

SN74LS682, SN74LS684, SN74LS688



ON Semiconductor

<http://onsemi.com>

8-Bit Magnitude Comparators

The SN74LS682, 684, 688 are 8-bit magnitude comparators. These device types are designed to perform comparisons between two eight-bit binary or BCD words. All device types provide $\overline{P} = \overline{Q}$ outputs and the LS682 and LS684 have $\overline{P} > \overline{Q}$ outputs also.

The LS682, LS684 and LS688 are totem pole devices. The LS682 has a 20 kΩ pullup resistor on the Q inputs for analog or switch data.

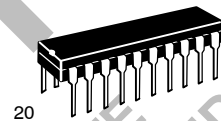
| TYPE | $\overline{P} = \overline{Q}$ | $\overline{P} > \overline{Q}$ | OUTPUT ENABLE | OUTPUT CONFIGURATION | PULLUP |
|-------|-------------------------------|-------------------------------|---------------|----------------------|--------|
| LS682 | yes | yes | no | totem-pole | yes |
| LS684 | yes | yes | no | totem-pole | no |
| LS688 | yes | no | yes | totem-pole | no |

GUARANTEED OPERATING RANGES

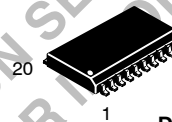
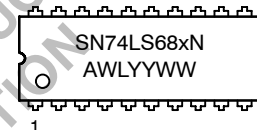
| Symbol | Parameter | Min | Typ | Max | Unit |
|-----------------|-------------------------------------|------|-----|-------|------|
| V _{CC} | Supply Voltage | 4.75 | 5.0 | 5.25 | V |
| T _A | Operating Ambient Temperature Range | 0 | 25 | 70 | °C |
| I _{OH} | Output Current – High | | | – 0.4 | mA |
| I _{OL} | Output Current – Low | | | 24 | mA |

LOW
POWER
SCHOTTKY

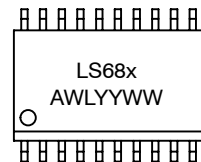
MARKING DIAGRAMS



PDIP-20
N SUFFIX
CASE 738



SOIC-20
DW SUFFIX
CASE 751D



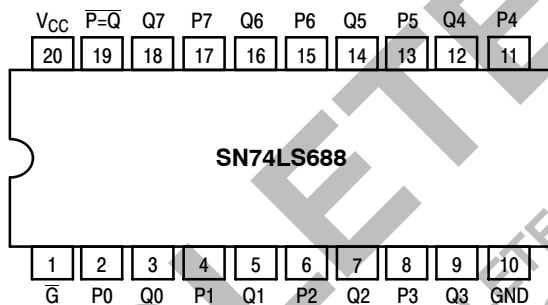
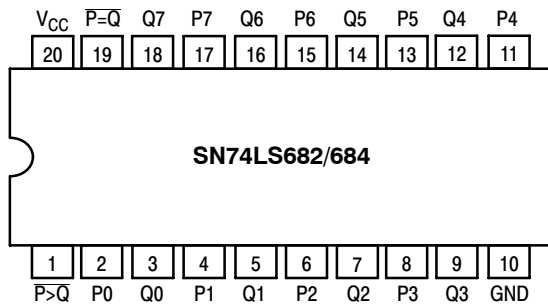
x = 2, 4, or 8
A = Assembly Location
WL = Wafer Lot
YY = Year
WW = Work Week

ORDERING INFORMATION

| Device | Package | Shipping |
|---------------|-----------|------------------|
| SN74LS682N | PDIP-20 | 1440 Units/Box |
| SN74LS682DW | SOIC-WIDE | 38 Units/Rail |
| SN74LS682DWR2 | SOIC-WIDE | 2500/Tape & Reel |
| SN74LS684N | PDIP-20 | 1440 Units/Box |
| SN74LS684DW | SOIC-WIDE | 38 Units/Rail |
| SN74LS684DWR2 | SOIC-WIDE | 2500/Tape & Reel |
| SN74LS688N | PDIP-20 | 1440 Units/Box |
| SN74LS688DW | SOIC-WIDE | 38 Units/Rail |
| SN74LS688DWR2 | SOIC-WIDE | 2500/Tape & Reel |

SN74LS682, SN74LS684, SN74LS688

CONNECTION DIAGRAMS (TOP VIEW)



FUNCTION TABLE

| INPUTS | | OUTPUTS | | |
|------------------|---------|---------|------------------|------------------|
| DATA | ENABLES | | $\overline{P=Q}$ | $\overline{P>Q}$ |
| P, Q | G, GT | G2 | | |
| $\overline{P=Q}$ | L | L | L | H |
| $\overline{P>Q}$ | L | L | H | L |
| $\overline{P<Q}$ | L | L | H | L |
| X | H | H | H | H |

H = HIGH Level, L = LOW Level, X = Irrelevant

SN74LS682, SN74LS684, SN74LS688

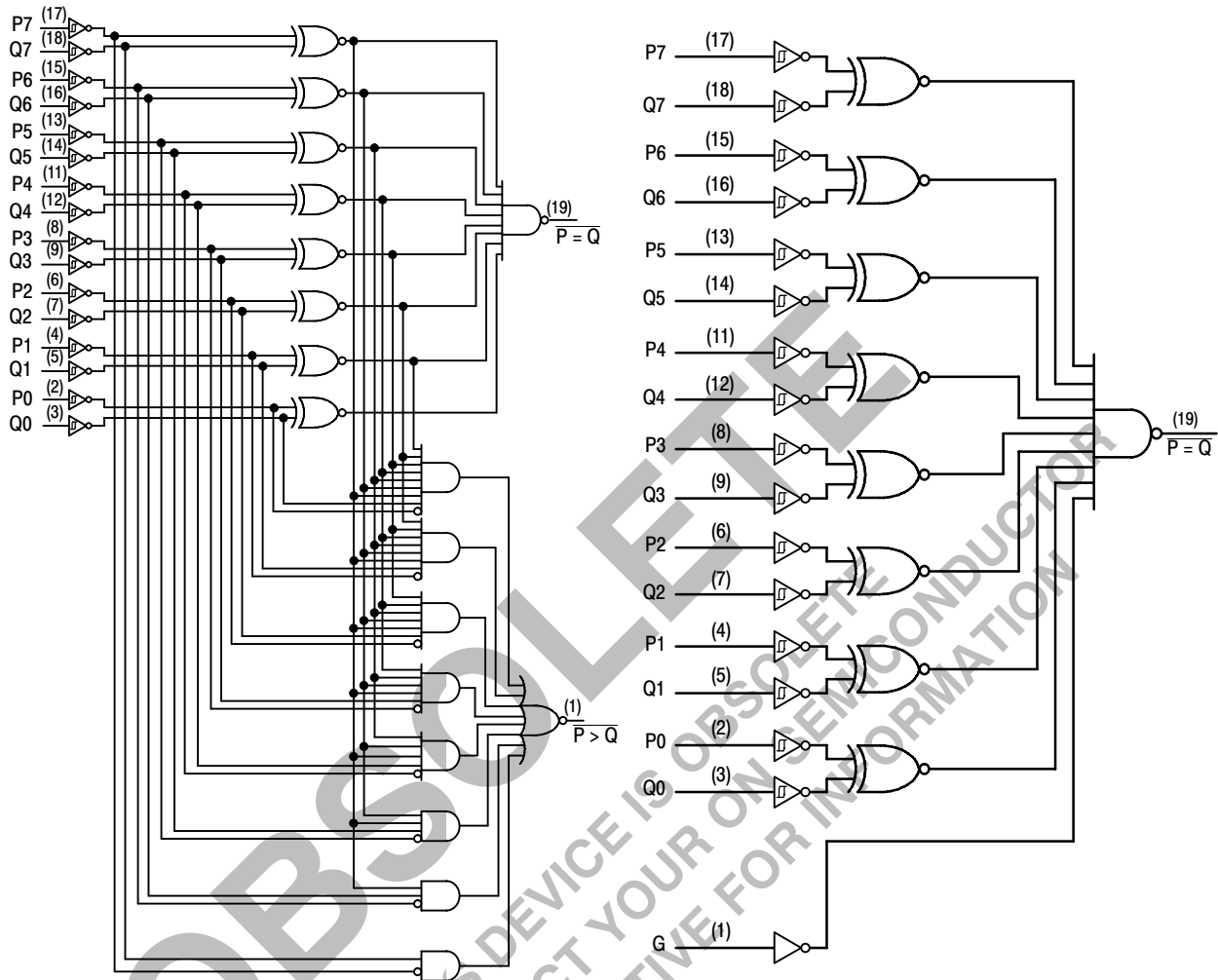
DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

| Symbol | Parameter | Limits | | | Unit | Test Conditions | |
|----------|--------------------------------|----------------|-------|------|---------------|---|--|
| | | Min | Typ | Max | | | |
| V_{IH} | Input HIGH Voltage | 2.0 | | | V | Guaranteed Input HIGH Voltage for All Inputs | |
| V_{IL} | Input LOW Voltage | | | 0.8 | V | Guaranteed Input LOW Voltage for All Inputs | |
| V_{IK} | Input Clamp Diode Voltage | | -0.65 | -1.5 | V | $V_{CC} = \text{MIN}$, $I_{IN} = -18 \text{ mA}$ | |
| V_{OH} | Output HIGH Voltage | 2.7 | 3.5 | | V | $V_{CC} = \text{MIN}$, $I_{OH} = \text{MAX}$, $V_{IN} = V_{IH}$ or V_{IL} per Truth Table | |
| V_{OL} | Output LOW Voltage | | 0.25 | 0.4 | V | $I_{OL} = 12 \text{ mA}$ | |
| | | | 0.35 | 0.5 | V | $I_{OL} = 24 \text{ mA}$ | |
| I_{IH} | Input HIGH Current | | | 20 | μA | $V_{CC} = \text{MAX}$, $V_{IN} = 2.7 \text{ V}$ | |
| | | LS682-Q Inputs | | | 0.1 | mA | $V_{CC} = \text{MAX}$, $V_{IN} = 5.5 \text{ V}$ |
| | | Others | | | 0.1 | mA | $V_{CC} = \text{MAX}$, $V_{IN} = 7.0 \text{ V}$ |
| I_{IL} | Input LOW Current | LS682-Q Inputs | | | -0.4 | mA | $V_{CC} = \text{MAX}$, $V_{IN} = 0.4 \text{ V}$ |
| | | Others | | | -0.2 | mA | |
| I_{OS} | Short Circuit Current (Note 1) | -30 | | -130 | mA | $V_{CC} = \text{MAX}$ | |
| I_{CC} | Power Supply Current | LS682 | | | 70 | mA | $V_{CC} = \text{MAX}$ |
| | | LS684 | | | 65 | mA | |
| | | LS688 | | | 65 | mA | |

1. Not more than one output should be shorted at a time, nor for more than 1 second.

SN74LS682, SN74LS684, SN74LS688

LOGIC DIAGRAMS



SN74LS682 and LS684

SN74LS688

SN74LS682, SN74LS684, SN74LS688

AC CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

SN74LS682

| Symbol | Parameter | Limits | | | Unit | Test Conditions |
|------------------------|---|--------|----------|----------|------|--|
| | | Min | Typ | Max | | |
| t_{PLH} t_{PHL} | Propagation Delay, P to $\overline{P} = \overline{Q}$ | | 13 15 | 25 25 | ns | $V_{CC} = 5.0\text{ V}$ $C_L = 45\text{ pF}$ $R_L = 667\ \Omega$ |
| t_{PLH} t_{PHL} | Propagation Delay, Q to $\overline{P} = \overline{Q}$ | | 14 15 | 25 25 | ns | |
| t_{PLH} t_{PHL} | Propagation Delay, P to $\overline{P} > \overline{Q}$ | | 20 15 | 30 30 | ns | |
| t_{PLH} t_{PHL} | Propagation Delay, Q to $\overline{P} > \overline{Q}$ | | 21 19 | 30 30 | ns | |

SN74LS684

| Symbol | Parameter | Limits | | | Unit | Test Conditions |
|------------------------|---|--------|----------|----------|------|--|
| | | Min | Typ | Max | | |
| t_{PLH} t_{PHL} | Propagation Delay, P to $\overline{P} = \overline{Q}$ | | 15 17 | 25 25 | ns | $V_{CC} = 5.0\text{ V}$ $C_L = 45\text{ pF}$ $R_L = 667\ \Omega$ |
| t_{PLH} t_{PHL} | Propagation Delay, Q to $\overline{P} = \overline{Q}$ | | 16 15 | 25 25 | ns | |
| t_{PLH} t_{PHL} | Propagation Delay, P to $\overline{P} > \overline{Q}$ | | 22 17 | 30 30 | ns | |
| t_{PLH} t_{PHL} | Propagation Delay, Q to $\overline{P} > \overline{Q}$ | | 24 20 | 30 30 | ns | |

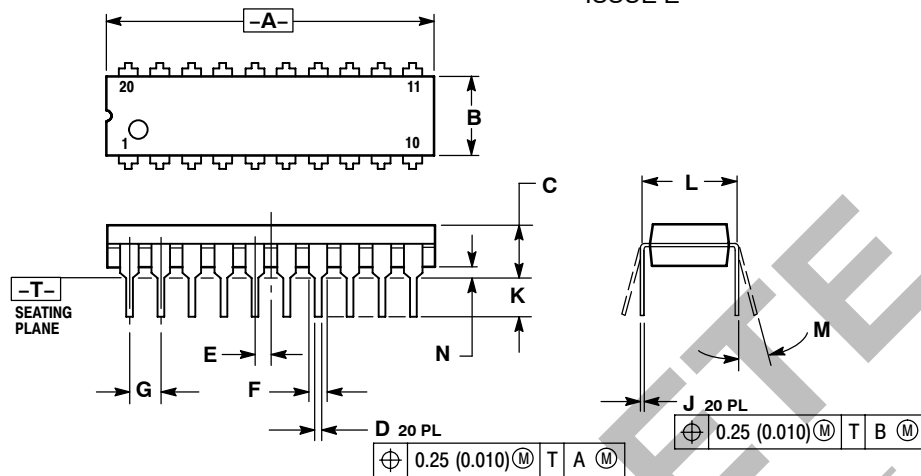
SN74LS688

| Symbol | Parameter | Limits | | | Unit | Test Conditions |
|------------------------|--|--------|----------|----------|------|--|
| | | Min | Typ | Max | | |
| t_{PLH} t_{PHL} | Propagation Delay, P to $\overline{P} = \overline{Q}$ | | 12 17 | 18 23 | ns | $V_{CC} = 5.0\text{ V}$ $C_L = 45\text{ pF}$ $R_L = 667\ \Omega$ |
| t_{PLH} t_{PHL} | Propagation Delay, Q to $\overline{P} = \overline{Q}$ | | 12 17 | 18 23 | ns | |
| t_{PLH} t_{PHL} | Propagation Delay, \overline{G} , $\overline{G1}$ to $\overline{P} = \overline{Q}$ | | 12 13 | 18 20 | ns | |

SN74LS682, SN74LS684, SN74LS688

PACKAGE DIMENSIONS

N SUFFIX
PLASTIC PACKAGE
 CASE 738-03
 ISSUE E



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.

| DIM | INCHES | | MILLIMETERS | |
|-----|-------------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 1.010 | 1.070 | 25.66 | 27.17 |
| B | 0.240 | 0.260 | 6.10 | 6.60 |
| C | 0.150 | 0.180 | 3.81 | 4.57 |
| D | 0.015 | 0.022 | 0.39 | 0.55 |
| E | 0.050 BSC | | 1.27 BSC | |
| F | 0.050 0.070 | | 1.27 1.77 | |
| G | 0.100 BSC | | 2.54 BSC | |
| J | 0.008 | 0.015 | 0.21 | 0.38 |
| K | 0.110 | 0.140 | 2.80 | 3.55 |
| L | 0.800 BSC | | 7.62 BSC | |
| M | 0° 15° | | 0° 15° | |
| N | 0.020 | 0.040 | 0.51 | 1.01 |

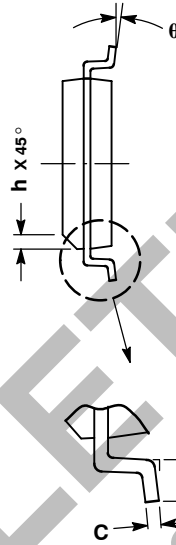
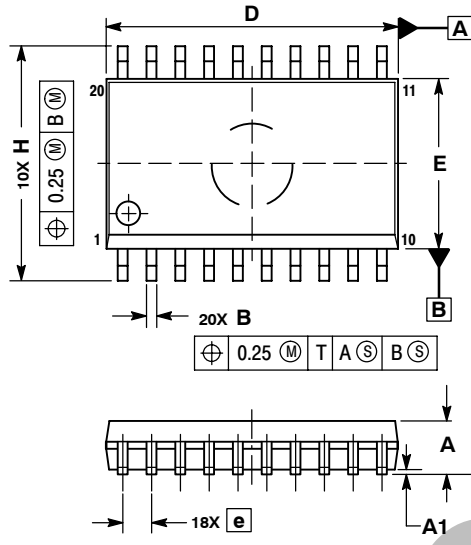
OBSOLETE

THIS DEVICE IS OBSOLETE
 PLEASE CONTACT YOUR ON SEMICONDUCTOR REPRESENTATIVE FOR INFORMATION

SN74LS682, SN74LS684, SN74LS688

PACKAGE DIMENSIONS

DW SUFFIX
PLASTIC SOIC PACKAGE
CASE 751D-05
ISSUE F



NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS | |
|-----|-------------|-------|
| | MIN | MAX |
| A | 2.35 | 2.65 |
| A1 | 0.10 | 0.25 |
| B | 0.35 | 0.49 |
| C | 0.23 | 0.32 |
| D | 12.65 | 12.95 |
| E | 7.40 | 7.60 |
| e | 1.27 BSC | |
| H | 10.05 | 10.55 |
| h | 0.25 | 0.75 |
| L | 0.50 | 0.90 |
| θ | 0° - 7° | |

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