

# 7SB3257

## Mux / Demux Bus Switch

The 7SB3257 Mux / Demux Bus Switch is an advanced high-speed line switch in ultra-small footprint.

### 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
- Ultra-Small Packages
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

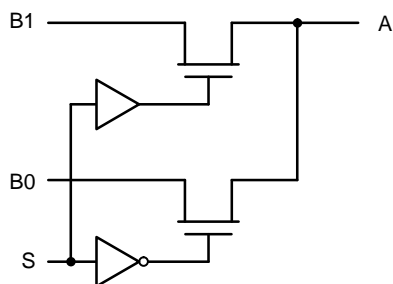


Figure 1. Logic Diagram

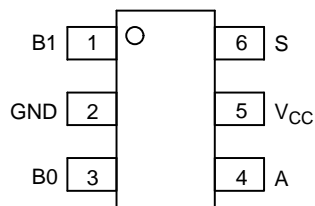


Figure 2. TSOP-6/SC-88 (Top View)

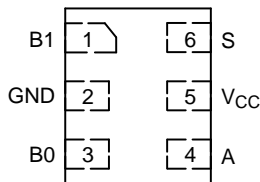


Figure 3. ULLGA6/UDFN6 (Top View)

### Function Table

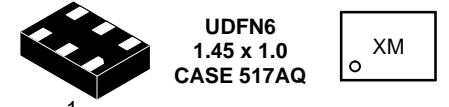
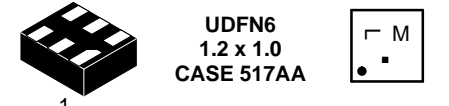
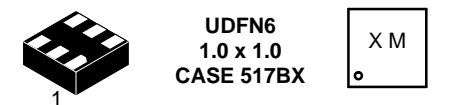
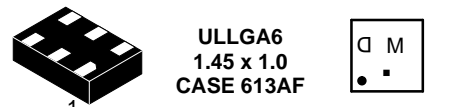
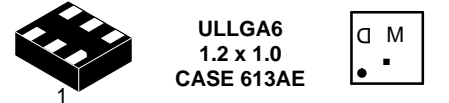
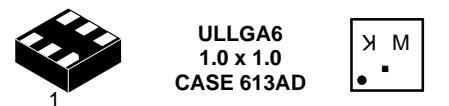
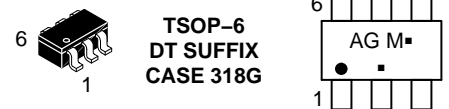
| Input S | Function |
|---------|----------|
| L       | A = B0   |
| H       | A = B1   |



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### MARKING DIAGRAMS



AK, AG, K, D, L = Specific Device Code  
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 4 of this data sheet.

# 7SB3257

**Table 1. 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          | $^{\circ}C$   |
| $T_L$         | 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<br>SC-88 / TSOP-6 (Note 1)<br>ULLGA6/UDFN6  | 333<br>496           | $^{\circ}C/W$ |
| $P_D$         | Power Dissipation in Still Air at 85 $^{\circ}C$<br>SC-88 / TSOP-6 (Note 1)<br>ULLGA6/UDFN6                | 200<br>252           | mW            |
| MSL           | Moisture Sensitivity   | Level 1              |               |
| $F_R$         | Flammability Rating<br>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 Mode (Note 3)<br>Charged Device Mode (Note 4) | >2000<br>>200<br>N/A | V             |
| $I_{LATCHUP}$ | Latchup Performance Above $V_{CC}$ and Below GND at 85 $^{\circ}C$ (Note 5)                                | $\pm 100$            | mA            |

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.

**Table 2. RECOMMENDED OPERATING CONDITIONS**

| Symbol                | Parameter   | Min    | Max     | Unit        |
|-----------------------|---|--------|---------|-------------|
| $V_{CC}$              | Positive DC Supply Voltage  | 4.0    | 5.5     | V           |
| $V_I$                 | 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<br>Control Input<br>Switch I/O | 0<br>0 | 5<br>DC | nS/V        |

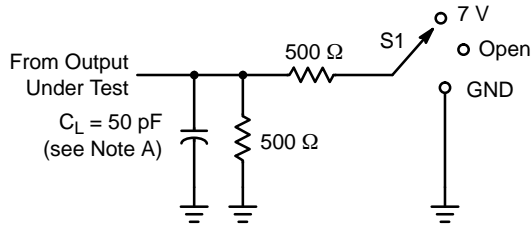
Table 3. DC ELECTRICAL CHARACTERISTICS

| 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>IN</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    |
| 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                  | 5.5                 |                       |        | ±0.1   |                                  | ±1.0   | 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,<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                           | 4.5                 |                       | 6      | 15     |                                  | 15     |      |
|                  |  | V <sub>I/O</sub> = 2.4,<br>I <sub>I/O</sub> = 15 mA                           | 4.0                 |                       | 10     | 20     |                                  | 20     |      |

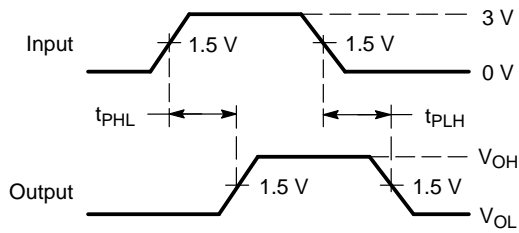
Table 4. AC ELECTRICAL CHARACTERISTICS

| Symbol               | Parameter                           | V <sub>CC</sub> (V) | Test Condition | 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, A to B or B to A | 4.0 to 5.5          | See Figure 4   |                            |     | 0.25 |                                  | 0.25 | ns   |
| t <sub>EN</sub>      | Output Enable Time                  | 4.5 to 5.5          |                | 0.8                        | 2.5 | 4.2  | 0.8                              | 4.2  |      |
|                      |                                     | 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                        | 3.1 | 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           | 5.0                 |                | V <sub>IN</sub> = 3 V or 0 |     | 2.0  |                                  |      |      |
| C <sub>IO(ON)</sub>  | Switch On Capacitance               | 5.0                 | Switch ON      |                            | 10  |      |                                  |      | pF   |
| C <sub>IO(OFF)</sub> | Switch Off Capacitance              | 5.0                 | Switch OFF     |                            | 3.5 |      |                                  |      | pF   |

AC Loading and Waveforms

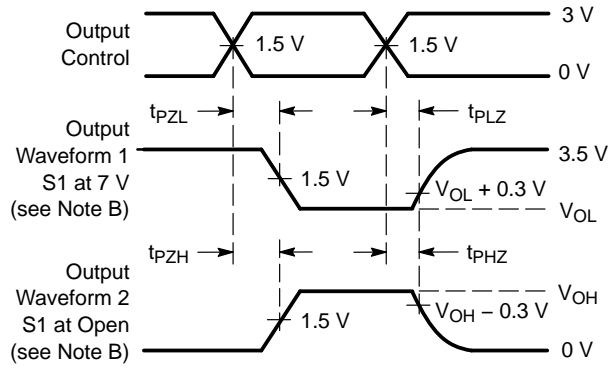


LOAD CIRCUIT



VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES

| TEST              | S1   |
|-------------------|------|
| $t_{PD}$          | Open |
| $t_{PLZ}/t_{PZL}$ | 7 V  |
| $t_{PHZ}/t_{PZH}$ | GND  |



VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES

- A.  $C_L$  includes probe and jig capacitance.
- B. 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.
- C. 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.
- D. The output is measured with one input transition per measurement.
- E.  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
- F.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
- G.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .

Figure 4. Load Circuit and Voltage Waveforms

DEVICE ORDERING INFORMATION

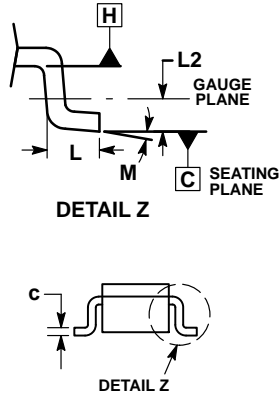
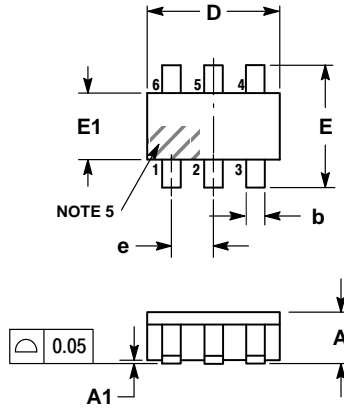
| Device         | Package                                | Shipping <sup>†</sup> |
|----------------|--|-----------------------|
| 7SB3257DTT1G   | TSOP-6<br>(Pb-Free)                    | 3000 / Tape & Reel    |
| 7SB3257DTT2G   |  |                       |
| 7SB3257DFT2G   | SC-88<br>(Pb-Free)                     | 3000 / Tape & Reel    |
| 7SB3257AMX1TCG | ULLGA6 - 1.45 x 1.0, 0.5P<br>(Pb-Free) | 3000 / Tape & Reel    |
| 7SB3257BMX1TCG | ULLGA6 - 1.2 x 1.0, 0.4P<br>(Pb-Free)  | 3000 / Tape & Reel    |
| 7SB3257CMX1TCG | ULLGA6 - 1.0 x 1.0, 0.35P<br>(Pb-Free) | 3000 / Tape & Reel    |
| 7SB3257MU1TCG  | UDFN6 - 1.45 x 1.0, 0.5P<br>(Pb-Free)  | 3000 / Tape & Reel    |
| 7SB3257MUTCG   | UDFN6 - 1.2 x 1.0, 0.4P<br>(Pb-Free)   | 3000 / Tape & Reel    |
| 7SB3257MU3TCG  | UDFN6 - 1.0 x 1.0, 0.35P<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.

# 7SB3257

## PACKAGE DIMENSIONS

TSOP-6  
CASE 318G-02  
ISSUE U

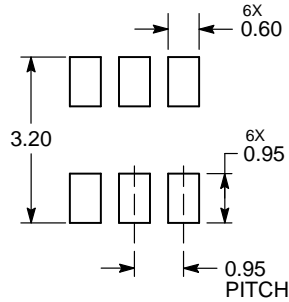


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN ONE INDICATOR MUST BE LOCATED IN THE INDICATED ZONE.

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN         | NOM  | MAX  |
| A   | 0.90        | 1.00 | 1.10 |
| A1  | 0.01        | 0.06 | 0.10 |
| b   | 0.25        | 0.38 | 0.50 |
| c   | 0.10        | 0.18 | 0.26 |
| D   | 2.90        | 3.00 | 3.10 |
| E   | 2.50        | 2.75 | 3.00 |
| E1  | 1.30        | 1.50 | 1.70 |
| e   | 0.85        | 0.95 | 1.05 |
| L   | 0.20        | 0.40 | 0.60 |
| L2  | 0.25 BSC    |      |      |
| M   | 0°          | -    | 10°  |

### RECOMMENDED SOLDERING FOOTPRINT\*



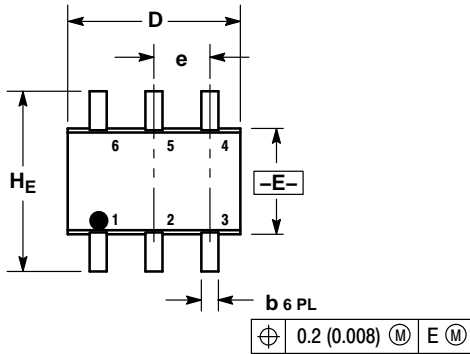
DIMENSIONS: MILLIMETERS

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

# 7SB3257

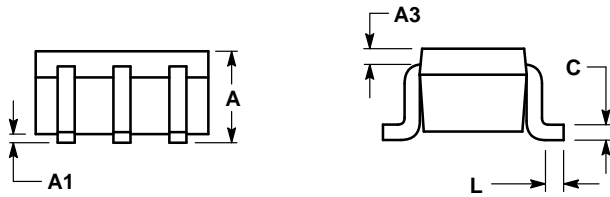
## PACKAGE DIMENSIONS

SC-88/SC70-6/SOT-363  
CASE 419B-02  
ISSUE W

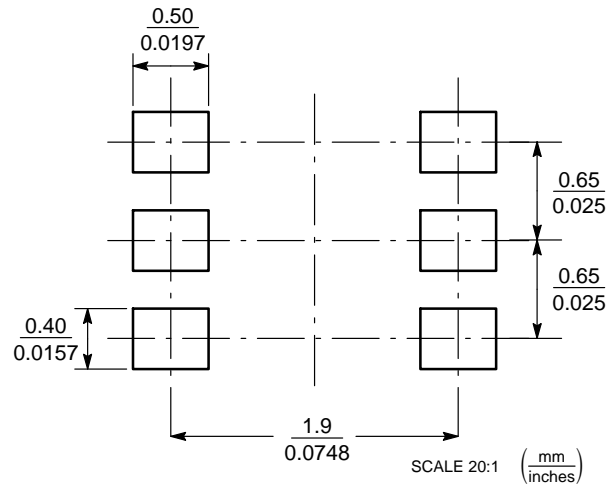


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

| DIM | MILLIMETERS |      |      | INCHES    |       |       |
|-----|-------------|------|------|-----------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN       | NOM   | MAX   |
| A   | 0.80        | 0.95 | 1.10 | 0.031     | 0.037 | 0.043 |
| A1  | 0.00        | 0.05 | 0.10 | 0.000     | 0.002 | 0.004 |
| A3  | 0.20 REF    |      |      | 0.008 REF |       |       |
| b   | 0.10        | 0.21 | 0.30 | 0.004     | 0.008 | 0.012 |
| C   | 0.10        | 0.14 | 0.25 | 0.004     | 0.005 | 0.010 |
| D   | 1.80        | 2.00 | 2.20 | 0.070     | 0.078 | 0.086 |
| E   | 1.15        | 1.25 | 1.35 | 0.045     | 0.049 | 0.053 |
| e   | 0.65 BSC    |      |      | 0.026 BSC |       |       |
| L   | 0.10        | 0.20 | 0.30 | 0.004     | 0.008 | 0.012 |
| HE  | 2.00        | 2.10 | 2.20 | 0.078     | 0.082 | 0.086 |



### SOLDERING FOOTPRINT\*

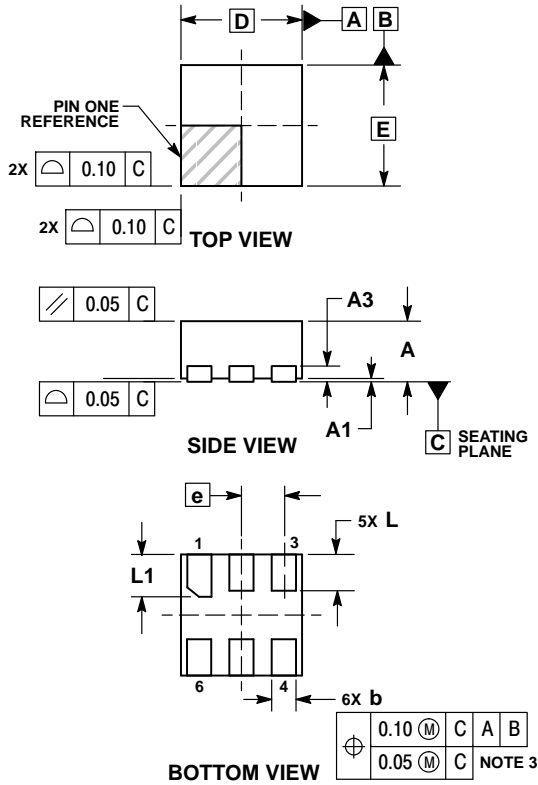


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# 7SB3257

## PACKAGE DIMENSIONS

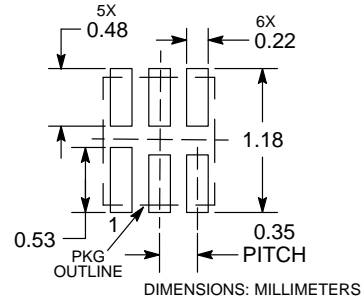
UDFN6 1.0x1.0, 0.35P  
CASE 517BX  
ISSUE O



- 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.

| DIM | MILLIMETERS |      |
|-----|-------------|------|
|     | MIN         | MAX  |
| A   | 0.45        | 0.55 |
| A1  | 0.00        | 0.05 |
| A3  | 0.13        | REF  |
| b   | 0.12        | 0.22 |
| D   | 1.00        | BSC  |
| E   | 1.00        | BSC  |
| e   | 0.35        | BSC  |
| L   | 0.25        | 0.35 |
| L1  | 0.30        | 0.40 |

### RECOMMENDED SOLDERING FOOTPRINT\*

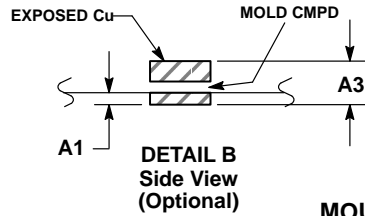
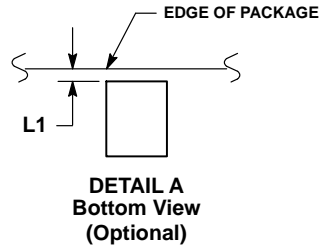
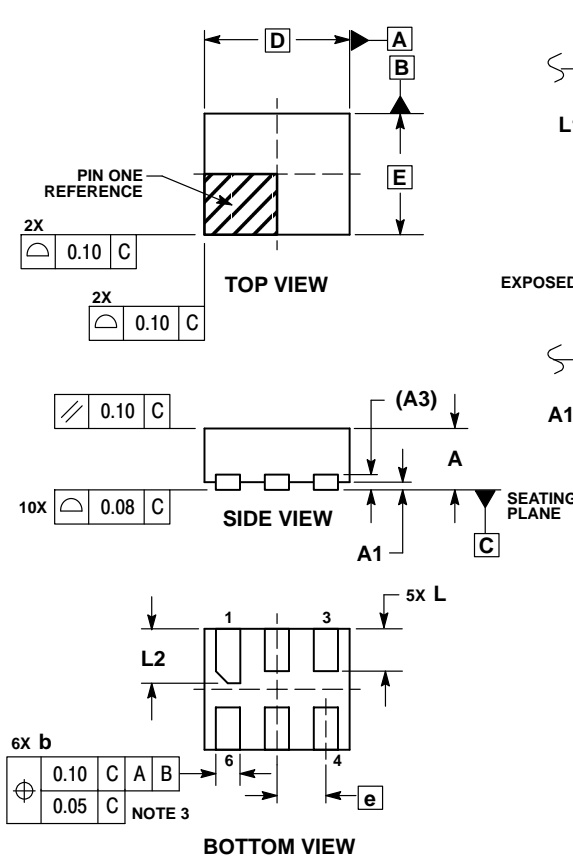


\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# 7SB3257

## PACKAGE DIMENSIONS

UDFN6 1.2x1.0, 0.4P  
CASE 517AA  
ISSUE C

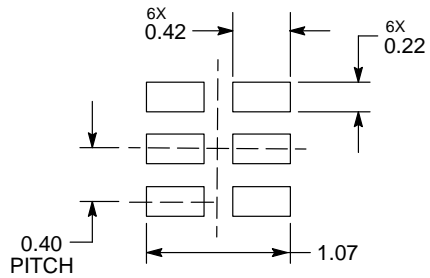


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30 mm FROM TERMINAL.
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

| MILLIMETERS |       |      |
|-------------|-------|------|
| DIM         | MIN   | MAX  |
| A           | 0.45  | 0.55 |
| A1          | 0.00  | 0.05 |
| A3          | 0.127 | REF  |
| b           | 0.15  | 0.25 |
| D           | 1.20  | BSC  |
| E           | 1.00  | BSC  |
| e           | 0.40  | BSC  |
| L           | 0.30  | 0.40 |
| L1          | 0.00  | 0.15 |
| L2          | 0.40  | 0.50 |

MOUNTING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

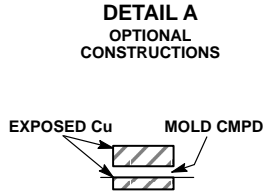
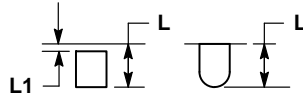
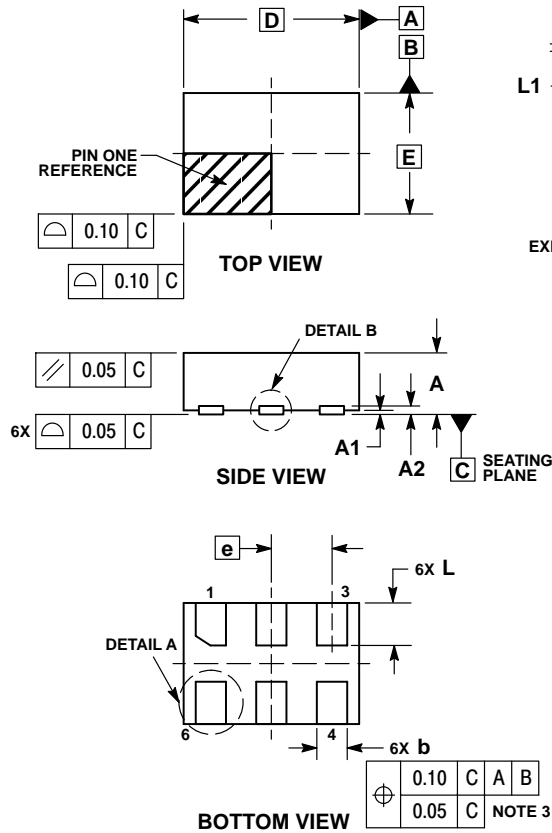
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



# 7SB3257

## PACKAGE DIMENSIONS

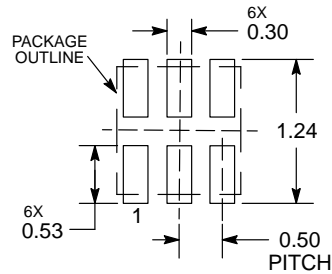
UDFN6 1.45x1.0, 0.5P  
CASE 517AQ  
ISSUE C



- 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 THE TERMINAL TIP.

| MILLIMETERS |      |      |
|-------------|------|------|
| DIM         | MIN  | MAX  |
| A           | 0.45 | 0.55 |
| A1          | 0.00 | 0.05 |
| A2          | 0.07 | REF  |
| b           | 0.20 | 0.30 |
| D           | 1.45 | BSC  |
| E           | 1.00 | BSC  |
| e           | 0.50 | BSC  |
| L           | 0.30 | 0.40 |
| L1          | ---  | 0.15 |

### MOUNTING FOOTPRINT



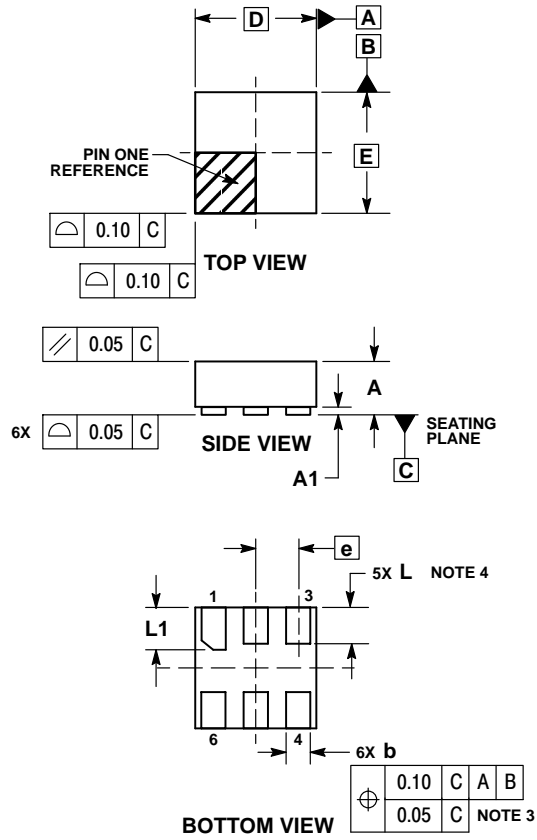
DIMENSIONS: MILLIMETERS

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

# 7SB3257

## PACKAGE DIMENSIONS

### ULLGA6 1.0x1.0, 0.35P CASE 613AD ISSUE A

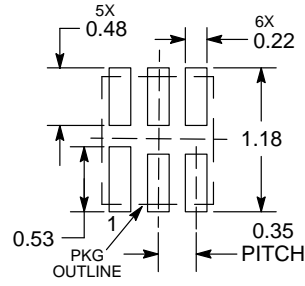


**NOTES:**

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.
4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

| MILLIMETERS |          |      |
|-------------|----------|------|
| DIM         | MIN      | MAX  |
| A           | —        | 0.40 |
| A1          | 0.00     | 0.05 |
| b           | 0.12     | 0.22 |
| D           | 1.00 BSC |      |
| E           | 1.00 BSC |      |
| e           | 0.35 BSC |      |
| L           | 0.25     | 0.35 |
| L1          | 0.30     | 0.40 |

### MOUNTING FOOTPRINT SOLDERMASK DEFINED\*



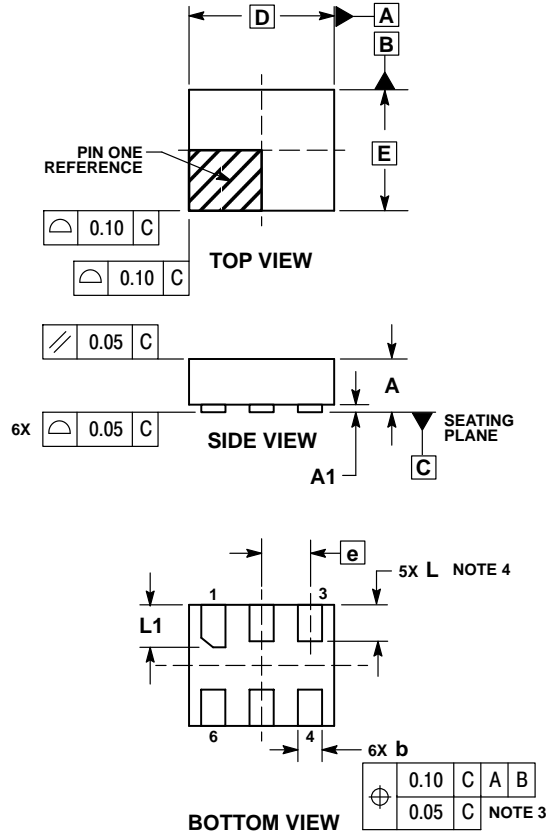
DIMENSIONS: MILLIMETERS

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

# 7SB3257

## PACKAGE DIMENSIONS

ULLGA6 1.2x1.0, 0.4P  
CASE 613AE  
ISSUE A

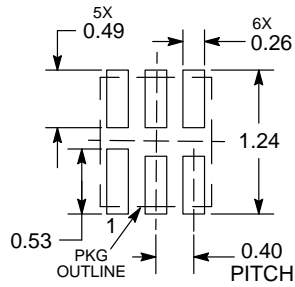


**NOTES:**

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.
4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

| MILLIMETERS |          |      |
|-------------|----------|------|
| DIM         | MIN      | MAX  |
| A           | ---      | 0.40 |
| A1          | 0.00     | 0.05 |
| b           | 0.15     | 0.25 |
| D           | 1.20 BSC |      |
| E           | 1.00 BSC |      |
| e           | 0.40 BSC |      |
| L           | 0.25     | 0.35 |
| L1          | 0.35     | 0.45 |

**MOUNTING FOOTPRINT  
SOLDERMASK DEFINED\***



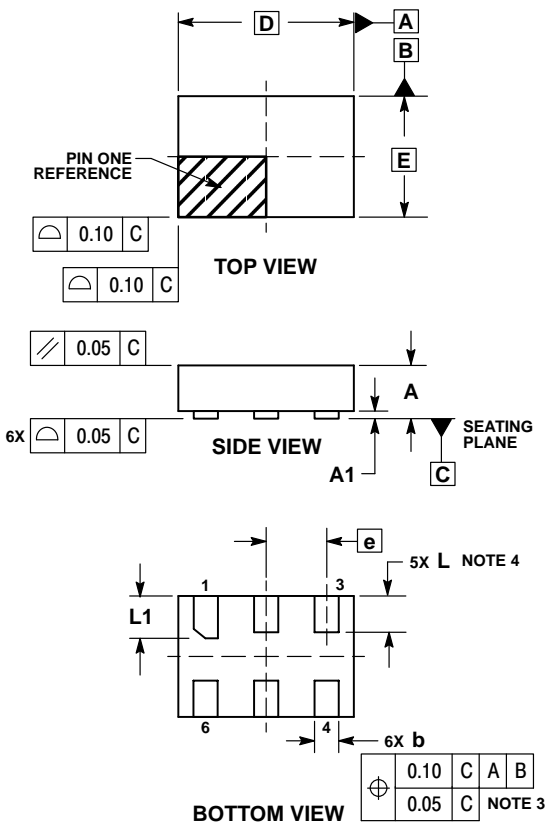
DIMENSIONS: MILLIMETERS

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

# 7SB3257

## PACKAGE DIMENSIONS

ULLGA6 1.45x1.0, 0.5P  
CASE 613AF  
ISSUE A

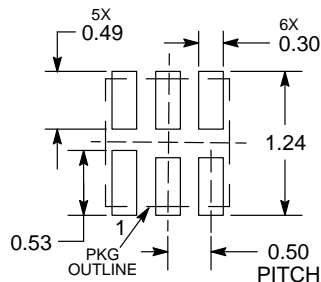


### NOTES:

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.
4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

| DIM | MILLIMETERS |      |
|-----|-------------|------|
|     | MIN         | MAX  |
| A   | ---         | 0.40 |
| A1  | 0.00        | 0.05 |
| b   | 0.15        | 0.25 |
| D   | 1.45 BSC    |      |
| E   | 1.00 BSC    |      |
| e   | 0.50 BSC    |      |
| L   | 0.25        | 0.35 |
| L1  | 0.30        | 0.40 |

### MOUNTING FOOTPRINT SOLDERMASK DEFINED\*



DIMENSIONS: MILLIMETERS

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