TYPES SN54ALS688, SN54ALS689, SN74ALS688, SN74ALS689
8-BIT IDENTITY COMPARATORS

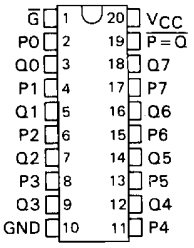
D2661, JUNE 1982 REVISED DECEMBER 1983

- **Compares Two Eight-Bit Words**
- **Choice of Totem-Pole or Open-Collector Outputs**
- **Package Options Include Both Plastic and Ceramic Chip Carriers in Addition to Plastic and Ceramic DIPs**
- **Dependable Texas Instruments Quality and Reliability**

TYPE	OUTPUT FUNCTION AND CONFIGURATION
'ALS688†	$\overline{P=Q}$ totem-pole
'ALS689	$\overline{P=Q}$ open-collector

†'ALS688 is identical to 'ALS521

SN54ALS688, SN54ALS689 . . . J PACKAGE
SN74ALS688, SN74ALS689 . . . N PACKAGE
(TOP VIEW)



description

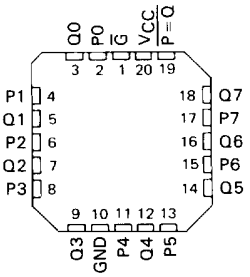
These identity comparators perform comparisons of two eight-bit binary or BCD words. The 'ALS688 and 'ALS689 provide $\overline{P=Q}$ outputs. The 'ALS688 has totem-pole outputs, while 'ALS689 has open-collector outputs.

The SN54ALS688 and SN54ALS689 are characterized for operation over the full military temperature range of −55°C to 125°C. The SN74ALS688 and SN74ALS689 are characterized for operation from 0°C to 70°C.

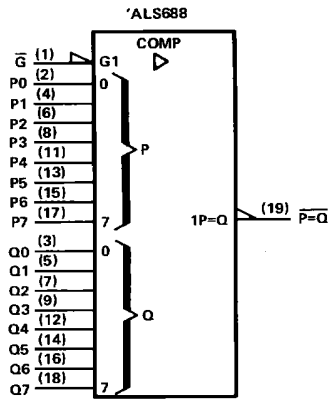
FUNCTION TABLE

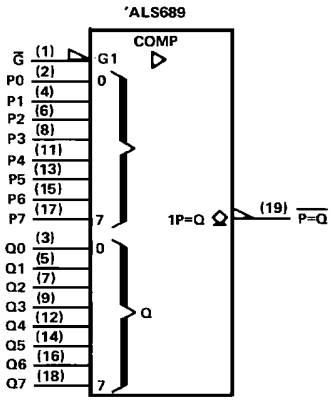
INPUTS		OUTPUT
DATA P,Q	ENABLE $\overline{G}$	$\overline{P=Q}$
P=Q	L	L
P>Q	L	H
P<Q	L	H
X	H	H

SN54ALS688, SN54ALS689 . . . FH PACKAGE
SN74ALS688, SN74ALS689 . . . FN PACKAGE
(TOP VIEW)



logic symbols





Pin numbers shown are for J and N packages.

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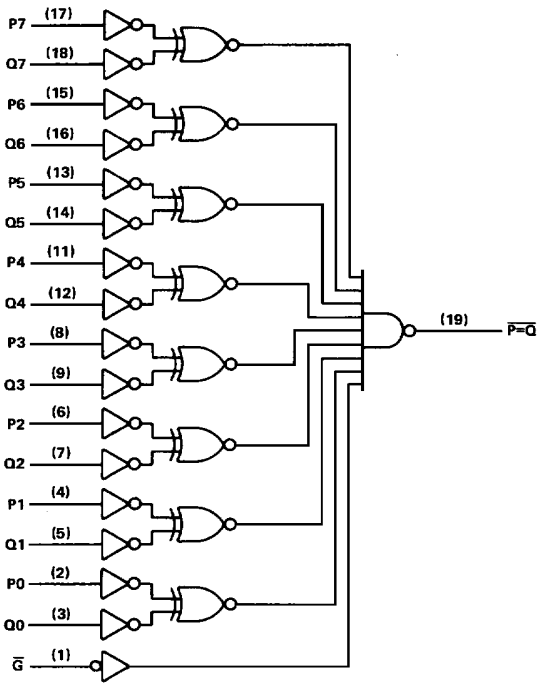
logic diagram (positive logic)



Pin numbers shown are for J and N packages.

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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage: . . . . . 7 V
Off-state output voltage: 'ALS689 . . . . . 7 V
Operating free-air temperature range: SN54ALS688, SN54AS689 . . . . . −55 °C to 125 °C
SN74ALS688, SN74AS689 . . . . . 0 °C to 70 °C
Storage temperature range . . . . . −65 °C to 150 °C

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recommended operating conditions

		SN54ALS688			SN74ALS688			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			0.8			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		SN54ALS688			SN74ALS688			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	V_{CC} = 5.5 V,	V_I = 7 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_I = 0.4 V			−0.1			−0.1	mA
I_O‡	V_{CC} = 5.5 V,	V_O = 2.25 V	−30		−112	−30		−112	mA
I_{CC}	V_{CC} = 5.5 V	See Note 1		12	19		12	19	mA

†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, P and Q at 4.5 V.

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
			SN54ALS688		SN74ALS688		
			MIN	MAX	MIN	MAX	
t_{PLH}	P	$\overline{P=Q}$	3	16	3	12	ns
t_{PHL}			5	25	5	20	
t_{PLH}	Q	$\overline{P=Q}$	3	16	3	12	ns
t_{PHL}			5	25	5	20	
t_{PLH}	$\overline{G}$	$\overline{P=Q}$	3	15	3	12	ns
t_{PHL}			5	25	5	22	

NOTE 2: For load circuit and voltage waveforms, see page 1-12.

recommended operating conditions

		SN54ALS689			SN74ALS689			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			0.8			0.8	V
I_{OH}	High-level output current			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		SN54ALS689			SN74ALS689			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} = 4.5 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	V_{CC} = 5.5 V,	V_I = 7 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_I = 0.4 V			−0.1			−0.1	mA
I_{CC}	V_{CC} = 5.5 V,	See Note 1		12	19		12	19	mA

†All typical values are at V_{CC} = 5 V, T_A = 25°C.
NOTE 1: I_{CC} is measured with G grounded, P and Q at 4.5 V.

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 = 680 Ω, T_A = MIN to MAX				UNIT
			SN54ALS689		SN74ALS689		
			MIN	MAX	MIN	MAX	
t_{PLH}	P	$\overline{P=Q}$	10	30	10	25	ns
t_{PHL}			5	25	5	23	
t_{PLH}	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	25	

NOTE 2: For load circuit and voltage waveforms, see page 1-12.

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