

## HIGH SPEED 8K x 8 CMOS PROM/RPROM

**FOR MAINTENANCE PURPOSES ONLY! NOT TO BE USED FOR NEW DESIGNS.  
SEE WS57C49C FOR NEW VERSION!**

### KEY FEATURES

- **Ultra-Fast Access Time**  
— 35 ns
- **Low Power Consumption**
- **Fast Programming**
- **DESC SMD 5962-87515**
- **Pin Compatible with Am27S49 and MB7144 Bipolar PROMs**  
**Immune to Latch-Up**  
— Up to 200 mA
- **ESD Protection Exceeds 2000 V**

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### GENERAL DESCRIPTION

The WS57C49B is a High Performance 64K UV Erasable Electrically Re-Programmable Read Only Memory (RPROM). It is manufactured in an advanced CMOS technology which enables it to operate at Bipolar PROM speeds while consuming only 25% of the power required by its Bipolar counterparts. A further advantage of the WS57C49B over Bipolar PROM devices is the fact that it utilizes a proven EPROM technology. This enables the entire memory array to be tested for switching characteristics and functionality after assembly. Unlike devices which cannot be erased, every WS57C49B in a windowed package is 100% tested with worst case test patterns both before and after assembly.

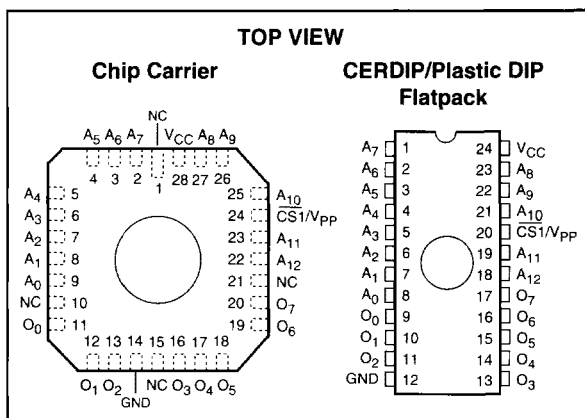
A unique feature of the WS57C49B is a designed-in output hold from address change. This enables the WS57C49B to be run at a cycle time equal to the address access time. While addresses are changing, output data is held long enough to be latched into external circuitry.

The WS57C49B is configured in the standard Bipolar PROM pinout which provides an easy upgrade path for systems which are currently using Bipolar PROMs.

### MODE SELECTION

| MODE \ PINS    | $\overline{CS1}/V_{PP}$ | $V_{CC}$ | OUTPUTS   |
|----------------|-------------------------|----------|-----------|
| Read           | $V_{IL}$                | $V_{CC}$ | $D_{OUT}$ |
| Output Disable | $V_{IH}$                | $V_{CC}$ | High Z    |
| Program        | $V_{PP}$                | $V_{CC}$ | $D_{IN}$  |
| Program Verify | $V_{IL}$                | $V_{CC}$ | $D_{OUT}$ |

### PIN CONFIGURATION



### PRODUCT SELECTION GUIDE

| PARAMETER                     | WS57C49B-35 | WS57C49B-45 | WS57C49B-55 | WS57C49B-70 |
|-------------------------------|-------------|-------------|-------------|-------------|
| Address Access Time (Max)     | 35 ns       | 45 ns       | 55 ns       | 70 ns       |
| CS to Output Valid Time (Max) | 20 ns       | 25 ns       | 25 ns       | 25 ns       |

**ABSOLUTE MAXIMUM RATINGS\***

|                                                    |                 |
|----------------------------------------------------|-----------------|
| Storage Temperature.....                           | –65° to + 150°C |
| Voltage on any Pin with<br>Respect to Ground ..... | –0.6V to +7V    |
| V <sub>PP</sub> with Respect to Ground.....        | –0.6V to + 14V  |
| ESD Protection .....                               | >2000V          |

**\*NOTICE:**

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect device reliability.

**OPERATING RANGE**

| RANGE      | TEMPERATURE     | V <sub>CC</sub> |
|------------|-----------------|-----------------|
| Commercial | 0°C to +70°C    | +5V ± 10%       |
| Industrial | –40°C to +85°C  | +5V ± 10%       |
| Military   | –55°C to +125°C | +5V ± 10%       |

**DC READ CHARACTERISTICS** Over Operating Range. (See Above)

| SYMBOL           | PARAMETER                             | TEST CONDITIONS                       | MIN        | MAX                   | UNITS |
|------------------|---------------------------------------|---------------------------------------|------------|-----------------------|-------|
| V <sub>IL</sub>  | Input Low Voltage                     | (Note 4)                              | –0.1       | 0.8                   | V     |
| V <sub>IH</sub>  | Input High Voltage                    | (Note 4)                              | 2.0        | V <sub>CC</sub> + 0.3 | V     |
| V <sub>OL</sub>  | Output Low Voltage                    | I <sub>OL</sub> = 16 mA               |            | 0.4                   | V     |
| V <sub>OH</sub>  | Output High Voltage                   | I <sub>OH</sub> = –4 mA               | 2.4        |                       | V     |
| I <sub>CC1</sub> | V <sub>CC</sub> Active Current (CMOS) | (Notes 1 and 3)<br>Outputs Not Loaded | Comm'l     | 30                    | mA    |
|                  |                                       |                                       | Industrial | 35                    | mA    |
|                  |                                       |                                       | Military   | 35                    | mA    |
| I <sub>CC2</sub> | V <sub>CC</sub> Active Current (TTL)  | (Notes 2 and 3)<br>Outputs Not Loaded | Comm'l     | 40                    | mA    |
|                  |                                       |                                       | Industrial | 40                    | mA    |
|                  |                                       |                                       | Military   | 40                    | mA    |
| I <sub>LI</sub>  | Input Leakage Current                 | V <sub>IN</sub> = 5.5V or Gnd         | –10        | 10                    | μA    |
| I <sub>LO</sub>  | Output Leakage Current                | V <sub>OUT</sub> = 5.5 V or Gnd       | –10        | 10                    | μA    |

**NOTES:** 1. CMOS inputs: GND ± 0.3V or V<sub>CC</sub> ± 0.3V.  
 2. TTL inputs: V<sub>IL</sub> ≤ 0.8V, V<sub>IH</sub> ≥ 2.0V.  
 3. Add 3 mA/MHz for A.C. power component.

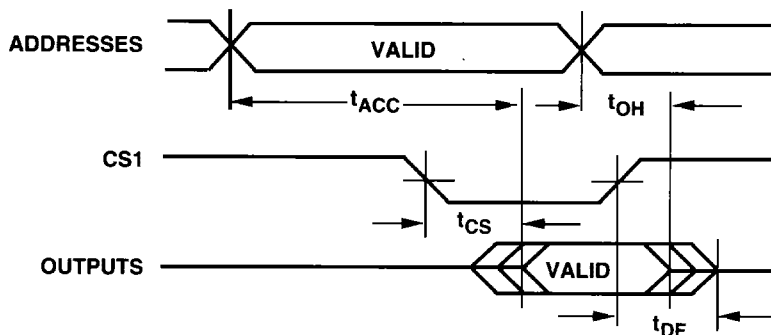
4. These are absolute voltages with respect to device ground pin and include all overshoots due to system and/or tester noise. Do not attempt to test these values without suitable equipment.

**AC READ CHARACTERISTICS** Over Operating Range. (See Above)

| PARAMETER                       | SYMBOL           | 57C49B-35 |     | 57C49B-45 |     | 57C49B-55 |     | 57C49B-70 |     | UNITS |
|---------------------------------|------------------|-----------|-----|-----------|-----|-----------|-----|-----------|-----|-------|
|                                 |                  | MIN       | MAX | MIN       | MAX | MIN       | MAX | MIN       | MAX |       |
| Address to Output Delay         | t <sub>ACC</sub> |           | 35  |           | 45  |           | 55  |           | 70  | ns    |
| CS1 to Output Delay             | t <sub>CS</sub>  |           | 20  |           | 25  |           | 25  |           | 25  |       |
| Output Disable to Output Float* | t <sub>DF</sub>  |           | 25  |           | 25  |           | 25  |           | 25  |       |
| Address to Output Hold          | t <sub>OH</sub>  | 0         |     | 0         |     | 0         |     | 0         |     |       |

\*Sampled, Not 100% Tested.

## AC READ TIMING DIAGRAM



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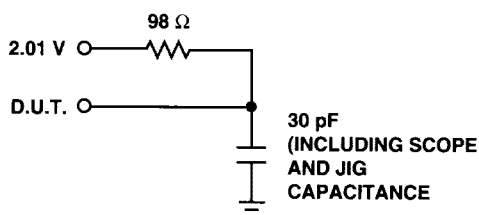
CAPACITANCE<sup>(5)</sup>  $T_A = 25^\circ\text{C}$ ,  $f = 1\text{ MHz}$ 

| SYMBOL    | PARAMETER            | CONDITIONS             | TYP <sup>(6)</sup> | MAX | UNITS |
|-----------|----------------------|------------------------|--------------------|-----|-------|
| $C_{IN}$  | Input Capacitance    | $V_{IN} = 0\text{ V}$  | 4                  | 6   | pF    |
| $C_{OUT}$ | Output Capacitance   | $V_{OUT} = 0\text{ V}$ | 8                  | 12  | pF    |
| $C_{VPP}$ | $V_{PP}$ Capacitance | $V_{PP} = 0\text{ V}$  | 18                 | 25  | pF    |

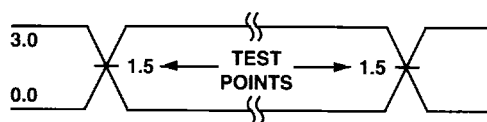
NOTES: 5. This parameter is only sampled and is not 100% tested.

6. Typical values are for  $T_A = 25^\circ\text{C}$  and nominal supply voltages.

## TEST LOAD (High Impedance Test Systems)



## A.C. TESTING INPUT/OUTPUT WAVEFORM



A.C. testing inputs are driven at 3.0 V for a logic "1" and 0.0 V for a logic "0." Timing measurements are made at 1.5 V for input and output transitions in both directions.

NOTE: 7. Provide adequate decoupling capacitance as close as possible to this device to achieve the published A.C. and D.C. parameters. A 1.0 microfarad capacitor in parallel with a 0.1 microfarad capacitor connected between  $V_{CC}$  and ground is recommended. Inadequate decoupling may result in access time degradation or other transient performance failures.

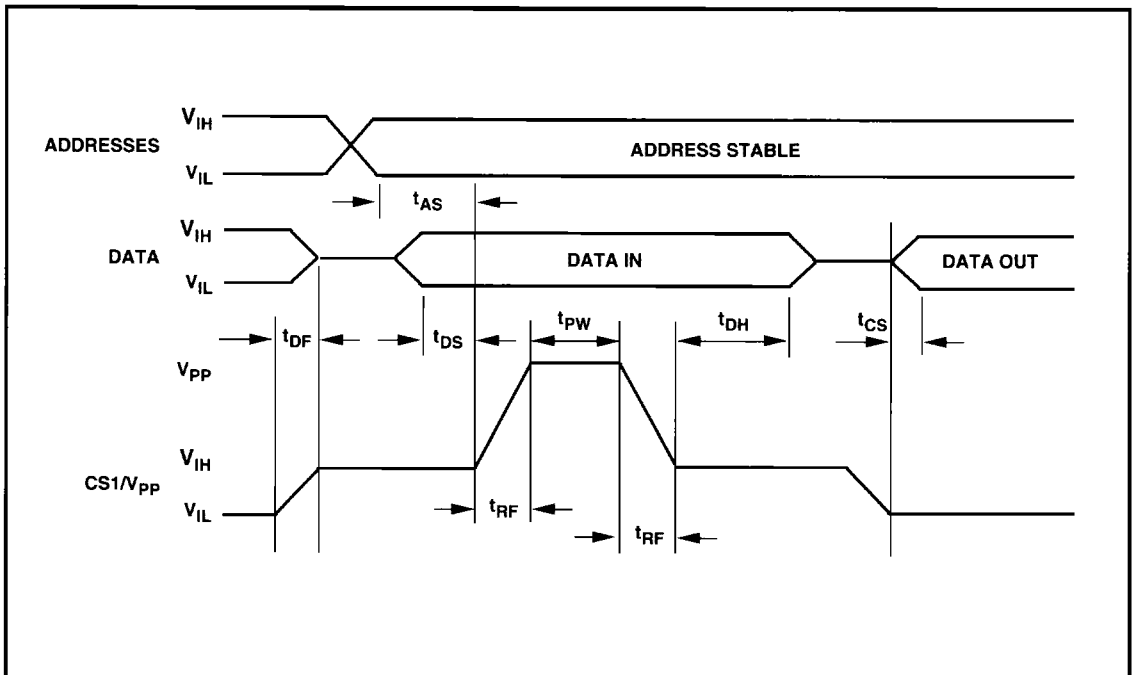
**PROGRAMMING INFORMATION****DC CHARACTERISTICS** ( $T_A = 25 \pm 5^\circ\text{C}$ ,  $V_{CC} = 5.6 \text{ V} \pm 0.25 \text{ V}$ ,  $V_{PP} = 13.5 \pm 0.5 \text{ V}$ )

| SYMBOLS  | PARAMETER                                                         | MIN | MAX  | UNITS         |
|----------|-------------------------------------------------------------------|-----|------|---------------|
| $I_{LI}$ | Input Leakage Current<br>( $V_{IN} = V_{CC}$ or Gnd)              | -10 | 10   | $\mu\text{A}$ |
| $I_{PP}$ | $V_{PP}$ Supply Current During Programming Pulse                  |     | 60   | mA            |
| $I_{CC}$ | $V_{CC}$ Supply Current                                           |     | 35   | mA            |
| $V_{OL}$ | Output Low Voltage During Verify<br>( $I_{OL} = 16 \text{ mA}$ )  |     | 0.45 | V             |
| $V_{OH}$ | Output High Voltage During Verify<br>( $I_{OH} = -4 \text{ mA}$ ) | 2.4 |      | V             |

**NOTES:** 8.  $V_{PP}$  must not be greater than 14 volts including overshoot.

**AC CHARACTERISTICS** ( $T_A = 25 \pm 5^\circ\text{C}$ ,  $V_{CC} = 5.6 \text{ V} \pm 0.25 \text{ V}$ ,  $V_{PP} = 13.5 \pm 0.5 \text{ V}$ )

| SYMBOLS  | PARAMETER                   | MIN | TYP | MAX | UNITS         |
|----------|-----------------------------|-----|-----|-----|---------------|
| $t_{AS}$ | Address Setup Time          | 2   |     |     | $\mu\text{s}$ |
| $t_{DF}$ | Chip Disable Setup Time     |     |     | 30  | ns            |
| $t_{DS}$ | Data Setup Time             | 2   |     |     | $\mu\text{s}$ |
| $t_{PW}$ | Program Pulse Width         | 1   | 3   | 10  | ms            |
| $t_{DH}$ | Data Hold Time              | 2   |     |     | $\mu\text{s}$ |
| $t_{CS}$ | Chip Select Delay           |     |     | 30  | ns            |
| $t_{RF}$ | $V_{PP}$ Rise and Fall Time | 1   |     |     | $\mu\text{s}$ |

**PROGRAMMING WAVEFORM**

**ORDERING INFORMATION**

| PART NUMBER     | SPEED<br>(ns) | PACKAGE<br>TYPE          | PACKAGE<br>DRAWING | OPERATING<br>TEMPERATURE<br>RANGE | WSI<br>MANUFACTURING<br>PROCEDURE |
|-----------------|---------------|--------------------------|--------------------|-----------------------------------|-----------------------------------|
| WS57C49B-35D    | 35            | 24 Pin Cerdip, 0.6"      | D1                 | Comm'l                            | Standard                          |
| WS57C49B-35J    | 35            | 28 Pin PLDCC             | J3                 | Comm'l                            | Standard                          |
| WS57C49B-35T    | 35            | 24 Pin Cerdip, 0.3"      | T1                 | Comm'l                            | Standard                          |
| WS57C49B-45CMB* | 45            | 28 Pad CLLCC             | C1                 | Military                          | MIL-STD-883C                      |
| WS57C49B-45FMB* | 45            | 24 Pin Ceramic Flatpack  | F1                 | Military                          | MIL-STD-883C                      |
| WS57C49B-45D    | 45            | 24 Pin Cerdip, 0.6"      | D1                 | Comm'l                            | Standard                          |
| WS57C49B-45DMB* | 45            | 24 Pin Cerdip, 0.6"      | D1                 | Military                          | MIL-STD-883C                      |
| WS57C49B-45J    | 45            | 28 Pin PLDCC             | J3                 | Comm'l                            | Standard                          |
| WS57C49B-45JI   | 45            | 28 Pin PLDCC             | J3                 | Industrial                        | Standard                          |
| WS57C49B-45S    | 45            | 24 Pin Plastic DIP, 0.3" | S1                 | Comm'l                            | Standard                          |
| WS57C49B-45T    | 45            | 24 Pin Cerdip, 0.3"      | T1                 | Comm'l                            | Standard                          |
| WS57C49B-45TI   | 45            | 24 Pin Cerdip, 0.3"      | T1                 | Industrial                        | Standard                          |
| WS57C49B-45TMB* | 45            | 24 Pin Cerdip, 0.3"      | T1                 | Military                          | MIL-STD-883C                      |
| WS57C49B-55CMB* | 55            | 28 Pad CLLCC             | C1                 | Military                          | MIL-STD-883C                      |
| WS57C49B-55D    | 55            | 24 Pin Cerdip, 0.6"      | D1                 | Comm'l                            | Standard                          |
| WS57C49B-55DMB* | 55            | 24 Pin Cerdip, 0.6"      | D1                 | Military                          | MIL-STD-883C                      |
| WS57C49B-55FMB* | 55            | 24 Pin Ceramic Flatpack  | F1                 | Military                          | MIL-STD-883C                      |
| WS57C49B-55J    | 55            | 28 Pin PLDCC             | J3                 | Comm'l                            | Standard                          |
| WS57C49B-55S    | 55            | 24 Pin Plastic DIP, 0.3" | S1                 | Comm'l                            | Standard                          |
| WS57C49B-55T    | 55            | 24 Pin Cerdip, 0.3"      | T1                 | Comm'l                            | Standard                          |
| WS57C49B-55TMB* | 55            | 24 Pin Cerdip, 0.3"      | T1                 | Military                          | MIL-STD-883C                      |
| WS57C49B-70CMB* | 70            | 28 Pad CLLCC             | C1                 | Military                          | MIL-STD-883C                      |
| WS57C49B-70D    | 70            | 24 Pin Cerdip, 0.6"      | D1                 | Comm'l                            | Standard                          |
| WS57C49B-70DMB* | 70            | 24 Pin Cerdip, 0.6"      | D1                 | Military                          | MIL-STD-883C                      |
| WS57C49B-70T    | 70            | 28 Pin Cerdip, 0.3"      | T1                 | Comm'l                            | Standard                          |
| WS57C49B-70TMB* | 70            | 28 Pin Cerdip, 0.3"      | T1                 | Military                          | MIL-STD-883C                      |

**NOTE:** The actual part marking will not include the initials "WS."

\*SMD product. See section 5 for SMD number.

**PROGRAMMING/ALGORITHMS/ERASURE/PROGRAMMERS**

**REFER TO  
PAGE 6-1**

The WS57C49B is programmed using Algorithm A shown on page 6-3.

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