1Mx32 SRAM MODULE *ADVANCED**

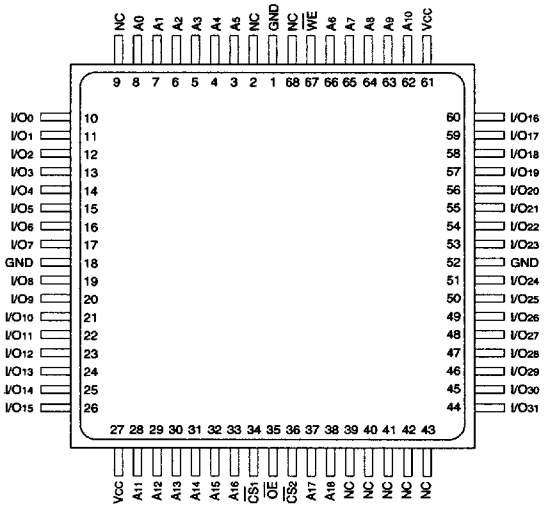
FEATURES

- Access Times of 17, 20, 25ns
- 68 lead, 40mm Low Profile CQFP, 3.5mm (0.140") high (Package 502)
- Organized as two banks of 512Kx32
- Commercial, Industrial and Military Temperature Ranges
- TTL Compatible Inputs and Outputs
- 5 Volt Power Supply
- Low Power CMOS
- Built in Decoupling Caps and Multiple Ground Pins for Low Noise Operation
- Weight
  WS1M32-XG4TX - 20 grams typical

** This data sheet describes a product that may or may not be under development and is subject to change or cancellation without notice.*

PIN CONFIGURATION FOR WS1M32-XG4TX

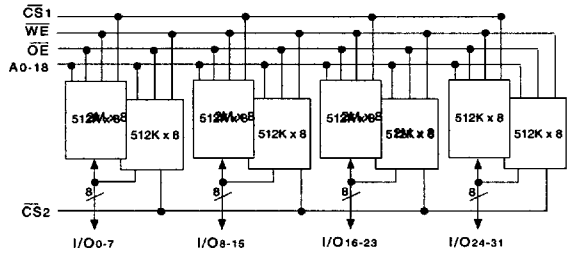
TOP VIEW



PIN DESCRIPTION

I/O0-31	Data Inputs/Outputs
A0-18	Address Inputs
$\overline{WE}$	Write Enable
$\overline{CS}_{1-2}$	Chip Selects
$\overline{OE}$	Output Enable
Vcc	Power Supply
GND	Ground
NC	Not Connected

BLOCK DIAGRAM



NOTE: $\overline{CS}_1$ & $\overline{CS}_2$ are used as bank select

SRAM MODULES

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

CAPACITANCE

(T_A = +25°C)

Parameter	Symbol	Conditions	Max	Unit
$\overline{OE}$ capacitance	C_{OE}	V_{IN} = 0 V, f = 1.0 MHz	50	pF
$\overline{WE}$ capacitance	C_{WE}	V_{IN} = 0 V, f = 1.0 MHz	30	pF
$\overline{CS}_{1-2}$ capacitance	C_{CS}	V_{IN} = 0 V, f = 1.0 MHz	20	pF
Data I/O capacitance	$C_{I/O}$	$V_{I/O}$ = 0 V, f = 1.0 MHz	30	pF
Address input capacitance	C_{AD}	V_{IN} = 0 V, f = 1.0 MHz	20	pF

This parameter is guaranteed by design but not tested.

TRUTH TABLE

$\overline{CS}_1$	$\overline{CS}_2$	$\overline{OE}$	$\overline{WE}$	Mode	Data I/O	Power
H	H	X	X	Standby	High Z	Standby
L	H	L	H	Read	Data Out	Active
L	H	H	H	Out Disable	High Z	Active
L	H	X	L	Write	Data In	Active
H	L	L	H	Read	Data Out	Active
H	L	H	H	Out Disable	High Z	Active
H	L	X	L	Write	Data In	Active
L	L	X	X	Invalid State	Invalid State	Invalid State

DC CHARACTERISTICS

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

Parameter	Symbol	Conditions	Min	Max	Units
Input Leakage Current	I_{LI}	V_{CC} = 5.5, V_{IN} = GND to V_{CC}		10	µA
Output Leakage Current	I_{LO}	$\overline{CS}$ = V_{IH}, $\overline{OE}$ = V_{IH}, V_{OUT} = GND to V_{CC}		10	µA
Operating Supply Current x 32 Mode	$I_{CC \times 32}$	$\overline{CS}$ = V_{IL}, $\overline{OE}$ = V_{IH}, f = 5MHz, V_{CC} = 5.5		580	mA
Standby Current	I_{SB}	$\overline{CS}$ = V_{IH}, $\overline{OE}$ = V_{IH}, f = 5MHz, V_{CC} = 5.5		120	mA
Output Low Voltage	V_{OL}	I_{OL} = 8mA, V_{CC} = 4.5		0.4	
Output High Voltage	V_{OH}	I_{OH} = -4.0mA, V_{CC} = 4.5	2.4		V

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°C to +125°C)

Parameter Read Cycle	Symbol	-17		-20		-25		Units
		Min	Max	Min	Max	Min	Max	
Read Cycle Time	t_{RC}	17		20		25		ns
Address Access Time	t_{AA}		17		20		25	ns
Output Hold from Address Change	t_{OH}	0		0		0		ns
Chip Select Access Time	t_{ACS}		17		20		25	ns
Output Enable to Output Valid	t_{OE}		10		10		12	ns
Chip Select to Output in Low Z	t_{CLZ}[1]	2		2		2		ns
Output Enable to Output in Low Z	t_{OLZ}[1]	0		0		0		ns
Chip Disable to Output in High Z	t_{CHZ}[1]		12		12		12	ns
Output Disable to Output in High Z	t_{OHZ}[1]		12		12		12	ns

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

AC CHARACTERISTICS

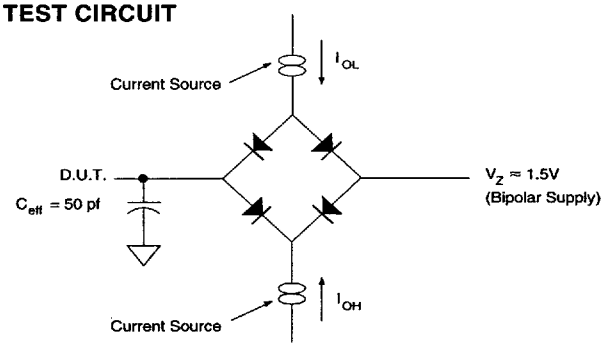
(V_{CC} = 5.0V, V_{SS} = 0V, T_A = -55°C to +125°C)

Parameter Write Cycle	Symbol	-17		-20		-25		Units
		Min	Max	Min	Max	Min	Max	
Write Cycle Time	t_{WC}	17		20		25		ns
Chip Select to End of Write	t_{CW}	15		15		17		ns
Address Valid to End of Write	t_{AW}	15		15		17		ns
Data Valid to End of Write	t_{DW}	11		12		13		ns
Write Pulse Width	t_{WP}	15		15		17		ns
Address Setup Time	t_{AS}	2		2		2		ns
Address Hold Time	t_{AH}	0		0		0		ns
Output Active from End of Write	t_{OW}[1]	2		3		4		ns
Write Enable to Output in High Z	t_{WHZ}[1]		9		11		13	ns
Data Hold Time	t_{DH}	0		0		0		ns

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

SRAM MODULES

AC TEST CIRCUIT

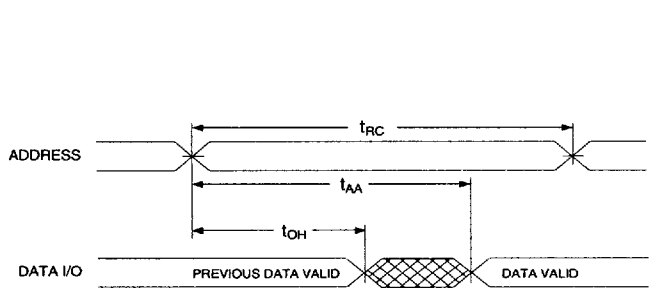


AC TEST CONDITIONS

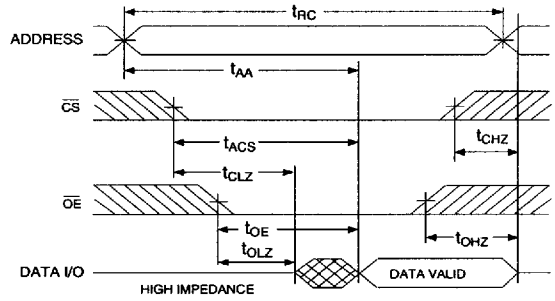
Parameter	Typ	Unit
Input Pulse Levels	V_{IL} = 0, V_{IH} = 3.0	V
Input Rise and Fall	5	ns
Input and Output Reference Level	1.5	V
Output Timing Reference Level	1.5	V

NOTES:
V_Z is programmable from -2V to +7V.
I_{OL} & I_{OH} programmable from 0 to 16mA.
Tester Impedance Z_0 = 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

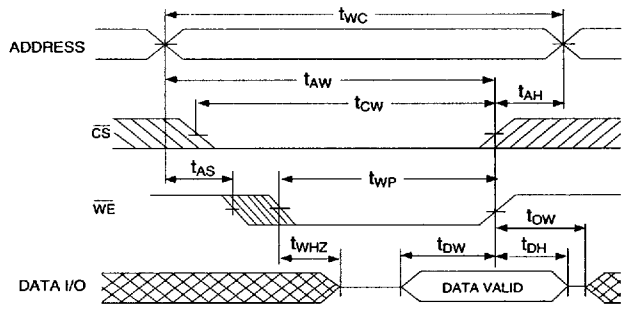


READ CYCLE 1 ($\overline{CS}$ = $\overline{OE}$ = V_{IL}, $\overline{WE}$ = V_{IH})



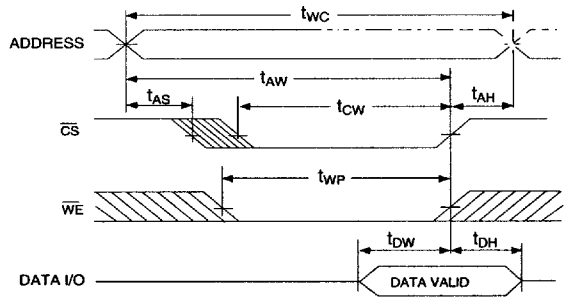
READ CYCLE 2 ($\overline{WE}$ = V_{IH})

WRITE CYCLE - $\overline{WE}$ CONTROLLED



WRITE CYCLE 1, $\overline{WE}$ CONTROLLED

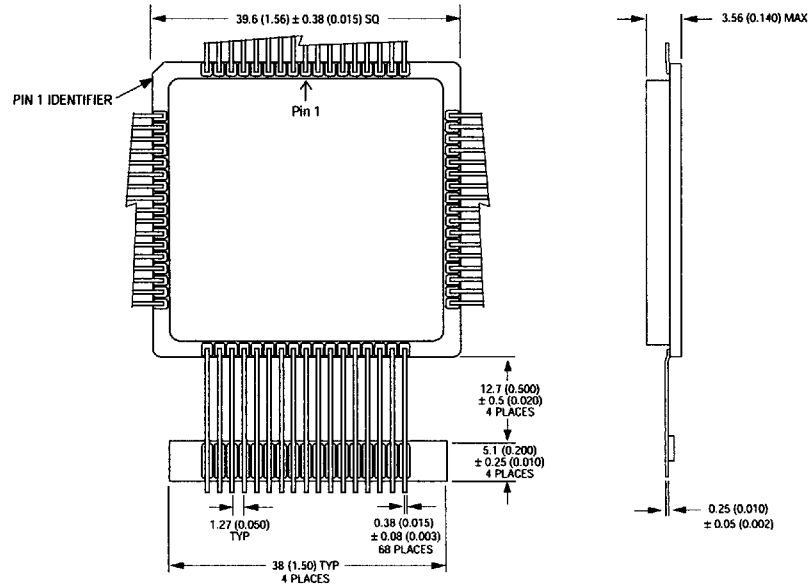
WRITE CYCLE - $\overline{CS}$ CONTROLLED



WRITE CYCLE 2, $\overline{CS}$ CONTROLLED

SRAM MODULES

PACKAGE 502: 68 LEAD, CERAMIC QUAD FLAT PACK, LOW PROFILE CQFP (G4T)



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

ORDERING INFORMATION

W S 1M32 - XX G4T X

DEVICE GRADE:

M = Military Screened	-55°C to +125°C
I = Industrial	-40°C to +85°C
C = Commercial	0 to +70°C

PACKAGE TYPE:
G4T = 40 mm Low Profile CQFP (Package 502)

ACCESS TIME in ns

ORGANIZATION, two banks of 512Kx32

SRAM

WHITE MICROELECTRONICS