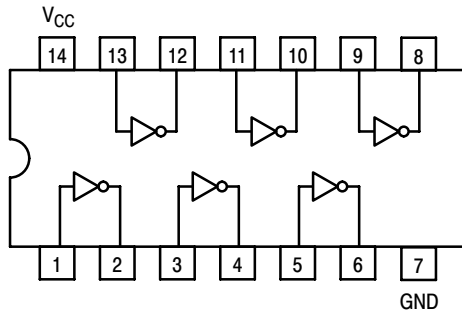


# SN74LS04

## Hex Inverter



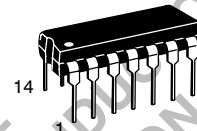
ON Semiconductor™

<http://onsemi.com>

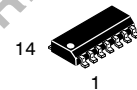
LOW  
POWER  
SCHOTTKY

### GUARANTEED OPERATING RANGES

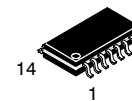
| Symbol   | Parameter                           | Min  | Typ | Max  | Unit |
|----------|-------------------------------------|------|-----|------|------|
| $V_{CC}$ | Supply Voltage                      | 4.75 | 5.0 | 5.25 | V    |
| $T_A$    | Operating Ambient Temperature Range | 0    | 25  | 70   | °C   |
| $I_{OH}$ | Output Current - High               |      |     | -0.4 | mA   |
| $I_{OL}$ | Output Current - Low                |      |     | 8.0  | mA   |



PLASTIC  
N SUFFIX  
CASE 646



SOIC  
D SUFFIX  
CASE 751A



SOEIAJ  
M SUFFIX  
CASE 965

### ORDERING INFORMATION

| Device      | Package    | Shipping         |
|-------------|------------|------------------|
| SN74LS04N   | 14 Pin DIP | 2000 Units/Box   |
| SN74LS04D   | SOIC-14    | 55 Units/Rail    |
| SN74LS04DR2 | SOIC-14    | 2500/Tape & Reel |
| SN74LS04M   | SOEIAJ-14  | See Note 1       |
| SN74LS04MEL | SOEIAJ-14  | See Note 1       |

1. For ordering information on the EIAJ version of the SOIC package, please contact your local ON Semiconductor representative.

# SN74LS04

## 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                          |        |       | 0.8  | V    | Guaranteed Input LOW Voltage for All Inputs   |
| 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                        | 2.7    | 3.5   |      | 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                            |
| V <sub>OL</sub> | Output LOW Voltage                         |        | 0.25  | 0.4  | V    | I <sub>OL</sub> = 4.0 mA<br>V <sub>CC</sub> = V <sub>CC</sub> MIN,<br>V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>per Truth Table |
|                 |  |        | 0.35  | 0.5  | V    |   |
| I <sub>IH</sub> | Input HIGH Current                         |        |       | 20   | μA   | V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V  |
|                 |  |        |       | 0.1  | mA   | V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V  |
| I <sub>IL</sub> | Input LOW Current                          |        |       | -0.4 | mA   | V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.4 V  |
| I <sub>OS</sub> | Short Circuit Current (Note 2)             | -20    |       | -100 | mA   | V <sub>CC</sub> = MAX   |
| I <sub>CC</sub> | Power Supply Current<br>Total, Output HIGH |        |       | 2.4  | mA   | V <sub>CC</sub> = MAX   |
|                 | Total, Output LOW                          |        |       | 6.6  |      |   |

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

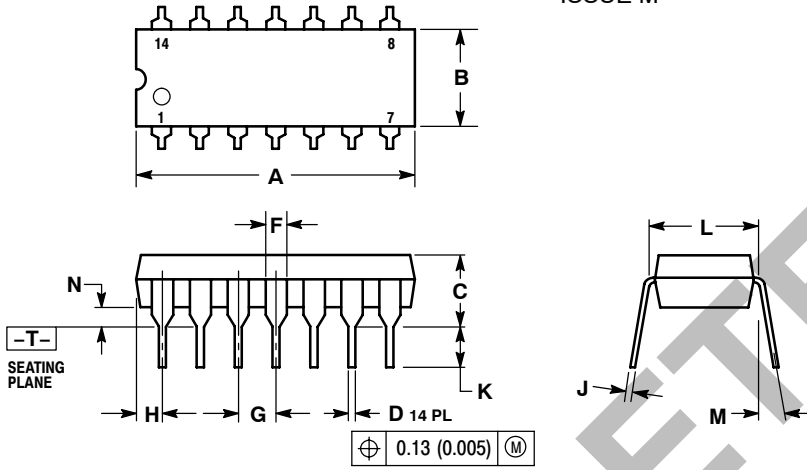
## AC CHARACTERISTICS (T<sub>A</sub> = 25°C)

| Symbol           | Parameter                       | Limits |     |     | Unit | Test Conditions                                   |
|------------------|---------------------------------|--------|-----|-----|------|---|
|                  |                                 | Min    | Typ | Max |      |   |
| t <sub>PLH</sub> | Turn-Off Delay, Input to Output |        | 9.0 | 15  | ns   | V <sub>CC</sub> = 5.0 V<br>C <sub>L</sub> = 15 pF |
| t <sub>PHL</sub> | Turn-On Delay, Input to Output  |        | 10  | 15  | ns   |   |

# SN74LS04

## PACKAGE DIMENSIONS

### N SUFFIX PLASTIC PACKAGE CASE 646-06 ISSUE M

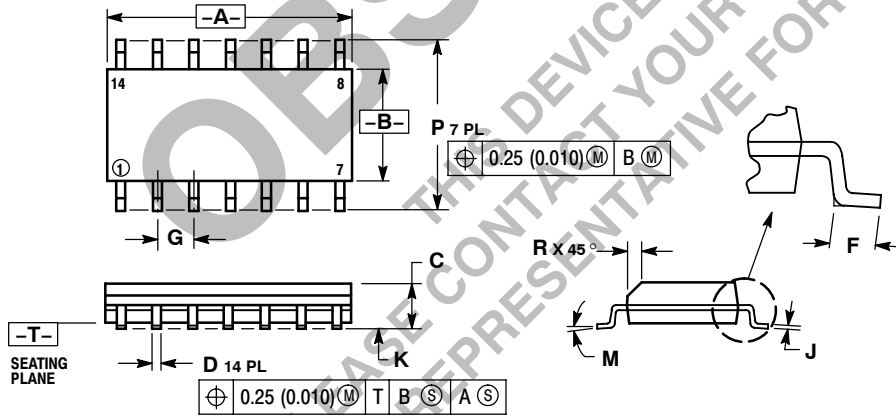


**NOTES:**

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.

| DIM | INCHES             |       | MILLIMETERS |       |
|-----|--------------------|-------|-------------|-------|
|     | MIN                | MAX   | MIN         | MAX   |
| A   | 0.715              | 0.770 | 18.16       | 18.80 |
| B   | 0.240              | 0.260 | 6.10        | 6.60  |
| C   | 0.145              | 0.185 | 3.69        | 4.69  |
| D   | 0.015              | 0.021 | 0.38        | 0.53  |
| F   | 0.040              | 0.070 | 1.02        | 1.78  |
| G   | 0.100 BSC 2.54 BSC |       |             |       |
| H   | 0.052              | 0.095 | 1.32        | 2.41  |
| J   | 0.008              | 0.015 | 0.20        | 0.38  |
| K   | 0.115              | 0.135 | 2.92        | 3.43  |
| L   | 0.290              | 0.310 | 7.37        | 7.87  |
| M   | --- 10° --- 10°    |       |             |       |
| N   | 0.015              | 0.039 | 0.38        | 1.01  |

### D SUFFIX PLASTIC SOIC PACKAGE CASE 751A-03 ISSUE F



**NOTES:**

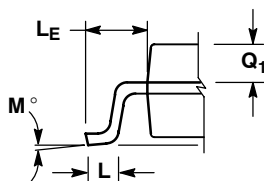
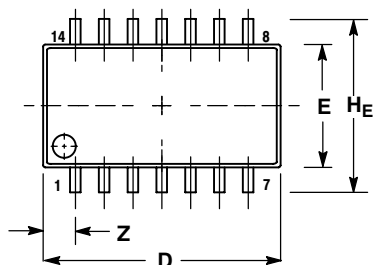
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
|     | MIN         | MAX  | MIN       | MAX   |
| A   | 8.55        | 8.75 | 0.337     | 0.344 |
| 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 | 0.228     | 0.244 |
| R   | 0.25        | 0.50 | 0.010     | 0.019 |

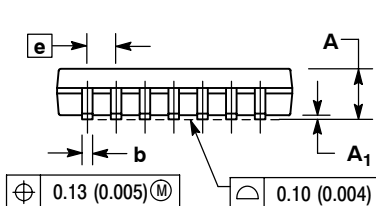
# SN74LS04

## PACKAGE DIMENSIONS

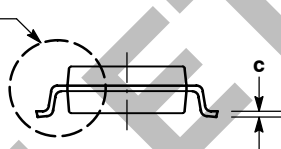
**M SUFFIX**  
**SOEIAJ PACKAGE**  
**CASE 965-01**  
**ISSUE O**



DETAIL P



VIEW P



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
5. THE LEAD WIDTH DIMENSION (b) DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE LEAD WIDTH DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSIONS AND ADJACENT LEAD TO BE 0.46 (0.018).

| DIM            | MILLIMETERS |       | INCHES    |       |
|----------------|-------------|-------|-----------|-------|
|                | MIN         | MAX   | MIN       | MAX   |
| A              | ---         | 2.05  | ---       | 0.081 |
| A <sub>1</sub> | 0.05        | 0.20  | 0.002     | 0.008 |
| b              | 0.35        | 0.50  | 0.014     | 0.020 |
| c              | 0.18        | 0.27  | 0.007     | 0.011 |
| D              | 9.90        | 10.50 | 0.390     | 0.413 |
| E              | 5.10        | 5.45  | 0.201     | 0.215 |
| e              | 1.27 BSC    |       | 0.050 BSC |       |
| H <sub>E</sub> | 7.40        | 8.20  | 0.291     | 0.323 |
| 0.50           | 0.50        | 0.85  | 0.020     | 0.033 |
| L <sub>E</sub> | 1.10        | 1.50  | 0.043     | 0.059 |
| M              | 0°          | 10°   | 0°        | 10°   |
| Q <sub>1</sub> | 0.70        | 0.90  | 0.028     | 0.035 |
| Z              | ---         | 1.42  | ---       | 0.056 |

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