



## 128Kx32 3.3V SRAM MULTICHIP PACKAGE PRELIMINARY\*

### FEATURES

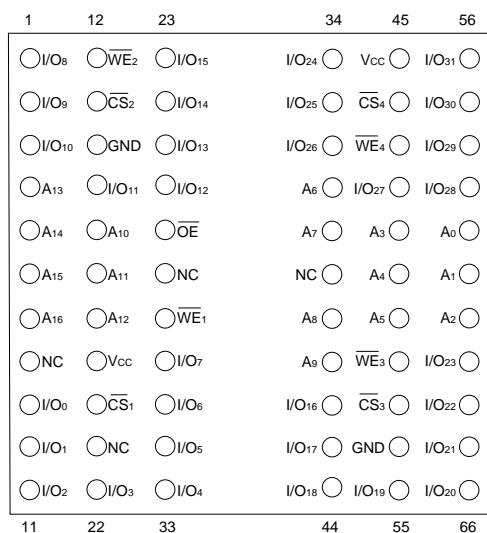
- Access Times of 15 \*\*, 17, 20, 25, 35ns
- Low Voltage Operation
- Packaging
  - 66-pin, PGA Type, 1.075 inch square Hermetic Ceramic HIP (Package 400)
  - 68 lead, Hermetic CQFP (G2T), 22.4mm (0.880 inch) square (Package 509), 4.57mm (0.180 inch) high. Designed to fit JEDEC 68 lead 0.990" CQFJ footprint (Fig. 2)
  - 68 lead, Hermetic CQFP (G1U), 23.8mm (0.940 inch) square (Package 509), 3.56mm (0.140 inch) high.
- Organized as 128Kx32; User Configurable as 256Kx16 or 512Kx8
- Commercial, Industrial and Military Temperature Ranges
- 3.3 Volt Power Supply
- Low Power CMOS
- TTL Compatible Inputs and Outputs
- Built-in Decoupling Caps and Multiple Ground Pins for Low Noise Operation
- Weight
  - WS128K32V-XG2TX - 8 grams typical
  - WS128K32V-XG1UX - 5 grams typical
  - WS128K32V-XH1X - 13 grams typical

\* This data sheet describes a product that is not fully qualified or characterized and is subject to change without notice.

\*\* Commercial and Industrial temperature ranges only.

**FIG. 1 PIN CONFIGURATION FOR WS128K32NV-XH1X**

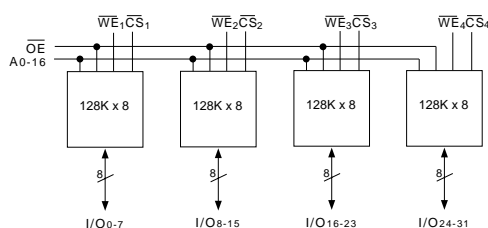
#### TOP VIEW



#### PIN DESCRIPTION

I/O <sub>0-31</sub>	Data Inputs/Outputs
A <sub>0-16</sub>	Address Inputs
$\overline{WE}_{1-4}$	Write Enables
$\overline{CS}_{1-4}$	Chip Selects
$\overline{OE}$	Output Enable
V <sub>CC</sub>	Power Supply
GND	Ground
NC	Not Connected

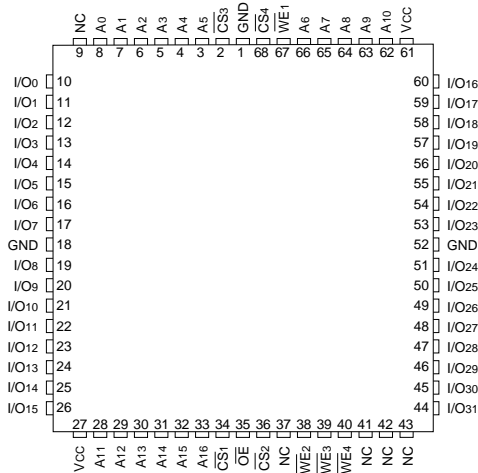
#### BLOCK DIAGRAM





**FIG. 2 PIN CONFIGURATION FOR WS128K32V-XG2TX AND WS128K32V-XG1UX**

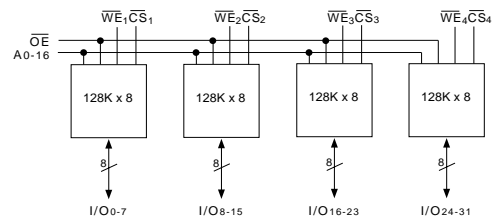
**TOP VIEW**



**PIN DESCRIPTION**

I/O0-31	Data Inputs/Outputs
A0-16	Address Inputs
$\overline{WE}_{1-4}$	Write Enables
$\overline{CS}_{1-4}$	Chip Selects
$\overline{OE}$	Output Enable
Vcc	Power Supply
GND	Ground
NC	Not Connected

**BLOCK DIAGRAM**





### 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	4.6	V
Junction Temperature	T <sub>J</sub>		150	°C
Supply Voltage	V <sub>CC</sub>	-0.5	5.5	V

### RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V <sub>CC</sub>	3.0	3.6	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

### 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
$\overline{OE}$ capacitance	C <sub>OE</sub>	V <sub>IN</sub> = 0 V, f = 1.0 MHz	50	pF
$\overline{WE}$ 1-4 capacitance HIP (PGA)	C <sub>WE</sub>	V <sub>IN</sub> = 0 V, f = 1.0 MHz	20	pF
CQFP G2T/G1U			20	
$\overline{CS}$ 1-4 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	50	pF

This parameter is guaranteed by design but not tested.

### DC CHARACTERISTICS

(V<sub>CC</sub> = 3.3V ±0.3V, V<sub>SS</sub> = 0V, T<sub>A</sub> = -55°C to +125°C)

Parameter	Sym	Conditions	Min	Max	Units
Input Leakage Current	I <sub>LI</sub>	V <sub>IN</sub> = GND to V <sub>CC</sub>		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	μA
Operating Supply Current (x 32 Mode)	I <sub>CC</sub> x 32	$\overline{CS}$ = V <sub>IL</sub> , $\overline{OE}$ = V <sub>IH</sub> , f = 5MHz		500	mA
Standby Current	I <sub>SB</sub>	$\overline{CS}$ = V <sub>IH</sub> , $\overline{OE}$ = V <sub>IH</sub> , f = 5MHz		32	mA
Output Low Voltage	V <sub>OL</sub>	I <sub>OL</sub> = 8mA		0.4	V
Output High Voltage	V <sub>OH</sub>	I <sub>OH</sub> = -4.0mA	2.4		V



### AC CHARACTERISTICS

(V<sub>CC</sub> = 3.3V, T<sub>A</sub> = -55°C to +125°C)

Parameter	Symbol	-15*		-17		-20		-25		-35		Units
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
Read Cycle Time	trc	15		17		20		25		35		ns
Address Access Time	tAA		15		17		20		25		35	ns
Output Hold from Address Change	tOH	0		0		0		0		0		ns
Chip Select Access Time	tACS		15		17		20		25		35	ns
Output Enable to Output Valid	tOE		10		11		12		15		20	ns
Chip Select to Output in Low Z	tCLZ <sup>1</sup>	5		5		5		5		5		ns
Output Enable to Output in Low Z	tOLZ <sup>1</sup>	5		5		5		5		5		ns
Chip Disable to Output in High Z	tCHZ <sup>1</sup>		8		9		10		12		15	ns
Output Disable to Output in High Z	tOHZ <sup>1</sup>		8		9		10		12		15	ns

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

\* Commercial and Industrial only.

### AC CHARACTERISTICS

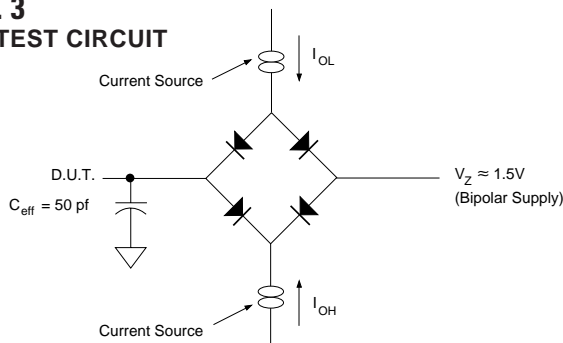
(V<sub>CC</sub> = 3.3V, T<sub>A</sub> = -55°C to +125°C)

Parameter	Symbol	-15*		-17		-20		-25		-35		Units
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
Write Cycle Time	tWC	15		17		20		25		35		ns
Chip Select to End of Write	tCW	13		14		15		20		30		ns
Address Valid to End of Write	tAW	13		14		15		20		30		ns
Data Valid to End of Write	tdW	10		11		12		15		18		ns
Write Pulse Width	tWP	13		14		15		20		30		ns
Address Setup Time	tAS	0		0		0		0		0		ns
Address Hold Time	tAH	0		0		0		0		0		ns
Output Active from End of Write	tOW <sup>1</sup>	5		5		5		5		5		ns
Write Enable to Output in High Z	tWHZ <sup>1</sup>		8		9		10		10		15	ns
Data Hold Time	tdH	0		0		0		0		0		ns

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

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**FIG. 3**  
**AC TEST CIRCUIT**



### AC TEST CONDITIONS

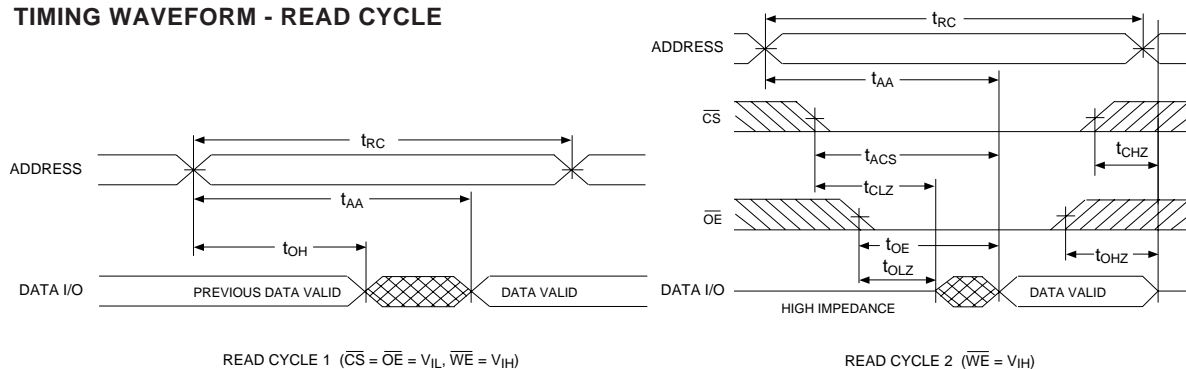
Parameter	Typ	Unit
Input Pulse Levels	$V_{IL} = 0, V_{IH} = 3.0$	V
Input Rise and Fall	5	ns
Input and Output Reference Level	1.5	V
Output Timing Reference Level	1.5	V

#### NOTES:

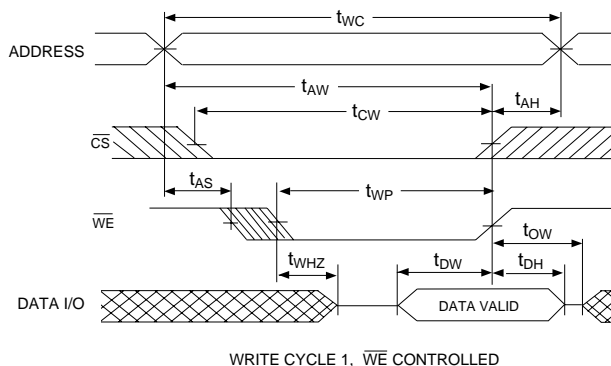
V<sub>Z</sub> is programmable from -2V to +7V.  
 $I_{OL}$  &  $I_{OH}$  programmable from 0 to 16mA.  
 Tester Impedance  $Z_0 = 75 \Omega$ .  
 V<sub>Z</sub> is typically the midpoint of V<sub>OH</sub> and V<sub>OL</sub>.  
 $I_{OL}$  &  $I_{OH}$  are adjusted to simulate a typical resistive load circuit.  
 ATE tester includes jig capacitance.



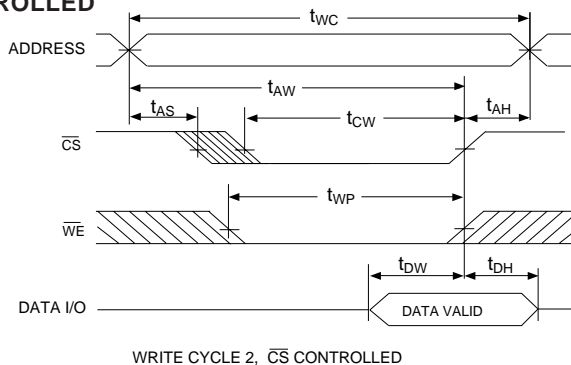
**FIG. 4**  
**TIMING WAVEFORM - READ CYCLE**



**FIG. 5**  
**WRITE CYCLE -  $\overline{WE}$  CONTROLLED**

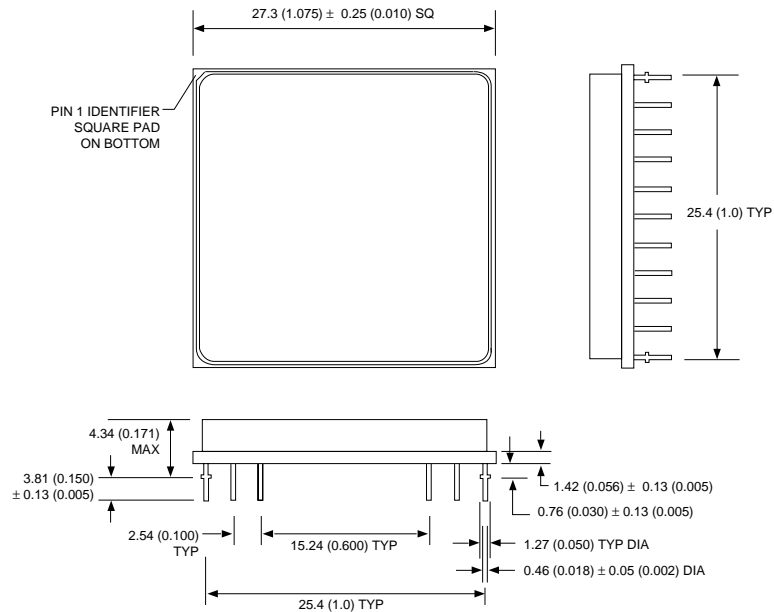


**FIG. 6**  
**WRITE CYCLE -  $\overline{CS}$  CONTROLLED**





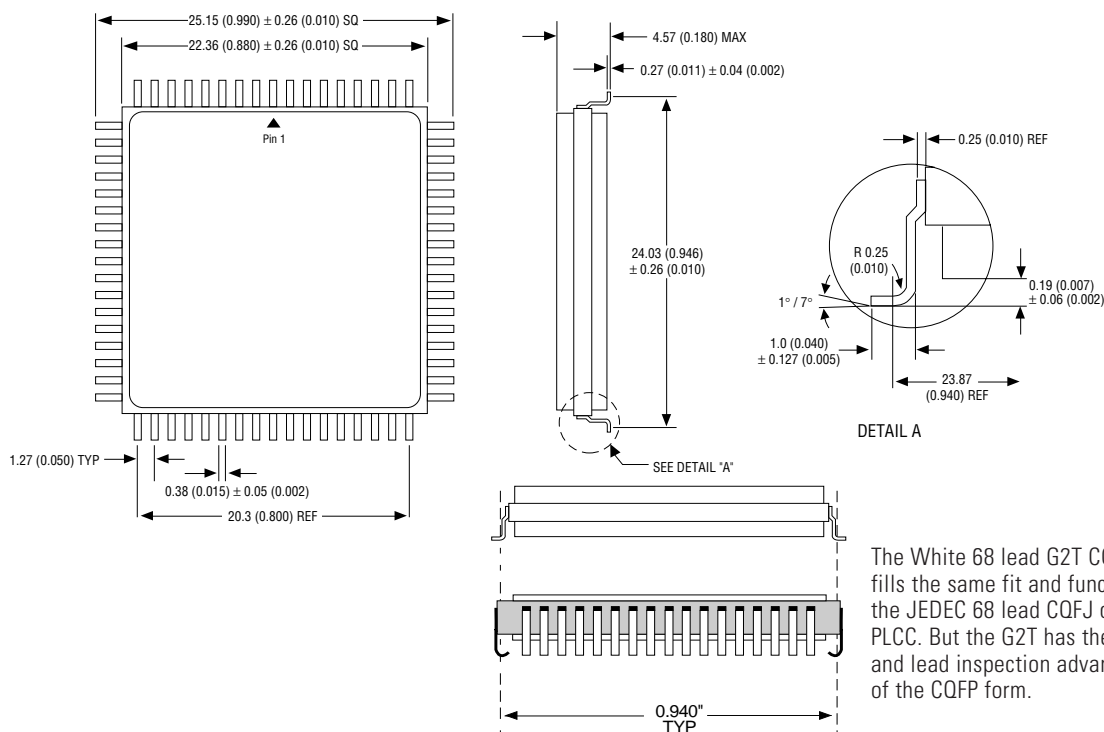
### PACKAGE 400: 66 PIN, PGA TYPE, CERAMIC HEX-IN-LINE PACKAGE, HIP (H1)



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

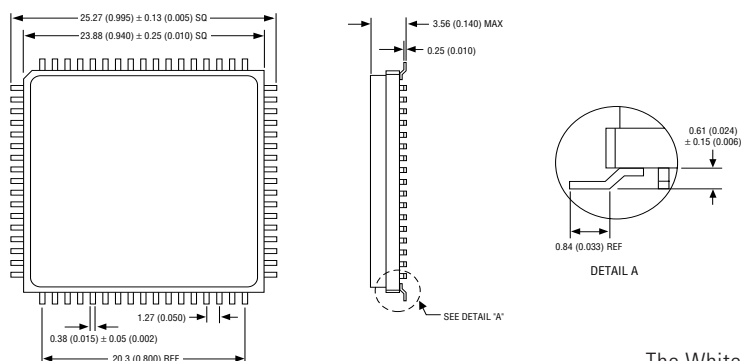


### PACKAGE 509: 68 LEAD, CERAMIC QUAD FLAT PACK, CQFP (G2T)



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

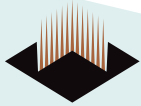
### PACKAGE 519: 68 LEAD, CERAMIC QUAD FLAT PACK, LOW PROFILE CQFP (G1U)



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

The White 68 lead G2T CQFP fills the same fit and function as the JEDEC 68 lead CQFJ or 68 PLCC. But the G2T has the TCE and lead inspection advantage of the CQFP form.

The White 68 lead G1U CQFP fills the same fit and function as the JEDEC 68 lead CQFJ or 68 PLCC. But the G1U has the TCE and lead inspection advantage of the CQFP form.



### ORDERING INFORMATION

**W S 128K 32 X V - XXX X 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:

H1 = Ceramic Hex-In-line Package, HIP (Package 400)

G2T = 22.4mm CQFP (Package 509)

G1U = 23.8mm Low Profile CQFP (Package 519)

#### ACCESS TIME (ns)

Low Voltage Supply 3.3V  $\pm$  10%

#### IMPROVEMENT MARK:

N = No Connect at pins 8, 21, 28, 39 in HIP for upgrade.

#### ORGANIZATION, 128Kx32

User configurable as 256Kx16 or 512Kx8

#### SRAM

#### WHITE ELECTRONIC DESIGNS CORP.