

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

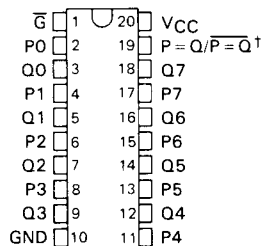
† 'ALS521 is identical to 'ALS688

description

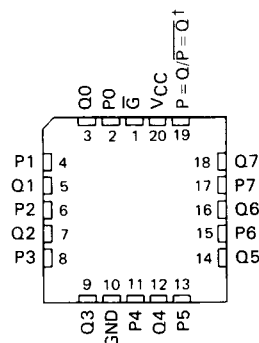
These identity comparators perform comparisons on two eight-bit binary or BCD words. The 'ALS518 and 'ALS519 provide $P=Q$ outputs, while the 'ALS520, 'ALS521, and 'ALS522 provide $\overline{P}=\overline{Q}$ outputs. The 'ALS518, 'ALS519, and 'ALS522 have open-collector outputs. The 'ALS518, 'ALS520, 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 .

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.

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

PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

TEXAS
INSTRUMENTS

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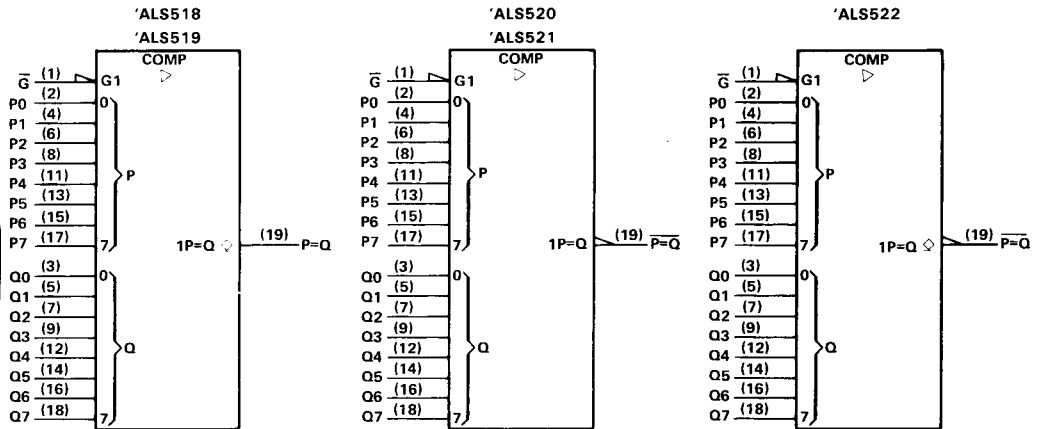
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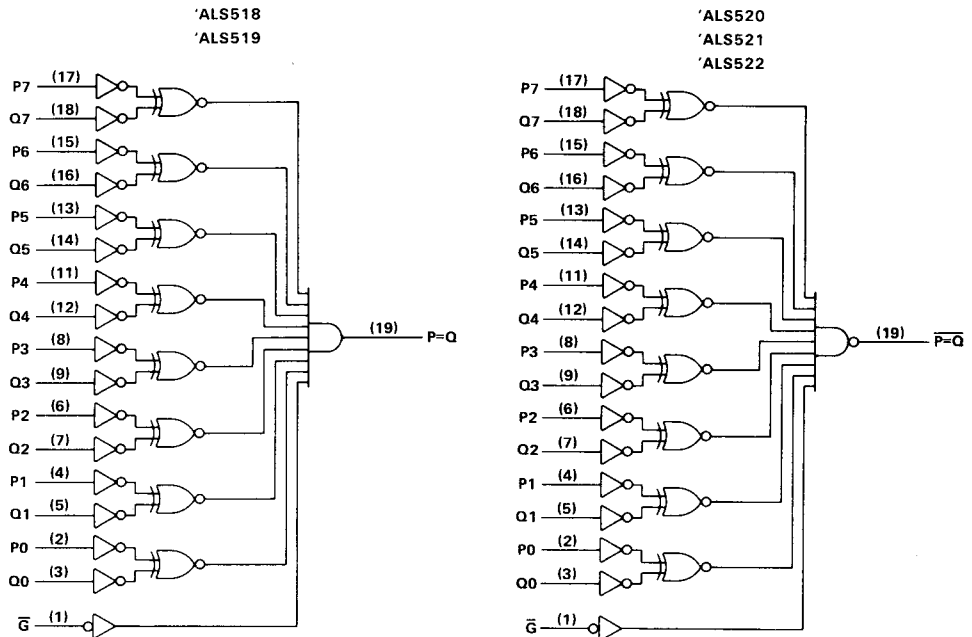
logic symbols[†]



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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			0.1			0.1	mA
	All other inputs			0.1			0.1	
I_{IH}	'ALS518, 'ALS522 Q inputs			-0.2			-0.2	mA
	All other inputs			20			20	
I_{IL}	'ALS518, 'ALS522 Q inputs			-0.6			-0.6	mA
	All other inputs			-0.1			-0.1	
I_{CC}	'ALS518		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
8-BIT IDENTITY COMPARATORS

'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 V to 5.5 V, C _L = 50 pF, R _L = 680 Ω, T _A = 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.

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ALS and AS Circuits

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	$V_{CC} \pm 0.5$ 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

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	μA
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 G grounded and P and Q inputs at 4.5 V.

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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}	$\overline{G}$	$\overline{P = Q}$	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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