



### 512Kx8 MONOLITHIC SRAM, SMD 5962-95613

#### FEATURES

- Access Times 15, 17, 20, 25, 35, 45, 55ns
- MIL-STD-883 Compliant Devices Available
- Revolutionary, Center Power/Ground Pinout JEDEC Approved
  - 36 lead Ceramic SOJ (Package 100)
  - 36 lead Ceramic Flat Pack (Package 226)
- Evolutionary, Corner Power/Ground Pinout JEDEC Approved
  - 32 pin Ceramic DIP (Package 300)
  - 32 lead Ceramic SOJ (Package 101)
  - 32 lead Ceramic Flat Pack (Package 220)
  - 32 lead Ceramic Flat Pack (Package 142)
- 32 pin, Rectangular Ceramic Leadless Chip Carrier (Package 601)
- Commercial, Industrial and Military Temperature Range
- 5 Volt Power Supply
- Low Power CMOS
- Low Power Data Retention for Battery Back-up Operation
- TTL Compatible Inputs and Outputs

#### REVOLUTIONARY PINOUT

36 FLAT PACK  
36 CSOJ

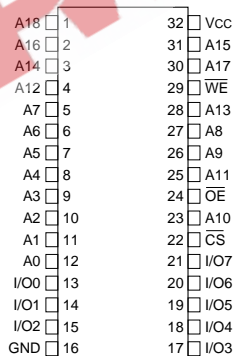
##### TOP VIEW



#### EVOLUTIONARY PINOUT

32 DIP  
32 CSOJ (DE)  
32 FLAT PACK (FE)\*  
32 FLAT PACK (FD)

##### TOP VIEW



32 CLCC

##### TOP VIEW



#### PIN DESCRIPTION

A0-18	Address Inputs
I/O0-7	Data Input/Output
CS	Chip Select
OE	Output Enable
WE	Write Enable
Vcc	+5.0V Power
GND	Ground

\*Package not recommended for new designs, "FD" recommended for new designs.



## 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

## TRUTH TABLE

CS	OE	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

## 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

## CAPACITANCE

(T<sub>A</sub> = +25°C)

Parameter	Symbol	Condition	Package	Speed (ns)	Max	Unit
Input capacitance	C <sub>IN</sub>	V <sub>IN</sub> = 0V, f = 1.0MHz	32 Pin CSOJ, DIP, Flat Pack Evolutionary	15 to 55	20	pF
			32 Pin CLCC	15 to 55	15	pF
			36 Pin CSOJ & Flat Pack Revolutionary	15 to 35 45 to 55	12 20	pF pF
Output capacitance	C <sub>OUT</sub>	V <sub>OUT</sub> = 0V, f = 1.0MHz	32 Pin CSOJ, DIP, Flat Pack Evolutionary	15 to 55	20	pF
			36 Pin CSOJ & Flat Pack Revolutionary	15 to 35	12	pF
				45 to 55	20	pF

This parameter is guaranteed by design but not tested.

## DC CHARACTERISTICS

(V<sub>CC</sub> = 5.0V, GND = 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>CC</sub> = 5.5, V <sub>IN</sub> = GND to V <sub>CC</sub>		10	μA
Output Leakage Current	I <sub>LO</sub>	CS = V <sub>IH</sub> , OE = V <sub>IH</sub> , V <sub>OUT</sub> = GND to V <sub>CC</sub>		10	μA
Operating Supply Current*	I <sub>CC</sub>	CS = V <sub>IL</sub> , OE = V <sub>IH</sub> , f = 5MHz, V <sub>CC</sub> = 5.5		160	mA
Standby Current	I <sub>SB</sub>	CS = V <sub>IH</sub> , OE = V <sub>IH</sub> , f = 5MHz, V <sub>CC</sub> = 5.5		15	mA
Output Low Voltage	V <sub>OL</sub>	I <sub>OL</sub> = 8mA for 17 - 35ns, I <sub>OL</sub> = 2.1mA for 45 - 55ns, V <sub>CC</sub> = 4.5		0.4	V
Output High Voltage	V <sub>OH</sub>	I <sub>OH</sub> = -4.0mA for 17 - 35ns, I <sub>OH</sub> = -1.0mA for 45 - 55ns, V <sub>CC</sub> = 4.5	2.4		V

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

\* Not 100% duty cycle

## DATA RETENTION CHARACTERISTICS FOR LOW POWER "L" VERSION

Parameter	Symbol	Conditions	Units		
			Min	Max	
Data Retention Supply Voltage	V <sub>DR</sub>	CS ≥ V <sub>CC</sub> - 0.2V	2.0	5.5	V
Low Power Data Retention	I <sub>CCDR1</sub>	V <sub>CC</sub> = 3V		7	mA
Low Power Data Retention	I <sub>CCDR2</sub>	V <sub>CC</sub> = 2V		2	mA



**AC CHARACTERISTICS**

(V<sub>CC</sub> = 5.0V, GND = 0V, T<sub>A</sub> = -55°C to +125°C)

Parameter	Symbol	-15		-17		-20		-25		-35		-45		-55		Units
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
Read Cycle Time	t <sub>RC</sub>	15		17		20		25		35		45		55		ns
Address Access Time	t <sub>AA</sub>		15		17		20		25		35		45		55	ns
Output Hold from Address Change	t <sub>OH</sub>	0		0		0		0		0		0		0		ns
Chip Select Access Time	t <sub>ACS</sub>		15		17		20		25		35		45		55	ns
Output Enable to Output Valid	t <sub>OE</sub>		8		9		10		12		25		25		25	ns
Chip Select to Output in Low Z	t <sub>CLZ</sub> <sup>1</sup>	2		2		2		2		4		4		4		ns
Output Enable to Output in Low Z	t <sub>OLZ</sub> <sup>1</sup>	0		0		0		0		0		0		0		ns
Chip Disable to Output in High Z	t <sub>CHZ</sub> <sup>1</sup>		8		9		10		12		15		20		20	ns
Output Disable to Output in High Z	t <sub>OHZ</sub> <sup>1</sup>		8		9		10		12		15		20		20	ns

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

**AC CHARACTERISTICS**

(V<sub>CC</sub> = 5.0V, GND = 0V, T<sub>A</sub> = -55°C to +125°C)

Parameter	Symbol	-15		-17		-20		-25		-35		-45		-55		Units
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
Write Cycle Time	t <sub>WC</sub>	15		17		20		25		35		45		55		ns
Chip Select to End of Write	t <sub>CW</sub>	13		14		14		15		25		35		50		ns
Address Valid to End of Write	t <sub>AW</sub>	13		14		14		15		25		35		50		ns
Data Valid to End of Write	t <sub>DW</sub>	8		9		10		10		20		25		25		ns
Write Pulse Width	t <sub>WP</sub>	13		14		14		15		25		35		40		ns
Address Setup Time	t <sub>AS</sub>	2		2		2		2		2		2		2		ns
Address Hold Time	t <sub>AH</sub>	0		0		0		0		0		5		5		ns
Output Active from End of Write	t <sub>OW</sub> <sup>1</sup>	2		2		3		4		4		5		5		ns
Write Enable to Output in High Z	t <sub>WHZ</sub> <sup>1</sup>		8		9		9		10		15		20		25	ns
Data Hold Time	t <sub>DH</sub>	0		0		0		0		0		0		0		ns

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

**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.



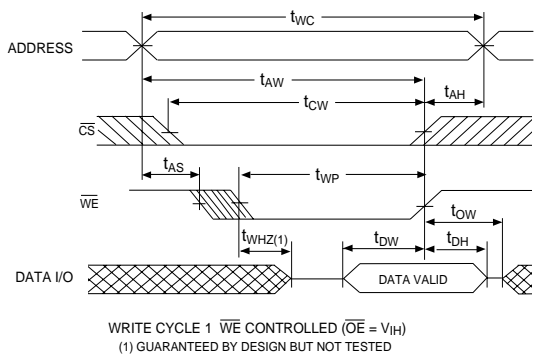
TIMING WAVEFORM - READ CYCLE



WRITE CYCLE -  $\overline{WE}$  CONTROLLED



WRITE CYCLE -  $\overline{CS}$  CONTROLLED





**PACKAGE 100: 36 LEAD, CERAMIC SOJ**



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

**PACKAGE 101: 32 LEAD, CERAMIC SOJ**



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**PACKAGE 220: 32 LEAD, CERAMIC FLAT PACK**



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES

**PACKAGE 226: 36 LEAD, CERAMIC FLAT PACK**



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**PACKAGE 300: 32 PIN, CERAMIC DIP, SINGLE CAVITY SIDE BRAZED**

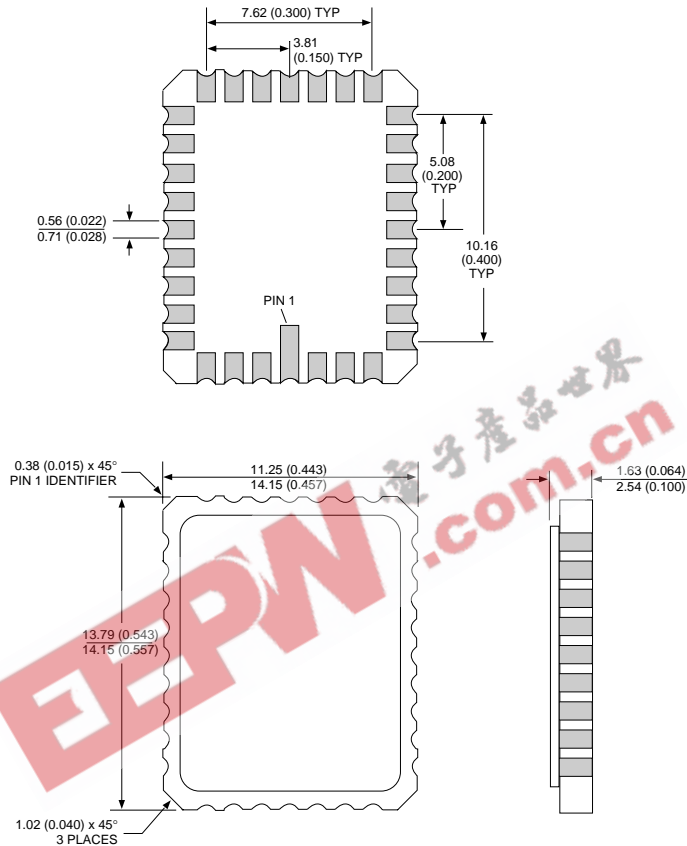


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**PACKAGE 601: 32 PIN, RECTANGULAR CERAMIC LEADLESS CHIP CARRIER**



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### ORDERING INFORMATION

W M S 512K 8 X - 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:**

C = 32 Pin Ceramic 0.600" DIP (Package 300)  
CL = 32 Pin Rectangular Ceramic Leadless Chip Carrier (Package 601)  
DE = 32 Lead Ceramic SOJ (Package 101) Evolutionary  
DJ = 36 Lead Ceramic SOJ (Package 100)  
F = 36 Lead Ceramic Flat Pack (Package 226)  
FE = 32 Lead Ceramic Flat Pack (Package 220)

**ACCESS TIME (ns)**

**IMPROVEMENT MARK:**

Blank = Standard  
L = Low Power Data Retention

**ORGANIZATION, 512K x 8**

**SRAM**

**MONOLITHIC**

**WHITE ELECTRONIC DESIGNS CORP.**





DEVICE TYPE	SPEED	PACKAGE	SMD NO.
512K x 8 SRAM Monolithic	55ns	32 pin DIP (C)	5962-95613 05HYX
512K x 8 SRAM Monolithic	45ns	32 pin DIP (C)	5962-95613 06HYX
512K x 8 SRAM Monolithic	35ns	32 pin DIP (C)	5962-95613 07HYX
512K x 8 SRAM Monolithic	25ns	32 pin DIP (C)	5962-95613 08HYX
512K x 8 SRAM Monolithic	20ns	32 pin DIP (C)	5962-95613 09HYX
512K x 8 SRAM Monolithic	17ns	32 pin DIP (C)	5962-95613 10HYX
512K x 8 SRAM Monolithic	15ns	32 pin DIP (C)	5962-95613 14HYX
512K x 8 SRAM Monolithic	55ns	32 lead SOJ Evol (DE)	5962-95613 05HTX
512K x 8 SRAM Monolithic	45ns	32 lead SOJ Evol (DE)	5962-95613 06HTX
512K x 8 SRAM Monolithic	35ns	32 lead SOJ Evol (DE)	5962-95613 07HTX
512K x 8 SRAM Monolithic	25ns	32 lead SOJ Evol (DE)	5962-95613 08HTX
512K x 8 SRAM Monolithic	20ns	32 lead SOJ Evol (DE)	5962-95613 09HTX
512K x 8 SRAM Monolithic	17ns	32 lead SOJ Evol (DE)	5962-95613 10HTX
512K x 8 SRAM Monolithic	15ns	32 lead SOJ Evol (DE)	5962-95613 14HTX
512K x 8 SRAM Monolithic	55ns	36 lead SOJ (DJ)	5962-95613 05HZX
512K x 8 SRAM Monolithic	45ns	36 lead SOJ (DJ)	5962-95613 06HZX
512K x 8 SRAM Monolithic	35ns	36 lead SOJ (DJ)	5962-95613 07HZX
512K x 8 SRAM Monolithic	25ns	36 lead SOJ (DJ)	5962-95613 08HZX
512K x 8 SRAM Monolithic	20ns	36 lead SOJ (DJ)	5962-95613 09HZX
512K x 8 SRAM Monolithic	17ns	36 lead SOJ (DJ)	5962-95613 10HZX
512K x 8 SRAM Monolithic	15ns	36 lead SOJ (DJ)	5962-95613 14HZX
512K x 8 SRAM Monolithic	55ns	36 lead Flatpack (F)	5962-95613 05HXX
512K x 8 SRAM Monolithic	45ns	36 lead Flatpack (F)	5962-95613 06HXX
512K x 8 SRAM Monolithic	35ns	36 lead Flatpack (F)	5962-95613 07HXX
512K x 8 SRAM Monolithic	25ns	36 lead Flatpack (F)	5962-95613 08HXX
512K x 8 SRAM Monolithic	20ns	36 lead Flatpack (F)	5962-95613 09HXX
512K x 8 SRAM Monolithic	17ns	36 lead Flatpack (F)	5962-95613 10HXX
512K x 8 SRAM Monolithic	15ns	36 lead Flatpack (F)	5962-95613 14HXX