# 7WB3126

## 2-Bit Bus Switch

The 7WB3126 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 Ω Switch Connection Between 2 Ports
- Power Down Protection Provided on Inputs
- Zero Bounce
- TTL−Compatible Control Inputs
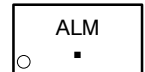- Ultra−Small Pb−Free Packages
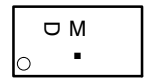- These are Pb−Free Devices

## ON Semiconductor®

**http://onsemi.com**

### MARKING DIAGRAMS

| | | |
|---|---|---|
| 8 1 | UDFN8 MU SUFFIX CASE 517AJ | ALM ▫ |
| 1 | ULLGA8 1.45 x 1.0 CASE 613AA | ▱ M ▫ |
| 1 | ULLGA8 1.6 x 1.0 CASE 613AB | AUM ▫ |
| 1 | ULLGA8 1.95 x 1.0 CASE 613AC | AUM ▫ |
| | Micro8™ DM SUFFIX CASE 846A | 8 3126 AYW▪ 1 |
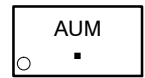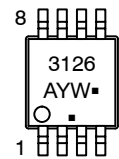
A = Assembly Location
Y = Year
W = Work Week
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.
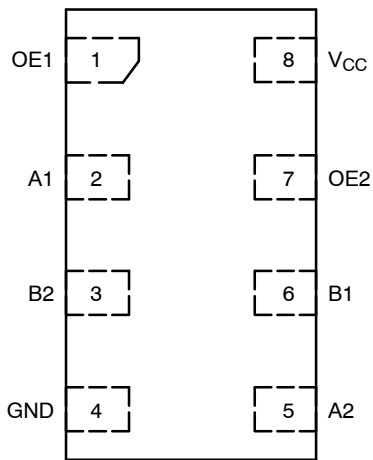
**1**

# 7WB3126

OE1 [1] ... [8] V<sub>CC</sub>

**Figure 1. ULLGA8/UDFN8**
(Top Thru−View)
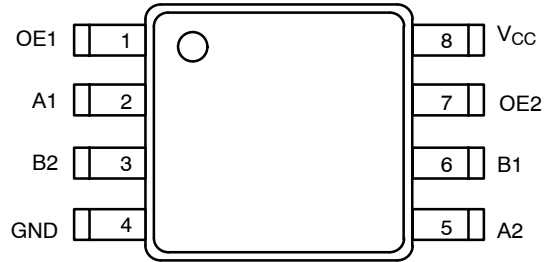
**Figure 2. Micro8**
(Top View)
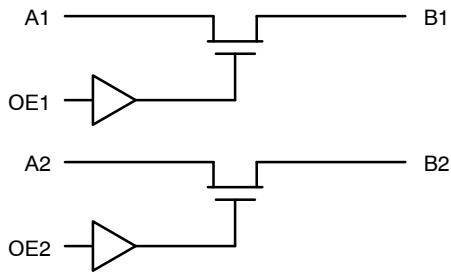
**FUNCTION TABLE**

| Input OEn | Function |
|-----------|----------|
| L | Disconnect |
| H | Bn = An |

**Figure 3. Logic Diagram**

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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 | °C |
| T$_L$ | Lead Temperature, 1 mm from Case for 10 Seconds | | 260 | °C |
| T$_J$ | Junction Temperature Under Bias | | 150 | °C |
| θ$_{JA}$ | Thermal Resistance | UDFN8 (Note 1)<br>ULLGA8<br>Micro8 | 111<br>455<br>392 | °C/W |
| P$_D$ | Power Dissipation in Still Air at 85°C | UDFN8<br>ULLGA8<br>Micro8 | 1127<br>274<br>319 | mW |
| 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)<br>Machine Model (Note 3)<br>Charged Device Model (Note 4) | > 2000<br>> 200<br>N/A | V |
| I$_{LATCHUP}$ | Latchup Performance Above V$_{CC}$ and Below GND at 125°C (Note 5) | | ±200 | mA |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.
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 | °C |
| Δt/ΔV | Input Transition Rise or Fall Rate | Control Input<br>Switch I/O | 0<br>0 | 5<br>DC | nS/V |

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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 4 | | | | | | | |
| 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 | 5.5 | | | ± 0.1 | | ± 1.0 | 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 | | | 6 | 15 | | 15 | |
| | | V$_{I/O}$ = 2.4, I$_{I/O}$ = 15 mA | 4.0 | | 10 | 20 | | 20 | |

## 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 5 | 4.0 to 5.5 | | | 0.25 | | 0.25 | ns |
| t$_{EN}$ | Output Enable Time | See Figure 5 | 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 |

## TYPICAL DC CHARACTERISTICS
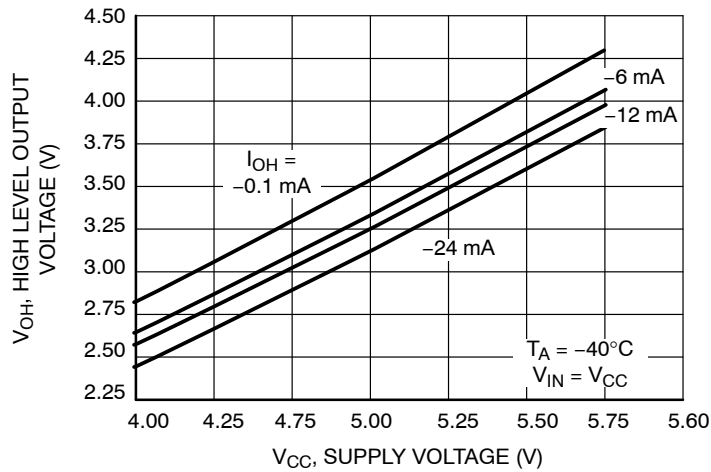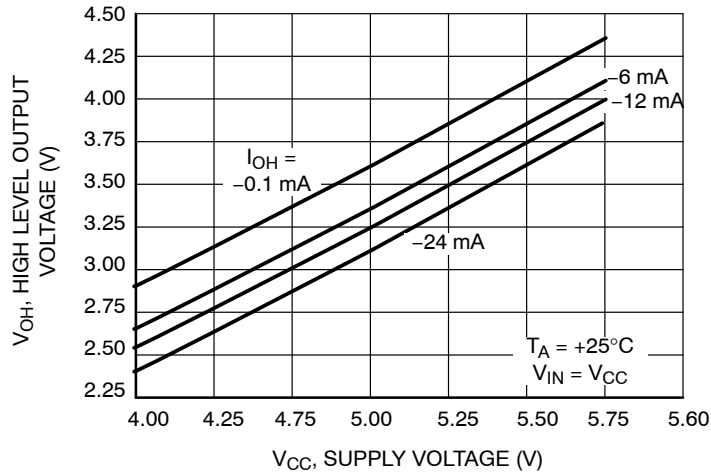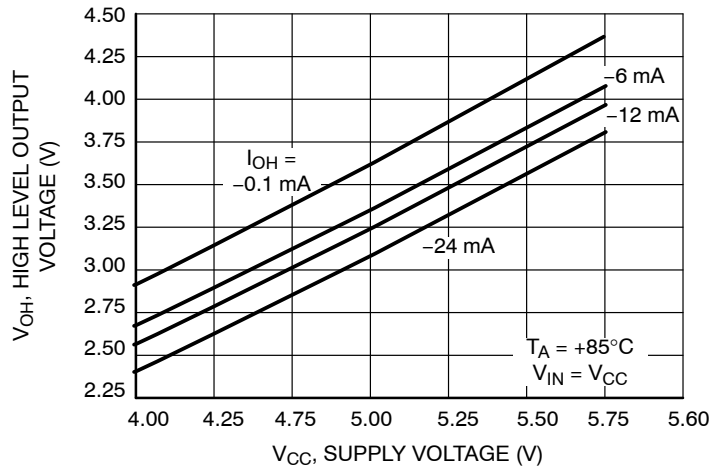


**Figure 4. Output Voltage High vs Supply Voltage**

## AC LOADING AND WAVEFORMS

**Parameter Measurement Information**



| Test | S1 |
|------|-----|
| $t_{PD}$ | Open |
| $t_{PLZ}/t_{PZL}$ | 7 V |
| $t_{PHZ}/t_{PZH}$ | Open |
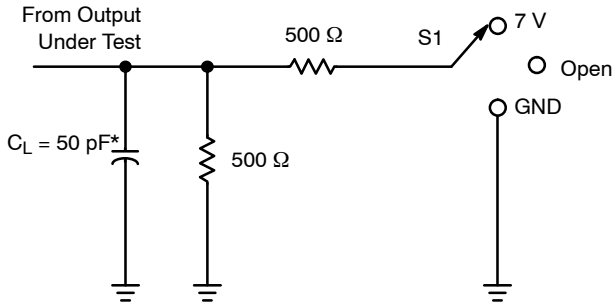
*$C_L$ includes probes and jig capacitance.
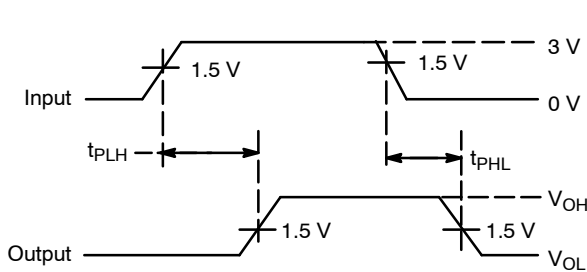


**Voltage Waveforms**
**Propagation Delay Times**
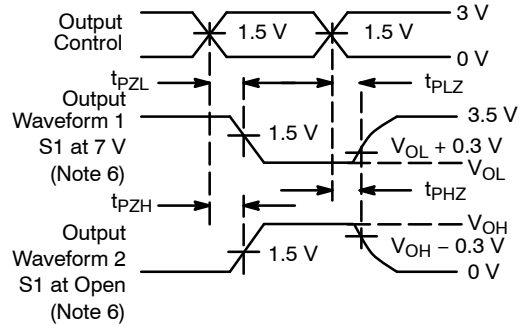


**Voltage Waveforms**
**Enable and Disable Times**

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 MHz, $Z_O$ = 50 $\Omega$, $t_r \leq$ 2.5 ns, $t_f \leq$ 2.5 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 5. $t_{PD}$, $t_{EN}$, $t_{DIS}$ Loading and Waveforms**

**ORDERING INFORMATION**

| Device | Package | Shipping† |
|--------|---------|-----------|
| 7WB3126MUTAG | UDFN8<br>(Pb−Free) | 3000 / Tape & Reel |
| 7WB3126AMX1TCG | ULLGA8 − 0.5 mm Pitch<br>(Pb−Free) | 3000 / Tape & Reel |
| 7WB3126BMX1TCG | ULLGA8 − 0.4 mm Pitch<br>(Pb−Free) | 3000 / Tape & Reel |
| 7WB3126CMX1TCG | ULLGA8 − 0.35 mm Pitch<br>(Pb−Free) | 3000 / Tape & Reel |
| 7WB3126DMR2G | Micro8<br>(Pb−Free) | 4000 / 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**
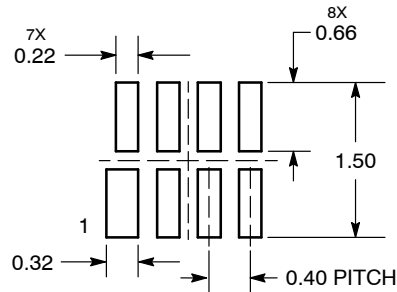CASE 517AJ−01
ISSUE O
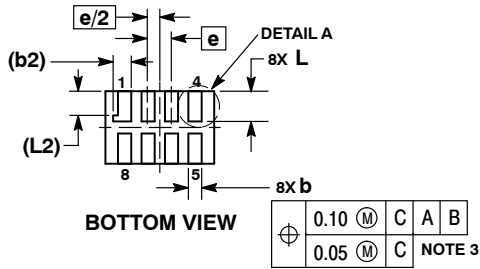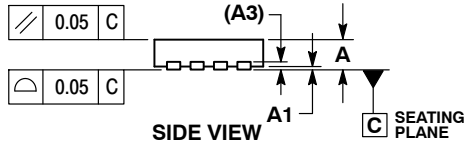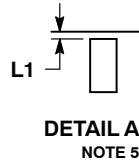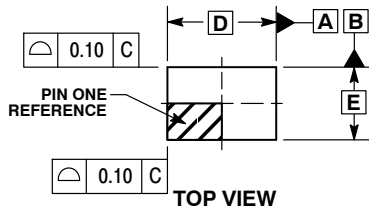
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM TERMINAL TIP.
4. MOLD FLASH ALLOWED ON TERMINALS ALONG EDGE OF PACKAGE. FLASH MAY NOT EXCEED 0.03 ONTO BOTTOM SURFACE OF TERMINALS.
5. DETAIL A SHOWS OPTIONAL CONSTRUCTION FOR TERMINALS.

**TOP VIEW**

**DETAIL A**
NOTE 5

**SIDE VIEW**

SEATING PLANE

**BOTTOM VIEW**

| 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 | |

0.10 (M) C A B
0.05 (M) C   NOTE 3

**MOUNTING FOOTPRINT\***
**SOLDERMASK DEFINED**
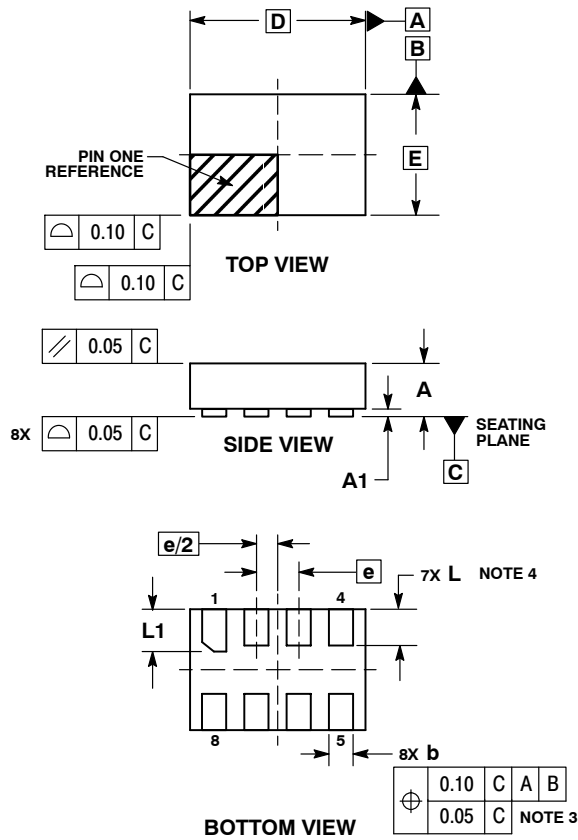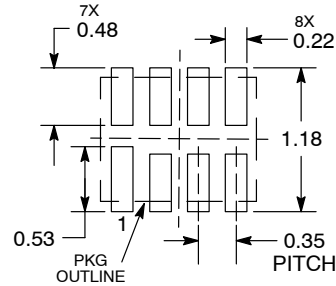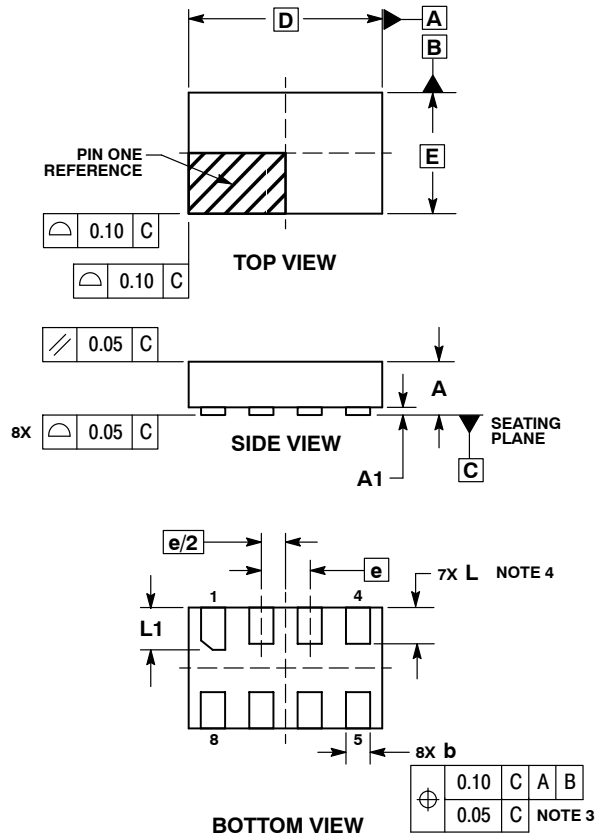
7X
0.22

8X
0.66

1.50

1

0.32

0.40 PITCH

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

**ULLGA8 1.45x1.0, 0.35P**
CASE 613AA–01
ISSUE A
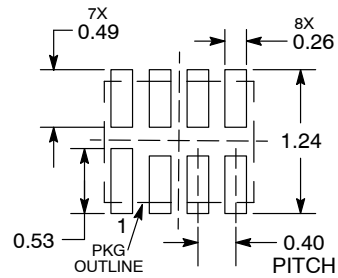
**TOP VIEW**

**SIDE VIEW**

**BOTTOM VIEW**

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.
4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

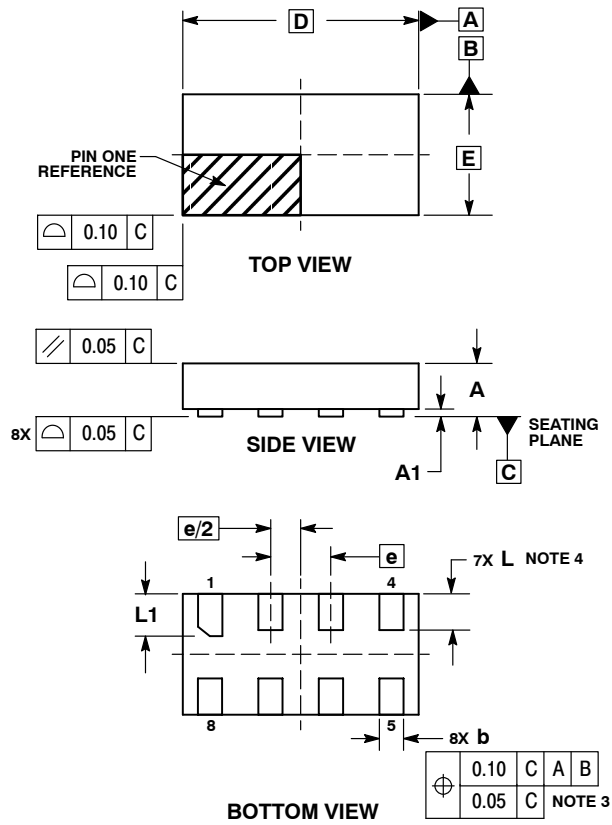| DIM | MILLIMETERS | |
| | MIN | MAX |
| --- | --- | --- |
| A | ––– | 0.40 |
| A1 | 0.00 | 0.05 |
| b | 0.15 | 0.25 |
| D | 1.45 BSC | |
| E | 1.00 BSC | |
| e | 0.35 BSC | |
| L | 0.25 | 0.35 |
| L1 | 0.30 | 0.40 |

### 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

**ULLGA8 1.6x1.0, 0.4P**
CASE 613AB−01
ISSUE A

**TOP VIEW**

PIN ONE
REFERENCE

| | 0.10 | C |
| | 0.10 | C |

**SIDE VIEW**

| | 0.05 | C |
8X | | 0.05 | C |

SEATING PLANE

A1

C

**BOTTOM VIEW**

e/2

e

7X L   NOTE 4

L1

1    4

8    5

8X b

| ⊕ | 0.10 | C | A | B |
| | 0.05 | C | NOTE 3 |

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.
4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

| DIM | MILLIMETERS | |
| | MIN | MAX |
| --- | --- | --- |
| A | ––– | 0.40 |
| A1 | 0.00 | 0.05 |
| b | 0.15 | 0.25 |
| D | 1.60 BSC | |
| E | 1.00 BSC | |
| e | 0.40 BSC | |
| L | 0.25 | 0.35 |
| L1 | 0.30 | 0.40 |

## MOUNTING FOOTPRINT
## SOLDERMASK DEFINED*

7X
0.49

8X
0.26

1.24

0.53

1

PKG
OUTLINE

0.40
PITCH

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.
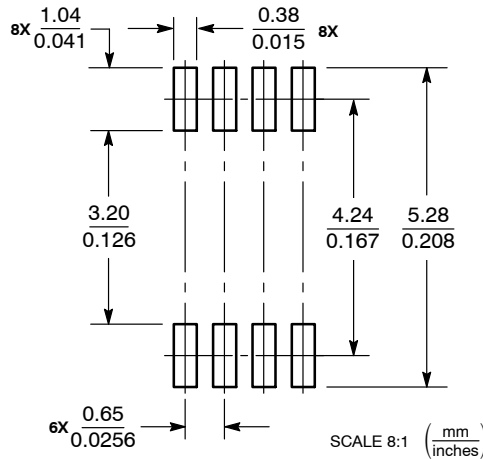
# 7WB3126

## PACKAGE DIMENSIONS

**ULLGA8 1.95x1.0, 0.5P**
CASE 613AC−01
ISSUE A

**TOP VIEW**

PIN ONE REFERENCE

0.10 | C

0.10 | C

**SIDE VIEW**

0.05 | C

8X | 0.05 | C

SEATING PLANE

A1 | C

**BOTTOM VIEW**

e/2

e

7X **L** NOTE 4

1     4

L1

8     5

8X **b**

| | | | |
|---|---|---|---|
| 0.10 | C | A | B |
| 0.05 | C | NOTE 3 | |

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.
4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

| DIM | MILLIMETERS | |
|---|---|---|
| | MIN | MAX |
| A | ––– | 0.40 |
| A1 | 0.00 | 0.05 |
| 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 |
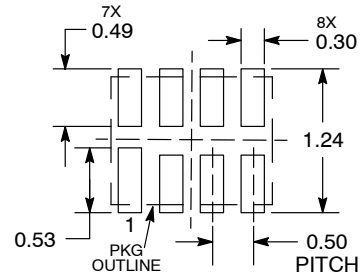
## MOUNTING FOOTPRINT SOLDERMASK DEFINED*

7X
0.49

8X
0.30

1.24

0.53

1

PKG OUTLINE

0.50 PITCH

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

**Micro8** ™
CASE 846A−02
ISSUE H
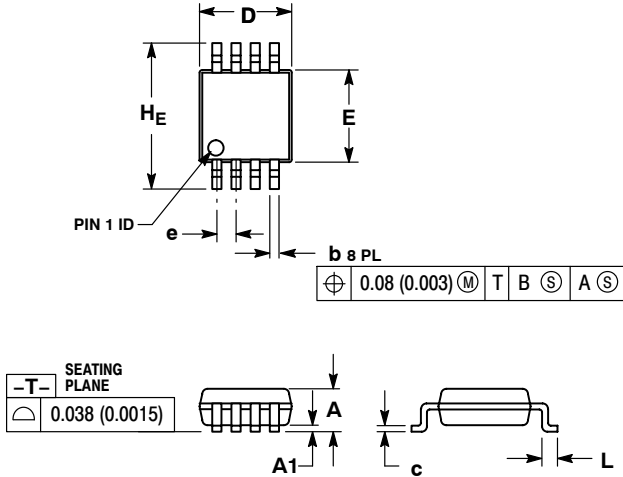
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. 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 |
| $H_E$ | 4.75 | 4.90 | 5.05 | 0.187 | 0.193 | 0.199 |

## SOLDERING FOOTPRINT*

8X $\frac{1.04}{0.041}$    $\frac{0.38}{0.015}$ 8X

$\frac{3.20}{0.126}$    $\frac{4.24}{0.167}$  $\frac{5.28}{0.208}$

6X $\frac{0.65}{0.0256}$    SCALE 8:1 $\left(\frac{mm}{inches}\right)$

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

Micro8 is a trademark of International Rectifier.

## PUBLICATION ORDERING INFORMATION