



## 128Kx8 SRAM MODULE

FIG. 1

PIN CONFIGURATION  
TOP VIEW

|                 |    |    |                 |
|-----------------|----|----|-----------------|
| NC              | 1  | 32 | V <sub>CC</sub> |
| A16             | 2  | 31 | A15             |
| A14             | 3  | 30 | NC              |
| A12             | 4  | 29 | WE              |
| A7              | 5  | 28 | A13             |
| A6              | 6  | 27 | A8              |
| A5              | 7  | 26 | A9              |
| A4              | 8  | 25 | A11             |
| A3              | 9  | 24 | OE              |
| A2              | 10 | 23 | A10             |
| A1              | 11 | 22 | CS              |
| A0              | 12 | 21 | I/O7            |
| I/O0            | 13 | 20 | I/O6            |
| I/O1            | 14 | 19 | I/O5            |
| I/O2            | 15 | 18 | I/O4            |
| V <sub>SS</sub> | 16 | 17 | I/O3            |

## PIN DESCRIPTION

|                 |                   |
|-----------------|-------------------|
| A0-16           | Address Inputs    |
| I/O0-7          | Data Input/Output |
| CS              | Chip Select       |
| OE              | Output Enable     |
| WE              | Write Enable      |
| V <sub>CC</sub> | +5.0V Power       |
| V <sub>SS</sub> | Ground            |

## FEATURES

- Access Times 25 to 45nS
- Standard Microcircuit Drawing, 5962-93156
- MIL-STD-883 Compliant Devices Available
- Rad Tolerant Devices Available
- JEDEC Standard 32 pin, Hermetic Ceramic DIP (Package 302)
- Military Temperature Range (-55°C to +125°C)
- Organized as 128K x 8
- 5 Volt Power Supply
- Low Power CMOS
- TTL Compatible Inputs and Outputs
- Battery Back-Up Operation



## 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> | -0.5 | +0.8                  | V    |
| Operating Temp. (Mil.) | T <sub>A</sub>  | -55  | +125                  | °C   |

## CAPACITANCE

(T<sub>A</sub> = +25°C)

| Parameter          | Symbol           | Condition                         | Max | Unit |
|--------------------|------------------|-----------------------------------|-----|------|
| Input capacitance  | C <sub>IN</sub>  | V <sub>IN</sub> = 0V, f = 1.0MHz  | 40  | pF   |
| Output capacitance | C <sub>OUT</sub> | V <sub>OUT</sub> = 0V, f = 1.0MHz | 40  | pF   |

This parameter is guaranteed by design but not tested.

## DC CHARACTERISTICS

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

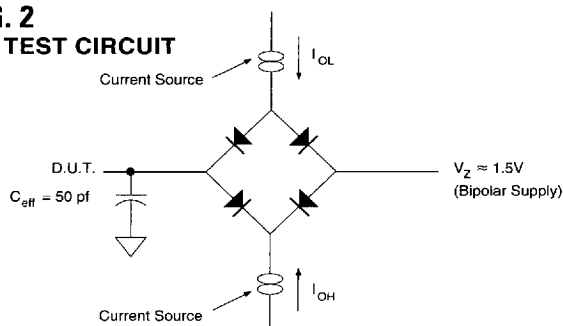
| Parameter                | Sym             | Conditions                                                                              | -25 |     | -35 |     | -45 |     | Units |
|--------------------------|-----------------|-----------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-------|
|                          |                 |                                                                                         | 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  | 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  |     | 10  |     | 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           |     | 110 |     | 110 |     | 70  | mA    |
| Standby Current          | I <sub>SB</sub> | CS = V <sub>IH</sub> , OE = V <sub>IH</sub> , f = 5MHz                                  |     | 30  |     | 30  |     | 25  | 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 | 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 |     | V     |

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

## DATA RETENTION CHARACTERISTICS

(T<sub>A</sub> = -55°C to +125°C)

| Parameter                     | Symbol             | Conditions                  | -25 |     |     | -35 |     |     | -45 |     |     | Units |
|-------------------------------|--------------------|-----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
|                               |                    |                             | Min | Typ | Max | Min | Typ | Max | Min | Typ | Max |       |
| Data Retention Supply Voltage | V <sub>DR</sub>    | CS ≥ V <sub>CC</sub> - 0.2V | 2.0 |     | 5.5 | 2.0 |     | 5.5 | 2.0 |     | 5.5 | V     |
| Data Retention Current        | I <sub>CCDR1</sub> | V <sub>CC</sub> = 3V        |     | .10 | 3.5 |     | .10 | 3.5 |     | .10 | 3.5 | mA    |
|                               | I <sub>CCDR2</sub> | V <sub>CC</sub> = 2V        |     | .05 | 2.0 |     | .05 | 2.0 |     | .05 | 2.0 | mA    |

FIG. 2  
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, V<sub>SS</sub> = 0V, T<sub>A</sub> = -55°C to +125°C)

| Parameter                          | Symbol                        | <u>-25</u> |     | <u>-35</u> |     | <u>-45</u> |     | Units |
|------------------------------------|-------------------------------|------------|-----|------------|-----|------------|-----|-------|
|                                    |                               | Min        | Max | Min        | Max | Min        | Max |       |
| Read Cycle                         |                               |            |     |            |     |            |     |       |
| Read Cycle Time                    | t <sub>RC</sub>               | 25         |     | 35         |     | 45         |     | nS    |
| Address Access Time                | t <sub>AA</sub>               |            | 25  |            | 35  |            | 45  | nS    |
| Output Hold from Address Change    | t <sub>OH</sub>               | 5          |     | 5          |     | 5          |     | nS    |
| Chip Select Access Time            | t <sub>ACS</sub>              |            | 25  |            | 35  |            | 45  | nS    |
| Output Enable to Output Valid      | t <sub>OE</sub>               |            | 20  |            | 25  |            | 35  | nS    |
| Chip Select to Output in Low Z     | t <sub>CLZ</sub> <sup>1</sup> | 5          |     | 5          |     | 5          |     | nS    |
| Output Enable to Output in Low Z   | t <sub>OLZ</sub> <sup>1</sup> | 5          |     | 5          |     | 5          |     | nS    |
| Chip Disable to Output in High Z   | t <sub>CHZ</sub> <sup>1</sup> |            | 15  |            | 20  |            | 30  | nS    |
| Output Disable to Output in High Z | t <sub>OHZ</sub> <sup>1</sup> |            | 15  |            | 20  |            | 25  | nS    |

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

## AC CHARACTERISTICS

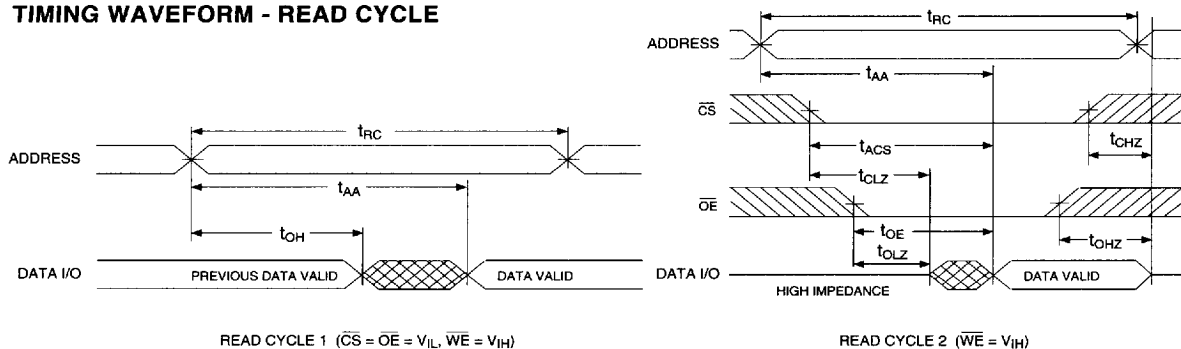
(V<sub>CC</sub> = 5.0V, V<sub>SS</sub> = 0V, T<sub>A</sub> = -55°C to +125°C)

| Parameter                        | Symbol                        | <u>-25</u> |     | <u>-35</u> |     | <u>-45</u> |     | Units |
|----------------------------------|-------------------------------|------------|-----|------------|-----|------------|-----|-------|
|                                  |                               | Min        | Max | Min        | Max | Min        | Max |       |
| Write Cycle                      |                               |            |     |            |     |            |     |       |
| Write Cycle Time                 | t <sub>WC</sub>               | 25         |     | 35         |     | 45         |     | nS    |
| Chip Select to End of Write      | t <sub>CW</sub>               | 20         |     | 25         |     | 30         |     | nS    |
| Address Valid to End of Write    | t <sub>AW</sub>               | 20         |     | 25         |     | 30         |     | nS    |
| Data Valid to End of Write       | t <sub>DW</sub>               | 15         |     | 20         |     | 25         |     | nS    |
| Write Pulse Width                | t <sub>WP</sub>               | 20         |     | 25         |     | 30         |     | nS    |
| Address Setup Time               | t <sub>AS</sub>               | 0          |     | 0          |     | 0          |     | nS    |
| Address Hold Time                | t <sub>AH</sub>               | 0          |     | 0          |     | 0          |     | nS    |
| Output Active from End of Write  | t <sub>OW</sub> <sup>1</sup>  | 5          |     | 5          |     | 5          |     | nS    |
| Write Enable to Output in High Z | t <sub>WHZ</sub> <sup>1</sup> | 0          | 15  | 0          | 20  | 0          | 25  | nS    |
| Data Hold Time                   | t <sub>DH</sub>               | 0          |     | 0          |     | 0          |     | nS    |

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



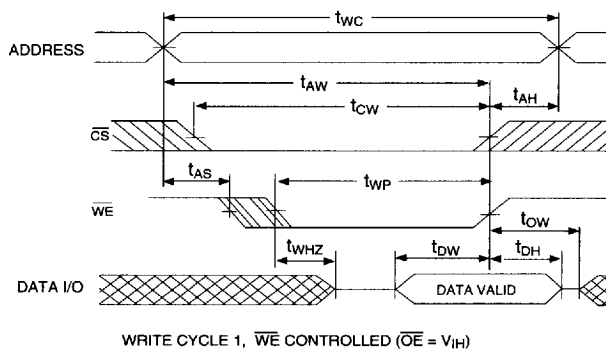
**FIG. 3**  
**TIMING WAVEFORM - READ CYCLE**



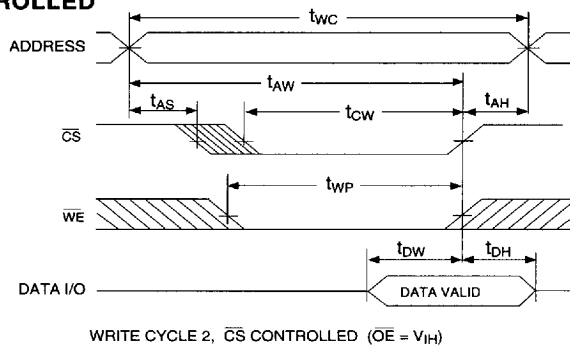
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SRAM MODULES

**FIG. 4**  
**WRITE CYCLE -  $\overline{WE}$  CONTROLLED**



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





## ORDERING INFORMATION

**W S 128K 8 - XXX C X X****SPECIAL PROCESSING:**

E = Epitaxial Layer

**DEVICE GRADE:**

Q = MIL-STD-883 Compliant

M = Military Screened -55°C to +125°C

I = Industrial -40°C to +85°C

C = Commercial 0°C to +70°C

**PACKAGE:**

C = Ceramic .600" DIP (Package 302)

**ACCESS TIME in nS****ORGANIZATION, 128K x 8****SRAM****WHITE MICROELECTRONICS**

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SRAM MODULES

| Device Type   | Speed | Package    | SMD Number       |
|---------------|-------|------------|------------------|
| 128K x 8 SRAM | 45nS  | 32 pin DIP | 5962-93156 06HXX |
| 128K x 8 SRAM | 35nS  | 32 pin DIP | 5962-93156 07HXX |
| 128K x 8 SRAM | 25nS  | 32 pin DIP | 5962-93156 08HXX |