



WAFERSCALE INTEGRATION, INC.

WS57C43

HIGH SPEED 4K x 8 CMOS R PROM™

KEY FEATURES

- **Ultra-Fast Access Time**
 - 55 ns
- **Low Power Consumption**
 - 225 mW Active Power
- **Fast Programming**
- **Pin Compatible with AM27S43, MB7142 and 82S321 Bipolar PROMs**
- **Immune to Latch-Up**
 - Up to 200 mA
- **ESD Protection Exceeds 2000V**

GENERAL DESCRIPTION

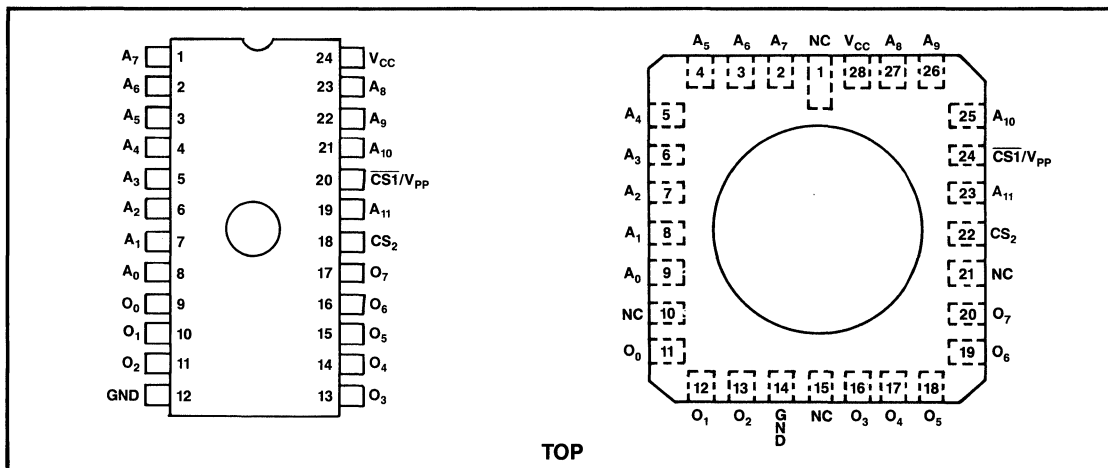
The WS57C43 is an extremely HIGH PERFORMANCE 32K UV Erasable Electrically Re-Programmable Read Only Memory. It is manufactured in an advanced CMOS technology which allows it to operate at Bipolar PROM speeds while consuming only 25% of the power of its Bipolar counterparts.

A further advantage of the WS57C43 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 WS57C43 is 100% tested with worst case test patterns both before and after assembly.

Another feature of the WS57C43 is its uniquely designed output structure. When compared with other high speed devices, the output structure of the WS57C43 virtually eliminates the introduction of switch related noise into the system environment.

The WS57C43 is configured in the standard Bipolar PROM pinout. Packaging options include both 300 and 600 mil wide Dips as well as a Leadless Chip Carrier.

PIN CONFIGURATION



PRODUCT SELECTION GUIDE

PARAMETER	WS57C43-55	WS57C43-70
Address Access Time (Max)	55ns	70ns
Output Enable Time (Max)	25ns	30ns

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%

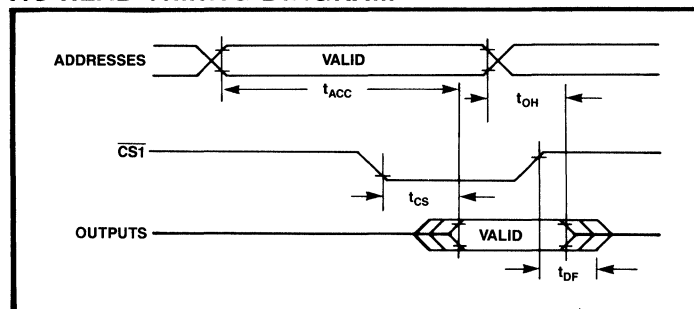
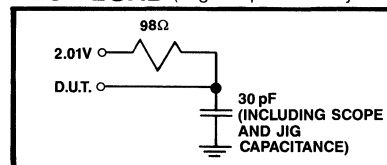
DC READ CHARACTERISTICS Over Operating Range. (See above)

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	
I _{LO}	Output Leakage Current	V _{OUT} = 5.5V or Gnd	-10	10	μA

NOTES: 1) CMOS inputs: GND ± 0.3V or V_{CC} ± 0.3V. 3) A.C. Power component adds 3 mA/MHz.
 2) TTL inputs: V_{IL} ≤ 0.8V, V_{IH} ≥ 2.0V.

AC READ CHARACTERISTICS Over operating Range. (See above)

PARAMETER	SYMBOL	WS57C43-55		WS57C43-70		UNITS
		MIN	MAX	MIN	MAX	
Address to Output Delay	t _{ACC}		55		70	ns
$\overline{\text{CS}}$ to Output Delay	t _{CS}		25		30	
Output Disable to Output Float	t _{DF}		25		30	
Address to Output Hold	t _{OH}	0		0		

AC READ TIMING DIAGRAM**TEST LOAD** (High Impedance Systems)**TIMING LEVELS**

Input Levels: 0 and 3V
 Reference Levels: 1.5V

PROGRAMMING INFORMATION

DC CHARACTERISTICS ($T_A = 25 \pm 5^\circ\text{C}$, $V_{CC} = 5.50\text{V} \pm 5\%$, $V_{pp} = 13.5 \pm 0.5\text{V}$)

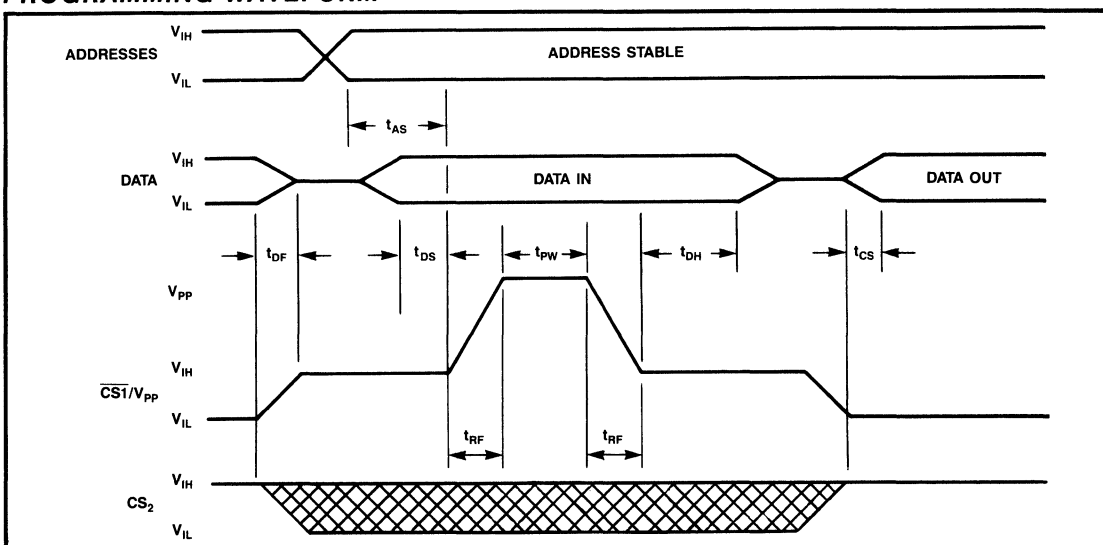
PARAMETER	SYMBOLS	MIN.	MAX.	UNIT
Input Leakage Current $V_{IN} = V_{CC}$ or Gnd	I_{LI}	-10	10	μA
V_{PP} Supply Current During Programming Pulse	I_{PP}		60	mA
V_{CC} Supply Current (Notes 2 and 3)	I_{CC}		25	mA
Input Low Level	V_{IL}	-0.1	0.8	V
Input High Level	V_{IH}	2.0	$V_{CC}+0.3$	V
Output Low Voltage During Verify ($I_{OL} = 16\text{mA}$)	V_{OL}		0.45	V
Output High Voltage During Verify ($I_{OH} = -4\text{mA}$)	V_{OH}	2.4		V

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

AC CHARACTERISTICS ($T_A = 25 \pm 5^\circ\text{C}$, $V_{CC} = 5.50\text{V} \pm 5\%$, $V_{pp} = 13.5 \pm 0.5\text{V}$)

PARAMETER	SYMBOLS	MIN.	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}	5		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

PROGRAMMING WAVEFORM



PROGRAMMING

Upon delivery from WaferScale Integration, Inc. or after each erasure (see Erasure section), the WS57C43 has all 4096×8 bits in the “1,” or high state. “0’s” are loaded into the WS57C43 through the procedure of programming.

Programming is performed by raising V_{CC} to 5.75V, 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 CS1/ 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 μ F 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 WS57C43 to an ultra-violet light

source. A dosage of 15W second/cm² is required to completely erase a WS57C43. This dosage can be obtained by exposure to an ultra-violet lamp with wavelength of 2537 Angstroms (Å) with intensity of 12000 μ W/cm² for 15 to 20 minutes. The WS57C43 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 WS57C43 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 WS57C43 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.

ORDERING INFORMATION

PART NUMBER	SPEED (ns)	PACKAGE TYPE	PACKAGE DRAWING	OPERATING TEMPERATURE RANGE	WSI MANUFACTURING PROCEDURE
WS57C43-55D	55	24 Pin Cerdip, 0.6"	D1	Comm'l	Standard
WS57C43-55T	55	24 Pin Cerdip, 0.3"	T1	Comm'l	Standard
WS57C43-70CMB	70	28 Pad CLLCC	C1	Military	MIL-STD-883C
WS57C43-70D	70	24 Pin Cerdip, 0.6"	D1	Comm'l	Standard
WS57C43-70DM	70	24 Pin Cerdip, 0.6"	D1	Military	Standard
WS57C43-70DMB	70	24 Pin Cerdip, 0.6"	D1	Military	MIL-STD-883C
WS57C43-70T	70	24 Pin Cerdip, 0.3"	T1	Comm'l	Standard
WS57C43-70TM	70	24 Pin Cerdip, 0.3"	T1	Military	Standard
WS57C43-70TMB	70	24 Pin Cerdip, 0.3"	T1	Military	MIL-STD-883C