

7WBD3306

2-Bit Translating Bus Switch

The 7WBD3306 is an advanced high-speed low-power 2-bit translating bus switch in ultra-small footprints.

Features


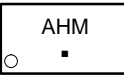



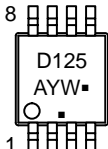

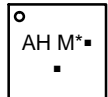

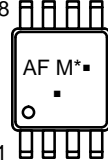
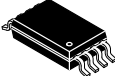
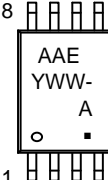
- High Speed: $t_{PD} = 0.25$ ns (Max) @ $V_{CC} = 4.5$ V
- $3\ \Omega$ Switch Connection Between 2 Ports
- Power Down Protection Provided on Inputs
- Zero Bounce
- TTL-Compatible Control Inputs
- Ultra-Small Pb-Free Packages
- These are Pb-Free Devices



ON Semiconductor®

<http://onsemi.com>

MARKING DIAGRAMS

| | | |
|--|--|---|
|  | UDFN8 MU SUFFIX CASE 517AJ |  |
|  | UDFN8 1.95 x 1.0 CASE 517CA |  |
|  | Micro8™ DM SUFFIX CASE 846A |  |
|  | UQFN8 MU SUFFIX CASE 523AN |  |
|  | US8 US SUFFIX CASE 493 |  |
|  | TSSOP8 DT SUFFIX CASE 948AL |  |

A = Assembly Location
 Y = Year
 W = Work Week
 M = Date Code
 ■ = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

This document contains information on some products that are still under development. ON Semiconductor reserves the right to change or discontinue these products without notice.

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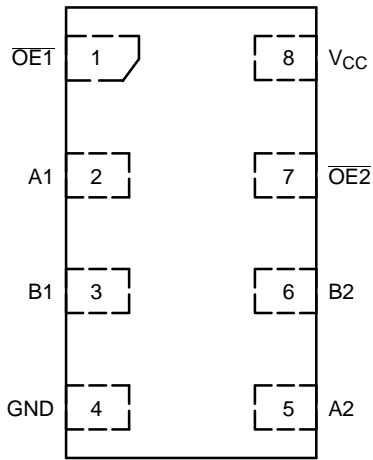


Figure 1. UDFN8
(Top Thru-View)

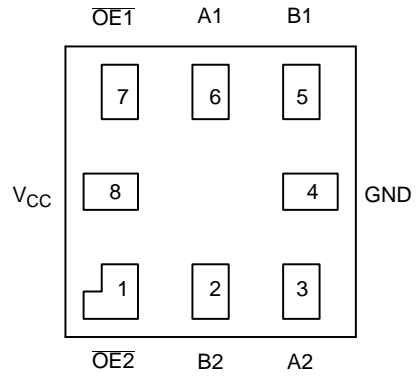


Figure 2. UQFN8
(Top Thru-View)

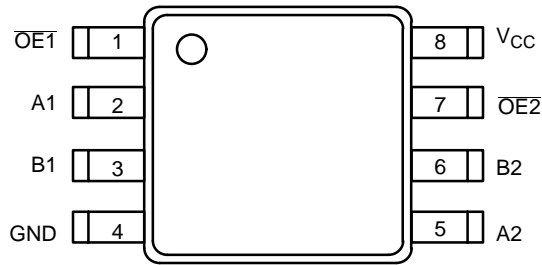


Figure 3. US8/Micro8/TSSOP8
(Top View)

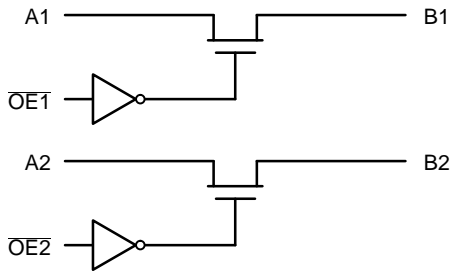


Figure 4. Logic Diagram

FUNCTION TABLE

| Input $\overline{OE}n$ | Function |
|------------------------|------------|
| L | $Bn = An$ |
| H | Disconnect |

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MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit | |
|---------------|--|-------------------------------|-------------|---------------|
| V_{CC} | DC Supply Voltage | -0.5 to +7.0 | V | |
| V_{IN} | Control Pin Input Voltage | -0.5 to +7.0 | V | |
| $V_{I/O}$ | Switch Input / Output Voltage | -0.5 to +7.0 | V | |
| I_{IK} | Control Pin DC Input Diode Current $V_{IN} < GND$ | -50 | mA | |
| I_{OK} | Switch I/O Port DC Diode Current $V_{I/O} < GND$ | -50 | mA | |
| I_O | ON-State Switch Current | ± 128 | mA | |
| | Continuous Current Through V_{CC} or GND | ± 150 | mA | |
| I_{CC} | DC Supply Current Per Supply Pin | ± 150 | mA | |
| I_{GND} | DC Ground Current per Ground Pin | ± 150 | mA | |
| T_{STG} | Storage Temperature Range | -65 to +150 | $^{\circ}C$ | |
| T_L | Lead Temperature, 1 mm from Case for 10 Seconds | 260 | $^{\circ}C$ | |
| T_J | Junction Temperature Under Bias | 150 | $^{\circ}C$ | |
| θ_{JA} | Thermal Resistance | US8 (Note 1) | 251 | $^{\circ}C/W$ |
| | | UDFN8 | 111 | |
| | | UQFN8 | 208 | |
| | | Micro8 | 392 | |
| | | TSSOP8 | 150 | |
| P_D | Power Dissipation in Still Air at 85 $^{\circ}C$ | US8 | 498 | mW |
| | | UDFN8 | 1127 | |
| | | UQFN8 | 601 | |
| | | Micro8 | 319 | |
| | | TSSOP8 | 833 | |
| MSL | Moisture Sensitivity | Level 1 | | |
| F_R | Flammability Rating Oxygen Index: 28 to 34 | UL 94 V-0 @ 0.125 in | | |
| V_{ESD} | ESD Withstand Voltage | Human Body Mode (Note 2) | > 2000 | V |
| | | Machine Model (Note 3) | > 200 | |
| | | Charged Device Model (Note 4) | N/A | |
| $I_{LATCHUP}$ | Latchup Performance Above V_{CC} and Below GND at 125 $^{\circ}C$ (Note 5) | ± 200 | 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. Measured with minimum pad spacing on an FR4 board, using 10 mm-by-1 inch, 2 ounce copper trace no air flow.
2. Tested to EIA / JESD22-A114-A.
3. Tested to EIA / JESD22-A115-A.
4. Tested to JESD22-C101-A.
5. Tested to EIA / JESD78.

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Max | Unit | |
|-----------------------|------------------------------------|---------------|------|-------------|------|
| V_{CC} | Positive DC Supply Voltage | 4.0 | 5.5 | V | |
| V_{IN} | Control Pin Input Voltage | 0 | 5.5 | V | |
| $V_{I/O}$ | Switch Input / Output Voltage | 0 | 5.5 | V | |
| T_A | Operating Free-Air Temperature | -55 | +125 | $^{\circ}C$ | |
| $\Delta t / \Delta V$ | Input Transition Rise or Fall Rate | Control Input | 0 | 5 | nS/V |
| | | Switch I/O | 0 | DC | |

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.

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DC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Conditions | V _{CC} (V) | T _A = 25 °C | | | T _A = -55 °C to +125 °C | | Unit |
|------------------|---|---|------------------------|------------------------|--------|--------------|---------------------------------------|--------------|----------|
| | | | | Min | Typ | Max | Min | Max | |
| V _{IK} | Clamp Diode Voltage | I _{I/O} = -18 mA | 4.5 | | | -1.2 | | -1.2 | V |
| V _{IH} | High-Level Input Voltage (Control) | | 4.0 to 5.5 | 2.0 | | | 2.0 | | V |
| V _{IL} | Low-Level Input Voltage (Control) | | 4.0 to 5.5 | | | 0.8 | | 0.8 | V |
| V _{OH} | Output Voltage High | See Figure 5 | | | | | | | |
| I _{IN} | Input Leakage Current | 0 ≤ V _{IN} ≤ 5.5 V | 5.5 | | | ±0.1 | | ±1.0 | μA |
| I _{OFF} | Power Off Leakage Current | V _{I/O} = 0 to 5.5 V | 0 | | | ±0.1 | | ±1.0 | μA |
| I _{CC} | Quiescent Supply Current | I _O = 0, V _{IN} = V _{CC} or 0 V OE1 = OE2 = GND OE1 = OE2 = V _{CC} | 5.5 | | | ±1.0 ±0.1 | | ±1.0 ±1.0 | mA μA |
| ΔI _{CC} | Increase in Supply Current (Control Pin) | One input at 3.4 V; Other inputs at V _{CC} or GND | 5.5 | | | | | 2.5 | mA |
| R _{ON} | Switch ON Resistance | V _{I/O} = 0, I _{I/O} = 64 mA I _{I/O} = 30 mA | 4.5 | | 3 3 | 7 7 | | 7 7 | Ω |
| | | V _{I/O} = 2.4, I _{I/O} = 15 mA | | | 15 | 50 | | 50 | |
| | | V _{I/O} = 2.4, I _{I/O} = 15 mA | 4.0 | | 50 | 70 | | 70 | |

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

| Symbol | Parameter | Test Condition | V _{CC} (V) | T _A = 25 °C | | | T _A = -55 °C to +125 °C | | Unit |
|----------------------|-------------------------------|----------------------------|------------------------|------------------------|-----|------|---------------------------------------|------|------|
| | | | | Min | Typ | Max | Min | Max | |
| t _{PD} | Propagation Delay, Bus to Bus | See Figure 6 | 4.0 to 5.5 | | | 0.25 | | 0.25 | ns |
| t _{EN} | Output Enable Time | See Figure 6 | 4.5 to 5.5 | 0.8 | 2.5 | 4.2 | 0.8 | 4.2 | ns |
| | | | 4.0 | 0.8 | 3.0 | 4.6 | 0.8 | 4.6 | |
| t _{DIS} | Output Disable Time | | 4.5 to 5.5 | 0.8 | 3.0 | 4.8 | 0.8 | 4.8 | ns |
| | | | 4.0 | 0.8 | 2.9 | 4.4 | 0.8 | 4.4 | |
| C _{IN} | Control Input Capacitance | V _{IN} = 5 or 0 V | 5.0 | | 2.5 | | | | pF |
| C _{IO(ON)} | Switch On Capacitance | Switch ON | 5.0 | | 10 | | | | pF |
| C _{IO(OFF)} | Switch Off Capacitance | Switch OFF | 5.0 | | 5 | | | | pF |

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TYPICAL DC CHARACTERISTICS

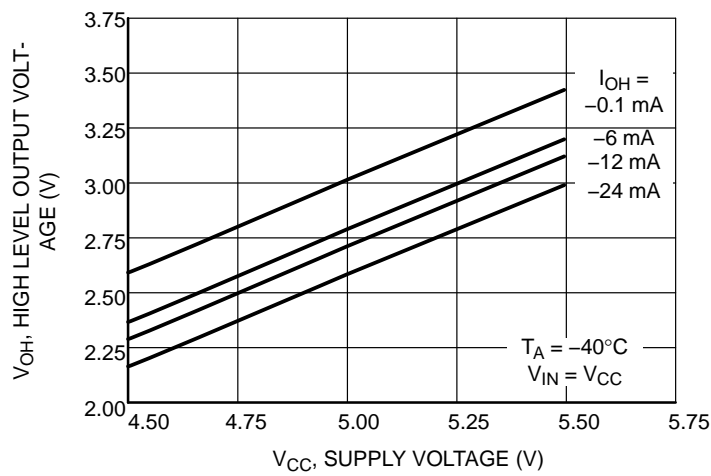
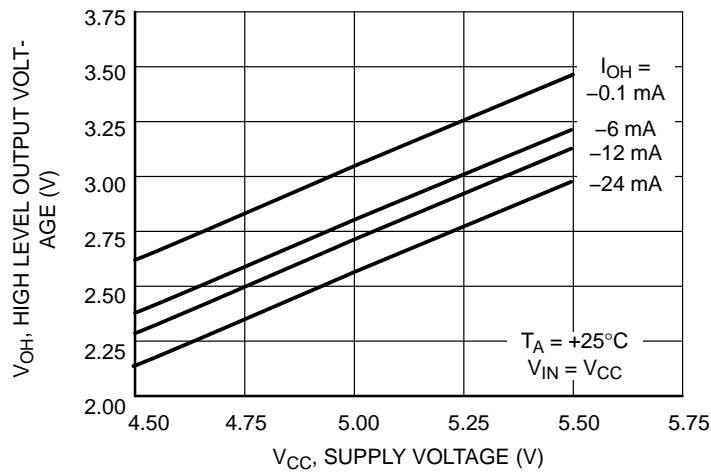
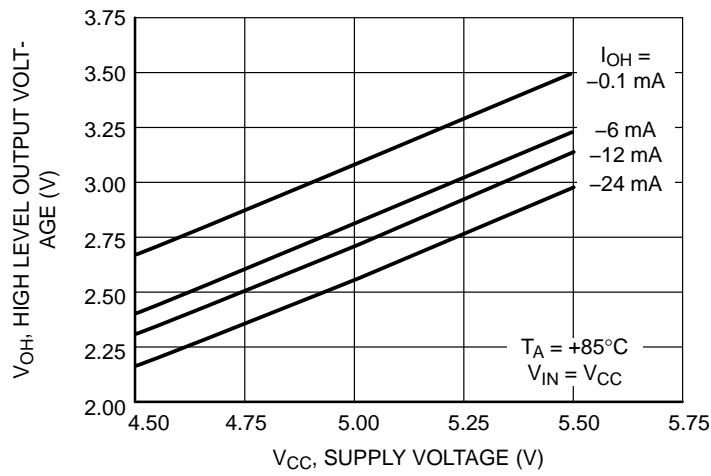
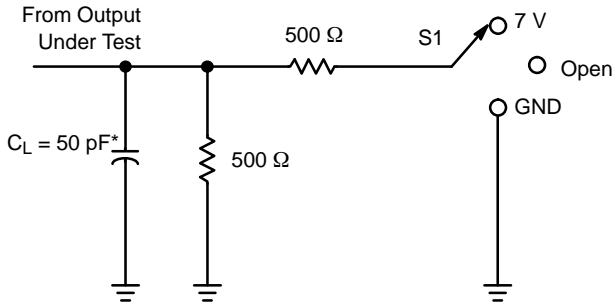


Figure 5. Output Voltage High vs Supply Voltage

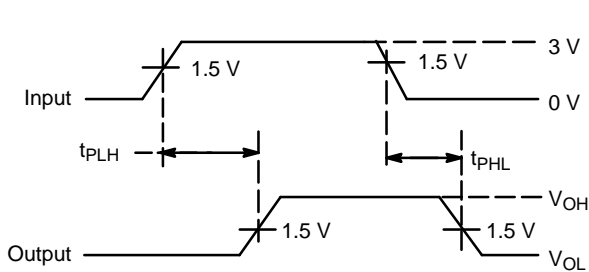
AC LOADING AND WAVEFORMS

Parameter Measurement Information

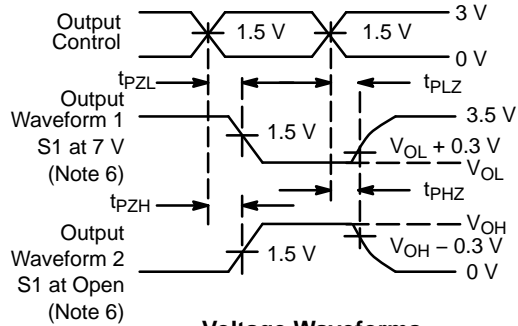


* C_L includes probes and jig capacitance.

| Test | S1 |
|-------------------|------|
| t_{PD} | Open |
| t_{PLZ}/t_{PZL} | 7 V |
| t_{PHZ}/t_{PZH} | Open |



**Voltage Waveforms
Propagation Delay Times**



**Voltage Waveforms
Enable and Disable Times**

6. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control
7. All input pulses are supplied by generators having the following characteristics: $PRR \leq 10 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r \leq 2.5 \text{ ns}$, $t_f \leq 2.5 \text{ ns}$.
8. The outputs are measured one at a time, with one transition per measurement.
9. t_{PLZ} and t_{PHZ} are the same as t_{DIS} .
10. t_{PZL} and t_{PZH} are the same as t_{EN} .
11. t_{PHL} and t_{PLH} are the same as t_{PD} .

Figure 6. t_{PD} , t_{EN} , t_{DIS} Loading and Waveforms

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ORDERING INFORMATION

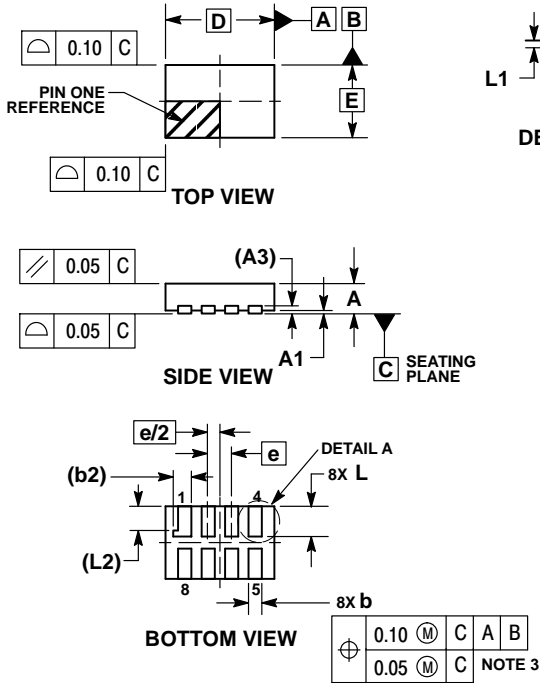
| Device | Package | Shipping† |
|----------------|--------------------------------------|--|
| 7WBD3306USG | US8 (Pb-Free) | 3000 / Tape & Reel |
| 7WBD3306MUTAG | UDFN8 (Pb-Free) | 3000 / Tape & Reel |
| 7WBD3306AMUTCG | UQFN8 (Pb-Free) | 3000 / Tape & Reel |
| 7WBD3306DMR2G | Micro8 (Pb-Free) | 4000 / Tape & Reel (In Development) |
| 7WBD3306DTR2G | TSSOP8 (Pb-Free) | 4000 / Tape & Reel |
| 7WBD3306DMUTCG | UDFN8, 1.95 x 1.0, 0.5P (Pb-Free) | 3000 / 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.

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PACKAGE DIMENSIONS

UDFN8 1.8 x 1.2, 0.4P
CASE 517AJ
ISSUE O

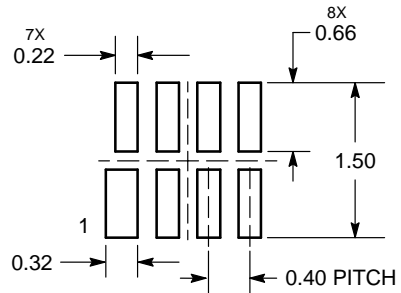


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM TERMINAL TIP.
4. MOLD FLASH ALLOWED ON TERMINALS ALONG EDGE OF PACKAGE. FLASH MAY NOT EXCEED 0.03 ONTO BOTTOM SURFACE OF TERMINALS.
5. DETAIL A SHOWS OPTIONAL CONSTRUCTION FOR TERMINALS.

| DIM | MILLIMETERS | |
|-----|-------------|------|
| | MIN | MAX |
| A | 0.45 | 0.55 |
| A1 | 0.00 | 0.05 |
| A3 | 0.127 | REF |
| b | 0.15 | 0.25 |
| b2 | 0.30 | REF |
| D | 1.80 | BSC |
| E | 1.20 | BSC |
| e | 0.40 | BSC |
| L | 0.45 | 0.55 |
| L1 | 0.00 | 0.03 |
| L2 | 0.40 | REF |

**MOUNTING FOOTPRINT*
SOLDERMASK DEFINED**



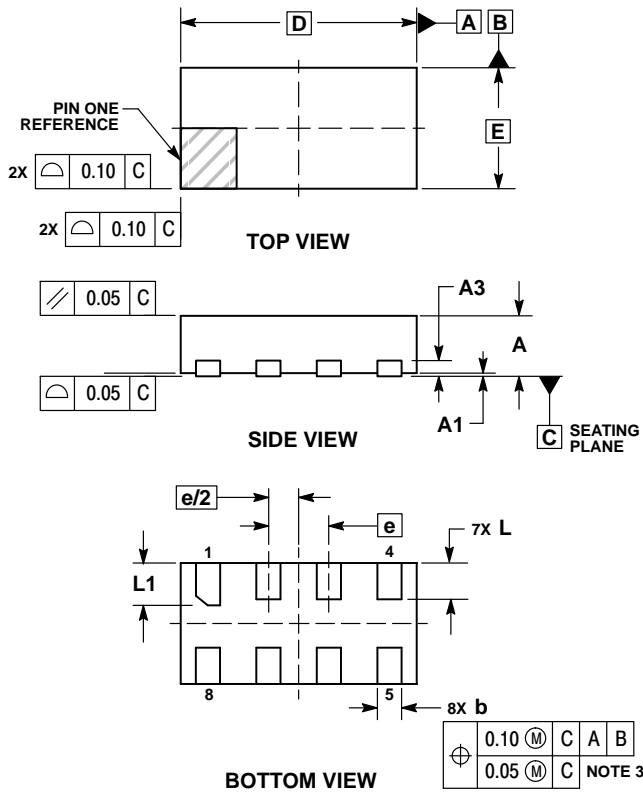
DIMENSIONS: MILLIMETERS

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

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PACKAGE DIMENSIONS

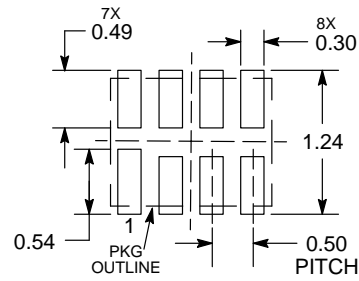
UDFN8 1.95x1.0, 0.5P
CASE 517CA
ISSUE O



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20 MM FROM TERMINAL TIP.
 4. PACKAGE DIMENSIONS EXCLUSIVE OF BURRS AND MOLD FLASH.

| MILLIMETERS | | |
|-------------|----------|------|
| DIM | MIN | MAX |
| A | 0.45 | 0.55 |
| A1 | 0.00 | 0.05 |
| A3 | 0.13 REF | |
| b | 0.15 | 0.25 |
| D | 1.95 BSC | |
| E | 1.00 BSC | |
| e | 0.50 BSC | |
| L | 0.25 | 0.35 |
| L1 | 0.30 | 0.40 |

RECOMMENDED SOLDERING FOOTPRINT*



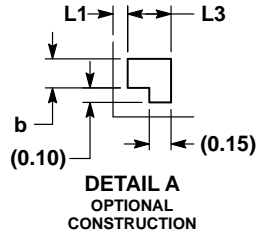
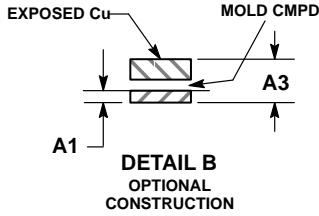
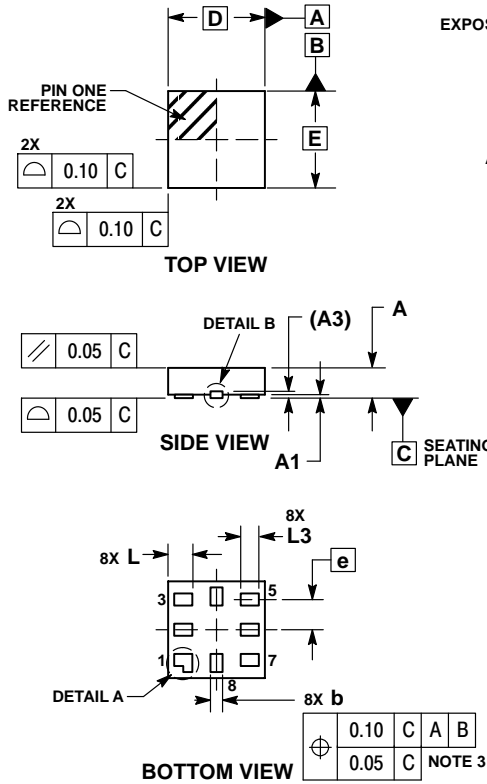
DIMENSIONS: MILLIMETERS

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

7WBD3306

PACKAGE DIMENSIONS

UQFN8, 1.6x1.6, 0.5P CASE 523AN ISSUE O

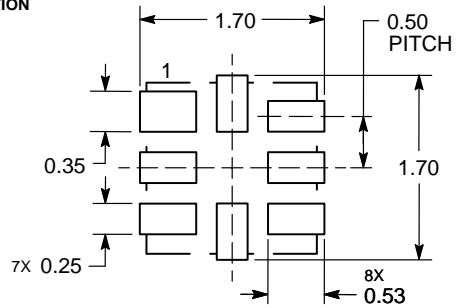


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.

| MILLIMETERS | | |
|-------------|------|------|
| DIM | MIN | MAX |
| A | 0.45 | 0.60 |
| A1 | 0.00 | 0.05 |
| A3 | 0.13 | REF |
| b | 0.15 | 0.25 |
| D | 1.60 | BSC |
| E | 1.60 | BSC |
| e | 0.50 | BSC |
| L | 0.35 | 0.45 |
| L1 | - | 0.15 |
| L3 | 0.25 | 0.35 |

SOLDERING FOOTPRINT*



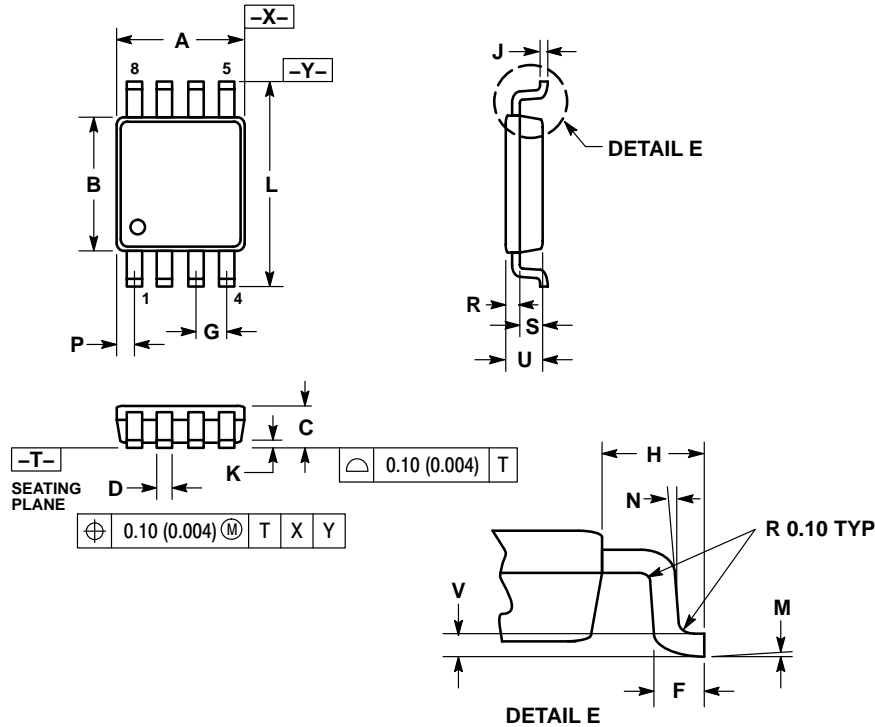
DIMENSIONS: MILLIMETERS

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7WBD3306

PACKAGE DIMENSIONS

US8
CASE 493
ISSUE B

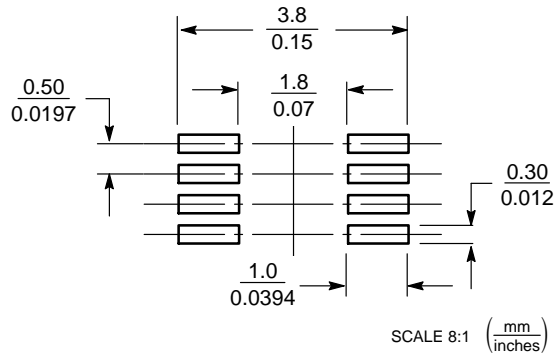


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION "A" DOES NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURR. MOLD FLASH, PROTRUSION AND GATE BURR SHALL NOT EXCEED 0.140 MM (0.0055") PER SIDE.
4. DIMENSION "B" DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSION. INTER-LEAD FLASH AND PROTRUSION SHALL NOT EXCEED 0.140 (0.0055") PER SIDE.
5. LEAD FINISH IS SOLDER PLATING WITH THICKNESS OF 0.0076-0.0203 MM. (300-800 Å).
6. ALL TOLERANCE UNLESS OTHERWISE SPECIFIED ±0.0508 (0.0002").

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 1.90 | 2.10 | 0.075 | 0.083 |
| B | 2.20 | 2.40 | 0.087 | 0.094 |
| C | 0.60 | 0.90 | 0.024 | 0.035 |
| D | 0.17 | 0.25 | 0.007 | 0.010 |
| F | 0.20 | 0.35 | 0.008 | 0.014 |
| G | 0.50 BSC | | 0.020 BSC | |
| H | 0.40 REF | | 0.016 REF | |
| J | 0.10 | 0.18 | 0.004 | 0.007 |
| K | 0.00 | 0.10 | 0.000 | 0.004 |
| L | 3.00 | 3.20 | 0.118 | 0.126 |
| M | 0° | 6° | 0° | 6° |
| N | 5° | 10° | 5° | 10° |
| P | 0.23 | 0.34 | 0.010 | 0.013 |
| R | 0.23 | 0.33 | 0.009 | 0.013 |
| S | 0.37 | 0.47 | 0.015 | 0.019 |
| U | 0.60 | 0.80 | 0.024 | 0.031 |
| V | 0.12 BSC | | 0.005 BSC | |

SOLDERING FOOTPRINT*

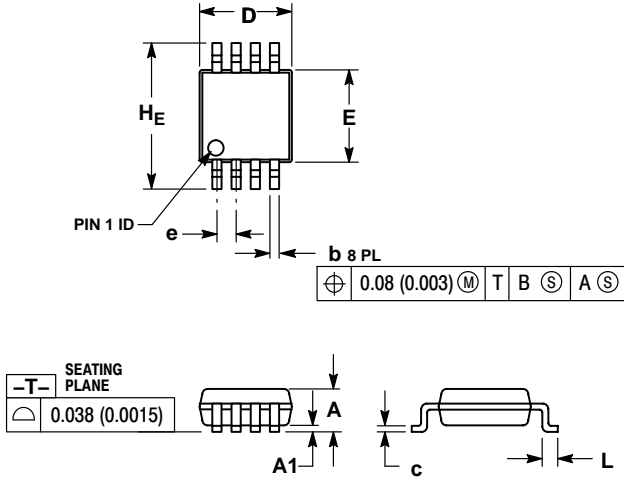


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

7WBD3306

PACKAGE DIMENSIONS

Micro8™
CASE 846A
ISSUE H

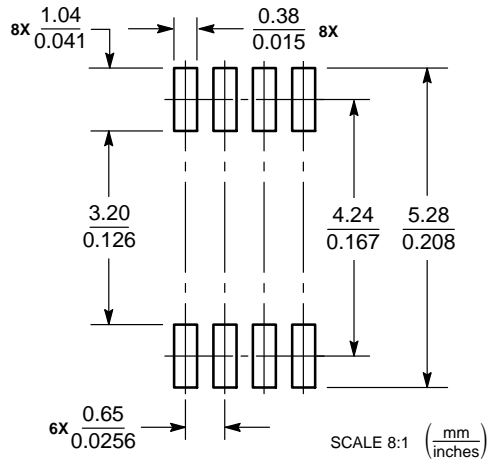


NOTES:

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, PROTRUSIONS 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. 846A-01 OBSOLETE, NEW STANDARD 846A-02.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|-----------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | --- | --- | 1.10 | --- | --- | 0.043 |
| A1 | 0.05 | 0.08 | 0.15 | 0.002 | 0.003 | 0.006 |
| b | 0.25 | 0.33 | 0.40 | 0.010 | 0.013 | 0.016 |
| c | 0.13 | 0.18 | 0.23 | 0.005 | 0.007 | 0.009 |
| D | 2.90 | 3.00 | 3.10 | 0.114 | 0.118 | 0.122 |
| E | 2.90 | 3.00 | 3.10 | 0.114 | 0.118 | 0.122 |
| e | 0.65 BSC | | | 0.026 BSC | | |
| L | 0.40 | 0.55 | 0.70 | 0.016 | 0.021 | 0.028 |
| HE | 4.75 | 4.90 | 5.05 | 0.187 | 0.193 | 0.199 |

SOLDERING FOOTPRINT*

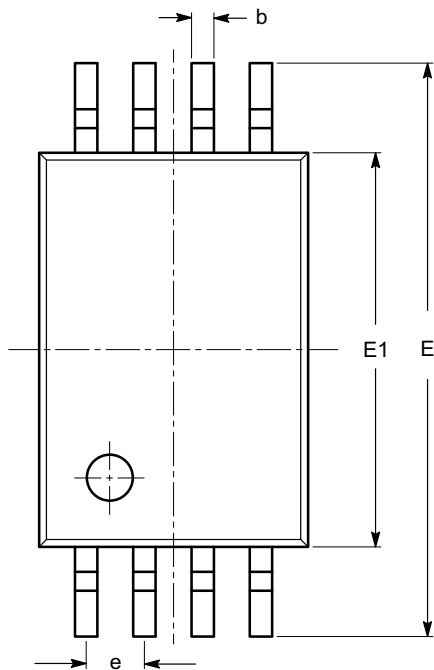


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

7WBD3306

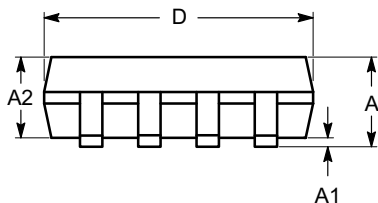
PACKAGE DIMENSIONS

TSSOP8, 4.4x3
CASE 948AL
ISSUE O

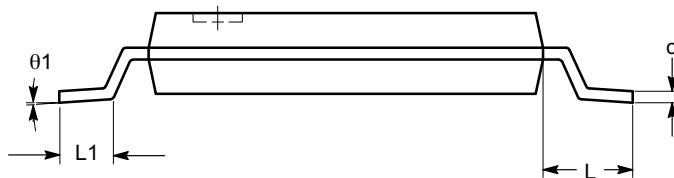


| SYMBOL | MIN | NOM | MAX |
|----------|----------|------|------|
| A | | | 1.20 |
| A1 | 0.05 | | 0.15 |
| A2 | 0.80 | 0.90 | 1.05 |
| b | 0.19 | | 0.30 |
| c | 0.09 | | 0.20 |
| D | 2.90 | 3.00 | 3.10 |
| E | 6.30 | 6.40 | 6.50 |
| E1 | 4.30 | 4.40 | 4.50 |
| e | 0.65 BSC | | |
| L | 1.00 REF | | |
| L1 | 0.50 | 0.60 | 0.75 |
| θ | 0° | | 8° |

TOP VIEW



SIDE VIEW




END VIEW

Notes:

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MO-153.

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