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2-Bit Translating Bus Switch

7WBD3306

The 7WBD3306 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
- These are Pb-Free Devices-



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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





TSSOP8 DT SUFFIX CASE 948AL



AH, X, D125, AF, AAE = Specific Device Code

M = Date Code

A = Assembly Location
L = Lot Code
Y = Year Code
W = Work Week Code
Pb-Free Package

(Note: Microdot may be in either location)*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

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

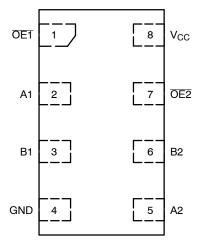


Figure 1. UDFN8 (Top Thru-View)

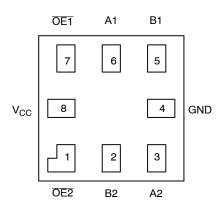


Figure 2. UQFN8 (Top Thru-View)

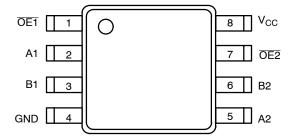


Figure 3. US8/Micro8/TSSOP8 (Top View)

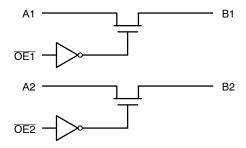


Figure 4. Logic Diagram

FUNCTION TABLE

Input OEn	Function		
L	Bn = An		
Н	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		± 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	
TL	Lead Temperature, 1 mm from Case for 10 Sec	conds	260	°C
TJ	Junction Temperature Under Bias		150	°C
θЈА	Thermal Resistance	mal Resistance US8 (Note 1) UDFN8 UQFN8 Micro8 TSSOP8		°C/W
P _D	Power Dissipation in Still Air at 85°C	US8 UDFN8 UQFN8 Micro8 TSSOP8	498 1127 601 319 833	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 Hur Charge	> 2000 > 200 N/A	V	
I _{LATCHUP}	Latchup Performance Above V _{CC} and Below G	±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.
- Tested to JESD22-C101-A.
 Tested to EIA / JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter			Max	Unit
V _{CC}	Positive DC Supply Voltage		4.0	5.5	V
V _{IN}	Control Pin Input Voltage			5.5	V
V _{I/O}	Switch Input / Output Voltage			5.5	V
T _A	Operating Free-Air Temperature			+125	°C
Δt / ΔV	Input Transition Rise or Fall Rate	Control Input Switch 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

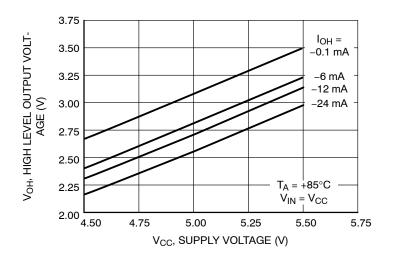
			V _{CC}	T _A = 25°C		T _A = -55°C to +125°C			
Symbol	Parameter	Conditions	(V)	Min	Тур	Max	Min	Max	Unit
V _{IK}	Clamp Diode Voltage	I _{I/O} = -18 mA	4.5			-1.2		-1.2	V
V _{IH}	High-Level Input Voltage (Control)		4.0 to 5.5	2.0			2.0		V
V _{IL}	Low-Level Input Voltage (Control)		4.0 to 5.5			0.8		0.8	V
V _{OH}	Output Voltage High	See Figure 5							
I _{IN}	Input Leakage Current	$0 \le V_{IN} \le 5.5 V$	5.5			±0.1		±1.0	μΑ
I _{OFF}	Power Off Leakage Current	V _{I/O} = 0 to 5.5 V	0			±0.1		±1.0	μΑ
I _{CC}	Quiescent Supply Current	$\begin{aligned} I_{O} &= 0, \\ V_{IN} &= V_{CC} \text{ or } 0 \text{ V} \\ \hline OE1 &= \overline{OE2} = \text{GND} \\ \hline OE1 &= \overline{OE2} = V_{CC} \end{aligned}$	5.5			±1.0 ±0.1		±1.0 ±1.0	mΑ μΑ
Δl _{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	$V_{I/O} = 0,$ $I_{I/O} = 64 \text{ mA}$ $I_{I/O} = 30 \text{ mA}$	4.5		3 3	7 7		7 7	Ω
		V _{I/O} = 2.4, I _{I/O} = 15 mA			15	50		50	
		$V_{I/O} = 2.4,$ $I_{I/O} = 15 \text{ mA}$	4.0	-	50	70		70	

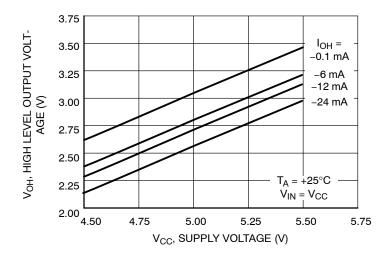
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

AC ELECTRICAL CHARACTERISTICS

			V _{CC}	T _A = 25 °C		T _A = -55°C to +125°C			
Symbol	Parameter	Test Condition	(V)	Min	Тур	Max	Min	Max	Unit
t _{PD}	Propagation Delay, Bus to Bus	See Figure 6	4.0 to 5.5			0.25		0.25	ns
t _{EN}	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 _{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





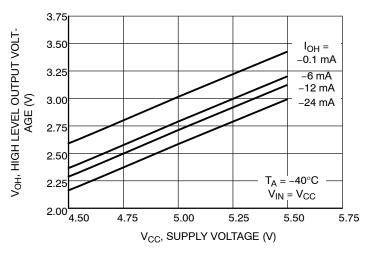
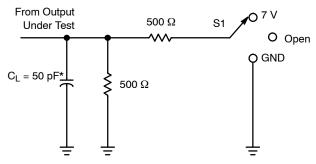


Figure 5. Output Voltage High vs Supply Voltage

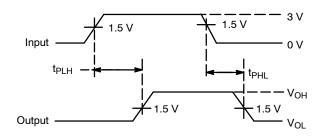
AC LOADING AND WAVEFORMS

Parameter Measurement Information

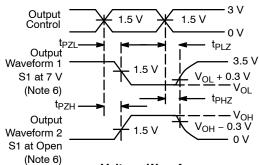


Test	S1
t _{PD}	Open
t _{PLZ} /t _{PZL}	7 V
t _{PHZ} /t _{PZH}	Open

^{*}CL includes probes and jig capacitance.







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 All input pulses are supplied by generators having the following characteristics: PRR \leq 10 MHz, $Z_0 = 50 \ \Omega$, $t_r \leq$ 2.5 ns, $t_f \leq$ 2.5 ns.
- The outputs are measured one at a time, with one transition per measurement.
- 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

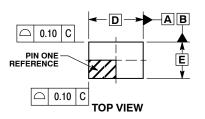
ORDERING INFORMATION

Device	Package	Shipping [†]
7WBD3306USG	US8 (Pb-Free)	3000 / Tape & Reel
7WBD3306MUTAG	D3306MUTAG UDFN8 (Pb-Free)	
7WBD3306AMUTCG	UQFN8 (Pb-Free)	3000 / Tape & Reel
WBD3306DMR2G Micro8 (Pb-Free)		4000 / Tape & Reel
7WBD3306DTR2G	TSSOP8 (Pb-Free)	4000 / Tape & Reel
7WBD3306DMUTCG	UDFN8, 1.95 x 1.0, 0.5P (Pb-Free)	3000 / Tape & Reel

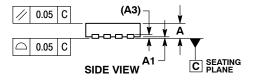
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

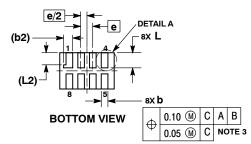
PACKAGE DIMENSIONS

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





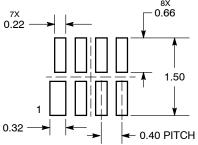




- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. DIMENSION & APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM TERMINAL TIP.
 4. MOLD FLASH ALLOWED ON TERMINALS ALONG EOGE OF PACKAGE, FLASH MAY NOT EXCEED 0.03 ONTO BOTTOM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

	MILLIMETERS					
DIM	MIN	MAX				
Α	0.45	0.55				
A1	0.00	0.05				
А3	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

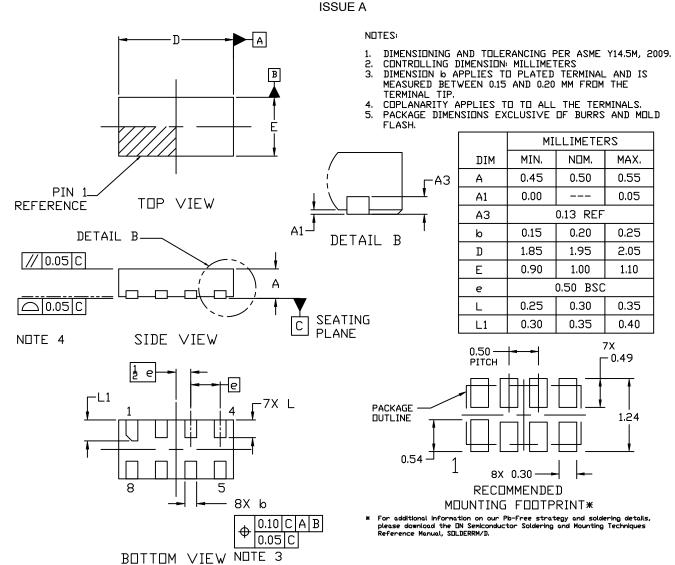


DIMENSIONS: MILLIMETERS

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

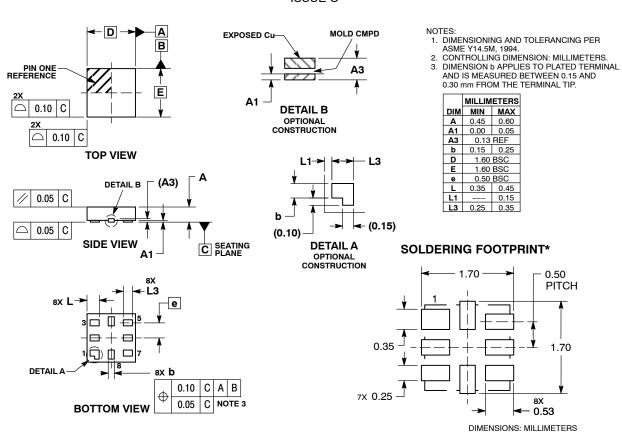
PACKAGE DIMENSIONS

UDFN8 1.95x1.0, 0.5P CASE 517CA



PACKAGE DIMENSIONS

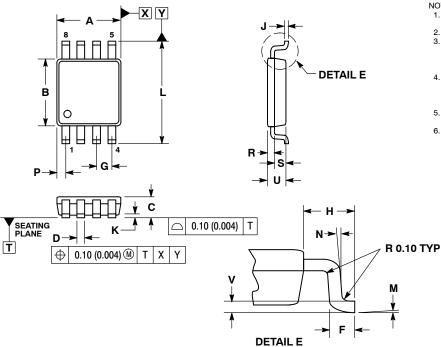
UQFN8, 1.6x1.6, 0.5P CASE 523AN ISSUE O



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

PACKAGE DIMENSIONS

US8 **CASE 493** ISSUE D



- NOTES:

 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

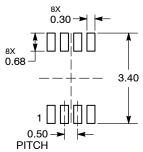
 2. CONTROLLING DIMENSION: MILLIMETERS.

 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 AND PROTRUSION. INTERLEAD FLASH AND PROTRUSION SHALL NOT EXCEED 0.14MM (0.0055") PER SIDE.
- AND PHOTHOSION SHALL NOT EXCEED 0.14MM (0.0055") PER SIDE.
 LEAD FINISH IS SOLDER PLATING WITH
 THICKNESS OF 0.0076-0.0203MM (0.003-0.008").
 ALL TOLERANCE UNLESS OTHERWISE
 SPECIFIED ±0.0508MM (0.0002").

	MILLIN	IETERS	INC	HES
DIM	MIN	MAX	MIN	MAX
Α	1.90	2.10	0.075	0.083
В	2.20	2.40	0.087	0.094
С	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
Н	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 °
Р	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*



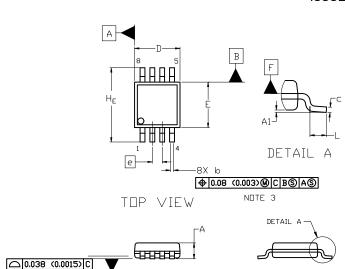
DIMENSIONS: MILLIMETERS

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

PACKAGE DIMENSIONS

Micro8 CASE 846A ISSUE K

END VIEW

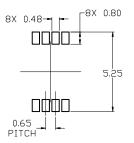


SIDE VIEW

С

NOTES:

- 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. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.



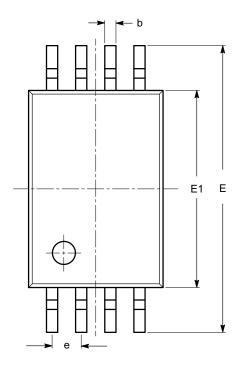
MILLIMETERS DIM MIN. NDM. MAX. 1.10 Α A1 0.05 0.08 0.15 b 0.25 0.33 0.40 0.23 c 0.13 0.18 D 2.90 3.00 3.10 Ε 2.90 3.00 3.10 0.65 BSC e HE 4.75 4.90 5.05 0.40 0.55 0.70

RECOMMENDED MOUNTING FOOTPRINT

soldering details, please download the DN Seniconductor Soldering and Mounting Techniques Reference Manual, SDLDERRY/D.

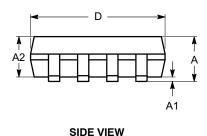
PACKAGE DIMENSIONS

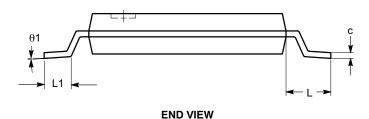
TSSOP8, 4.4x3 CASE 948AL ISSUE O



SYMBOL	MIN	NOM	MAX			
Α			1.20			
A1	0.05		0.15			
A2	0.80	0.90	1.05			
b	0.19		0.30			
С	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			
е	0.65 BSC					
L	1.00 REF					
L1	0.50	0.60	0.75			
θ	0°		8°			







Notes:

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MO-153.

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<u>7WBD3306AMX1TCG</u> <u>7WBD3306BMX1TCG</u> <u>7WBD3306CMX1TCG</u> <u>7WBD3306MUTAG</u> <u>7WBD3306DTR2G</u> 7WBD3306AMUTCG 7WBD3306USG