



512Kx32 SRAM MULTI-CHIP PACKAGE

FEATURES

- Access Times of 12, 15, 17, 20, ns
- Packaging
 - 16mm x 18mm, 143 PBGA
- Organized as 512Kx32, User Configurable as 1Mx16 or 2Mx8

- Commercial, Industrial and Military Temperature Ranges
- TTL Compatible Inputs and Outputs
- 5 Volt Power Supply
- Low Power CMOS

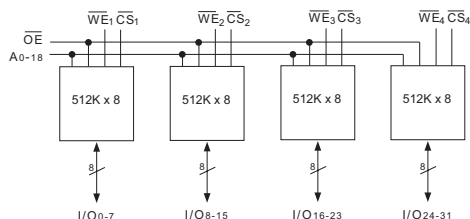
Note: This data sheet describes a product that is subject to change without notice.

FIG. 1 PIN CONFIGURATION FOR WEDPS512K32-XBX

TOP VIEW

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

BLOCK DIAGRAM



PIN DESCRIPTION

I/O0-31	Data Inputs/Outputs
A0-18	Address Inputs
$\overline{WE1-4}$	Write Enables
$\overline{CS1-4}$	Chip Selects
$\overline{OE}$	Output Enable
V _{CC}	Power Supply
GND	Ground
NC	Not Connected



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	V _{CC} +0.5	V
Junction Temperature	T _J		150	°C
Supply Voltage	V _{CC}	-0.5	7.0	V

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V _{CC}	4.5	5.5	V
Input High Voltage	V _{IH}	2.2	V _{CC} + 0.3	V
Input Low Voltage	V _{IL}	-0.5	+0.8	V
Operating Temp (Mil)	T _A	-55	+125	°C

TRUTH TABLE

$\overline{CS}$	$\overline{OE}$	$\overline{WE}$	Mode	Data I/O	Power
H	X	X	Standby	High Z	Standby
L	L	H	Read	Data Out	Active
L	H	H	Out Disable	High Z	Active
L	X	L	Write	Data In	Active

BGA THERMAL RESISTANCE

Description	Symbol	Max	Unit	Notes
Junction to Ambient (No Airflow)	Theta JA	16.5	°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.whiteedc.com in the application notes section for modeling conditions.

CAPACITANCE (T_A = +25°C)

Parameter	Symbol	Conditions	Max	Unit
$\overline{OE}$ capacitance	C _{OE}	V _{IN} = 0 V, f = 1.0 MHz	30	pF
$\overline{WE}$ 1-4 capacitance	C _{WE}	V _{IN} = 0 V, f = 1.0 MHz	10	pF
$\overline{CS}$ 1-4 capacitance	C _{CS}	V _{IN} = 0 V, f = 1.0 MHz	10	pF
Data I/O capacitance	C _{IO}	V _{IO} = 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} = 5.0V, V_{SS} = 0V, T_A = -55°C TO +125°C)

Parameter	Symbol	Conditions	Units	
			Min	Max
Input Leakage Current	I _{LI}	V _{CC} = 5.5, V _{IN} = GND to V _{CC}		10
Output Leakage Current	I _{LO}	$\overline{CS}$ = V _{IH} , $\overline{OE}$ = V _{IH} , V _{OUT} = GND to V _{CC}		10
Operating Supply Current x32 Mode	I _{CC} x 32	$\overline{CS}$ = V _{IL} , $\overline{OE}$ = V _{IH} , f = 5MHz, V _{CC} = 5.5		660
Standby Current	I _{SB}	$\overline{CS}$ = V _{IH} , $\overline{OE}$ = V _{IH} , f = 5MHz, V _{CC} = 5.5		80
Output Low Voltage	V _{OL}	I _{OL} = 8mA		0.4
Output High Voltage	V _{OH}	I _{OH} = -4.0mA	2.4	

NOTE: DC test conditions: V_{IH} = V_{CC} - 0.3V, V_{IL} = 0.3V



AC CHARACTERISTICS ($V_{CC} = 5.0V$, $V_{SS} = 0V$, $T_A = -55^{\circ}C$ TO $+125^{\circ}C$)

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		9		10	ns
Chip Select to Output in Low Z	t_{CLZ}^1	1		2		2		2		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		12		12		12	ns
Output Disable to Output in High Z	t_{OHZ}^1		7		12		12		12	ns

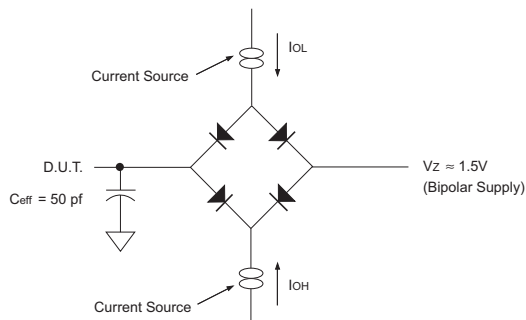
1. This parameter is guaranteed by design but not tested.

AC CHARACTERISTICS ($V_{CC} = 5.0V$, $V_{SS} = 0V$, $T_A = -55^{\circ}C$ TO $+125^{\circ}C$)

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		13		15		15		ns
Address Valid to End of Write	t_{AW}	10		13		15		15		ns
Data Valid to End of Write	t_{DW}	8		10		11		12		ns
Write Pulse Width	t_{WP}	10		13		15		15		ns
Address Setup Time	t_{AS}	0		2		2		2		ns
Address Hold Time	t_{AH}	0		0		0		0		ns
Output Active from End of Write	t_{OW}^1	2		2		2		3		ns
Write Enable to Output in High Z	t_{WHZ}^1		7		8		9		11	ns
Data Hold Time	t_{DH}	0		0		0		0		

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

FIG. 4 AC TEST CIRCUIT



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:

VZ is programmable from -2V to +7V.

IOL & IOH programmable from 0 to 16mA.

Tester Impedance ZO = 75 Ω.

VZ is typically the midpoint of VOH and VOL.

IOL & IOH are adjusted to simulate a typical resistive load circuit.

ATE tester includes jig capacitance.



FIG. 5 TIMING WAVEFORM - READ CYCLE

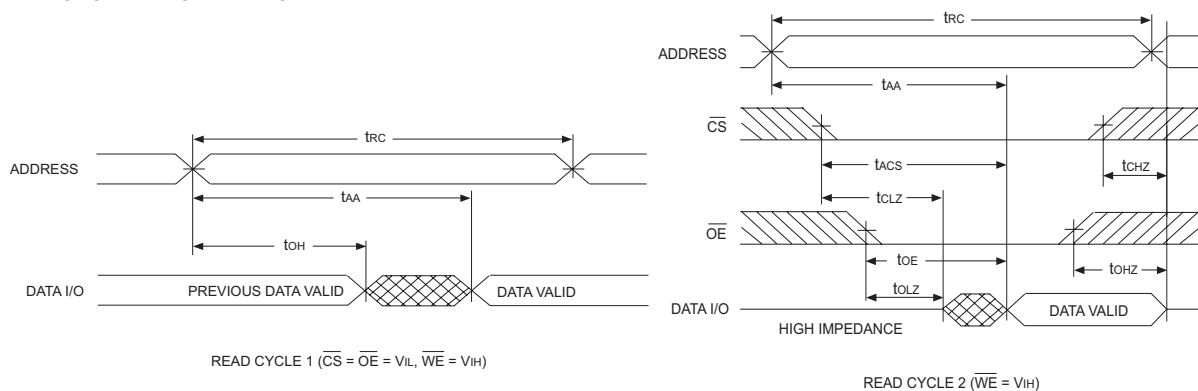


FIG. 6 WRITE CYCLE - $\overline{WE}$ CONTROLLED

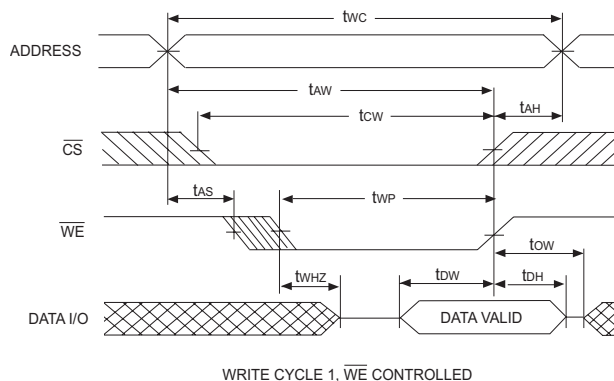
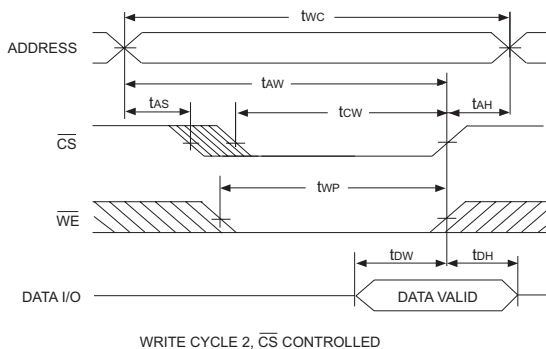
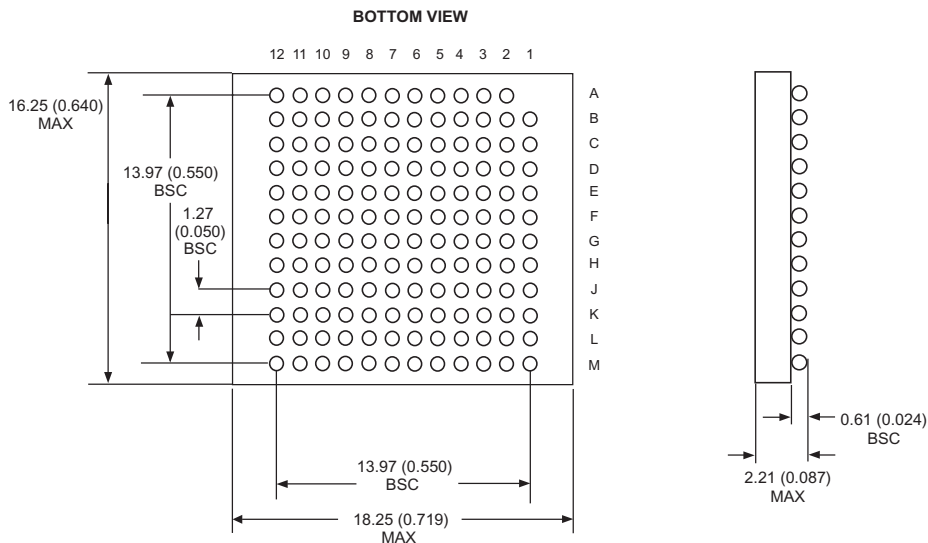


FIG. 6 WRITE CYCLE - $\overline{CS}$ CONTROLLED





PACKAGE 756: 143 BALL GRID ARRAY



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES



ORDERING INFORMATION

WED P S 512K 32 - XX X X

WHITE ELECTRONIC DESIGNS CORP. _____

PLASTIC _____

SRAM _____

ORGANIZATION, 512Kx32 _____
User configurable as 1Mx16 or 2Mx8

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 Multi-Chip Package

Revision History

<u>Rev #</u>	<u>History</u>	<u>ReleaseDate</u>	<u>Status</u>
Rev 0	Initial Release	March, 2002	Advanced
Rev 1	Switch Rows and Columns header position (Pg. 1)	March, 2002	Advanced
Rev 2	Switch Rows and Columns header position (Pg. 1)	May, 2002	Advanced
Rev 3	Change mechanical outline to more accurate design (Pg. 1, 5)	May, 2002	Advanced
Rev 4	Remove references to 25-55ns speed grades (Pg. 1, 2, 3)	August 2002	Advanced
Rev 5	Changes (Pg. 1, 2) 1.1 Add Thermal Resistance Table 1.2 Change product status to Final	January, 2003	Final