



512Kx32 SRAM 3.3V MULTI-CHIP PACKAGE

FEATURES

- Access Times of 12, 15, 17, 20ns
- Packaging
 - 143 PBGA, 16mm x 18mm, 288mm²
- Organized as 512Kx32; User Configurable as 1Mx16 or 2Mx8
- Commercial, Industrial and Military Temperature Ranges
- Low Voltage Operation:
 - 3.3V ± 10% Power Supply
- Low Power Data Retention 'L' Option
- TTL Compatible Inputs and Outputs
- Fully Static Operation:
 - No clock or refresh required.
- Three State Output.

This product is subject to change without notice.

PIN CONFIGURATION FOR WEDPS512K32V-XBX

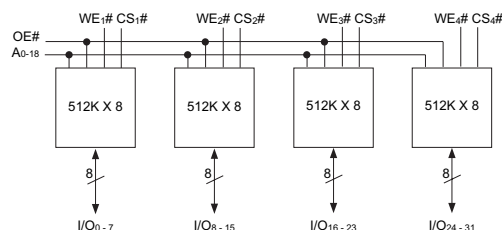
Top View

	1	2	3	4	5	6	7	8	9	10	11	12
A	-	A2	A1	A0	GND	GND	VCC	VCC	A18	A17	A16	GND
B	CS2#	A3	A4	D14	D15	NC	CS4#	D24	D25	OE#	A15	NC
C	D9	D8	NC	D12	D13	GND	VCC	D26	D27	WE4#	D31	D30
D	D10	D11	GND	GND	GND	GND	VCC	VCC	VCC	VCC	D28	D29
E	WE2#	GND	GND	GND	GND	GND	VCC	VCC	VCC	VCC	VCC	NC
F	GND	GND	GND	GND	GND	GND	VCC	VCC	VCC	VCC	VCC	VCC
G	VCC	VCC	VCC	VCC	VCC	VCC	GND	GND	GND	GND	GND	GND
H	CS1#	VCC	VCC	VCC	VCC	VCC	GND	GND	GND	GND	GND	NC
J	D1	D0	VCC	VCC	VCC	VCC	GND	GND	GND	GND	D23	D22
K	D2	D3	NC	D7	D5	VCC	GND	D17	D16	CS3#	D20	D21
L	WE1#	A6	A5	D6	D4	NC	WE3#	D19	D18	A14	A13	NC
M	GND	A7	A8	A9	vcc	vcc	GND	GND	A10	A11	A12	vcc

Pin Description

I/O ₀₋₃₁	Data Inputs/Outputs
A ₀₋₁₈	Address Inputs
WE _{1-4#}	Write Enables
CS _{1-4#}	Chip Selects
OE#	Output Enable
V _{cc}	Power Supply
GND	Ground
NC	Not Connected

Block Diagram





ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Operating Temperature	T _A	-55	+125	°C
Storage Temperature	T _{STG}	-65	+150	°C
Signal Voltage Relative to GND	V _G	-0.5	4.6	V
Junction Temperature	T _J		150	°C
Supply Voltage	V _{CC}	-0.5	4.6	V

TRUTH TABLE

CS#	OE#	WE#	Mode	Data I/O	Power
H	X	X	Standby	High Z	Standby
L	L	H	Read	Data Out	Active
L	X	L	Write	Data In	Active
L	H	H	Out Disable	High Z	Active

BGA THERMAL RESISTANCE

Parameter	Symbol	Max	Unit	Note
Junction to Ambient (No Airflow)	Theta JA	16.9	°C/W	1
Junction to Ball	Theta JB	11.3	°C/W	1
Junction to Case (Top)	Theta JC	9.8	°C/W	1

NOTE: Refer to Application Note "PBGA Thermal Resistance Correlation" at www.wedc.com in the application notes section for modeling conditions.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V _{CC}	3.0	3.6	V
Input High Voltage	V _{IH}	2.2	V _{CC} + 0.3	V
Input Low Voltage	V _{IL}	-0.3	+0.8	V

CAPACITANCE

T_a = +25°C

Parameter	Symbol	Conditions	Max	Unit
OE# capacitance	C _{OE}	V _{IN} = 0 V, f = 1.0 MHz	30	pF
WE ₁₋₄ # capacitance	C _{WE}	V _{IN} = 0 V, f = 1.0 MHz	10	pF
CS ₁₋₄ # capacitance	C _{CS}	V _{IN} = 0 V, f = 1.0 MHz	10	pF
Data I/O capacitance	C _{I/O}	V _{I/O} = 0 V, f = 1.0 MHz	10	pF
Address input capacitance	C _{AD}	V _{IN} = 0 V, f = 1.0 MHz	30	pF

This parameter is guaranteed by design but not tested.

DC CHARACTERISTICS

V_{CC} = 3.3V ± 0.3V, -55°C ≤ T_A ≤ +125°C

Parameter	Symbol	Conditions	Min	Max	Units
Input Leakage Current	I _{LI}	V _{IN} = GND to V _{CC}		10	μA
Output Leakage Current	I _{LO}	CS# = V _{IH} , OE# = V _{IH} , V _{OUT} = GND to V _{CC}		10	μA
Operating Supply Current (x 32 Mode)	I _{CC} x 32	CS# = V _{IL} , OE# = V _{IH} , f = 5MHz, V _{CC} = 3.6V		400	mA
Standby Current	I _{SB}	CS# = V _{IH} , OE# = V _{IH} , f = 5MHz, V _{CC} = 3.6V		120	mA
Output Low Voltage	V _{OL}	I _{OL} = 4.0mA		0.4	V
Output High Voltage	V _{OH}	I _{OH} = -4.0mA	2.4		V

NOTE: DC test conditions: V_{IH} = V_{CC} - 0.3V, V_{IL} = 0.3V.
Contact factory for low power option.

DATA RETENTION CHARACTERISTICS (WEDPS512K32LV-XBX only)

-55°C ≤ T_A ≤ +125°C

Parameter	Symbol	Conditions	Min	Max	Units
Data Retention Voltage	V _{CC}	V _{CC} = 2.19V	2.19		V
Data Retention Current	I _{CCDR}	CS = V _{CC} - 0.2V		8.0	mA



AC CHARACTERISTICS

V_{CC} = 3.3V, -55°C ≤ T_A ≤ +125°C

Parameter	Symbol	-12		-15		-17		-20		Units
		Min	Max	Min	Max	Min	Max	Min	Max	
Read Cycle Time	t _{RC}	12		15		17		20		ns
Address Access Time	t _{AA}		12		15		17		20	ns
Output Hold from Address Change	t _{OH}	0		0		0		0		ns
Chip Select Access Time	t _{ACS}		12		15		17		20	ns
Output Enable to Output Valid	t _{OE}		7		8		8		10	ns
Chip Select to Output in Low Z	t _{CLZ} ¹	1		1		1		1		ns
Output Enable to Output in Low Z	t _{OLZ} ¹	0		0		0		0		ns
Chip Disable to Output in High Z	t _{CHZ} ¹		7		8		8		10	ns
Output Disable to Output in High Z	t _{OHZ} ¹		7		8		8		10	ns

1. This parameter is guaranteed by design but not tested.

AC CHARACTERISTICS

V_{CC} = 3.3V, -55°C ≤ T_A ≤ +125°C

Parameter	Symbol	-12		-15		-17		-20		Units
		Min	Max	Min	Max	Min	Max	Min	Max	
Write Cycle Time	t _{WC}	12		15		17		20		ns
Chip Select to End of Write	t _{CW}	10		12		12		14		ns
Address Valid to End of Write	t _{AW}	10		12		12		14		ns
Data Valid to End of Write	t _{DW}	8		9		9		10		ns
Write Pulse Width	t _{WP}	10		12		14		14		ns
Address Setup Time	t _{AS}	0		0		0		0		ns
Address Hold Time	t _{AH}	0		0		0		0		ns
Output Active from End of Write	t _{OW} ¹	2		2		3		3		ns
Write Enable to Output in High Z	t _{WHZ} ¹		7		8		8		9	ns
Data Hold Time	t _{DH}	0		0		0		0		ns

1. This parameter is guaranteed by design but not tested.

FIGURE 4 – AC TEST CIRCUIT

The diagram shows a Device Under Test (D.U.T.) connected to a bipolar supply (V_Z = 1.5V). Two current sources are connected to the D.U.T. terminals, labeled I_{oL} and I_{oH}. A capacitor C_{eff} = 50 pf is connected to the D.U.T. input. The supply is labeled as a Bipolar Supply.

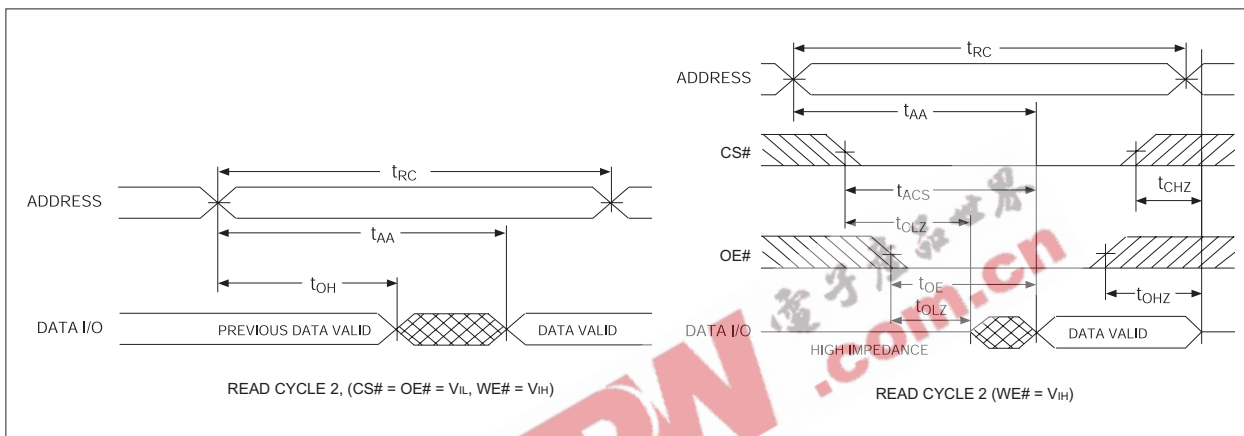
AC Test Conditions

Parameter	Typ	Unit
Input Pulse Levels	V _{IL} = 0, V _{IH} = 3.0	V
Input Rise and Fall	5	ns
Input and Output Reference Level	1.5	V
Output Timing Reference Level	1.5	V

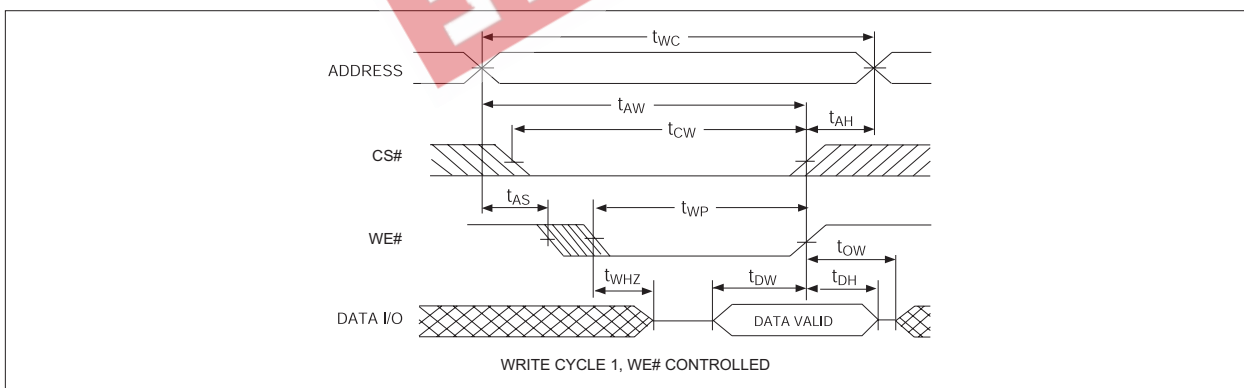
Notes:
V_Z is programmable from -2V to +7V.
I_{oL} & I_{oH} programmable from 0 to 16mA.
Tester Impedance Z₀ = 75 Ω.
V_Z is typically the midpoint of V_{OH} and V_{OL}.
I_{oL} & I_{oH} are adjusted to simulate a typical resistive load circuit.
ATE tester includes jig capacitance.



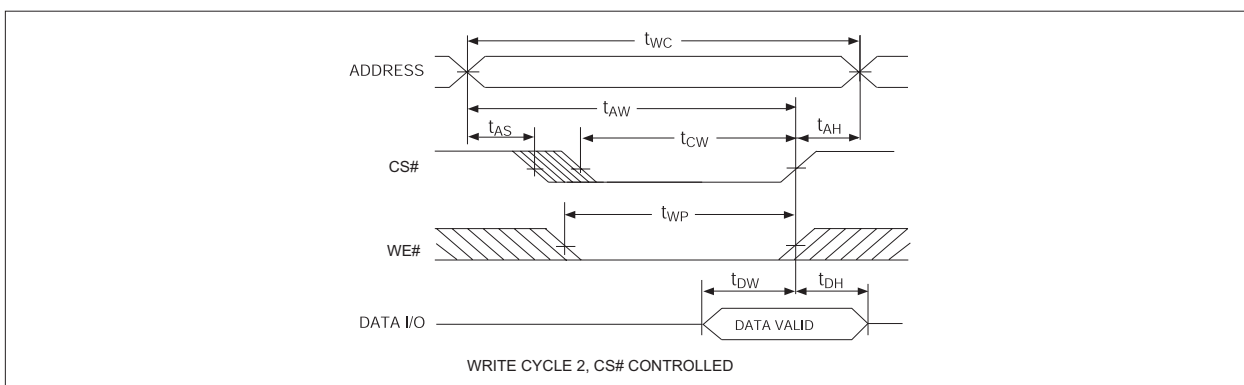
TIMING WAVEFORM - READ CYCLE



WRITE CYCLE - WE# CONTROLLED

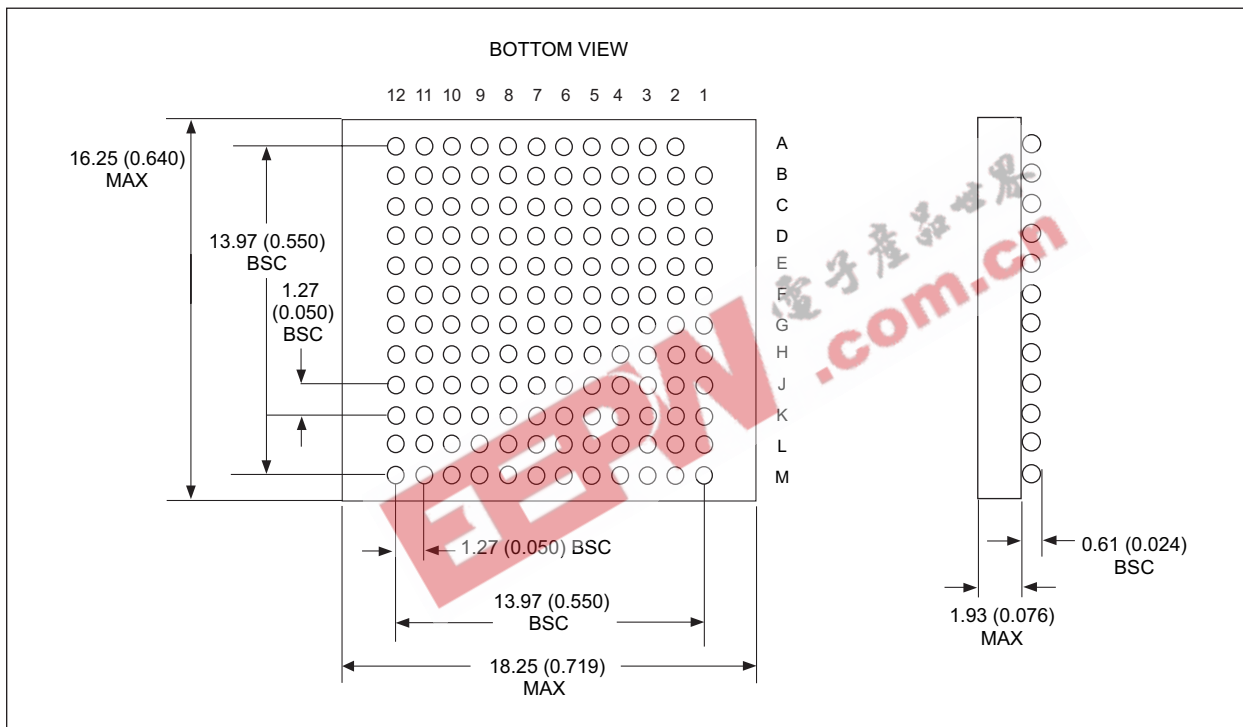


WRITE CYCLE - CS# CONTROLLED





PACKAGE 756: 143 BALL GRID ARRAY





ORDERING INFORMATION

WED P S 512K 32 L V - XX X X

WHITE ELECTRONIC DESIGNS CORP.

PLASTIC

SRAM

ORGANIZATION, 512Kx32

User configurable as 1Mx16 or 2Mx8

OPTIONS:

L = Low power data retention

Low Voltage Supply 3.3V ± 10%

ACCESS TIME (ns)

PACKAGE TYPE:

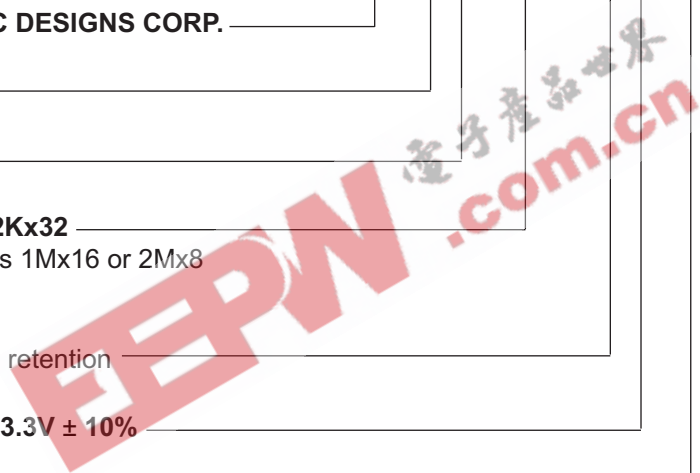
B = 143 PBGA, 16mm x 18mm, 288mm²

DEVICE GRADE:

M = MILITARY SCREENED -55°C TO +125°C

I = INDUSTRIAL -40°C TO 85°C

C = COMMERCIAL 0°C TO +70°C



**Document Title**

512K x 32 SRAM PBGA Multi-Chip Package

Revision History

Rev #	History	Release Date	Status
Rev 0	Initial Release	March 2002	Advanced
Rev 1	Changes (Pg. 1) 1.1 Switch Rows and Columns header position	March 2002	Advanced
Rev 2	Changes (Pg. 1) 2.1 Switch Rows and Columns header position (Pg. 1)	May 2002	Advanced
Rev 3	Changes (Pg. 1, 5) 3.1 Remove excess white space from package drawing for to create a consistent accurate style.	May 2002	Advanced
Rev 4	Changes (Pg. 1, 2, 7) 4.1 Add Thermal Resistance Table 4.2 Change product status to Final	January 2003	Final
Rev 5	Changes (Pg. 1, 2, 6, 7) 5.1 Add low power data retention option	June 2004	Final