

# 7WB3306

## 2-Bit Bus Switch

The 7WB3306 is an advanced high-speed low-power 2-bit bus switch in ultra-small footprints.

### Features

- High Speed:  $t_{PD} = 0.25 \text{ ns (Max) @ } V_{CC} = 4.5 \text{ V}$
- $3 \Omega$  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



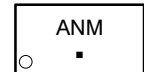
**ON Semiconductor®**

<http://onsemi.com>

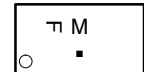
### MARKING DIAGRAMS



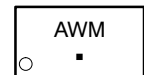
**UDFN8**  
**MU SUFFIX**  
**CASE 517AJ**



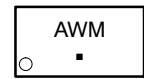
**ULLGA8**  
**1.45 x 1.0**  
**CASE 613AA**



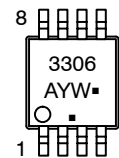
**ULLGA8**  
**1.6 x 1.0**  
**CASE 613AB**



**ULLGA8**  
**1.95 x 1.0**  
**CASE 613AC**



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



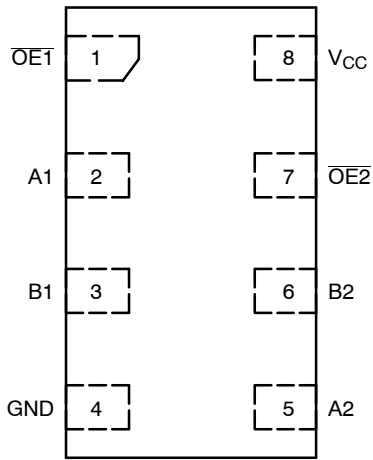
A = Assembly Location  
Y = Year  
W = Work Week  
M = Date Code  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

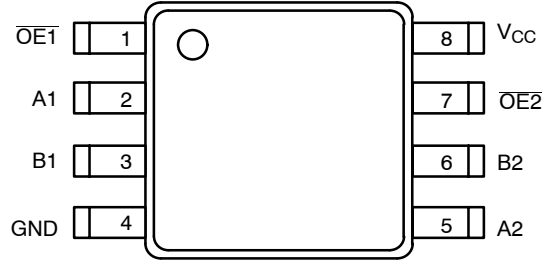
### ORDERING INFORMATION

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

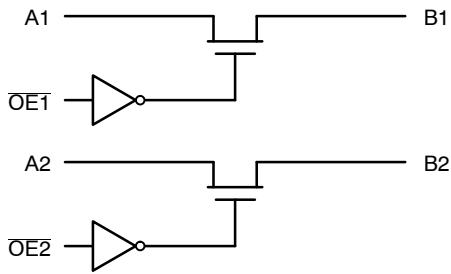
# 7WB3306



**Figure 1. ULLGA8/UDFN8**  
(Top Thru-View)



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



**Figure 3. Logic Diagram**

## FUNCTION TABLE

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

## 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	$\pm 128$	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	$^{\circ}C/W$
		ULLGA8	455	
		Micro8	392	
$P_D$	Power Dissipation in Still Air at 85 $^{\circ}C$	UDFN8	1127	mW
		ULLGA8	274	
		Micro8	319	
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)	$\pm 200$	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	$^{\circ}C$	
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate	Control Input	0	5	nS/V
		Switch I/O	0	DC	

## DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	T <sub>A</sub> = 25°C			T <sub>A</sub> = -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 (Control)		4.0 to 5.5	2.0			2.0		V
V <sub>IL</sub>	Low-Level Input Voltage (Control)		4.0 to 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, 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 (Control Pin)	One input at 3.4 V; Other inputs at V <sub>CC</sub> or GND	5.5					2.5	mA
R <sub>ON</sub>	Switch ON Resistance	V <sub>I/O</sub> = 0, I <sub>I/O</sub> = 64 mA I <sub>I/O</sub> = 30 mA	4.5		3 3	7 7		7 7	Ω
		V <sub>I/O</sub> = 2.4, I <sub>I/O</sub> = 15 mA			6	15		15	
		V <sub>I/O</sub> = 2.4, I <sub>I/O</sub> = 15 mA	4.0		10	20		20	

## AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test Condition	V <sub>CC</sub> (V)	T <sub>A</sub> = 25 °C			T <sub>A</sub> = -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 5.5			0.25		0.25	ns
t <sub>EN</sub>	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 <sub>DIS</sub>	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 <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

# 7WB3306

## TYPICAL DC CHARACTERISTICS

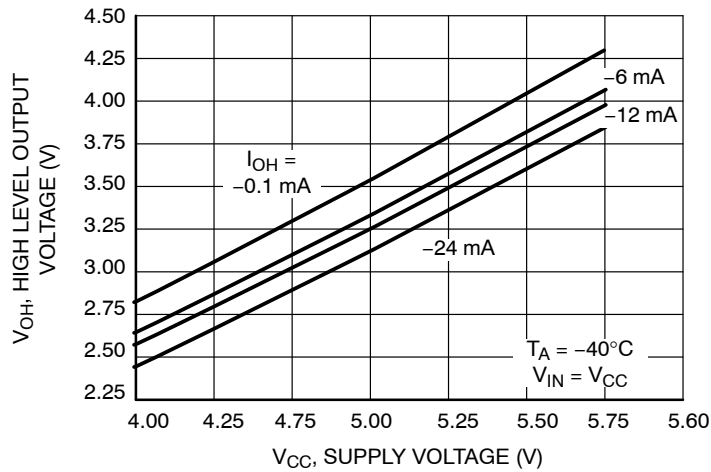
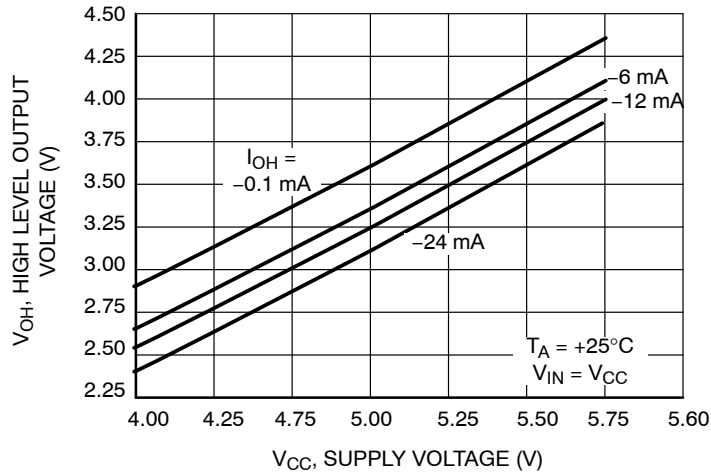
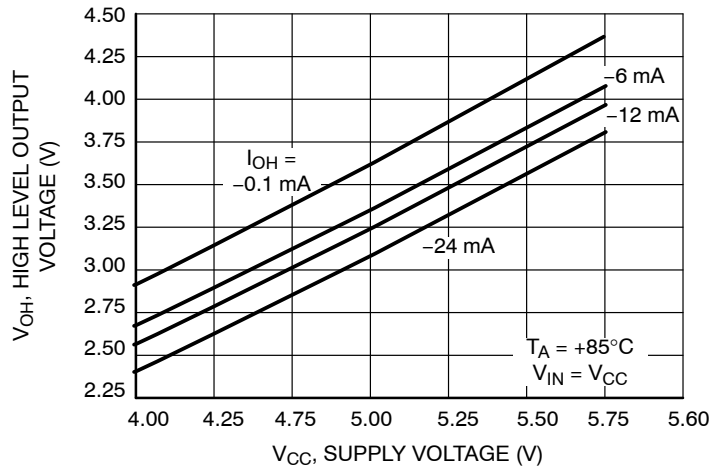
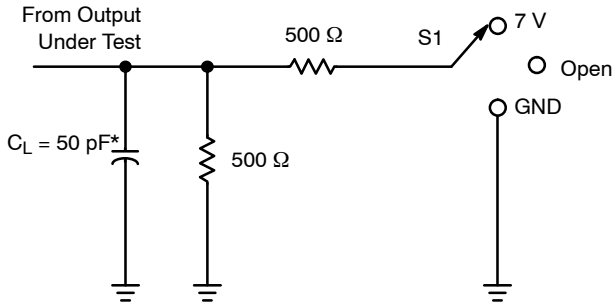


Figure 4. Output Voltage High vs Supply Voltage

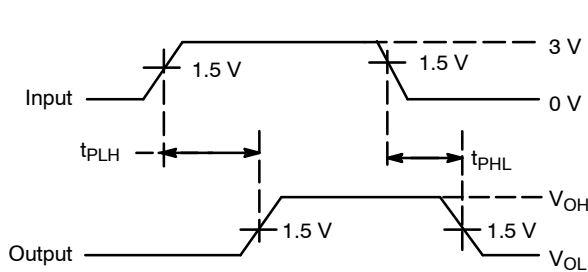
AC LOADING AND WAVEFORMS

Parameter Measurement Information

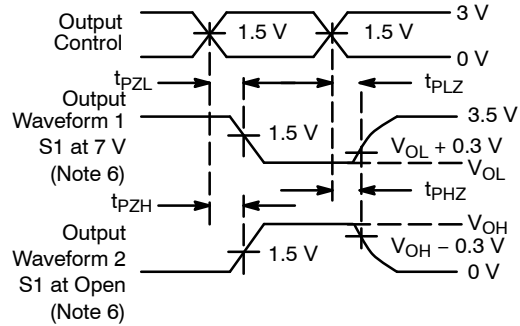


\* $C_L$  includes probes and jig capacitance.

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

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

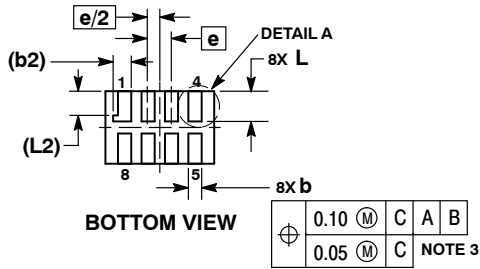
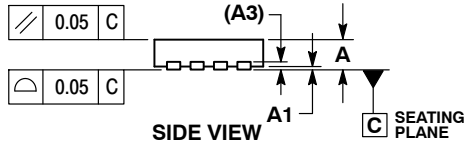
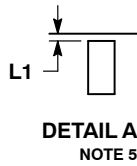
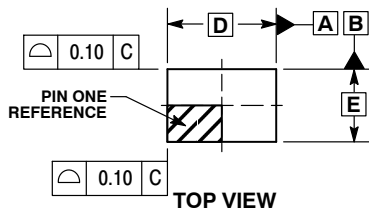
Device	Package	Shipping†
7WB3306MUTAG	UDFN8 (Pb-Free)	3000 / Tape & Reel
7WB3306AMX1TCG	ULLGA8 – 0.5 mm Pitch (Pb-Free)	3000 / Tape & Reel
7WB3306BMX1TCG	ULLGA8 – 0.4 mm Pitch (Pb-Free)	3000 / Tape & Reel
7WB3306CMX1TCG	ULLGA8 – 0.35 mm Pitch (Pb-Free)	3000 / Tape & Reel
7WB3306DMR2G	Micro8 (Pb-Free)	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.

# 7WB3306

## PACKAGE DIMENSIONS

UDFN8 1.8 x 1.2, 0.4P  
CASE 517AJ-01  
ISSUE O

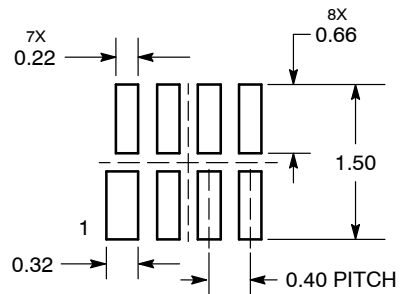


**NOTES:**

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.

MILLIMETERS		
DIM	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**



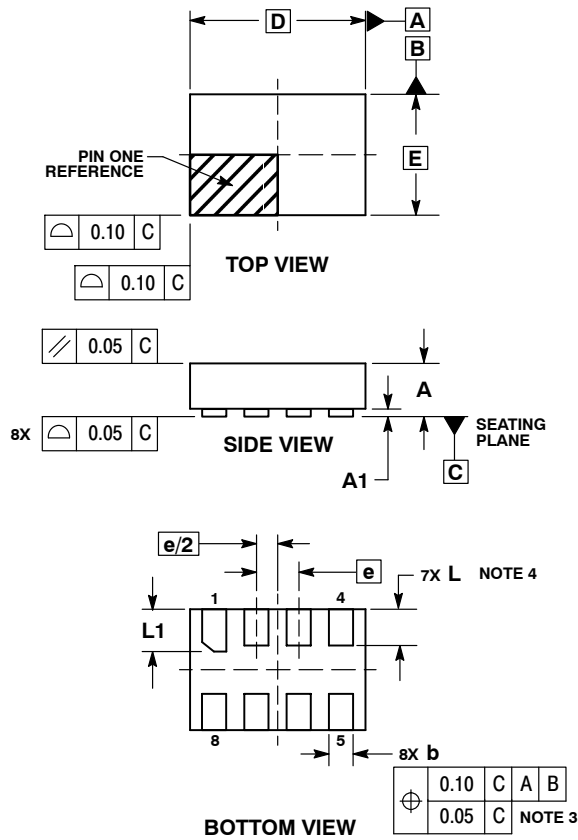
DIMENSIONS: MILLIMETERS

\*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

ULLGA8 1.45x1.0, 0.35P  
CASE 613AA-01  
ISSUE A

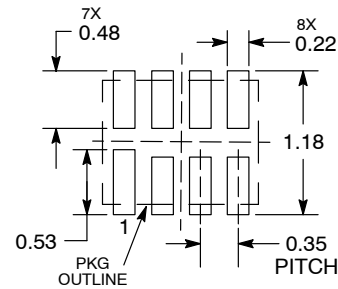


**NOTES:**

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.

MILLIMETERS		
DIM	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

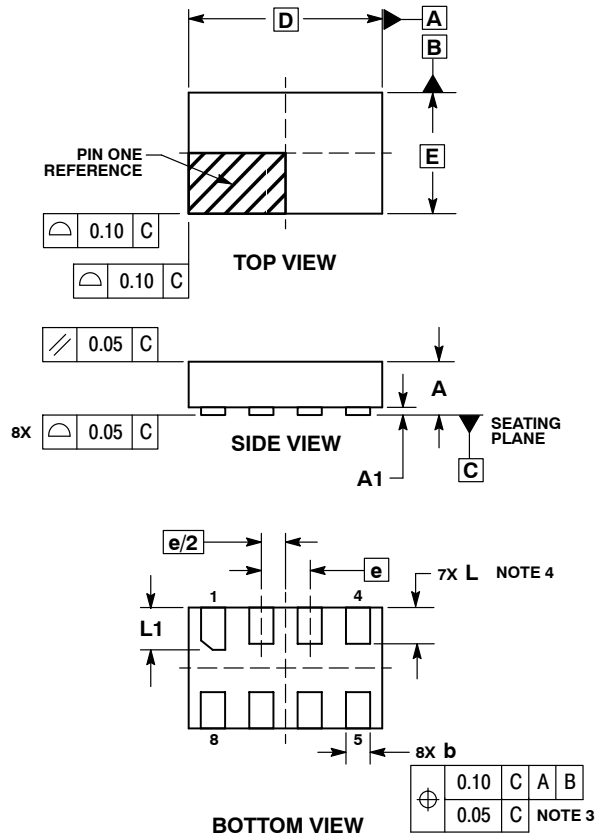
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# 7WB3306

## PACKAGE DIMENSIONS

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

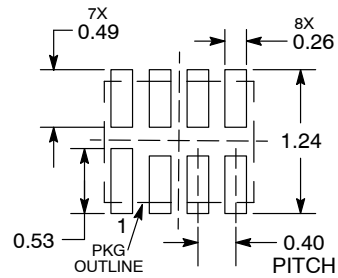


**NOTES:**

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.

MILLIMETERS		
DIM	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\***



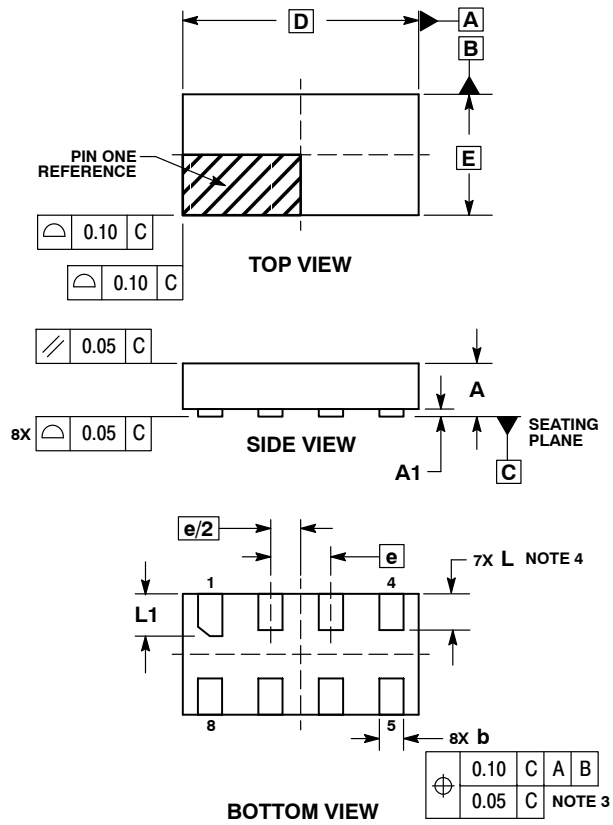
DIMENSIONS: MILLIMETERS

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# 7WB3306

## PACKAGE DIMENSIONS

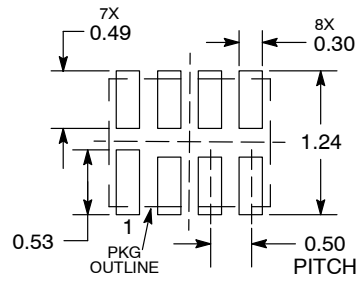
ULLGA8 1.95x1.0, 0.5P  
CASE 613AC-01  
ISSUE A



- 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.

MILLIMETERS		
DIM	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\*



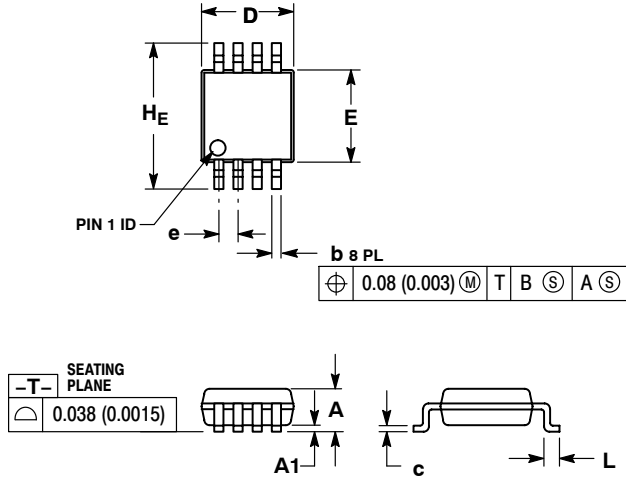
DIMENSIONS: MILLIMETERS

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# 7WB3306

## PACKAGE DIMENSIONS

Micro8™  
CASE 846A-02  
ISSUE H

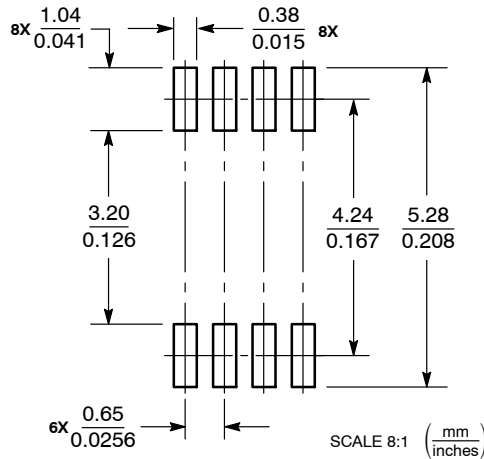


### NOTES:

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
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.

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