

MC74AC245, MC74ACT245

Octal Bidirectional Transceiver with 3-State Inputs/Outputs

The MC74AC245/74ACT245 contains eight non-inverting bidirectional buffers with 3-state outputs and is intended for bus-oriented applications. Current sinking capability is 24 mA at both the A and B ports. The Transmit/Receive (T/ \bar{R}) input determines the direction of data flow through the bidirectional transceiver. Transmit (active-HIGH) enables data from A ports to B ports; Receive (active-LOW) enables data from B ports to A ports. The Output Enable input, when HIGH, disables both A and B ports by placing them in a High Z condition.

Features

- Noninverting Buffers
- Bidirectional Data Path
- A and B Outputs Source/Sink 24 mA
- 'ACT245 has TTL Compatible Inputs
- These are Pb-Free Devices

PIN ASSIGNMENT

| PIN | FUNCTION |
|--------------------------------|--|
| $\bar{O}E$ | Output Enable Input |
| T/ \bar{R} | Transmit/Receive Input |
| A ₀ –A ₇ | Side A 3–State Inputs or 3–State Outputs |
| B ₀ –B ₇ | Side B 3–State Inputs or 3–State Outputs |

TRUTH TABLES

| Inputs | | Outputs |
|------------|--------------|---------------------|
| $\bar{O}E$ | T/ \bar{R} | |
| L | L | Bus B Data to Bus A |
| L | H | Bus A Data to Bus B |
| H | X | High Z State |

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

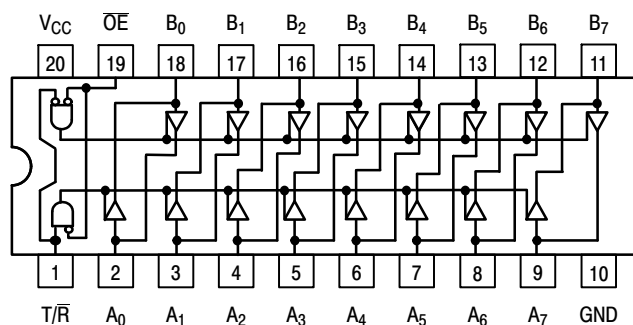
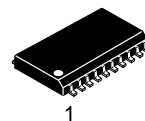


Figure 1.

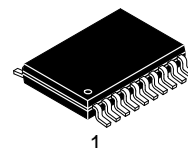


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SOIC-20W
DW SUFFIX
CASE 751D



TSSOP-20
DT SUFFIX
CASE 948E

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 7 of this data sheet.

MC74AC245, MC74ACT245

MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---------------|---|---------------------------|------|
| V_{CC} | DC Supply Voltage (Referenced to GND) | –0.5 to +7.0 | 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) (Note 1) | –0.5 to V_{CC} +0.5 | V |
| I_{IK} | DC Input Diode Current | ±20 | mA |
| I_{OK} | DC Output Diode Current | ±50 | mA |
| I_{OUT} | DC Output Sink/Source Current | ±50 | mA |
| I_{CC} | DC Supply Current, per Output Pin | ±50 | mA |
| I_{GND} | DC Ground Current, per Output Pin | ±100 | mA |
| T_{STG} | Storage Temperature Range | – 65 to + 150 | °C |
| T_L | Lead temperature, 1 mm from Case for 10 Seconds | 260 | °C |
| T_J | Junction Temperature Under Bias | 140 | °C |
| θ_{JA} | Thermal Resistance (Note 2) SOIC TSSOP | 65.8 110.7 | °C/W |
| MSL | Moisture Sensitivity | Level 1 | |
| F_R | Flammability Rating Oxygen Index: 30% – 35% | UL 94 V–0 @ 0.125 in | |
| V_{ESD} | ESD Withstand Voltage Human Body Model (Note 3) Machine Model (Note 4) Charged Device Model (Note 5) | > 2000 > 200 > 1000 | V |
| $I_{Latchup}$ | Latchup Performance Above V_{CC} and Below GND at 85°C (Note 6) | ±100 | mA |

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. I_{OUT} absolute maximum rating must be observed.
2. The package thermal impedance is calculated in accordance with JESD 51–7.
3. Tested to EIA/JESD22–A114–A.
4. Tested to EIA/JESD22–A115–A.
5. Tested to JESD22–C101–A.
6. Tested to EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Typ | Max | Unit |
|-------------------|---|------------------|-----|----------|------|
| V_{CC} | Supply Voltage | 'AC | 2.0 | 5.0 | V |
| | | 'ACT | 4.5 | 5.0 | |
| V_{IN}, V_{OUT} | DC Input Voltage, Output Voltage (Ref. to GND) | 0 | – | V_{CC} | V |
| t_r, t_f | Input Rise and Fall Time (Note 7) 'AC Devices except Schmitt Inputs | V_{CC} @ 3.0 V | – | 150 | ns/V |
| | | V_{CC} @ 4.5 V | – | 40 | |
| | | V_{CC} @ 5.5 V | – | 25 | |
| t_r, t_f | Input Rise and Fall Time (Note 8) 'ACT Devices except Schmitt Inputs | V_{CC} @ 4.5 V | – | 10 | ns/V |
| | | V_{CC} @ 5.5 V | – | 8.0 | |
| T_A | Operating Ambient Temperature Range | –40 | 25 | 85 | °C |
| I_{OH} | Output Current – High | – | – | –24 | mA |
| I_{OL} | Output Current – Low | – | – | 24 | mA |

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.

7. V_{IN} from 30% to 70% V_{CC} ; see individual Data Sheets for devices that differ from the typical input rise and fall times.
8. V_{IN} from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

MC74AC245, MC74ACT245

DC CHARACTERISTICS

| Symbol | Parameter | V _{CC} (V) | 74AC | | 74AC | Unit | Conditions |
|------------------|--------------------------------------|------------------------|------------------------|-------------------|---------------------------------------|------|---|
| | | | T _A = +25°C | | T _A = –40°C to +85°C | | |
| | | | Typ | Guaranteed Limits | | | |
| V _{IH} | Minimum High Level Input Voltage | 3.0 | 1.5 | 2.1 | 2.1 | V | V _{OUT} = 0.1 V or V _{CC} – 0.1 V |
| | | 4.5 | 2.25 | 3.15 | 3.15 | | |
| | | 5.5 | 2.75 | 3.85 | 3.85 | | |
| V _{IL} | Maximum Low Level Input Voltage | 3.0 | 1.5 | 0.9 | 0.9 | V | V _{OUT} = 0.1 V or V _{CC} – 0.1 V |
| | | 4.5 | 2.25 | 1.35 | 1.35 | | |
| | | 5.5 | 2.75 | 1.65 | 1.65 | | |
| V _{OH} | Minimum High Level Output Voltage | 3.0 | 2.99 | 2.9 | 2.9 | V | I _{OUT} = –50 μA |
| | | 4.5 | 4.49 | 4.4 | 4.4 | | |
| | | 5.5 | 5.49 | 5.4 | 5.4 | | |
| | | 3.0 | – | 2.56 | 2.46 | V | *V _{IN} = V _{IL} or V _{IH} –12 mA I _{OH} –24 mA –24 mA |
| | | 4.5 | – | 3.86 | 3.76 | | |
| | | 5.5 | – | 4.86 | 4.76 | | |
| V _{OL} | Maximum Low Level Output Voltage | 3.0 | 0.002 | 0.1 | 0.1 | V | I _{OUT} = 50 μA |
| | | 4.5 | 0.001 | 0.1 | 0.1 | | |
| | | 5.5 | 0.001 | 0.1 | 0.1 | | |
| | | 3.0 | – | 0.36 | 0.44 | V | *V _{IN} = V _{IL} or V _{IH} 12 mA I _{OL} 24 mA 24 mA |
| | | 4.5 | – | 0.36 | 0.44 | | |
| | | 5.5 | – | 0.36 | 0.44 | | |
| I _{IN} | Maximum Input Leakage Current | 5.5 | – | ±0.1 | ±1.0 | μA | V _I = V _{CC} , GND |
| I _{OZT} | Maximum 3-State Current | 5.5 | – | ±0.6 | ±6.0 | μA | V _I (OE) = V _{IL} , V _{IH} V _I = V _{CC} , GND V _O = V _{CC} , GND |
| I _{OLD} | †Minimum Dynamic Output Current | 5.5 | – | – | 75 | mA | V _{OLD} = 1.65 V Max |
| I _{OHD} | | 5.5 | – | – | –75 | mA | V _{OHD} = 3.85 V Min |
| I _{CC} | Maximum Quiescent Supply Current | 5.5 | – | 8.0 | 80.0 | μA | V _{IN} = V _{CC} or GND |

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

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

NOTE: I_{IN} and I_{CC} @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V_{CC}.

MC74AC245, MC74ACT245

AC CHARACTERISTICS (For Figures and Waveforms – See AND8277/D at www.onsemi.com)

| Symbol | Parameter | V _{CC} * (V) | 74AC | | | 74AC | | Unit | Fig. No. |
|------------------|---|--------------------------|--|------------|-------------|--|--------------|------|-------------|
| | | | T _A = +25°C C _L = 50 pF | | | T _A = -40°C to +85°C C _L = 50 pF | | | |
| | | | Min | Typ | Max | Min | Max | | |
| t _{PLH} | Propagation Delay A _n to B _n or B _n to A _n | 3.3 5.0 | 1.5 1.5 | 5.0 3.5 | 8.5 6.5 | 1.0 1.0 | 9.0 7.0 | ns | 3-5 |
| t _{PHL} | Propagation Delay A _n to B _n or B _n to A _n | 3.3 5.0 | 1.5 1.5 | 5.0 3.5 | 8.5 6.0 | 1.0 1.0 | 9.0 7.0 | ns | 3-5 |
| t _{PZH} | Output Enable Time | 3.3 5.0 | 2.5 1.5 | 7.0 5.0 | 11.5 8.5 | 2.0 1.0 | 12.5 9.0 | ns | 3-7 |
| t _{PZL} | Output Enable Time | 3.3 5.0 | 2.5 1.5 | 7.5 5.5 | 12.0 9.0 | 2.0 1.0 | 13.5 9.5 | ns | 3-8 |
| t _{PHZ} | Output Disable Time | 3.3 5.0 | 2.0 1.5 | 6.5 5.5 | 12.0 9.0 | 1.0 1.0 | 12.5 10.0 | ns | 3-7 |
| t _{PLZ} | Output Disable Time | 3.3 5.0 | 2.0 1.5 | 7.0 5.5 | 11.5 9.0 | 1.5 1.0 | 13.0 10.0 | ns | 3-8 |

*Voltage Range 3.3 V is 3.3 V ±0.3 V.
Voltage Range 5.0 V is 5.0 V ±0.5 V.

DC CHARACTERISTICS

| Symbol | Parameter | V _{CC} (V) | 74ACT | | 74ACT | Unit | Conditions |
|-------------------|--|------------------------|------------------------|-------------------|---------------------------------------|------|---|
| | | | T _A = +25°C | | T _A = –40°C to +85°C | | |
| | | | Typ | Guaranteed Limits | | | |
| V _{IH} | Minimum High Level Input Voltage | 4.5 5.5 | 1.5 1.5 | 2.0 2.0 | 2.0 2.0 | V | V _{OUT} = 0.1 V or V _{CC} – 0.1 V |
| V _{IL} | Maximum Low Level Input Voltage | 4.5 5.5 | 1.5 1.5 | 0.8 0.8 | 0.8 0.8 | V | V _{OUT} = 0.1 V or V _{CC} – 0.1 V |
| V _{OH} | Minimum High Level Output Voltage | 4.5 5.5 | 4.49 5.49 | 4.4 5.4 | 4.4 5.4 | V | I _{OUT} = –50 μA |
| | | 4.5 5.5 | – – | 3.86 4.86 | 3.76 4.76 | V | *V _{IN} = V _{IL} or V _{IH} I _{OH} –24 mA –24 mA |
| V _{OL} | Maximum Low Level Output Voltage | 4.5 5.5 | 0.001 0.001 | 0.1 0.1 | 0.1 0.1 | V | I _{OUT} = 50 μA |
| | | 4.5 5.5 | – – | 0.36 0.36 | 0.44 0.44 | V | *V _{IN} = V _{IL} or V _{IH} I _{OL} 24 mA 24 mA |
| I _{IN} | Maximum Input Leakage Current | 5.5 | – | ±0.1 | ±1.0 | μA | V _I = V _{CC} , GND |
| ΔI _{CCT} | Additional Max. I _{CC} /Input | 5.5 | 0.6 | – | 1.5 | mA | V _I = V _{CC} – 2.1 V |
| I _{OZT} | Maximum 3–State Current | 5.5 | – | ±0.6 | ±6.0 | μA | V _I (OE) = V _{IL} , V _{IH} V _I = V _{CC} , GND V _O = V _{CC} , GND |
| I _{OLD} | †Minimum Dynamic Output Current | 5.5 | – | – | 75 | mA | V _{OLD} = 1.65 V Max |
| I _{OHD} | | 5.5 | – | – | –75 | mA | V _{OHD} = 3.85 V Min |
| I _{CC} | Maximum Quiescent Supply Current | 5.5 | – | 8.0 | 80.0 | μA | V _{IN} = V _{CC} or GND |

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

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

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AC CHARACTERISTICS (For Figures and Waveforms – See AND8277/D at www.onsemi.com)

| Symbol | Parameter | V _{CC} * (V) | 74ACT | | | 74ACT | | Unit | Fig. No. |
|------------------|---|--------------------------|--|-----|-----|--|------|------|-------------|
| | | | T _A = +25°C C _L = 50 pF | | | T _A = –40°C to +85°C C _L = 50 pF | | | |
| | | | Min | Typ | Max | Min | Max | | |
| t _{PLH} | Propagation Delay, A _n to B _n or B _n to A _n | 5.0 | 1.5 | 4.0 | 7.5 | 1.5 | 8.0 | ns | 3–5 |
| t _{PHL} | Propagation Delay, A _n to B _n or B _n to A _n | 5.0 | 1.5 | 4.0 | 8.0 | 1.0 | 9.0 | ns | 3–5 |
| t _{PZH} | Output Enable Time | 5.0 | 1.5 | 5.0 | 10 | 1.5 | 11.0 | ns | 3–7 |
| t _{PZL} | Output Enable Time | 5.0 | 1.5 | 5.5 | 10 | 1.5 | 12.0 | ns | 3–8 |
| t _{PHZ} | Output Disable Time | 5.0 | 1.5 | 5.5 | 10 | 1.0 | 11.0 | ns | 3–7 |
| t _{PLZ} | Output Disable Time | 5.0 | 2.0 | 5.0 | 10 | 1.5 | 11.0 | ns | 3–8 |

*Voltage Range 5.0 V is 5.0 V ±0.5 V.

CAPACITANCE

| Symbol | Parameter | Value Typ | Unit | Test Conditions |
|------------------|-------------------------------|--------------|------|-------------------------|
| C _{IN} | Input Capacitance | 4.5 | pF | V _{CC} = 5.0 V |
| C _{I/O} | Input/Output Capacitance | 15 | pF | V _{CC} = 5.0 V |
| C _{PD} | Power Dissipation Capacitance | 45 | pF | V _{CC} = 5.0 V |

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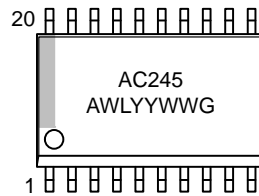
ORDERING INFORMATION

| Device | Package | Shipping† |
|-----------------|-----------------------|--------------------|
| MC74AC245DWG | SOIC-20 (Pb-Free) | 38 Units / Rail |
| MC74AC245DWR2G | SOIC-20 (Pb-Free) | 1000 / Tape & Reel |
| MC74ACT245DWG | SOIC-20 (Pb-Free) | 38 Units / Rail |
| MC74ACT245DWR2G | SOIC-20 (Pb-Free) | 1000 / Tape & Reel |
| MC74AC245DTG | TSSOP-20 (Pb-Free) | 75 Units / Rail |
| MC74AC245DTR2G | TSSOP-20 (Pb-Free) | 2500 / Tape & Reel |
| MC74ACT245DTG | TSSOP-20 (Pb-Free) | 75 Units / Rail |
| MC74ACT245DTR2G | TSSOP-20 (Pb-Free) | 2500 / Tape & Reel |

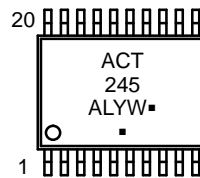
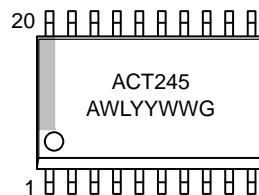
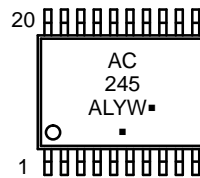
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MARKING DIAGRAMS

SOIC-20W



TSSOP-20

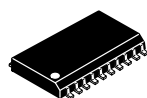


A = Assembly Location
 WL, L = Wafer Lot
 YY, Y = Year
 WW, W = Work Week
 G or ■ = Pb-Free Package
 (Note: Microdot may be in either location)

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

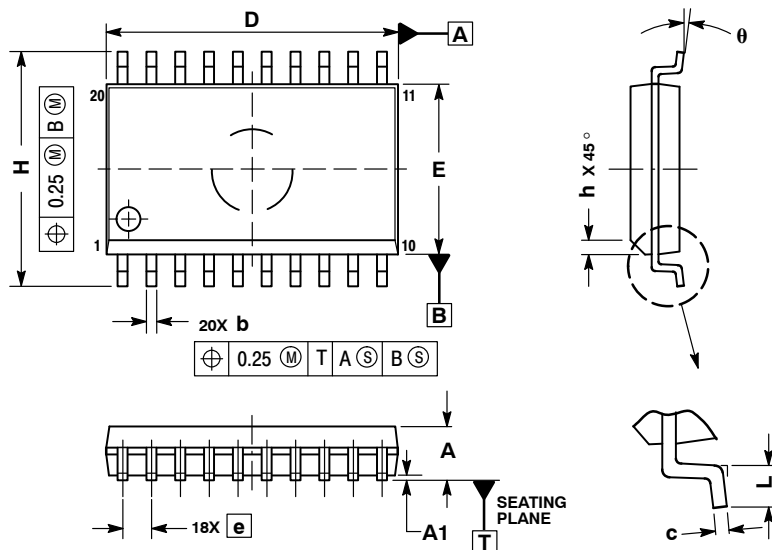
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SCALE 1:1

SOIC-20 WB
CASE 751D-05
ISSUE H

DATE 22 APR 2015

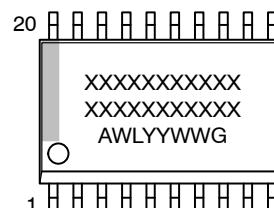


NOTES:

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 |
| θ | 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.

DOCUMENT NUMBER: 98ASB42343B

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DESCRIPTION: SOIC-20 WB

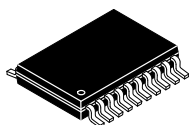
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MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

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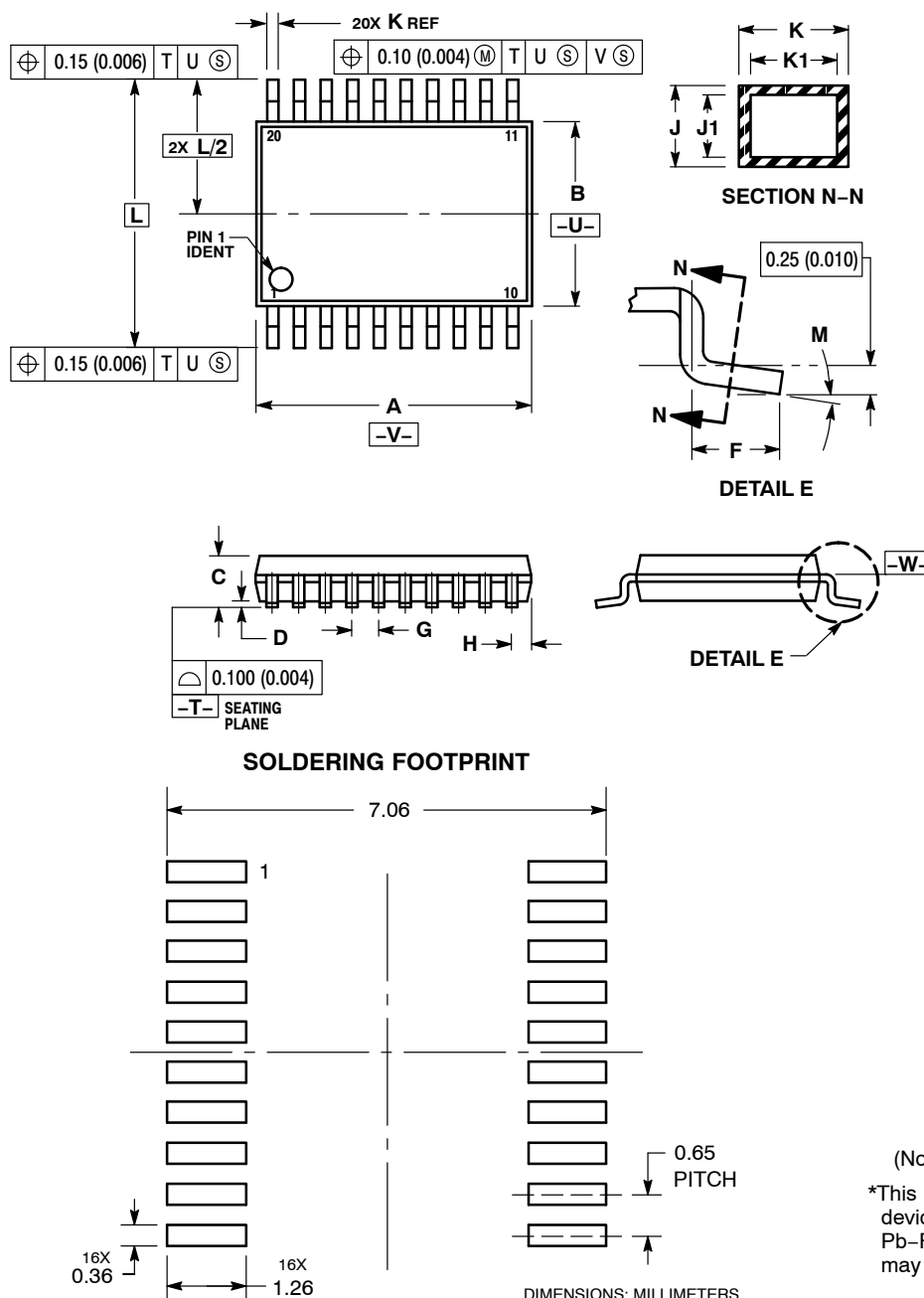
ON



SCALE 2:1

TSSOP-20 WB
CASE 948E
ISSUE D

DATE 17 FEB 2016

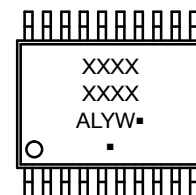


NOTES:

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° |

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.

DOCUMENT NUMBER: 98ASH70169A

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DESCRIPTION: TSSOP-20 WB

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