

# 7WB3305

## 2-Bit Bus Switch

The 7WB3305 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



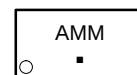
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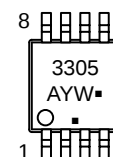
### MARKING DIAGRAMS



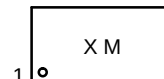
UDFN8  
MU SUFFIX  
CASE 517AJ



Micro8™  
DM SUFFIX  
CASE 846A



UDFN8  
1.95 x 1.0  
CASE 517CA



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 7 of this data sheet.

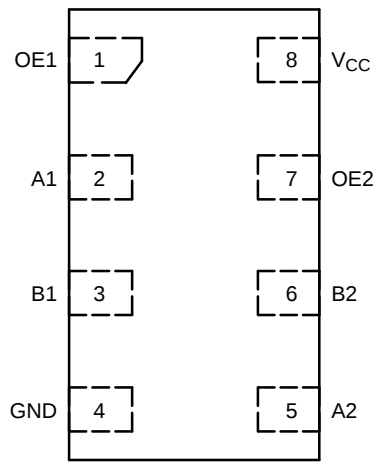


Figure 1. UDFN8  
(Top Thru-View)

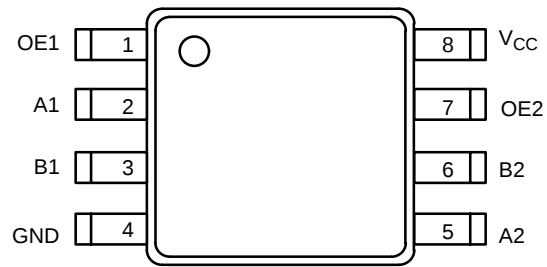


Figure 2. Micro8  
(Top View)

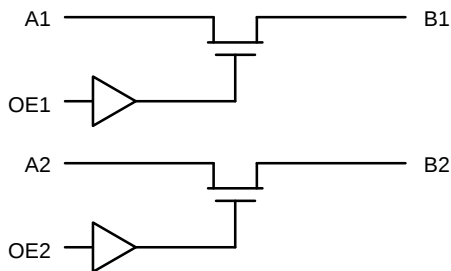


Figure 3. Logic Diagram

FUNCTION TABLE

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

## 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<br>$V_{IN} < GND$                                                         | -50                    | mA   |
| $I_{OK}$      | Switch I/O Port DC Diode Current<br>$V_{I/O} < GND$                                                          | -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            | °C   |
| $T_L$         | Lead Temperature, 1 mm from Case for 10 Seconds                                                              | 260                    | °C   |
| $T_J$         | Junction Temperature Under Bias                                                                              | 150                    | °C   |
| $\theta_{JA}$ | Thermal Resistance<br>UDFN8 (Note 1)<br>Micro8                                                               | 111<br>392             | °C/W |
| $P_D$         | Power Dissipation in Still Air at 85°C<br>UDFN8<br>Micro8                                                    | 1127<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<br>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)                                           | $\pm 200$              | 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    | °C   |
| $\Delta t/\Delta V$ | Input Transition Rise or Fall Rate<br>Control Input<br>Switch I/O | 0<br>0 | 5<br>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

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

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><br>(V) | T <sub>A</sub> = 25 °C |     |      | T <sub>A</sub> =<br>-55°C to +125°C |      | Unit |
|----------------------|----------------------------------|----------------------------|------------------------|------------------------|-----|------|-------------------------------------|------|------|
|                      |                                  |                            |                        | Min                    | Typ | Max  | Min                                 | Max  |      |
| t <sub>PD</sub>      | Propagation Delay,<br>Bus to Bus | See Figure 5               | 4.0 to<br>5.5          |                        |     | 0.25 |                                     | 0.25 | ns   |
| t <sub>EN</sub>      | Output Enable Time               | See Figure 5               | 4.5 to<br>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<br>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

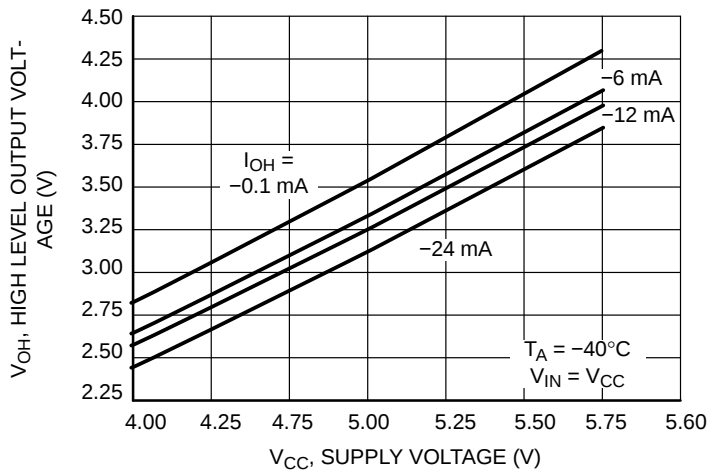
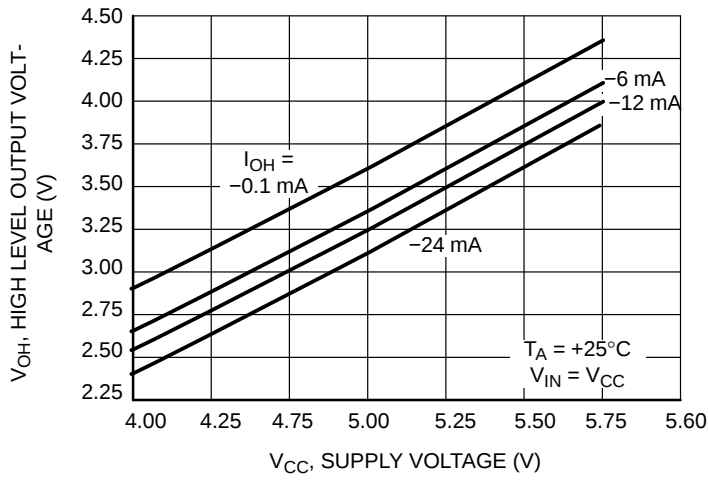
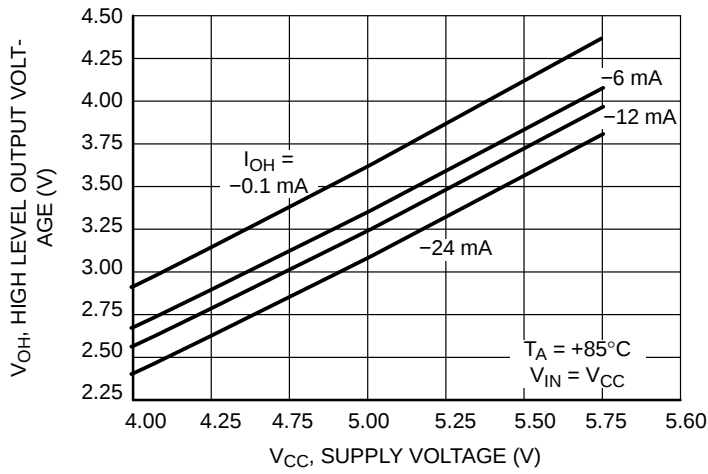
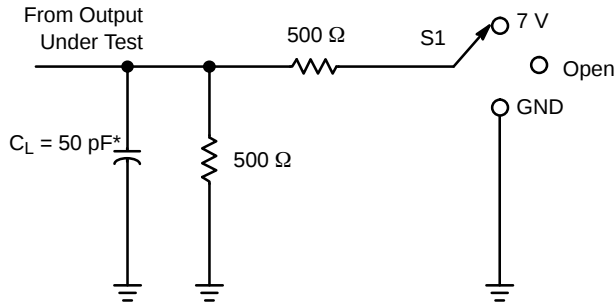


Figure 4. Output Voltage High vs Supply Voltage

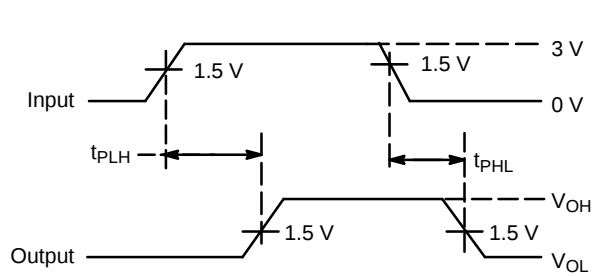
## AC LOADING AND WAVEFORMS

## Parameter Measurement Information

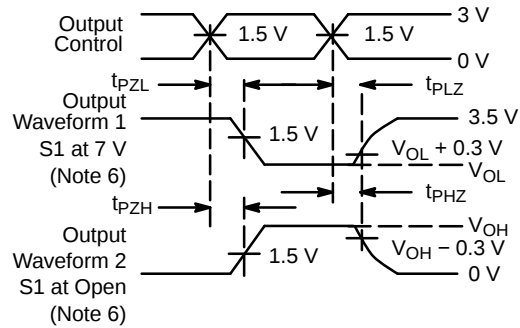


\* $C_L$  includes probes and jig capacitance.

| 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:  $PRR \leq 10 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5 \text{ ns}$ ,  $t_f \leq 2.5 \text{ ns}$ .
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 5.  $t_{PD}$ ,  $t_{EN}$ ,  $t_{DIS}$  Loading and Waveforms**

## 7WB3305

### ORDERING INFORMATION

| Device        | Package                                      | Shipping <sup>†</sup> |
|---------------|----------------------------------------------|-----------------------|
| 7WB3305MUTAG  | UDFN8<br>(Pb-Free)                           | 3000 / Tape & Reel    |
| 7WB3305DMR2G  | Micro8<br>(Pb-Free)                          | 4000 / Tape & Reel    |
| 7WB3305DMUTCG | UDFN8, 1.95 x 1.0, 0.5 mm Pitch<br>(Pb-Free) | 3000 / Tape & Reel    |

<sup>†</sup>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.

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

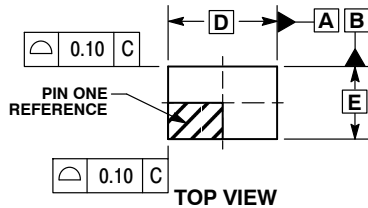
ON Semiconductor®



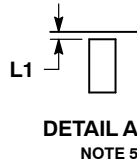
SCALE 4:1

UDFN8 1.8x1.2, 0.4P  
CASE 517AJ-01  
ISSUE O

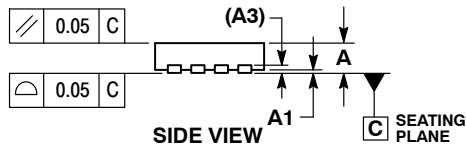
DATE 08 NOV 2006



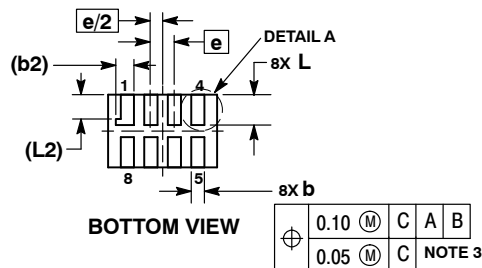
TOP VIEW



DETAIL A  
NOTE 5



SIDE VIEW



BOTTOM VIEW

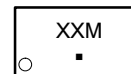
|                |        |
|----------------|--------|
| 0.10 (M) C A B | NOTE 3 |
| 0.05 (M) C     |        |

### 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  |

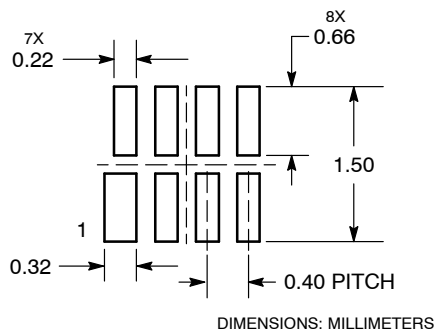
### GENERIC MARKING DIAGRAM\*



- XX = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

### MOUNTING FOOTPRINT SOLDERMASK DEFINED



DIMENSIONS: MILLIMETERS

|                  |                     |                                                                                                                                                                                  |
|------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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