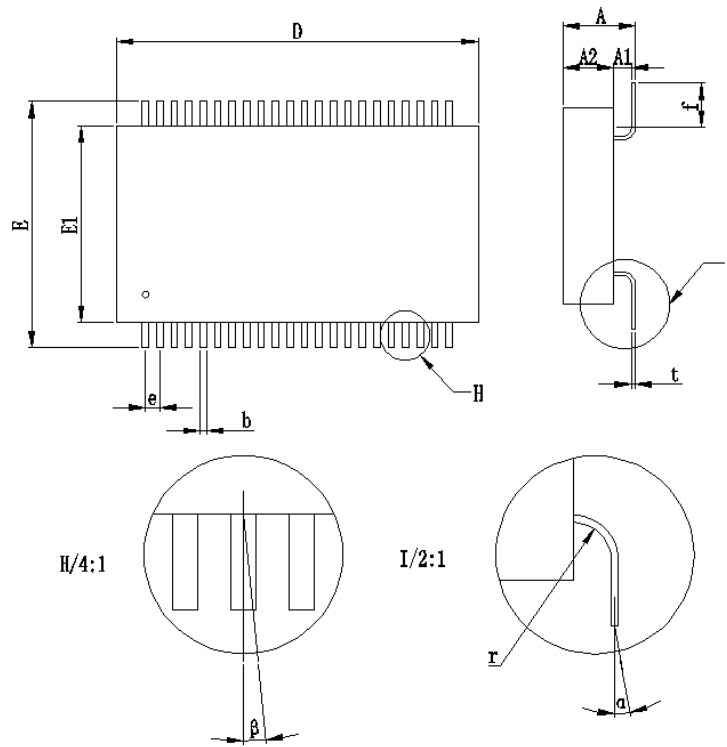


Figure 4 Package dimensions

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	$\leq 3^\circ$	
β	$\leq 3^\circ$	
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	Mar 13,2018	Add or reduce the chapters
B0	May 22, 2018	Modified Operating Temperature Range and Storage temperature.