

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

D2661, JUNE 1982 — REVISED MAY 1986

- Compares Two Eight-Bit Words
- Choice of Totem-Pole or Open-Collector Outputs
- 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	OUTPUT FUNCTION AND CONFIGURATION
'ALS688†	$\overline{P} = \overline{Q}$ totem pole
'ALS689	$\overline{P} = \overline{Q}$ open-collector

†'ALS688 is identical to 'ALS521

description

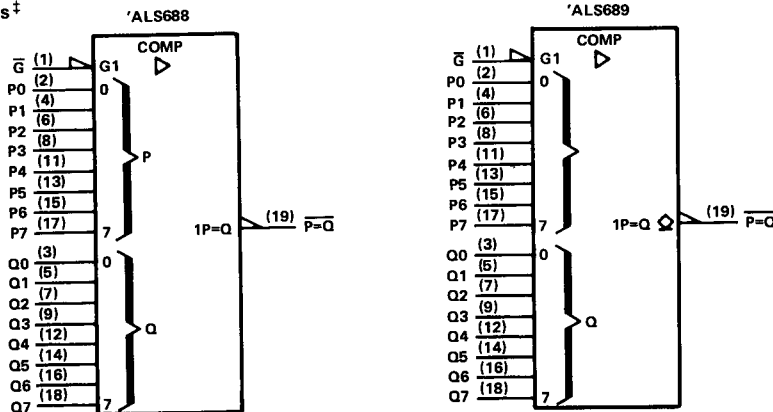
These identity comparators perform comparisons of two eight-bit binary or BCD words. The 'ALS688 and 'ALS689 provide $\overline{P} = \overline{Q}$ outputs. The 'ALS688 has totem-pole outputs, while 'ALS689 has open-collector outputs.

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

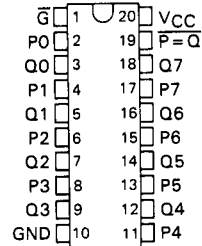
logic symbols†



†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

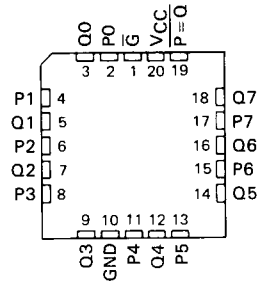
SN54ALS688, SN54ALS689 . . . J PACKAGE
SN74ALS688, SN74ALS689 . . . DW OR N PACKAGE

(TOP VIEW)



SN54ALS688, SN54ALS689 . . . FK PACKAGE

(TOP VIEW)



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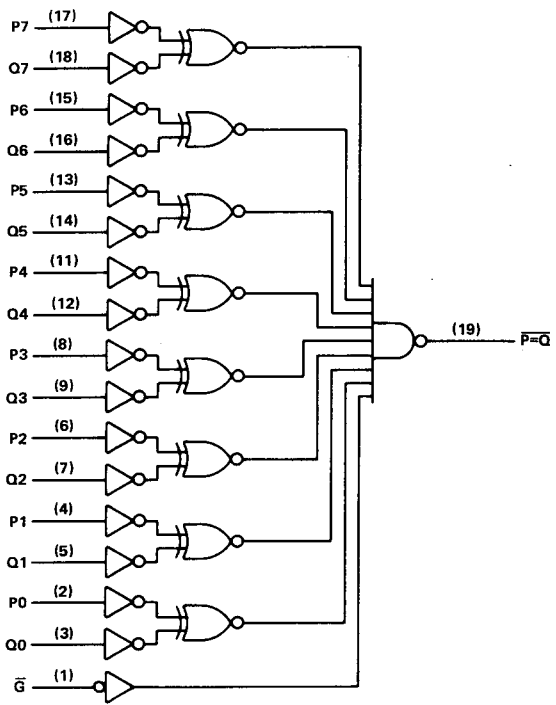
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SN54ALS688, SN54ALS689, SN74ALS688, SN74ALS689
8-BIT IDENTITY COMPARATORS

logic diagram (positive logic)

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ALS and AS Circuits



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

SN54ALS688, SN74ALS688 8-BIT IDENTITY COMPARATORS WITH TOTEM-POLE OUTPUTS

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	0.7			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	SN54ALS688			SN74ALS688			UNIT
		MIN	TYP [†]	MAX	MIN	TYP [†]	MAX	
V_{IK}	$V_{CC} = 4.5\text{ V}$, $I_I = -18\text{ mA}$	-1.5			-1.5			V
V_{OH}	$V_{CC} = 4.5\text{ V to } 5.5\text{ V}$, $I_{OH} = -0.4\text{ mA}$	$V_{CC} - 2$			$V_{CC} - 2$			V
	$V_{CC} = 4.5\text{ V}$, $I_{OH} = -1\text{ mA}$	2.4	3.3					
	$V_{CC} = 4.5\text{ V}$, $I_{OH} = -2.6\text{ mA}$				2.4	3.2		
V_{OL}	$V_{CC} = 4.5\text{ V}$, $I_{OL} = 12\text{ mA}$	0.25			0.4			V
	$V_{CC} = 4.5\text{ V}$, $I_{OL} = 24\text{ mA}$				0.35			
I_I	$V_{CC} = 5.5\text{ V}$, $V_I = 7\text{ V}$	0.1			0.1			mA
I_{IH}	$V_{CC} = 5.5\text{ V}$, $V_I = 2.7\text{ V}$	20			20			μA
I_{IL}	$V_{CC} = 5.5\text{ V}$, $V_I = 0.4\text{ V}$	-0.1			-0.1			mA
I_O^{\ddagger}	$V_{CC} = 5.5\text{ V}$, $V_O = 2.25\text{ V}$	-30		-112	-30		-112	mA
I_{CC}	$V_{CC} = 5.5\text{ V}$ See Note 1	12		19	12		19	mA

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

[‡]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)	$V_{CC} = 4.5\text{ V to } 5.5\text{ V}$, $C_L = 50\text{ pF}$, $R_L = 500\ \Omega$, $T_A = \text{MIN to MAX}$				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: Load circuit and voltage waveforms are shown in Section 1.

SN54ALS689, SN74ALS689

8-BIT IDENTITY COMPARATORS WITH OPEN-COLLECTOR OUTPUTS

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				0.7			V
I _{OH}	High-level output current				5.5			V
I _{OL}	Low-level output current				24			mA
T _A	Operating free-air temperature	-55			125			°C

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ALS and AS Circuits

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} = 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	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	P=Q	10	30	10	25	ns
t _{PHL}			5	25	5	23	
t _{PLH}	Q	P=Q	10	30	10	25	ns
t _{PHL}			5	25	5	23	
t _{PLH}	Q̄	P=Q̄	8	30	8	25	ns
t _{PHL}			8	30	8	25	

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