

# 2-Bit Bus Switch

## 7WB3306

The 7WB3306 is an advanced high-speed low-power 2-bit 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



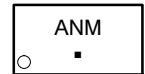
**ON Semiconductor®**

[www.onsemi.com](http://www.onsemi.com)

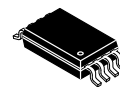
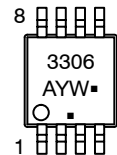
### MARKING DIAGRAMS



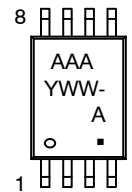
**UDFN8**  
**MU SUFFIX**  
**CASE 517AJ**



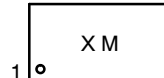
**Micro8**  
**DM SUFFIX**  
**CASE 846A**



**TSSOP8**  
**DT SUFFIX**  
**CASE 948AL**



**UDFN8**  
**1.95 x 1.0**  
**CASE 517CA**



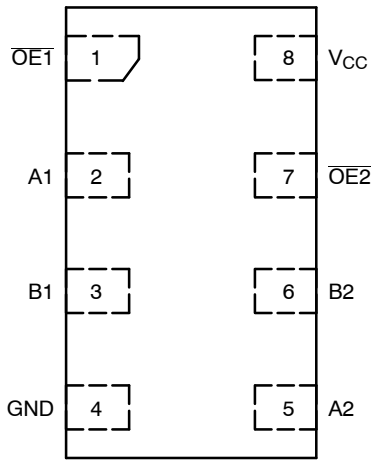
- A = Assembly Location
- Y = Year
- W = Work Week
- M = Date Code
- = Pb-Free Package

(Note: Microdot may be in either location)

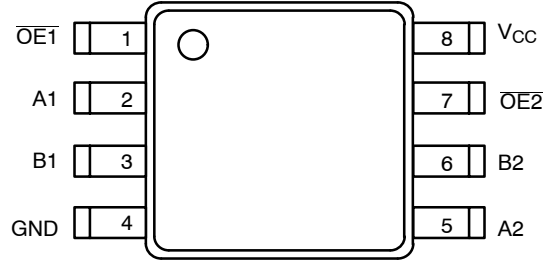
### ORDERING INFORMATION

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

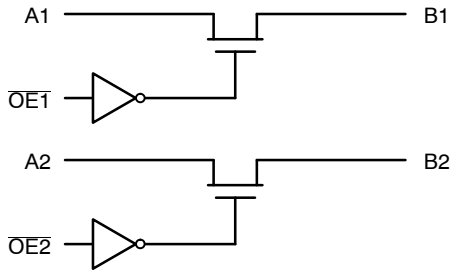
# 7WB3306



**Figure 1. UDFN8**  
(Top Thru-View)



**Figure 2. Micro8/TSSOP8**  
(Top View)



**Figure 3. Logic Diagram**

## FUNCTION TABLE

| Input $\overline{OE}_n$ | Function    |
|-------------------------|-------------|
| L                       | $B_n = A_n$ |
| H                       | Disconnect  |

# 7WB3306

## 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<br>$V_{IN} < GND$                         | -50                                     | mA          |               |
| $I_{OK}$      | Switch I/O Port DC Diode Current<br>$V_{I/O} < GND$                          | -50                                     | mA          |               |
| $I_O$         | ON-State Switch Current                                                      | $\pm 128$                               | mA          |               |
|               | Continuous Current Through $V_{CC}$ or GND                                   | $\pm 150$                               | mA          |               |
| $I_{CC}$      | DC Supply Current Per Supply Pin                                             | $\pm 150$                               | mA          |               |
| $I_{GND}$     | DC Ground Current per Ground Pin                                             | $\pm 150$                               | 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                                     | $^{\circ}C$ |               |
| $\theta_{JA}$ | Thermal Resistance                                                           | UDFN8 (Note 1)                          | 111         | $^{\circ}C/W$ |
|               |                                                                              | Micro8                                  | 392         |               |
|               |                                                                              | TSSOP8                                  | 150         |               |
| $P_D$         | Power Dissipation in Still Air at 85 $^{\circ}C$                             | UDFN8                                   | 1127        | mW            |
|               |                                                                              | 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 (Note 2)                                               | Human Body Model, all pins              | > 1.5       | kV            |
|               |                                                                              | Human Body Model, $A_n/B_n$ to Ground   | > 4         | kV            |
|               |                                                                              | Human Body Model, $A_n/B_n$ to $V_{CC}$ | > 4         | kV            |
| $I_{LATCHUP}$ | Latchup Performance Above $V_{CC}$ and Below GND at 125 $^{\circ}C$ (Note 3) | $\pm 100$                               | 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. 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 / 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           |
|                     |                                    | 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.

## DC ELECTRICAL CHARACTERISTICS

| Symbol           | Parameter                                   | Conditions                                                                    | V <sub>CC</sub><br>(V) | T <sub>A</sub> = 25°C |        |        | T <sub>A</sub> =<br>-55°C to +125°C |        | Unit |
|------------------|---------------------------------------------|-------------------------------------------------------------------------------|------------------------|-----------------------|--------|--------|-------------------------------------|--------|------|
|                  |                                             |                                                                               |                        | Min                   | Typ    | Max    | Min                                 | Max    |      |
| V <sub>IK</sub>  | Clamp Diode Voltage                         | I <sub>I/O</sub> = -18 mA                                                     | 4.5                    |                       |        | -1.2   |                                     | -1.2   | V    |
| V <sub>IH</sub>  | High-Level Input Voltage<br>(Control)       |                                                                               | 4.0 to<br>5.5          | 2.0                   |        |        | 2.0                                 |        | V    |
| V <sub>IL</sub>  | Low-Level Input Voltage<br>(Control)        |                                                                               | 4.0 to<br>5.5          |                       |        | 0.8    |                                     | 0.8    | V    |
| V <sub>OH</sub>  | Output Voltage High                         | See Figure 4                                                                  |                        |                       |        |        |                                     |        |      |
| I <sub>IN</sub>  | Input Leakage Current                       | 0 ≤ V <sub>IN</sub> ≤ 5.5 V                                                   | 5.5                    |                       |        | ±0.1   |                                     | ±1.0   | μA   |
| I <sub>OFF</sub> | Power Off Leakage Current                   | V <sub>I/O</sub> = 0 to 5.5 V                                                 | 0                      |                       |        | ±0.1   |                                     | ±1.0   | μA   |
| I <sub>CC</sub>  | Quiescent Supply Current                    | I <sub>O</sub> = 0,<br>V <sub>IN</sub> = V <sub>CC</sub> or 0 V               | 5.5                    |                       |        | ±0.1   |                                     | ±1.0   | μA   |
| ΔI <sub>CC</sub> | Increase in Supply Current<br>(Control Pin) | One input at 3.4 V;<br>Other inputs at<br>V <sub>CC</sub> or GND              | 5.5                    |                       |        |        |                                     | 2.5    | mA   |
| R <sub>ON</sub>  | Switch ON Resistance                        | V <sub>I/O</sub> = 0,<br>I <sub>I/O</sub> = 64 mA<br>I <sub>I/O</sub> = 30 mA | 4.5                    |                       | 3<br>3 | 7<br>7 |                                     | 7<br>7 | Ω    |
|                  |                                             | V <sub>I/O</sub> = 2.4,<br>I <sub>I/O</sub> = 15 mA                           |                        |                       | 6      | 15     |                                     | 15     |      |
|                  |                                             | V <sub>I/O</sub> = 2.4,<br>I <sub>I/O</sub> = 15 mA                           | 4.0                    |                       | 10     | 20     |                                     | 20     |      |

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 <sub>CC</sub><br>(V) | T <sub>A</sub> = 25 °C |     |      | T <sub>A</sub> =<br>-55°C to +125°C |      | Unit |
|----------------------|-------------------------------|----------------------------|------------------------|------------------------|-----|------|-------------------------------------|------|------|
|                      |                               |                            |                        | Min                    | Typ | Max  | Min                                 | Max  |      |
| t <sub>PD</sub>      | Propagation Delay, Bus to Bus | See Figure 5               | 4.0 to<br>5.5          |                        |     | 0.25 |                                     | 0.25 | ns   |
| t <sub>EN</sub>      | Output Enable Time            | See Figure 5               | 4.5 to<br>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 <sub>DIS</sub>     | Output Disable Time           |                            | 4.5 to<br>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 <sub>IN</sub>      | Control Input Capacitance     | V <sub>IN</sub> = 5 or 0 V | 5.0                    |                        | 2.5 |      |                                     |      | pF   |
| C <sub>IO(ON)</sub>  | Switch On Capacitance         | Switch ON                  | 5.0                    |                        | 10  |      |                                     |      | pF   |
| C <sub>IO(OFF)</sub> | Switch Off Capacitance        | Switch OFF                 | 5.0                    |                        | 5   |      |                                     |      | pF   |

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## TYPICAL DC CHARACTERISTICS

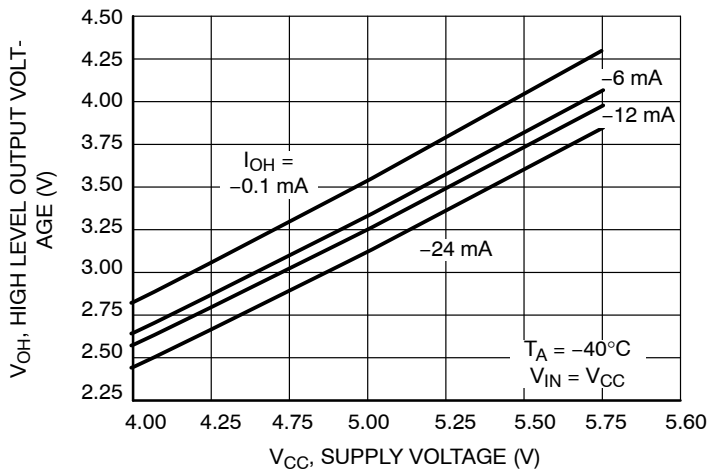
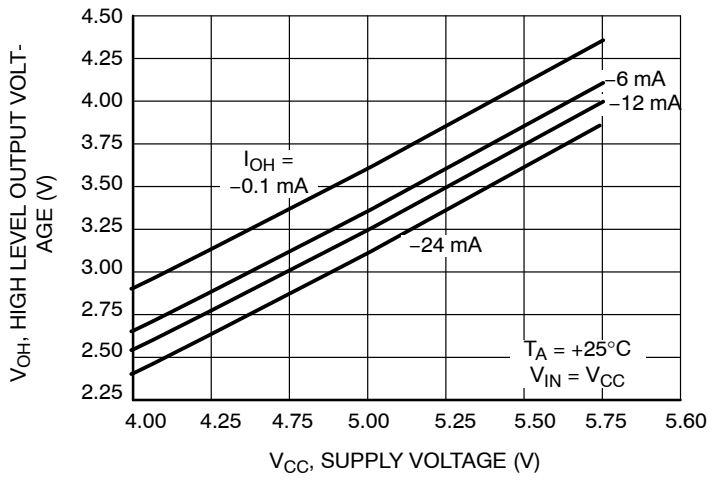
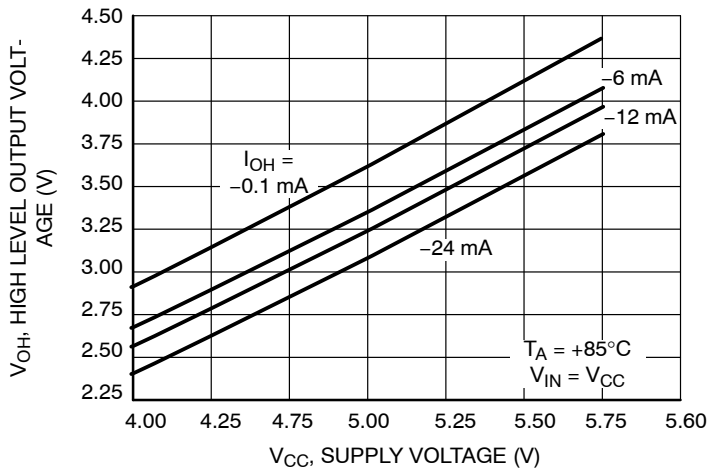
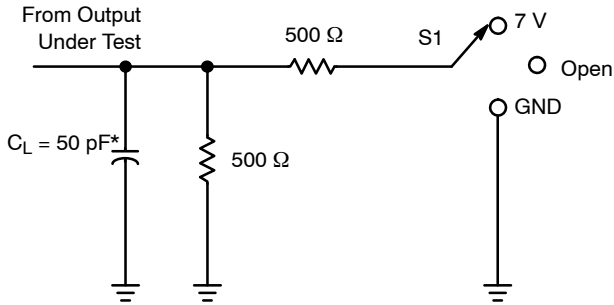


Figure 4. Output Voltage High vs Supply Voltage

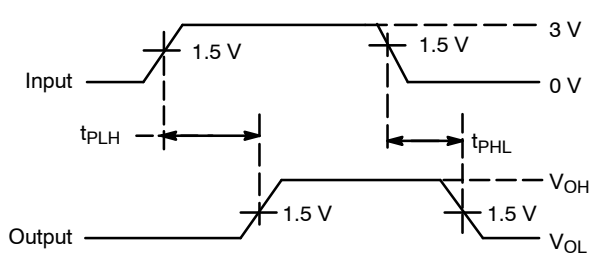
AC LOADING AND WAVEFORMS

Parameter Measurement Information

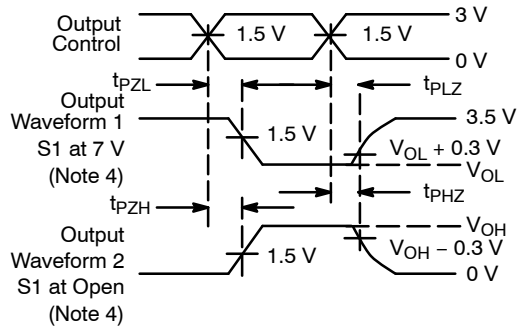


\* $C_L$  includes probes and jig capacitance.

| 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

- 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.
- All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10$  MHz,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5$  ns,  $t_f \leq 2.5$  ns.
- The outputs are measured one at a time, with one transition per measurement.
- $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{DIS}$ .
- $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{EN}$ .
- $t_{PHL}$  and  $t_{PLH}$  are the same as  $t_{PD}$ .

Figure 5.  $t_{PD}$ ,  $t_{EN}$ ,  $t_{DIS}$  Loading and Waveforms

## 7WB3306

### ORDERING INFORMATION

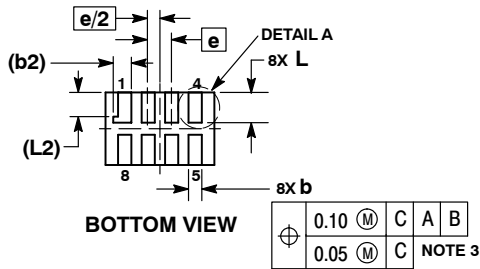
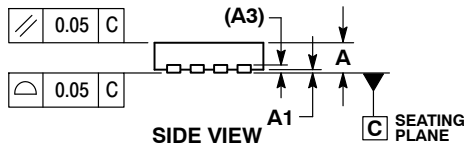
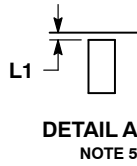
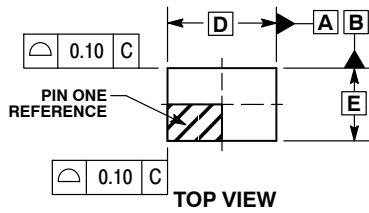
| Device        | Package                                      | Shipping†          |
|---------------|----------------------------------------------|--------------------|
| 7WB3306MU2AG  | UDFN8<br>(Pb-Free)                           | 3000 / Tape & Reel |
| 7WB3306DMR2G  | Micro8<br>(Pb-Free)                          | 4000 / Tape & Reel |
| 7WB3306DTR2G  | TSSOP8<br>(Pb-Free)                          | 5000 / Tape & Reel |
| 7WB3306DMUTCG | UDFN8, 1.95 x 1.0, 0.5 mm Pitch<br>(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.

# 7WB3306

## PACKAGE DIMENSIONS

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

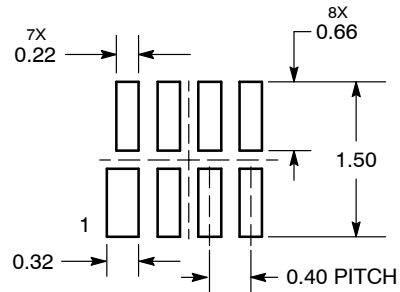


NOTES:

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

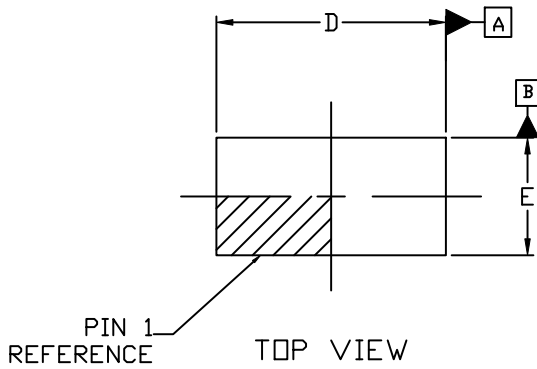
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



# 7WB3306

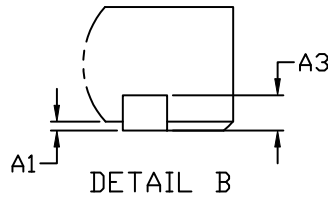
## PACKAGE DIMENSIONS

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

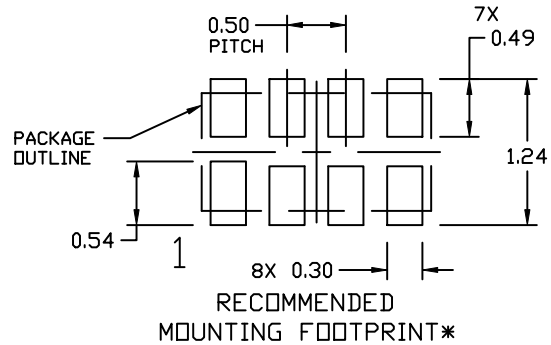
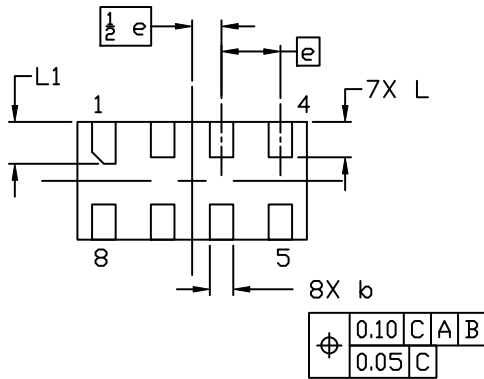
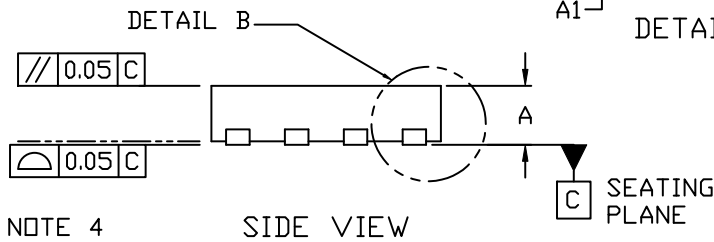


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.20 MM FROM THE TERMINAL TIP.
4. COPLANARITY APPLIES TO ALL THE TERMINALS.
5. PACKAGE DIMENSIONS EXCLUSIVE OF BURRS AND MOLD FLASH.



| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | 0.45        | 0.50 | 0.55 |
| A1  | 0.00        | ---  | 0.05 |
| A3  | 0.13 REF    |      |      |
| b   | 0.15        | 0.20 | 0.25 |
| D   | 1.85        | 1.95 | 2.05 |
| E   | 0.90        | 1.00 | 1.10 |
| e   | 0.50 BSC    |      |      |
| L   | 0.25        | 0.30 | 0.35 |
| L1  | 0.30        | 0.35 | 0.40 |

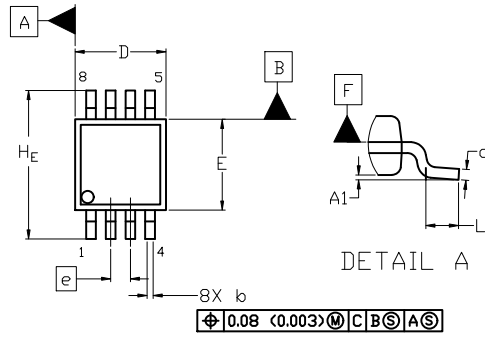


\* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERM/D.

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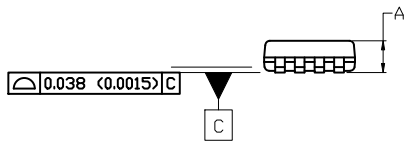
## PACKAGE DIMENSIONS

### Micro8 CASE 846A ISSUE K

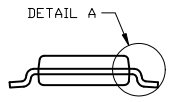


TOP VIEW

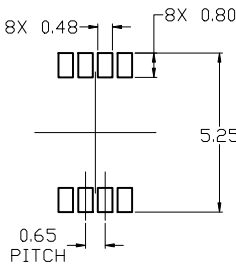
NOTE 3



SIDE VIEW



END VIEW



RECOMMENDED MOUNTING FOOTPRINT

#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION *b* DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.10 mm IN EXCESS OF MAXIMUM MATERIAL CONDITION.
4. DIMENSIONS *D* AND *E* DO NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 mm PER SIDE. DIMENSION *E* DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 mm PER SIDE. DIMENSIONS *D* AND *E* ARE DETERMINED AT DATUM *F*.
5. DATUMS *A* AND *B* ARE TO BE DETERMINED AT DATUM *F*.
6. *A1* IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.

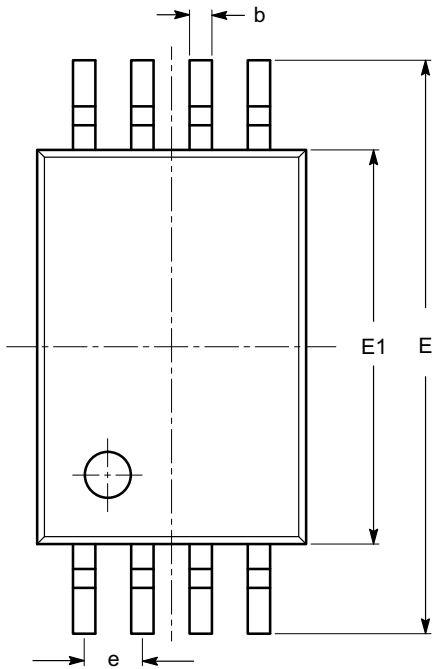
| DIM                  | MILLIMETERS |      |      |
|----------------------|-------------|------|------|
|                      | MIN.        | NOM. | MAX. |
| A                    | ---         | ---  | 1.10 |
| A1                   | 0.05        | 0.08 | 0.15 |
| <i>b</i>             | 0.25        | 0.33 | 0.40 |
| <i>c</i>             | 0.13        | 0.18 | 0.23 |
| <i>D</i>             | 2.90        | 3.00 | 3.10 |
| <i>E</i>             | 2.90        | 3.00 | 3.10 |
| <i>e</i>             | 0.65 BSC    |      |      |
| <i>H<sub>E</sub></i> | 4.75        | 4.90 | 5.05 |
| <i>L</i>             | 0.40        | 0.55 | 0.70 |

■ For additional information on our Pb-Free strategy and soldering details, please download the [DN Semiconductor Soldering and Mounting Techniques Reference Manual, SD\\_02004/1](#).

# 7WB3306

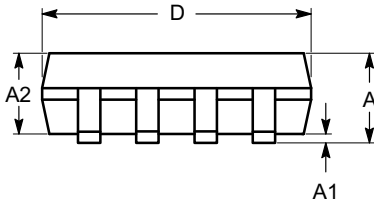
## PACKAGE DIMENSIONS

**TSSOP8, 4.4x3**  
CASE 948AL  
ISSUE O

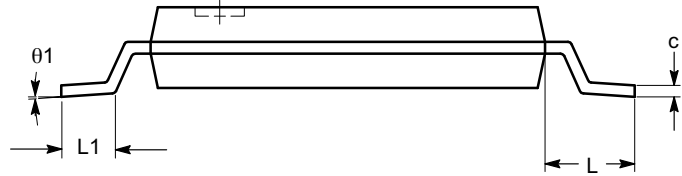


| SYMBOL   | MIN      | NOM  | MAX  |
|----------|----------|------|------|
| A        |          |      | 1.20 |
| A1       | 0.05     |      | 0.15 |
| A2       | 0.80     | 0.90 | 1.05 |
| b        | 0.19     |      | 0.30 |
| c        | 0.09     |      | 0.20 |
| D        | 2.90     | 3.00 | 3.10 |
| 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 |
| $\theta$ | 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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