



# 128Kx48 SRAM MODULE ADVANCED\*

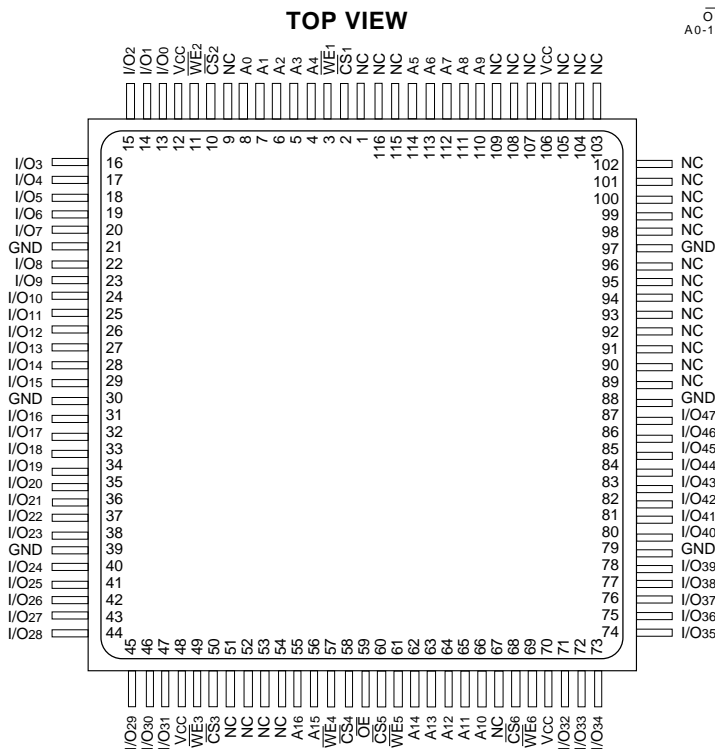
## FEATURES

- Access Times 17, 20, 25, 35ns
- Packaging:
  - 116 Lead, 40.0mm Hermetic CQFP (Package 504)
- Commercial, Industrial and Military Temperature Ranges
- 5 Volt Power Supply
- Low Power CMOS
- Organized as 128K x 48, Data Width is user configurable.

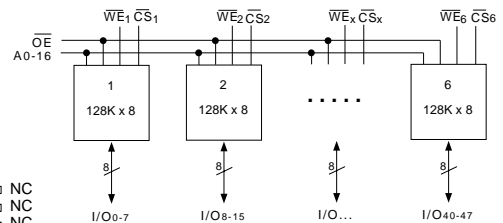
- 2V Data Retention Devices Available (Low Power Version)
- TTL Compatible Inputs and Outputs
- Weight  
WS128K48-XG4WX - 20 grams typical

\* 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 WS128K48-XG4WX



## BLOCK DIAGRAM



## PIN DESCRIPTION

I/O0-47	Data Inputs/Outputs
A0-16	Address Inputs
WE1-6	Write Enables
CS1-6	Chip Selects
OE	Output Enable
Vcc	Power Supply
GND	Ground
NC	Not Connected



## ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Operating Temperature	T <sub>A</sub>	-55	+125	°C
Storage Temperature	T <sub>STG</sub>	-65	+150	°C
Signal Voltage Relative to GND	V <sub>G</sub>	-0.5	V <sub>CC</sub> +0.5	V
Junction Temperature	T <sub>J</sub>		150	°C
Supply Voltage	V <sub>CC</sub>	-0.5	7.0	V

## RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V <sub>CC</sub>	4.5	5.5	V
Input High Voltage	V <sub>IH</sub>	2.2	V <sub>CC</sub> + 0.3	V
Input Low Voltage	V <sub>IL</sub>	-0.3	+0.8	V
Operating Temp. (Mil.)	T <sub>A</sub>	-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	X	L	Write	Data In	Active
L	H	H	Out Disable	High Z	Active

## CAPACITANCE

(T<sub>A</sub> = +25°C)

Parameter	Symbol	Conditions	Max	Unit
OE capacitance	C <sub>OE</sub>	V <sub>IN</sub> = 0 V, f = 1.0 MHz	100	pF
WE capacitance	C <sub>WE</sub>	V <sub>IN</sub> = 0 V, f = 1.0 MHz	20	pF
CS capacitance	C <sub>CS</sub>	V <sub>IN</sub> = 0 V, f = 1.0 MHz	20	pF
Data I/O capacitance	C <sub>I/O</sub>	V <sub>I/O</sub> = 0 V, f = 1.0 MHz	20	pF
Address input capacitance	C <sub>AD</sub>	V <sub>IN</sub> = 0 V, f = 1.0 MHz	100	pF

This parameter is guaranteed by design but not tested.

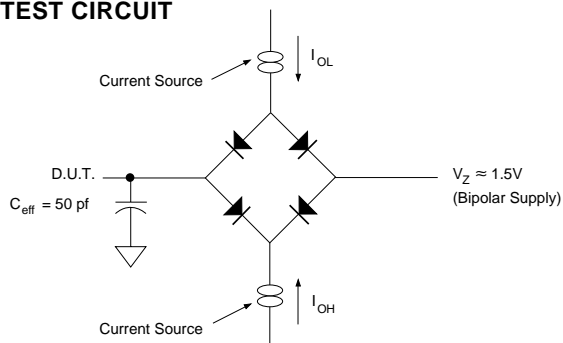
## DC CHARACTERISTICS

(V<sub>CC</sub> = 5.0V, T<sub>A</sub> = -55°C to +125°C)

Parameter	Sym	Conditions	-17		-20		-25		-35		Units
			Min	Max	Min	Max	Min	Max	Min	Max	
Input Leakage Current	I <sub>LI</sub>	V <sub>CC</sub> = 5.5, V <sub>IN</sub> = GND to V <sub>CC</sub>		10		10		10		10	μA
Output Leakage Current	I <sub>LO</sub>	$\overline{CS}$ = V <sub>IH</sub> , $\overline{OE}$ = V <sub>IH</sub> , V <sub>OUT</sub> = GND to V <sub>CC</sub>		10		10		10		10	μA
Operating Supply Current	I <sub>CC</sub>	$\overline{CS}$ = V <sub>IL</sub> , $\overline{OE}$ = V <sub>IH</sub> , f = 5MHz, V <sub>CC</sub> = 5.5		720		720		720		720	mA
Standby Current	I <sub>SB</sub>	$\overline{CS}$ = V <sub>IH</sub> , $\overline{OE}$ = V <sub>IH</sub> , f = 5MHz, V <sub>CC</sub> = 5.5		120		120		90		90	mA
Output Low Voltage	V <sub>OL</sub>	I <sub>OL</sub> = 8mA, V <sub>CC</sub> = 4.5		0.4		0.4		0.4		0.4	V
Output High Voltage	V <sub>OH</sub>	I <sub>OH</sub> = -4.0mA, V <sub>CC</sub> = 4.5	2.4		2.4		2.4		2.4		V

NOTE: DC test conditions: V<sub>IH</sub> = V<sub>CC</sub> - 0.3V, V<sub>IL</sub> = 0.3V

## AC TEST CIRCUIT



## AC TEST CONDITIONS

Parameter	Typ	Unit
Input Pulse Levels	V <sub>IL</sub> = 0, V <sub>IH</sub> = 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<sub>Z</sub> is programmable from -2V to +7V.  
I<sub>OL</sub> & I<sub>OH</sub> programmable from 0 to 16mA.  
Tester Impedance Z<sub>0</sub> = 75 Ω.  
V<sub>Z</sub> is typically the midpoint of V<sub>OH</sub> and V<sub>OL</sub>.  
I<sub>OL</sub> & I<sub>OH</sub> are adjusted to simulate a typical resistive load circuit.  
ATE tester includes jig capacitance.



### AC CHARACTERISTICS

(V<sub>CC</sub> = 5.0V, T<sub>A</sub> = -55°C To +125°C)

Parameter Read Cycle	Symbol	<u>-17</u>		<u>-20</u>		<u>-25</u>		<u>-35</u>		Units
		Min	Max	Min	Max	Min	Max			
Read Cycle Time	t <sub>RC</sub>	17		20		25		35		ns
Address Access Time	t <sub>AA</sub>		17		20		25		35	ns
Output Hold from Address Change	t <sub>OH</sub>	0		0		0		0		ns
Chip Select Access Time	t <sub>ACS</sub>		17		20		25		35	ns
Output Enable to Output Valid	t <sub>OE</sub>		10		12		15		20	ns
Chip Select to Output in Low Z	t <sub>CLZ</sub> <sup>1</sup>	3		3		3		3		ns
Output Enable to Output in Low Z	t <sub>OLZ</sub> <sup>1</sup>	0		0		0		0		ns
Chip Disable to Output in High Z	t <sub>CHZ</sub> <sup>1</sup>		10		12		12		20	ns
Output Disable to Output in High Z	t <sub>OHZ</sub> <sup>1</sup>		10		12		12		20	ns

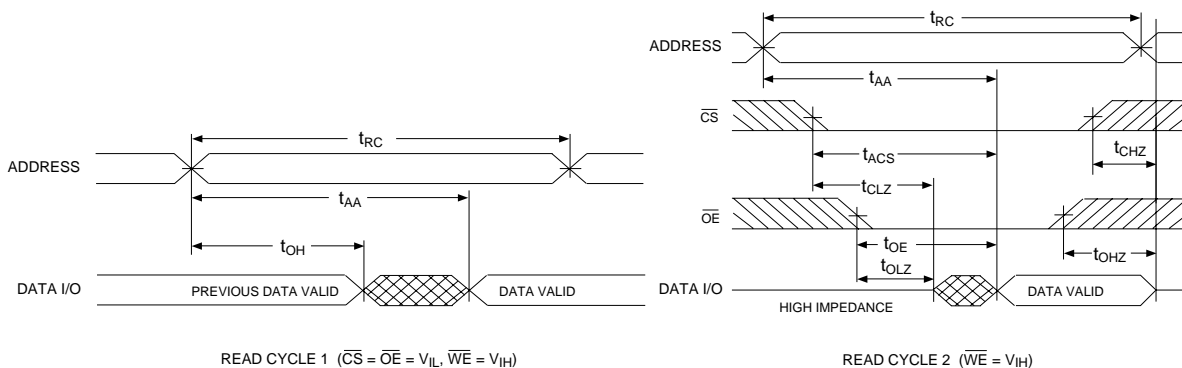
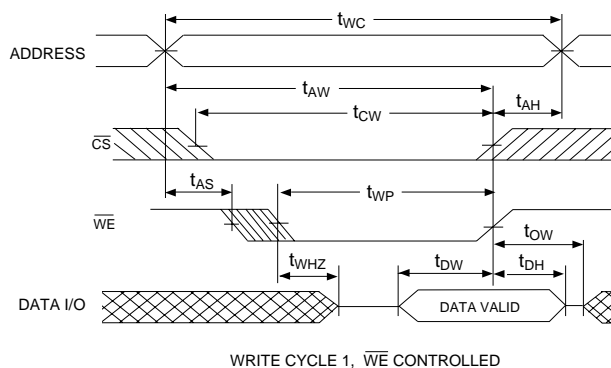
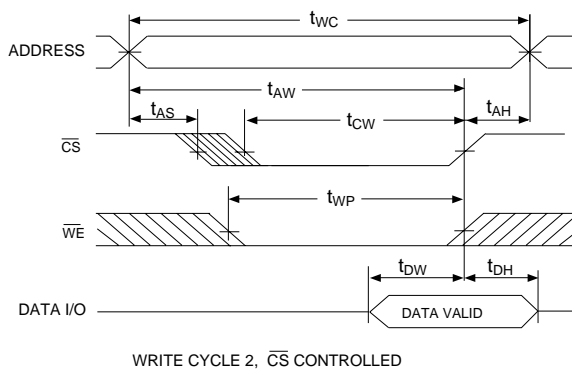
1. This parameter is guaranteed by design but not tested.

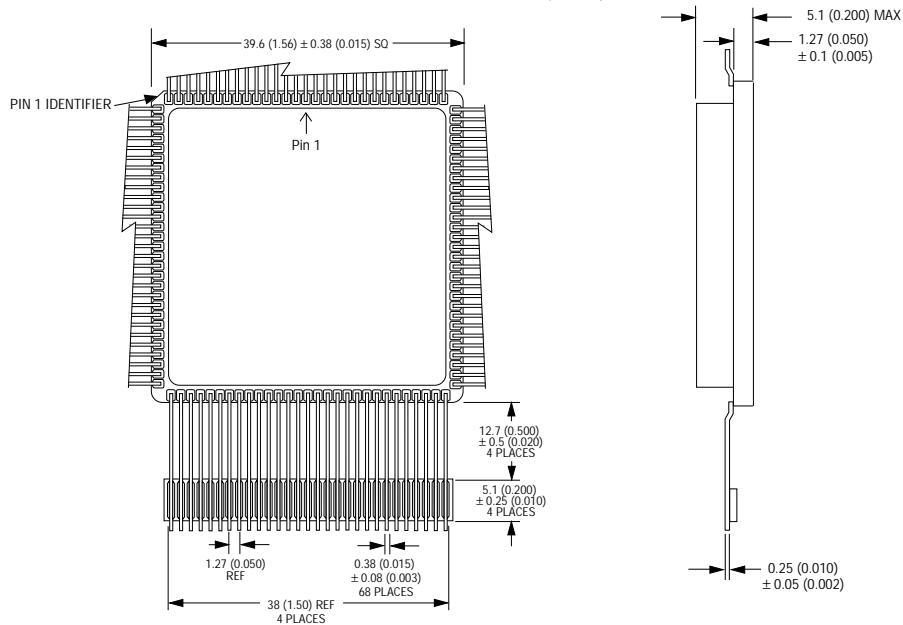
### AC CHARACTERISTICS

(V<sub>CC</sub> = 5.0V, T<sub>A</sub> = -55°C To +125°C)

Parameter Write Cycle	Symbol	<u>-17</u>		<u>-20</u>		<u>-25</u>		<u>-35</u>		Units
		Min	Max	Min	Max	Min	Max	Min	Max	
Write Cycle Time	t <sub>WC</sub>	17		20		25		35		ns
Chip Select to End of Write	t <sub>CW</sub>	14		15		20		25		ns
Address Valid to End of Write	t <sub>AW</sub>	15		15		20		25		ns
Data Valid to End of Write	t <sub>DW</sub>	10		12		15		20		ns
Write Pulse Width	t <sub>WP</sub>	14		15		20		25		ns
Address Setup Time	t <sub>AS</sub>	0		0		0		0		ns
Address Hold Time	t <sub>AH</sub>	0		0		0		0		ns
Output Active from End of Write	t <sub>OW</sub> <sup>1</sup>	3		3		3		4		ns
Write Enable to Output in High Z	t <sub>WHZ</sub> <sup>1</sup>		10		12		15		20	ns
Data Hold Time	t <sub>DH</sub>	0		0		0		0		ns

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

**TIMING WAVEFORM - READ CYCLE****WRITE CYCLE -  $\overline{WE}$  CONTROLLED****WRITE CYCLE -  $\overline{CS}$  CONTROLLED**

**PACKAGE 504: 116 LEAD, CERAMIC QUAD FLAT PACK, CQFP (G4W)**

ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

**ORDERING INFORMATION**

**W S 128K48 - XXX G4W X X**

**LEAD FINISH:**

Blank = Gold plated leads  
A = Solder dip leads

**DEVICE GRADE:**

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

**PACKAGE TYPE:**

G4W = 116 Lead 40mm Ceramic Quad Flat Pack, CQFP (Package 504)

**ACCESS TIME (ns)****ORGANIZATION, 128K x 48****SRAM****WHITE MICROELECTRONICS**