

MILITARY 16K x 8 CMOS EPROM

**FOR MAINTENANCE PURPOSES ONLY! NOT TO BE USED FOR NEW DESIGNS.
SEE WS57C128FB FOR NEW DESIGNS!**

KEY FEATURES

- **Fast Access Time**
— 90 ns Over Full Mil Temp Range
- **Low Power Consumption**
- **DESC SMD No. 5962-87661**
- **EPI Processing**
— Latch-Up Immunity Up to 200 mA
- **Standard EPROM Pinout**
- **Military Operating Range**

GENERAL DESCRIPTION

The WS27C128F is an extremely High Performance 128K 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 WS27C128F was specifically designed to replace standard EPROMs in military environments. No hardware or software changes are required to replace standard military 27128 EPROMs with the WSI WS27C128F.

The WS27C128F is configured in the standard EPROM pinout which provides an easy upgrade path for the WS27C64F.

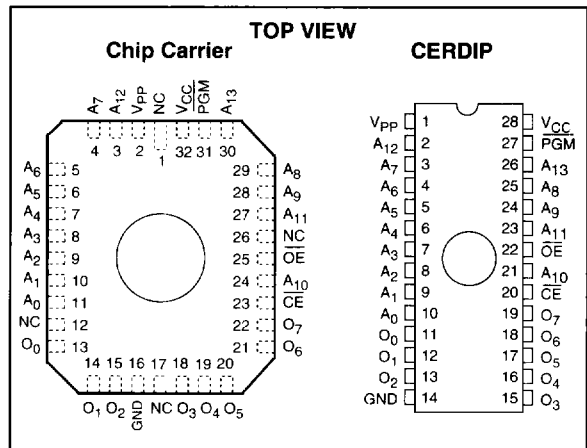
MODE SELECTION

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, A₉ = 12V, A₀ is toggled, and all other addresses are at TTL low. A₀ = V_{IL} = MFG# 23H, A₀ = V_{IH} = DEVICE A8H.

PIN CONFIGURATION


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PRODUCT SELECTION GUIDE

PARAMETER	WS27C128F-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 Ground-0.6V to +7V
 V_{PP} with Respect to Ground.....-0.6V to + 13V
 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 _{CC}
Military	-55°C 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 Voltage	(Note 4)	-0.1	0.8	V
V _{IH}	Input High Voltage	(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 Leakage Current	V _{IN} = 5.5V or Gnd	-10	10	μA
I _{LO}	Output Leakage Current	V _{OUT} = 5.5 V or Gnd	-10	10	μA

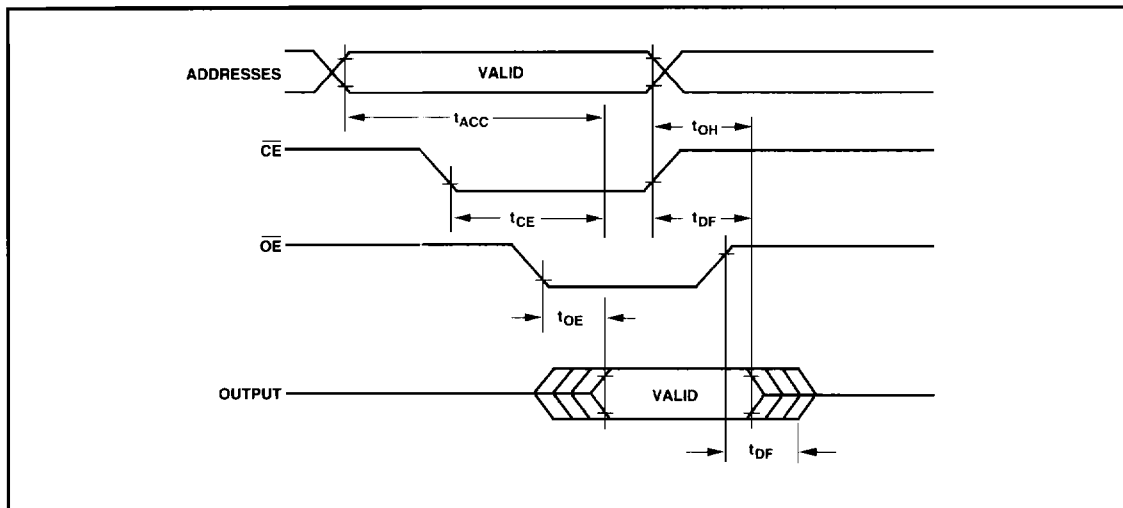
- NOTES:**
1. CMOS inputs: GND ± 0.3V or V_{CC} ± 0.3V.
 2. TTL inputs: V_{IL} ≤ 0.8V, V_{IH} ≥ 2.0V.
 3. Add 3 mA/MHz for A.C. power component.
 4. These are absolute voltages with respect to device ground pin and include all overshoots due to system and/or tester noise. Do not attempt to test these values without suitable equipment.

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

SYMBOL	PARAMETER	WS27C128F-90		UNITS
		MIN	MAX	
t _{ACC}	Address to Output Delay		90	ns
t _{CE}	\overline{CE} to Output Delay		90	
t _{OE}	\overline{OE} to Output Delay		30	
t _{DF}	Output Disable to Output Float		30	
t _{OH}	Address to Output Hold	0		

NOTE: 5. Single shot programming algorithms should use one 10 ms PGM pulse per word.

AC READ TIMING DIAGRAM



CAPACITANCE⁽⁶⁾ $T_A = 25^\circ\text{C}$, $f = 1\text{ MHz}$

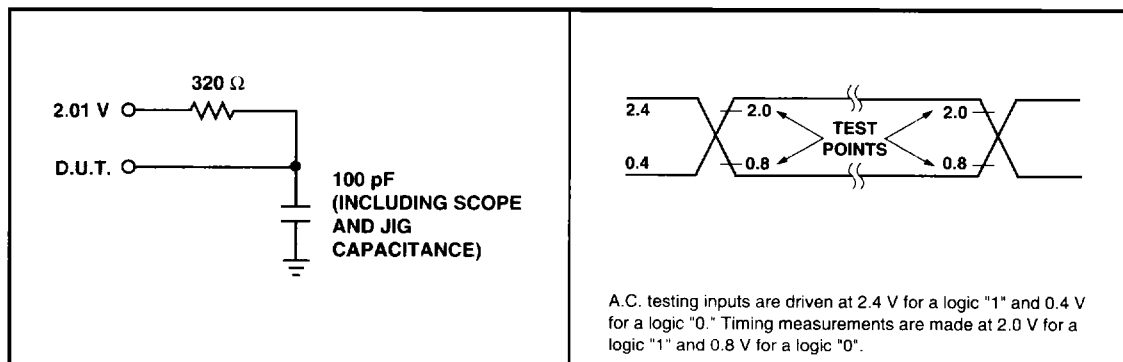
SYMBOL	PARAMETER	CONDITIONS	TYP ⁽⁷⁾	MAX	UNITS
C_{IN}	Input Capacitance	$V_{IN} = 0\text{ V}$	4	6	pF
C_{OUT}	Output Capacitance	$V_{OUT} = 0\text{ V}$	8	12	pF
C_{VPP}	V_{PP} Capacitance	$V_{PP} = 0\text{ V}$	18	25	pF

NOTES: 6. This parameter is only sampled and is not 100% tested.
 7. Typical values are for $T_A = 25^\circ\text{C}$ and nominal supply voltages.

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TEST LOAD (High Impedance Test Systems)

A.C. TESTING INPUT/OUTPUT WAVEFORM



NOTE: 7. Provide adequate decoupling capacitance as close as possible to this device to achieve the published A.C. and D.C. parameters. A 0.1 microfarad capacitor in parallel with a 0.01 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 ($T_A = 25 \pm 5^\circ\text{C}$, $V_{CC} = 5.6\text{V} \pm 0.25\text{V}$, $V_{PP} = 13.5 \pm 0.5\text{V}$)

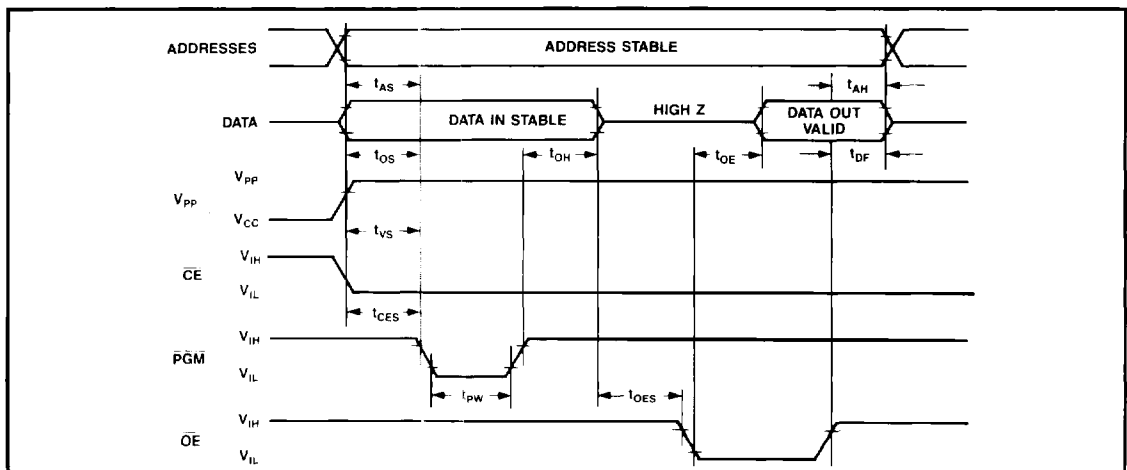
SYMBOLS	PARAMETER	MIN	MAX	UNIT
I_{LI}	Input Leakage Current ($V_{IN} = V_{CC}$ or Gnd)	-10	10	μA
I_{PP}	V_{PP} Supply Current During Programming Pulse ($\overline{CE} = \overline{PGM} = V_{IL}$)		30	mA
I_{CC}	V_{CC} Supply Current		50	mA
V_{OL}	Output Low Voltage During Verify ($I_{OL} = 4\text{ mA}$)		0.45	V
V_{OH}	Output High Voltage During Verify ($I_{OH} = -1\text{ mA}$)	2.4		V

- NOTES:**
- V_{CC} must be applied either coincidentally or before V_{PP} and removed either coincidentally or after V_{PP} .
 - 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 12.5 volts or vice-versa.
 - 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 ($T_A = 25 \pm 5^\circ\text{C}$, $V_{CC} = 5.6\text{V} \pm 0.25\text{V}$, $V_{PP} = 13.5 \pm 0.5\text{V}$)

SYMBOLS	PARAMETER	MIN	TYP	MAX	UNITS
t_{AS}	Address Setup Time	2			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	5		ms

PROGRAMMING WAVEFORM



ORDERING INFORMATION

PART NUMBER	SPEED (ns)	PACKAGE TYPE	PACKAGE DRAWING	OPERATING TEMPERATURE RANGE	WSI MANUFACTURING PROCEDURE
WS27C128F-90DM	90	28 Pin CERDIP, 0.6"	D2	Military	Standard
WS27C128F-90DMB*	90	28 Pin CERDIP, 0.6"	D2	Military	MIL-STD-883C

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

*SMD product. See page 5-2 for DESC SMD number.

PROGRAMMING/ALGORITHMS/ERASURE/PROGRAMMERS

**REFER TO
PAGE 6-1**

The WS27C128F is programmed using Algorithm A shown on page 6-3.

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