393-538/526

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82S126A
82S129A
1K-Bit TTL Bipolar PROM

Product Specification

Bipolar Memory Products

DESCRIPTION

The 82S126A and 82S129A are field programmable, which means that custom patterns are immediately available by following the Signetics Generic I fusing procedure. The 82S126A and 82S129A devices are supplied with all outputs at logical Low. Outputs are programmed to a logic High level at any specified address by fusing the Ni-Cr link matrix.

These devices include on-chip decoding and 2 Chip Enable inputs for ease of memory expansion. They feature either Open Collector or 3-State outputs for optimization of word expansion in bused organizations.

Ordering information can be found on the following page.

The 82S126A and 82S129A devices are also processed to military requirements for operation over the military temperature range. For specifications and ordering information consult the Signetics Military Data Book.

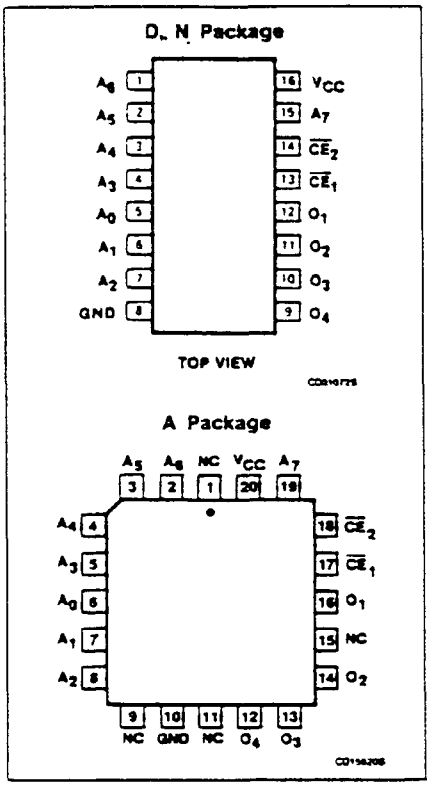
FEATURES

- **Address access time:**
  - **N82S126A: 30ns max**
  - **N82S129A: 27ns max**
- **Power dissipation: 0.5mW/bit typ**
- **Input loading: −100μA max**
- **On-chip address decoding**
- **Two Chip Enable inputs**
- **Output options:**
  - **82S126A: Open-Collector**
  - **82S129A: 3-State**
- **No separate fusing pins**
- **Unprogrammed outputs are Low level**
- **Fully TTL compatible**

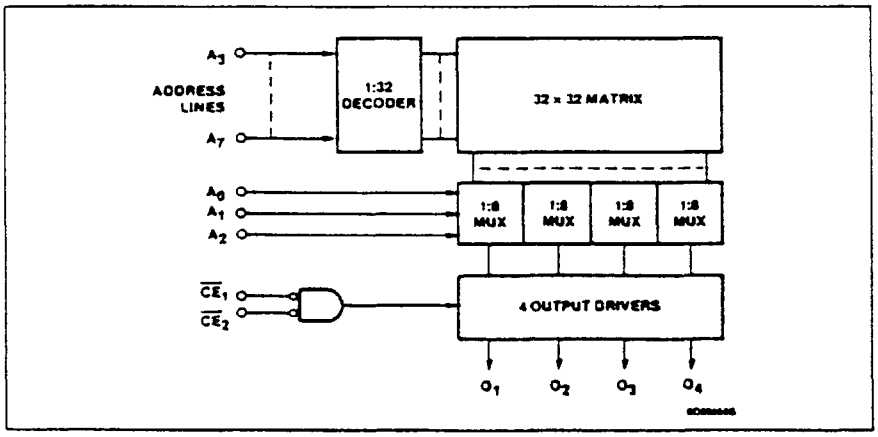
APPLICATIONS

- **Prototyping/volume production**
- **Sequential controllers**
- **Microprogramming**
- **Hardwired algorithms**
- **Control store**
- **Random logic**
- **Code conversion**

PIN CONFIGURATIONS



BLOCK DIAGRAM



ORDERING INFORMATION

DESCRIPTION	ORDER CODE
16-pin Plastic DIP 300mil-wide	N82S126A N • N82S129A N
16-pin Plastic SO 300mil-wide	N82S126A D • N82S129A D
20-pin Plastic Leaded Chip Carrier 350mil-square	N82S126A A • N82S129A A

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	RATING	UNIT
V_{CC}	Supply voltage	+7	V_{DC}
V_{IN}	Input voltage	+5.5	V_{DC}
V_{OH} V_O	Output voltage High (82S126) Off-state (82S129)	 +5.5 +5.5	V_{DC}
T_A	Operating temperature range	0 to +75	°C
T_{STG}	Storage temperature range	−65 to +150	°C

DC ELECTRICAL CHARACTERISTICS $0°C \leq T_A \leq +75°C$, $4.75V \leq V_{CC} \leq 5.25V$

SYMBOL	PARAMETER	TEST CONDITIONS[1,2]	LIMITS			UNIT
			Min	Typ[5]	Max	
Input voltage						
V_{IL}	Low	$V_{CC} = 4.75V$			0.8	V
V_{IH}	High	$V_{CC} = 5.25V$	2.0			V
V_{IC}	Clamp	$V_{CC} = 4.75V$, $I_{IN} = -12mA$			−1.2	V
Output voltage						
		$\overline{CE}_{1,2}$ = Low				
V_{OL}	Low	$I_{OUT} = 16mA$			0.45	V
V_{OH}	High (82S129A)	$I_{OUT} = -2.0mA$	2.4			V
Input current						
I_{IL}	Low	$V_{IN} = 0.45V$			−100	μA
I_{IH}	High	$V_{IN} = 5.5V$			40	μA
Output current						
I_{OLK}	Leakage (82S126A)	$\overline{CE}_1$ or $\overline{CE}_2$ = High, $V_{OUT} = 5.5V$			40	μA
I_{OZ}	Hi-Z State (82S129A)	$\overline{CE}_1$ or $\overline{CE}_2$ = High, $V_{OUT} = 5.5V$			40	
		$\overline{CE}_1$ or $\overline{CE}_2$ = High, $V_{OUT} = 0.5V$			−40	
I_{OS}	Short circuit (82S129A)[3]	$\overline{CE}_{1,2}$ = Low, V_{OUT} = 0V, High stored	−15		−70	mA
Supply current[7]						
I_{CC}		$V_{CC} = 5.25V$			120	mA
Capacitance						
		$\overline{CE}_1$ or $\overline{CE}_2$ = High, $V_{CC} = 5.0V$				
C_{IN}	Input	$V_{IN} = 2.0V$		5		pF
C_{OUT}	Output	$V_{OUT} = 2.0V$		8		pF

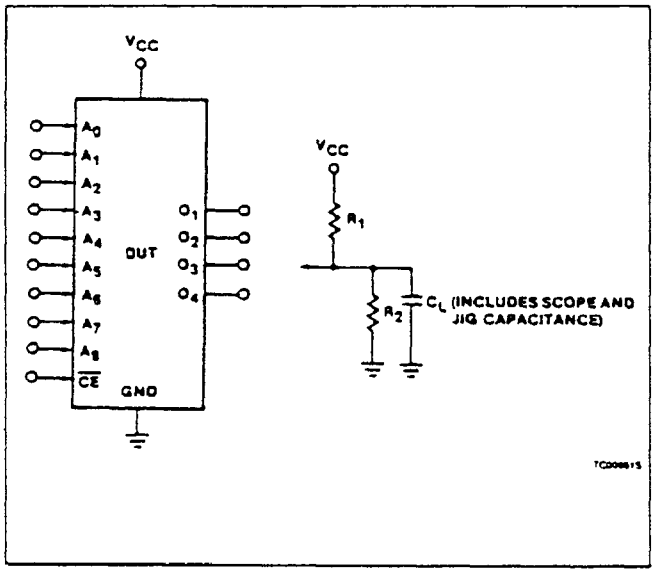
Notes on following page.

AC ELECTRICAL CHARACTERISTICS $R_1 = 270\Omega$, $R_2 = 600\Omega$, $C_L = 30pF$, $0°C \leq T_A \leq +75°C$, $4.75V \leq V_{CC} \leq 5.25V$

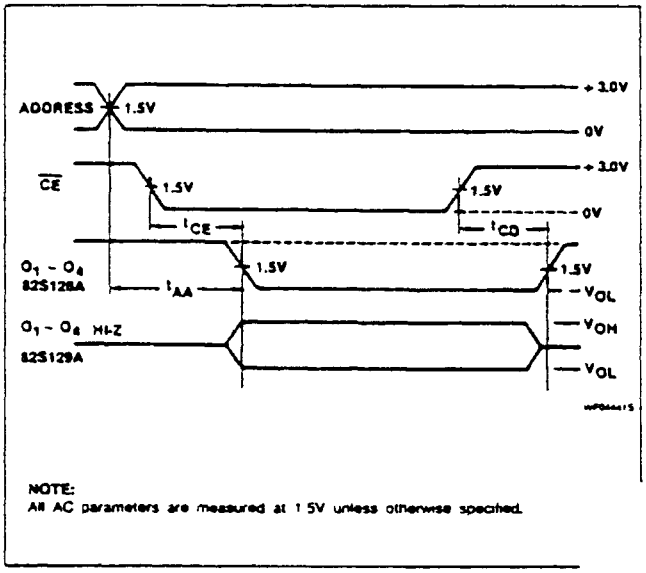
SYMBOL	PARAMETER	TO	FROM	N82S129A			N82S126A			UNIT
				Min	Typ[5]	Max	Min	Typ[5]	Max	
Access time[4]										
t_{AA}		Output	Address		17	27		17	30	ns
t_{CE}		Output	Chip Enable		10	20		10	20	ns
Disable time[6]										
t_{CD}		Output	Chip Enable		6	15		6	15	ns

NOTES:
1. Positive current is defined as into the terminal referenced.
2. All voltages with respect to network ground.
3. Duration of short circuit should not exceed 1 second.
4. Tested at an address cycle time of 1μs.
5. Typical values are at $V_{CC} = 5V$, $T_A = +25°C$.
6. Measured at a delta of 0.5V from Logic Level with $R_1 = 750\Omega$, $R_2 = 750\Omega$ and $C_L = 5pF$.
7. Measured with all inputs grounded and all outputs open.

TEST LOAD CIRCUIT



VOLTAGE WAVEFORMS



NOTE:
All AC parameters are measured at 1.5V unless otherwise specified.

Bipolar Programming Procedures

GENERIC I PROGRAMMING

The Signetics family of Advanced Junction Isolated Schottky PROMs are high performance bipolar devices which use a nickel/chromium (NiCr) alloy fuse to provide the many benefits of field programming. Programming is accomplished by application of voltages above those used for normal operation, therefore, no special pins are required for programming (except the 82S115 which has two fusing pins: FE1 and FE2). The programming voltages and timing requirements make unintentional programming virtually impossible. Arrays of devices may be programmed in the user's circuit, if desirable, as long as proper application of programming voltages is provided.

GENERIC I PROCEDURE

The Generic I family of Schottky PROMs uses no special pins for programming. The address pins remain TTL compatible during the programming procedure and are used to select the unique word to be programmed. The outputs are used to supply fusing current during the programming mode as well as selection of the bit to be programmed. Programming is performed one bit at a time. The programming mode is evoked by raising the V_{CC} pin to 8.75 ± 0.25V. This voltage is referred to as V_{CCP}. After the proper delay the output corresponding to the bit selected is raised to 17.5 ± 0.5V. This voltage is known as V_{OPF} and must be supplied by a voltage source with a low impedance and very fast transient response. Reliable programming depends on the V_{OPF} power supply and circuitry. I_{OPF} is the current which will be drawn by the part during the programming sequence. Again, after the proper delay the chip enable CE is pulsed to a TTL "0" level for 10 to 25μs. It is during this time that the actual fusing of the NiCr link occurs. The actual time for fusing of a Signetics NiCr fuse link has been determined to be between 0.6 to 1.2μs. The shorter the fusing pulse (CE), within the recommended limits, the sooner the total programming sequence is completed. Note that unprogrammed Generic I (Junction Isolated) parts are supplied with all bits at a logic "0" level. Only the bits intended to be "ones" will be programmed. Verification of programming can be performed after each bit or after the entire device has been programmed.

A fuse which does not blow during the first programming cycle should be considered a defective device and should be discarded.

GENERIC II PROGRAMMING

The Signetics family of Oxide Isolated Schottky PROMs are high performance bipolar devices which use a vertical diode fuse to provide the benefits of field programming. Programming is accomplished by application of voltages above those used for normal operation, therefore, no special pins are required for programming. The programming voltages and timing requirements make unintentional programming virtually impossible.

GENERIC II PROCEDURE

As with the Generic I devices, the addresses remain TTL compatible during the programming procedure and are used to select the unique word to be programmed. The outputs are used to supply fusing current during the programming mode as well as selection of the bit to be programmed. Programming is performed one bit at a time. The programming mode is evoked by raising the V_{CC} pin to 8.75 ± 0.25V. This voltage is referred to as V_{CCP}. After the proper delay the output corresponding to the bit selected is raised to 20.0 ± 0.5V. This voltage is known as V_{OPF} and must be supplied by a voltage source with a low impedance and very fast transient response. Reliable programming depends on the V_{OPF} power supply and circuitry. I_{OPF} is the current which will be drawn by the part during the programming sequence. Again, after the proper delay the chip enable CE is pulsed to a TTL "0" level for 1μs. The properly blown fuse will verify the TTL "0" level. Note that unprogrammed Generic II (Oxide Isolated) parts are supplied with all bits at a logic "1" level. Only the bits intended to be "zeros" will be programmed.

GENERIC III PROGRAMMING

The Signetics Generic III PROM family consist of those devices constructed with Oxide Isolated Schottky circuitry using Titanium Tungsten horizontal fuses. This results in a very high performance PROM at an optimum cost of manufacture. Programming is accomplished by application of voltages above those used for normal operation, therefore, no special pins are required for programming. The programming voltages and timing requirements make unintentional programming virtually impossible.

GENERIC III PROCEDURE

As with the Generic I devices, the addresses remain TTL compatible during the programming procedure and are used to select the unique word to be programmed. The outputs are used to supply fusing current during the programming mode as well as selection of the bit to be programmed. Programming is performed one bit at a time. The programming mode is evoked by raising the V_{CC} pin to 8.75 ± 0.25V. This voltage is referred to as V_{CCP}. After the proper delay the output corresponding to the bit selected is raised to 14.25 ± 0.25V. This voltage is known as V_{OPF} and must be supplied by a voltage source with a low impedance and very fast transient response. Reliable programming depends on the V_{OPF} power supply and circuitry. I_{OPF}, approximately 300mA, is the current which will be drawn by the part during the programming sequence. Again, after the proper delay the chip enable CE is pulsed to a TTL "0" level for 5μs. The properly blown fuse will verify the TTL "1" or "High" level. Note that unprogrammed Generic III parts are supplied with all bits at a logic "0" or "Low" level. Only the bits intended to be "Ones" will be programmed.

GENERIC IV PROGRAMMING

The Signetics family of ECL PROMs are bipolar devices which use a nickel/chromium (NiCr) alloy fuse, or as in the case of the newest members a Titanium Tungsten (TiW) fuse. Both of these designs are programmed using the same Generic IV method.

GENERIC IV PROCEDURE

Unlike previous methods the addresses used to select the proper word are unique voltage levels which become necessary when the V_{CC} pin is raised to a positive voltage. (ECL normal mode of operation is with the V_{CC} pin held to ground potential.) The outputs are used to supply fusing current during the programming mode as well as select the bit to be programmed. Programming is performed one bit at a time. The programming mode is evoked by raising the V_{CC1} pin to 11.5 ± 0.5V. This voltage is referred to as V_{CCP}. After the proper delay the output corresponding to the bit selected is raised to

12 ± 0.5V for 10μs. The properly blown fuse will verify a "High" level of 4.4V min. Note that unprogrammed Generic IV devices are supplied with all bits at a logic "Low" level. Only the bits intended to be "High" will be programmed.

PROGRAMMING INFORMATION

Complete programming system specifications are available upon request from the Memory Marketing department. Signetics encourages the purchase of programming equipment from a manufacturer who has a full line of programming products to offer. Signetics also encourages the manufacturers of programming equipment to submit their equipment for verification of electrical parameters and programming procedures. Information on manufacturers offering equipment certified by Signetics is available upon request from the Memory Marketing department.

SIGNETICS DISCOURAGES THE CONSTRUCTION AND USE OF "HOMEMADE" PROGRAMMING EQUIPMENT

In order to consistently achieve excellent programming yields, periodic calibration of the programming equipment is required. Consult the equipment manufacturer for the recommended calibration interval. Records of programming yield, by device type, should be kept and any downward trend or sudden change should be considered as an indication of a need to recalibrate the programming equipment.