

# Quad 2-Input NAND Gate

## 74AC00, 74ACT00

### Description

The AC00/ACT00 contains four, 2-input NAND gates.

### Features

- ICC Reduced by 50%
- Outputs Source/Sink 24 mA
- ACT00 Has TTL-Compatible Inputs

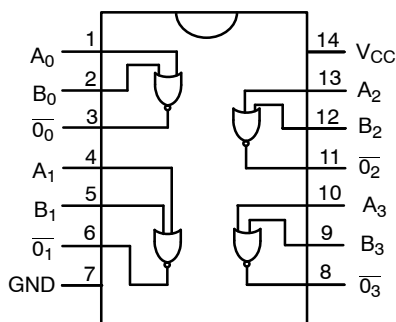


Figure 1. Connection Diagram

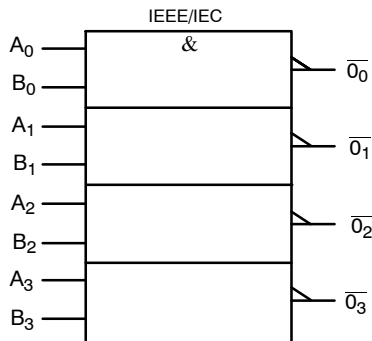


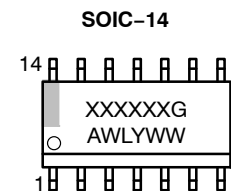
Figure 2. Logic Symbol

### PIN DESCRIPTION

| Pin Name         | Pin Description |
|------------------|-----------------|
| $A_n, B_n$       | Inputs          |
| $\overline{O}_n$ | Outputs         |

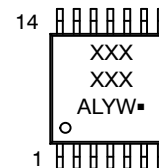


### MARKING DIAGRAM



- XXX = Specific Device Code  
 A = Assembly Location  
 WL = Wafer Lot  
 Y = Year  
 WW = Work Week  
 G = Pb-Free Package

### TSSOP-14 WB



- XXX = Specific Device Code  
 A = Assembly Location  
 L = Wafer Lot  
 Y = Year  
 W = Work Week  
 ■ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

**ABSOLUTE MAXIMUM RATINGS**

| Symbol                | Parameter                                    | Rating                     |
|-----------------------|----------------------------------------------|----------------------------|
| $V_{CC}$              | Supply Voltage                               | -0.5 V to +6.5 V           |
| $I_{IK}$              | DC Input Diode Current<br>$V_I = -0.5$ V     | -20 mA                     |
|                       | $V_I = V_{CC} + 0.5$                         | +20 mA                     |
| $V_I$                 | DC Input Voltage                             | -0.5 V to $V_{CC} + 0.5$ V |
| $I_{OK}$              | DC Output Diode Current<br>$V_O = -0.5$ V    | -20 mA                     |
|                       | $V_O = V_{CC} + 0.5$ V                       | +20 mA                     |
| $V_O$                 | DC Output Voltage                            | -0.5 V to $V_{CC} + 0.5$ V |
| $I_O$                 | DC Output Source or Sink Current             | $\pm 50$ mA                |
| $I_{CC}$ or $I_{GND}$ | DC $V_{CC}$ or Ground Current per Output Pin | $\pm 50$ mA                |
| $T_{STG}$             | Storage Temperature                          | -65°C to +150°C            |
| $T_J$                 | Junction Temperature                         | 140°C                      |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

**RECOMMENDED OPERATING CONDITIONS**

| Symbol                | Parameter                                                                                                     | Rating          |
|-----------------------|---------------------------------------------------------------------------------------------------------------|-----------------|
| $V_{CC}$              | Supply Voltage<br>AC                                                                                          | 2.0 V to 6.0 V  |
|                       | ACT                                                                                                           | 4.5 V to 5.5 V  |
| $V_I$                 | Input Voltage                                                                                                 | 0 V to $V_{CC}$ |
| $V_O$                 | Output Voltage                                                                                                | 0 V to $V_{CC}$ |
| $T_A$                 | Operating Temperature                                                                                         | -40°C to +85°C  |
| $\Delta V / \Delta t$ | Minimum Input Edge Rate, AC Devices:<br>$V_{IN}$ from 30% to 70% of $V_{CC}$ , $V_{CC}$ @ 3.3 V, 4.5 V, 5.5 V | 125 mV/ns       |
| $\Delta V / \Delta t$ | Minimum Input Edge Rate, ACT Devices:<br>$V_{IN}$ from 0.8 V to 2.0 V, $V_{CC}$ @ 4.5 V, 5.5 V                | 125 mV/ns       |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.



# 74AC00, 74ACT00

## DC ELECTRICAL CHARACTERISTICS FOR AC

| Symbol                   | Parameter                               | V <sub>CC</sub> (V) | Conditions                                                                               | T <sub>A</sub> = +25°C |                   | T <sub>A</sub> = -40°C to +85°C |  | Unit |
|--------------------------|-----------------------------------------|---------------------|------------------------------------------------------------------------------------------|------------------------|-------------------|---------------------------------|--|------|
|                          |                                         |                     |                                                                                          | Typ.                   | Guaranteed Limits |                                 |  |      |
| V <sub>IH</sub>          | Minimum HIGH Level Input Voltage        | 3.0                 | V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V                                      | 1.5                    | 2.1               | 2.1                             |  | V    |
|                          |                                         | 4.5                 |                                                                                          | 2.25                   | 3.15              | 3.15                            |  |      |
|                          |                                         | 5.5                 |                                                                                          | 2.75                   | 3.85              | 3.85                            |  |      |
| V <sub>IL</sub>          | Maximum LOW Level Input Voltage         | 3.0                 | V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V                                      | 1.5                    | 0.9               | 0.9                             |  | V    |
|                          |                                         | 4.5                 |                                                                                          | 2.25                   | 1.35              | 1.35                            |  |      |
|                          |                                         | 5.5                 |                                                                                          | 2.75                   | 1.65              | 1.65                            |  |      |
| V <sub>OH</sub>          | Minimum HIGH Level Output Voltage       | 3.0                 | I <sub>OUT</sub> = -50 μA                                                                | 2.99                   | 2.9               | 2.9                             |  | V    |
|                          |                                         | 4.5                 |                                                                                          | 4.49                   | 4.4               | 4.4                             |  |      |
|                          |                                         | 5.5                 |                                                                                          | 5.49                   | 5.4               | -5.4                            |  |      |
|                          |                                         | 3.0                 | V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , I <sub>OH</sub> = -12 mA          | -                      | 2.56              | 2.46                            |  |      |
|                          |                                         | 4.5                 | V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , I <sub>OH</sub> = -24 mA          | -                      | 3.86              | 3.76                            |  |      |
|                          |                                         | 5.5                 | V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , I <sub>OH</sub> = -24 mA (Note 1) | -                      | 4.86              | 4.76                            |  |      |
| V <sub>OL</sub>          | Maximum LOW Level Output Voltage        | 3.0                 | I <sub>OUT</sub> = 50 μA                                                                 | 0.002                  | 0.1               | 0.1                             |  | V    |
|                          |                                         | 4.5                 |                                                                                          | 0.001                  | 0.1               | 0.1                             |  |      |
|                          |                                         | 5.5                 |                                                                                          | 0.001                  | 0.1               | 0.1                             |  |      |
|                          |                                         | 3.0                 | V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , I <sub>OL</sub> = 12 mA           | -                      | 0.36              | 0.44                            |  |      |
|                          |                                         | 4.5                 | V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , I <sub>OL</sub> = 24 mA           | -                      | 0.36              | 0.44                            |  |      |
|                          |                                         | 5.5                 | V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , I <sub>OL</sub> = 24 mA (Note 1)  | -                      | 0.36              | 0.44                            |  |      |
| I <sub>IN</sub> (Note 3) | Maximum Input Leakage Current           | 5.5                 | V <sub>I</sub> = V <sub>CC</sub> , GND                                                   | -                      | ±0.1              | ±1.0                            |  | μA   |
| I <sub>OLD</sub>         | Minimum Dynamic Output Current (Note 2) | 5.5                 | V <sub>OLD</sub> = 1.65 V Max.                                                           | -                      | -                 | 75                              |  | mA   |
| I <sub>OHD</sub>         |                                         | 5.5                 | V <sub>OHD</sub> = 3.85 V Min.                                                           | -                      | -                 | -75                             |  | mA   |
| I <sub>CC</sub> (Note 3) | Maximum Quiescent Supply Current        | 5.5                 | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                 | -                      | 2.0               | 20.0                            |  | μA   |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. All outputs loaded; thresholds on input associated with output under test.
2. Maximum test duration 2.0 ms, one output loaded at a time.
3. I<sub>IN</sub> and I<sub>CC</sub> @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V<sub>CC</sub>.



## DC ELECTRICAL CHARACTERISTICS FOR ACT

| Symbol           | Parameter                               | V <sub>CC</sub> (V) | Conditions                                                                              | T <sub>A</sub> = +25°C |                   | T <sub>A</sub> = −40°C to +85°C | Unit |
|------------------|-----------------------------------------|---------------------|-----------------------------------------------------------------------------------------|------------------------|-------------------|---------------------------------|------|
|                  |                                         |                     |                                                                                         | Typ.                   | Guaranteed Limits |                                 |      |
| V <sub>IH</sub>  | Minimum HIGH Level Input Voltage        | 4.5                 | V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> − 0.1 V                                     | 1.5                    | 2.0               | 2.0                             | V    |
|                  |                                         | 5.5                 |                                                                                         | 1.5                    | 2.0               | 2.0                             |      |
| V <sub>IL</sub>  | Maximum LOW Level Input Voltage         | 4.5                 | V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> − 0.1 V                                     | 1.5                    | 0.8               | 0.8                             | V    |
|                  |                                         | 5.5                 |                                                                                         | 1.5                    | 0.8               | 0.8                             |      |
| V <sub>OH</sub>  | Minimum HIGH Level Output Voltage       | 4.5                 | I <sub>OUT</sub> = −50 μA                                                               | 4.49                   | 4.4               | 4.4                             | V    |
|                  |                                         | 5.5                 |                                                                                         | 5.49                   | 5.4               | 5.4                             |      |
|                  |                                         | 4.5                 | V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , I <sub>OH</sub> = −24 mA         | –                      | 3.86              | 3.76                            |      |
|                  |                                         | 5.5                 | V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , I <sub>OH</sub> = 24 mA (Note 4) | –                      | 4.86              | 4.76                            |      |
| V <sub>OL</sub>  | Maximum LOW Level Output Voltage        | 4.5                 | I <sub>OUT</sub> = 50 μA                                                                | 0.001                  | 0.1               | 0.1                             | V    |
|                  |                                         | 5.5                 |                                                                                         | 0.001                  | 0.1               | 0.1                             |      |
|                  |                                         | 4.5                 | V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , I <sub>OL</sub> = 24 mA          | –                      | 0.36              | 0.44                            |      |
|                  |                                         | 5.5                 | V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub> , I <sub>OL</sub> = 24 mA (Note 4) | –                      | 0.36              | 0.44                            |      |
| I <sub>IN</sub>  | Maximum Input Leakage Current           | 5.5                 | V <sub>I</sub> = V <sub>CC</sub> , GND                                                  | –                      | ±0.1              | ±1.0                            | μA   |
| I <sub>CCT</sub> | Maximum I <sub>CC</sub> /Input          | 5.5                 | V <sub>I</sub> = V <sub>CC</sub> − 2.1 V                                                | 0.6                    | –                 | 1.5                             | mA   |
| I <sub>OLD</sub> | Minimum Dynamic Output Current (Note 5) | 5.5                 | V <sub>OLD</sub> = 1.65 V Max.                                                          | –                      | –                 | 75                              | mA   |
| I <sub>OHD</sub> |                                         | 5.5                 | V <sub>OHD</sub> = 3.85 V Min.                                                          | –                      | –                 | −75                             | mA   |
| I <sub>CC</sub>  | Maximum Quiescent Supply Current        | 5.5                 | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                | –                      | 2.0               | 20.0                            | μA   |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. All outputs loaded; thresholds on input associated with output under test.

5. Maximum test duration 2.0 ms, one output loaded at a time.

## AC ELECTRICAL CHARACTERISTICS FOR AC

| Symbol           | Parameter         | V <sub>CC</sub> (V)<br>(Note 6) | T <sub>A</sub> = +25°C<br>C <sub>L</sub> = 50 pF |      |      | T <sub>A</sub> = -40°C to +85°C<br>C <sub>L</sub> = 50 pF |      | Unit |
|------------------|-------------------|---------------------------------|--------------------------------------------------|------|------|-----------------------------------------------------------|------|------|
|                  |                   |                                 | Min.                                             | Typ. | Max. | Min.                                                      | Max. |      |
| t <sub>PLH</sub> | Propagation Delay | 3.3                             | 2.0                                              | 7.0  | 9.5  | 2.0                                                       | 10.0 | ns   |
|                  |                   | 5.0                             | 1.5                                              | 6.0  | 8.0  | 1.5                                                       | 8.5  |      |
| t <sub>PHL</sub> | Propagation Delay | 3.3                             | 1.5                                              | 5.5  | 8.0  | 1.0                                                       | 8.5  | ns   |
|                  |                   | 5.0                             | 1.5                                              | 4.5  | 6.5  | 1.0                                                       | 7.0  |      |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

6. Voltage range 3.3 is 3.3 V ±0.3 V. Voltage range 5.0 is 5.0 V ±0.5 V.

## AC ELECTRICAL CHARACTERISTICS FOR ACT

| Symbol           | Parameter         | V <sub>CC</sub> (V)<br>(Note 7) | T <sub>A</sub> = +25°C<br>C <sub>L</sub> = 50 pF |      |      | T <sub>A</sub> = -40°C to +85°C<br>C <sub>L</sub> = 50 pF |      | Unit |
|------------------|-------------------|---------------------------------|--------------------------------------------------|------|------|-----------------------------------------------------------|------|------|
|                  |                   |                                 | Min.                                             | Typ. | Max. | Min.                                                      | Max. |      |
| t <sub>PLH</sub> | Propagation Delay | 5.0                             | 1.5                                              | 5.5  | 9.0  | 1.0                                                       | 9.5  | ns   |
| t <sub>PHL</sub> | Propagation Delay | 5.0                             | 1.5                                              | 4.0  | 7.0  | 1.0                                                       | 8.0  | ns   |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

7. Voltage Range 5.0 is 5.0 V ±0.5 V.



## 74AC00, 74ACT00

### CAPATICANCE

| Symbol          | Parameter                     | Conditions              | Typ. | Unit |
|-----------------|-------------------------------|-------------------------|------|------|
| C <sub>IN</sub> | Input Capacitance             | V <sub>CC</sub> = OPEN  | 4.5  | pF   |
| C <sub>PD</sub> | Power Dissipation Capacitance | V <sub>CC</sub> = 5.0 V | 30.0 | pF   |

### ORDERING INFORMATION

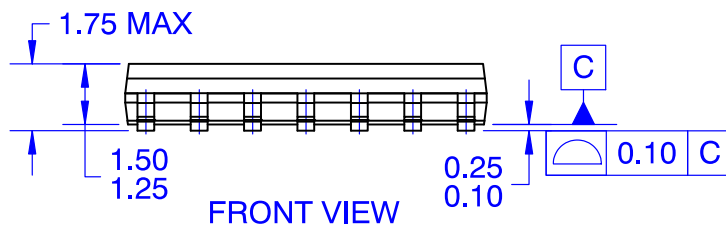
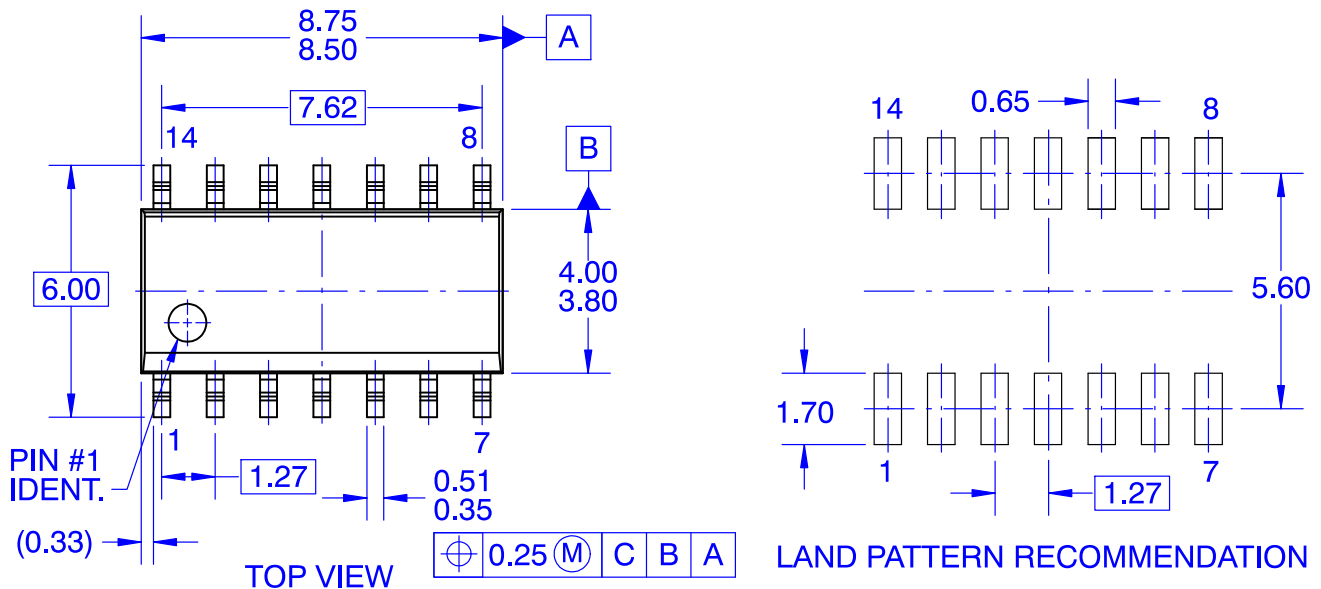
| Order Number | Marking   | Package                            | Shipping (Qty / Packing) <sup>†</sup> |
|--------------|-----------|------------------------------------|---------------------------------------|
| 74AC00MTCX   | AC<br>00  | TSSOP-14<br>(Pb-Free/Halogen Free) | 2500 / Tape & Reel                    |
| 74ACT00MTCX  | ACT<br>00 | TSSOP-14<br>(Pb-Free/Halogen Free) | 2500 / Tape & Reel                    |
| 74AC00SCX    | AC00      | SOIC-14<br>(Pb-Free/Halogen Free)  | 2500 / Tape & Reel                    |
| 74ACT00SCX   | ACT00     | SOIC-14<br>(Pb-Free/Halogen Free)  | 2500 / Tape & Reel                    |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.



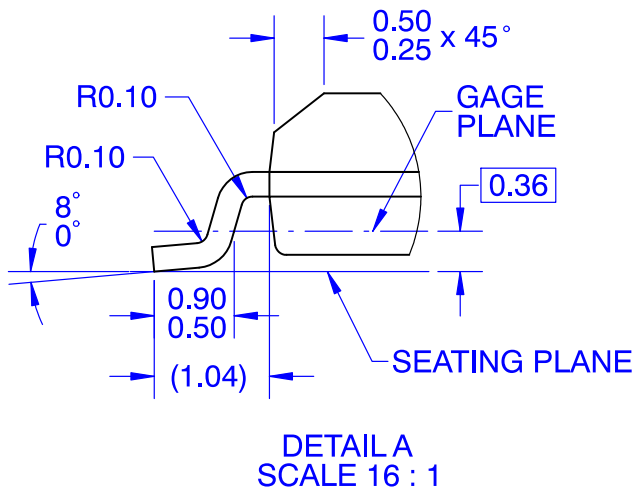
**SOIC14**  
**CASE 751EF**  
**ISSUE O**

DATE 30 SEP 2016



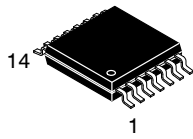
**NOTES:**

- A. CONFORMS TO JEDEC MS-012, VARIATION AB, ISSUE C
- B. ALL DIMENSIONS ARE IN MILLIMETERS
- C. DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS
- D. LAND PATTERN STANDARD: SOIC127P600X145-14M
- E. CONFORMS TO ASME Y14.5M, 2009



|                         |                    |                                                                                                                                                                                     |
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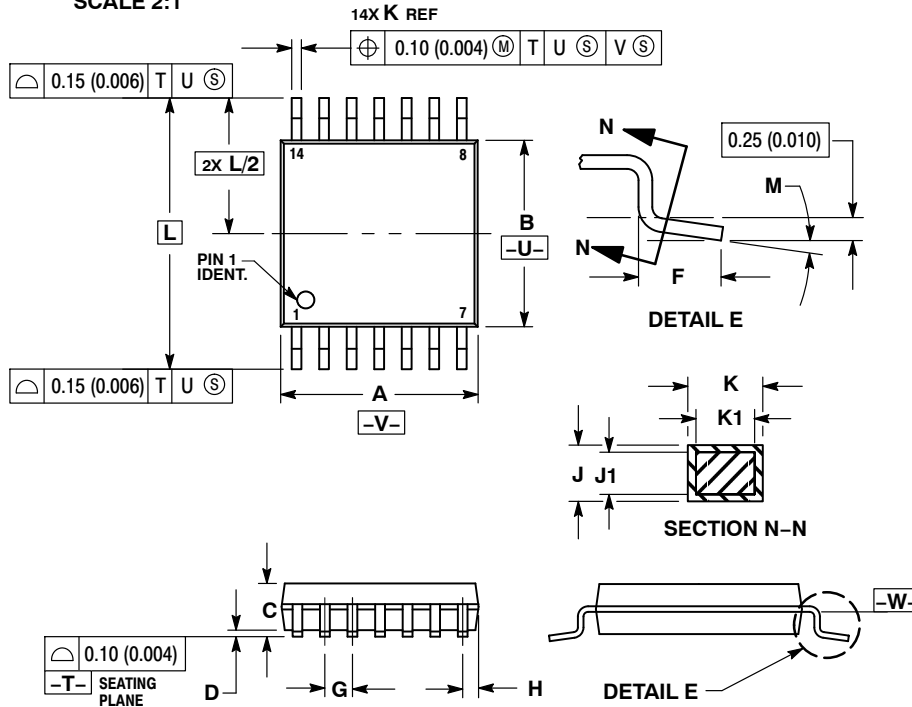
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TSSOP-14 WB  
CASE 948G  
ISSUE C

DATE 17 FEB 2016

SCALE 2:1

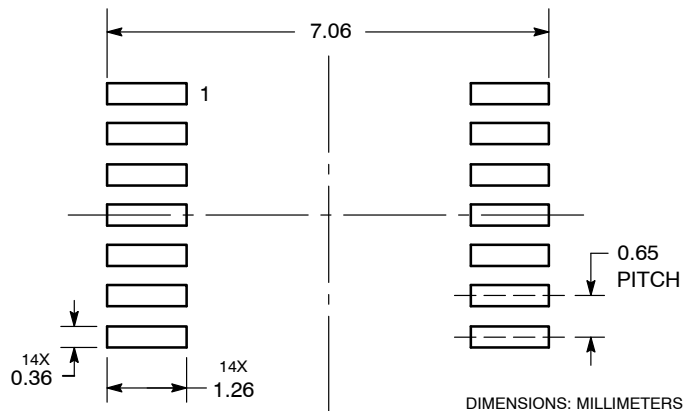


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

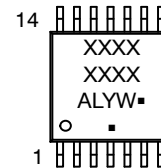
| DIM | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
|     | MIN         | MAX  | MIN       | MAX   |
| A   | 4.90        | 5.10 | 0.193     | 0.200 |
| B   | 4.30        | 4.50 | 0.169     | 0.177 |
| C   | ---         | 1.20 | ---       | 0.047 |
| D   | 0.05        | 0.15 | 0.002     | 0.006 |
| F   | 0.50        | 0.75 | 0.020     | 0.030 |
| G   | 0.65 BSC    |      | 0.026 BSC |       |
| H   | 0.50        | 0.60 | 0.020     | 0.024 |
| J   | 0.09        | 0.20 | 0.004     | 0.008 |
| J1  | 0.09        | 0.16 | 0.004     | 0.006 |
| K   | 0.19        | 0.30 | 0.007     | 0.012 |
| K1  | 0.19        | 0.25 | 0.007     | 0.010 |
| L   | 6.40 BSC    |      | 0.252 BSC |       |
| M   | 0°          | 8°   | 0°        | 8°    |

RECOMMENDED  
SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

GENERIC  
MARKING DIAGRAM\*



A = Assembly Location  
L = Wafer Lot  
Y = Year  
W = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

|                  |             |                                                                                                                                                                                     |
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