

# ON Semiconductor

## Is Now

# onsemi™

To learn more about onsemi™, please visit our website at  
[www.onsemi.com](http://www.onsemi.com)

---

**onsemi** and **onsemi** and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi** product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner. Other names and brands may be claimed as the property of others.

# 2-Bit Translating Bus Switch

## 7WBD3125

The 7WBD3125 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
- NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These are Pb-Free Devices



**ON Semiconductor®**

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

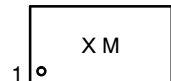
### MARKING DIAGRAMS



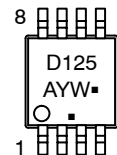
**UDFN8**  
MU SUFFIX  
CASE 517AJ



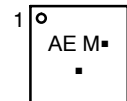
**UDFN8**  
1.95 x 1.0  
CASE 517CA



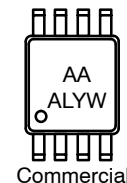
**Micro8**  
DM SUFFIX  
CASE 846A



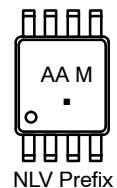
**UQFN8**  
MU SUFFIX  
CASE 523AN



**US8**  
US SUFFIX  
CASE 493



Commercial



NLV Prefix

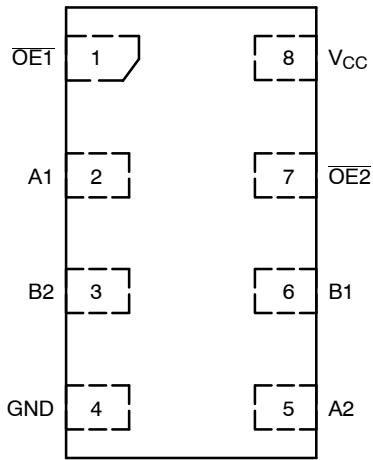
AF, X, D125, AE, AA	= Specific Device Code
M	= Date Code
A	= Assembly Location
L	= Lot Code
Y	= Year Code
W	= Week Code
▪	= Pb-Free Package

(Note: Microdot may be in either location)

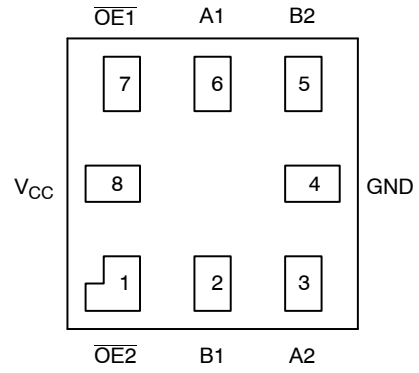
### ORDERING INFORMATION

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

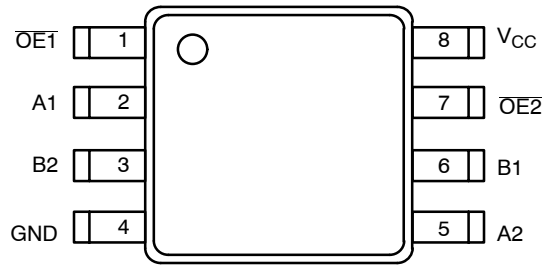
# 7WBD3125



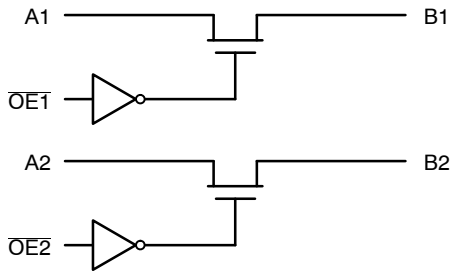
**Figure 1. UDFN8**  
(Top Thru-View)



**Figure 2. UQFN8**  
(Top Thru-View)



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



**Figure 4. Logic Diagram**

**FUNCTION TABLE**

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

# 7WBD3125

## 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	US8 (Note 1)	251	$^{\circ}C/W$
		UDFN8	111	
		UQFN8	208	
		Micro8	392	
$P_D$	Power Dissipation in Still Air at 85 $^{\circ}C$	US8	498	mW
		UDFN8	1127	
		UQFN8	601	
		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 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
		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.

# 7WBD3125

## 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 5							
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 OE1 = OE2 = GND OE1 = OE2 = V <sub>CC</sub>	5.5			±1.0 ±0.1		±1.0 ±1.0	mA 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			15	50		50	
		V <sub>I/O</sub> = 2.4, I <sub>I/O</sub> = 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 <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 6	4.0 to 5.5			0.25		0.25	ns
t <sub>EN</sub>	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 <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

# 7WBD3125

## TYPICAL DC CHARACTERISTICS

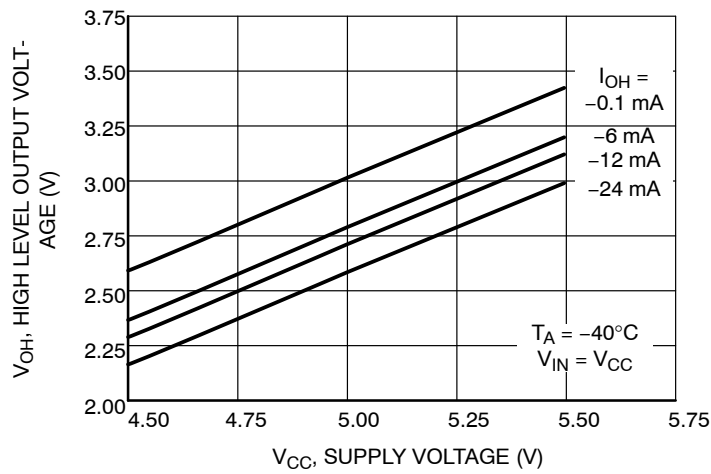
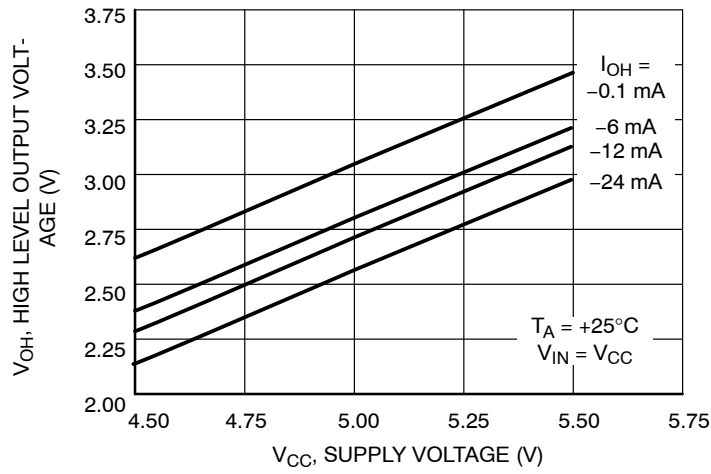
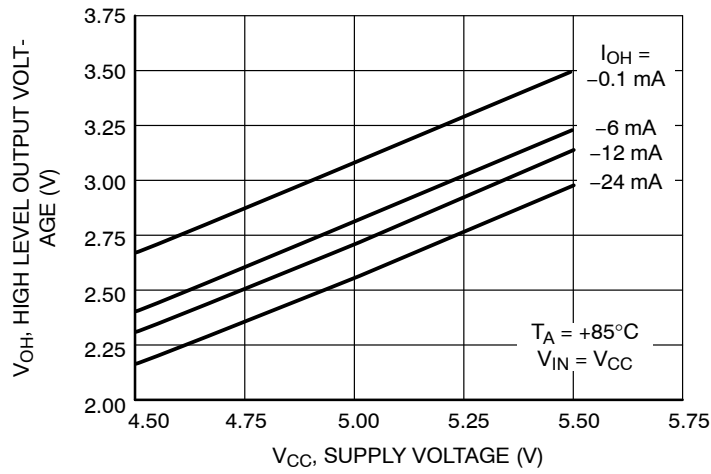
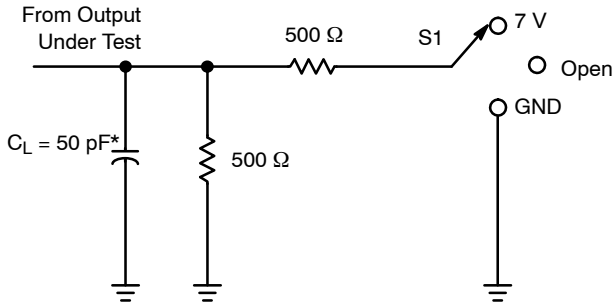


Figure 5. Output Voltage High vs Supply Voltage

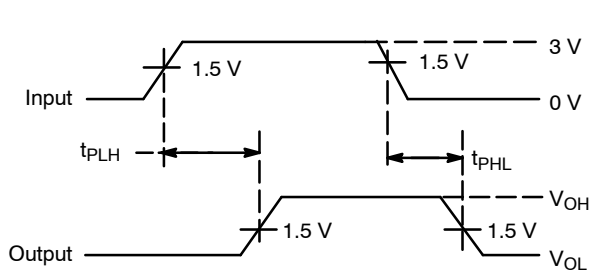
AC LOADING AND WAVEFORMS

Parameter Measurement Information

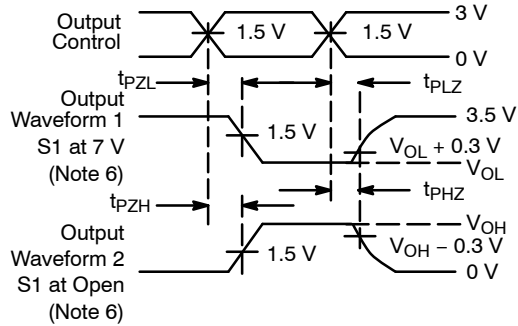


\* $C_L$  includes probes and jig capacitance.

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

# 7WBD3125

## ORDERING INFORMATION

Device	Package	Shipping†
7WBD3125USG	US8 (Pb-Free)	3000 / Tape & Reel
NLV7WBD3125USG*	US8 (Pb-Free)	3000 / Tape & Reel
7WBD3125MUTAG	UDFN8 (Pb-Free)	3000 / Tape & Reel
7WBD3125AMUTCG	UQFN8 (Pb-Free)	3000 / Tape & Reel
7WBD3125DMR2G	Micro8 (Pb-Free)	4000 / Tape & Reel
7WBD3125DMUTCG	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.

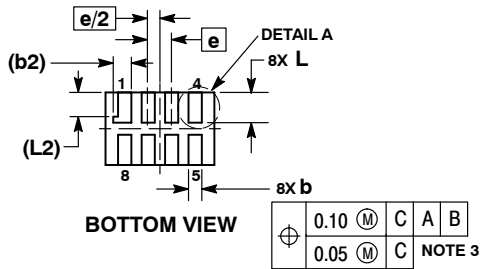
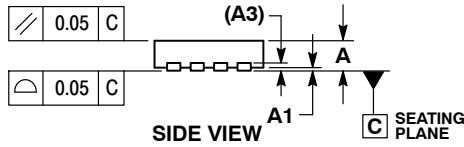
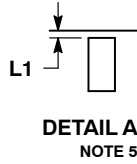
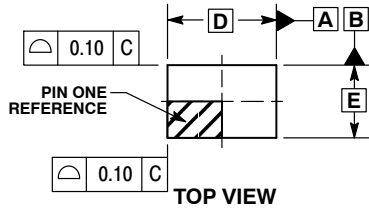
\*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.



# 7WBD3125

## PACKAGE DIMENSIONS

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

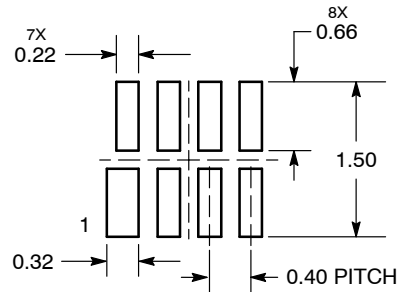


**NOTES:**

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**



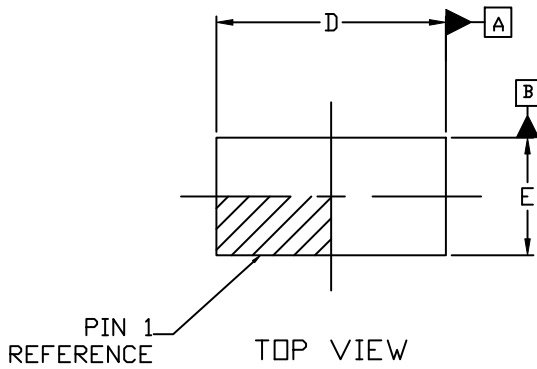
DIMENSIONS: MILLIMETERS

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

# 7WBD3125

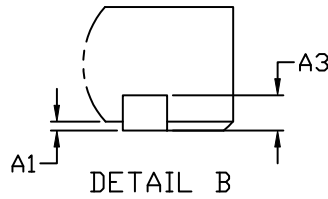
## PACKAGE DIMENSIONS

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

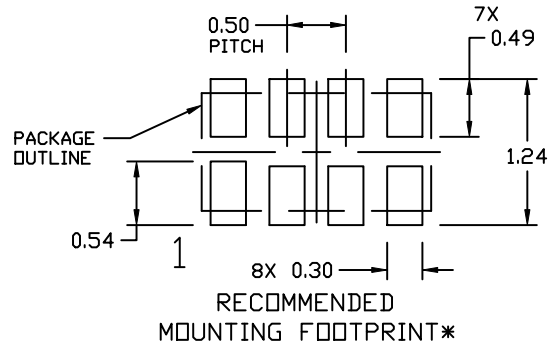
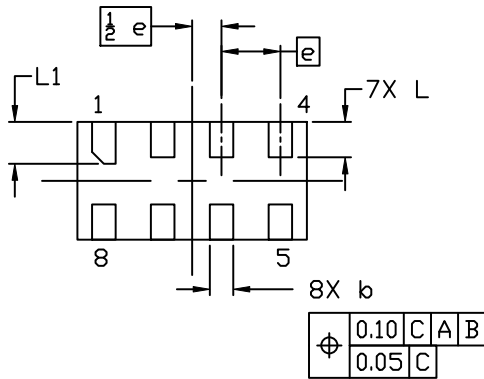
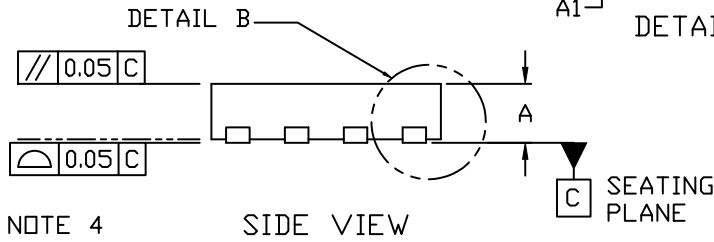


NOTES:

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 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

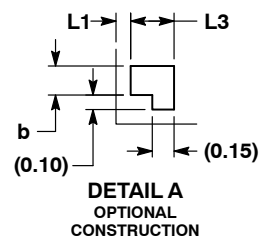
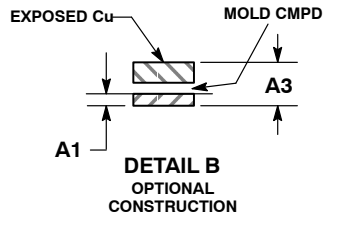
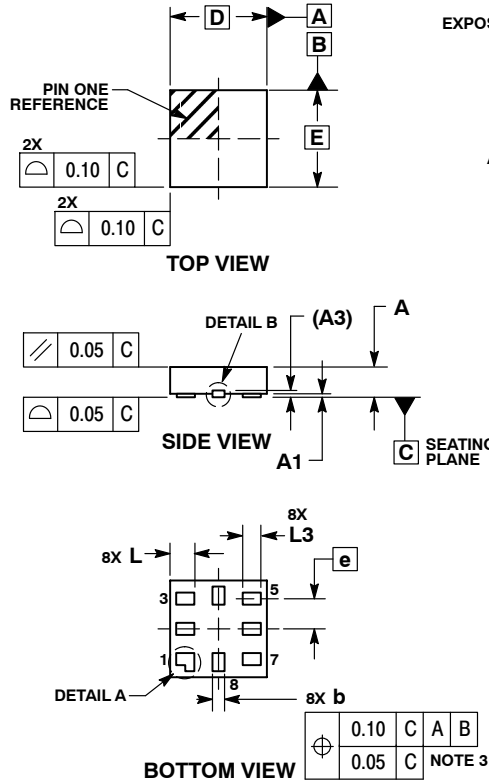


\* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERM/D.

# 7WBD3125

## PACKAGE DIMENSIONS

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

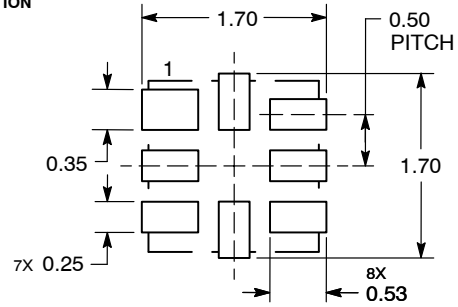


**NOTES:**

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\***



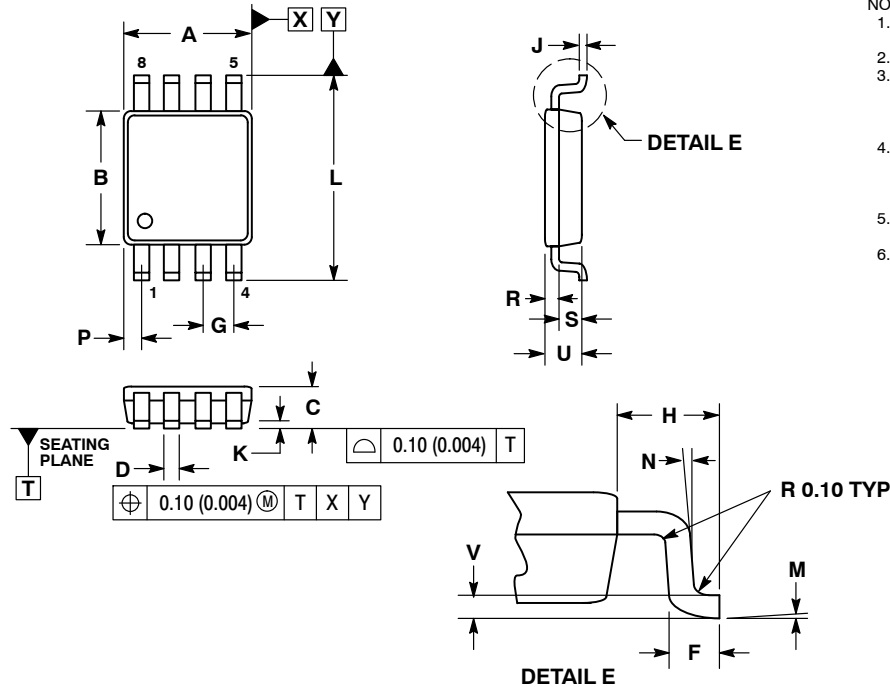
DIMENSIONS: MILLIMETERS

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

# 7WBD3125

## PACKAGE DIMENSIONS

US8  
CASE 493  
ISSUE D

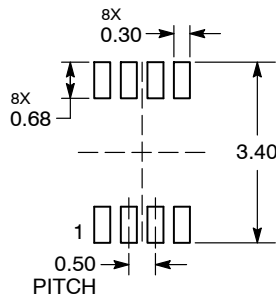


NOTES:

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 0.14MM (0.0055") PER SIDE.
4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH AND PROTRUSION SHALL NOT EXCEED 0.14MM (0.0055") PER SIDE.
5. LEAD FINISH IS SOLDER PLATING WITH THICKNESS OF 0.0076-0.0203MM (0.003-0.008").
6. ALL TOLERANCE UNLESS OTHERWISE SPECIFIED  $\pm 0.0508\text{MM}$  (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	0.128
M	0°	6°	0°	6°
N	0°	10°	0°	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	

### RECOMMENDED SOLDERING FOOTPRINT\*



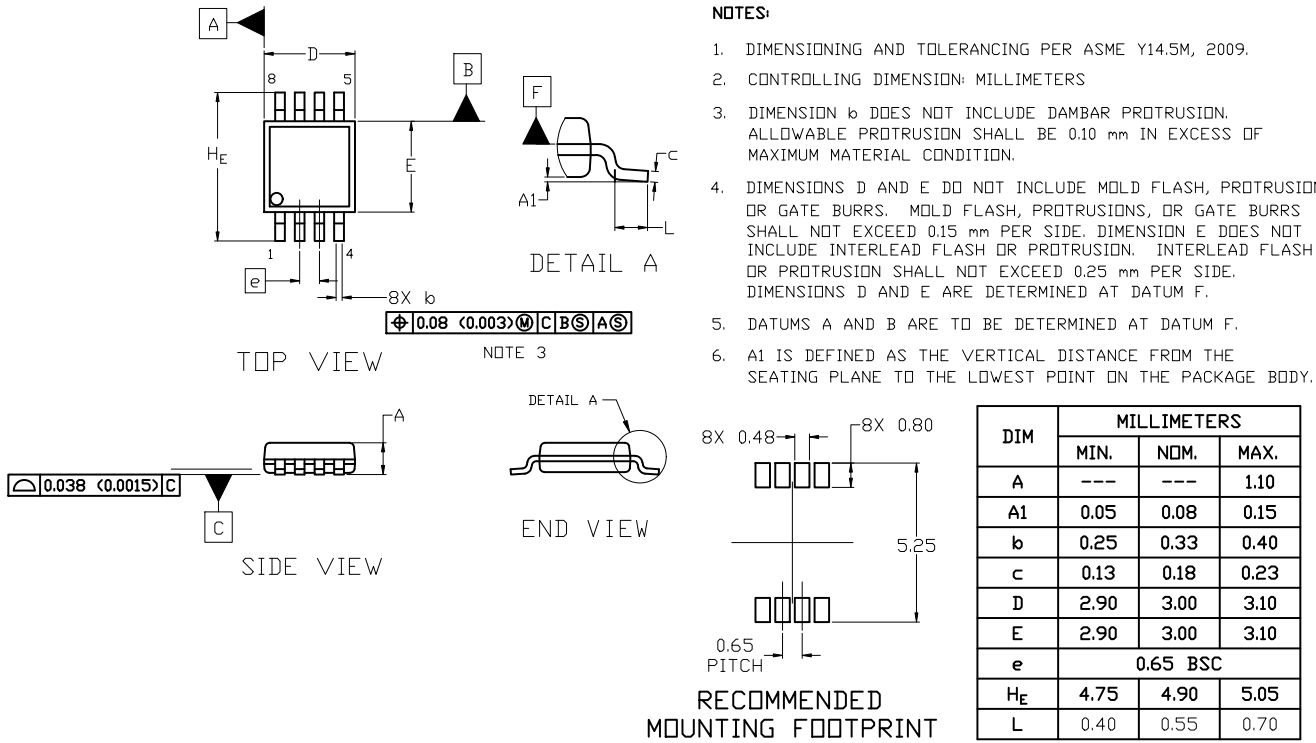
DIMENSIONS: MILLIMETERS

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

# 7WBD3125

## PACKAGE DIMENSIONS

### Micro8 CASE 846A ISSUE K



For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, [SOLDS004/1.0](#).

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

### PUBLICATION ORDERING INFORMATION

**LITERATURE FULFILLMENT:**  
Email Requests to: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**TECHNICAL SUPPORT**  
**North American Technical Support:**  
Voice Mail: 1 800-282-9855 Toll Free USA/Canada  
Phone: 011 421 33 790 2910

**Europe, Middle East and Africa Technical Support:**  
Phone: 00421 33 790 2910  
For additional information, please contact your local Sales Representative