



# 8-INPUT PRIORITY ENCODERS WITH 3-STATE OUTPUTS

The SN54/74LS348 and the SN54/74LS848 are eight input priority encoders which provide the 8-line to 3-line function.

The outputs (A0–A2) and inputs (0–7) are active low. The active low input which has the highest priority (input 7 has the highest) is represented on the outputs (output A0 is the lowest bit). An example would be if inputs 1, 2 and 4 were low, then a binary 4 would be represented on the outputs.

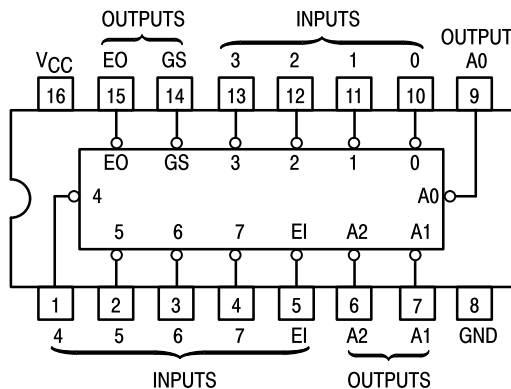
The GS (Group Signal) output is active low when any of the inputs are low. It serves to indicate when any of the inputs are active.

A0, A1 and A2 are three-state outputs. This allows for up to 64 line expansion without the need for special external circuitry.

A logical one on the Enable Input (EI) forces A0, A1 and A2 to the disabled state and outputs GS and EO to the high state. A high on all data inputs (0–7) together with a low on the EI input disables outputs A0, A1, and A2 and forces output GS to the high state and output EO to the low state.

Use of the EI input in conjunction with the EO output provides for the capability of having priority encoding of n input signals.

The LS848 has special internal circuitry providing for a greatly reduced negative going glitch on the GS (Group Signal) output and on a reduced tendency for the A0, A1 and A2 outputs to become momentarily enabled. Both of these occurrences happen when the EI input goes from a logical one to a logical zero and all data inputs (0–7) are held at logical ones. The internal glitch reduction circuitry does add an additional fan-in of one on all data inputs (compared to that of the LS348).



FUNCTION TABLE

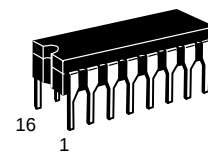
| INPUTS |   |   |   |   |   |   |   |   | OUTPUTS |    |    |    |    |
|--------|---|---|---|---|---|---|---|---|---------|----|----|----|----|
| EI     | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | A2      | A1 | A0 | GS | EO |
| H      | X | X | X | X | X | X | X | X | Z       | Z  | Z  | H  | H  |
| L      | H | H | H | H | H | H | H | H | Z       | Z  | Z  | H  | L  |
| L      | X | X | X | X | X | X | X | L | L       | L  | L  | L  | H  |
| L      | X | X | X | X | X | X | L | H | L       | L  | H  | L  | H  |
| L      | X | X | X | X | L | H | H | H | L       | H  | H  | L  | H  |
| L      | X | X | X | L | H | H | H | H | H       | L  | L  | L  | H  |
| L      | X | X | L | H | H | H | H | H | H       | L  | H  | L  | H  |
| L      | X | L | H | H | H | H | H | H | H       | H  | L  | L  | H  |
| L      | L | H | H | H | H | H | H | H | H       | H  | H  | L  | H  |

H = HIGH Logic Level  
L = LOW Logic Level  
X = Irrelevant  
Z = High Impedance State

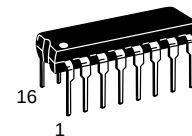
SN54/74LS348  
SN54/74LS848

8-INPUT PRIORITY ENCODERS WITH 3-STATE OUTPUTS

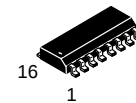
LOW POWER SCHOTTKY



J SUFFIX  
CERAMIC  
CASE 620-09



N SUFFIX  
PLASTIC  
CASE 648-08



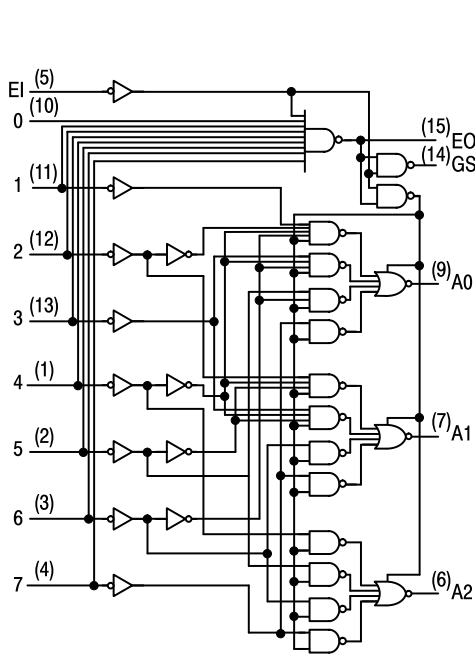
D SUFFIX  
SOIC  
CASE 751B-03

## ORDERING INFORMATION

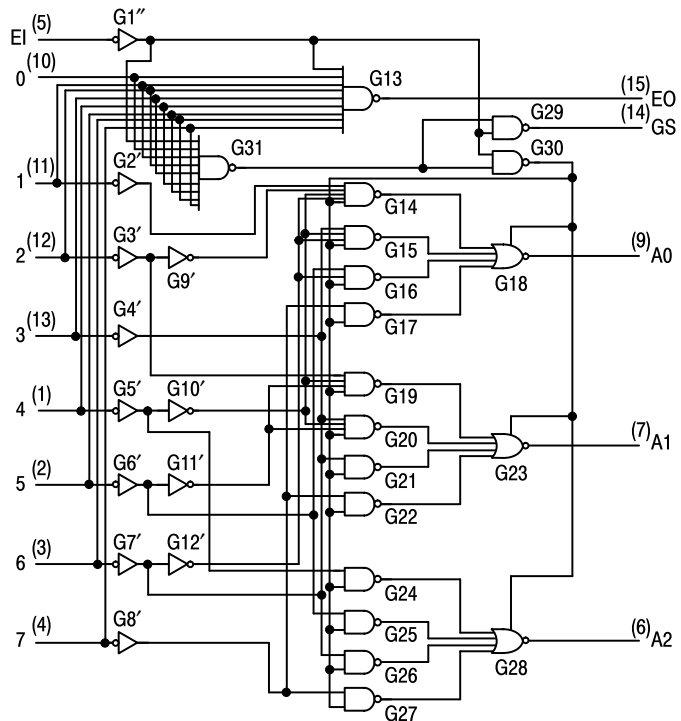
SN54LSXXXJ Ceramic  
SN74LSXXXN Plastic  
SN74LSXXXD SOIC

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## BLOCK DIAGRAMS



SN54/74LS348



SN54/74LS848

## GUARANTEED OPERATING RANGES

| Symbol          | Parameter                           |                          | Min         | Typ        | Max          | Unit |
|-----------------|-------------------------------------|--------------------------|-------------|------------|--------------|------|
| V <sub>CC</sub> | Supply Voltage                      | 54<br>74                 | 4.5<br>4.75 | 5.0<br>5.0 | 5.5<br>5.25  | V    |
| T <sub>A</sub>  | Operating Ambient Temperature Range | 54<br>74                 | -55<br>0    | 25<br>25   | 125<br>70    | °C   |
| I <sub>OH</sub> | Output Current — High               | EO, GS                   | 54, 74      |            | -0.4         | mA   |
| I <sub>OH</sub> | Output Current — High               | A0, A1, A2<br>A0, A1, A2 | 54<br>74    |            | -1.0<br>-2.6 | mA   |
| I <sub>OL</sub> | Output Current — Low                | EO, GS                   | 54<br>74    |            | 4.0<br>8.0   | mA   |
| I <sub>OL</sub> | Output Current — Low                | A0, A1, A2<br>A0, A1, A2 | 54<br>74    |            | 12<br>24     | mA   |

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## DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

| Symbol           | Parameter                                                                                              |        | Limits |       |              | Unit     | Test Conditions                                                                                                    |                                                                                                             |
|------------------|--------------------------------------------------------------------------------------------------------|--------|--------|-------|--------------|----------|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
|                  |                                                                                                        |        | Min    | Typ   | Max          |          |                                                                                                                    |                                                                                                             |
| V <sub>IH</sub>  | Input HIGH Voltage                                                                                     |        | 2.0    |       |              | V        | Guaranteed Input HIGH Voltage for All Inputs                                                                       |                                                                                                             |
| V <sub>IL</sub>  | Input LOW Voltage                                                                                      | 54     |        |       | 0.7          | V        | Guaranteed Input LOW Voltage for All Inputs                                                                        |                                                                                                             |
|                  |                                                                                                        | 74     |        |       | 0.8          |          |                                                                                                                    |                                                                                                             |
| V <sub>IK</sub>  | Input Clamp Diode Voltage                                                                              |        |        | −0.65 | −1.5         | V        | V <sub>CC</sub> = MIN, I <sub>IN</sub> = −18 mA                                                                    |                                                                                                             |
| V <sub>OH</sub>  | Output HIGH Voltage<br>A0, A1, A2<br>EO, GS<br>EO, GS                                                  | 54, 74 | 2.4    | 3.1   |              | V        | V <sub>CC</sub> = MIN, I <sub>OH</sub> = MAX, V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> per Truth Table |                                                                                                             |
|                  |                                                                                                        | 54     | 2.5    | 3.5   |              | V        |                                                                                                                    |                                                                                                             |
|                  |                                                                                                        | 74     | 2.7    | 3.5   |              | V        |                                                                                                                    |                                                                                                             |
| V <sub>OL</sub>  | Output LOW Voltage<br>EO, GS                                                                           | 54, 74 |        | 0.25  | 0.4          | V        | I <sub>OL</sub> = 4.0 mA                                                                                           | V <sub>CC</sub> = V <sub>CC</sub> MIN, V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> per Truth Table |
|                  |                                                                                                        | 74     |        | 0.35  | 0.5          | V        | I <sub>OL</sub> = 8.0 mA                                                                                           |                                                                                                             |
| V <sub>OL</sub>  | Output LOW Voltage<br>A0, A1, A2                                                                       | 54, 74 |        | 0.25  | 0.4          | V        | I <sub>OL</sub> = 12 mA                                                                                            | V <sub>CC</sub> = V <sub>CC</sub> MIN, V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> per Truth Table |
|                  |                                                                                                        | 74     |        | 0.35  | 0.5          | V        | I <sub>OL</sub> = 24 mA                                                                                            |                                                                                                             |
| I <sub>OZH</sub> | Output Off Current HIGH                                                                                |        |        |       | 20           | μA       | V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 2.7 V                                                                    |                                                                                                             |
| I <sub>OZL</sub> | Output Off Current LOW                                                                                 |        |        |       | −20          | μA       | V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 0.4 V                                                                    |                                                                                                             |
| I <sub>IH</sub>  | Input HIGH Current<br>Input 0, EI — LS348<br><br>Input 0 — LS848<br><br>Other — LS348<br>Other — LS848 |        |        |       | 20           | μA       | V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V                                                                     |                                                                                                             |
|                  |                                                                                                        |        |        |       | 40           | μA       |                                                                                                                    |                                                                                                             |
|                  |                                                                                                        |        |        |       | 40<br>60     | μA<br>μA |                                                                                                                    |                                                                                                             |
|                  | Input HIGH Current<br>Input 0, EI — LS348<br><br>Input 0 — LS848<br><br>Other — LS348<br>Other — LS848 |        |        |       | 0.1          | mA       | V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V                                                                     |                                                                                                             |
|                  |                                                                                                        |        |        |       | 0.2          | mA       |                                                                                                                    |                                                                                                             |
|                  |                                                                                                        |        |        |       | 0.2<br>0.3   | mA<br>mA |                                                                                                                    |                                                                                                             |
| I <sub>IL</sub>  | Input LOW Current<br>Input 0, EI — LS348<br><br>Input 0 — LS848<br><br>Other — LS348<br>Other — LS848  |        |        |       | −0.4         | mA       | V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.4 V                                                                     |                                                                                                             |
|                  |                                                                                                        |        |        |       | −0.8         | mA       |                                                                                                                    |                                                                                                             |
|                  |                                                                                                        |        |        |       | −0.8<br>−1.2 | mA<br>mA |                                                                                                                    |                                                                                                             |
| I <sub>OS</sub>  | Short Circuit Current (Note 1)<br>EO, GS<br>A0, A1, A2                                                 |        | −20    |       | −120         | mA       | V <sub>CC</sub> = MAX                                                                                              |                                                                                                             |
|                  |                                                                                                        |        | −30    |       | −130         | mA       |                                                                                                                    |                                                                                                             |
| I <sub>CC</sub>  | Power Supply Current<br>Total, Output HIGH                                                             |        |        | 12    | 23           | mA       | V <sub>CC</sub> = MAX<br>All Inputs and Outputs Open                                                               |                                                                                                             |
|                  | Total, Output LOW                                                                                      |        |        | 13    | 25           |          | V <sub>CC</sub> = MAX, Inputs 7, EI = GND<br>All Others Open                                                       |                                                                                                             |

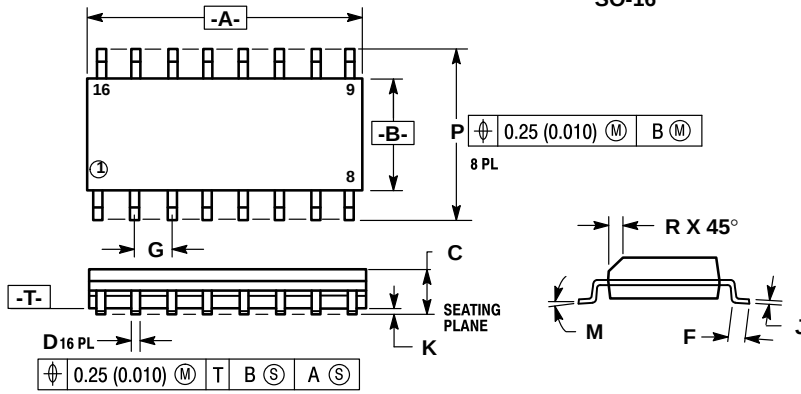
Note 1: Not more than one output should be shorted at a time, nor for more than 1 second.

# SN54/74LS348 • SN54/74LS848

## AC CHARACTERISTICS ( $V_{CC} = 5.0\text{ V}$ , $T_A = 25^\circ\text{C}$ )

| Symbol | From<br>(Input) | To<br>(Output) | Waveform               | LS348<br>Limits |     |     | LS848<br>Limits |     |     | Unit | Test Conditions           |
|--------|-----------------|----------------|------------------------|-----------------|-----|-----|-----------------|-----|-----|------|---------------------------|
|        |                 |                |                        | Min             | Typ | Max | Min             | Typ | Max |      |                           |
| tPLH   | 1 thru 7        | A0, A1 or A2   | In-Phase<br>output     |                 | 11  | 17  |                 | 12  | 18  | ns   | CL = 45 pF<br>RL = 667 Ω  |
| tPHL   |                 |                |                        |                 | 20  | 30  |                 | 20  | 30  |      |                           |
| tPLH   | 1 thru 7        | A0, A1 or A2   | Out-of-Phase<br>output |                 | 23  | 35  |                 | 23  | 35  | ns   |                           |
| tPHL   |                 |                |                        |                 | 23  | 35  |                 | 23  | 35  |      |                           |
| tPZH   | EI              | A0, A1 or A2   |                        |                 | 25  | 39  |                 | 25  | 39  | ns   |                           |
| tPZL   |                 |                |                        |                 | 24  | 41  |                 | 24  | 41  |      |                           |
| tPLH   | 0 thru 7        | E0             | Out-of-Phase<br>output |                 | 11  | 18  |                 | 11  | 18  | ns   | CL = 15 pF<br>RL = 2.0 Ω  |
| tPHL   |                 |                |                        |                 | 26  | 40  |                 | 26  | 40  |      |                           |
| tPLH   | 0 thru 7        | GS             | In-Phase<br>output     |                 | 38  | 55  |                 | 38  | 55  | ns   |                           |
| tPHL   |                 |                |                        |                 | 9.0 | 21  |                 | 9.0 | 21  |      |                           |
| tPLH   | EI              | GS             | In-Phase<br>output     |                 | 11  | 17  |                 | 11  | 17  | ns   |                           |
| tPHL   |                 |                |                        |                 | 14  | 36  |                 | 14  | 36  |      |                           |
| tPLH   | EI              | EO             | In-Phase<br>output     |                 | 17  | 21  |                 | 17  | 21  | ns   |                           |
| tPHL   |                 |                |                        |                 | 25  | 40  |                 | 30  | 45  |      |                           |
| tPHZ   | EI              | A0, A1 or A2   |                        |                 | 18  | 27  |                 | 18  | 27  | ns   | CL = 5.0 pF<br>RL = 667 Ω |
| tPLZ   |                 |                |                        |                 | 23  | 35  |                 | 23  | 35  |      |                           |

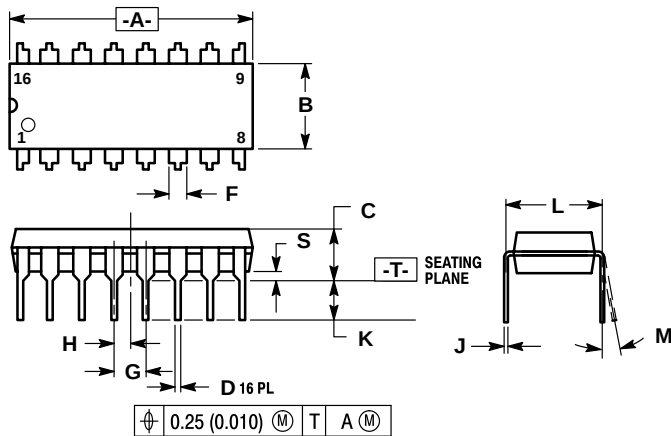
**Case 751B-03 D Suffix**  
**16-Pin Plastic**  
**SO-16**



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
  5. 751B-01 IS OBSOLETE, NEW STANDARD 751B-03.

| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | 9.80        | 10.00 | 0.386     | 0.393 |
| B   | 3.80        | 4.00  | 0.150     | 0.157 |
| C   | 1.35        | 1.75  | 0.054     | 0.068 |
| D   | 0.35        | 0.49  | 0.014     | 0.019 |
| F   | 0.40        | 1.25  | 0.016     | 0.049 |
| G   | 1.27 BSC    |       | 0.050 BSC |       |
| J   | 0.19        | 0.25  | 0.008     | 0.009 |
| K   | 0.10        | 0.25  | 0.004     | 0.009 |
| M   | 0°          | 7°    | 0°        | 7°    |
| P   | 5.80        | 6.20  | 0.229     | 0.244 |
| R   | 0.25        | 0.50  | 0.010     | 0.019 |

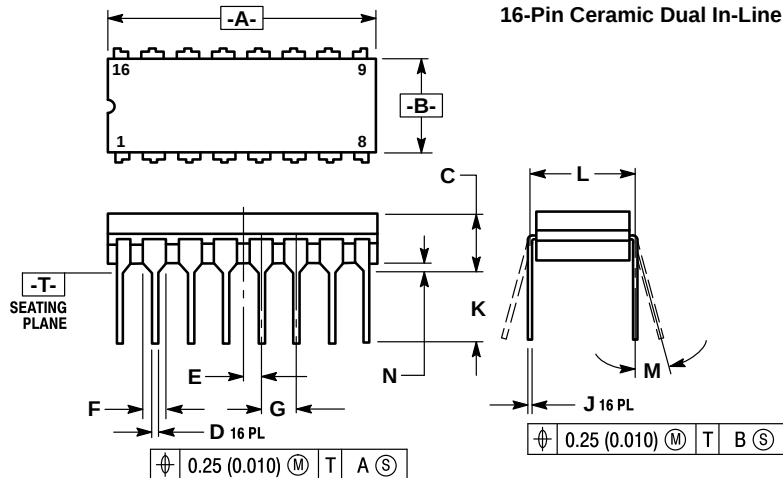
**Case 648-08 N Suffix**  
**16-Pin Plastic**



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
  4. DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.
  5. ROUNDED CORNERS OPTIONAL.
  6. 648-01 THRU -07 OBSOLETE, NEW STANDARD 648-08.

| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | 18.80       | 19.55 | 0.740     | 0.770 |
| B   | 6.35        | 6.85  | 0.250     | 0.270 |
| C   | 3.69        | 4.44  | 0.145     | 0.175 |
| D   | 0.39        | 0.53  | 0.015     | 0.021 |
| F   | 1.02        | 1.77  | 0.040     | 0.070 |
| G   | 2.54 BSC    |       | 0.100 BSC |       |
| H   | 1.27 BSC    |       | 0.050 BSC |       |
| J   | 0.21        | 0.38  | 0.008     | 0.015 |
| K   | 2.80        | 3.30  | 0.110     | 0.130 |
| L   | 7.50        | 7.74  | 0.295     | 0.305 |
| M   | 0°          | 10°   | 0°        | 10°   |
| S   | 0.51        | 1.01  | 0.020     | 0.040 |

**Case 620-09 J Suffix**  
**16-Pin Ceramic Dual In-Line**



- 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. DIM F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.
  5. 620-01 THRU -08 OBSOLETE, NEW STANDARD 620-09.

| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | 19.05       | 19.55 | 0.750     | 0.770 |
| B   | 6.10        | 7.36  | 0.240     | 0.290 |
| C   | —           | 4.19  | —         | 0.165 |
| D   | 0.39        | 0.53  | 0.015     | 0.021 |
| E   | 1.27 BSC    |       | 0.050 BSC |       |
| F   | 1.40        | 1.77  | 0.055     | 0.070 |
| G   | 2.54 BSC    |       | 0.100 BSC |       |
| J   | 0.23        | 0.27  | 0.009     | 0.011 |
| K   | —           | 5.08  | —         | 0.200 |
| L   | 7.62 BSC    |       | 0.300 BSC |       |
| M   | 0°          | 15°   | 0°        | 15°   |
| N   | 0.39        | 0.88  | 0.015     | 0.035 |

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