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7WBD383

Translating Bus Exchange Switch

The 7WBD383 is an advanced high-speed low-power translating bus exchange switch in ultra-small footprints.

Features

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



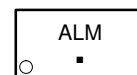
ON Semiconductor®

<http://onsemi.com>

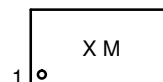
MARKING DIAGRAMS



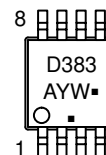
UDFN8
MU SUFFIX
CASE 517AJ



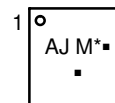
UDFN8
1.95 x 1.0
CASE 517CA



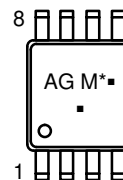
Micro8™
DM SUFFIX
CASE 846A



UQFN8
MU SUFFIX
CASE 523AN



US8
US SUFFIX
CASE 493



- A = Assembly Location
- Y = Year
- W = Work Week
- M = Date 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.

This document contains information on some products that are still under development. ON Semiconductor reserves the right to change or discontinue these products without notice.

7WBD383

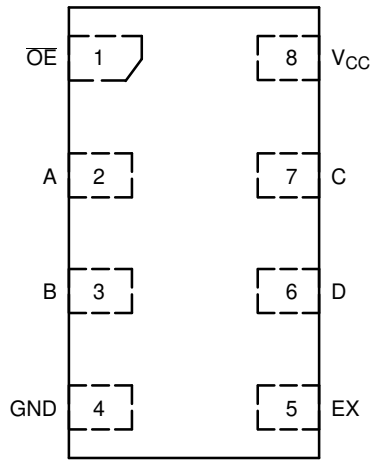


Figure 1. UDFN8
(Top Thru-View)

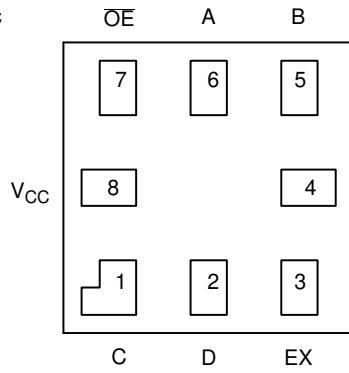


Figure 2. UQFN8
(Top Thru-View)

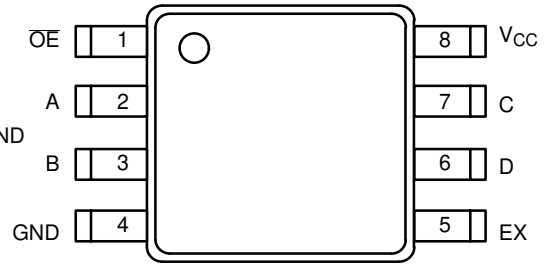


Figure 3. US8/Micro8
(Top View)

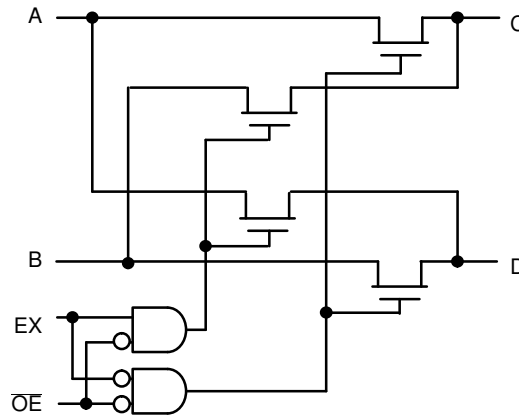


Figure 4. Logic Diagram

FUNCTION TABLE

| Input \overline{OE} | Input EX | Function |
|-----------------------|----------|--------------|
| L | L | A = C; B = D |
| L | H | A = D; B = C |
| H | X | Disconnect |

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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 | $^{\circ}C$ | |
| T_L | Lead Temperature, 1 mm from Case for 10 Seconds | 260 | $^{\circ}C$ | |
| T_J | Junction Temperature Under Bias | 150 | $^{\circ}C$ | |
| θ_{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) Machine Model (Note 3) Charged Device Model (Note 4) | > 2000 | V | |
| | | > 200 | | |
| | | N/A | | |
| $I_{LATCHUP}$ | Latchup Performance Above V_{CC} and Below GND at 125 $^{\circ}C$ (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.
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 Switch I/O | 0 | 5 | nS/V |
| | | 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.

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DC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Conditions | V _{CC} (V) | T _A = 25°C | | | T _A = -55°C to +125°C | | Unit |
|------------------|---|---|------------------------|-----------------------|--------|--------------|-------------------------------------|--------------|----------|
| | | | | Min | Typ | Max | Min | Max | |
| 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 ≤ V _{IN} ≤ 5.5 V | 5.5 | | | ±0.1 | | ±1.0 | μA |
| I _{OFF} | Power Off Leakage Current | V _{I/O} = 0 to 5.5 V | 0 | | | ±0.1 | | ±1.0 | μA |
| I _{CC} | Quiescent Supply Current | I _O = 0, V _{IN} = V _{CC} or 0 V OE = GND OE = V _{CC} | 5.5 | | | ±1.0 ±0.1 | | ±1.0 ±1.0 | mA μA |
| ΔI _{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 mA I _{I/O} = 30 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 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 _{CC} (V) | T _A = 25 °C | | | T _A = -55°C to +125°C | | Unit |
|----------------------|-------------------------------|------------------------------|------------------------|------------------------|-----|------|-------------------------------------|------|------|
| | | | | Min | Typ | Max | Min | Max | |
| t _{PD} | Propagation Delay, Bus to Bus | See Figure 6 | 4.0 to 5.5 | | | 0.25 | | 0.25 | ns |
| t _{PD-EX} | Propagation Delay, EX to Bus | See Figure 6 and Figure 7 | 4.0 to 5.5 | | | 4.5 | | 4.5 | 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 |

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TYPICAL DC CHARACTERISTICS

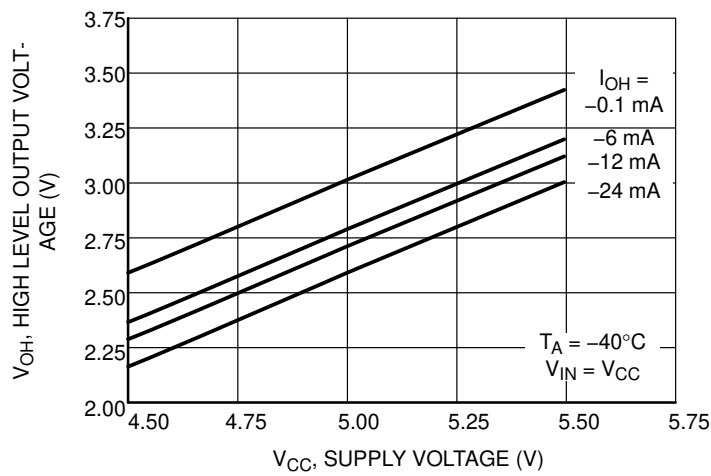
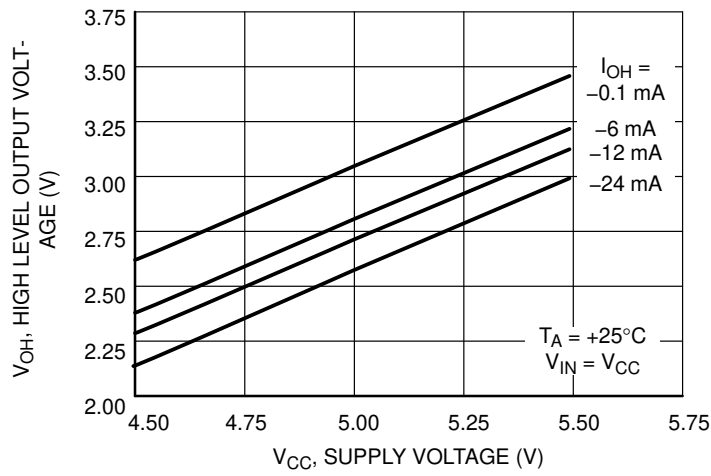
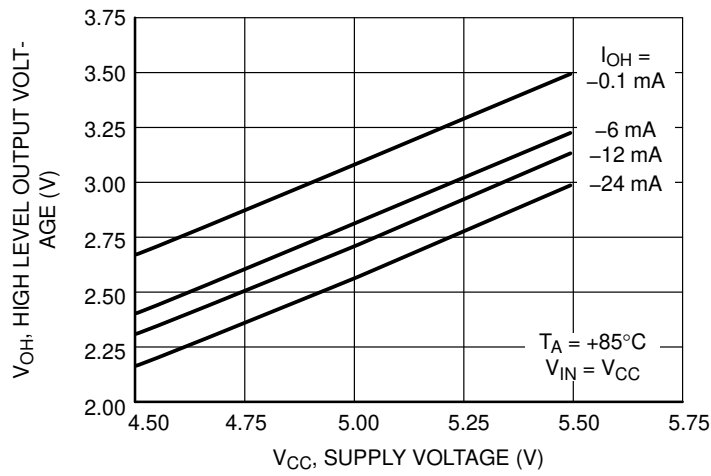
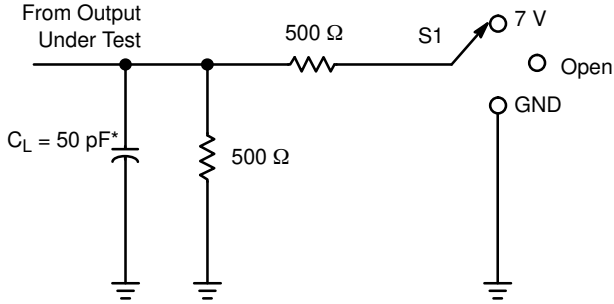


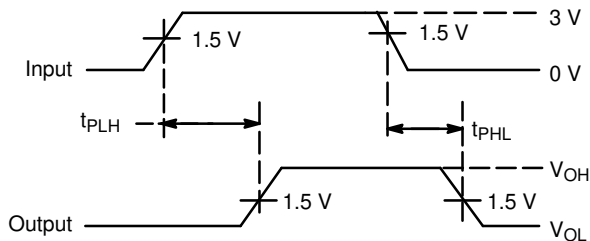
Figure 5. Output Voltage High vs Supply Voltage

AC LOADING AND WAVEFORMS

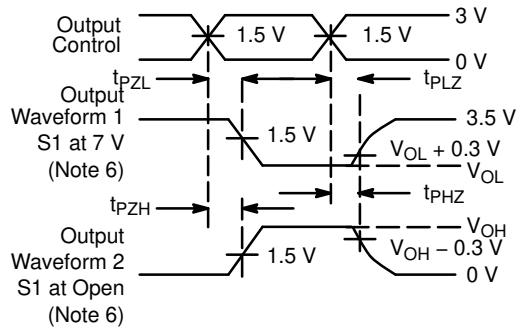


| Test | S1 |
|-------------------|------|
| t_{PD} | Open |
| t_{PLZ}/t_{PZL} | 7 V |
| t_{PHZ}/t_{PZH} | Open |

* C_L includes probes and jig capacitance.



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 6. t_{PD} , t_{EN} , t_{DIS} Loading and Waveforms

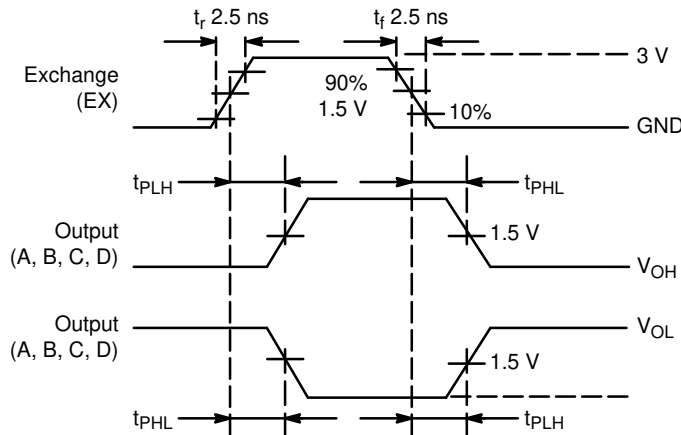


Figure 7. t_{PD-EX} Waveforms

7WBD383

ORDERING INFORMATION

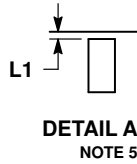
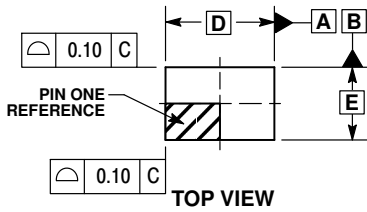
| Device | Package | Shipping† |
|---------------|--|--|
| 7WBD383USG | US8 (Pb-Free) | 3000 / Tape & Reel |
| 7WBD383MUTAG | UDFN8 (Pb-Free) | 3000 / Tape & Reel |
| 7WBD383AMUTCG | UQFN8 (Pb-Free) | 3000 / Tape & Reel |
| 7WBD383DMR2G | Micro8 (Pb-Free) | 4000 / Tape & Reel (In Development) |
| 7WBD383DMUTCG | UDFN8, 1.95 x 1.0, 0.5 mm Pitch (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.

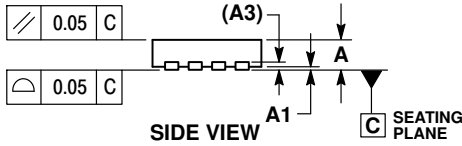
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PACKAGE DIMENSIONS

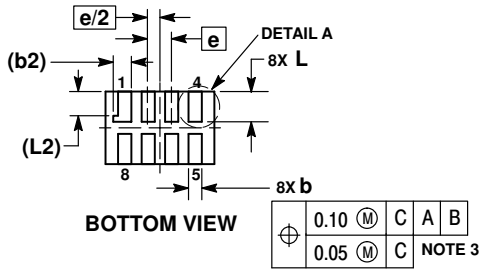
UDFN8 1.8 x 1.2, 0.4P
CASE 517AJ
ISSUE O



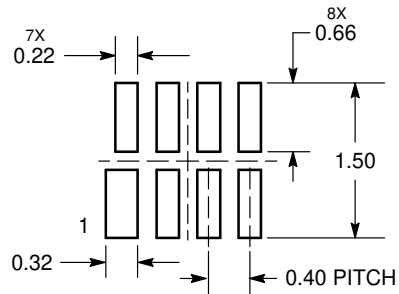
- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
 2. CONTROLLING DIMENSION: MILLIMETERS.
 3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM TERMINAL TIP.
 4. MOLD FLASH ALLOWED ON TERMINALS ALONG EDGE OF PACKAGE. FLASH MAY NOT EXCEED 0.03 ONTO BOTTOM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



| 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



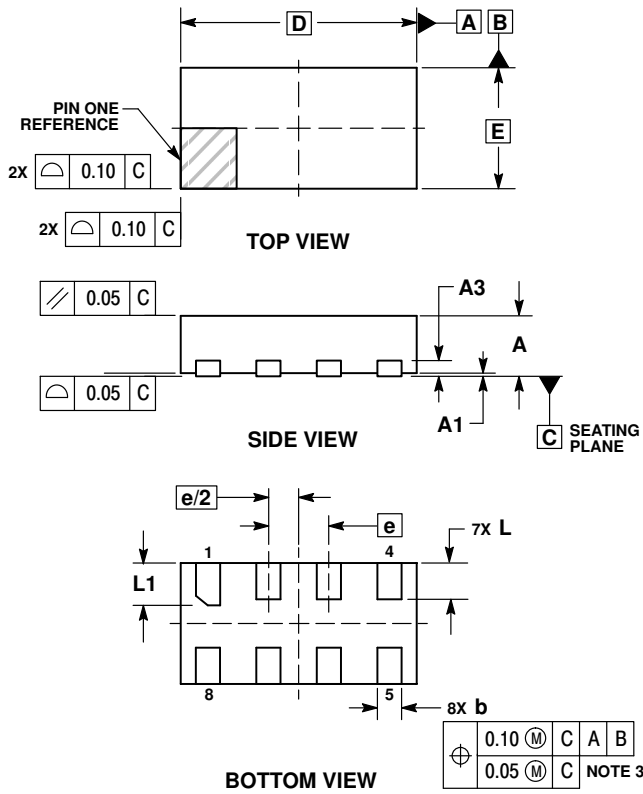
DIMENSIONS: MILLIMETERS

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

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PACKAGE DIMENSIONS

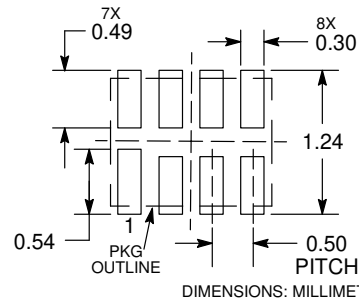
UDFN8 1.95x1.0, 0.5P
CASE 517CA
ISSUE O



- 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 0.20 MM FROM TERMINAL TIP.
 4. PACKAGE DIMENSIONS EXCLUSIVE OF BURRS AND MOLD FLASH.

| MILLIMETERS | | |
|-------------|----------|------|
| DIM | MIN | MAX |
| A | 0.45 | 0.55 |
| A1 | 0.00 | 0.05 |
| A3 | 0.13 REF | |
| 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 |

RECOMMENDED SOLDERING FOOTPRINT*

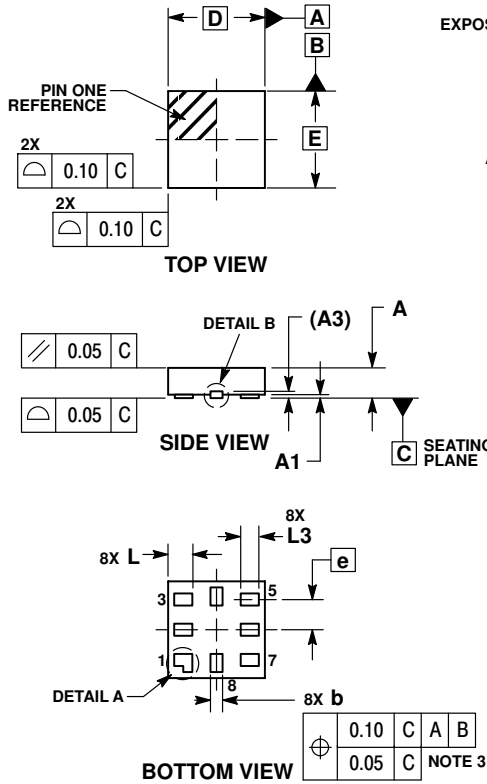


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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PACKAGE DIMENSIONS

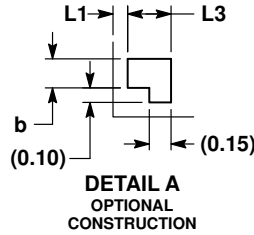
UQFN8, 1.6x1.6, 0.5P
CASE 523AN
ISSUE O



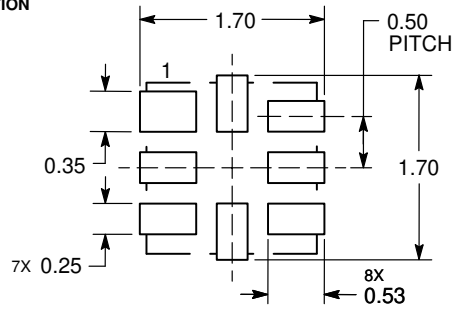
NOTES:

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*



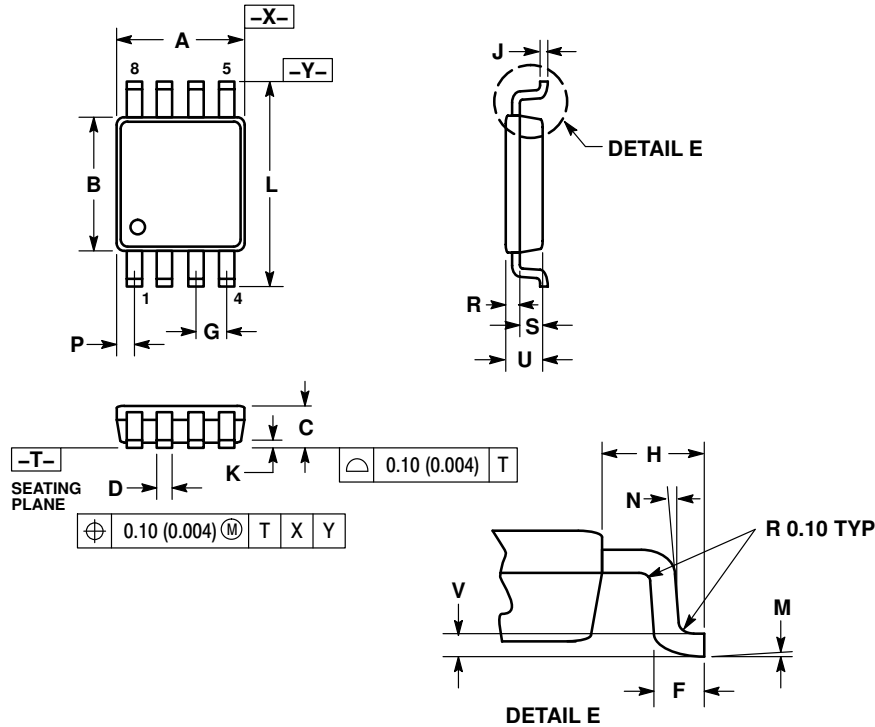
DIMENSIONS: MILLIMETERS

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

7WBD383

PACKAGE DIMENSIONS

US8
CASE 493
ISSUE B

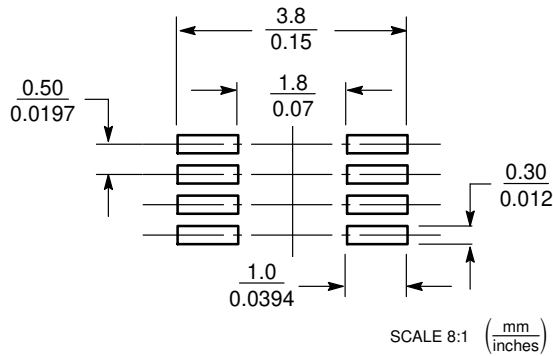


NOTES:

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 0.140 MM (0.0055") PER SIDE.
4. DIMENSION "B" DOES NOT INCLUDE INTER-LEAD FLASH OR PROTRUSION. INTER-LEAD FLASH AND PROTRUSION SHALL NOT EXCEED 0.140 (0.0055") PER SIDE.
5. LEAD FINISH IS SOLDER PLATING WITH THICKNESS OF 0.0076-0.0203 MM. (300-800 °).
6. ALL TOLERANCE UNLESS OTHERWISE SPECIFIED ±0.0508 (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 | 0.126 |
| M | 0° | 6° | 0° | 6° |
| N | 5° | 10° | 5° | 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 | |

SOLDERING FOOTPRINT*

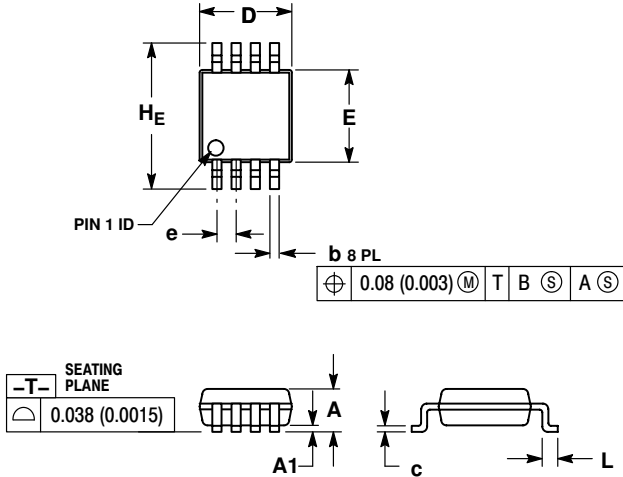


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

7WBD383

PACKAGE DIMENSIONS

Micro8™
CASE 846A
ISSUE H

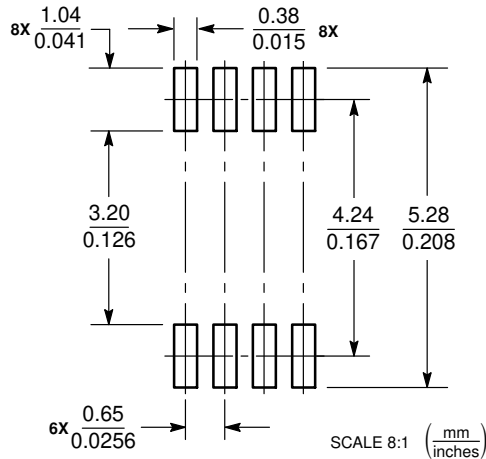


NOTES:

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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