VDIC DDR1 SYNCHRONOUS DYNAMIC RAM

VD1D8G08XS66XX8T7B 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

Contents

VDIC-DDR SDRAM

HIGH-SPEED 2.5V 1G x 8bit

SYNCHRONOUS DYNAMIC RAM

1. DESCRIPTION

The VD1D8G08XS66XX8T7B is a 8192M bits DDR1 SDRAM, organized as 1G words× 8 bits. The device has eight dies, each die includes 1Gbit. The device has a 8-bit interface and is selected with specific #CS,#CK and CKE. The device is useful for a variety of high bandwidth, high performance memory system applications. It is packaged in standard 66-pin SOP.

2. FEATURES

_Stack of eight 1Gbit DDR SDRAM.

_ Organized as 1Gx8-bit.

_ Power supply: V_{DD}, V_{DDQ}=2.5V±0.2V.

_ Double-data-rate architecture; two data transfer per clock cycle.

_ Internal pipelined operation; column address can be changed every clock cycle.

_ Bidirectional data strobe.

_ Differential clock inputs (CK AND #CK).

_DLL aligns DQ and DQS transition with CK transition,.

_Programmable Read Latency 2, 2.5(clock).

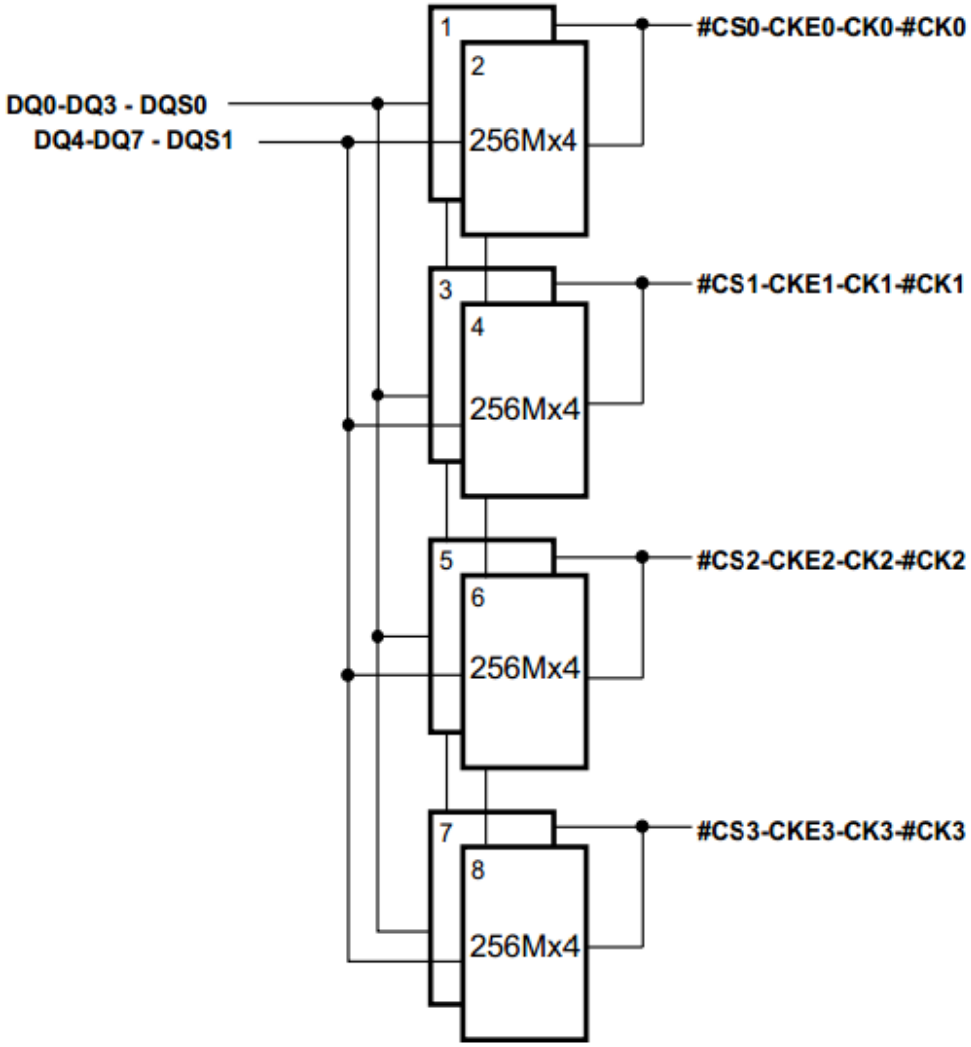
_Programmable Burst length (2, 4, 8).

_Programmable Burst type (sequential & interleave).

_Edge aligned data output, center aligned data input.

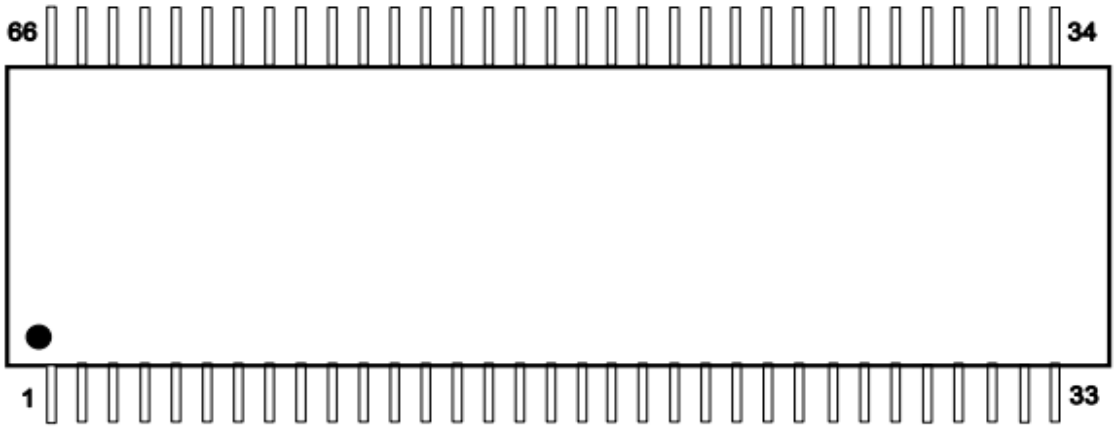
_Auto & Self refresh, 7.8μs refresh interval (8192/64ms refresh).

3. BLOCK DIAGRAM



(All other signals are common to the eight memories)

4. PIN DESCRIPTIONS



1	VDD	23	#RAS	45	CK0
2	#CS1	24	#CS0	46	#CK0
3	VDDQ	25	#CS2	47	DM
4	DQ4	26	BA0	48	VSS
5	DQ0	27	BA1	49	VREF
6	VSSQ	28	AP/A10	50	CKE3
7	NC	29	A0	51	DQS0
8	NC	30	A1	52	VSSQ
9	VDDQ	31	A2	53	#CK3
10	DQ5	32	A3	54	CK3
11	DQ1	33	VDD	55	VDDQ
12	VSSQ	34	VSS	56	DQ2
13	#CK1	35	A4	57	DQ6
14	CK1	36	A5	58	VSSQ
15	VDDQ	37	A6	59	NC
16	#CS3	38	A7	60	DQS1
17	A13	39	A8	61	VDDQ
18	VDD	40	A9	62	DQ3
19	#CK2	41	A11	63	DQ7
20	CK2	42	A12	64	VSSQ
21	#WE	43	CKE2	65	CKE1
22	#CAS	44	CKE0	66	VSS

Figure 1 Pin configuration

Table 1 Pin description

Name	Function
A0~A13	Address Input. Provide the row address for ACTIVE commands, and the column address and auto precharge bit (A10) for READ/WRITE commands, to select one location out of the memory array in the respective bank. A10 sampled during a PRECHARGE command determines whether the PRECHARGE applies to one bank (A10 LOW, bank selected by BA0, BA1) or all banks (A10 HIGH). The address inputs also provide the op-code during a LOAD MODE REGISTER (LMR) command.
DQ0-DQ7	Data Input/Output Ports. 8bi-directional ports are used to read data from, or write data into the DDR1 SDRAM.
#CS0-#CS7	Die Enable Input. When #CS is Low, the command input cycle becomes valid. When CSn is High, all inputs are ignored. However, internal operations (bank active, burst operations, etc.) are held.
BA0,BA1	Bank address inputs: BA0 and BA1 define the bank to which an ACTIVE, READ, WRITE, or PRECHARGE command is being applied. BA0 and BA1 also define which mode register (mode register or extended mode register) is loaded during the LOAD MODE REGISTER command.
#RAS	Row address strobe. Latches row addresses on the positive going edge of the CLK with RAS low. Enables row access & precharge.
#CAS	Column address strobe. Latches column addresses on the positive going edge of the CLK with CAS low. Enables column access.
#WE	Write Enable Input. Enables write operation and row precharge. Latches data in starting from CAS, #WE active.
DM	Input Data Mask: DM is an input mask signal for write data. Input data is masked when DM is sampled HIGH along with that input data during a WRITE access. DM is sampled on both edges of DQS. Although DM pins are input-only, the DM loading is designed to match that of DQ and DQS pins.
DQS	Data strobe: Output with read data, input with write data. DQS is edge-aligned with read data, center-aligned with write data. It is used to capture data.
CK,CK#	Clock: CK and CK# are differential clock inputs. All address and control input signals are sampled on the crossing of the positive edge of CK and the negative edge of #CK. Output data (DQ and DQS) is referenced to the crossings of CK and #CK.
CKE	Clock enable: CKE HIGH activates and CKE LOW deactivates the internal clock, input buffers, and output drivers. Taking CKE LOW provides PRECHARGE power-down and SELF REFRESH operations (all banks idle) or ACTIVE power-down (row active in any bank). CKE is synchronous for power-down entry and exit and for self refresh entry. CKE is asynchronous for self refresh exit and for disabling the outputs. CKE must be maintained HIGH throughout read and write accesses. Input buffers (excluding CK, #CK, and CKE) are disabled during power-down. Input buffers (excluding CKE) are disabled during SELF REFRESH. CKE is an SSTL_2 input but will detect an LVCMOS LOW level after V_{DD} is applied and until CKE is first brought HIGH, after which it becomes a SSTL_2 input only.
V_{DD},V_{DDQ}	Power supply, connect to 2.5V
V_{REF}	SSTL_2 reference voltage.

Name	Function
V_{SS},V_{SSQ}	Ground
NC,DNU	No connect

5. ELECTRICAL SPECIFICATIONS – DC and AC

Stresses greater than those listed may cause permanent damage to the device. This is a stress rating only, and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

5.1. Absolute Maximum Ratings

Table 2 Absolute maximum ratings

Characteristics	Symbol	Maxinmum ratings	Unit
Voltage on V_{DD} supply relative to Vss	V_{DD}/ V_{DDQ}	-1 ~ 3.6	V
Voltage on any pin relative to Vss	V_{IN}	-0.5 to V_{DDQ}+0.5	V
Power Dissipation	P_D	2.0	W
Operating Temperature Range	T_{OPR}	-55~ +105	℃
Storage Temperature Range	T_{STG}	-65 to +150	℃

5.2. Recommended DC Operating Conditions

Table 3 Recommended DC operating condition

Parameter	Symbol	Min	Typical	Max	Unit
Supply Voltage	V_{DD}	2.3	2.5	2.7	V
I/O Supply Voltage	V_{DDQ}	2.3	2.5	2.7	V
I/O Reference Voltage	V_{REF}	0.49×V_{DDQ}	—	0.51×V_{DDQ}	V
I/O Termination Voltage(System)	V_{TT}	V_{REF}-0.04	V_{REF}	V_{REF}+0.04	V
Input high Voltage	V_{IH}（DC）	V_{REF}+0.15	—	V_{DD}+0.3	V
Input Low Voltage	V_{IL}（DC）	-0.3	—	V_{REF}-0.15	V

5.3. DC Electrical Characteristics and Operating Conditions

Table 4 DC Electrical Characteristics and Operating Conditions

Technical Parameters	symbol	Test Conditions	Min	Max	Uint
Input leakage current low /high	I_{LIL}	V_{DD}=2.7V，V_{REF}=1.35V V_{in}=0V	-2	2	μA
	I_{LIH}	V_{DD}=2.7V，V_{REF}=1.35V VIN=V_{DD}	-2	2	μA
Output leakage current low/high	I_{LOL}	V_{DD}=2.7V，V_{REF}=1.35V，V_{out}=0V	-5	5	μA
	I_{LOH}	V_{DD}=2.7V，V_{REF}=1.35V，V_{out} =V_{DD}	-5	5	μA

6. TYPICAL APPLICATION

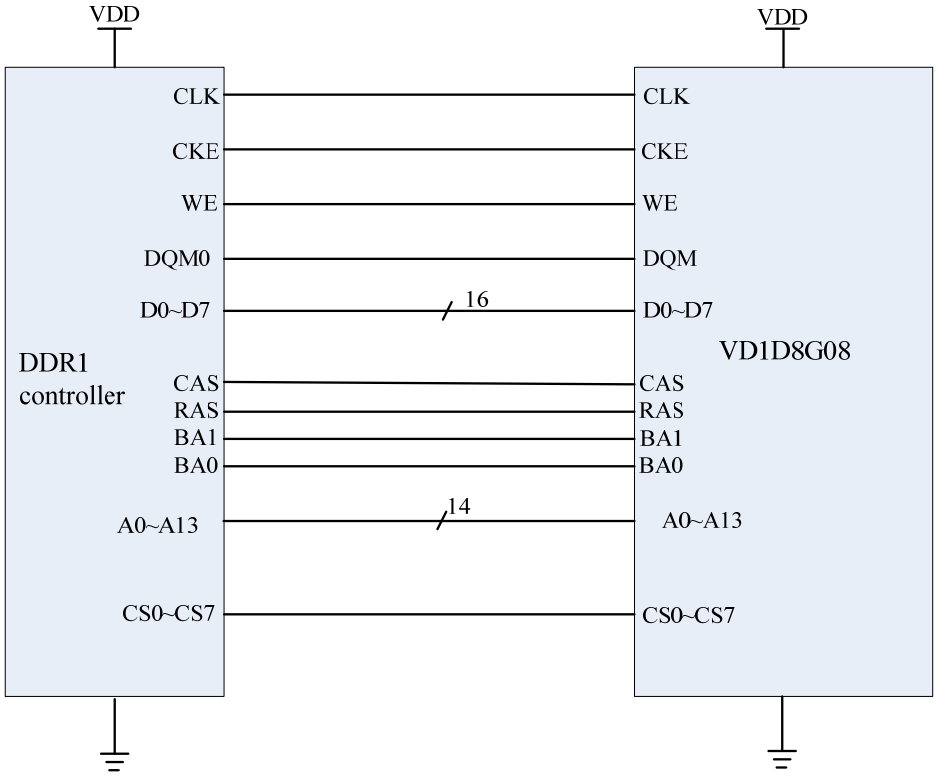


Figure 2 Typical application

7. ORDERING INFORMATION

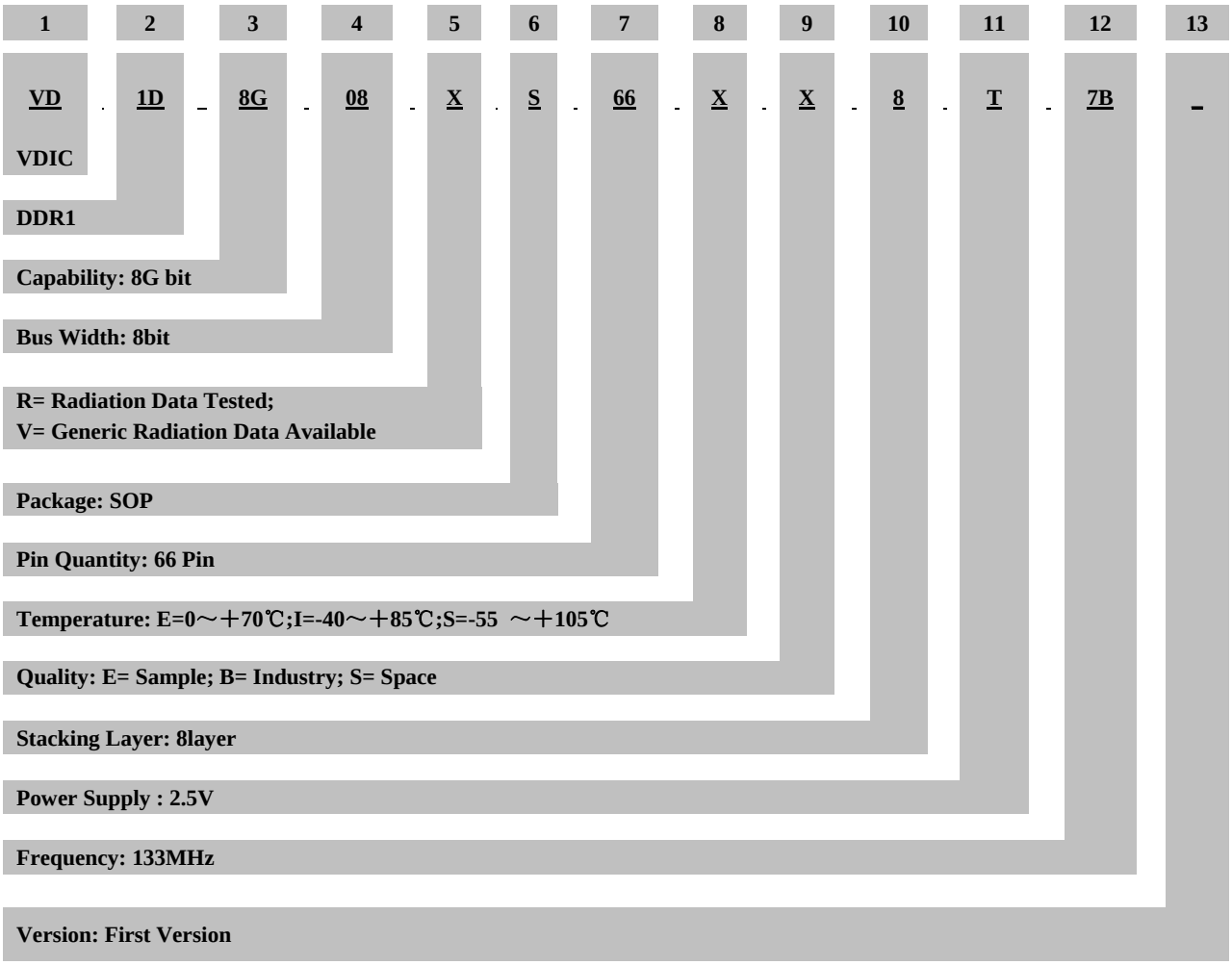


Table 5 Ordering information

Part Number	Capacity (bit)	Bus Width (bit)	Radiation			Packaging	Temperature (℃)
			TID[1]	SEL[2]	SEU[3]		
VD1D8G08VS66EE8T7B	8G	08	-	-	-	SOP66	0 ~ + 70
VD1D8G08VS66IB8T7B	8G	08	-	-	-	SOP66	-40 ~ + 85
VD1D8G08RS66SS8T7B	8G	08	TBD	TBD	TBD	SOP66	-55 ~ + 105

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

8. PACKAGE DIMENSIONS

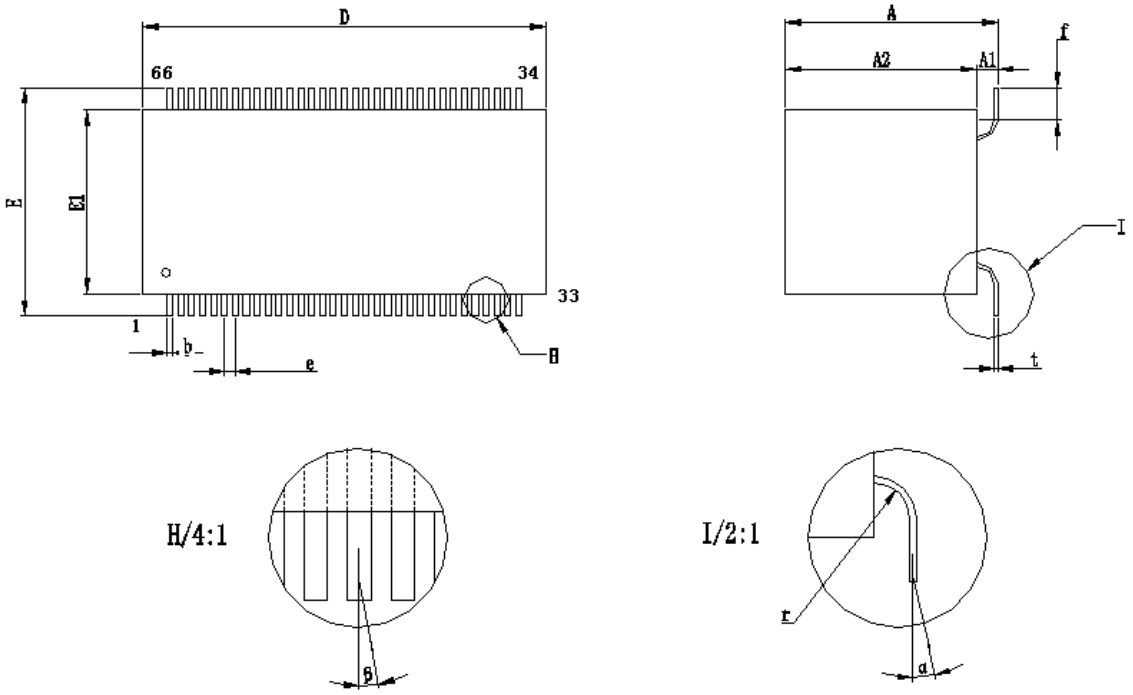


Figure 3 Package dimensions

Table 6 Dimensions information

	Min	Max
A	12.30	12.80
A2	11.10	11.50
D	23.80	24.20
E	13.40	13.80
E1	10.80	11.20
f	2.00	
b	0.35	
e	0.65	
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 5,2015	First Created
A1	Mar 21,2016	Modified the PIN DESCRIPTIONS
A2	Aug 23,2016	Modified the ORDERING INFORMATION
A3	Jan 9,2017	Modified the Package dimensions figure.
A4	Oct.25,2017	Changed company's name to Zhuhai Orbita Aerospace Science & Technology Co.，Ltd
A5	Mar 15,2018	Add or reduce the chapters.
B0	Mar 23,2020	Update TID and SEE