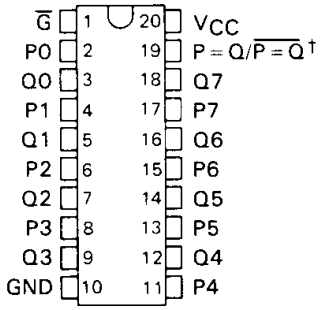
D2661, JUNE 1982 – REVISED MAY 1986

- **Compares Two 8-Bit Words**
- **Choice of Totem-Pole or Open-Collector Outputs**
- **'ALS518, 'ALS520, and 'ALS522 Have 20-kΩ 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**

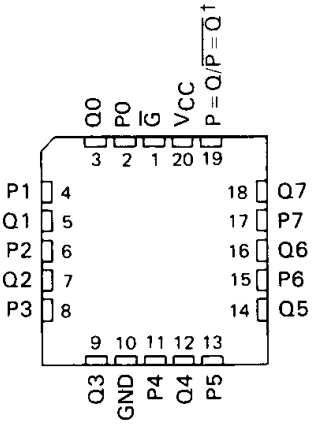
TYPE	INPUT PULL-UP RESISTOR	OUTPUT FUNCTION AND CONFIGURATION
'ALS518	Yes	P = Q open-collector
'ALS519	No	P = Q open-collector
'ALS520	Yes	$\overline{P=Q}$ totem-pole
'ALS521†	No	$\overline{P=Q}$ totem-pole
'ALS522	Yes	$\overline{P=Q}$ open-collector

†'ALS521 is identical to 'ALS688

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



SN54ALS' . . . FK PACKAGE
(TOP VIEW)



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

description

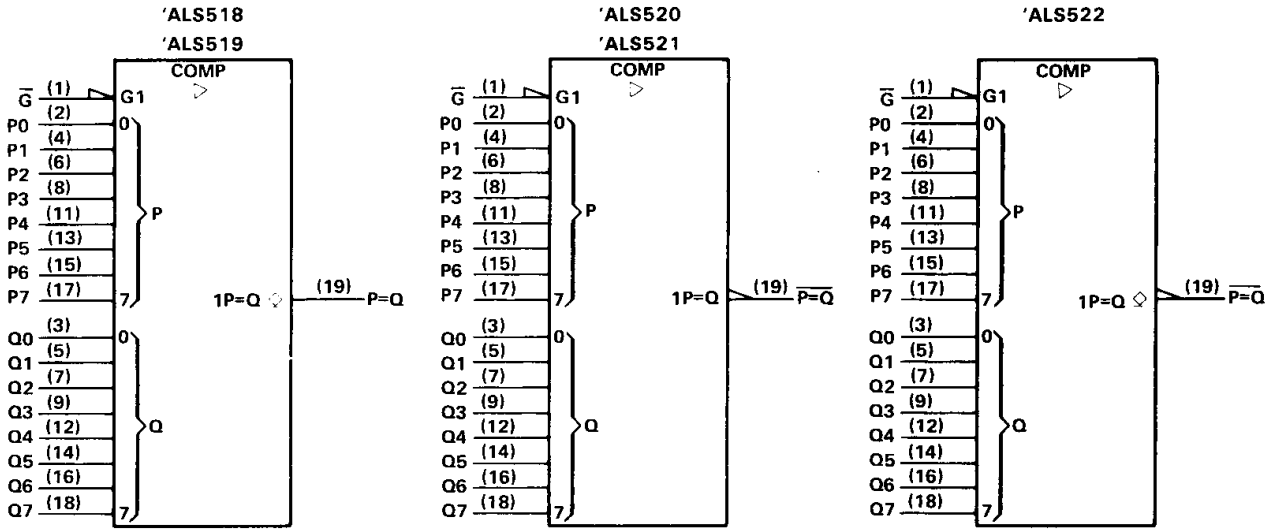
These identity comparators perform comparisons on two eight-bit binary or BCD words. The 'ALS518 and 'ALS519 provide P = Q outputs, while the 'ALS520, 'ALS521, and 'ALS522 provide $\overline{P=Q}$ outputs. The 'ALS518, 'ALS519, and 'ALS522 have open-collector outputs. The 'ALS518, 'ALS520, and 'ALS522 feature 20-kΩ 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.

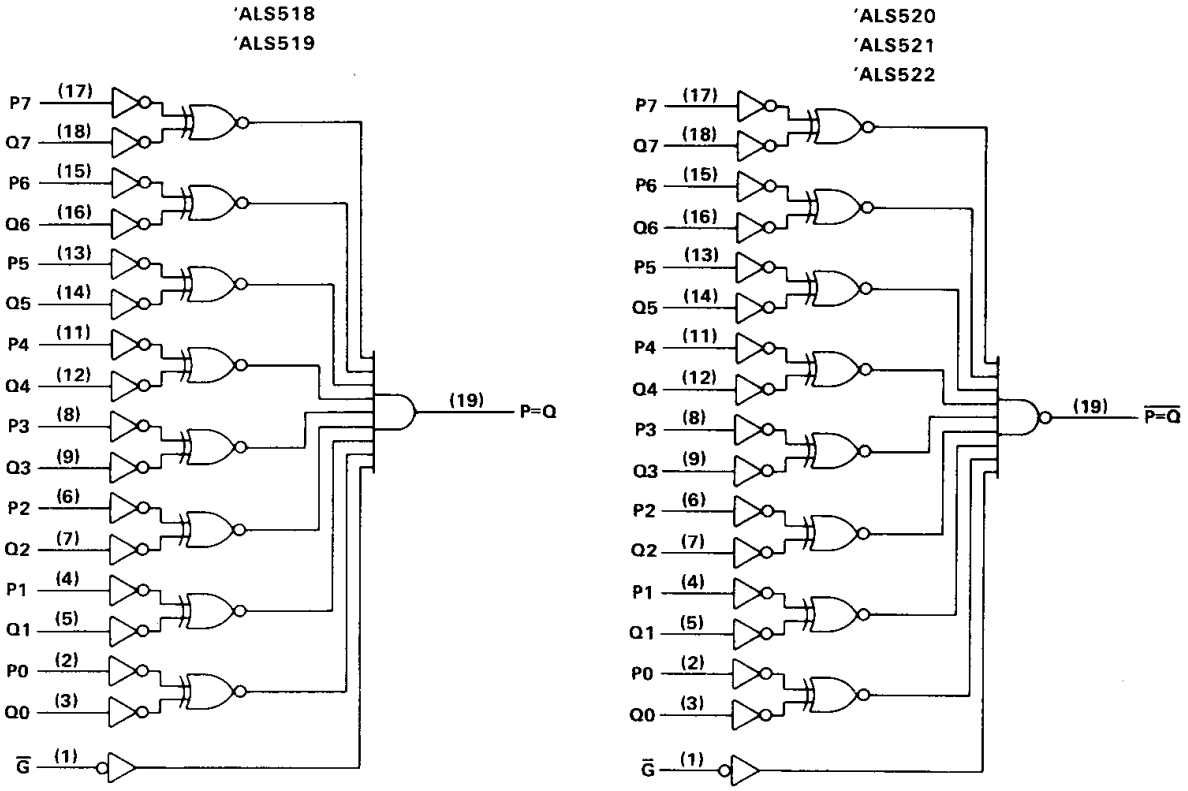
FUNCTION TABLE

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

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 $\overline{G}$ grounded, P and Q at 4.5 V.

'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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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

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‡		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 $\overline{G}$ grounded and P and Q inputs at 4.5 V.

'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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