**ON Semiconductor** 

Is Now

# Onsemi

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# **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:  $t_{PD} = 0.25 \text{ ns} (Max) @ V_{CC} = 4.5 \text{ V}$
- 3 Ω Switch Connection Between 2 Ports
- Power Down Protection Provided on Inputs
- Zero Bounce
- TTL-Compatible Control Inputs
- Ultra-Small Pb-Free Packages
- 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®**

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UDFN8

#### MARKING DIAGRAMS

AFM

.

ХМ



CASE 517AJ UDFN8



1.95 x 1.0 CASE 517CA 10





UQFN8 **MU SUFFIX** CASE 523AN

Micro8

**DM SUFFIX** 

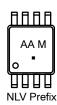
**CASE 846A** 





US8 **US SUFFIX CASE 493** 

8888 AA ALYW Commercial

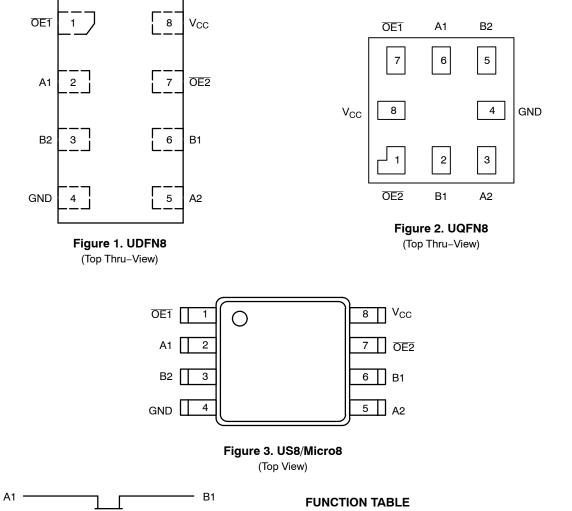


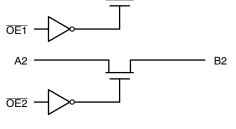
AF, X, D125, AE, AA M	= Specific Device Code = Date Code
А	= Assembly Location
L	= Lot Code
Υ	= Year Code
W	= Week Code
•	= Pb-Free Package

(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.







Input OEn	Function
L	Bn = An
Н	Disconnect

#### **MAXIMUM RATINGS**

Symbol	Parameter		Value	Unit
V <sub>CC</sub>	DC Supply Voltage		-0.5 to +7.0	V
V <sub>IN</sub>	Control Pin Input Voltage		-0.5 to +7.0	V
V <sub>I/O</sub>	Switch Input / Output Voltage		–0.5 to +7.0	V
I <sub>IK</sub>	Control Pin DC Input Diode Current	V <sub>IN</sub> < GND	-50	mA
Ι <sub>ΟΚ</sub>	Switch I/O Port DC Diode Current	V <sub>I/O</sub> < GND	-50	mA
Ι <sub>Ο</sub>	ON-State Switch Current		±128	mA
	Continuous Current Through $V_{CC}$ or GND		±150	mA
I <sub>CC</sub>	DC Supply Current Per Supply Pin		±150	mA
I <sub>GND</sub>	DC Ground Current per Ground Pin		±150	mA
T <sub>STG</sub>	Storage Temperature Range	Storage Temperature Range		°C
TL	Lead Temperature, 1 mm from Case for 10 Secon	ds	260	°C
TJ	Junction Temperature Under Bias		150	°C
$\theta_{JA}$	Thermal Resistance	US8 (Note 1) UDFN8 UQFN8 Micro8	251 111 208 392	°C/W
P <sub>D</sub>	Power Dissipation in Still Air at 85°C	US8 UDFN8 UQFN8 Micro8	498 1127 601 319	mW
MSL	Moisture Sensitivity		Level 1	
F <sub>R</sub>	Flammability Rating Oxygen Index: 28 to 34		UL 94 V-0 @ 0.125 in	
V <sub>ESD</sub>	ESD Withstand Voltage Human Body Mode (Note 2) Machine Model (Note 3) Charged Device Model (Note 4)		> 2000 > 200 N/A	V
ILATCHUP	Latchup Performance Above V <sub>CC</sub> and Below GNE	D at 125°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.

Tested to EIA / JESD22-A115-A.
 Tested to JESD22-C101-A.

5. Tested to EIA / JESD78.

#### **RECOMMENDED OPERATING CONDITIONS**

Symbol	Parameter			Max	Unit
V <sub>CC</sub>	Positive DC Supply Voltage		4.0	5.5	V
V <sub>IN</sub>	Control Pin Input Voltage			5.5	V
V <sub>I/O</sub>	Switch Input / Output Voltage		0	5.5	V
T <sub>A</sub>	Operating Free-Air Temperature		-55	+125	°C
Δt / ΔV		rol Input /itch I/O	0 0	5 DC	nS/V

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

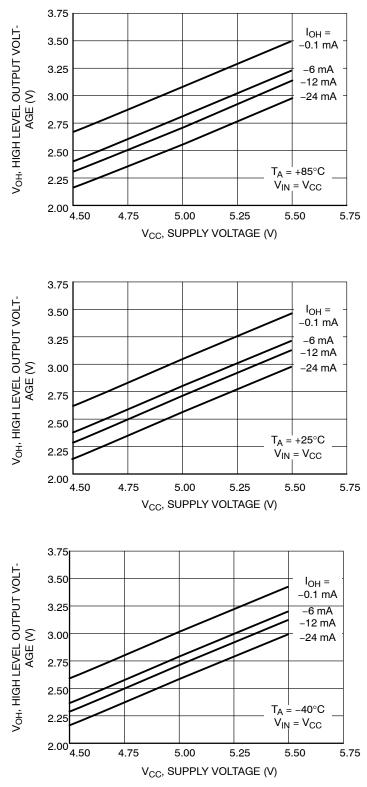
			$V_{CC}$ $T_A = 25^{\circ}C$		с	T <sub>A</sub> = –55°C to +125°C			;
Symbol	Parameter	Conditions	(V)	Min	Тур	Max	Min	Max	Unit
V <sub>IK</sub>	Clamp Diode Voltage	I <sub>I/O</sub> = -18 mA	4.5			-1.2		-1.2	V
V <sub>IH</sub>	High-Level Input Voltage (Control)		4.0 to 5.5	2.0			2.0		V
V <sub>IL</sub>	Low-Level 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	$0 \le V_{IN} \le 5.5 V$	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
Icc	Quiescent Supply Current	$I_{O} = 0,$ $V_{IN} = V_{CC} \text{ or } 0 \text{ V}$ $\overline{OE1} = \overline{OE2} = \text{GND}$ $\overline{OE1} = \overline{OE2} = V_{CC}$	5.5			±1.0 ±0.1		±1.0 ±1.0	mA μA
$\Delta I_{CC}$	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 <sub>ON</sub>	Switch ON Resistance	$V_{I/O} = 0,$ $I_{I/O} = 64 \text{ mA}$ $I_{I/O} = 30 \text{ mA}$	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

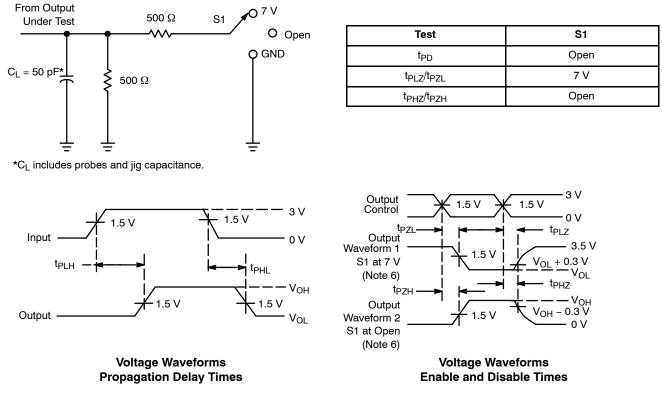
			V <sub>CC</sub>	T <sub>A</sub> = 25 °C		T <sub>A</sub> = −55°C to +125°C			
Symbol	Parameter	Test Condition	(V)	Min	Тур	Max	Min	Max	Unit
t <sub>PD</sub>	Propagation Delay, Bus to Bus	See Figure 6	4.0 to 5.5			0.25		0.25	ns
t <sub>EN</sub>	Output Enable Time	See Figure 6	4.5 to 5.5	0.8	2.5	4.2	0.8	4.2	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

## **TYPICAL DC CHARACTERISTICS**





#### AC LOADING AND WAVEFORMS



#### **Parameter Measurement Information**

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<sub>O</sub> = 50  $\Omega$ , t<sub>r</sub>  $\leq$  2.5 ns, t<sub>f</sub>  $\leq$  2.5 ns. 8. The outputs are measured one at a time, with one transition per measurement.

9. t<sub>PLZ</sub> and t<sub>PHZ</sub> are the same as t<sub>DIS</sub>.

10.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{EN}$ . 11.  $t_{PHL}$  and  $t_{PLH}$  are the same as  $t_{PD}$ .

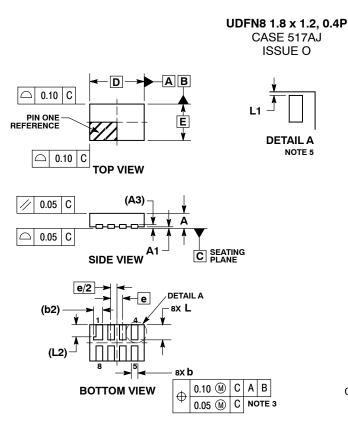


#### **ORDERING INFORMATION**

Device	Package	Shipping <sup>†</sup>	
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.

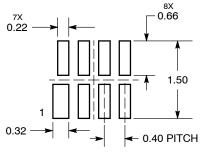
#### PACKAGE DIMENSIONS



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

eenennee nenne				
	MILLIMETERS			
DIM	MIN MAX			
Α	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		
Е	1.20	BSC		
е	0.40	BSC		
L	0.45 0.55			
L1	0.00	0.03		
L2	0.40 REF			

#### **MOUNTING FOOTPRINT\*** SOLDERMASK DEFINED

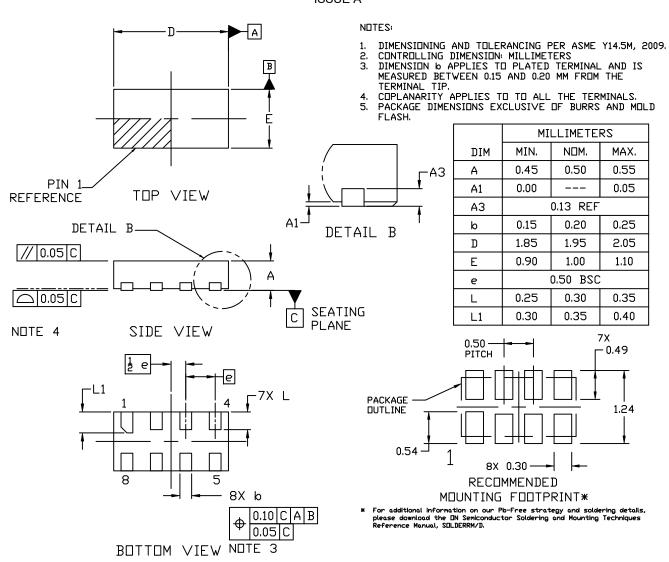


DIMENSIONS: MILLIMETERS

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

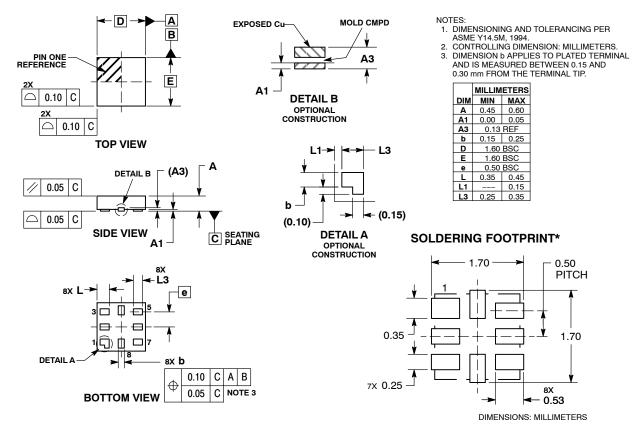
#### PACKAGE DIMENSIONS

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



#### PACKAGE DIMENSIONS

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



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

0.50

¥

8X

0.53

PITCH

1.70

#### PACKAGE DIMENSIONS

US8 **CASE 493** ISSUE D

INCHES

MIN MAX

0.024 0.035

0.008 0.014

0.020 BSC

0.016 REF

0.004 0.007

0.009 0.013

0.005 BSC

0.083

0.094

0.010

0.004

0.128

6

10 °

0.013

0.075

0.087

0.007

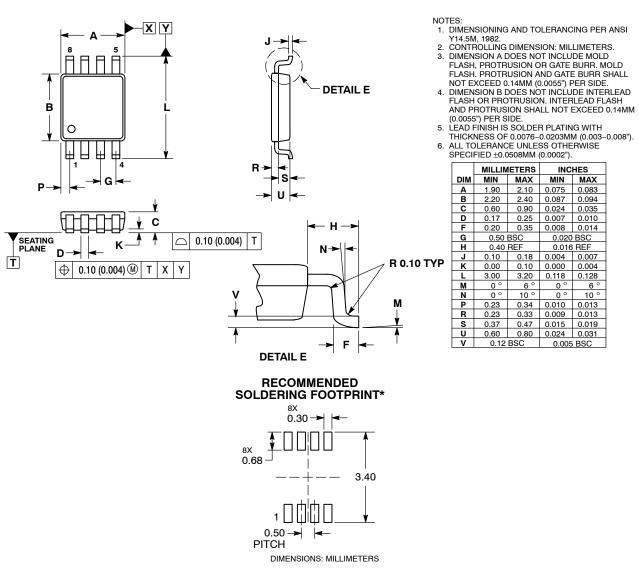
0.000

0.118

0

0.010

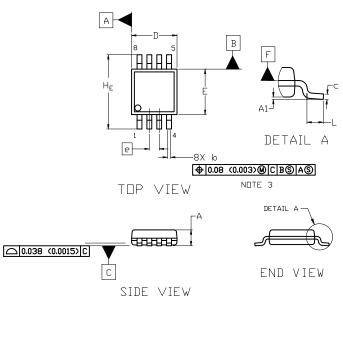
0 °



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

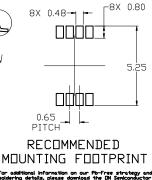
#### PACKAGE DIMENSIONS

#### Micro8 CASE 846A ISSUE K



#### NDTES

- 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
- 2. CONTROLLING DIMENSION: MILLIMETERS
- DIMENSION 6 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. AI IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.



DIM	MILLIMETERS				
DIM	MIN.	NDM.	MAX.		
Α			1.10		
A1	0.05	0.08	0.15		
ø	0.25	0.33	0.40		
с	0.13	0.18	0.23		
D	2.90	3.00	3.10		
E	2.90	3.00	3.10		
e	0.65 BSC				
Η <sub>E</sub>	4.75	4.90	5.05		
L	0.40	0.55	0.70		

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