128Kx32 3.3V SRAM MULTICHIP PACKAGE *PRELIMINARY**

FEATURES

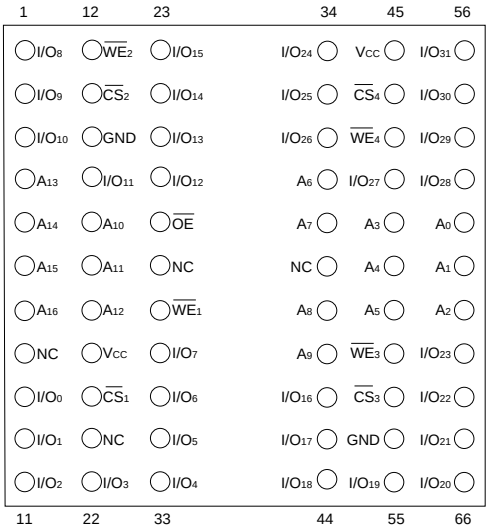
- Access Times of 15**, 17, 20, 25, 35ns
- Low Voltage Operation
- Packaging
  - 66-pin, PGA Type, 1.075 inch square Hermetic Ceramic HIP (Package 400)
  - 68 lead, Hermetic CQFP (G2T), 22.4mm (0.880 inch) square (Package 509), 4.57mm (0.180 inch) high. Designed to fit JEDEC 68 lead 0.990" CQFJ footprint (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 ot change without notice.*

** *Commercial and Industrial temperature ranges only.*

FIG. 1 PIN CONFIGURATION FOR WS128K32NV-XH1X

TOP VIEW



PIN DESCRIPTION

I/O_{0-31}	Data Inputs/Outputs
A_{0-16}	Address Inputs
$\overline{WE}_{1-4}$	Write Enables
$\overline{CS}_{1-4}$	Chip Selects
$\overline{OE}$	Output Enable
V_{CC}	Power Supply
GND	Ground
NC	Not Connected

BLOCK DIAGRAM

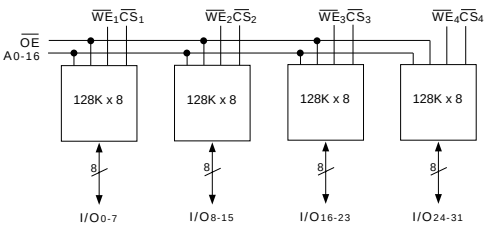
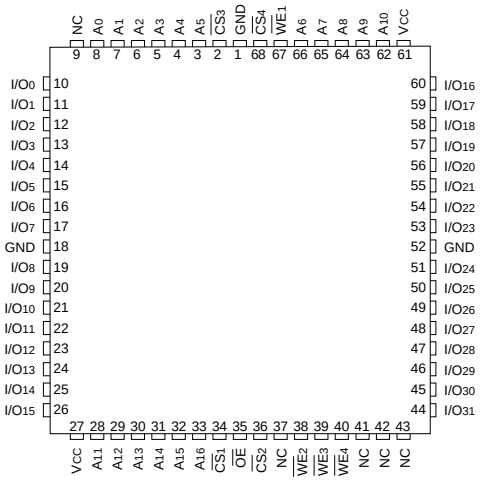


FIG. 2 PIN CONFIGURATION FOR WS128K32V-XG2TX AND WS128K32V-XG1UX

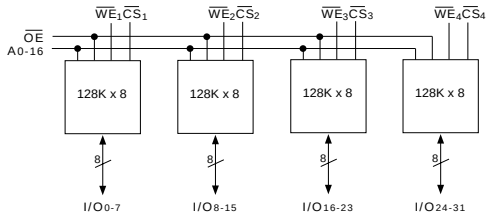
TOP VIEW



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_A	-55	+125	°C
Storage Temperature	T_{STG}	-65	+150	°C
Signal Voltage Relative to GND	V_G	-0.5	4.6	V
Junction Temperature	T_J		150	°C
Supply Voltage	V_{CC}	-0.5	5.5	V

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{CC}	3.0	3.6	V
Input High Voltage	V_{IH}	2.2	V_{CC} + 0.3	V
Input Low Voltage	V_{IL}	-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_A = +25°C)

Parameter	Symbol	Conditions	Max	Unit
$\overline{OE}$ capacitance	C_{OE}	V_{IN} = 0 V, f = 1.0 MHz	50	pF
$\overline{WE}_{1-4}$ capacitance	C_{WE}	V_{IN} = 0 V, f = 1.0 MHz		pF
HIP (PGA)			20	
CQFP G2T/G1U			20	
$\overline{CS}_{1-4}$ 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	20	pF
Address input capacitance	C_{AD}	V_{IN} = 0 V, f = 1.0 MHz	50	pF

This parameter is guaranteed by design but not tested.

DC CHARACTERISTICS

(V_{CC} = 3.3V ±0.3V, V_{SS} = 0V, T_A = -55°C to +125°C)

Parameter	Sym	Conditions	Min	Max	Units
Input Leakage Current	I_{LI}	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} x 32	$\overline{CS}$ = V_{IL}, $\overline{OE}$ = V_{IH}, f = 5MHz		500	mA
Standby Current	I_{SB}	$\overline{CS}$ = V_{IH}, $\overline{OE}$ = V_{IH}, f = 5MHz		32	mA
Output Low Voltage	V_{OL}	I_{OL} = 8mA		0.4	V
Output High Voltage	V_{OH}	I_{OH} = -4.0mA	2.4		V

AC CHARACTERISTICS
(V_{CC} = 3.3V, T_A = -55°C to +125°C)

Parameter	Symbol	-15*		-17		-20		-25		-35		Units
Read Cycle		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
Read Cycle Time	t_{RC}	15		17		20		25		35		ns
Address Access Time	t_{AA}		15		17		20		25		35	ns
Output Hold from Address Change	t_{OH}	0		0		0		0		0		ns
Chip Select Access Time	t_{ACS}		15		17		20		25		35	ns
Output Enable to Output Valid	t_{OE}		10		11		12		15		20	ns
Chip Select to Output in Low Z	t_{CLZ}[1]	5		5		5		5		5		ns
Output Enable to Output in Low Z	t_{OLZ}[1]	5		5		5		5		5		ns
Chip Disable to Output in High Z	t_{CHZ}[1]		8		9		10		12		15	ns
Output Disable to Output in High Z	t_{OHZ}[1]		8		9		10		12		15	ns

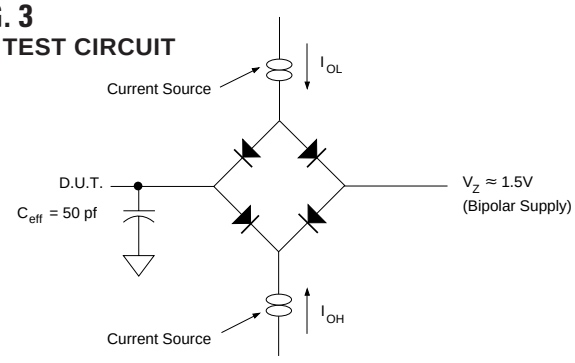
1. This parameter is guaranteed by design but not tested.
* Commercial and Industrial only.

AC CHARACTERISTICS
(V_{CC} = 3.3V, T_A = -55°C to +125°C)

Parameter	Symbol	-15*		-17		-20		-25		-35		Units
Write Cycle		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
Write Cycle Time	t_{WC}	15		17		20		25		35		ns
Chip Select to End of Write	t_{CW}	13		14		15		20		30		ns
Address Valid to End of Write	t_{AW}	13		14		15		20		30		ns
Data Valid to End of Write	t_{DW}	10		11		12		15		18		ns
Write Pulse Width	t_{WP}	13		14		15		20		30		ns
Address Setup Time	t_{AS}	0		0		0		0		0		ns
Address Hold Time	t_{AH}	0		0		0		0		0		ns
Output Active from End of Write	t_{OW}[1]	5		5		5		5		5		ns
Write Enable to Output in High Z	t_{WHZ}[1]		8		9		10		10		15	ns
Data Hold Time	t_{DH}	0		0		0		0		0		ns

1. This parameter is guaranteed by design but not tested.
* Commercial and Industrial only.

FIG. 3
AC TEST CIRCUIT

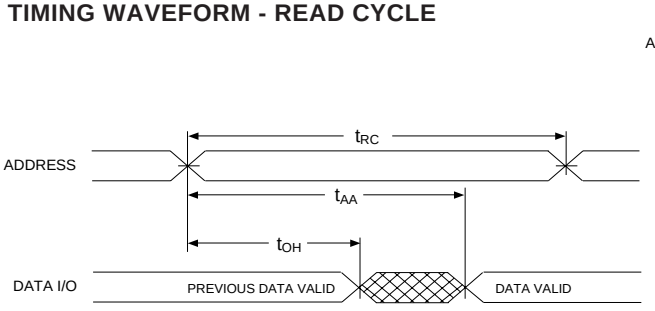


AC TEST CONDITIONS

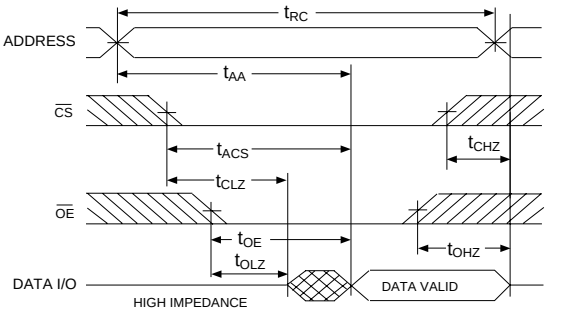
Parameter	Typ	Unit
Input Pulse Levels	V_{IL} = 0, V_{IH} = 3.0	V
Input Rise and Fall	5	ns
Input and Output Reference Level	1.5	V
Output Timing Reference Level	1.5	V

NOTES:
V_Z is programmable from -2V to +7V.
I_{OL} & I_{OH} programmable from 0 to 16mA.
Tester Impedance $Z_0 = 75\ \Omega$.
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.

FIG. 4
TIMING WAVEFORM - READ CYCLE

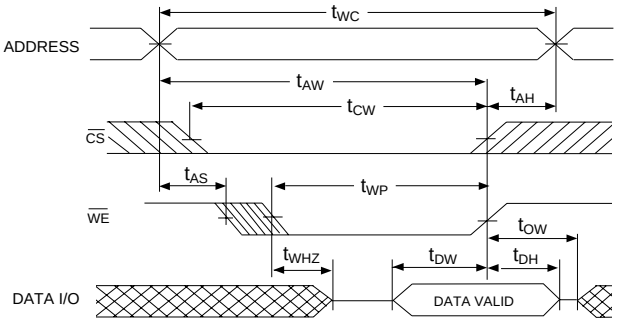


READ CYCLE 1 ($\overline{CS}$ = $\overline{OE}$ = V_{IL}, $\overline{WE}$ = V_{IH})



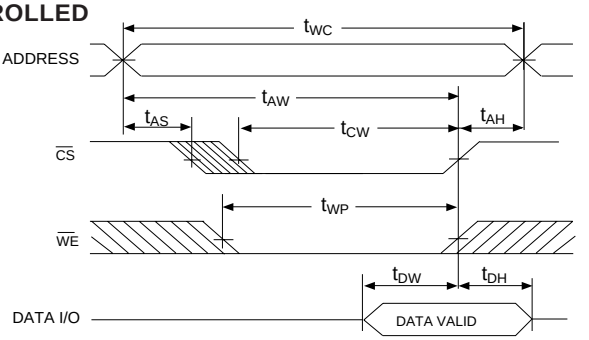
READ CYCLE 2 ($\overline{WE}$ = V_{IH})

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



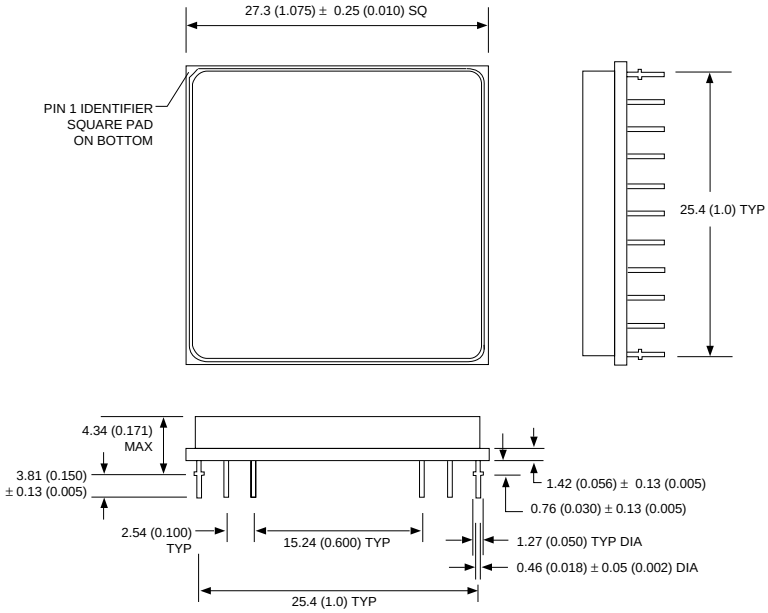
WRITE CYCLE 1, $\overline{WE}$ CONTROLLED

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



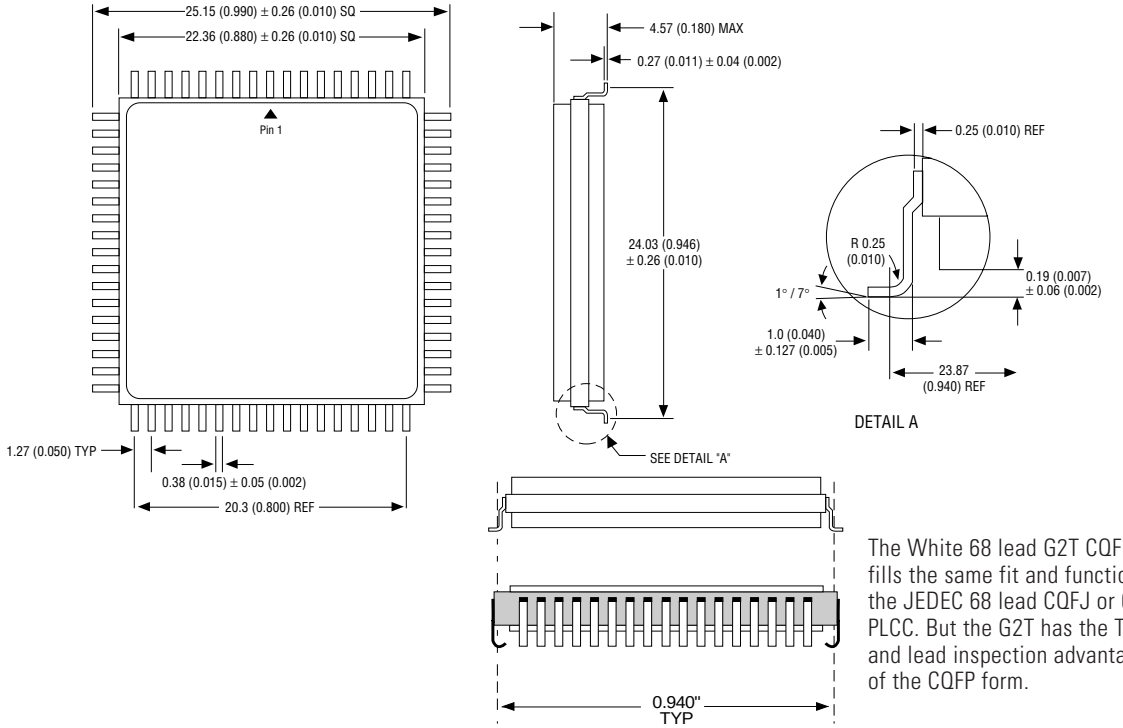
WRITE CYCLE 2, $\overline{CS}$ CONTROLLED

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



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

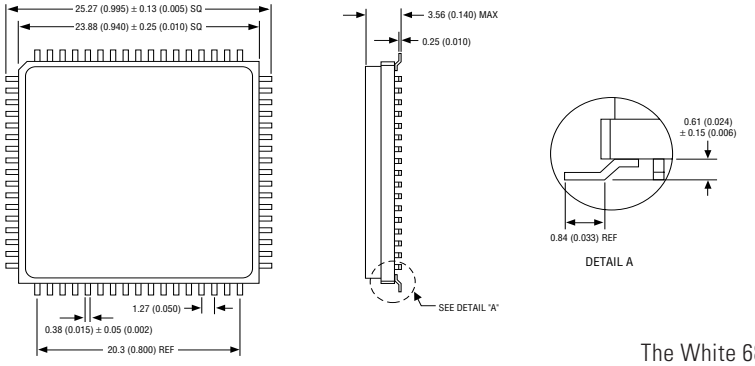
PACKAGE 509: 68 LEAD, CERAMIC QUAD FLAT PACK, CQFP (G2T)



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.

ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

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



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.

ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

ORDERING INFORMATION