

MC74HCT244A

Octal 3-State Noninverting Buffer/Line Driver/ Line Receiver with LSTTL-Compatible Inputs

High-Performance Silicon-Gate CMOS

The MC74HCT244A is identical in pinout to the LS244. This device may be used as a level converter for interfacing TTL or NMOS outputs to High-Speed CMOS inputs. The HCT244A is an octal noninverting buffer line driver line receiver designed to be used with 3-state memory address drivers, clock drivers, and other bus-oriented systems. The device has non-inverted outputs and two active-low output enables.

The HCT244A is the non-inverting version of the HCT240. See also HCT241.

Features

- Output Drive Capability: 15 LSTTL Loads
- TTL NMOS-Compatible Input Levels
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 4.5 to 5.5 V
- Low Input Current: 1 μ A
- In Compliance with the Requirements Defined by JEDEC Standard No. 7 A
- Chip Complexity: 112 FETs or 28 Equivalent Gates
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

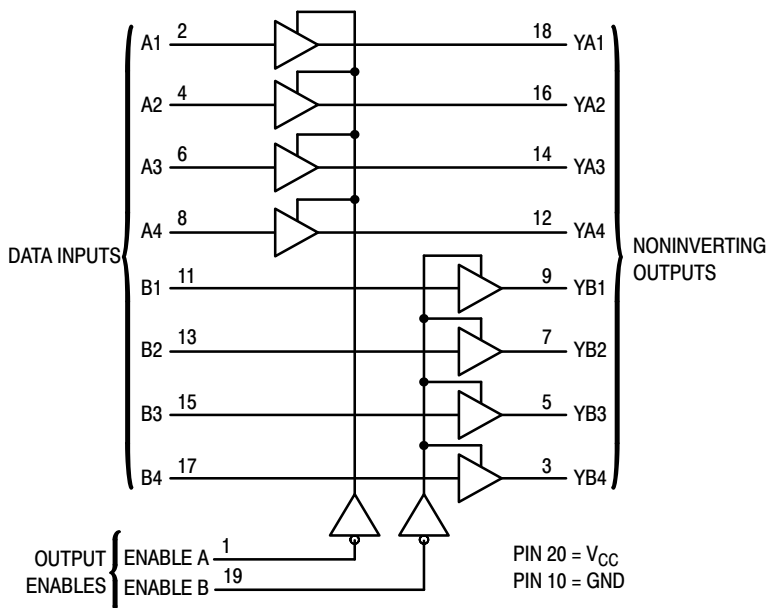
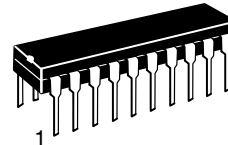


Figure 1. Logic Diagram

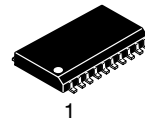


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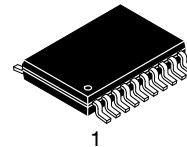
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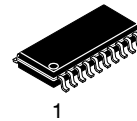
PDIP-20
N SUFFIX
CASE 738



SOIC-20W
DW SUFFIX
CASE 751D



TSSOP-20
DT SUFFIX
CASE 948E



SOEIAJ-20
M SUFFIX
CASE 967

PIN ASSIGNMENT

| | | | |
|----------|----|----|-----------------|
| ENABLE A | 1 | 20 | V _{CC} |
| 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 |

FUNCTION TABLE

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

Z = high impedance, X = don't care

ORDERING AND MARKING INFORMATION

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

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MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|-----------|---|-------------------------|------|
| V_{CC} | DC Supply Voltage (Referenced to GND) | - 0.5 to + 7 | V |
| V_{in} | DC Input Voltage (Referenced to GND) | - 0.5 to $V_{CC} + 0.5$ | V |
| V_{out} | DC Output Voltage (Referenced to GND) | - 0.5 to $V_{CC} + 0.5$ | V |
| I_{in} | DC Input Current, per Pin | ± 20 | mA |
| I_{out} | DC Output Current, per Pin | ± 35 | mA |
| I_{CC} | DC Supply Current, V_{CC} and GND Pins | ± 75 | mA |
| P_D | Power Dissipation in Still Air, Plastic DIP† SOIC Package† TSSOP Package† | 750 500 450 | mW |
| T_{stg} | Storage Temperature | - 65 to + 150 | °C |
| T_L | Lead Temperature, 1 mm from Case for 10 Seconds (Plastic DIP, SOIC, SSOP or TSSOP Package) | 260 | °C |

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{in} and V_{out} should be constrained to the range $GND \leq (V_{in} \text{ or } V_{out}) \leq V_{CC}$. Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V_{CC}). Unused outputs must be left open.

†Derating
 - Plastic DIP: - 10 mW/°C from 65° to 125°C
 - SOIC Package: - 7 mW/°C from 65° to 125°C
 - TSSOP Package: - 6.1 mW/°C from 65° to 125°C

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Max | Unit |
|-------------------|--|------|----------|------|
| V_{CC} | DC Supply Voltage (Referenced to GND) | 4.5 | 5.5 | V |
| V_{in}, V_{out} | DC Input Voltage, Output Voltage (Referenced to GND) | 0 | V_{CC} | V |
| T_A | Operating Temperature, All Package Types | - 55 | + 125 | °C |
| t_r, t_f | Input Rise and Fall Time (Figure 1) | 0 | 500 | ns |

DC ELECTRICAL CHARACTERISTICS (Voltages Referenced to GND)

| Symbol | Parameter | Test Conditions | V_{CC} V | Guaranteed Limit | | | Unit |
|-----------------|--|---|---------------|------------------|-----------------|----------|---------------|
| | | | | - 55 to 25° C | ≤ 85° C | ≤ 125° C | |
| V_{IH} | Minimum High-Level Input Voltage | $V_{out} = 0.1 \text{ V or } V_{CC} - 0.1 \text{ V}$ $ I_{out} \leq 20 \mu\text{A}$ | 4.5 | 2 | 2 | 2 | V |
| | | | 5.5 | 2 | 2 | 2 | |
| V_{IL} | Maximum Low-Level Input Voltage | $V_{out} = 0.1 \text{ V or } V_{CC} - 0.1 \text{ V}$ $ I_{out} \leq 20 \mu\text{A}$ | 4.5 | 0.8 | 0.8 | 0.8 | V |
| | | | 5.5 | 0.8 | 0.8 | 0.8 | |
| V_{OH} | Minimum High-Level Output Voltage | $V_{in} = V_{IH} \text{ or } V_{IL}$ $ I_{out} \leq 20 \mu\text{A}$ | 4.5 | 4.4 | 4.4 | 4.4 | V |
| | | | 5.5 | 5.4 | 5.4 | 5.4 | |
| V_{OL} | Maximum Low-Level Output Voltage | $V_{in} = V_{IH} \text{ or } V_{IL}$ $ I_{out} \leq 6 \text{ mA}$ | 4.5 | 3.98 | 3.84 | 3.7 | V |
| | | | 5.5 | 0.1 | 0.1 | 0.1 | |
| I_{in} | Maximum Input Leakage Current | $V_{in} = V_{CC} \text{ or } GND$ | 4.5 | 0.1 | 0.1 | 0.1 | μA |
| | | | 5.5 | 0.1 | 0.1 | 0.1 | |
| I_{oz} | Maximum Three-State Leakage Current | Output in High-Impedance State $V_{in} = V_{IL} \text{ or } V_{IH}; V_{out} = V_{CC} \text{ or } GND$ | 5.5 | ± 0.5 | ± 5.0 | ± 10 | μA |
| I_{CC} | Maximum Quiescent Supply Current (per Package) | $V_{in} = V_{CC} \text{ or } GND; I_{out} = 0 \mu\text{A}$ | 5.5 | 4 | 40 | 160 | μA |
| ΔI_{CC} | Additional Quiescent Supply Current | $V_{in} = 2.4 \text{ V, Any One Input}$ $V_{in} = V_{CC} \text{ or } GND, \text{ Other Inputs}$ $I_{out} = 0 \mu\text{A}$ | 5.5 | ≥ -55° C | 25° C to 125° C | | mA |
| | | | | 2.9 | 2.4 | | |

1. Total Supply Current = $I_{CC} + \Sigma \Delta I_{CC}$.

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AC ELECTRICAL CHARACTERISTICS ($V_{CC} = 5.0 \text{ V} \pm 10\%$, $C_L = 50 \text{ pF}$, Input $t_r = t_f = 6 \text{ ns}$)

| Symbol | Parameter | Guaranteed Limit | | | Unit |
|--------------------------|--|--|---------|----------|------|
| | | - 55 to 25 °C | ≤ 85 °C | ≤ 125 °C | |
| t_{PLH} , t_{PHL} | Maximum Propagation Delay, A to YA or B to YB (Figures 1 and 3) | 20 | 25 | 30 | ns |
| t_{PLZ} , t_{PHZ} | Maximum Propagation Delay, Output Enable to YA or YB (Figures 2 and 4) | 26 | 33 | 39 | ns |
| t_{PZL} , t_{PZH} | Maximum Propagation Delay, Output Enable to YA or YB (Figures 2 and 4) | 22 | 28 | 33 | ns |
| t_{TLH} , t_{THL} | Maximum Output Transition Time, Any Output (Figures 1 and 3) | 12 | 15 | 18 | ns |
| C_{in} | Maximum Input Capacitance | 10 | 10 | 10 | pF |
| C_{out} | Maximum Three-State Output Capacitance (Output in High-Impedance State) | 15 | 15 | 15 | pF |
| C_{PD} | Power Dissipation Capacitance (Per Enabled Output)* | Typical @ 25°C, $V_{CC} = 5.0 \text{ V}$ | | | pF |
| | | 55 | | | |

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

SWITCHING WAVEFORMS

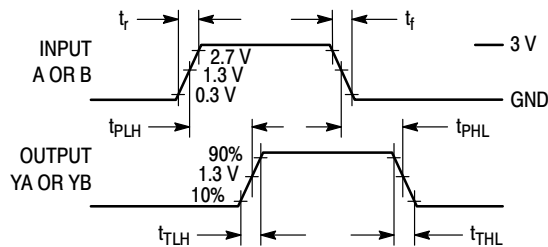


Figure 2.

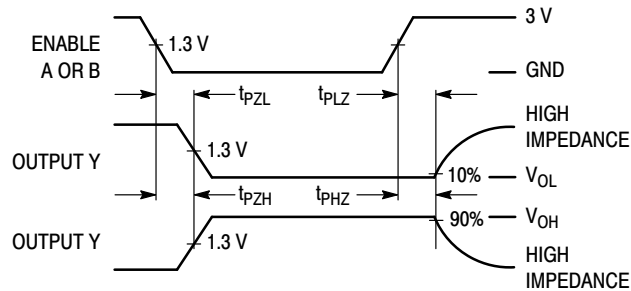
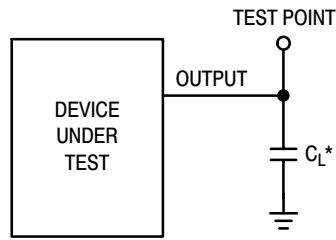


Figure 3.

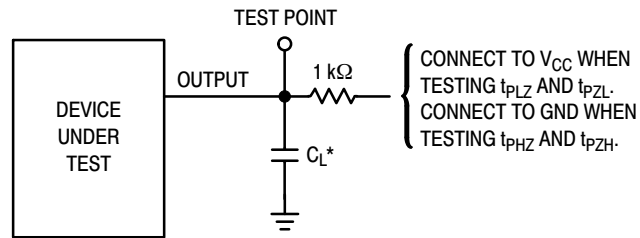
MC74HCT244A

TEST CIRCUITS



*Includes all probe and jig capacitance

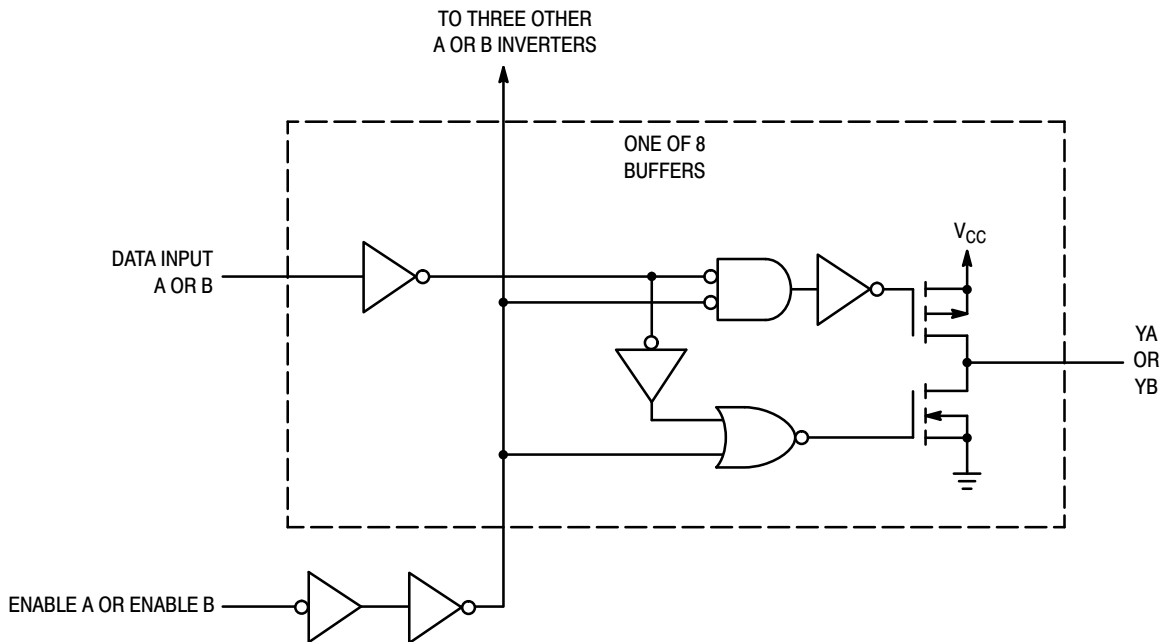
Figure 4.



*Includes all probe and jig capacitance

Figure 5.

LOGIC DETAIL



MC74HCT244A

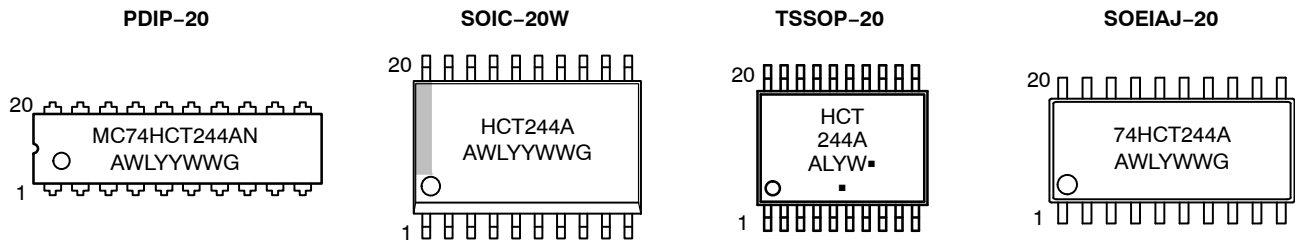
ORDERING INFORMATION

| Device | Package | Shipping† |
|------------------|------------------------|--------------------|
| MC74HCT244ANG | PDIP-20 (Pb-Free) | 18 Units / Rail |
| MC74HCT244ADWG | SOIC-20 (Pb-Free) | 38 Units / Rail |
| MC74HCT244ADWR2G | | 1000 / Tape & Reel |
| MC74HCT244ADTR2G | TSSOP-20 (Pb-Free) | 2500 / Tape & Reel |
| NLVHCT244ADTR2G* | | 2500 / Tape & Reel |
| MC74HCT244AFG | SOEIAJ-20 (Pb-Free) | 40 Units / Rail |
| MC74HCT244AFELG | | 2000 / 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.

*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.

MARKING DIAGRAMS

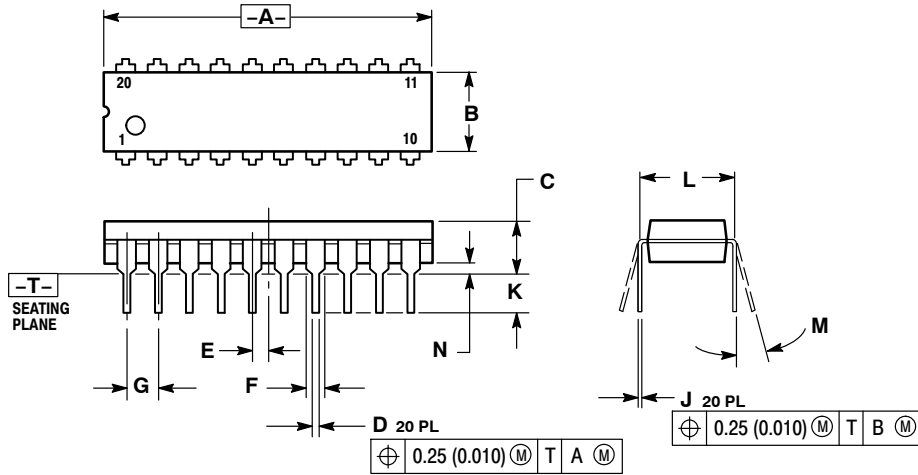


A = Assembly Location
 WL, L = Wafer Lot
 YY, Y = Year
 WW, W = Work Week
 G or ■ = Pb-Free Package
 (Note: Microdot may be in either location)

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PACKAGE DIMENSIONS

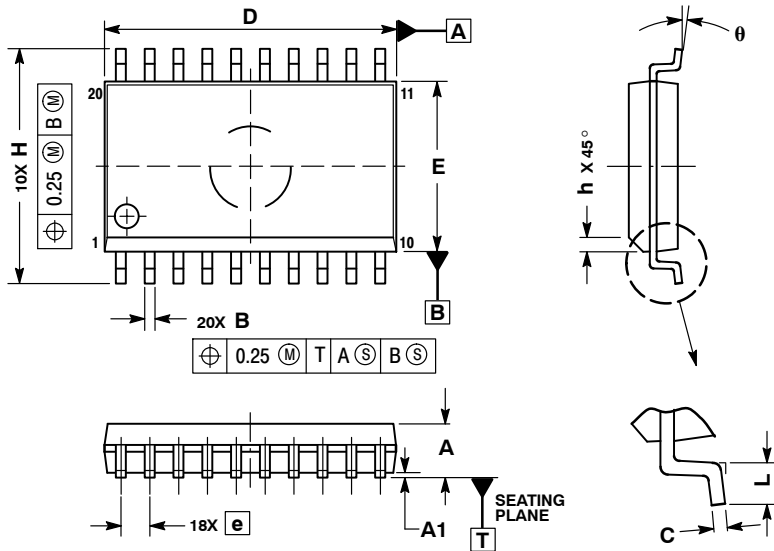
PDIP-20
N SUFFIX
PLASTIC DIP PACKAGE
CASE 738-03
ISSUE E



- 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. DIMENSION B DOES NOT INCLUDE MOLD FLASH.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 1.010 | 1.070 | 25.66 | 27.17 |
| B | 0.240 | 0.260 | 6.10 | 6.60 |
| C | 0.150 | 0.180 | 3.81 | 4.57 |
| D | 0.015 | 0.022 | 0.39 | 0.55 |
| E | 0.050 BSC | | 1.27 BSC | |
| F | 0.050 | 0.070 | 1.27 | 1.77 |
| G | 0.100 BSC | | 2.54 BSC | |
| J | 0.008 | 0.015 | 0.21 | 0.38 |
| K | 0.110 | 0.140 | 2.80 | 3.55 |
| L | 0.300 BSC | | 7.62 BSC | |
| M | 0° | 15° | 0° | 15° |
| N | 0.020 | 0.040 | 0.51 | 1.01 |

SOIC-20W
DW SUFFIX
CASE 751D-05
ISSUE G



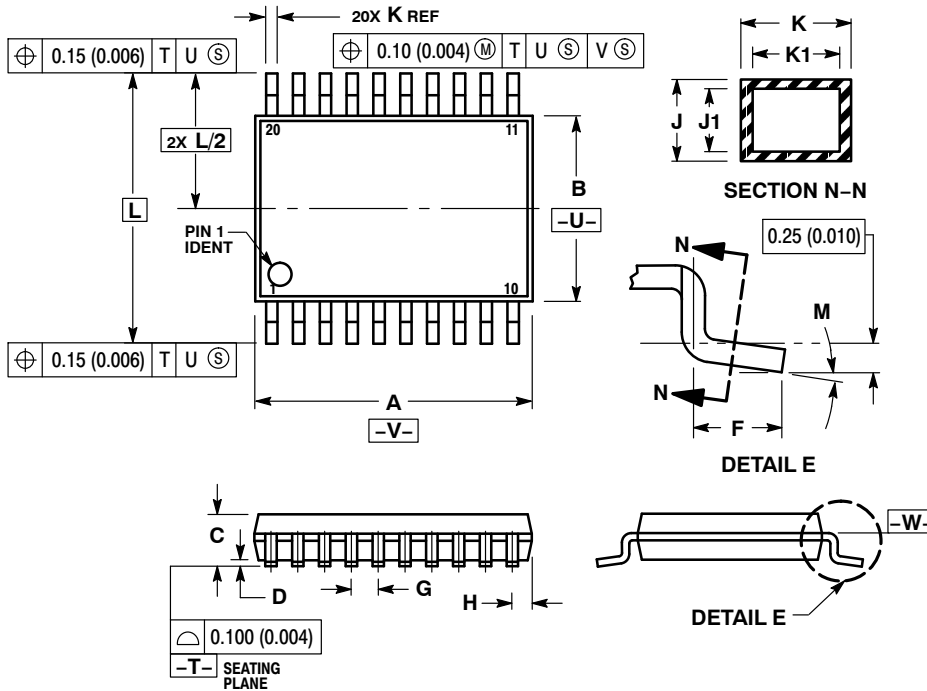
- NOTES:
1. DIMENSIONS ARE IN MILLIMETERS.
 2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
 3. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSION.
 4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
 5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS 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° |

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PACKAGE DIMENSIONS

TSSOP-20
DT SUFFIX
CASE 948E-02
ISSUE C

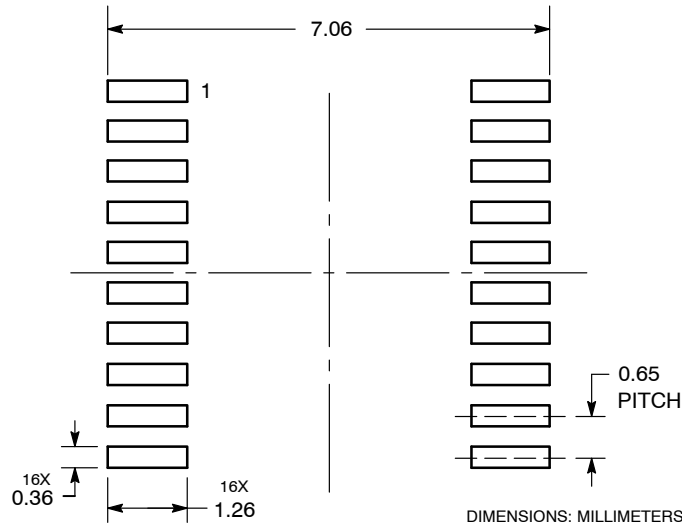


NOTES:

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° |

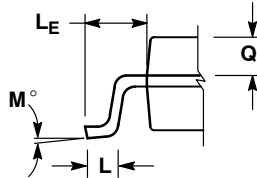
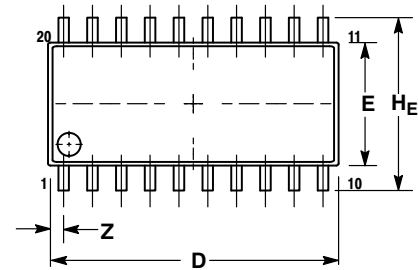
SOLDERING FOOTPRINT



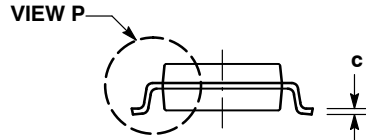
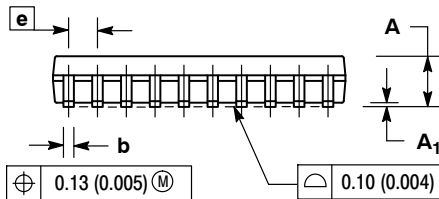
MC74HCT244A

PACKAGE DIMENSIONS

SOEIAJ-20
F SUFFIX
CASE 967
ISSUE A



DETAIL 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 ₁ | 0.05 | 0.20 | 0.002 | 0.008 |
| b | 0.35 | 0.50 | 0.014 | 0.020 |
| c | 0.15 | 0.25 | 0.006 | 0.010 |
| D | 12.35 | 12.80 | 0.486 | 0.504 |
| E | 5.10 | 5.45 | 0.201 | 0.215 |
| e | 1.27 BSC | | 0.050 BSC | |
| HE | 7.40 | 8.20 | 0.291 | 0.323 |
| L | 0.50 | 0.85 | 0.020 | 0.033 |
| LE | 1.10 | 1.50 | 0.043 | 0.059 |
| M | 0° | 10° | 0° | 10° |
| Q ₁ | 0.70 | 0.90 | 0.028 | 0.035 |
| Z | --- | 0.81 | --- | 0.032 |

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- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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- Консультации по применению компонента;
- Поставка образцов и прототипов;
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- Защита от снятия компонента с производства.



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