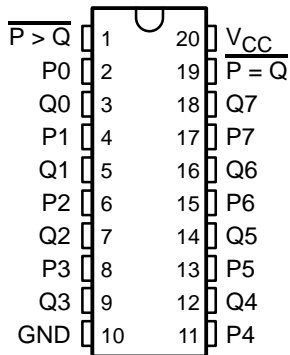


SN54HC684, SN74HC684 8-BIT MAGNITUDE COMPARATORS

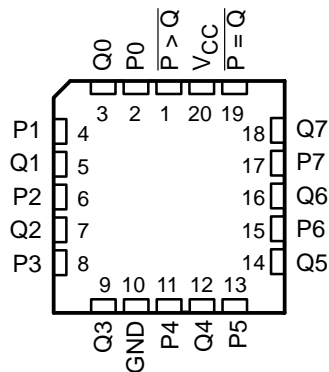
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- Wide Operating Voltage Range of 2 V to 6 V
- High-Current Outputs Drive Up To 10 LSTTL Loads
- Low Power Consumption, 80- μ A Max I_{CC}
- Typical $t_{pd} = 22$ ns
- ± 4 -mA Output Drive at 5 V
- Low Input Current of 1 μ A Max
- Compare Two 8-Bit Words

SN54HC684 . . . J OR W PACKAGE
SN74HC684 . . . DW OR N PACKAGE
(TOP VIEW)



SN54HC684 . . . FK PACKAGE
(TOP VIEW)



description/ordering information

These magnitude comparators perform comparisons of two 8-bit binary or BCD words. These devices provide $P = Q$ and $P > Q$ outputs.

ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	PDIP – N	Tube	SN74HC684N	HC684
	SOIC – DW	Tube	SN74HC684DW	
		Tape and reel	SN74HC684DWR	
-55°C to 125°C	CDIP – J	Tube	SNJ54HC684J	SNJ54HC684J
	CFP – W	Tube	SNJ54HC684W	SNJ54HC684W
	LCCC – FK	Tube	SNJ54HC684FK	SNJ54HC684FK

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION TABLE

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

The $P < Q$ function can be generated by applying $\overline{P = Q}$ and $\overline{P > Q}$ to a 2-input NAND gate.



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 **TEXAS
INSTRUMENTS**

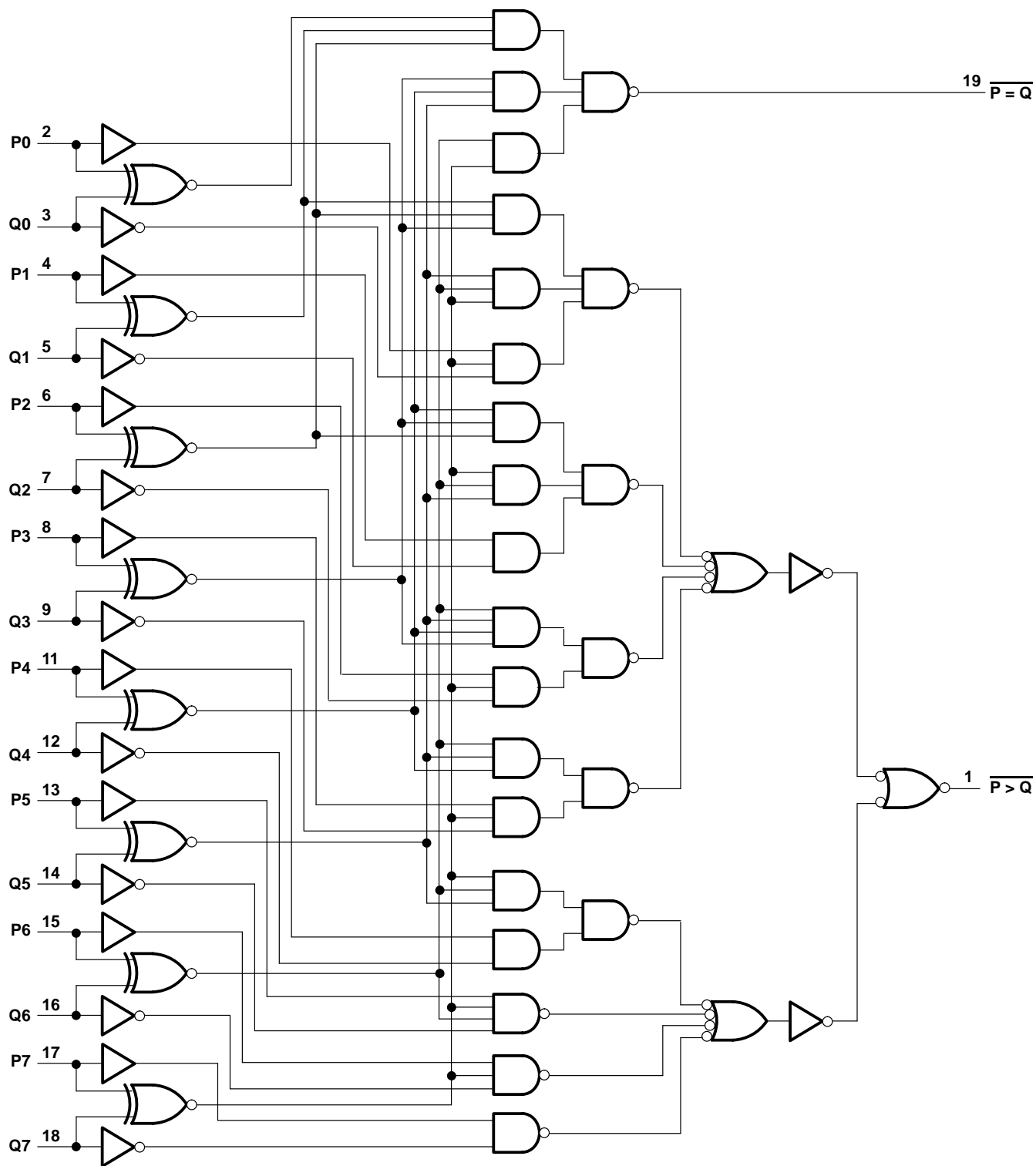
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logic diagram (positive logic)



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SN54HC684, SN74HC684 8-BIT MAGNITUDE COMPARATORS

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

Supply voltage range, V_{CC}	–0.5 V to 7 V
Input voltage range, V_I (see Note 1)	–0.5 V to 7 V
Output voltage range, V_O (see Note 1)	–0.5 V to $V_{CC} + 0.5$ V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$)	±20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$)	±20 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	±25 mA
Continuous current through V_{CC} or GND	±50 mA
Package thermal impedance, θ_{JA} (see Note 2): DW package	58°C/W
N package	69°C/W
Storage temperature range, T_{stg}	–65°C to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions (see Note 3)

		SN54HC684			SN74HC684			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	2	5	6	2	5	6	V
V_{IH}	High-level input voltage	$V_{CC} = 2$ V		1.5	$V_{CC} = 2$ V		1.5	V
		$V_{CC} = 4.5$ V		3.15	$V_{CC} = 4.5$ V		3.15	
		$V_{CC} = 6$ V		4.2	$V_{CC} = 6$ V		4.2	
V_{IL}	Low-level input voltage	$V_{CC} = 2$ V			0.5	$V_{CC} = 2$ V		0.5
		$V_{CC} = 4.5$ V			1.35	$V_{CC} = 4.5$ V		1.35
		$V_{CC} = 6$ V			1.8	$V_{CC} = 6$ V		1.8
V_I	Input voltage	0		V_{CC}	0		V_{CC}	V
V_O	Output voltage	0		V_{CC}	0		V_{CC}	V
t_t	Input transition (rise and fall) times	$V_{CC} = 2$ V			1000	$V_{CC} = 2$ V		1000
		$V_{CC} = 4.5$ V			500	$V_{CC} = 4.5$ V		500
		$V_{CC} = 6$ V			400	$V_{CC} = 6$ V		400
T_A	Operating free-air temperature	–55		125	–40		85	°C

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

SN54HC684, SN74HC684 8-BIT MAGNITUDE COMPARATORS

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

PARAMETER	TEST CONDITIONS		V _{CC}	T _A = 25°C			SN54HC684		SN74HC684		UNIT		
				MIN	TYP	MAX	MIN	MAX	MIN	MAX			
V _{OH}	V _I = V _{IH} or V _{IL}	I _{OH} = -20 μA	2 V	1.9	1.998		1.9		1.9	V			
			4.5 V	4.4	4.499		4.4		4.4				
			6 V	5.9	5.999		5.9		5.9				
		I _{OH} = -4 mA	4.5 V	3.98	4.30		3.7		3.84				
		I _{OH} = -5.2 mA	6 V	5.48	5.80		5.2		5.34				
V _{OL}	V _I = V _{IH} or V _{IL}	I _{OL} = 20 μA	2 V		0.002	0.1		0.1		0.1	V		
			4.5 V		0.001	0.1		0.1		0.1			
			6 V		0.001	0.1		0.1		0.1			
		I _{OL} = 4 mA	4.5 V		0.17	0.26		0.4		0.33			
		I _{OL} = 5.2 mA	6 V		0.15	0.26		0.4		0.33			
I _{IH}	V _I = V _{CC}		6 V		0.1	100		1000		1000	nA		
I _{IL}	V _I = 0		6 V		-0.1	-100		-1000		-1000	nA		
I _{CC}	V _I = V _{CC} or 0, I _O = 0		6 V				8		160		80	μA	
C _i			2 V to 6 V		3	10		10		10		10	pF

switching characteristics over recommended operating free-air temperature range, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC}	T _A = 25°C			SN54HC684		SN74HC684		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{pd}	P or Q	Any	2 V		130	275		413		344	ns
			4.5 V		26	55		88		69	
			6 V		22	47		70		58	
t _t		Any	2 V		38	75		110		95	ns
			4.5 V		8	15		22		19	
			6 V		6	13		19		16	

operating characteristics, T_A = 25°C

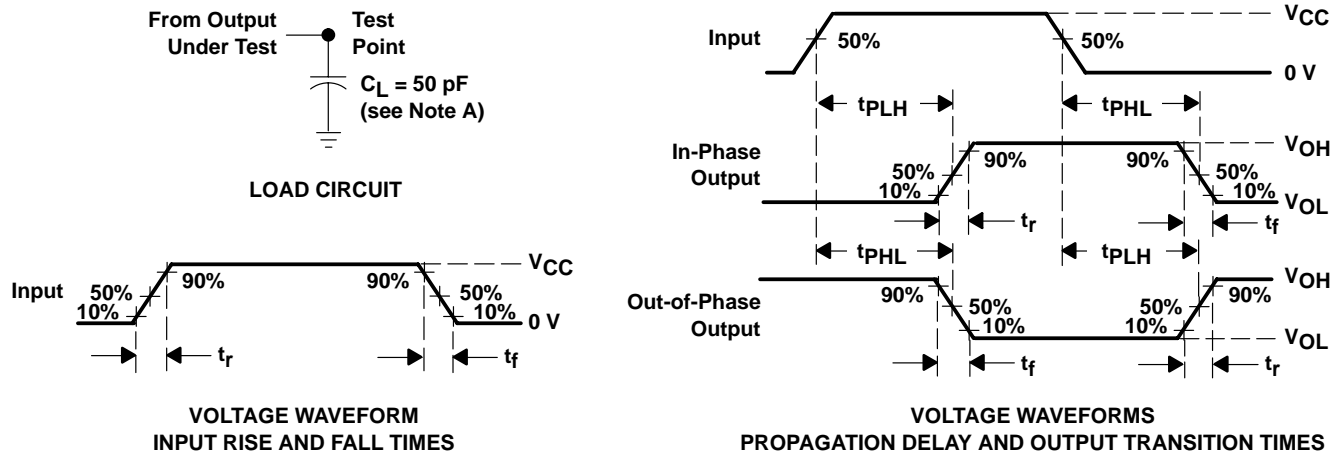
PARAMETER	TEST CONDITIONS	TYP	UNIT
C _{pd} Power dissipation capacitance	No load	40	pF

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PARAMETER MEASUREMENT INFORMATION



- NOTES: A. C_L includes probe and test-fixture capacitance.
 B. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r = 6 \text{ ns}$, $t_f = 6 \text{ ns}$.
 C. The outputs are measured one at a time with one input transition per measurement.
 D. t_{PLH} and t_{PHL} are the same as t_{pd} .

Figure 1. Load Circuit and Voltage Waveforms

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

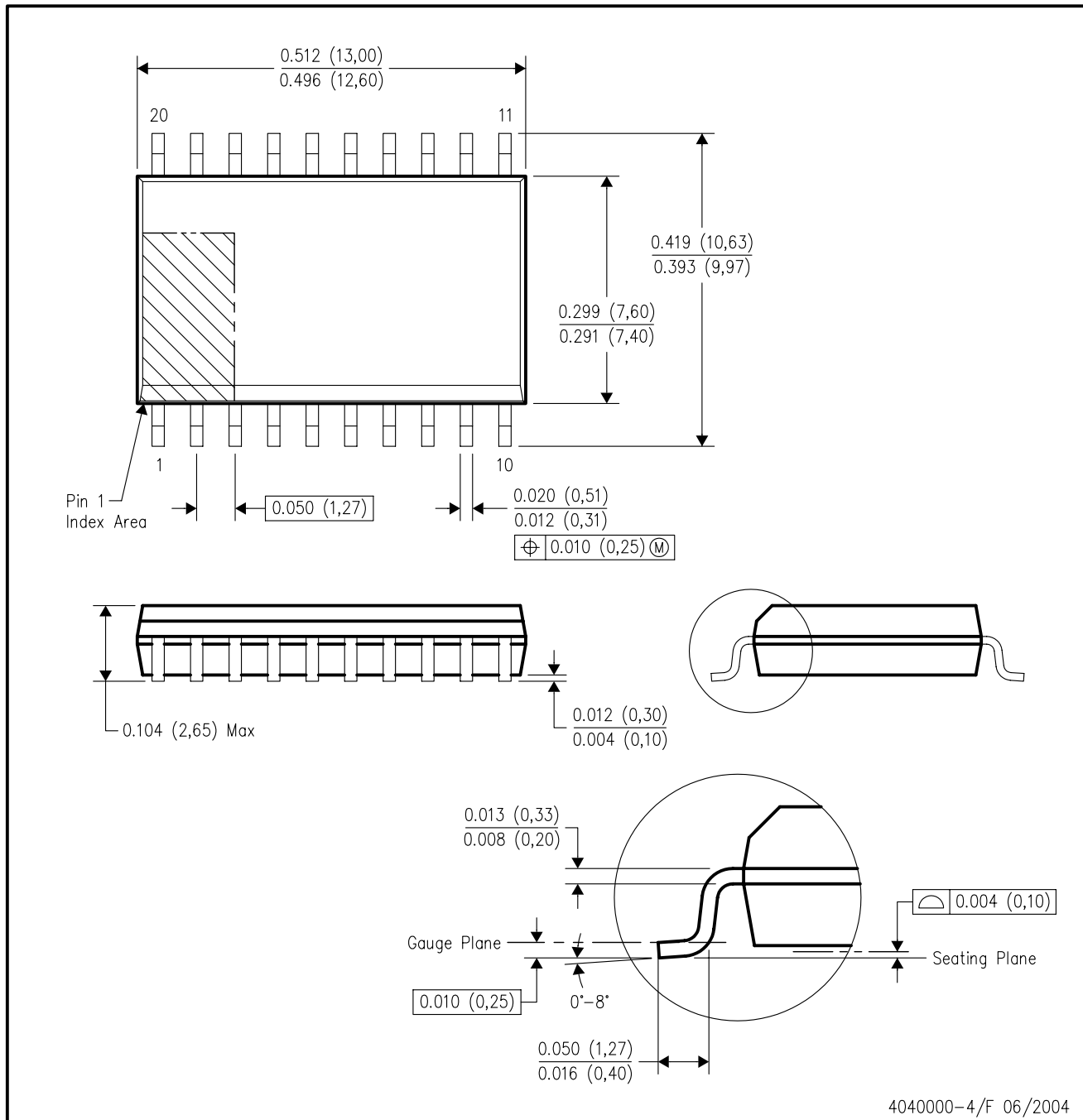
16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
 - The 20 pin end lead shoulder width is a vendor option, either half or full width.

DW (R-PDSO-G20)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - D. Falls within JEDEC MS-013 variation AC.

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