FUSE-PROGRAMMABLE IDENTITY COMPARATORS

D2826, JUNE 1984 – REVISED MAY 1986

- Can Be Programmed and Verified on Most Incoming Test Equipment
- Reduces Board and Package Size for Similar Fixed Comparator Functions
- High-Speed Address Recognition
- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

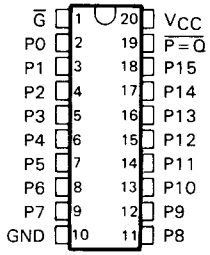
Programming Capabilities

'ALS526 – Fuse Programmable 16-Bit Identity Comparator

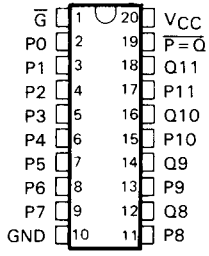
'ALS527 – Fuse Programmable 8-Bit Identity Comparator and 4-Bit Comparator

'ALS528 – Fuse Programmable 12-Bit Identity Comparator

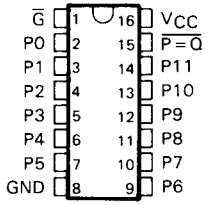
SN54ALS526 . . . J PACKAGE
SN74ALS526 . . . DW OR N PACKAGE
(TOP VIEW)



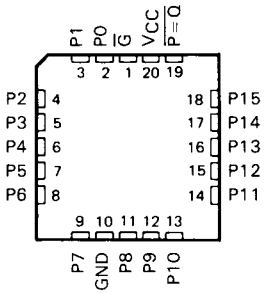
SN54ALS527 . . . J PACKAGE
SN74ALS527 . . . DW OR N PACKAGE
(TOP VIEW)



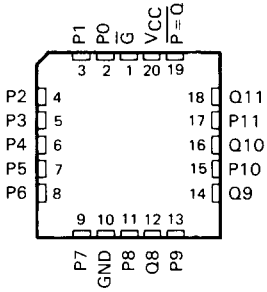
SN54ALS528 . . . J PACKAGE
SN54ALS528 . . . DW OR N PACKAGE
(TOP VIEW)



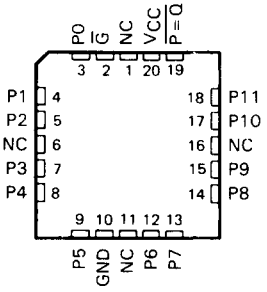
SN54ALS526 . . . FK PACKAGE
(TOP VIEW)



SN54ALS527 . . . FK PACKAGE
(TOP VIEW)



SN54ALS528 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

description

The 'ALS526 and 'ALS528 are fuse-programmable identity comparators designed for easy programming in fixed-comparator applications. The 'ALS526 compares a 16-bit data word against a preprogrammed 16-bit data word while the 'ALS528 compares a 12-bit data word against a preprogrammed 12-bit data word. The $\overline{P=Q}$ output will go low when the applied data word (P inputs) matches the preprogrammed data word (Q represents the preprogrammed data word). Programming is easily accomplished on the bench or with conventional automatic test equipment. Special equipment such as PROM-programmers are not required.

The 'ALS527 is a combination of an 8-bit fuse-programmable comparator and a conventional 4-bit comparator. For the $\overline{P=Q}$ output to go low, the applied data word P0 through P7 must match the preprogrammed data word Q0 through Q7, and the applied data word P8 through P11 must match the applied data word Q8 through Q11.

The SN54ALS526, SN54ALS527, and SN54ALS528 are characterized for operation over the full military temperature range of −55°C to 125°C. The SN74ALS526, SN74ALS527, and SN74ALS528 are characterized for operation from 0°C to 70°C.

programming procedure

Before any fuses are blown, the inputs will recognize a low logic level. Therefore, only the bits that are to recognize a high logic level require programming. A fuse is blown by applying 12 volts (V_{IHH}) to the desired P input and also to the $\overline{G}$ input. This permanently programs the pin to recognize a high. Only one input pin should be programmed at a time.

Step 1. Take $\overline{G}$ to V_{IL} and apply V_{IH} to all P inputs†.
Step 2. Take desired P input to V_{IHH}, output will be low if the fuse is intact.
Step 3. Pulse $\overline{G}$ to V_{IHH}. After $\overline{G}$ has returned to V_{IL}, the output will be high indicating that the fuse is blown.
Step 4. Take P input back to V_{IH}. Repeat steps 2 through 4 to program additional inputs.

verification procedure

These devices can be checked to determine which fuses if any are blown. Figure 1 shows how verification can be accomplished during programming.

Step 1. Take $\overline{G}$ and all P inputs† to V_{IL}. If the output is low, all fuses are intact.
Step 2. Take all P inputs† to V_{IH}. The output should be high except when all fuses are blown. If all fuses are blown then the output will be low.
Step 3. Take test input to V_{IHH}, leaving other inputs at V_{IH}. If the output goes low, the fuse is intact. If the output goes high, the fuse is blown.
Step 4. Take test input back to V_{IH}. Repeat steps 3 and 4 to test additional inputs.

†For the 'ALS527, P8 through P11 inputs must match the Q8 through Q11 inputs.

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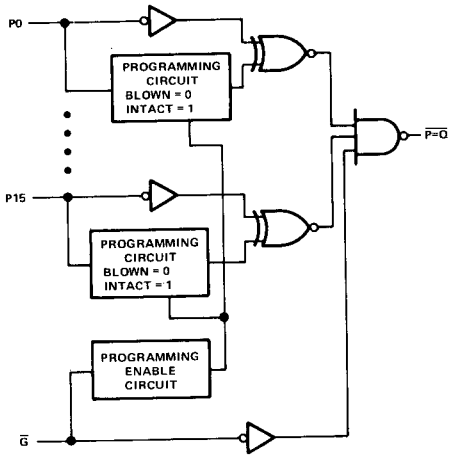
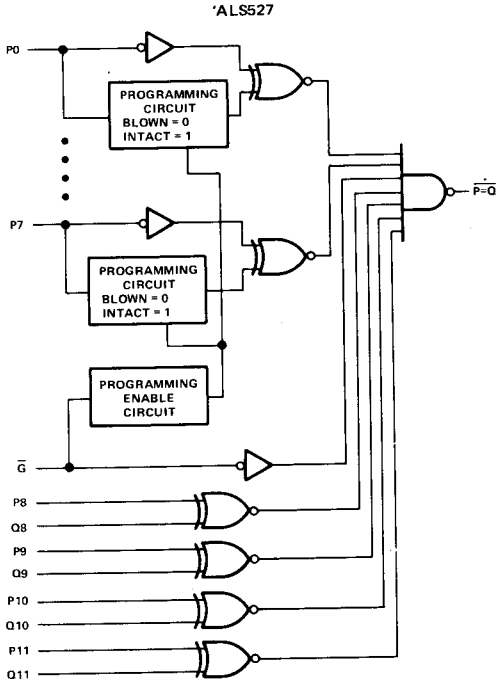
logic diagrams (positive logic)

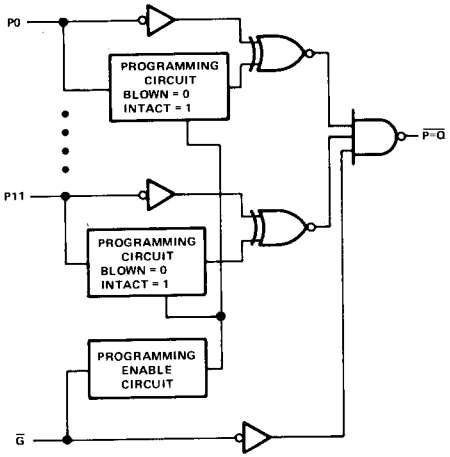
'ALS526



'ALS527

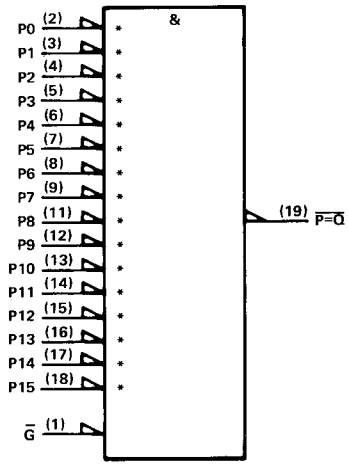


'ALS528

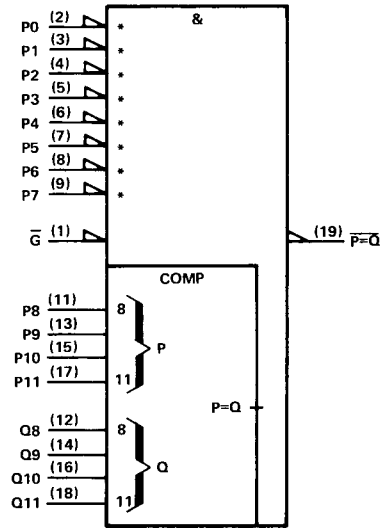


logic symbols†

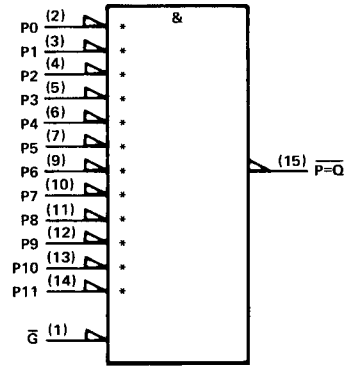
'ALS526



'ALS527



'ALS528



†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for DW, J, and N packages.
*These inputs can be programmed to be active high. The asterisk is not a part of the symbol. For a correct symbol for the programmed device, delete the polarity symbol (▷) at any input whose programming fuse has been blown.

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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Input voltage (see Note 1) . . . . . 5.5 V
Operating free-air temperature range: SN54ALS' . . . . . −55°C to 125°C
SN74ALS' . . . . . 0°CC to 70°C
Storage temperature range . . . . . −65°C to 150°C

NOTE 1: These ratings apply except for programming pins during a programming cycle.

recommended operating conditions

		SN54ALS'			SN74ALS'			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	2		5.5	2		5.5	V
V_{IL}	Low-level input voltage			0.7			0.8	V
I_{OH}	High-level output current			−1			−2.6	mA
I_{OL}	Low-level output current			12			24	mA
T_A	Operating free-air temperature	−55		125	0		70	°C

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS		SN54ALS'			SN74ALS'			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = −18 mA			−1.5			−1.5	V
V_{OH}		V_{CC} = 4.5 V to 5.5 V,	I_{OH} = −0.4 mA	V_{CC}−2			V_{CC}−2			V
		V_{CC} = 4.5 V,	I_{OH} = −1 mA	2.4	3					
		V_{CC} = 4.5 V,	I_{OH} = −2.6 mA				2.4	2.9		
V_{OL}		V_{CC} = 4.5 V,	I_{OL} = 12 mA		0.25	0.4		0.25	0.4	V
		V_{CC} = 4.5 V,	I_{OL} = 24 mA					0.36	0.5	
I_I		V_{CC} = 5.5 V,	V_I = 5.5 V			0.1			0.1	mA
I_{IH}		V_{CC} = 5.5 V,	V_I = 2.7 V			20			20	μA
I_{IL}		V_{CC} = 5.5 V,	V_{IL} = 0.4 V			−0.2			−0.2	mA
I_O‡		V_{CC} = 5.5 V,	V_O = 2.25 V	−30		−130	−30		−130	mA
I_{CC}	'ALS526	V_{CC} = 5.5 V, All inputs at 4.5 V			16	27		16	27	mA
	'ALS527				15	24		15	24	
	'ALS528				13	21		13	21	

†All typical values are at V_{CC} = 5 V, T_A = 25°C.
‡The output conditions have been chosen to produce a current that closely approximtes one half of the true short-circuit output current, I_{OS}.

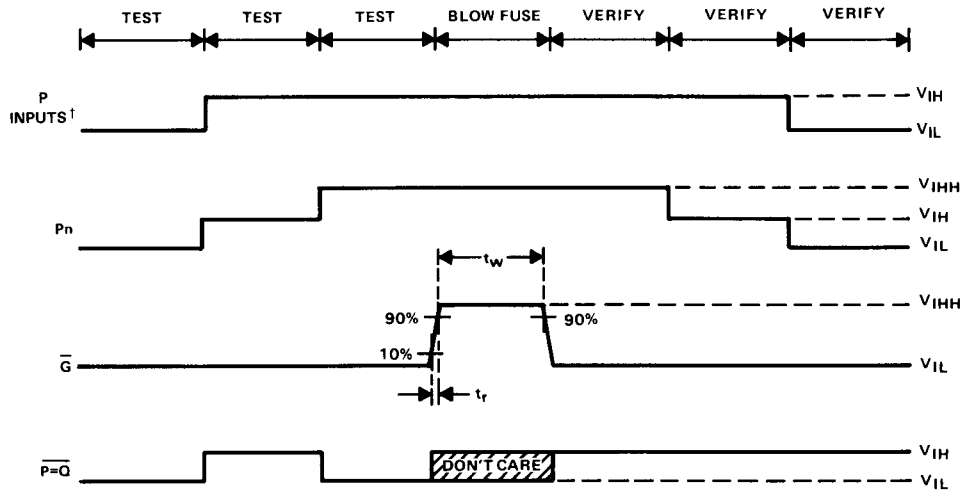
switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R_L = 500 Ω, T_A = MIN to MAX				UNIT
			SN54ALS'		SN74ALS'		
			MIN	MAX	MIN	MAX	
t_{PLH}	P or Q	$\overline{P=Q}$	3	18	3	15	ns
t_{PHL}			2	15	2	12	
t_{PLH}	$\overline{G}$	$\overline{P=Q}$	2	18	2	15	ns
t_{PHL}			2	15	2	12	

NOTE 2: Load circuit and voltage waveforms are shown in Section 1.

programming parameters

PARAMETER			MIN	MAX	UNIT
V_{IH}	High-level input voltage		2	5.5	V
V_{IL}	Low-level input voltage			0.8	V
V_{IHH}	Program-pulse input voltage		11.5	12.5	V
V_{CC}	Supply voltage		6.5	7.5	V
I_{IHH}	Program-pulse input current	Pn ($\overline{G}$ low)		10	mA
		$\overline{G}$		1.24	
I_{CCHH}	Supply current with V_{IHH} applied	'ALS526		31	mA
		'ALS527		29	
		'ALS528		26	
t_w	Pulse duration, program		10	50	μs
t_r	Rise time, program voltage			10	μs



Illustrated above is the following sequence:

NOTES: A. It is desired to program a particular input to recognize a high level input. With $\overline{G}$ low and all P inputs† at V_{IL}, the output is low if no fuses are blown.
B. With $\overline{G}$ low all P inputs† at V_{IH}, the output is high unless all fuses are blown.
C. The desired input is taken to V_{IHH}, the output goes low if the fuse is intact.
D. $\overline{G}$ is pulsed to V_{IHH} blowing the desired fuse.
E. After $\overline{G}$ is low output will be high indicating that the fuse is blown.
F. The programmed input returns to V_{IH}, the output is high unless all fuses have been blown.
G. All P inputs† are taken to V_{IL}, the output is high if a fuse has been blown.

†For the 'ALS527, P8 through P11 inputs must match the Q8 through Q11 inputs.

FIGURE 1. PROGRAMMING WAVEFORMS

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