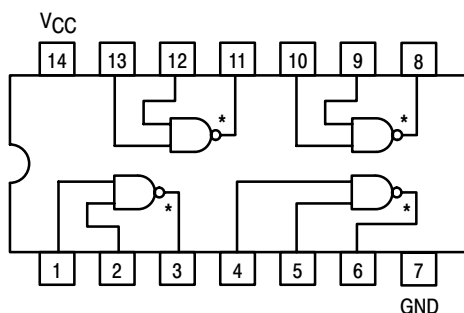


# SN74LS38

## Quad 2-Input NAND Buffer



\*OPEN COLLECTOR OUTPUTS

### GUARANTEED OPERATING RANGES

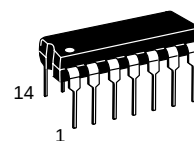
| Symbol   | Parameter                           | Min  | Typ | Max  | Unit |
|----------|-------------------------------------|------|-----|------|------|
| $V_{CC}$ | Supply Voltage                      | 4.75 | 5.0 | 5.25 | V    |
| $T_A$    | Operating Ambient Temperature Range | 0    | 25  | 70   | °C   |
| $V_{OH}$ | Output Voltage – High               |      |     | 5.5  | V    |
| $I_{OL}$ | Output Current – Low                |      |     | 24   | mA   |



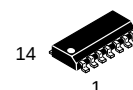
**ON Semiconductor™**

<http://onsemi.com>

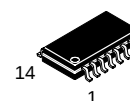
**LOW  
POWER  
SCHOTTKY**



**PLASTIC  
N SUFFIX  
CASE 646**



**SOIC  
D SUFFIX  
CASE 751A**



**SOEIAJ  
M SUFFIX  
CASE 965**

### ORDERING INFORMATION

| Device      | Package    | Shipping         |
|-------------|------------|------------------|
| SN74LS38N   | 14 Pin DIP | 2000 Units/Box   |
| SN74LS38D   | SOIC–14    | 55 Units/Rail    |
| SN74LS38DR2 | SOIC–14    | 2500/Tape & Reel |
| SN74LS38M   | SOEIAJ–14  | See Note 1       |
| SN74LS38MEL | SOEIAJ–14  | See Note 1       |

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

# SN74LS38

## 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             | $V_{CC} = \text{MIN}$ , $I_{IN} = -18 \text{ mA}$ |
| $I_{OH}$ | Output HIGH Current                        |        |       | 250  | $\mu\text{A}$ | $V_{CC} = \text{MIN}$ , $V_{OH} = \text{MAX}$     |
| $V_{OL}$ | 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   | $\mu\text{A}$ | $V_{CC} = \text{MAX}$ , $V_{IN} = 2.4 \text{ V}$  |
|          |                                            |        |       | 0.1  | mA            | $V_{CC} = \text{MAX}$ , $V_{IN} = 7.0 \text{ V}$  |
| $I_{IL}$ | Input LOW Current                          |        |       | -0.4 | mA            | $V_{CC} = \text{MAX}$ , $V_{IN} = 0.4 \text{ V}$  |
| $I_{CC}$ | Power Supply Current<br>Total, Output HIGH |        |       | 2.0  | mA            | $V_{CC} = \text{MAX}$                             |
|          | Total, Output LOW                          |        |       | 12   |               |                                                   |

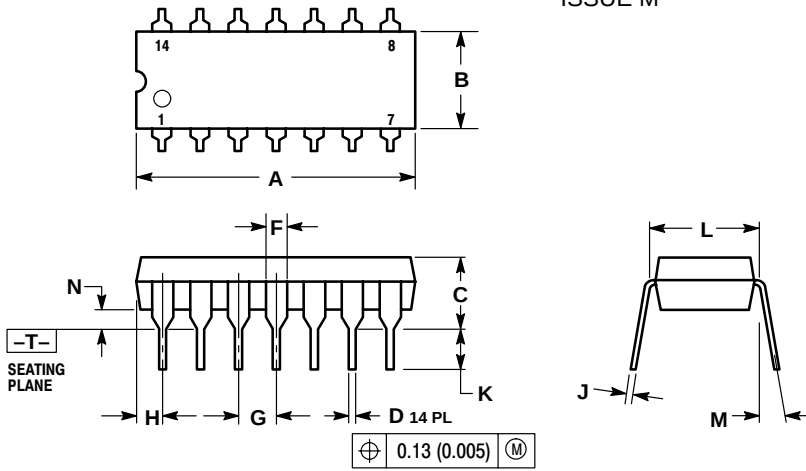
## AC CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

| Symbol    | Parameter                       | Limits |     |     | Unit | Test Conditions                                                        |
|-----------|---------------------------------|--------|-----|-----|------|------------------------------------------------------------------------|
|           |                                 | Min    | Typ | Max |      |                                                                        |
| $t_{PLH}$ | Turn-Off Delay, Input to Output |        | 20  | 32  | ns   | $V_{CC} = 5.0 \text{ V}$ , $R_L = 667 \Omega$<br>$C_L = 45 \text{ pF}$ |
| $t_{PHL}$ | Turn-On Delay, Input to Output  |        | 18  | 28  | ns   |                                                                        |

# SN74LS38

## PACKAGE DIMENSIONS

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

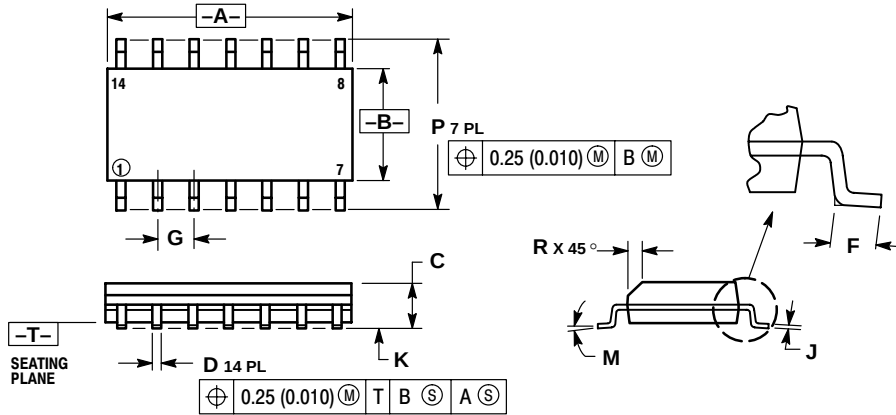


#### NOTES:

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:

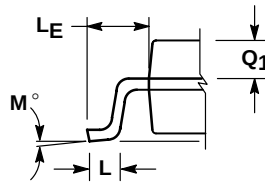
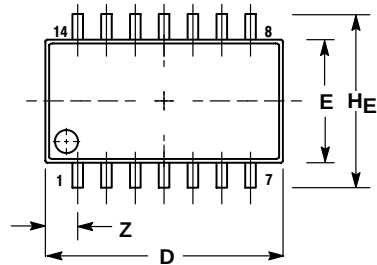
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL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

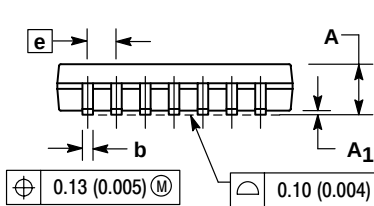
# SN74LS38

## PACKAGE DIMENSIONS

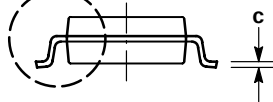
**M SUFFIX**  
SOEIAJ PACKAGE  
CASE 965-01  
ISSUE O



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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