VDIC
NAND FLASH MEMORY

VDNF32G08XS50XX2V25
USER MANUAL

Version : A1

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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-NAND Flash Memory

HIGH-SPEED 3.3V 4G×8bit

1. DESCRIPTION

Offered in 4Gx8bit, the VDNF32G08XS50XX2V25 is a32G-bit NAND Flash Memory with spare capacity of 1792M -bits. The device operates at 3.3V. The I/O pins serve as the ports for address and data input/output as well as command input.

The VDNF32G08XS50XX2V25 device is stacked with two chips. The I/O ports and the control pins (ALE,CLE,#WE,#RE) of each chip are connected.

A program operation can be performed in typical 230μs on the (4K+224)Byte page and an erase operation can be performed in typical 700us on a (512K+28K)Byte block. Data in the data register can be read out at 25ns cycle time per Byte.

Every chip has an on-chip write controller which is used to automate all program and erase functions including pulse repetition, where required, and internal verification and margining of data. Even the write-intensive systems can take advantage of the VDNF32G08XS50XX2V25′s extended reliability of 100K program/erase cycles by providing ECC(Error Correcting Code) with real time mapping-out algorithm.

Its NAND cell provides the most cost-effective solution for the solid state application market. The VDNF32G08XS50XX2V25 is an optimum solution for large nonvolatile storage applications such as solid state data storage and advanced embedded control applications.

2. FEATURES

• Voltage Supply
  - 3.3V device: 2.7 ~ 3.6 V
• Organization
  - Memory Cell Array
    -2 chips x (2G +112M)x 8 bit
• Automatic Program and Erase
  - Page Program for each chip
    -(4K + 224)Byte
  - Block Erase for each chip
    - (512K +28K)Byte
• Page Read Operation for each chip
  - Page Size
    - (4K + 224)Byte
  - Random Access : 25μs(Max.)
  - Serial Page Access : 25ns(Min.)
• Fast Write Cycle Time
  - Program time : 230μs(Typ.)
  - Block Erase Time : 700us(Typ.)
• Command/Address/Data Multiplexed I/O Port

- Hardware Data Protection
  - Program/Erase Lockout During Power Transitions
- Reliable CMOS Floating-Gate Technology
  - Endurance : 100K Program/Erase Cycles
  - Data Retention : 10 Years
- Command Register Operation
- Intelligent Copy-Back with internal 4bit/540Byte EDC
- Package SOP-50

3. BLOCK DIAGRAM

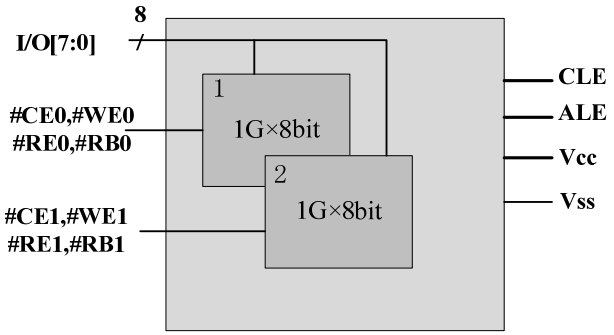

Figure 1 Block diagram

4. PIN DESCRIPTIONS– SOP-50

Pin Id	Pin #		Pin Id
NC	1	50	NC
NC	2	49	NC
NC	3	48	NC
NC	4	47	NC
NC	5	46	NC
NC	6	45	I/O7
#RB1	7	44	I/O6
#RB0	8	43	I/O5
#RE0	9	42	I/O4
#CE0	10	41	NC
#CE1	11	40	#RE1
NC	12	39	VCC
VCC	13	38	VCC
VSS	14	37	VSS
NC	15	36	VSS
NC	16	35	VSS
CLE	17	34	NC
ALE	18	33	I/O3
#WE0	19	32	I/O2
#WP	20	31	I/O1
#WE1	21	30	I/O0
NC	22	29	NC
NC	23	28	NC
NC	24	27	NC
NC	25	26	NC

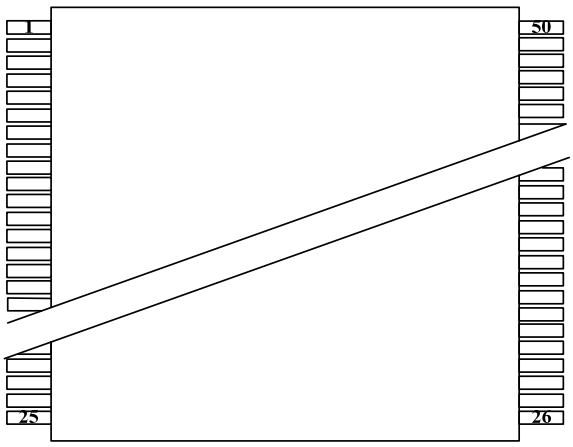

Figure 2 Pin configuration

Table 1: Pin description

Name	Function
I/O0~I/O7	**DATA INPUTS/OUTPUTS** The I/O pins are used to input command, address and data, and to output data during read operations. The I/O pins float to high-z when the chip is deselected or when the outputs are disabled.
CLE	**COMMAND LATCH ENABLE** The CLE input controls the activating path for commands sent to the command register. When active high, commands are latched into the command register through the I/O ports on the rising edge of the #WE signal.
#CE0 (Chip1)	**Chip Enable Input .**When #CEn is Low, the command input cycle becomes valid in chip n. When #CEn is High, all inputs are ignored in chip n.
#CE1 (Chip2)	
ALE	**ADDRESS LATCH ENABLE** The ALE input controls the activating path for the address to the internal address registers. Addresses are latched on the rising edge of #WE with ALE high.
#REn	**READ ENABLE** The #REn input is the serial data-out control, and when active，drives the data onto the I/O bus. Data is valid t_{REA} after the falling edge of #RE which also increments the internal column address counter by one.
#WEn	**WRITE ENABLE** The #WEn input controls writes to the I/O port. Commands, address and data are latched on the rising edge of the #WE pulse.
#WP	**WRITE PROTECT** The #WP pin provides inadvertent write/erase protection during power transitions. The internal high voltage generator is reset when the #WP pin is active low.
#RB0 (Chip1)	**READY/BUSY OUTPUT** The #R/Bn output indicates the status of the device operation. When low it indicates that a program, erase or random read operation is in process and returns to high state upon completion. It is an open drain output and does not float to high-z condition when the chip is deselected or when outputs are disabled.
#RB1 (Chip2)	
VCC	**POWER** VCC is the power supply for device.
VSS	**GROUND**

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}	-0.6 ~ +4.6	V
Voltage on any pin relative to Vss	V_{IN}	-0.6 ~ +4.6	V
Power Dissipation	P_D	1.0	W
Operating Temperature Range	T_A	-55 ~ +125	℃
Storage Temperature Range	T_{STG}	-65 ~ +150	℃

5.2. Recommended DC Operating Conditions

Table 3:Recommended DC Operating Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage	V_{CC}	2.7	3.3	3.6	V
Input high voltage	V_{IH}	V_{CC}×0.8	——	V_{CC}+0.3	V
Input low voltage	V_{IL}	-0.3	——	V_{CC}×0.2	V

5.3. DC And Operating Characteristics

Table 4:DC And Operating Characteristics

Parameter	Symbol	Test Conditions	Min	Max	Unit
Output voltage low level	V_{OL}	V_{CC}=2.7V I_{OL} =2.1mA	——	0.4	V
Output voltage high level	V_{OH}	V_{CC}=2.7V,I_{OH}= -0.4mA	2.4	——	V

6. Typical Application

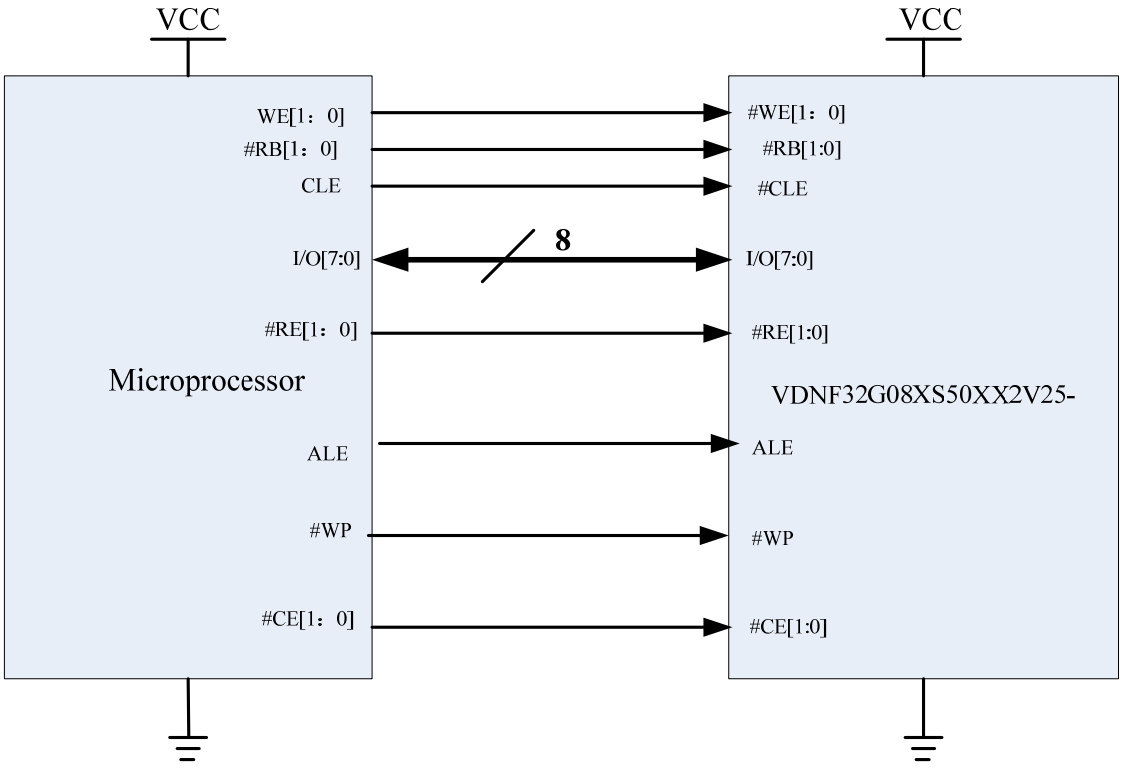

Figure 3 Typical application

7. ORDERING INFORMATION

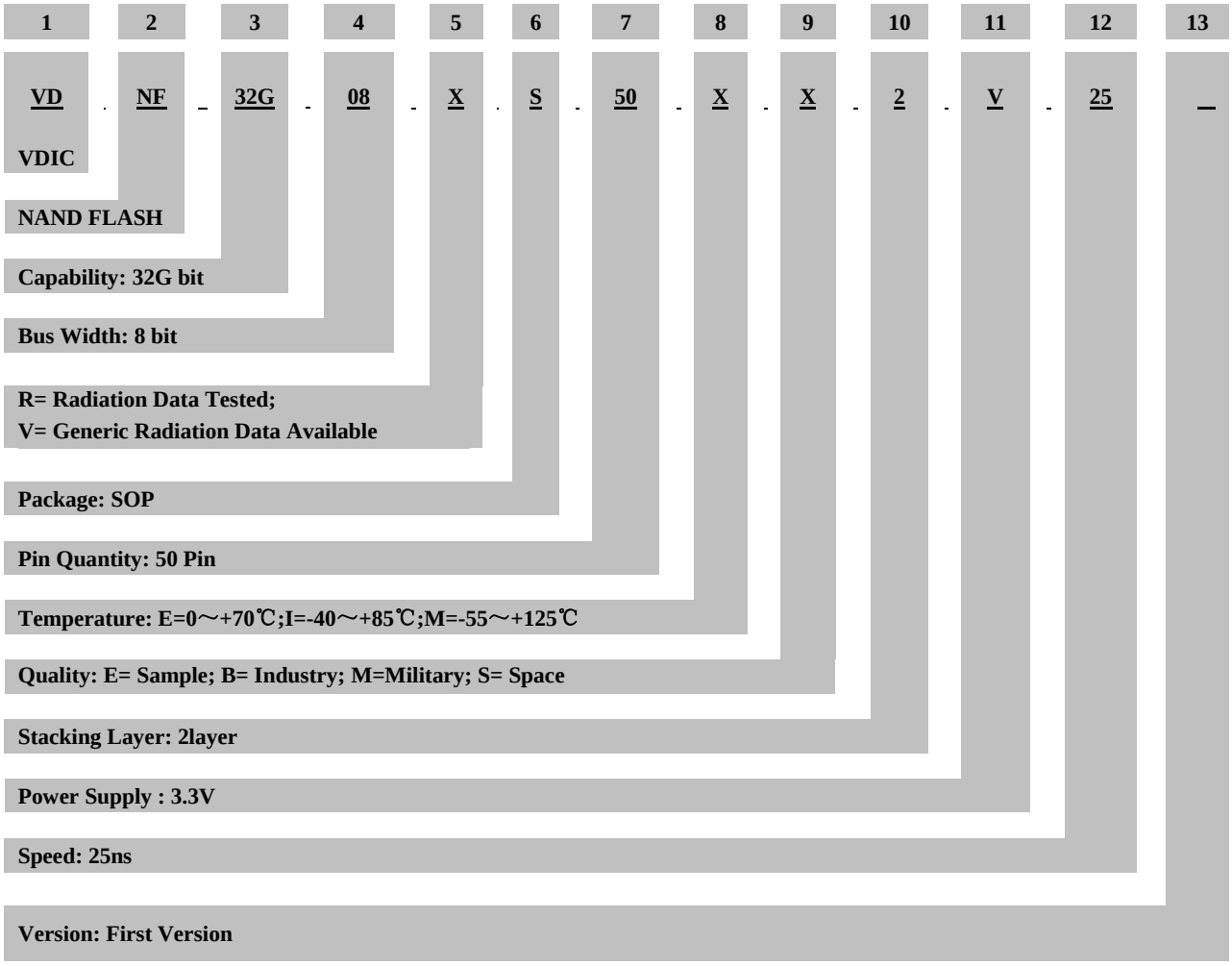

Table 5:Part Information

Part Number	Capacity (bit)	Bus Width (bit)	Radiation			Packaging	Temperature (℃)
			TID[1]	SEL[2]	SEU[3]		
VDNF32G08VS50EE2V25	32G	8	-	-	-	SOP50	0 ~ +70
VDNF32G08VS50IB2V25	32G	8	-	-	-	SOP50	-40 ~ +85
VDNF32G08VS50MM2V25	32G	8	-	-	-	SOP50	-55 ~ +125
VDNF32G08RS50MS2V25	32G	8	>60	>60	1.3	SOP50	-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

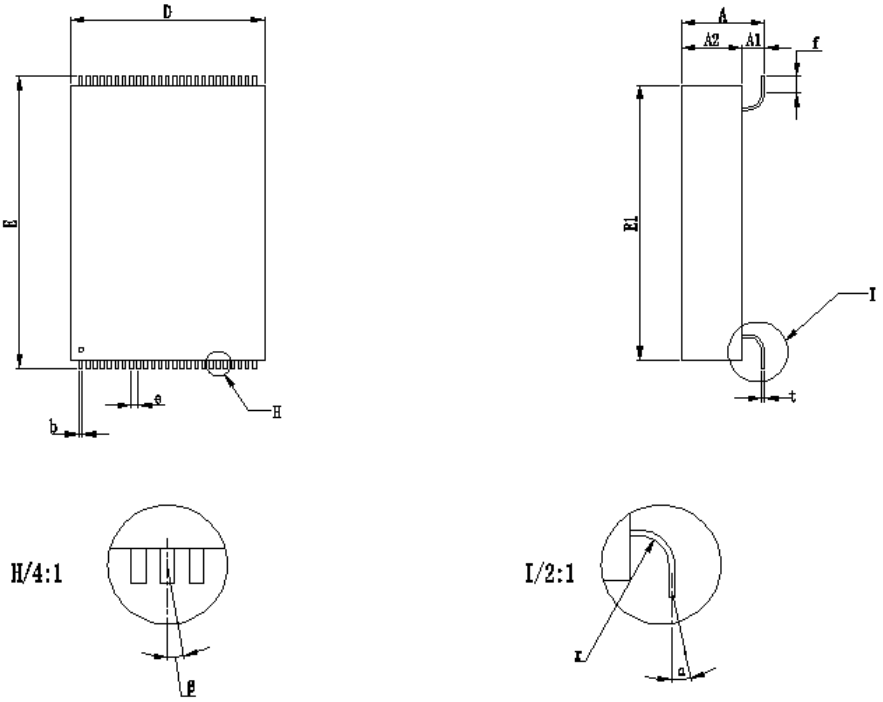

Figure 4 Package dimensions

Table 6 Dimensions information

	Min	Max
A	5.20	5.70
A2	4.00	4.40
D	13.30	13.70
E	19.80	20.20
E1	18.80	19.20
f	1.20	
b	0.25	
e	0.50	
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	Sep 4,2018	First Created
A1	Mar 20,2020	Update TID and SEE