



## 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 Thinpack™ Flat Pack (Package 321)
- 32 pin, Rectangular Ceramic Leadless Chip Carrier (Package 601)
- Commercial, Industrial and Military Temperature Range
- 5V Power Supply
- Low Power CMOS
- Low Power Data Retention for Battery Back-up Operation
- TTL Compatible Inputs and Outputs

\*This product is subject to change without notice.

### REVOLUTIONARY PINOUT

36 FLAT PACK  
36 CSOJ

TOP VIEW

### EVOLUTIONARY PINOUT

32 DIP  
32 CSOJ (DE)  
32 FLAT PACK (FF)

TOP VIEW

### 32 CLCC

TOP VIEW

### PIN DESCRIPTION

|                 |                   |
|-----------------|-------------------|
| A0-18           | Address Inputs    |
| I/O 0-7         | Data Input/Output |
| CS#             | Chip Select       |
| OE#             | Output Enable     |
| WE#             | Write Enable      |
| V <sub>cc</sub> | +5.0V Power       |
| GND             | Ground            |



**Absolute Maximum Ratings**

| Parameter                               | Symbol           | Min  | Max                  | Unit |
|---|------------------|------|----------------------|------|
| Operating Temperature                   | T <sub>A</sub>   | -55  | +125                 | °C   |
| Storage Temperature Range               | T <sub>STG</sub> | -65  | +150                 | °C   |
| Signal Voltage Range 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 Range (V <sub>CC</sub> ) | 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. (Mf) | T <sub>A</sub>  | -55  | +125                  | °C   |

**Capacitance**  
(T<sub>A</sub> = +25°C)

| Parameter          | Symbol           | Conditions                          | Package                                   | Speed (ns) | Max | Unit |
|--------------------|------------------|-------------------------------------|---|------------|-----|------|
| Input capacitance  | C <sub>IN</sub>  | V <sub>IN</sub> = 0 V, f = 1.0 MHz  | 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   | 12  | pF   |
|                    |                  |                                     |   | 45 to 55   | 20  | pF   |
| Output capacitance | C <sub>OUT</sub> | V <sub>OUT</sub> = 0 V, f = 1.0 MHz | 32 pin CSOJ, DIP, Flat Pack Revolutionary | 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 - CMOS Compatible**

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

| Parameter                 | Symbol          | Conditions  | Min | Max  | Unit |
|---------------------------|-----------------|---|-----|------|------|
| Input Leakage Current     | I <sub>LI</sub> | V <sub>CC</sub> = 5.5, V <sub>IN</sub> = GND to V <sub>CC</sub>   |     | 10   | A    |
| 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   | A    |
| Operating Supply Current* | I <sub>CC</sub> | CS# = V <sub>IH</sub> , OE# = V <sub>IH</sub> , f = 5MHz, V <sub>CC</sub> = 5.5,                        |     | 160  | mA   |
| Standby Current           | I <sub>SS</sub> | CS# = V <sub>IH</sub> , OE# = V <sub>IH</sub> , f = 5MHz, V <sub>CC</sub> = 5.5                         |     | 0.45 | mA   |
| Output Low Voltage        | V <sub>OL</sub> | I <sub>OL</sub> = 6mA for 17 - 35ns,<br>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,<br>I <sub>OH</sub> = 1.0mA for 45 - 55ns, V <sub>CC</sub> = 4.5 | 2.4 |      | V    |

**Data retention characteristics for low power "I" version**

| Parameter                     | Symbol             | Conditions                             | Min | Max | Unit |
|-------------------------------|--------------------|--|-----|-----|------|
| Data Retention Supply Voltage | V <sub>DR</sub>    | CS# <sup>3</sup> 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**

( $V_{CC} = 5.0V, GND = 0V, -55^{\circ}C \leq T_A \leq 125^{\circ}C$ )

| Parameter                          | Symbol     | -15 |     | -17 |     | -20 |     | -25 |     | -35 |     | -45 |     | -55 |     | Unit |
|------------------------------------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
|                                    |            | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |      |
| Read Cycle Time                    | $t_{RC}$   | 15  |     | 17  |     | 20  |     | 25  |     | 35  |     | 45  |     | 55  |     | ns   |
| Address Access Time                | $t_{AA}$   |     | 15  |     | 17  |     | 20  |     | 25  |     | 35  |     | 45  |     | 55  | ns   |
| Output Hold from Address Change    | $t_{OH}$   | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | ns   |
| Chip Select Access Time            | $t_{ACS}$  |     | 15  |     | 17  |     | 20  |     | 25  |     | 35  |     | 45  |     | 55  | ns   |
| Output Enable to Output Valid      | $t_{OE}$   |     | 8   |     | 9   |     | 10  |     | 12  |     | 25  |     | 25  |     | 25  | ns   |
| Chip Select to Output in Low Z     | $t_{CLZ1}$ | 2   |     | 2   |     | 2   |     | 2   |     | 4   |     | 4   |     | 4   |     | ns   |
| Output Enable to Output in Low Z   | $t_{OLZ1}$ | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | ns   |
| Chip Disable to Output in High Z   | $t_{CHZ1}$ |     | 8   |     | 9   |     | 10  |     | 12  |     | 15  |     | 20  |     | 20  | ns   |
| Output Disable to Output in High Z | $t_{OHZ1}$ |     | 8   |     | 9   |     | 10  |     | 12  |     | 15  |     | 20  |     | 20  | ns   |

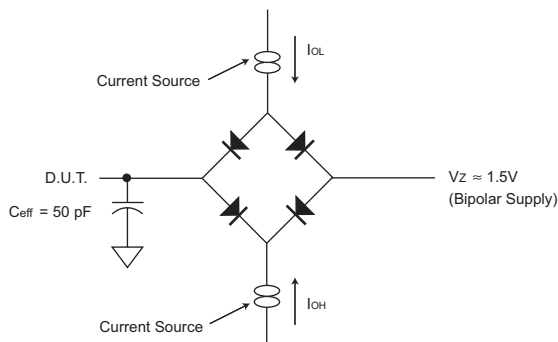
**AC Characteristics**

( $V_{CC} = 5.0V, GND = 0V, -55^{\circ}C \leq T_A \leq 125^{\circ}C$ )

| Parameter                        | Symbol     | -15 |     | -17 |     | -20 |     | -25 |     | -35 |     | -45 |     | -55 |     | Unit |
|----------------------------------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
|                                  |            | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |      |
| Write Cycle Time                 | $t_{WC}$   | 15  |     | 17  |     | 20  |     | 25  |     | 35  |     | 45  |     | 55  |     | ns   |
| Chip Select to End of Write      | $t_{CW}$   | 13  |     | 14  |     | 14  |     | 15  |     | 25  |     | 35  |     | 50  |     | ns   |
| Address Valid to End of Write    | $t_{AW}$   | 13  |     | 14  |     | 14  |     | 15  |     | 25  |     | 35  |     | 50  |     | ns   |
| Data Valid to End of Write       | $t_{DW}$   | 8   |     | 9   |     | 10  |     | 10  |     | 20  |     | 25  |     | 25  |     | ns   |
| Write Pulse Width                | $t_{WP}$   | 13  |     | 14  |     | 14  |     | 15  |     | 25  |     | 35  |     | 40  |     | ns   |
| Address Setup Time               | $t_{AS}$   | 2   |     | 2   |     | 2   |     | 2   |     | 2   |     | 2   |     | 2   |     | ns   |
| Address Hold Time                | $t_{AH}$   | 0   |     | 0   |     | 0   |     | 0   |     | 0   |     | 5   |     | 5   |     | ns   |
| Output Active from End of Write  | $t_{OW1}$  | 2   |     | 2   |     | 3   |     | 4   |     | 4   |     | 5   |     | 5   |     | ns   |
| Write Enable to Output in High Z | $t_{WHZ1}$ |     | 8   |     | 9   |     | 9   |     | 10  |     | 15  |     | 20  |     | 25  | ns   |
| Data Hold Time                   | $t_{DH}$   | 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               | $V_{IL} = 0, V_{IH} = 3.0$ | 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.



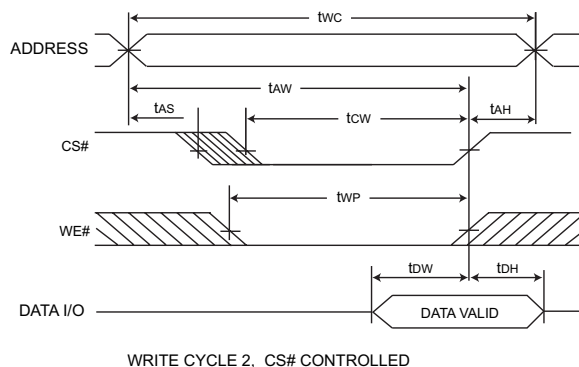
### TIMING WAVEFORM - READ CYCLE



### WRITE CYCLE - WE# CONTROLLED



### WRITE CYCLE - 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 321: 32 PIN CERAMIC THINPACK™ FLATPACK**



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



ALL LINEAR DIMENSIONS ARE MILLIMETERS AND PARENTHETICALLY IN INCHES



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



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



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**ORDERING INFORMATION**

W M S 512K 8 X - XXX X X X

WHITE ELECTRONIC DESIGNS CORP. \_\_\_\_\_

MONOLITHIC \_\_\_\_\_

SRAM \_\_\_\_\_

ORGANIZATION, 512K X 8 \_\_\_\_\_

IMPROVEMENT MARK: \_\_\_\_\_

- BLANK = STANDARD
- L = LOW POWER DATA RETENTION

ACCESS TIME (NS) \_\_\_\_\_

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)
- FF = 32 LEAD CERAMIC THINPACK™ FLAT PACK (PACKAGE 321)

DEVICE GRADE: \_\_\_\_\_

- Q = MIL-STD-883 COMPLIANT
- M = MILITARY SCREENED -55°C ≤ TA ≤ 125°C
- I = INDUSTRIAL -40°C ≤ TA ≤ 85°C
- C = COMMERCIAL 0°C ≤ TA ≤ 70°C

LEAD FINISH: \_\_\_\_\_

- BLANK = GOLD PLATED LEADS
- A = SOLDER DIP LEADS



| 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 |