

FIGURE 1 — Pin Configuration Top View

I/O ₀₋₃₁	Data Inputs/Outputs
A ₀₋₁₈	Address Inputs
\overline{WE}_{1-4}	Write Enables
\overline{CS}_{1-4}	Chip Selects
\overline{OE}	Output Enable
V _{CC}	Power Supply
GND	Ground

Pin Description

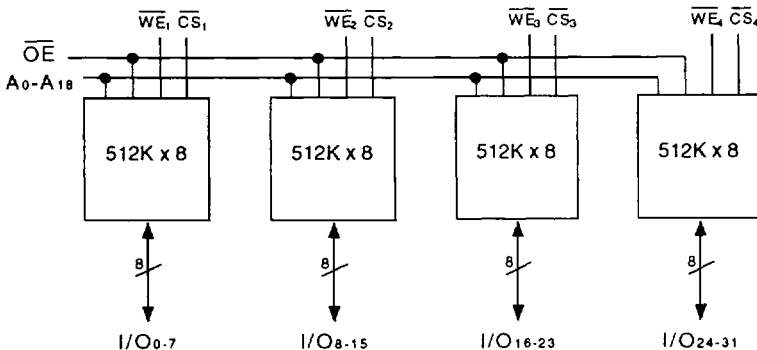


FIGURE 2 — Block Diagram

WS-512K32-XHX

ADVANCED* 16 Megabit CMOS SRAM Module

FEATURES

- Access Times of 25nS to 120nS
- 66-pin, PGA Type, 1.38 inch square HIP Package, Hermetic Ceramic Package
- User Configurable as 512Kx32, 1024Kx16 or 2Mx8
- Battery Back-Up Operation
- Commercial, Industrial and Military Temperature Ranges
- TTL Compatible Inputs and Outputs
- Low Power CMOS Fully Static Design
- 5 Volt Power Supply
- Built in Decoupling Caps and Multiple Ground Pins for Low Noise Operation

DESCRIPTION

The White Technology WS-512K32-XHX is a 16-megabit CMOS SRAM module organized as 512K words by 32 bits; 1024K x 16 or 2M x 8. The module is constructed on a multilayer ceramic substrate, hermetically sealed, with a welded metal cover, hex-in-line package (HIP) utilizing four 512K x 8 SRAM devices.

This device is part of White Technology's "WHIP" family of memory subsystems. These modules are compatible with most 66-pin HIP packaged SRAM, EEPROM and Flash memory modules.

The WS-512K32-XHX is available with access times of 25 to 120nS over the commercial and military temperature ranges.

* This data sheet describes a product under development and is subject to change without notice.

7105114

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol		Unit
Operating Temperature	T _A	-55 to +125	°C
Storage Temperature Range	T _{STG}	-65 to +150	°C
Supply Voltage	V _{CC}	-0.5 to 7.0	V
Signal Voltages Any Pin	V _G	-0.5 to 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} (1)	-0.5	+0.8	V
Operating Temp. (Mil.)	T _A	-55	+125	°C

(1) V_{IL} (min.) = 3.0V for pulse width less than 20ns.

TRUTH TABLE

CS	OE	WE	A0-A18	Mode	Data I/O	Device Current
H	X	X	X	Standby	High Z	Standby
L	L	H	Stable	Read	Data Out	Active
L	X	L	Stable	Write	Data In	Active
L	H	H	Stable	Out Disable	High Z	Active

CAPACITANCE

(@ T_A = 25°C)

Parameter	Symbol	Condition	Max	Unit
* Input Capacitance	C _{IN}	V _{IN} = 0V, f = 1.0 MHz	30	pF
* I/O Capacitance	C _{OUT}	V _{OUT} = 0V, f = 1.0 MHz	10	pF

* This parameter is guaranteed by design but not tested.

DC CHARACTERISTICS - 5V

(V_{CC} = 5V, V_{SS} = 0V, T_A = -55°C TO 125°C)

Parameter	Sym	Conditions	-25		-35		-45		-55		Units
			Typ	Max	Typ	Max	Typ	Max	Typ	Max	
Input Leakage Current	I _{LI}	V _{CC} = Max, V _{IN} = GND or V _{CC}								10	µA
Output Leakage Current	I _{LO}	CS = V _{IH} , OE = V _{IH} , V _{OUT} = GND to V _{CC}								2	µA
Operating Supply Current x 32 Mode	I _{CC} x 32	CS = V _{IL} , OE = V _{IH} , Duty Cycle = Max							240	500	mA
Operating Supply Current x 16 Mode	I _{CC} x 16	CS = V _{IL} , OE = V _{IH} , Duty Cycle = Max							150	300	mA
Operating Supply Current x 8 Mode	I _{CC} x 8	CS = V _{IL} , OE = V _{IH} , Duty Cycle = Max							80	160	mA
Standby Current	I _{SB}	CS = V _{CC} , OE = V _{IH} , Duty Cycle = Max								500	µA
Output Low Voltage	V _{OL}	I _{OL} = 8mA, V _{CC} = Min									V
		I _{OL} = 2.1mA, V _{CC} = Min								0.4	V
Output High Voltage	V _{OH}	I _{OH} = -4.0mA, V _{CC} = Min									V
		I _{OH} = -1.0mA, V _{CC} = Min								2.4	V

NOT AVAILABLE AT TIME OF PRINTING

Parameter	Sym	Conditions	-70		-85		-100		-120		Units
			Typ	Max	Typ	Max	Typ	Max	Typ	Max	
Input Leakage Current	I _{LI}	V _{CC} = Max, V _{IN} = GND or V _{CC}		10		10		10		10	µA
Output Leakage Current	I _{LO}	CS = V _{IH} , OE = V _{IH} , V _{OUT} = GND to V _{CC}		2		2		2		2	µA
Operating Supply Current x 32 Mode	I _{CC} x 32	CS = V _{IL} , OE = V _{IH} , Duty Cycle = Max	240	500	240	500	240	400	240	400	mA
Operating Supply Current x 16 Mode	I _{CC} x 16	CS = V _{IL} , OE = V _{IH} , Duty Cycle = Max	150	300	150	300	150	200	150	200	mA
Operating Supply Current x 8 Mode	I _{CC} x 8	CS = V _{IL} , OE = V _{IH} , Duty Cycle = Max	80	160	80	160	80	120	80	120	mA
Standby Current	I _{SB}	CS ≥ V _{CC} - 2V		500		500		500		500	µA
Output Low Voltage	V _{OL}	I _{OL} = 2.1mA		0.4		0.4		0.4			V
Output High Voltage	V _{OH}	I _{OH} = -1.0mA		2.4		2.4		2.4			V

DC CHARACTERISTICS - 3V

(V_{CC} = 5V, V_{SS} = 0V, T_A = -55°C TO 125°C)

Parameter	Sym	Conditions	-25		-35		-45		-55		Units	
			Typ	Max	Typ	Max	Typ	Max	Typ	Max		
Input Leakage Current	I _{LI}	V _{CC} = Max, V _{IN} = GND or V _{CC}								10	μA	
Output Leakage Current	I _{LO}	\overline{CS} = V _{IH} , \overline{OE} = V _{IH} , V _{OUT} = GND to V _{CC}								2	μA	
Operating Supply Current x 32 Mode	I _{CC} x 32	\overline{CS} = V _{IL} , \overline{OE} = V _{IH} , Duty Cycle = Max								80	200	mA
Operating Supply Current x 16 Mode	I _{CC} x 16	\overline{CS} = V _{IL} , \overline{OE} = V _{IH} , Duty Cycle = Max								60	100	mA
Operating Supply Current x 8 Mode	I _{CC} x 8	\overline{CS} = V _{IL} , \overline{OE} = V _{IH} , Duty Cycle = Max								40	70	mA
Standby Current	I _{SB}	\overline{CS} = V _{CC} , \overline{OE} = V _{IH} , Duty Cycle = Max									250	μA
Output Low Voltage	V _{OL}	I _{OL} = 8mA, V _{CC} = Min										V
		I _{OL} = 2.1mA, V _{CC} = Min									0.4	V
Output High Voltage	V _{OH}	I _{OH} = -4.0mA, V _{CC} = Min										V
		I _{OH} = -1.0mA, V _{CC} = Min									2.4	V

NOT AVAILABLE AT TIME OF PRINTING

Parameter	Sym	Conditions	-70		-85		-100		-120		Units
			Typ	Max	Typ	Max	Typ	Max	Typ	Max	
Input Leakage Current	I _{LI}	V _{CC} = Max, V _{IN} = GND or V _{CC}		10		10		10		10	μA
Output Leakage Current	I _{LO}	\overline{CS} = V _{IH} , \overline{OE} = V _{IH} , V _{OUT} = GND to V _{CC}		2		2		2		2	μA
Operating Supply Current x 32 Mode	I _{CC} x 32	\overline{CS} = V _{IL} , \overline{OE} = V _{IH} , Duty Cycle = Max	80	200	80	200	80	150	80	150	mA
Operating Supply Current x 16 Mode	I _{CC} x 16	\overline{CS} = V _{IL} , \overline{OE} = V _{IH} , Duty Cycle = Max	60	100	60	100	60	80	60	80	mA
Operating Supply Current x 8 Mode	I _{CC} x 8	\overline{CS} = V _{IL} , \overline{OE} = V _{IH} , Duty Cycle = Max	40	70	40	70	40	60	40	60	mA
Standby Current	I _{SB}	$\overline{CS} \geq V_{CC} - 2V$		250		250		250		250	μA
Output Low Voltage	V _{OL}	I _{OL} = 2.1mA		0.4		0.4		0.4			V
Output High Voltage	V _{OH}	I _{OH} = -1.0mA		2.4		2.4		2.4			V

AC ELECTRICAL CHARACTERISTICS

(V_{CC} = 5.0V, V_{SS} = 0V, T_A = -55°C TO 125°C)

Parameter	Symbol	-25		-35		-45		-55		Units
		Min	Max	Min	Max	Min	Max	Min	Max	
Read Cycle Time	t _{RC}							55		nS
Address Access Time	t _{AA}								55	nS
Data Hold from Address Change	t _{OH}							10		nS
Chip Select Access	t _{ACS}								55	nS
Output Enable to Output Valid	t _{OE}								30	nS
Chip Select to Output in Low Z	t _{CLZ} ¹							10		nS
Output Enable to Output in Low Z	t _{OLZ} ¹							5		nS
Chip Deselect to Output in High Z	t _{CHZ} ¹								20	nS
Output Disable to Output in High Z	t _{OHZ} ¹								20	nS

NOT AVAILABLE AT TIME OF PRINTING

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

Parameter	Symbol	-70		-85		-100		-120		Units
		Min	Max	Min	Max	Min	Max	Min	Max	
Read Cycle Time	t _{RC}	70		85		100		120		nS
Address Access Time	t _{AA}		70		85		100		120	nS
Data Hold from Address Change	t _{OH}	10		10		10		10		nS
Chip Select Access	t _{ACS}		70		85		100		120	nS
Output Enable to Output Valid	t _{OE}		40		45		50		60	nS
Chip Select to Output in Low Z	t _{CLZ} ¹	10		10		10		10		nS
Output Enable to Output in Low Z	t _{OLZ} ¹	5		5		5		5		nS
Chip Deselect to Output in High Z	t _{CHZ} ¹		25		30		35		40	nS
Output Disable to Output in High Z	t _{OHZ} ¹		25		30		35		40	nS

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

AC ELECTRICAL CHARACTERISTICS

(V_{CC} = 5.0V, T_A = -55°C TO 125°C)

Parameter	Symbol	-25		-35		-45		-55		Units
		Min	Max	Min	Max	Min	Max	Min	Max	
Write Cycle Time	t _{wc}							55		nS
Chip Select to End of Write	t _{cw}							50		nS
Address Valid to End of Write	t _{aw}							50		nS
Data to Write-Time Overlap	t _{dW}							25		nS
Data Hold from Write Time	t _{dH}							0		nS
Write Pulse Width	t _{wP}							40		nS
Address Setup Time	t _{as}							0		nS
Write Recovery Time	t _{wR}							0		nS
Output Active from End of Write	t _{ow}							5		nS
Write to Output in High Z	t _{wHZ} ¹							0	20	nS

NOT AVAILABLE AT TIME OF PRINTING

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

Parameter	Symbol	-70		-85		-100		-120		Units
		Min	Max	Min	Max	Min	Max	Min	Max	
Write Cycle Time	t _{wc}	70		85		100		120		nS
Chip Select to End of Write	t _{cw}	60		70		80		100		nS
Address Valid to End of Write	t _{aw}	60		70		80		100		nS
Data to Write-Time Overlap	t _{dW}	30		35		40		55		nS
Data Hold from Write Time	t _{dH}	0		0		0		0		nS
Write Pulse Width	t _{wP}	50		60		70		90		nS
Address Setup Time	t _{as}	0		0		0		0		nS
Write Recovery Time	t _{wR}	0		0		0		0		nS
Output Active from End of Write	t _{ow}	5		5		5		5		nS
Write to Output in High Z	t _{wHZ} ¹		25		30		30		45	nS

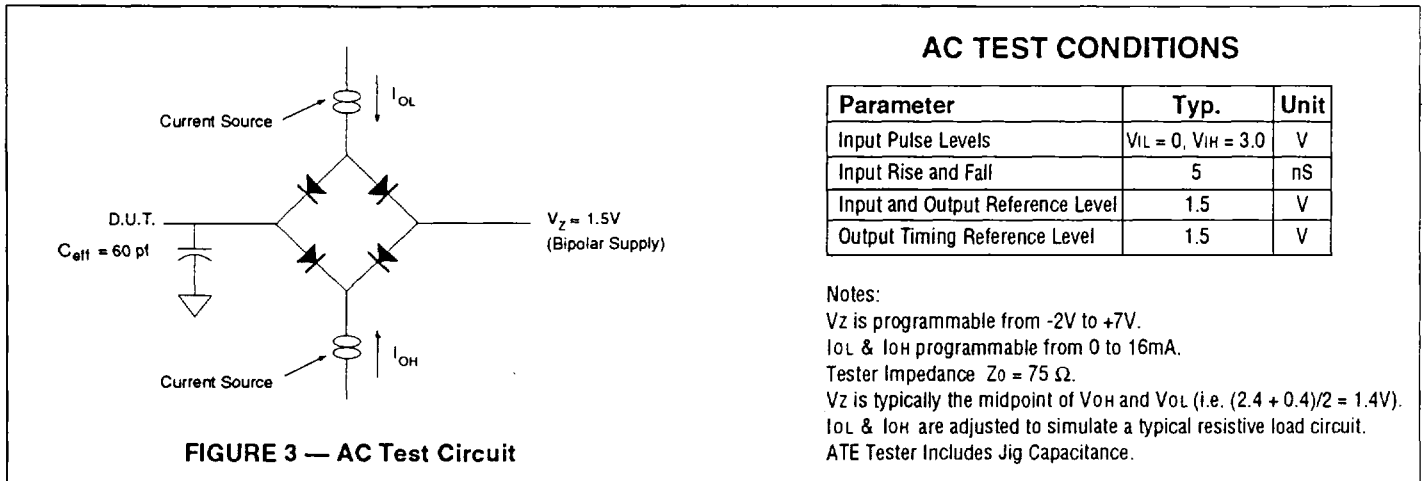
1. This parameter is guaranteed by design but not tested.

DATA RETENTION CHARACTERISTICS

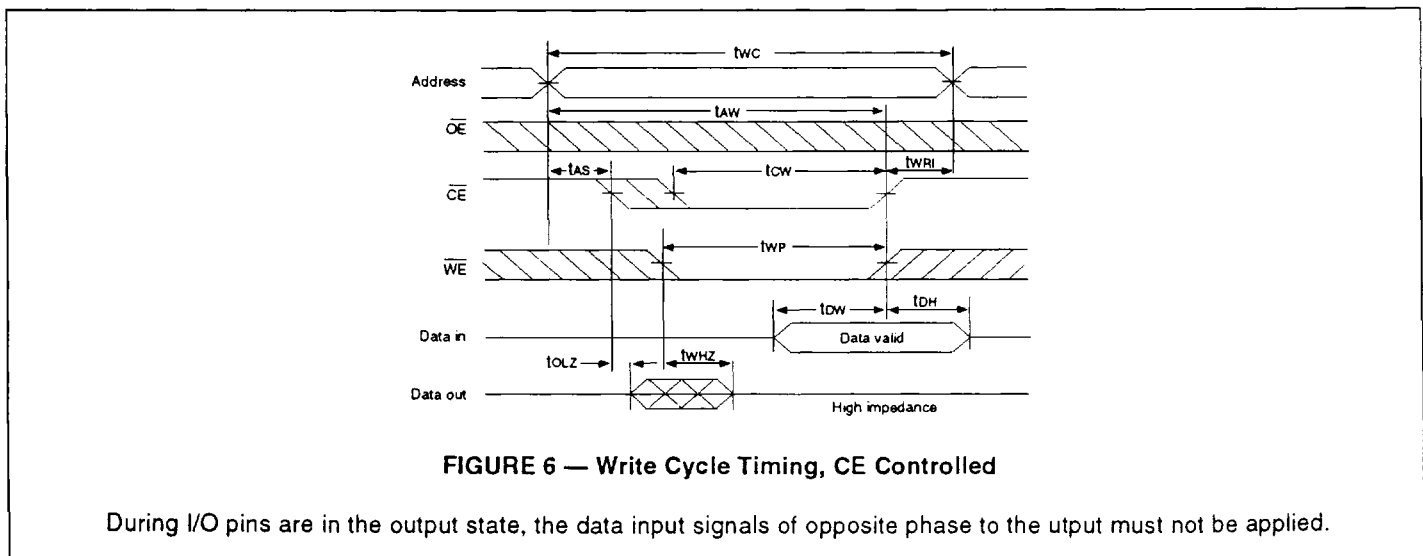
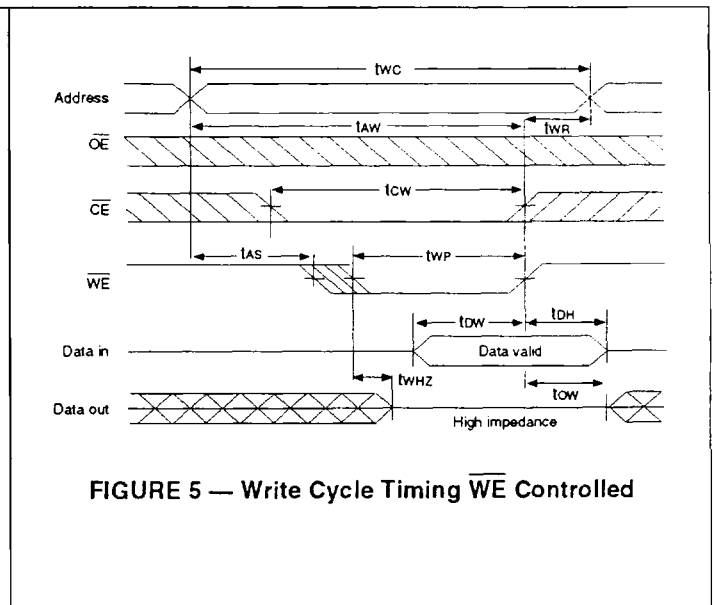
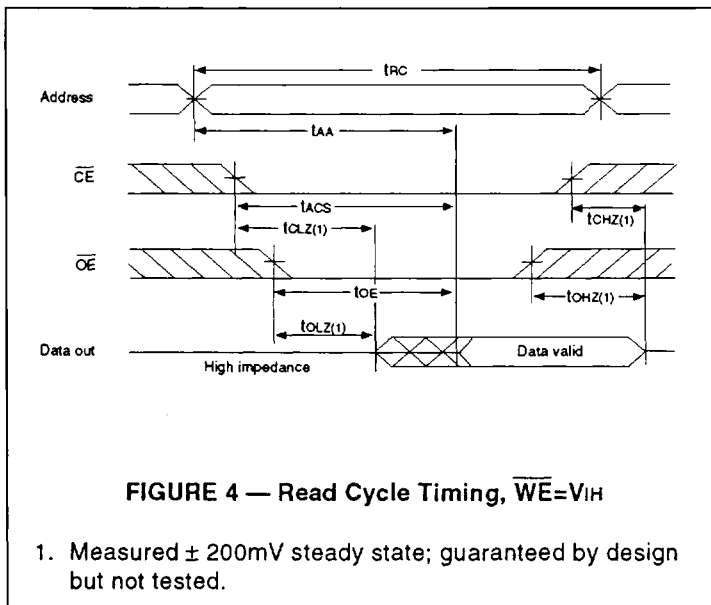
(T_A = -55°C TO 125°C)

Parameter	Symbol	Conditions	-25			-35			-45			-55			Units
			Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Data Retention Supply Voltage	V _{DR}	CS ≥ V _{CC} - .2V										2.0		5.5	V
Data Retention Current	I _{CCDR1}	V _{CC} = 3V											10	400	μA
	I _{CCDR2}	V _{CC} = 2V											8	300	μA

Parameter	Symbol	Conditions	-70			-85			-100			-120			Units
			Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
Data Retention Supply Voltage	V _{DR}	CS ≥ V _{CC} - .2V	2.0		5.5	2.0		5.5	2.0		5.5	2.0		5.5	V
Data Retention Current	I _{CCDR1}	V _{CC} = 3V		.5	8		.5	8		.5	8		.5	8	μA
	I _{CCDR2}	V _{CC} = 2V		8	300		8	300		8	300		8	300	μA



TIMING WAVEFORMS



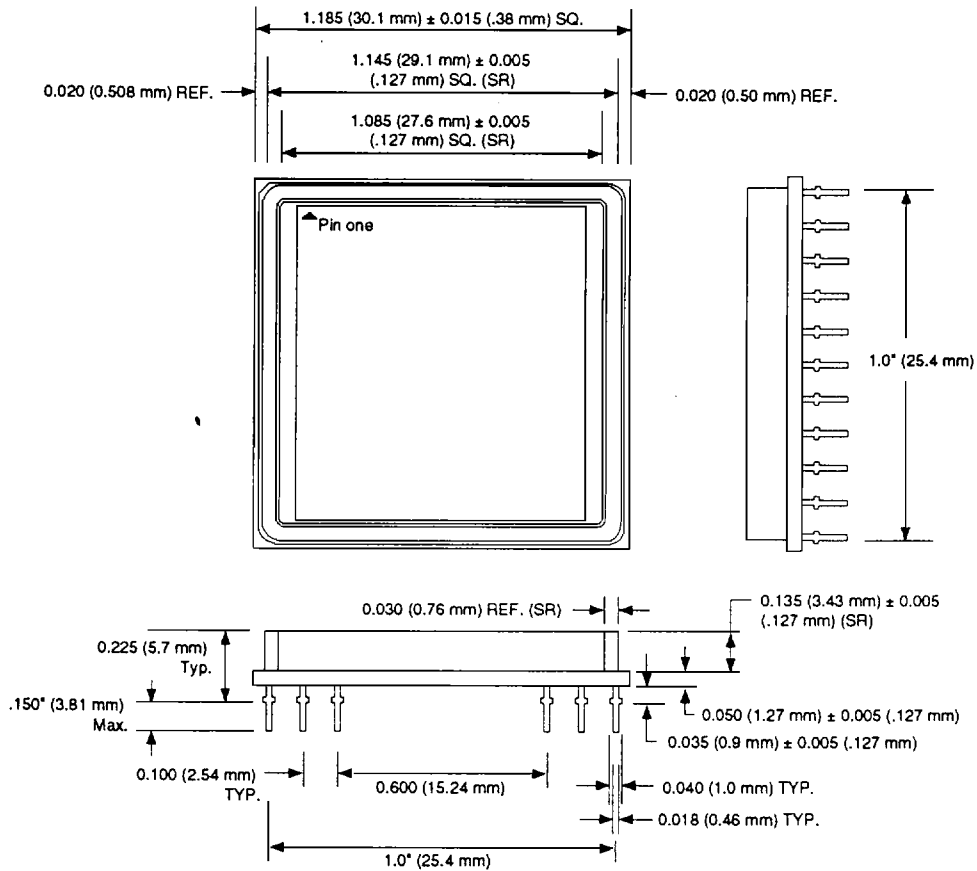


FIGURE 7 — Package Dimensions

ORDERING INFORMATION

WS - 512K32 - XXX H X

DEVICE GRADE:

- Q = MIL-STD-883 Compliant
- M = Mil, -55°C to +125°C
- I = Industrial, -40°C to 85°C
- C = Commercial, 0 to 70°C

PACKAGE TYPE:

- H = Ceramic Hex in line package

ACCESS TIME IN nS

ORGANIZATION, 512Kx32

User configurable as 1024Kx16 or 2Mx8

SRAM

WHITE TECHNOLOGY

"This data has been carefully checked and is believed to be accurate. The information contained herein is not intended to and does not create any warranty of merchantability or fitness for a particular purpose. White Technology reserves the right to change specifications at any time without notice."

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