

SN54HC682, SN74HC682 8-BIT MAGNITUDE COMPARATORS

SCLS018B – MARCH 1984 – REVISED JANUARY 1996

- Compare Two 8-Bit Words
- 100-k Ω Pullup Resistors Are on the Q Inputs
- Package Options Include Plastic Small-Outline (DW) and Ceramic Flat (W) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

description

These magnitude comparators perform comparisons of two 8-bit binary or BCD words. The 'HC682 feature 100-k Ω pullup termination resistors on the Q inputs for analog or switch data.

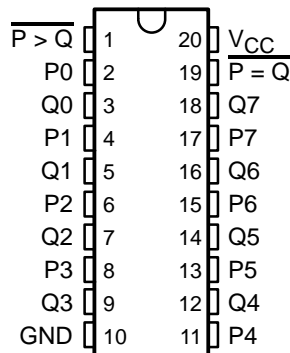
The SN54HC682 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74HC682 is characterized for operation from -40°C to 85°C .

FUNCTION TABLE

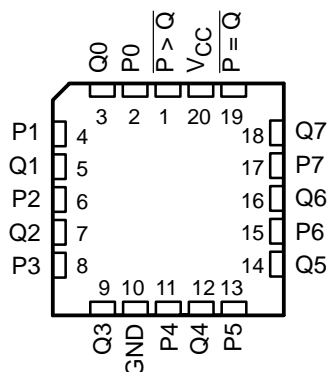
| DATA INPUTS P, Q | OUTPUTS | |
|---------------------|--------------------|--------------------|
| | $\overline{P = Q}$ | $\overline{P > Q}$ |
| $P = Q$ | L | H |
| $P > Q$ | H | L |
| $P < Q$ | H | H |

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

SN54HC682 . . . J OR W PACKAGE
SN74HC682 . . . DW OR N PACKAGE
(TOP VIEW)



SN54HC682 . . . FK PACKAGE
(TOP VIEW)



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**TEXAS
INSTRUMENTS**

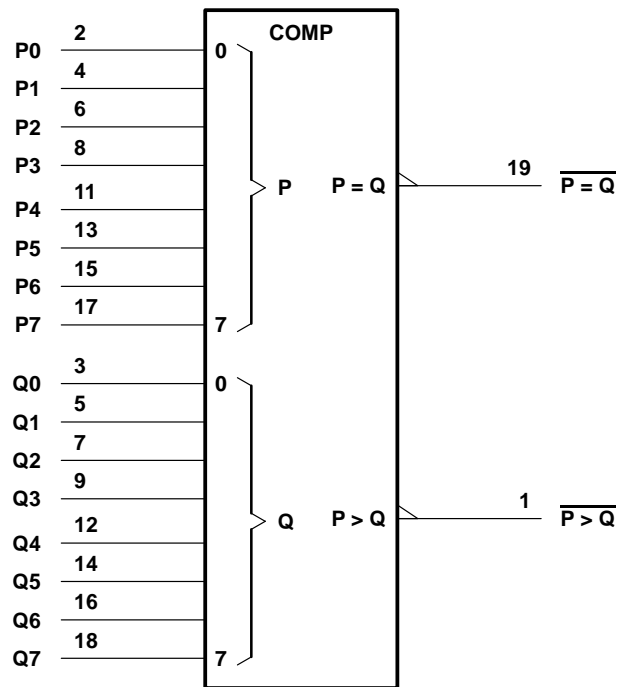
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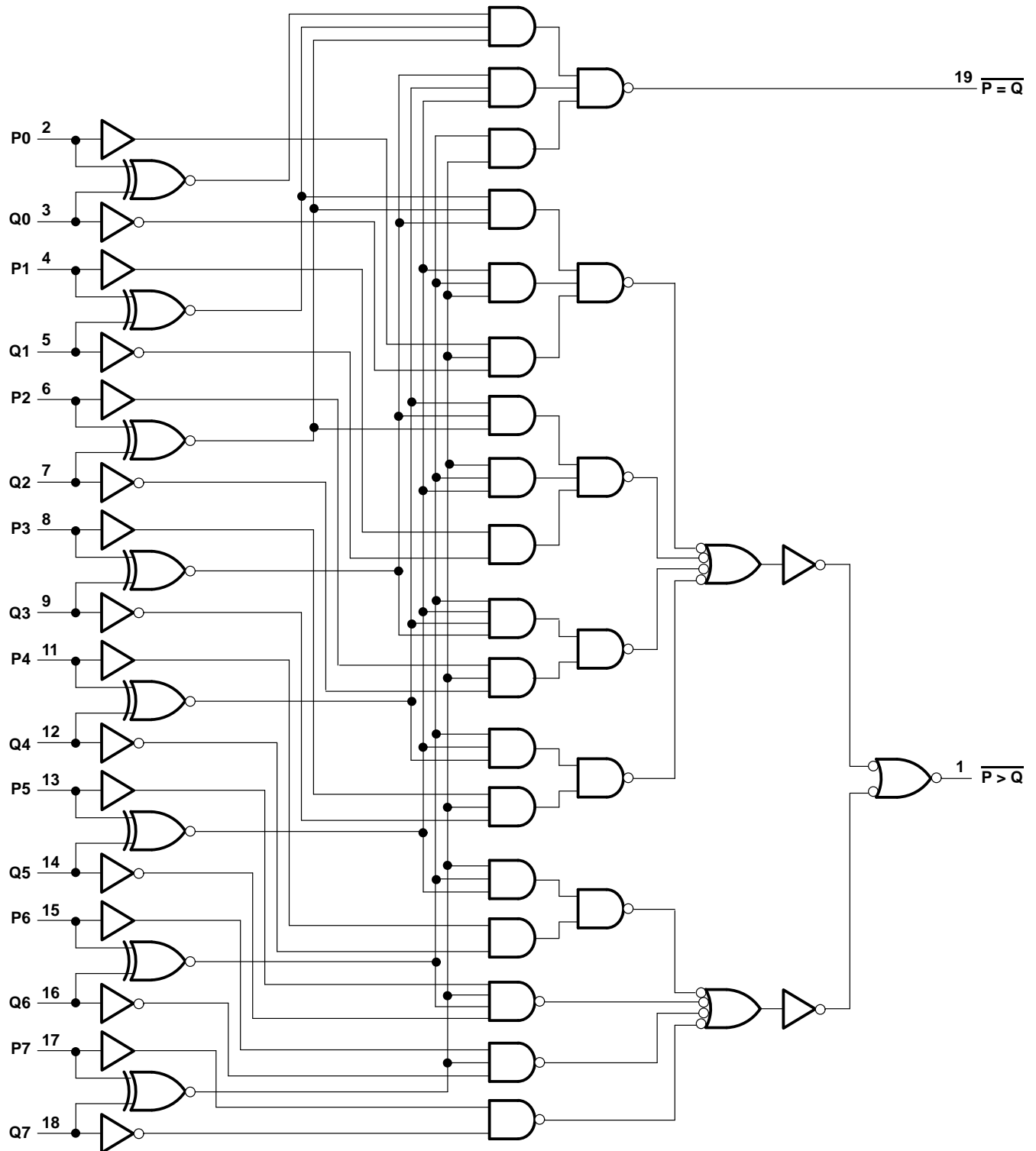
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logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)



SN54HC682, SN74HC682

8-BIT MAGNITUDE COMPARATORS

SCLS018B – MARCH 1984 – REVISED JANUARY 1996

absolute maximum ratings over operating free-air temperature†

| | |
|---|----------------|
| Supply voltage range, V_{CC} | –0.5 V to 7 V |
| Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) (see Note 1) | ± 20 mA |
| Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) (see Note 1) | ± 20 mA |
| Continuous output current, I_O ($V_O = 0$ to V_{CC}) | ± 25 mA |
| Continuous current through V_{CC} or GND | ± 50 mA |
| Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 2): DW package | 1.6 W |
| N package | 1.3 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 maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils, except for the N package, which has a trace length of zero.

recommended operating conditions

| | | | SN54HC682 | | | SN74HC682 | | | 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 | | | 1.5 | | | V |
| | | $V_{CC} = 4.5$ V | 3.15 | | | 3.15 | | | |
| | | $V_{CC} = 6$ V | 4.2 | | | 4.2 | | | |
| V_{IL} | Low-level input voltage | $V_{CC} = 2$ V | 0 | | 0.5 | 0 | | 0.5 | V |
| | | $V_{CC} = 4.5$ V | 0 | | 1.35 | 0 | | 1.35 | |
| | | $V_{CC} = 6$ V | 0 | | 1.8 | 0 | | 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) time | $V_{CC} = 2$ V | 0 | | 1000 | 0 | | 1000 | ns |
| | | $V_{CC} = 4.5$ V | 0 | | 500 | 0 | | 500 | |
| | | $V_{CC} = 6$ V | 0 | | 400 | 0 | | 400 | |
| T_A | Operating free-air temperature | | –55 | | 125 | –40 | | 85 | °C |

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SCLS018B – MARCH 1984 – REVISED JANUARY 1996

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

| PARAMETER | TEST CONDITIONS | | V _{CC} | T _A = 25°C | | | SN54HC682 | | SN74HC682 | | 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 | 4.3 | | 3.7 | | 3.84 | | |
| | | I _{OH} = -5.2 mA | 6 V | 5.48 | 5.8 | | 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 | Q inputs | 6 V | | -50 | -90 | | -160 | | -140 | µA |
| | | All other inputs | 6 V | | -0.1 | -100 | | -1000 | | -1000 | nA |
| I _{CC} | V _I = V _{CC} or 0, I _O = 0 | | 6 V | | 480 | 700 | | 1300 | | 1100 | µA |
| C _i | | | 2 V to 6 V | | 3 | 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 | | | SN54HC682 | | SN74HC682 | | 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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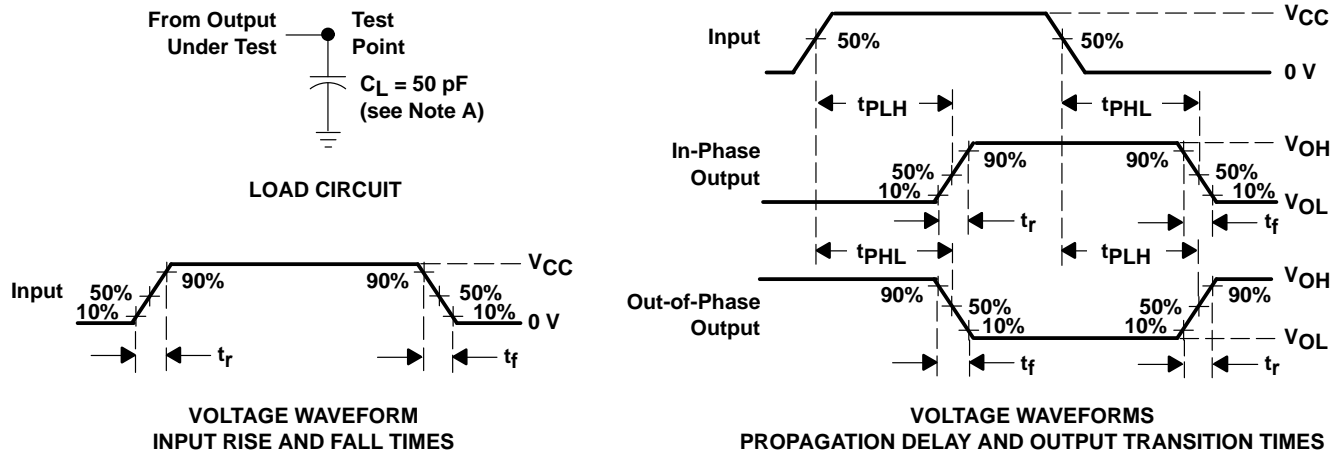


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PARAMETER MEASUREMENT INFORMATION



- 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

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