VDIC
NOR FLASH MEMORY

VDRF256M16XS54XX4V90
USER MANUAL

Version: B2

Document NO.： ORBITA/SIP-VDRF256M16XS54XX4V90-USM-01
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VDIC-NOR Flash Memory

HIGH-SPEED 3.3V 16M × 16bit

1. DESCRIPTION

The VDRF256M16XS54XX4V90is a 256Mbit high-density simultaneous Read/Write FLASH Memory module organized as 4 × 4M ×16bit.

Using high-performance and high–reliability technology chips, stacking with the well-known ORBITA Proprietary technology, this FLASH memory module provides a cost-effective solution for low power and high-capacity non-volatile memory data storage needs.

Each device of the module is a 64Mbit FLASH Memory, organized 4M x 16bit that can be accessed by activating the associated control signals(#CE x and #WP/ACC x),and electrically erasable, read/write non-volatile flash memory. Any word can be programmed typically in 8μs. The device features 3.3V voltage read and write operation, with access times as fast as 90ns to eliminate the need for WAIT states in high-performance microprocessor systems. This device is designed to allow either single Sector or full Chip erase operation, where each Sector can be individually protected against program/erase operations or temporarily unprotected to erase or program. The device can sustain a minimum of 1 million program/erase cycles on each Sector. The VDRF256M16XS54XX4V90 module is packaged in a 54 sop package and is available for commercial, industrial and military temperature range.

2. FEATURES

◆ Single power supply operation

- Full voltage range: 2.7 to 3.6 volts read and write operations

◆ High performance

- Access times as fast as 90 ns

◆ Low power consumption (typical values at 5MHz)

- 9 mA typical active read current
- 20 mA typical program/erase current
- Less than 4 μA current in standby or automatic sleep mode

◆ Flexible Sector Architecture:

- Eight 8-Kbyte sectors, One hundred and twenty-seven 32K-Word / 64K-byte sectors
- 8-Kbyte sectors for Top or Bottom boot
- Sector/Sector Group protection: Hardware locking of sectors to prevent program or erase operations within individual sectors. Additionally, temporary Sector Group Unprotect allows code changes in previously locked sectors

◆ High performance program/erase speed

- Word program time: 8μs typical
- Sector erase time: 500ms typical
- Chip erase time: 64s typical

- ◆ JEDEC Standard compatible
- ◆ Standard DATA# polling and toggle bits feature
- ◆ Unlock Bypass Program command supported
- ◆ Erase Suspend / Resume modes:

- Read and program another Sector during Erase Suspend Mode

- ◆ Support JEDEC Common Flash Interface(CFI)
- ◆ Low Vcc write inhibit < 2.5V
- ◆ Minimum 100K program/erase endurance cycles
- ◆ #RESET hardware reset pin

- Hardware method to reset the device to read mode

- ◆ #WP/ACC input pin

- Write Protect (#WP) function allows protection of outermost two boot sectors, regardless of sector protect status
- Acceleration (ACC) function provides accelerated program times

- ◆ Package Options

- 54-pin SOP

- ◆ Commercial and Industrial Temperature Range

3. BLOCK DIAGRAM

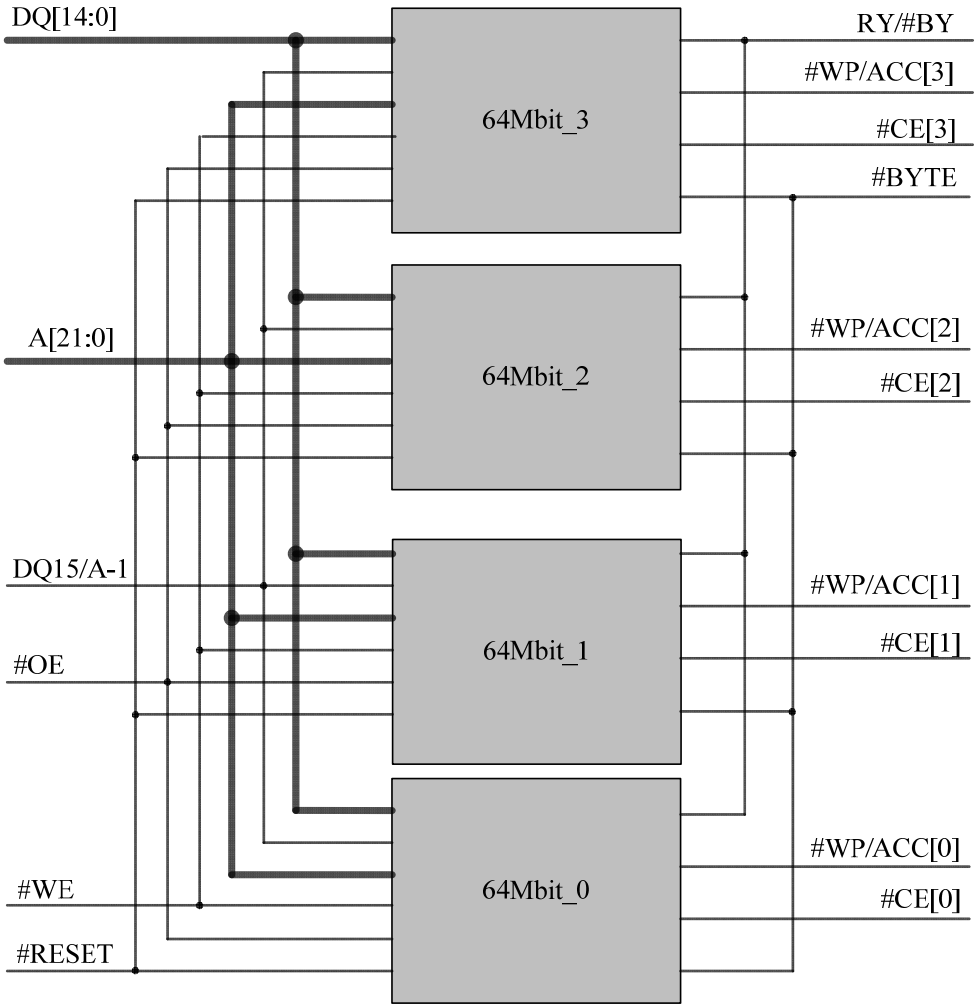

Figure 1 Block diagram

4. PIN DESCRIPTIONS– SOP54

Pin Id	Pin #		Pin Id
#WP/ACC2	1	54	#WP/ACC3
#WP/ACC1	2	53	#CE1
A15	3	52	A16
A14	4	51	#BYTE
A13	5	50	VSS
A12	6	49	DQ15/A-1
A11	7	48	DQ7
A10	8	47	DQ14
A9	9	46	DQ6
A8	10	45	DQ13
A19	11	44	DQ5
A20	12	43	DQ12
#WE	13	42	DQ4
#RESET	14	41	VCC
A21	15	40	DQ11
#WP/ACC0	16	39	DQ3
RY/#BY	17	38	DQ10
A18	18	37	DQ2
A17	19	36	DQ9
A7	20	35	DQ1
A6	21	34	DQ8
A5	22	33	DQ0
A4	23	32	#OE
A3	24	31	VSS
A2	25	30	#CE0
A1	26	29	A0
#CE3	27	28	#CE2

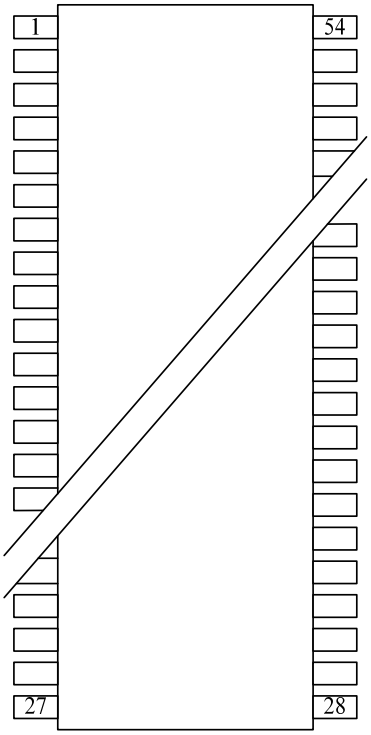

Figure 2 Pin configuration

Table 1 Pin description

Pin Name	Function
A0-A21	Address inputs
DQ0-DQ14	Data Inputs/Outputs
DQ15 / A-1	DQ15 (data input/output, in word mode), A-1 (LSB address input, in byte mode)
#CE [3:0]	Chip Enable
#OE	Output Enable
#WE	Write Enable
#WP/ACC[3:0]	Write Protect / Acceleration Pin
#RESET	Hardware Reset Pin
#BYTE	Byte/Word mode selection

Pin Name	Function
RY/#BY	Ready/Busy Output
Vcc	Supply Voltage(2.7-3.6V)
Vss	Ground
NC	Not Connected to anything

5. ELECTRICAL SPECIFICATIONS

5.1. ABSOLUTE MAXIMUM RATINGS

Table 2 Absolute maximum ratings

Characteristics	Symbol	Maximum ratings	Unit
Voltage on V_{CC} supply relative to Vss	V_{CC}	-0.5 ~ +4.0	V
Voltage on any pin relative to Vss	V_{IN}	-0.5~V_{CC}+0.5	V
Power Dissipation	P_D	＜1.0	W
Operating Temperature Range	T_{OPR}	-55 ~ +125	℃
Storage Temperature Range	T_{STG}	-65 ~ +150	℃

5.2. Recommended DC Operating Conditions

Table 3 Recommended DC operating condition

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	V_{CC}	2.7	3.3	3.6	V
Input high voltage	V_{IH}	0.7×V_{CC}	——	V_{CC}+0.3	V
Input low voltage	V_{IL}	-0.5	——	0.8	V

5.3. DC Characteristics Tables

Table 4 DC characteristics

Parameter	Symbol	Test Conditions	Min	Max	Unit
Output voltage low level	V_{OL}	V_{CC}=2.7V，I_{OL}=+2mA	——	0.45	V
Output voltage high level	V_{OH}	V_{CC}=2.7V，I_{OH}=-2mA	2.3	——	V

6. TYPICAL APPLICATION

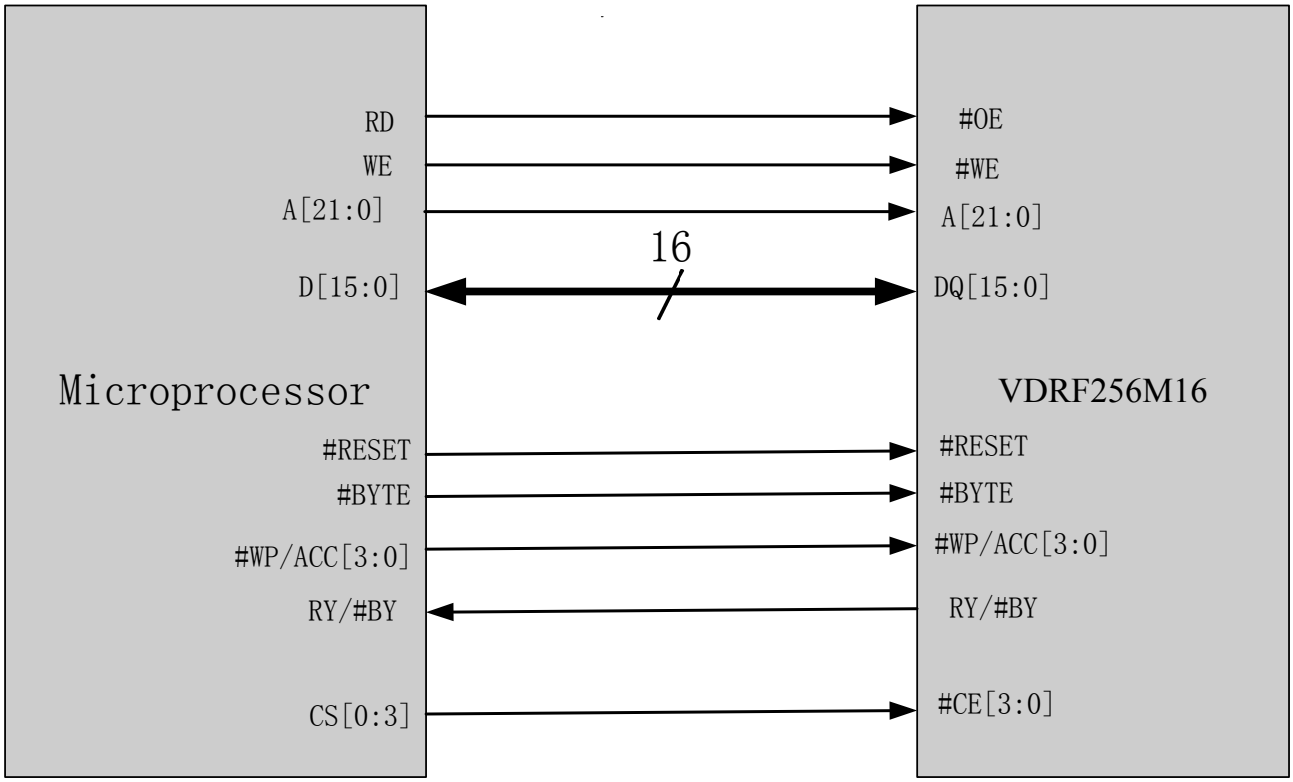

Figure 3 Typical application

7. ORDERING INFORMATION

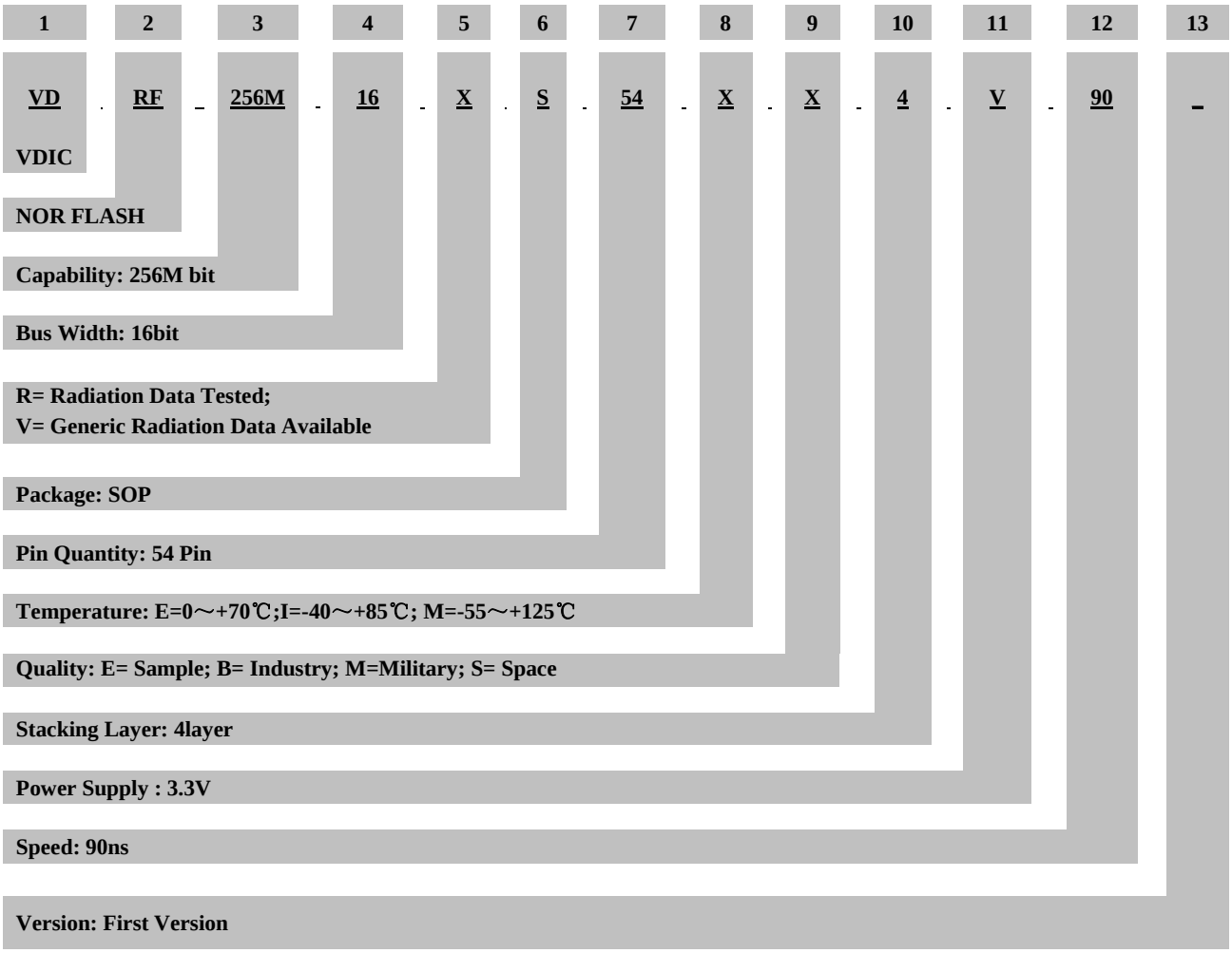

Table 5 Ordering information

Part Number	Capacity (bit)	Bus Width (bit)	Radiation			Packaging	Temperature (℃)
			TID[1]	SEL[2]	SEU[3]		
VDRF256M16VS54EE4V90	256M	16	-	-	-	SOP54	0 ~ + 70
VDRF256M16VS54IB4V90	256M	16	-	-	-	SOP54	-40 ~ + 85
VDRF256M16VS54MM4V90	256M	16	-	-	-	SOP54	-55 ~ + 125
VDRF256M16RS54MS4V90	256M	16	> 15, < 20	> 99.8	> 4.7 , < 13.1	SOP54	-55 ~ + 125

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

8. PACKAGE DIMENSIONS

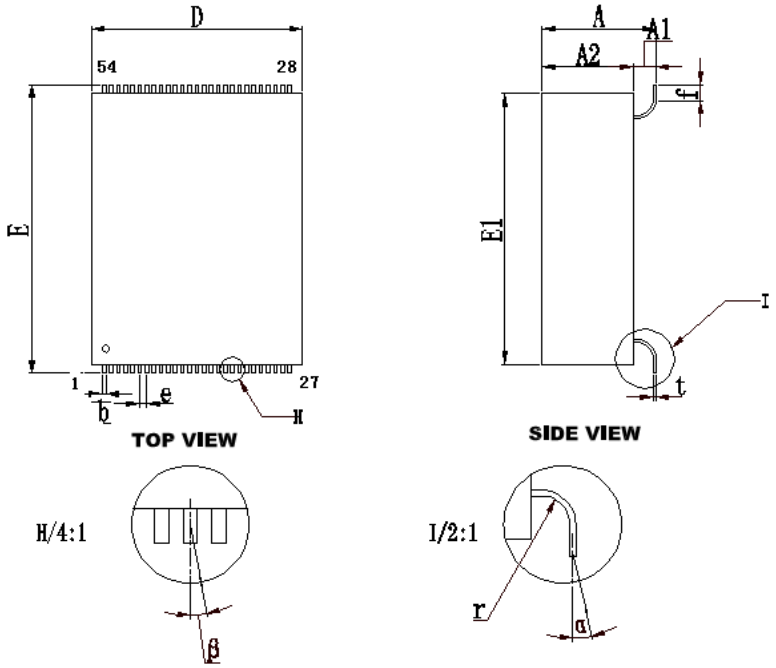

Figure 4 Package dimensions

Table 6 Dimensions information

	Min	Typical	Max
A	7.40	—	7.90
A2	6.20	—	6.60
D	14.40	—	14.80
E	19.80	—	20.20
E1	18.80	—	19.20
f	1.10	—	1.30
b	0.22	—	0.28
e	—	0.50	—
r	1.0	—	1.30
t	0.18	—	0.22
α	—	—	3°
β	—	—	3°
NOTE: 1.Uint: mm 2. A1= A - A2			

9. Pads Designation

It is highly recommended to design pads as below.

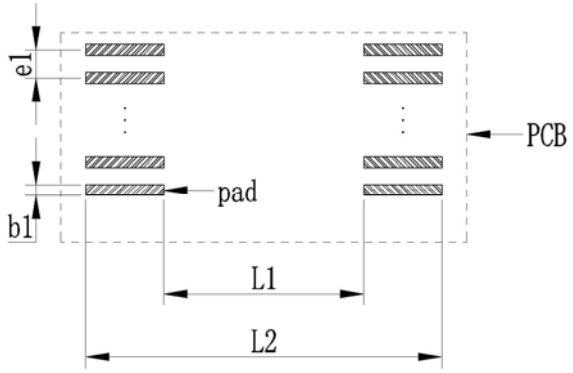

Figure 5 Pads Dimensions

NOTE:

e1: 0.50 mm;

b1: 0.30mm;

L1: 14.4mm;

L2: 21.2mm.

10. REVISION HISTORY

Table 7 Revision history

Revision	Date	Description of Change
A0	Nov 3,2015	First Created
A1	Mar 14,2016	Modified PIN DESCRIPTIONS
A2	Aug 23,2016	Modified ORDERING INFORMATION
A3	Jan 9,2017	Modified the Truth Table
A4	Oct.25,2017	Changed company's name to Zhuhai Orbita Aerospace Science & Technology Co.，Ltd
A5	Mar 30,2018	Add or reduce chapters
B0	Mar 21,2020	Update TID and SEE
B1	Feb 22, 2021	Update SEE
B2	April 22, 2021	Add pads designation