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32K x 32 SRAM MODULE

PUMA 2S1000 - 020/025/35/45

Issue 4.3 : November 1998

Description

The PUMA 2S1000 is a 1 Mbit high speed static RAM organised as 32K x 32 in a 66 pin ceramic PGA package. Access times of 20ns, 25ns, 35ns or 45ns are available. The device has a user configurable output width by 8 ,16 or 32 bits, and features a low power standby mode with 3.0V battery back-up capability. The package includes on board decoupling capacitors and is suitable for thermal ladder operations.

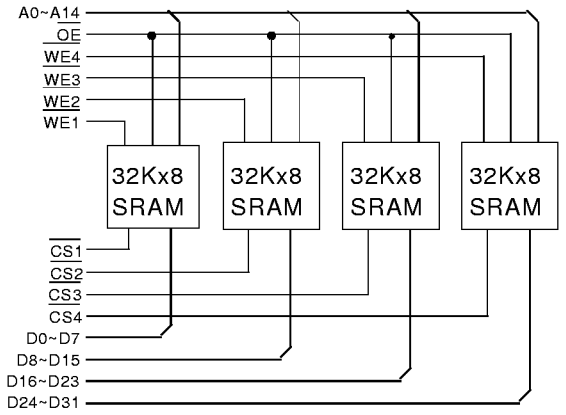
It may be screened in accordance with MIL-STD-883.

1,048,576 bit CMOS High Speed Static RAM

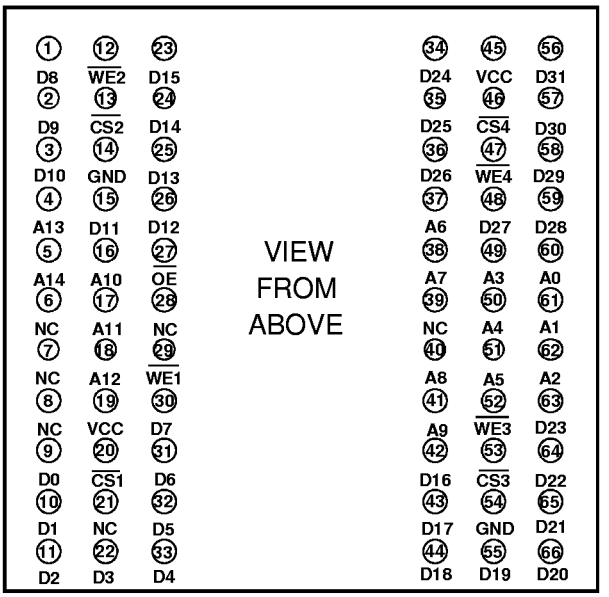
Features

- Very Fast Access times of 20/25/35/45 ns.
- User Configurable as 8 / 16 / 32 bit wide output.
- Operating Power 1.6 W (max) 8 bit
- Low Power Standby 44 mW (max) - L Version
- Upgradeable Package.
- Package Suitable for Thermal Ladder Applications.
- On board decoupling capacitors.
- Low voltage data retention.
- May be screened in accordance with MIL-STD-883.

Block Diagram



Pin Definition



Pin Functions

A0~A14	Address Inputs	**D0~D31**	Data Inputs/Outputs
$\overline{CS1}$~4	Chip Select	**$\overline{OE}$**	Output Enable
$\overline{WE1}$~4	Write Enable	**NC**	No Connect
V_{cc}	Power (+5V)	**GND**	Ground

DC OPERATING CONDITIONS

Absolute Maximum Ratings (1)

Voltage on any pin relative to V_{SS} (2)	V_T	-0.5V to +7.0	V
Power Dissipation	P_T	4	W
Storage Temperature	T_{STG}	-65 to +150	°C

Notes : (1)Stresses above 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 device reliability.

(2) Pulse width:- 3.0V for less than 10ns.

Recommended Operating Conditions

Parameter	*Symbol*	*min*	*typ*(1)	*max*	*Unit*	
Supply Voltage	V_{CC}	4.5	5.0	5.5	V	
Input High Voltage	V_{IH}	2.2	-	V_{CC}+0.5	V	
Input Low Voltage	V_{IL}	-0.5	-	0.8	V	
Operating Temperature	T_A	0	-	70	°C	
	T_{AI}	-40	-	85	°C	(**I** suffix**I**)
	T_{AM}	-55	-	125	°C	(**M**, **MB** suffix)

DC Electrical Characteristics (V_{CC}=5V±10%, T_A=-55°C to +125°C)

Parameter		*Symbol*	*Test Condition*	*min*	*typ*(1)	*max*	*Unit*
I/P Leakage Current		I_{LI1}	V_{IN}=0V to V_{CC}	-8	-	8	µA
Output Leakage Current	8 bit	I_{LO}	$\overline{CS}$(2)=V_{IH} or $\overline{OE}$=V_{IH}, $V_{I/O}$=0V to V_{CC}, $\overline{WE}$(2)=V_{IL}	-8	-	8	µA
Average Supply Current	32 bit	I_{CC32}	$\overline{CS}$(2)=V_{IL}, Min. cycle, $I_{I/O}$=0mA, 100% Duty.	-	-	660	mA
	16 bit	I_{CC16}	As above	-	-	410	mA
	8 bit	I_{CC8}	As above	-	-	285	mA
Standby Supply Current	TTL	I_{SB}	$\overline{CS}$(2)=V_{IH}, Min Cycle.	-	-	160	mA
	-L Version	I_{SB2}	$\overline{CS}$(2)≥V_{CC}-0.2V, 0.2V≥V_{IN}≥V_{CC}-0.2V	-	-	8	mA
Output Voltage Low		V_{OL}	I_{OL}=8.0mA	-	-	0.4	V
Output Voltage High		V_{OH}	I_{OH}=-4.0mA	2.4	-	-	V

Notes: $\overline{CS}$ and $\overline{WE}$ above are accessed through $\overline{CS1\sim4}$ and $\overline{WE1\sim4}$ respectively. These inputs must be operated simultaneously for 32 bit mode, in pairs for 16 bit mode and singly for 8 bit mode.

Capacitance (V_{CC}=5V±10%, T_A=25°C)

Parameter	*Symbol*	*Test Condition*	*typ*	*max*	*Unit*
Input Capacitance	C_{IN}	V_{IN}=0V	-	38	pF
I/O Capacitance:	$C_{I/O}$	$V_{I/O}$=0V	-	18	pF

Note:This parameter is calculated and not measured.

Operating Modes

The Table below shows the logic inputs required to control the operating modes of each of the SRAMs on the PUMA2S1000.

Mode	*$\overline{CS}$*	*$\overline{OE}$*	*$\overline{WE}$*	*V_{CC} Current*	*I/O Pin*	*Reference Cycle*
Not Selected	1	X	X	I_{SB}, I_{SB1}, I_{SB2}	High Z	Power Down
Output Disable	0	1	1	I_{CC}	High Z	
Read	0	0	1	I_{CC}	D_{OUT}	Read Cycle
Write	0	X	0	I_{CC}	D_{IN}	Write Cycle

1 = V_{IH}, 0 = V_{IL}, X = Don't Care

Note: $\overline{CS}$ is accessed through $\overline{CS1}$~4, and $\overline{WE}$ is accessed through $\overline{WE1}$~4. For correct operation, $\overline{CS1}$~4 must operate simultaneously for 32 bit operation, in pairs for 16 bit operation, or singly for 8 bit operation. $\overline{WE1}$~4 must also be operated in the same manner.

Low V_{cc} Data Retention Characteristics - L Version Only (V_{CC} = 5.0V±10%, T_A=-55°C to +125°C)

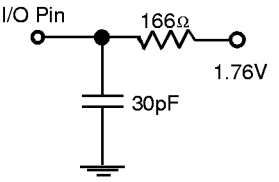
Parameter	*Symbol*	*Test Condition*	*min*	*typ*	*max*	*Unit*
V_{CC} for Data Retention	V_{DR}	$\overline{CS} \geq V_{CC}$-0.2V, $V_{IN} \geq 0V$	2.0	-	5.5	V
Data Retention Current	I_{CCDR1}	V_{CC}=2.0V, $\overline{CS} \geq V_{CC}$-0.2V, $V_{IN} \geq 0V$	-	-	8	mA
-L Version	I_{CCDR2}	As above	-	-	1.2	mA
Chip Deselect to Data Retention Time	t_{CDR}	See Retention Waveform	0	-	-	ns
Operation Recovery Time	t_R	See Retention Waveform	t_{RC}	-	-	ns

Note: $\overline{CS}$ above is accessed through $\overline{CS1}$~4.

AC Test Conditions

* Input pulse levels: 0V to 3.0V
* Input rise and fall times: 3ns
* Input and Output timing reference levels: 1.5V
* Output load: see diagram
* V_{cc}=5V±10%

Output Load



AC OPERATING CONDITIONS

Read Cycle

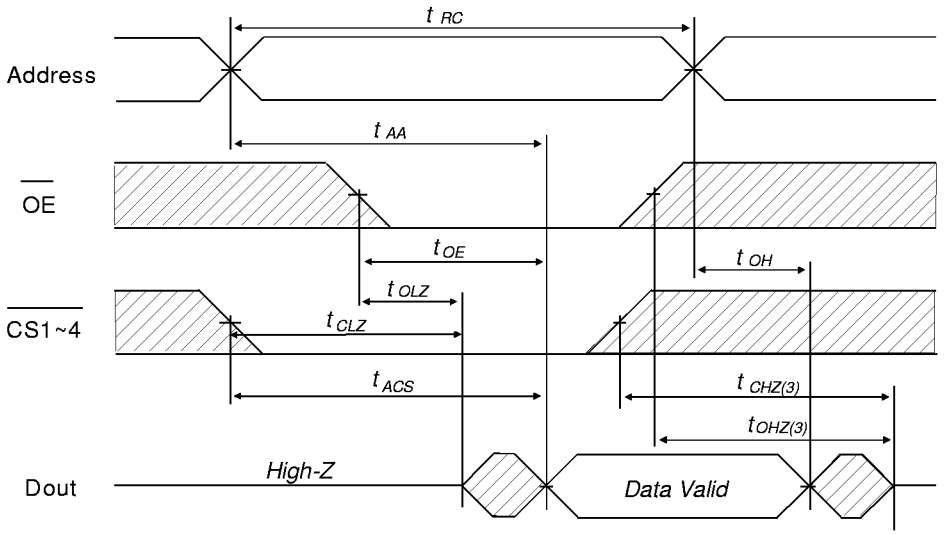
Parameter	Symbol	20 min	20 max	25 min	25 max	35 min	35 max	45 min	45 max	Unit
Read Cycle Time	t_{RC}	20	-	25	-	35	-	45	-	ns
Address Access Time	t_{AA}	-	20	-	25	-	35	-	45	ns
Chip Select Access Time	t_{ACS}	-	20	-	25	-	35	-	45	ns
Output Enable to Output Valid	t_{OE}	-	9	-	12	-	15	-	20	ns
Output Hold from Address Change	t_{OH}	3	-	5	-	5	-	5	-	ns
Chip Selection to Output in Low Z	t_{CLZ}	3	-	6	-	6	-	6	-	ns
Output Enable to Output in Low Z	t_{OLZ}	0	-	0	-	0	-	0	-	ns
Chip Deselection to Output in High Z[3]	t_{CHZ}	0	8	0	12	0	15	0	20	ns
Output Disable to Output in High Z[3]	t_{OHZ}	0	8	0	12	0	15	0	20	ns

Write Cycle

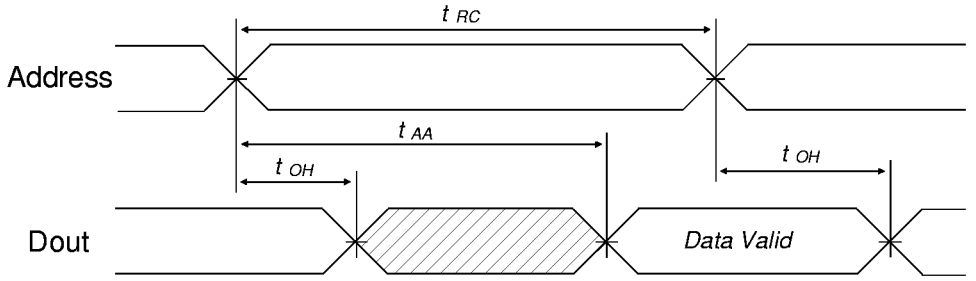
Parameter	Symbol	20 min	20 max	25 min	25 max	35 min	35 max	45 min	45 max	Unit
Write Cycle Time	t_{WC}	20	-	25	-	35	-	45	-	ns
Chip Selection to End of Write	t_{CW}	13	-	20	-	30	-	40	-	ns
Address Valid to End of Write	t_{AW}	13	-	20	-	30	-	40	-	ns
Address Setup Time	t_{AS}	0	-	0	-	0	-	0	-	ns
Write Pulse Width	t_{WP}	13	-	15	-	20	-	25	-	ns
Write Recovery Time	t_{WR}	0	-	0	-	0	-	0	-	ns
Write to Output in High Z	t_{WHZ}	0	8	0	15	0	18	0	20	ns
Data to Write Time Overlap	t_{DW}	10	-	20	-	20	-	20	-	ns
Data Hold from Write Time	t_{DH}	0	-	0	-	0	-	0	-	ns
Output Active from End of Write	t_{OW}	0	-	5	-	5	-	5	-	ns

Under Development

Read Cycle 1 Timing Waveform (1)

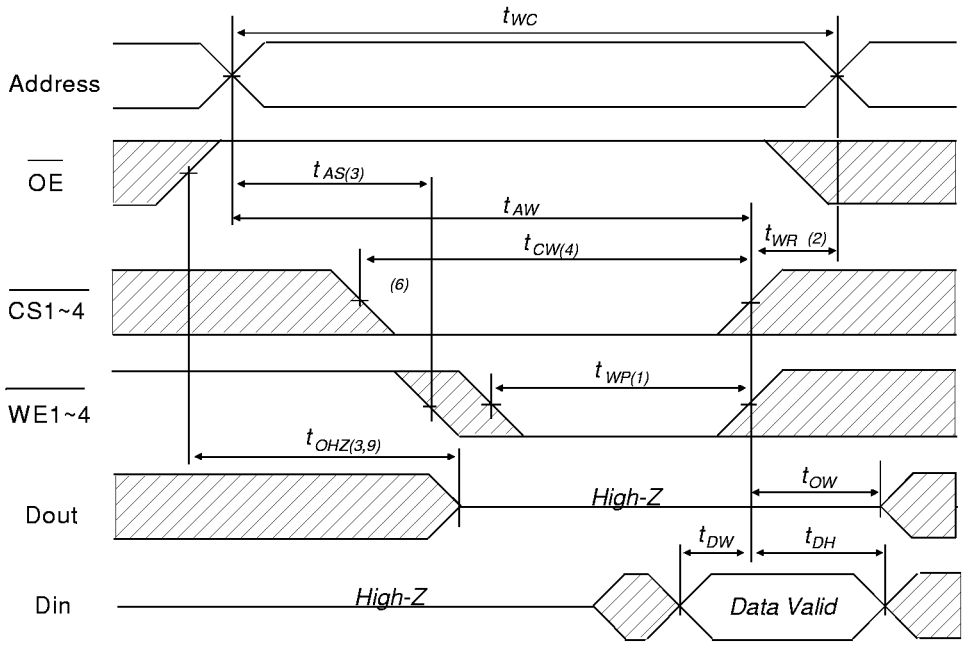


Read Cycle 2 Timing Waveform (1) (2) (4)

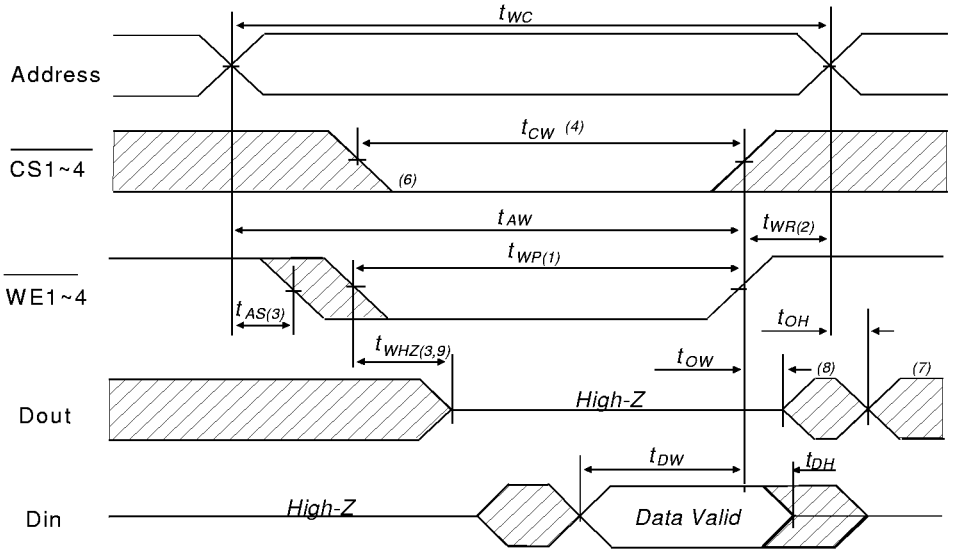


Notes: (1) $\overline{WE1\sim4}$ is High for Read Cycle.
(2) Device is continuously selected, $\overline{CS1\sim4}=V_{IL}$.
(3) t_{CHZ} and t_{OHZ} are defined as the time at which the outputs achieve the open circuit conditions and are not referenced to output voltage levels. These parameters are sampled and not 100% tested.
(4) $\overline{OE}=V_{IL}$.

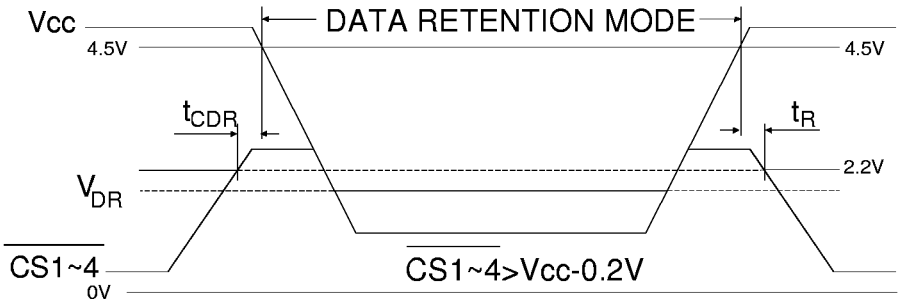
Write Cycle No.1 Timing Waveform



Write Cycle No.2 Timing Waveform (5)



Data Retention Waveform



AC Write Characteristics Notes

(1) A write occurs during the overlap (t_{WP}) of a low $\overline{CS}$ and a low $\overline{WE}$.

(2) t_{WR} is measured from the earlier of $\overline{CS}$ or $\overline{WE}$ going high to the end of write cycle.

(3) During this period, I/O pins are in the output state. Input signals out of phase must not be applied.

(4) If the $\overline{CS}$ low transition occurs simultaneously with the $\overline{WE}$ low transition or after the $\overline{WE}$ low transition, outputs remain in a high impedance state.

(5) $\overline{OE}$ is continuously low. ($\overline{OE}=V_{IL}$)

(6) Dout is in the same phase as written data of this write cycle.

(7) Dout is the read data of next address.

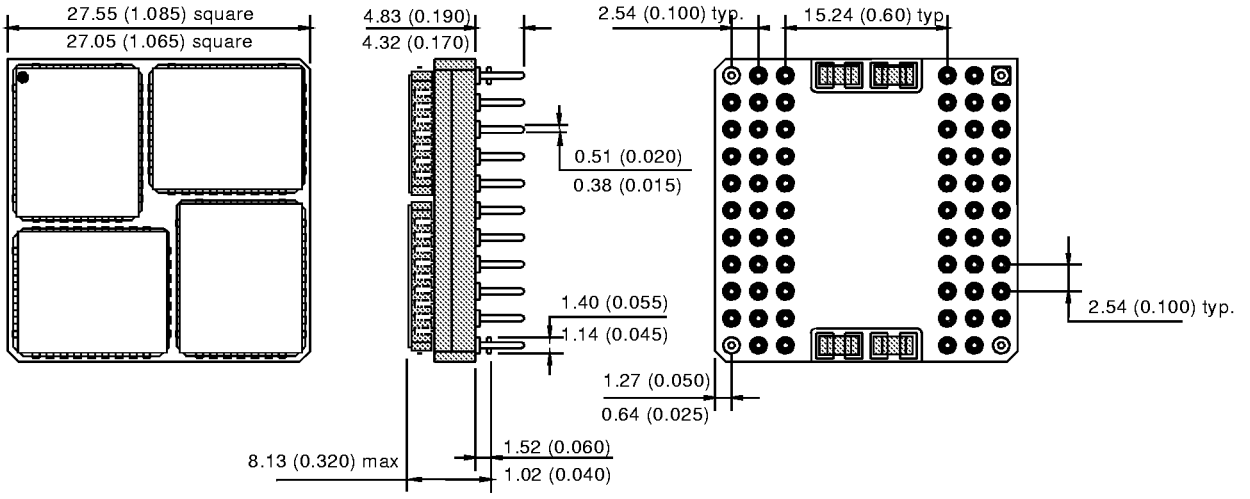
(8) If $\overline{CS}$ is low during this period, I/O pins are in the output state. Input signals out of phase must not be applied to I/O pins.

(9) t_{WHZ} and t_{OHZ} is defined as the time at which the outputs achieve the open circuit conditions and is not referenced to output voltage levels. This parameter is sampled and not 100% tested.

$\overline{CS}$ and $\overline{WE}$ above refer to $\overline{CS1\sim4}$ and $\overline{WE1\sim4}$ respectively.

PACKAGE DETAILS

66 Pin Ceramic PGA



Dimensions in mm (inches)

SCREENING

Military Screening Procedure

Module Screening Flow for high reliability product is in accordance with Mil-883 method 5004 .

MB MODULE SCREENING FLOW		
SCREEN	***TEST METHOD***	***LEVEL***
Visual and Mechanical		
External visual	2017 Condition B or manufacturers equivalent	100%
Temperature cycle	1010 Condition C (10 Cycles, -65°C to +150°C)	100%
Burn-In		
Pre-Burn-in electrical	Per applicable Device Specifications at T_A=+25°C	100%
Burn-in	T_A=+125°C,160hrs minimum.	100%
Final Electrical Tests	Per applicable Device Specification	
Static (DC)	a) @ T_A=+25°C and power supply extremes	100%
	b) @ temperature and power supply extremes	100%
Functional	a) @ T_A=+25°C and power supply extremes	100%
	b) @ temperature and power supply extremes	100%
Switching (AC)	a) @ T_A=+25°C and power supply extremes	100%
	b) @ temperature and power supply extremes	100%
Percent Defective allowable (PDA)	Calculated at Post Burn-in at T_A=+25°C	10%
Quality Conformance	Per applicable Device Specification	Sample
External Visual	2009 Per vendor or customer specification	100%

ORDERING INFORMATION

PUMA 2S1000LMB - 35

Speed	020	=	20 ns
	025	=	25 ns
	35	=	35 ns
	45	=	45 ns
Temp. range/screening	Blank	=	Commercial Temperature.
	I	=	Industrial Temperature.
	M	=	Military Temperature.
	MB	=	Screened in accordance with MIL-STD-883.
Power Consumption	Blank	=	Standard Part.
	L	=	Low Power Part.
Memory Organisation	1000	=	32K x 32, configurable as 64K x 16 and 128K x 8
Memory Technology	S	=	Static RAM.
Package	PUMA 2	=	66 pin Ceramic PGA.

Note :
Although this data is believed to be accurate, the information contained herein is not intended to and does not create any warranty of merchantibility or fitness for a particular purpose.
Our products are subject to a constant process of development. Data may be changed at any time without notice.
Products are not authorised for use as critical components in life support devices without the express written approval of a company director.