MILITARY 8K x 8 CMOS EPROM

KEY FEATURES

- **Fast Access Time**
  — 90 ns Over Full Mil Temp Range

- **Low Power Consumption**

- **DESC SMD No. 85102**

- **EPI Processing**
  — Latch-Up Immunity Up to 200 mA

- **Standard EPROM Pinout**

- **Military Temperature Operating Range**

GENERAL DESCRIPTION

The WS27C64F is a High Performance 64K UV Erasable Electrically Programmable Read Only Memory. It is manufactured in an advanced CMOS technology which enables it to operate at high speeds and very low power over the full Military temperature operating range.

The WS27C64F is a direct drop-in replacement for the industry standard 27C64 and/or 2764 EPROMs. It was developed specifically for this purpose and requires no board or software modifications to complete the change.

The WS27C64F is configured in the standard EPROM pinout which provides an easy upgrade path to the WS27C128F and WS27C256F.
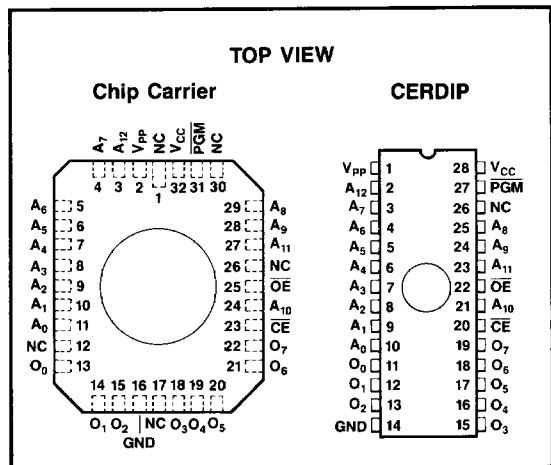
MODE SELECTION

MODE \ PINS	$\overline{CE}$	$\overline{OE}$	V_{PP}	V_{CC}	OUTPUTS
Read	V_{IL}	V_{IL}	V_{CC}	V_{CC}	D_{OUT}
Output Disable	X	V_{IH}	V_{CC}	V_{CC}	High Z
Standby	V_{IH}	X	V_{CC}	V_{CC}	High Z
Program	V_{IL}	V_{IH}	V_{PP}	V_{CC}	D_{IN}
Program Verify	X	V_{IL}	V_{PP}	V_{CC}	D_{OUT}
Program Inhibit	V_{IH}	V_{IH}	V_{PP}	V_{CC}	High Z
Signature*	V_{IL}	V_{IL}	V_{CC}	V_{CC}	Encoded Data

X can be either V_{IL} or V_{IH}.

*For Signature, A_9 = 12V, A_0 is toggled, and all other addresses are at TTL low. $A_0 = V_{IL}$ = MFGR 23H, $A_0 = V_{IH}$ = DEVICE A8H.

PIN CONFIGURATION

PRODUCT SELECTION GUIDE

PARAMETER	WS27C64F-90
Address Access Time (Max)	90 ns
Chip Select Time (Max)	90 ns
Output Enable Time (Max)	30 ns

ABSOLUTE MAXIMUM RATINGS*

Storage Temperature . . . . −65° to +150°C
Voltage on Any Pin with
　Respect to GND . . . . −0.6V to +7V
V_{PP} with respect to GND . . . . −0.6V to +14V
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	V_{CC}
Military	−55° to +125°C	+5V ± 10%

DC READ CHARACTERISTICS Over Operating Range with $V_{PP} = V_{CC}$

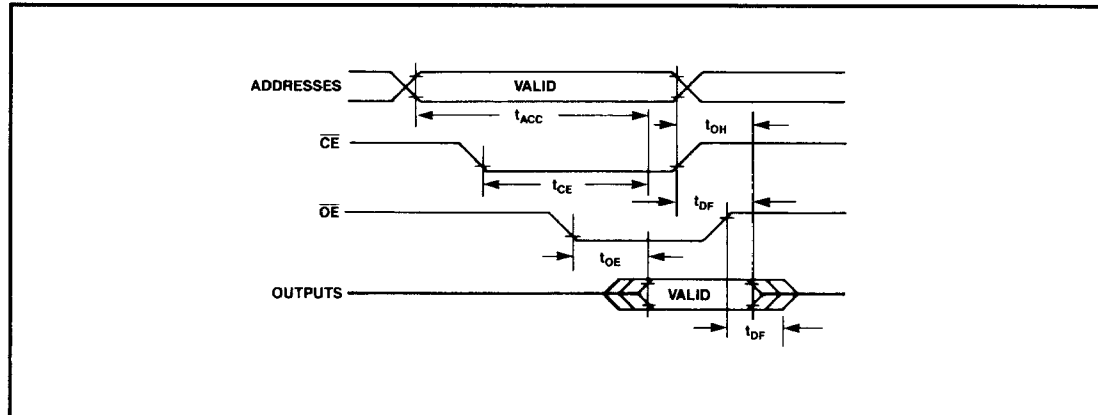| SYMBOL	PARAMETER	TEST CONDITIONS	MIN	MAX	UNITS
V_{IL}	Input Low Level	(Note 4)	−0.1	0.8	V
V_{IH}	Input High Level	(Note 4)	2.0	$V_{CC} + 0.3$	V
V_{OL}	Output Low Voltage	$I_{OL} = 4$ mA		0.4	V
V_{OH}	Output High Voltage	$I_{OH} = -1$ mA	2.4		V
I_{SB1}	V_{CC} Standby Current (CMOS)	(Note 1)		200	μA
I_{SB2}	V_{CC} Standby Current (TTL)	(Note 2)		10	mA
I_{CC1}	V_{CC} Active Current (CMOS)	(Notes 1 and 3)		25	mA
I_{CC2}	V_{CC} Active Current (TTL)	(Notes 2 and 3)		35	mA
I_{PP}	V_{PP} Supply Current	$V_{PP} = V_{CC}$		100	μA
V_{PP}	V_{PP} Read Voltage		$V_{CC} - 0.4$	V_{CC}	V
I_{LI}	Input Load Current	$V_{IN} = 5.5$V or Gnd	−10	10	μA
I_{LO}	Output Leakage Current	$V_{OUT} = 5.5$ V or Gnd	−10	10	μA

NOTES:
　1. CMOS inputs: GND ± 0.3V or V_{CC} ± 0.3V.
　2. TTL inputs: $V_{IL} \leq 0.8$V, $V_{IH} \geq 2.0$V.
　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 with $V_{PP} = V_{CC}$

SYMBOL	PARAMETER	WS27C64F-90		UNITS
		MIN	MAX	
t_{ACC}	Address to Output Delay		90	
t_{CE}	$\overline{CE}$ to Output Delay		90	
t_{OE}	$\overline{OE}$ to Output Delay		30	ns
t_{DF}	Output Disable to Output Float		30	
t_{OH}	Address to Output Hold	0		

AC READ TIMING DIAGRAM

CAPACITANCE[5] T_A = 25°C, f = 1 MHz

SYMBOL	PARAMETER	CONDITIONS	TYP[6]	MAX	UNITS
C_{IN}	Input Capacitance	V_{IN} = 0V	4	6	pF
C_{OUT}	Output Capacitance	V_{OUT} = 0V	8	12	pF
C_{VPP}	V_{PP} Capacitance	V_{PP} = 0V	18	25	pF

NOTES: 5. This parameter is only sampled and is not 100% tested.
6. Typical values are for T_A = 25°C and nominal supply voltages.

TEST LOAD (High Impedance Test Systems)

A.C. TESTING INPUT/OUTPUT WAVEFORM

A.C testing inputs are driven at 2.4V for a logic "1" and 0.4V for a logic "0". Timing measurements are made at 2.0V for a logic "1" and 0.8V for a logic "0"
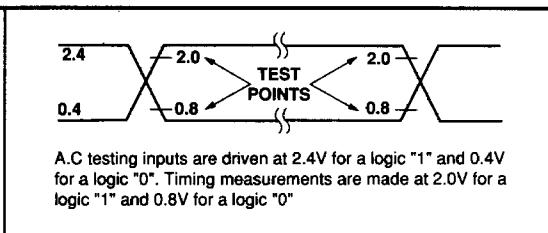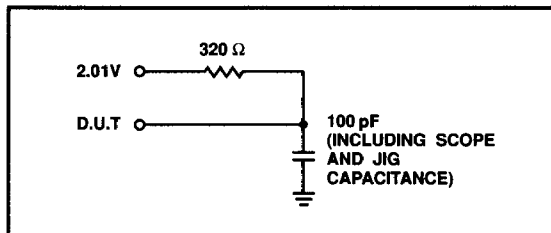
NOTE: 7. Provide adequate decoupling capacitance as close as possible to this device to achieve the published A.C. and D.C. parameters. A 1.0 microfarad capacitor in parallel with a 0.1 microfarad capacitor connected between V_{CC} and ground is recommended. Inadequate decoupling may result in access time degradation or other transient performance failures.

PROGRAMMING INFORMATION

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

| SYMBOLS	PARAMETER	MIN	MAX	UNIT
I_{LI}	Input Leakage Current ($V_{IN} = V_{CC}$ or Gnd)	−10	10	μA
I_{PP}	V_{PP} Supply Current During Programming Pulse ($\overline{CE} = \overline{PGM} = V_{IL}$)		60	mA
I_{CC}	V_{CC} Supply Current (Note 3)		50	mA
V_{OL}	Output Low Voltage During Verify ($I_{OL} = 4$ mA)		0.45	V
V_{OH}	Output High Voltage During Verify ($I_{OH} = -1$mA)	2.4		V

NOTES: 8. V_{CC} must be applied either coincidentally or before V_{PP} and removed either coincidentally or after V_{PP}.
 9. V_{PP} must not be greater than 14 volts including overshoot. During $\overline{CE} = \overline{PGM} = V_{IL}$, V_{PP} must not be switched from 5 volts to 13.5 volts or vice-versa.
 10. During power up the $\overline{PGM}$ pin must be brought high ($\geq V_{IH}$) either coincident with or before power is applied to V_{PP}.

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

SYMBOLS	PARAMETER	MIN	TYP	MAX	UNITS
t_{AS}	Address Setup Time	2			μs
t_{CES}	Chip Enable Setup Time	2			μs
t_{OES}	Output Enable Setup Time	2			μs
t_{OS}	Data Setup Time	2			μs
t_{AH}	Address Hold Time	0			μs
t_{OH}	Data Hold Time	2			μs
t_{DF}	Chip Disable to Output Float Delay	0		130	ns
t_{OE}	Data Valid From Output Enable			130	ns
t_{VS}	V_{PP} Setup Time	2			μs
t_{PW}	$\overline{PGM}$ Pulse Width	1	3	10	ms

NOTE: 11. Single shot programming algorithms should use one 10 ms PGM pulse per byte.

PROGRAMMING WAVEFORM
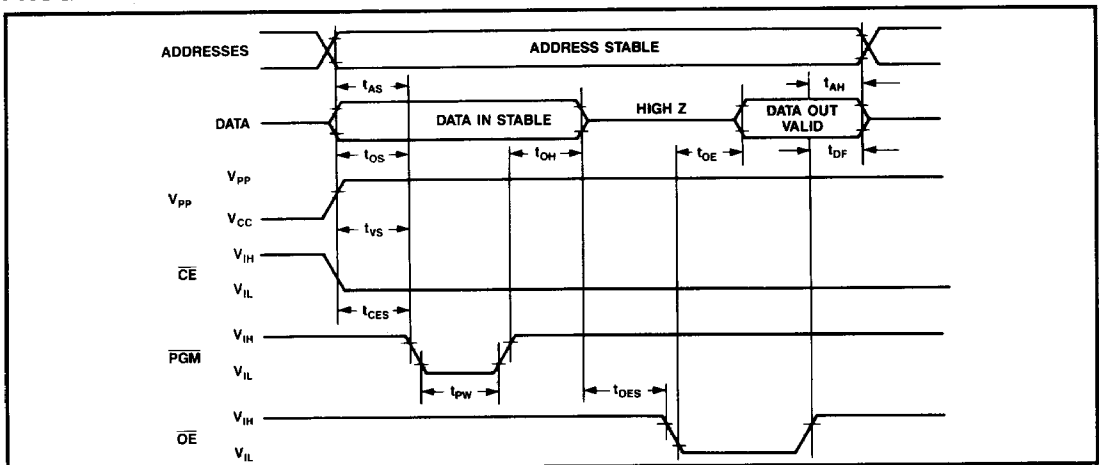
ORDERING INFORMATION

PART NUMBER	SPEED (ns)	PACKAGE TYPE	PACKAGE DRAWING	OPERATING TEMPERATURE RANGE	WSI MANUFACTURING PROCEDURE
WS27C64F-90CMB	90	32 Pad CLLCC	C2	Military	MIL-STD-883C
WS27C64F-90DMB	90	28 Pin CERDIP, 0.6"	D2	Military	MIL-STD-883C

NOTE: 12. The actual part marking will not include the initials "WS."

PROGRAMMING/ERASURE/PROGRAMMERS

REFER TO
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