

# Octal 3-State Noninverting Buffer/Line Driver/ Line Receiver MC74HC244A, MC74HCT244A

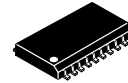
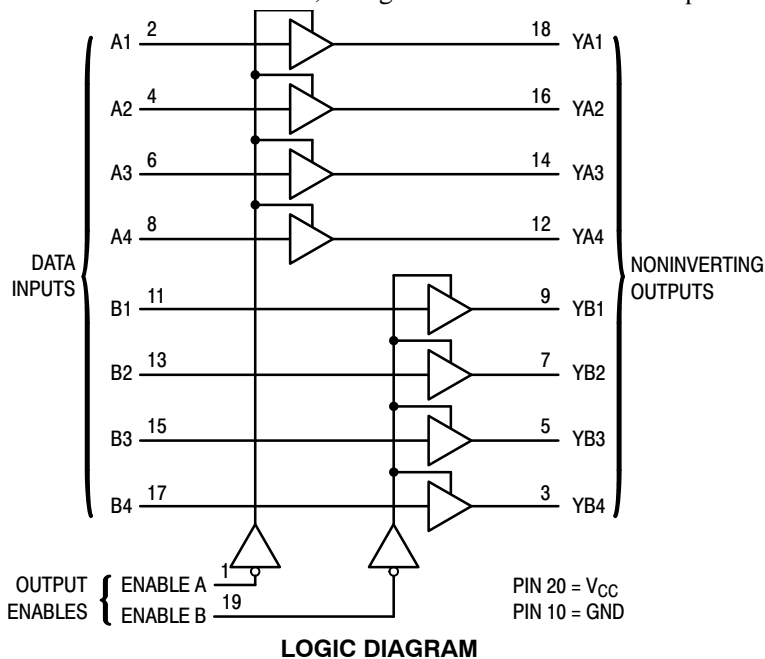
The MC74HC244A is identical in pinout to the LS244. The MC74HC244A device inputs are compatible with standard CMOS outputs; with pullup resistors, they are compatible with LSTTL outputs. The MC74HCT244A device inputs are compatible Standard CMOS or TTL outputs. The MC74HCT244A may be used as a level converter for interfacing TTL or NMOS outputs to High-Speed CMOS inputs.

These octal noninverting buffer/line drivers/line receivers are designed to be used with 3-state memory address drivers, clock drivers, and other bus-oriented systems. The devices have noninverting outputs and two active-low output enables.

The HC244A/HCT244A is the non-inverting version of the HC240A/HCT240A.

## Features

- Output Drive Capability: 15 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2.0 to 6.0 V (HC), 4.5 to 5.5 V (HCT)
- Low Input Current: 1  $\mu$ A
- High Noise Immunity Characteristic of CMOS Devices
- In Compliance with the Requirements Defined by JEDEC Standard No. 7A
- Chip Complexity: 136 FETs or 34 Equivalent Gates
- -Q Suffix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant



SOIC-20  
DW SUFFIX  
CASE 751D

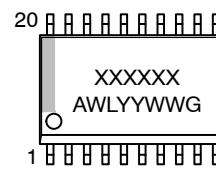


TSSOP-20  
DT SUFFIX  
CASE 948E

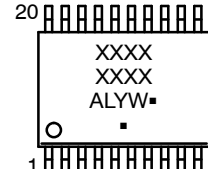
## PIN ASSIGNMENT

|          |    |    |                 |
|----------|----|----|-----------------|
| ENABLE A | 1  | 20 | V <sub>CC</sub> |
| A1       | 2  | 19 | ENABLE B        |
| YB4      | 3  | 18 | YA1             |
| A2       | 4  | 17 | B4              |
| YB3      | 5  | 16 | YA2             |
| A3       | 6  | 15 | B3              |
| YB2      | 7  | 14 | YA3             |
| A4       | 8  | 13 | B2              |
| YB1      | 9  | 12 | YA4             |
| GND      | 10 | 11 | B1              |

## MARKING DIAGRAMS



SOIC-20



TSSOP-20

A = Assembly Location  
 WL, L = Wafer Lot  
 YY, Y = Year  
 WW, W = Work Week  
 G or ■ = Pb-Free Package  
 (Note: Microdot may be in either location)

## FUNCTION TABLE

| Inputs                |      | Outputs |
|-----------------------|------|---------|
| Enable A,<br>Enable B | A, B | YA, YB  |
| L                     | L    | L       |
| L                     | H    | H       |
| H                     | X    | Z       |

Z = high impedance

## ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

# MC74HC244A, MC74HCT244A

## MAXIMUM RATINGS

| Symbol           | Parameter                                                                          | Value                                                      | Unit |
|------------------|------------------------------------------------------------------------------------|------------------------------------------------------------|------|
| V <sub>CC</sub>  | DC Supply Voltage                                                                  | −0.5 to +6.5                                               | V    |
| V <sub>IN</sub>  | DC Input Voltage                                                                   | −0.5 to V <sub>CC</sub> + 0.5                              | V    |
| V <sub>OUT</sub> | DC Output Voltage                                                                  | −0.5 to V <sub>CC</sub> + 0.5                              | V    |
| I <sub>IN</sub>  | DC Input Current, per Pin                                                          | ±20                                                        | mA   |
| I <sub>OUT</sub> | DC Output Current, per Pin                                                         | ±35                                                        | mA   |
| I <sub>CC</sub>  | DC Supply Current, V <sub>CC</sub> and GND Pins                                    | ±75                                                        | mA   |
| I <sub>IK</sub>  | Input Clamp Current (V <sub>IN</sub> < 0 or V <sub>IN</sub> > V <sub>CC</sub> )    | ±20                                                        | mA   |
| I <sub>OK</sub>  | Output Clamp Current (V <sub>OUT</sub> < 0 or V <sub>OUT</sub> > V <sub>CC</sub> ) | ±20                                                        | mA   |
| T <sub>STG</sub> | Storage Temperature                                                                | −65 to +150                                                | °C   |
| T <sub>L</sub>   | Lead Temperature, 1 mm from Case for 10 Seconds                                    | 260                                                        | °C   |
| T <sub>J</sub>   | Junction Temperature Under Bias                                                    | ±150                                                       | °C   |
| θ <sub>JA</sub>  | Thermal Resistance (Note 1)                                                        | SOIC−20W 96<br>WQFN20 99<br>QFN20 111<br>TSSOP−20 150      | °C/W |
| P <sub>D</sub>   | Power Dissipation in Still Air at 25°C                                             | SOIC−20W 1302<br>WQFN20 1256<br>QFN20 1127<br>TSSOP−20 833 | mW   |
| MSL              | Moisture Sensitivity                                                               | Level 1                                                    | –    |
| F <sub>R</sub>   | Flammability Rating                                                                | Oxygen Index: 28 to 34<br>UL 94 V−0 @ 0.125 in             | –    |
| V <sub>ESD</sub> | ESD Withstand Voltage (Note 2)                                                     | Human Body Model >2000<br>Charged Device Model N/A         | V    |

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.

1. Measured with minimum pad spacing on an FR4 board, using 76mm-by-114mm, 2-ounce copper trace no air flow per JESD51-7.
2. HBM tested to EIA / JESD22-A114-A. CDM tested to JESD22-C101-A. JEDEC recommends that ESD qualification to EIA/JESD22-A115A (Machine Model) be discontinued.

## RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Max | Unit |
|--------|-----------|-----|-----|------|
|--------|-----------|-----|-----|------|

### MC74HC

|                                    |                                           |                                                                                     |                    |    |
|------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------|--------------------|----|
| V <sub>CC</sub>                    | DC Supply Voltage                         | 2.0                                                                                 | 6.0                | V  |
| V <sub>IN</sub> , V <sub>OUT</sub> | DC Input Voltage, Output Voltage (Note 3) | 0                                                                                   | V <sub>CC</sub>    | V  |
| T <sub>A</sub>                     | Operating Free-Air Temperature            | −55                                                                                 | +125               | °C |
| t <sub>r</sub> , t <sub>f</sub>    | Input Rise or Fall Time                   | V <sub>CC</sub> = 2.0 V 0<br>V <sub>CC</sub> = 4.5 V 0<br>V <sub>CC</sub> = 6.0 V 0 | 1000<br>500<br>400 | ns |

### MC74HCT

|                                    |                                              |     |                 |    |
|------------------------------------|----------------------------------------------|-----|-----------------|----|
| V <sub>CC</sub>                    | DC Supply Voltage                            | 4.5 | 5.5             | V  |
| V <sub>IN</sub> , V <sub>OUT</sub> | DC Input Voltage, DC Output Voltage (Note 3) | 0   | V <sub>CC</sub> | V  |
| T <sub>A</sub>                     | Operating Free-Air Temperature               | −55 | +125            | °C |
| t <sub>r</sub> , t <sub>f</sub>    | Input Rise or Fall Time                      | 0   | 500             | 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.

3. Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V<sub>CC</sub>). Unused outputs must be left open.

# MC74HC244A, MC74HCT244A

## DC ELECTRICAL CHARACTERISTICS (MC74HC244A)

| Symbol          | Parameter                                      | Test Conditions                                                                                                                     | V <sub>CC</sub><br>V     | Guaranteed Limit          |                           |                           | Unit |
|-----------------|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------|---------------------------|---------------------------|---------------------------|------|
|                 |                                                |                                                                                                                                     |                          | -55 to<br>25°C            | ≤ 85°C                    | ≤ 125°C                   |      |
| V <sub>IH</sub> | Minimum High-Level Input Voltage               | V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V<br> I <sub>OUT</sub>   ≤ 20 μA                                                  | 2.0<br>3.0<br>4.5<br>6.0 | 1.5<br>2.1<br>3.15<br>4.2 | 1.5<br>2.1<br>3.15<br>4.2 | 1.5<br>2.1<br>3.15<br>4.2 | V    |
| V <sub>IL</sub> | Maximum Low-Level Input Voltage                | V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> - 0.1 V<br> I <sub>OUT</sub>   ≤ 20 μA                                                  | 2.0<br>3.0<br>4.5<br>6.0 | 0.5<br>0.9<br>1.35<br>1.8 | 0.5<br>0.9<br>1.35<br>1.8 | 0.5<br>0.9<br>1.35<br>1.8 | V    |
| V <sub>OH</sub> | Minimum High-Level Output Voltage              | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                                                                |                          |                           |                           |                           | V    |
|                 |                                                | I <sub>OUT</sub>   ≤ 20 μA                                                                                                          | 2.0<br>4.5<br>6.0        | 1.9<br>4.4<br>5.9         | 1.9<br>4.4<br>5.9         | 1.9<br>4.4<br>5.9         |      |
|                 |                                                | I <sub>OUT</sub>   ≤ 2.4 mA                                                                                                         | 3.0                      | 2.48                      | 2.34                      | 2.2                       |      |
|                 |                                                | I <sub>OUT</sub>   ≤ 6.0 mA                                                                                                         | 4.5                      | 3.98                      | 3.84                      | 3.7                       |      |
| V <sub>OL</sub> | Minimum Low-Level Output Voltage               | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                                                                |                          |                           |                           |                           | V    |
|                 |                                                | I <sub>OUT</sub>   ≤ 20 μA                                                                                                          | 2.0<br>4.5<br>6.0        | 0.1<br>0.1<br>0.1         | 0.1<br>0.1<br>0.1         | 0.1<br>0.1<br>0.1         |      |
|                 |                                                | I <sub>OUT</sub>   ≤ 2.4 mA                                                                                                         | 3.0                      | 0.26                      | 0.33                      | 0.4                       |      |
|                 |                                                | I <sub>OUT</sub>   ≤ 6.0 mA                                                                                                         | 4.5                      | 0.26                      | 0.33                      | 0.4                       |      |
| I <sub>IN</sub> | Maximum Input Leakage Current                  | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                                                            | 6.0                      | ±0.1                      | ±1.0                      | ±1.0                      | μA   |
| I <sub>OZ</sub> | Maximum Three-State Leakage Current            | Output in High-Impedance State<br>V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>V <sub>OUT</sub> = V <sub>CC</sub> or GND | 6.0                      | ±0.5                      | ±5.0                      | ±10                       | μA   |
| I <sub>CC</sub> | Maximum Quiescent Supply Current (per Package) | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                                                            | 6.0                      | 4.0                       | 40                        | 160                       | 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.

## AC ELECTRICAL CHARACTERISTICS (MC74HC244A)

| Symbol                                 | Parameter                                                                      | V <sub>CC</sub><br>V     | Guaranteed Limit      |                       |                       | Unit |
|----------------------------------------|--------------------------------------------------------------------------------|--------------------------|-----------------------|-----------------------|-----------------------|------|
|                                        |                                                                                |                          | −55 to<br>25°C        | ≤ 85°C                | ≤ 125°C               |      |
| t <sub>PLH</sub> ,<br>t <sub>PHL</sub> | Maximum Propagation Delay, A to YA or B to YB<br>(Figures 1 and 2)             | 2.0<br>3.0<br>4.5<br>6.0 | 96<br>50<br>18<br>15  | 115<br>60<br>23<br>20 | 135<br>70<br>27<br>23 | ns   |
| t <sub>PLZ</sub> ,<br>t <sub>PHZ</sub> | Maximum Propagation Delay, Output Enable to YA or B to YB<br>(Figures 1 and 2) | 2.0<br>3.0<br>4.5<br>6.0 | 110<br>60<br>22<br>19 | 140<br>70<br>28<br>24 | 165<br>80<br>33<br>28 | ns   |
| t <sub>PZL</sub> ,<br>t <sub>PZH</sub> | Maximum Propagation Delay, Output Enable to YA or B to YB<br>(Figures 1 and 2) | 2.0<br>3.0<br>4.5<br>6.0 | 110<br>60<br>22<br>19 | 140<br>70<br>28<br>24 | 165<br>80<br>33<br>28 | ns   |
| t <sub>TLH</sub> ,<br>t <sub>THL</sub> | Maximum Output Transition Time, Any Output<br>(Figures 1 and 2)                | 2.0<br>3.0<br>4.5<br>6.0 | 60<br>23<br>12<br>10  | 75<br>27<br>15<br>13  | 90<br>32<br>18<br>15  | ns   |
| C <sub>IN</sub>                        | Maximum Input Capacitance                                                      | –                        | 10                    | 10                    | 10                    | pF   |
| C <sub>OUT</sub>                       | Maximum Three-State Output Capacitance<br>(Output in High-Impedance State)     | –                        | 15                    | 15                    | 15                    | pF   |
| C <sub>PD</sub>                        | Power Dissipation Capacitance (Per Enabled Output) (Note 4)                    | 5.0                      | Typical @ 25°C        |                       |                       | pF   |
|                                        |                                                                                |                          | 34                    |                       |                       |      |

4. Used to determine the no-load dynamic power consumption:  $P_D = C_{PD} \times V_{CC}^2 \times f + I_{CC} \times V_{CC}$ .

# MC74HC244A, MC74HCT244A

## DC ELECTRICAL CHARACTERISTICS (MC74HCT244A)

| Symbol           | Parameter                                      | Test Conditions                                                                                                                     | V <sub>CC</sub><br>V | Guaranteed Limit |               |            | Unit |
|------------------|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------|---------------|------------|------|
|                  |                                                |                                                                                                                                     |                      | –55 to<br>25°C   | ≤ 85°C        | ≤ 125°C    |      |
| V <sub>IH</sub>  | Minimum High-Level Input Voltage               | V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> – 0.1 V<br> I <sub>OUT</sub>   ≤ 20 μA                                                  | 4.5<br>5.5           | 2.0<br>2.0       | 2.0<br>2.0    | 2.0<br>2.0 | V    |
| V <sub>IL</sub>  | Maximum Low-Level Input Voltage                | V <sub>OUT</sub> = 0.1 V or V <sub>CC</sub> – 0.1 V<br> I <sub>OUT</sub>   ≤ 20 μA                                                  | 4.5<br>5.5           | 4.4<br>5.4       | 4.4<br>5.4    | 4.4<br>5.4 | V    |
| V <sub>OH</sub>  | Minimum High-Level Output Voltage              | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                                                                |                      |                  |               |            | V    |
|                  |                                                | I <sub>OUT</sub>   ≤ 20 μA                                                                                                          | 4.5<br>5.5           | 4.4<br>5.4       | 4.4<br>5.4    | 4.4<br>5.4 |      |
|                  |                                                | I <sub>OUT</sub>   ≤ 6.0 mA                                                                                                         | 4.5                  | 3.98             | 3.84          | 3.7        |      |
| V <sub>OL</sub>  | Minimum Low-Level Output Voltage               | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>                                                                                |                      |                  |               |            | V    |
|                  |                                                | I <sub>OUT</sub>   ≤ 20 μA                                                                                                          | 4.5<br>5.5           | 0.1<br>0.1       | 0.1<br>0.1    | 0.1<br>0.1 |      |
|                  |                                                | I <sub>OUT</sub>   ≤ 6.0 mA                                                                                                         | 4.5                  | 0.26             | 0.33          | 0.4        |      |
| I <sub>IN</sub>  | Maximum Input Leakage Current                  | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                                                            | 5.5                  | ±0.1             | ±1.0          | ±1.0       | μA   |
| I <sub>OZ</sub>  | Maximum Three-State Leakage Current            | Output in High-Impedance State<br>V <sub>IN</sub> = V <sub>IL</sub> or V <sub>IH</sub><br>V <sub>OUT</sub> = V <sub>CC</sub> or GND | 5.5                  | ±0.5             | ±5.0          | ±10        | μA   |
| I <sub>CC</sub>  | Maximum Quiescent Supply Current (per Package) | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                                                            | 5.5                  | 4.0              | 40            | 160        | μA   |
| ΔI <sub>CC</sub> | Additional Quiescent Supply Current (Note 5)   | V <sub>IN</sub> = 2.4 V, Any One Input;<br>V <sub>IN</sub> = V <sub>CC</sub> or GND, Other Inputs;<br>I <sub>OUT</sub> = 0 μA       | 5.5                  | ≥ –55°C          | 25°C to 125°C |            | mA   |
|                  |                                                |                                                                                                                                     |                      | 2.9              | 2.4           |            |      |

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.

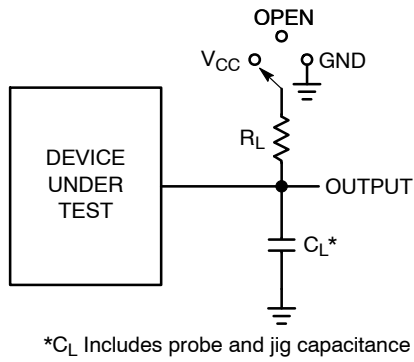
5. Total Supply Current = I<sub>CC</sub> + Σ ΔI<sub>CC</sub>.

## AC ELECTRICAL CHARACTERISTICS (MC74HCT244A)

| Symbol                                 | Parameter                                                                      | V <sub>CC</sub> (V) | Guaranteed Limit |        |         | Unit |
|----------------------------------------|--------------------------------------------------------------------------------|---------------------|------------------|--------|---------|------|
|                                        |                                                                                |                     | –55 to 25°C      | ≤ 85°C | ≤ 125°C |      |
| t <sub>PLH</sub> ,<br>t <sub>PHL</sub> | Maximum Propagation Delay, A to YA or B to YB<br>(Figures 1 and 2)             | 4.5 – 5.5           | 20               | 25     | 30      | ns   |
| t <sub>PLZ</sub> ,<br>t <sub>PHZ</sub> | Maximum Propagation Delay, Output Enable to YA or B to YB<br>(Figures 1 and 2) | 4.5 – 5.5           | 26               | 33     | 39      | ns   |
| t <sub>PZL</sub> ,<br>t <sub>PZH</sub> | Maximum Propagation Delay, Output Enable to YA or B to YB<br>(Figures 1 and 2) | 4.5 – 5.5           | 22               | 28     | 33      | ns   |
| t <sub>TLH</sub> ,<br>t <sub>THL</sub> | Maximum Output Transition Time, Any Output<br>(Figures 1 and 2)                | 4.5 – 5.5           | 12               | 15     | 18      | ns   |
| C <sub>IN</sub>                        | Maximum Input Capacitance                                                      | –                   | 10               | 10     | 10      | pF   |
| C <sub>OUT</sub>                       | Maximum Three-State Output Capacitance<br>(Output in High-Impedance State)     | –                   | 15               | 15     | 15      | pF   |

| C <sub>PD</sub> | Power Dissipation Capacitance (Per Enabled Output) (Note 4) | 5.0 | Typical @ 25°C | pF |
|-----------------|-------------------------------------------------------------|-----|----------------|----|
|                 |                                                             |     | 55             |    |

# MC74HC244A, MC74HCT244A



| Test                                | Switch Position | C <sub>L</sub> | R <sub>L</sub> |
|-------------------------------------|-----------------|----------------|----------------|
| t <sub>PLH</sub> / t <sub>PHL</sub> | Open            | 50 pF          | 1 kΩ           |
| t <sub>PLZ</sub> / t <sub>PZL</sub> | V <sub>CC</sub> |                |                |
| t <sub>PHZ</sub> / t <sub>PZH</sub> | GND             |                |                |

Figure 1. Test Circuit

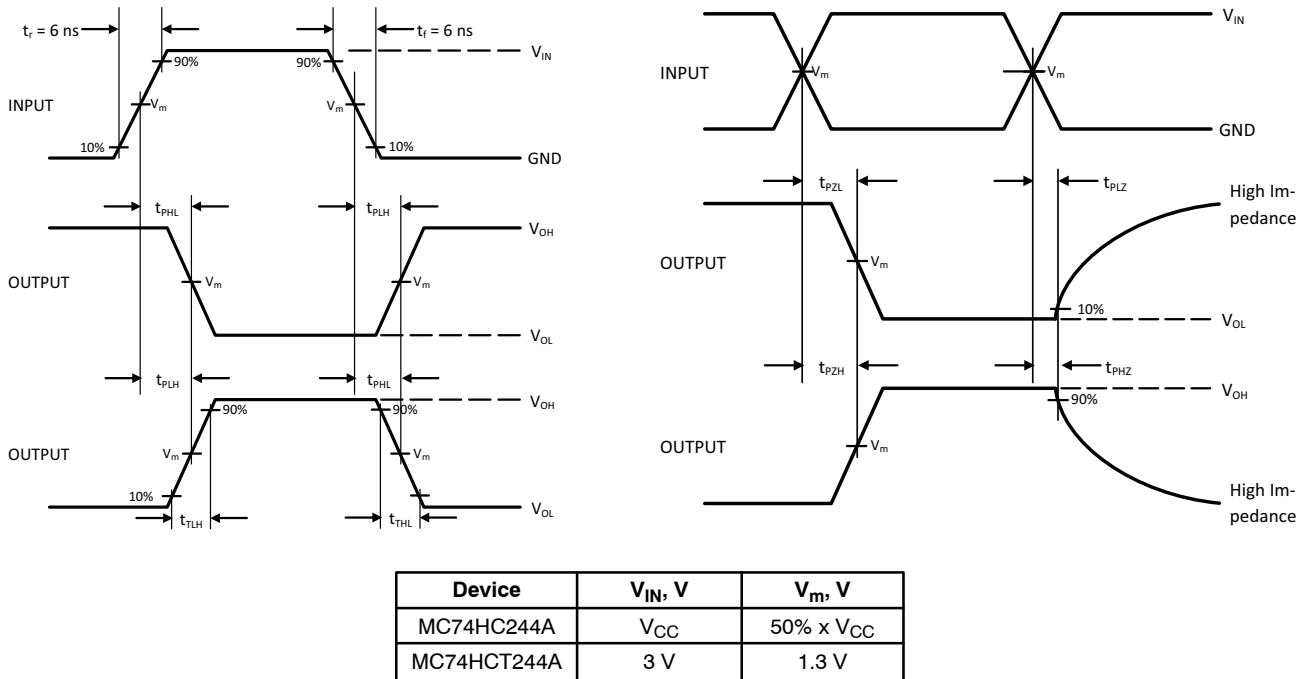


Figure 2. Switching Waveforms

## PIN DESCRIPTIONS

### INPUTS

**A1, A2, A3, A4, B1, B2, B3, B4**  
(Pins 2, 4, 6, 8, 11, 13, 15, 17)

Data input pins. Data on these pins appear in noninverted form on the corresponding Y outputs, when the outputs are enabled.

### CONTROLS

**Enable A, Enable B** (Pins 1, 19)

Output enables (active-low). When a low level is applied to these pins, the outputs are enabled and the devices

function as noninverting buffers. When a high level is applied, the outputs assume the high impedance state.

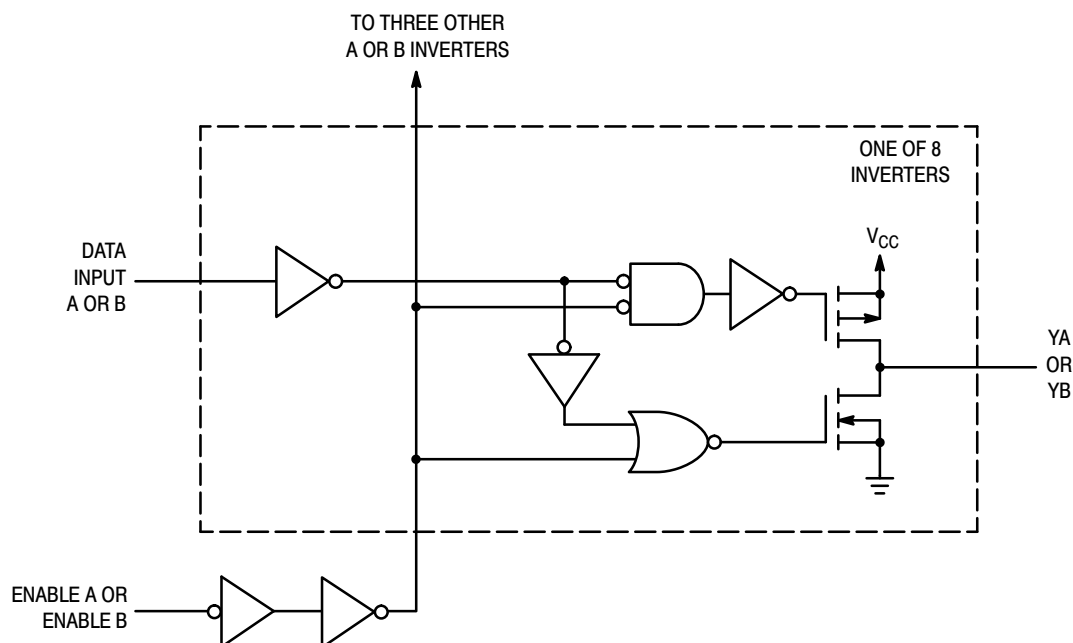
### OUTPUTS

**YA1, YA2, YA3, YA4, YB1, YB2, YB3, YB4**  
(Pins 18, 16, 14, 12, 9, 7, 5, 3)

Device outputs. Depending upon the state of the output-enable pins, these outputs are either noninverting outputs or high-impedance outputs.

# MC74HC244A, MC74HCT244A

## LOGIC DETAIL



## ORDERING INFORMATION

| Device              | Marking     | Package      | Shipping <sup>†</sup> |
|---------------------|-------------|--------------|-----------------------|
| MC74HC244ADWG       | HC244A      | SOIC–20 WIDE | 38 Units / Rail       |
| MC74HC244ADWR2G     | HC244A      | SOIC–20 WIDE | 1000 / Tape & Reel    |
| MC74HC244ADWR2G–Q*  | HC244A      | SOIC–20 WIDE | 1000 / Tape & Reel    |
| MC74HC244ADTG       | HC<br>244A  | TSSOP–20     | 75 Units / Rail       |
| MC74HC244ADTR2G     | HC<br>244A  | TSSOP–20     | 2500 / Tape & Reel    |
| MC74HC244ADTR2G–Q*  | HC<br>244A  | TSSOP–20     | 2500 / Tape & Reel    |
| MC74HCT244ADWG      | HCT244A     | SOIC–20 WIDE | 38 Units / Rail       |
| MC74HCT244ADWR2G    | HCT244A     | SOIC–20 WIDE | 1000 / Tape & Reel    |
| MC74HCT244ADWR2G–Q* | HCT244A     | SOIC–20 WIDE | 1000 / Tape & Reel    |
| MC74HCT244ADTR2G    | HCT<br>244A | TSSOP–20     | 2500 / Tape & Reel    |
| MC74HCT244ADTR2G–Q* | HCT<br>244A | TSSOP–20     | 2500 / Tape & Reel    |

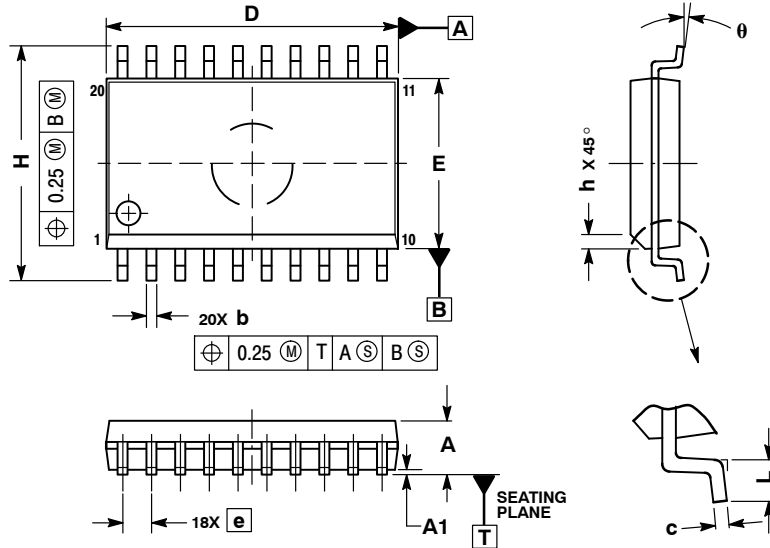
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*-Q Suffix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable

# MC74HC244A, MC74HCT244A

## PACKAGE DIMENSIONS

SOIC-20 WB  
CASE 751D-05  
ISSUE H

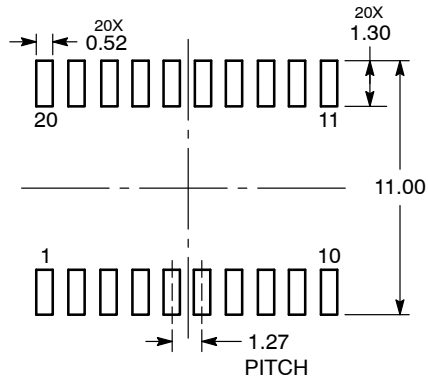


### NOTES:

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°    |

### RECOMMENDED SOLDERING FOOTPRINT\*



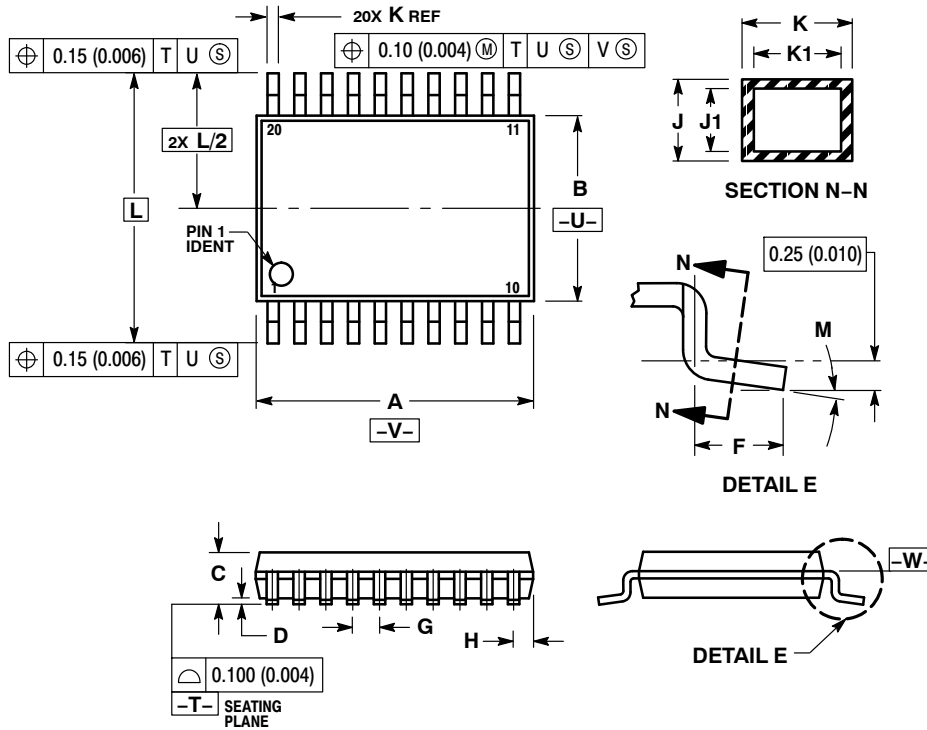
DIMENSIONS: MILLIMETERS

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

# MC74HC244A, MC74HCT244A

## PACKAGE DIMENSIONS

TSSOP-20 WB  
CASE 948E  
ISSUE D

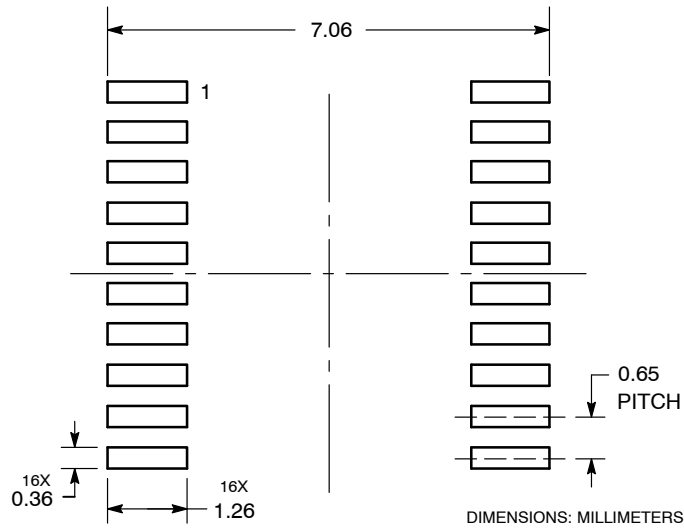


### NOTES:

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   | 6.40        | 6.60 | 0.252     | 0.260 |
| 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   | 0.27        | 0.37 | 0.011     | 0.015 |
| 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°    |

### 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.

# MC74HC244A, MC74HCT244A

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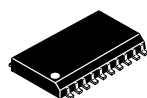
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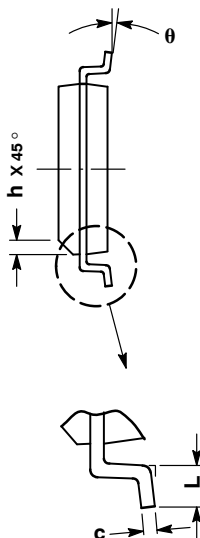
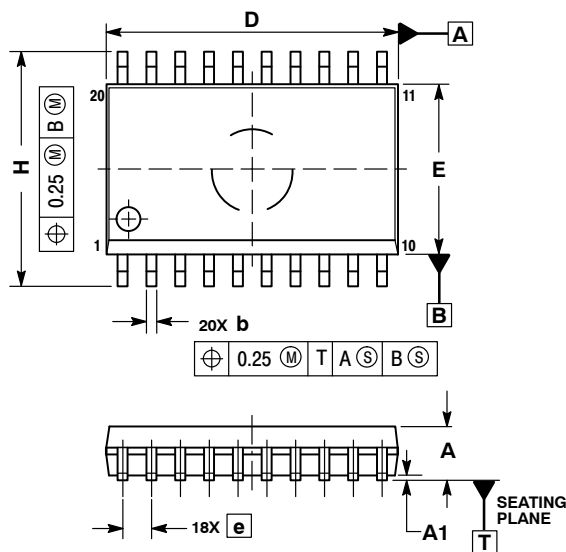
# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 1:1

SOIC-20 WB  
CASE 751D-05  
ISSUE H

DATE 22 APR 2015

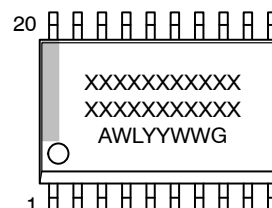


## NOTES:

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.

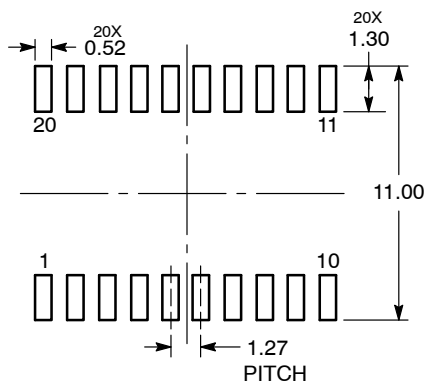
| DIM      | MILLIMETERS |       |
|----------|-------------|-------|
|          | MIN         | MAX   |
| A        | 2.35        | 2.65  |
| A1       | 0.10        | 0.25  |
| b        | 0.35        | 0.49  |
| c        | 0.23        | 0.32  |
| D        | 12.65       | 12.95 |
| E        | 7.40   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

## GENERIC MARKING DIAGRAM\*



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

## RECOMMENDED SOLDERING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

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

\*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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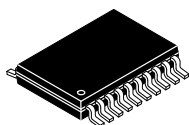
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# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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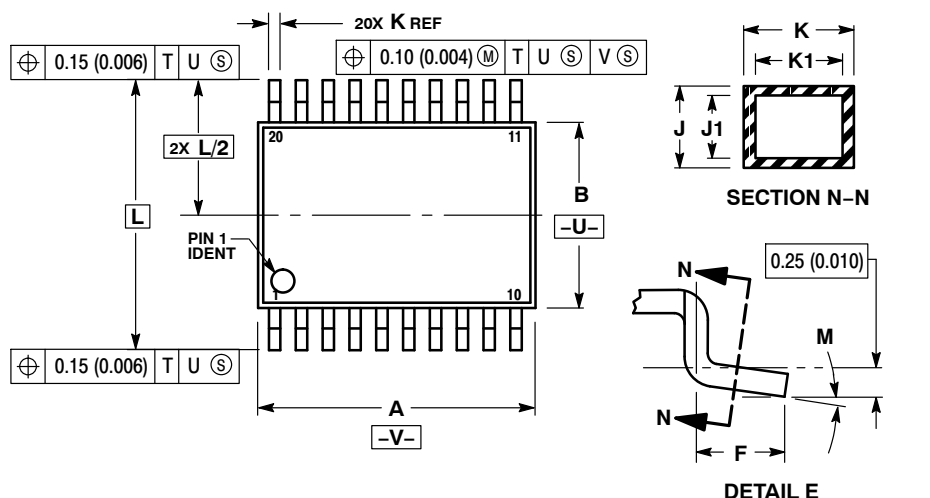
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SCALE 2:1

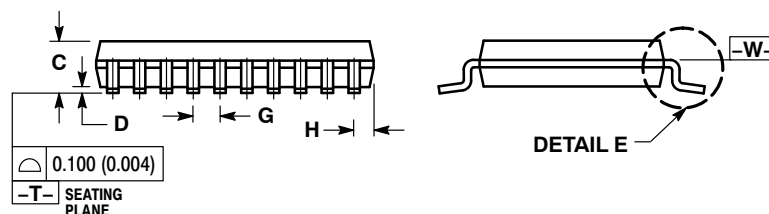
TSSOP-20 WB  
CASE 948E  
ISSUE D

DATE 17 FEB 2016

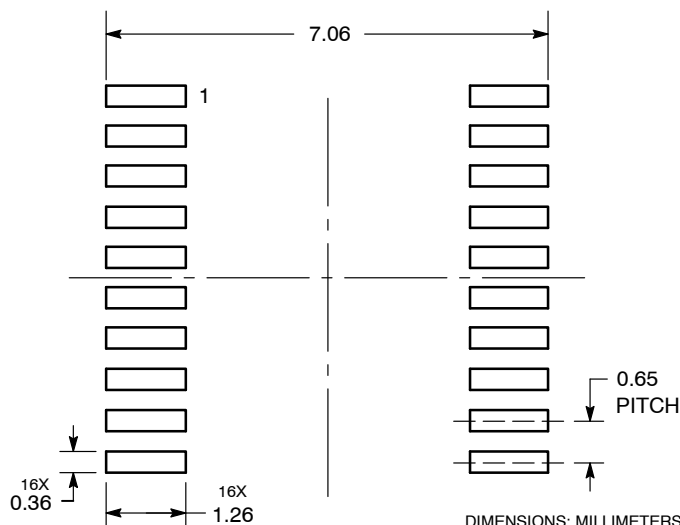


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
  4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. 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-.

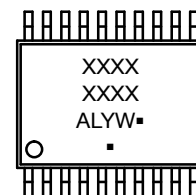
| DIM | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
|     | MIN         | MAX  | MIN       | MAX   |
| A   | 6.40        | 6.60 | 0.252     | 0.260 |
| B   | 4.30        | 4.50 | 0.169     | 0.177 |
| C   | ---         | 1.20 | ---       | 0.047 |
| D   | 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   | 0.27        | 0.37 | 0.011     | 0.015 |
| 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°    |



### SOLDERING FOOTPRINT



### 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.

|                  |             |                                                                                                                                                                                  |
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