

SN54ALS518 THRU SN54ALS522, SN74ALS518 THRU SN74ALS522 8-BIT IDENTITY COMPARATORS

D2661, JUNE 1982 – REVISED MAY 1986

- Compares Two 8-Bit Words
- Choice of Totem-Pole or Open-Collector Outputs
- 'ALS518, 'ALS520, and 'ALS522 Have 20-k Ω Pull-up Resistors on Q Inputs
- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

TYPE	INPUT PULL-UP RESISTOR	OUTPUT FUNCTION AND CONFIGURATION
'ALS518	Yes	$P=Q$ open-collector
'ALS519	No	$P=Q$ open-collector
'ALS520	Yes	$\overline{P}=\overline{Q}$ totem-pole
'ALS521†	No	$\overline{P}=\overline{Q}$ totem-pole
'ALS522	Yes	$\overline{P}=\overline{Q}$ open-collector

† 'ALS521 is identical to 'ALS688

description

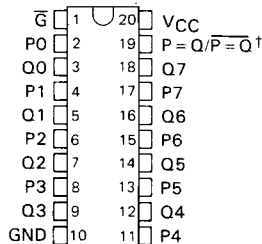
These identity comparators perform comparisons on two eight-bit binary or BCD words. The 'ALS518 and 'ALS519 provide $P=Q$ outputs, while the 'ALS520, 'ALS521, and 'ALS522 provide $\overline{P}=\overline{Q}$ outputs. The 'ALS518, 'ALS519, and 'ALS522 have open-collector outputs. The 'ALS518, 'ALS520, and 'ALS522 feature 20-k Ω pull-up termination resistors on the Q inputs for analog or switch data.

The SN54ALS518 through SN54ALS522 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS518 through SN74ALS522 are characterized for operation from 0°C to 70°C .

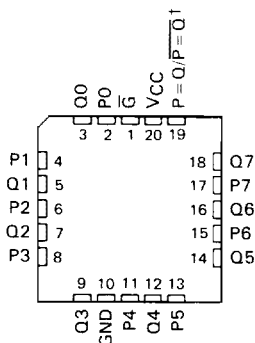
FUNCTION TABLE

INPUTS		OUTPUTS	
DATA P, Q	ENABLE G	$P=Q$	$\overline{P}=\overline{Q}$
$P=Q$	L	H	L
$P>Q$	L	L	H
$P<Q$	L	L	H
X	H	L	H

SN54ALS' . . . J PACKAGE
SN74ALS' . . . DW OR N PACKAGE
(TOP VIEW)



SN54ALS' . . . FK PACKAGE
(TOP VIEW)



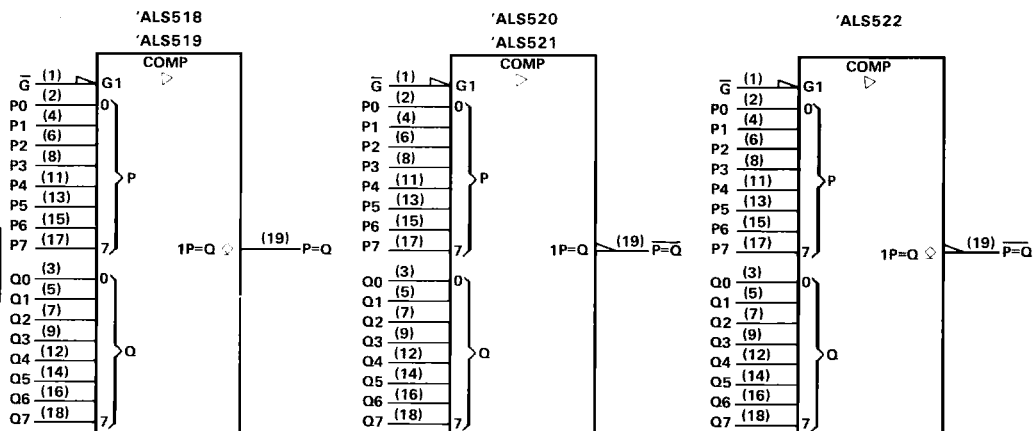
† $P=Q$ for 'ALS518 and 'ALS519, and $\overline{P}=\overline{Q}$ for 'ALS520, 'ALS521, and 'ALS522.

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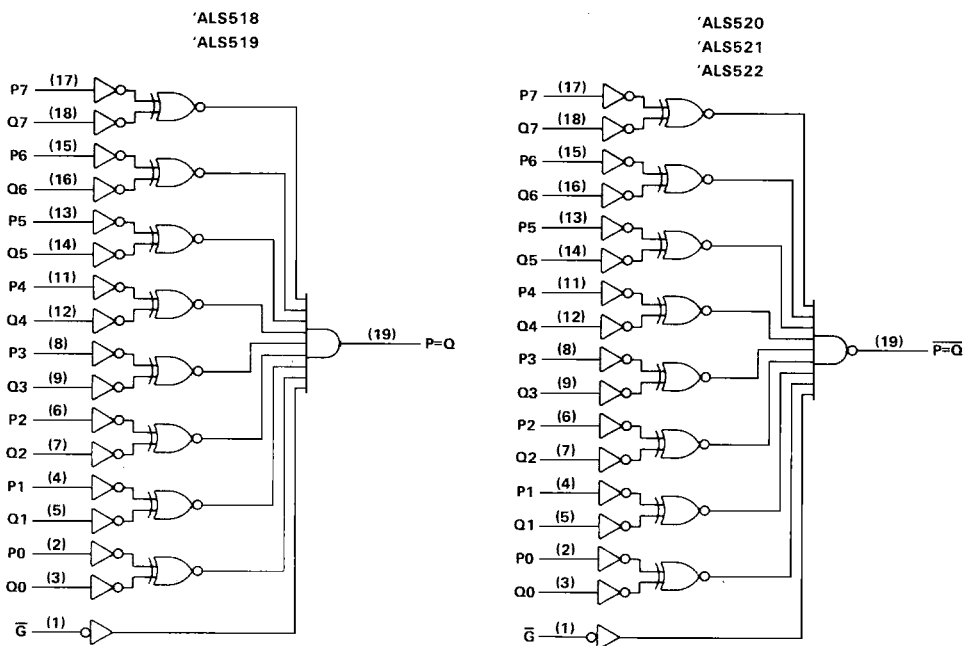
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logic symbols†



logic diagrams (positive logic)



†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.

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

Supply voltage, V_{CC}	7 V
Input voltage: Q inputs of 'ALS518, 'ALS522	$V_{CC} + 0.5$ V or 5.5 V, whichever is less
All other inputs	7 V
Off-state output voltage	7 V
Operating free-air temperature range: SN54ALS518, SN54ALS519, SN54ALS522	-55 °C to 125 °C
SN74ALS518, SN74ALS519, SN74ALS522	0 °C to 70 °C
Storage temperature range	-65 °C to 150 °C

recommended operating conditions

		SN54ALS518 SN54ALS519 SN54ALS522			SN74ALS518 SN74ALS519 SN74ALS522			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			2			V
V_{IL}	Low-level input voltage			0.7			0.8	V
V_{OH}	High-level output voltage			5.5			5.5	V
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	SN54ALS518 SN54ALS519 SN54ALS522			SN74ALS518 SN74ALS519 SN74ALS522			UNIT
			MIN	TYP [†]	MAX	MIN	TYP [†]	MAX	
V_{IK}		$V_{CC} = 4.5$ V, $I_I = -18$ mA			-1.5			-1.5	V
I_{OH}		$V_{CC} = 5.5$ V, $V_{OH} = 5.5$ V			0.1			0.1	mA
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					0.35	0.5	
I_I	'ALS518, 'ALS522 Q inputs	$V_{CC} = 5.5$ V, $V_I = 5.5$ V			0.1			0.1	mA
	All other inputs	$V_{CC} = 5.5$ V, $V_I = 7$ V			0.1			0.1	
I_{IH}	'ALS518, 'ALS522 Q inputs	$V_{CC} = 5.5$ V, $V_I = 2.7$ V			-0.2			-0.2	mA
	All other inputs				20			20	μA
I_{IL}	'ALS518, 'ALS522 Q inputs	$V_{CC} = 5.5$ V, $V_I = 0.4$ V			-0.6			-0.6	mA
	All other inputs				-0.1			-0.1	
I_{CC}	'ALS518	$V_{CC} = 5.5$ V, See Note 1		11	17		11	17	mA
	'ALS519			11	17		11	17	
	'ALS522			11	17		11	17	

[†]All typical values are at $V_{CC} = 5$ V, $T_A = 25$ °C.

NOTE 1: I_{CC} is measured with $\bar{G}$ grounded, P and Q at 4.5 V.

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SN54ALS518 THRU SN54ALS522, SN74ALS518 THRU SN74ALS522

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'ALS518, 'ALS519 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 680 Ω, T _A = MIN to MAX				UNIT
			SN54ALS518 SN54ALS519		SN74ALS518 SN74ALS519		
			MIN	MAX	MIN	MAX	
t _{PLH}	P or Q	P = Q	15	37	15	33	ns
t _{PHL}			3	18	3	15	
t _{PLH}	$\overline{G}$	P = Q	15	37	15	33	ns
t _{PHL}			3	18	3	15	

'ALS522 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V},$ $C_L = 50 \text{ pF},$ $R_L = 680 \Omega,$ $T_A = \text{MIN to MAX}$				UNIT
			SN54ALS522		SN74ALS522		
			MIN	MAX	MIN	MAX	
t_{PLH}	P or Q	$\overline{P = Q}$	10	30	10	25	ns
t_{PHL}			5	25	5	23	
t_{PLH}	$\overline{G}$	$\overline{P = Q}$	8	30	8	25	ns
t_{PHL}			8	30	8	23	

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

SN54ALS518 THRU SN54ALS522, SN74ALS518 THRU SN74ALS522 8-BIT IDENTITY COMPARATORS

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

Supply voltage, V_{CC}	7 V
Input voltage: Q inputs of 'ALS520	$V_{CC} + 0.5$ V or 5.5 V, whichever is less
All other inputs	7 V
Operating free-air temperature range: SN54ALS520, SN54ALS521	-55 °C to 125 °C
SN74ALS520, SN74ALS521	0 °C to 70 °C
Storage temperature range	-65 °C to 150 °C

recommended operating conditions

		SN54ALS520 SN54ALS521			SN74ALS520 SN74ALS521			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			2			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

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

PARAMETER		TEST CONDITIONS	SN54ALS520 SN54ALS521			SN74ALS520 SN74ALS521			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	3.3					
		$V_{CC} = 4.5$ V, $I_{OH} = -2.6$ mA				2.4	3.2		
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					0.35	0.5	
I_I	'ALS520 Q inputs	$V_{CC} = 5.5$ V, $V_I = 5.5$ V			0.1			0.1	mA
	All other inputs	$V_{CC} = 5.5$ V, $V_I = 7$ V			0.1			0.1	
I_{IH}	'ALS520 Q inputs	$V_{CC} = 5.5$ V, $V_I = 2.7$ V			-0.2			-0.2	mA
	All other inputs				20			20	
I_{IL}	'ALS520 Q inputs	$V_{CC} = 5.5$ V, $V_I = 0.4$ V			-0.6			-0.6	mA
	All other inputs				-0.1			-0.1	
$I_O^{\dagger}$		$V_{CC} = 5.5$ V, $V_O = 2.25$ V	-30		-112	-30		-112	mA
I_{CC}	'ALS520	$V_{CC} = 5.5$ V, See Note 1		12	19		12	19	mA
	'ALS521			12	19		12	19	

[†] 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 approximates one half of the true short-circuit output current, I_{OS} .

NOTE 1: I_{CC} is measured with $\bar{G}$ grounded and P and Q inputs at 4.5 V.

SN54ALS518 THRU SN54ALS522, SN74ALS518 THRU SN74ALS522
8-BIT IDENTITY COMPARATORS

'ALS520, 'ALS521 switching characteristics (see Note 1)

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
			SN54ALS520 SN54ALS521		SN74ALS520 SN74ALS521		
			MIN	MAX	MIN	MAX	
t _{PLH}	P or Q	$\overline{P = Q}$	3	19	3	12	ns
t _{PHL}			3	25	5	20	
t _{PLH}	$\overline{Q}$	$\overline{P = Q}$	2	18	2	12	ns
t _{PHL}			5	23	5	22	

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

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