WAFERSCALE INTEGRATION, INC.

HIGH SPEED 8K x 8 CMOS RPROM™

KEY FEATURES

- **Very-Fast Access Time**
  — 55 ns
- **Low Power Consumption**
  — 300 mW Active Power (Full Speed)
- **Fast Programming**
- **Pin Compatible with AM27S49 and MB7144 Bipolar PROMs**
- **Immune to Latch-Up**
  — Up to 200 mA
- **Commercial and Military Availability**

3

GENERAL DESCRIPTION

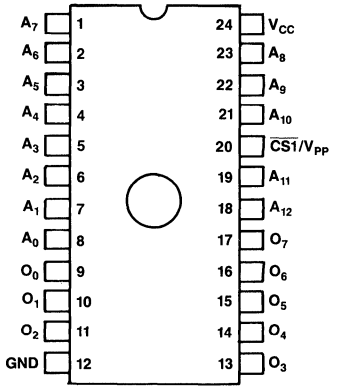
The WS57C49 is an extremely HIGH PERFORMANCE 64K UV Erasable Electrically Re-Programmable Read Only Memory. It is specifically designed to replace bipolar PROMs in existing applications.

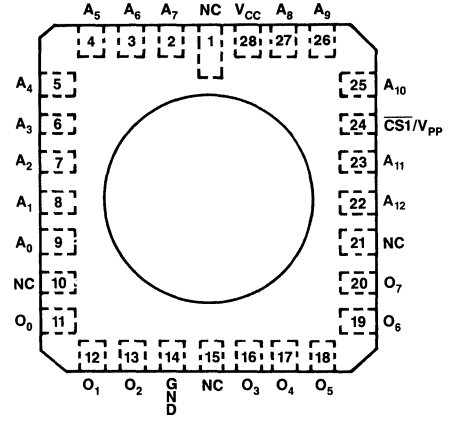
An advantage of the WS57C49 over Bipolar PROM devices is the fact that it utilizes a proven EPROM technology. This allows the entire memory array to be tested for switching characteristics and functionality after assembly. Unlike devices which cannot be erased, every WS57C49 is 100% tested with worst case test patterns both before and after assembly.

The WS57C49 is manufactured using WSI's patented CMOS EPROM technology which allows it to operate at Bipolar PROM speeds while consuming only 25% of the power required by its Bipolar counterparts.

The WS57C49 is configured in the standard Bipolar PROM pinout which provides an easy upgrade path for systems which are currently using Bipolar PROMs.

PIN CONFIGURATION





TOP

PRODUCT SELECTION GUIDE

PARAMETER	WS57C49-55	WS57C49-70
Address Access Time (Max)	55 ns	70 ns
Output Enable Time (Max)	20 ns	25 ns

ABSOLUTE MAXIMUM RATINGS*

Storage Temperature ..... -65°C to +150°C
Voltage on any pin with
respect to GND.....-0.6V to +7V
VPP with respect to GND .....-0.6V to +14.0V
ESD Protection .....>2000V

***Notice:** Stresses above those listed here 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	Vcc
Comm'l.	0° to +70°C	+5V ± 5%
Military	−55° to +125°C	+5V ± 10%

DC READ CHARACTERISTICS Over Operating Range. (See above)

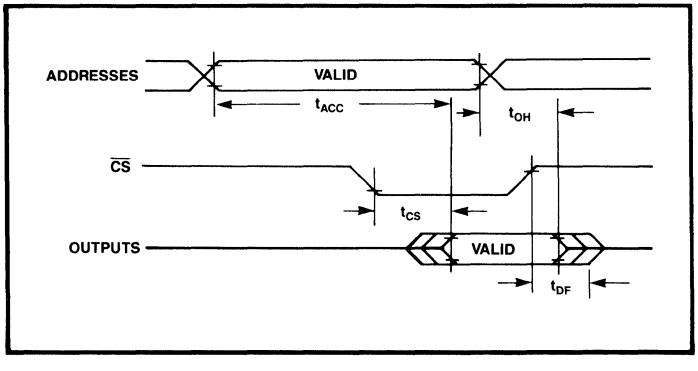
SYMBOL	PARAMETER	TEST CONDITIONS		MIN	MAX	UNITS
V_{OL}	Output Low Voltage	I_{OL}= 16mA			0.4	V
V_{OH}	Output High Voltage	I_{OH}= −4mA		2.4		
I_{CC1}	Vcc Active Current (CMOS)	Notes 1 and 3	Comm'l.		20	mA
			Military		30	
I_{CC2}	Vcc Active Current (TTL)	Notes 2 and 3	Comm'l.		25	
			Military		35	
I_{LI}	Input Load Current	V_{IN} = 5.5V or Gnd		−10	10	μA
I_{LO}	Output Leakage Current	V_{OUT} = 5.5V or Gnd		−10	10	

NOTES: 1) CMOS inputs: GND ± 0.3V or V_{CC} ± 0.3V.
2) TTL inputs: $V_{IL} \leq 0.8V$, $V_{IH} \geq 2.0V$.
3) AC Power component adds 3 mA/MHz.

AC READ CHARACTERISTICS Over Operating Range. (See Above)

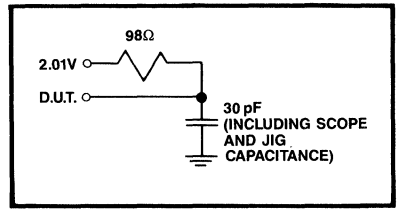
PARAMETER	SYMBOL	WS57C49-55		WS57C49-70		UNITS
		MIN	MAX	MIN	MAX	
Address to Output Delay	t_{ACC}		55		70	ns
$\overline{CS}$ to Output Delay	t_{CS}		20		25	
Output Disable to Output Float	t_{DF}		20		25	
Address to Output Hold	t_{OH}	10		10		

AC READ TIMING DIAGRAM



TEST LOAD

(High Impedance Test Systems)



TIMING LEVELS

Input Levels: 0 and 3V

Reference Levels: 1.5V

PROGRAMMING INFORMATION

DC CHARACTERISTICS (T_A = 25 ± 5°C, V_{CC} = 5.5V ± 5%, V_{PP} = 13.5 ± 0.5V)

PARAMETER	SYMBOLS	MIN.	MAX.	UNIT
Input Leakage Current V_{IN} = V_{CC} or Gnd	I_{LI}	−10	10	μA
V_{PP} Supply Current During Programming Pulse	I_{PP}		60	mA
V_{CC} Supply Current (Note 3)	I_{CC}		25	mA
Input Low Level	V_{IL}	−0.1	0.8	V
Input High Level	V_{IH}	2.0	V_{CC}+0.3	V
Output Low Voltage During Verify (I_{OL} = 16mA)	V_{OL}		0.45	V
Output High Voltage During Verify (I_{OH} = −4mA)	V_{OH}	2.4		V

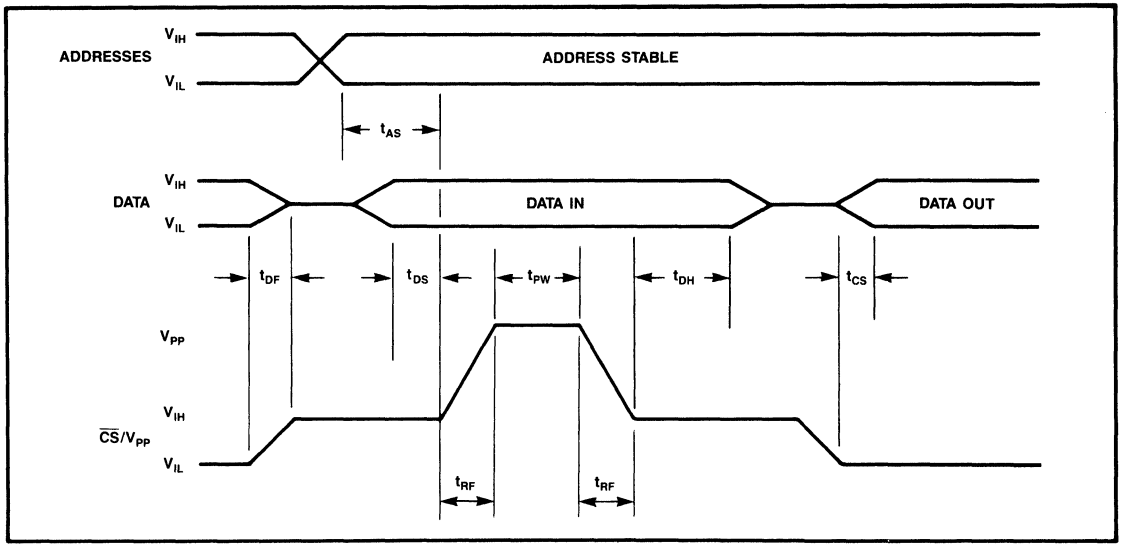
NOTE: 5) V_{PP} must not be greater than 14 volts including overshoot.

AC CHARACTERISTICS (T_A = 25 ± 5° C, V_{CC} = 5.5V ± 5%, V_{PP} = 13.5 ± 0.5V)

PARAMETER	SYMBOLS	MIN.	TYP.	MAX.	UNIT
Address Setup Time	t_{AS}	2			μs
Chip Disable Setup Time	t_{DF}			30	ns
Data Setup	t_{DS}	2			μs
Program Pulse Width	t_{PW}	1	3	10	ms
Data Hold Time	t_{DH}	2			μs
Chip Select Delay	t_{CS}			30	ns
V_{PP} Rise and Fall Time	t_{RF}	1			μs

NOTE: A single shot programming algorithm should use one 10 ms pulse.

PROGRAMMING WAVEFORM



PROGRAMMING

Upon delivery from WaferScale Integration, Inc. or after each erasure (see Erasure section), the WS57C49 has all 8192x8 bits in the "1," or high state. "0's" are loaded into the WS57C49 through the procedure of programming.

Programming is performed by raising V_{CC} to 5.5V, disabling the outputs, addressing the byte to be programmed, presenting the data to be programmed onto the data pins, and applying a 13.5V pulse to the $\overline{CS}/V_{PP}$ pin for 5 ms. The byte is then verified by removing the input data and reading the programmed byte as in the read operation. A 0.1 μF capacitor between V_{PP} and GND is needed to prevent excessive voltage transients which could damage the device.

ERASURE

In order to clear all locations of their programmed contents, it is necessary to expose the WS57C49 to an ultra-violet light source. A dosage of 15W second/cm^2 is required to completely erase a WS57C49. This dosage can be obtained by exposure to an ultra-violet lamp with wavelength of 2537 Angstroms (Å) with intensity of 12000μ W/cm^2 for 15 to 20 minutes. The WS57C49 should be about one inch from the source and all filters should be removed from the UV light source prior to erasure.

It is important to note that the WS57C49 and similar devices will erase with light sources having wavelengths shorter than 4000Å. Although erasure times will be much longer than with UV sources at 2537Å, the exposure to fluorescent light and sunlight will eventually erase the WS57C49 and exposure to them should be prevented to realize maximum system reliability. If used in such an environment, the package windows should be covered by an opaque label or substance.

PROGRAMMERS

Data I/O Unipak 2 or 2B, software version 9 or later, family/pinout code 3C/67; WSI's MagicPro™ IBM PC Compatible Engineering Programmer.

ORDERING INFORMATION

PART NUMBER	SPEED (ns)	PACKAGE TYPE	PACKAGE DRAWING	OPERATING TEMPERATURE RANGE	WSI MANUFACTURING PROCEDURE
WS57C49-55D	55	24 Pin CERDIP, 0.6″	D1	Comm'l	Standard
WS57C49-70CMB	70	28 Pad CLLCC	C1	Military	MIL-STD-883C
WS57C49-70D	70	24 Pin CERDIP, 0.6″	D1	Comm'l	Standard
WS57C49-70DMB	70	24 Pin CERDIP, 0.6″	D1	Military	MIL-STD-883C