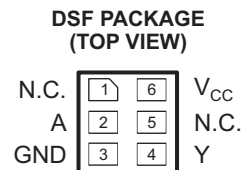
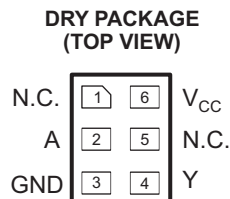
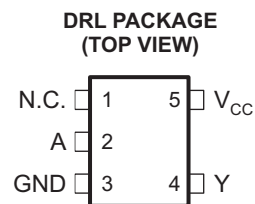
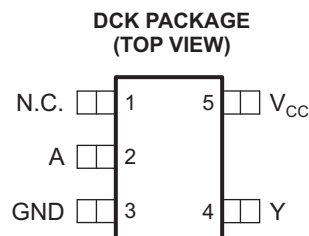
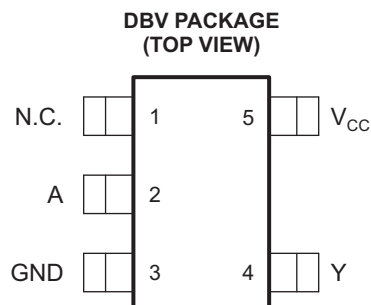


## SINGLE SCHMITT-TRIGGER BUFFER

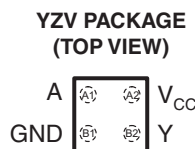
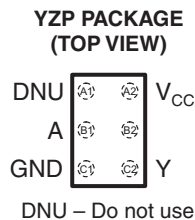
Check for Samples: [SN74LVC1G17](#)

### FEATURES

- Available in the Texas Instruments NanoFree™ Package
- Supports 5-V  $V_{CC}$  Operation
- Inputs Accept Voltages to 5.5 V
- Max  $t_{pd}$  of 4.6 ns at 3.3 V
- Low Power Consumption, 10- $\mu$ A Max  $I_{CC}$
- $\pm 24$ -mA Output Drive at 3.3 V
- $I_{off}$  Supports Live Insertion, Partial Power Down Mode, and Back Drive Protection
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)



N.C. – No internal connection  
See mechanical drawings for dimensions.



**Table 2. YZV PACKAGE TERMINAL**

**Table 1. YZP PACKAGE TERMINAL ASSIGNMENTS**

|          | 1   | 2        |
|----------|-----|----------|
| <b>A</b> | DNU | $V_{CC}$ |
| <b>B</b> | A   | No ball  |
| <b>C</b> | GND | Y        |

**Table 2. YZV PACKAGE TERMINAL ASSIGNMENTS (continued)**

|          | 1   | 2        |
|----------|-----|----------|
| <b>A</b> | A   | $V_{CC}$ |
| <b>B</b> | GND | Y        |



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

NanoFree is a trademark of Texas Instruments.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of the Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

## DESCRIPTION/ORDERING INFORMATION

This single Schmitt-trigger buffer is designed for 1.65-V to 5.5-V  $V_{CC}$  operation.

The SN74LVC1G17 contains one buffer and performs the Boolean function  $Y = A$ . The device functions as an independent buffer, but because of Schmitt action, it may have different input threshold levels for positive-going ( $V_{T+}$ ) and negative-going ( $V_{T-}$ ) signals.

NanoFree™ package technology is a major breakthrough in IC packaging concepts, using the die as the package.

This device is fully specified for partial-power-down applications using  $I_{off}$ . The  $I_{off}$  circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

### ORDERING INFORMATION

| $T_A$         | PACKAGE <sup>(1) (2)</sup>                                     |              | ORDERABLE PART NUMBER | TOP-SIDE MARKING <sup>(3)</sup> |
|---------------|----------------------------------------------------------------|--------------|-----------------------|---------------------------------|
| –40°C to 85°C | NanoFree™ – WCSP (DSBGA)<br>0.23-mm Large Bump – YZP (Pb-free) | Reel of 3000 | SN74LVC1G17YZPR       | – – _C7_                        |
|               |                                                                | Reel of 3000 | SN74LVC1G17YZVR       | $\overline{C7}$ – –             |
|               | QFN – DRY                                                      | Reel of 5000 | SN74LVC1G17DRYR       | C7                              |
|               |                                                                |              | SN74LVC1G17DRYRG4     |                                 |
|               | μQFN – DSF                                                     | Reel of 5000 | SN74LVC1G17DSFR       | C7                              |
|               | SOT (SOT-23) – DBV                                             | Reel of 3000 | SN74LVC1G17DBV3       | C17                             |
|               |                                                                |              | SN74LVC1G17DBVR       |                                 |
|               |                                                                |              | SN74LVC1G17DBVRE4     |                                 |
|               |                                                                |              | SN74LVC1G17DBVRG4     |                                 |
|               |                                                                | Tube of 250  | SN74LVC1G17DBVT       |                                 |
|               |                                                                |              | SN74LVC1G17DBVTE4     |                                 |
|               | SOT (SC-70) – DCK                                              | Reel of 3000 | SN74LVC1G17DCK3       | C7_                             |
|               |                                                                |              | SN74LVC1G17DCKR       |                                 |
|               |                                                                |              | SN74LVC1G17DCKRE4     |                                 |
|               |                                                                |              | SN74LVC1G17DCKRG4     |                                 |
|               |                                                                | Tube of 250  | SN74LVC1G17DCKT       |                                 |
|               |                                                                |              | SN74LVC1G17DCKTE4     |                                 |
|               | SOT (SOT-553) – DRL                                            | Reel of 4000 | SN74LVC1G17DRLR       | C7_                             |
|               |                                                                |              | SN74LVC1G17DRLRG4     |                                 |

(1) Package drawings, thermal data, and symbolization are available at [www.ti.com/packaging](http://www.ti.com/packaging).

(2) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at [www.ti.com](http://www.ti.com).

(3) DBV/DCK/DRL/DRY: The actual top-side marking has one additional character that designates the wafer fab/assembly site.  
 YZP: The actual top-side marking has three preceding characters to denote year, month, and sequence code, and one following character to designate the wafer fab/assembly site. Pin 1 identifier indicates solder-bump composition (1 = SnPb, • = Pb-free).  
 YZV: The actual top-side marking is two lines. Line 1 has four characters to denote year, month, day, and wafer fab/assembly site. Line 2 has two characters which show the family and function code. Pin 1 identifier indicates solder-bump composition (1 = SnPb, • = Pb-free).

**Table 3. FUNCTION TABLE**

| INPUT<br>A | OUTPUT<br>Y |
|------------|-------------|
| H          | H           |
| L          | L           |

**LOGIC DIAGRAM (POSITIVE LOGIC)  
(DBV, DCK, DRL, DSF, DRY, and YZP Package)**



**LOGIC DIAGRAM (POSITIVE LOGIC)  
(YZV Package)**



### Absolute Maximum Ratings<sup>(1)</sup>

over operating free-air temperature range (unless otherwise noted)

|                  |                                                                                             | MIN                | MAX                   | UNIT    |
|------------------|---------------------------------------------------------------------------------------------|--------------------|-----------------------|---------|
| V <sub>CC</sub>  | Supply voltage range                                                                        | –0.5               | 6.5                   | V       |
| V <sub>I</sub>   | Input voltage range <sup>(2)</sup>                                                          | –0.5               | 6.5                   | V       |
| V <sub>O</sub>   | Voltage range applied to any output in the high-impedance or power-off state <sup>(2)</sup> | –0.5               | 6.5                   | V       |
| V <sub>O</sub>   | Voltage range applied to any output in the high or low state <sup>(2) (3)</sup>             | –0.5               | V <sub>CC</sub> + 0.5 | V       |
| I <sub>IK</sub>  | Input clamp current                                                                         | V <sub>I</sub> < 0 |                       | –50 mA  |
| I <sub>OK</sub>  | Output clamp current                                                                        | V <sub>O</sub> < 0 |                       | –50 mA  |
| I <sub>O</sub>   | Continuous output current                                                                   |                    |                       | ±50 mA  |
|                  | Continuous current through V <sub>CC</sub> or GND                                           |                    |                       | ±100 mA |
| θ <sub>JA</sub>  | Package thermal impedance <sup>(4)</sup>                                                    | DBV package        |                       | 206     |
|                  |                                                                                             | DCK package        |                       | 252     |
|                  |                                                                                             | DRL package        |                       | 142     |
|                  |                                                                                             | DRY package        |                       | 234     |
|                  |                                                                                             | DSF package        |                       | 300     |
|                  |                                                                                             | YZP package        |                       | 132     |
|                  |                                                                                             | YZV package        |                       | 116     |
| T <sub>stg</sub> | Storage temperature range                                                                   | –65                | 150                   | °C      |

- (1) Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.
- (3) The value of V<sub>CC</sub> is provided in the recommended operating conditions table.
- (4) The package thermal impedance is calculated in accordance with JESD 51-7.

**Recommended Operating Conditions<sup>(1)</sup>**

|                                      |                          | MIN  | MAX      | UNIT |
|--------------------------------------|--------------------------|------|----------|------|
| $V_{CC}$ Supply voltage              | Operating                | 1.65 | 5.5      | V    |
|                                      | Data retention only      | 1.5  |          |      |
| $V_I$ Input voltage                  |                          | 0    | 5.5      | V    |
| $V_O$ Output voltage                 |                          | 0    | $V_{CC}$ | V    |
| $I_{OH}$ High-level output current   | $V_{CC} = 1.65\text{ V}$ |      | –4       | mA   |
|                                      | $V_{CC} = 2.3\text{ V}$  |      | –8       |      |
|                                      | $V_{CC} = 3\text{ V}$    |      | –16      |      |
|                                      |                          |      | –24      |      |
|                                      | $V_{CC} = 4.5\text{ V}$  |      | –32      |      |
| $I_{OL}$ Low-level output current    | $V_{CC} = 1.65\text{ V}$ |      | 4        | mA   |
|                                      | $V_{CC} = 2.3\text{ V}$  |      | 8        |      |
|                                      | $V_{CC} = 3\text{ V}$    |      | 16       |      |
|                                      |                          |      | 24       |      |
|                                      | $V_{CC} = 4.5\text{ V}$  |      | 32       |      |
| $T_A$ Operating free-air temperature |                          | –40  | 85       | °C   |

- (1) All unused inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

## Electrical Characteristics

over recommended operating free-air temperature range (unless otherwise noted)

| PARAMETER                                                             |                           | TEST CONDITIONS                                                                  |                    | V <sub>CC</sub> | 25 °C |                    |     | MIN                   | MAX  | UNIT |
|-----------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------|--------------------|-----------------|-------|--------------------|-----|-----------------------|------|------|
|                                                                       |                           |                                                                                  |                    |                 | MIN   | TYP <sup>(1)</sup> | MAX |                       |      |      |
| V <sub>T+</sub><br>(Positive-going<br>input threshold<br>voltage)     |                           |                                                                                  |                    | 1.65 V          |       |                    |     | 0.76                  | 1.13 | V    |
|                                                                       |                           |                                                                                  |                    | 2.3 V           |       |                    |     | 1.08                  | 1.56 |      |
|                                                                       |                           |                                                                                  |                    | 3 V             |       |                    |     | 1.48                  | 1.92 |      |
|                                                                       |                           |                                                                                  |                    | 4.5 V           |       |                    |     | 2.19                  | 2.74 |      |
|                                                                       |                           |                                                                                  |                    | 5.5 V           |       |                    |     | 2.65                  | 3.33 |      |
| V <sub>T–</sub><br>(Negative-going<br>input threshold<br>voltage)     |                           |                                                                                  |                    | 1.65 V          |       |                    |     | 0.35                  | 0.59 | V    |
|                                                                       |                           |                                                                                  |                    | 2.3 V           |       |                    |     | 0.56                  | 0.88 |      |
|                                                                       |                           |                                                                                  |                    | 3 V             |       |                    |     | 0.89                  | 1.2  |      |
|                                                                       |                           |                                                                                  |                    | 4.5 V           |       |                    |     | 1.51                  | 1.97 |      |
|                                                                       |                           |                                                                                  |                    | 5.5 V           |       |                    |     | 1.88                  | 2.4  |      |
| ΔV <sub>T</sub><br>Hysteresis<br>(V <sub>T+</sub> – V <sub>T–</sub> ) |                           |                                                                                  |                    | 1.65 V          |       |                    |     | 0.36                  | 0.64 | V    |
|                                                                       |                           |                                                                                  |                    | 2.3 V           |       |                    |     | 0.45                  | 0.78 |      |
|                                                                       |                           |                                                                                  |                    | 3 V             |       |                    |     | 0.51                  | 0.83 |      |
|                                                                       |                           |                                                                                  |                    | 4.5 V           |       |                    |     | 0.58                  | 0.93 |      |
|                                                                       |                           |                                                                                  |                    | 5.5 V           |       |                    |     | 0.69                  | 1.04 |      |
| V <sub>OH</sub>                                                       | I <sub>OH</sub> = –100 μA |                                                                                  |                    | 1.65 V to 5.5 V |       |                    |     | V <sub>CC</sub> – 0.1 | V    |      |
|                                                                       | I <sub>OH</sub> = –4 mA   |                                                                                  |                    | 1.65 V          |       |                    |     | 1.2                   |      |      |
|                                                                       | I <sub>OH</sub> = –8 mA   |                                                                                  |                    | 2.3 V           |       |                    |     | 1.9                   |      |      |
|                                                                       | I <sub>OH</sub> = –16 mA  |                                                                                  |                    | 3 V             |       |                    |     | 2.4                   |      |      |
|                                                                       | I <sub>OH</sub> = –24 mA  |                                                                                  |                    |                 |       |                    |     | 2.3                   |      |      |
|                                                                       | I <sub>OH</sub> = –32 mA  |                                                                                  |                    | 4.5 V           |       |                    |     | 3.8                   |      |      |
| V <sub>OL</sub>                                                       | I <sub>OL</sub> = 100 μA  |                                                                                  |                    | 1.65 V to 5.5 V |       |                    |     | 0.1                   | V    |      |
|                                                                       | I <sub>OL</sub> = 4 mA    |                                                                                  |                    | 1.65 V          |       |                    |     | 0.45                  |      |      |
|                                                                       | I <sub>OL</sub> = 8 mA    |                                                                                  |                    | 2.3 V           |       |                    |     | 0.3                   |      |      |
|                                                                       | I <sub>OL</sub> = 16 mA   |                                                                                  |                    | 3 V             |       |                    |     | 0.4                   |      |      |
|                                                                       | I <sub>OL</sub> = 24 mA   |                                                                                  |                    |                 |       |                    |     | 0.55                  |      |      |
|                                                                       | I <sub>OL</sub> = 32 mA   |                                                                                  |                    | 4.5 V           |       |                    |     | 0.55                  |      |      |
| I <sub>I</sub>                                                        | A input                   | V <sub>I</sub> = 5.5 V or GND                                                    |                    | 0 to 5.5 V      |       |                    |     |                       | ±5   | μA   |
| I <sub>off</sub>                                                      |                           | V <sub>I</sub> or V <sub>O</sub> = 5.5 V                                         |                    | 0               |       |                    |     |                       | ±10  | μA   |
| I <sub>CC</sub>                                                       |                           | V <sub>I</sub> = 5.5 V or GND,                                                   | I <sub>O</sub> = 0 | 1.65 V to 5.5 V |       | 0.5    1.5         |     |                       | 10   | μA   |
|                                                                       |                           | V <sub>I</sub> = 3.6 V or GND,                                                   |                    | 3 V to 3.6 V    |       |                    |     |                       |      |      |
| ΔI <sub>CC</sub>                                                      |                           | One input at V <sub>CC</sub> – 0.6 V,<br>Other inputs at V <sub>C C</sub> or GND |                    | 3 V to 5.5 V    |       |                    |     |                       | 500  | μA   |
| C <sub>I</sub>                                                        |                           | V <sub>I</sub> = V <sub>CC</sub> or GND                                          |                    | 3.3 V           |       | 4.5                |     |                       |      | pF   |

(1) All typical values are at V<sub>CC</sub> = 3.3 V, T<sub>A</sub> = 25°C.

## Switching Characteristics

over recommended operating free-air temperature range,  $C_L = 15$  pF (unless otherwise noted) (see [Figure 1](#) )

| PARAMETER | FROM<br>(INPUT) | TO<br>(OUTPUT) | $V_{CC} = 1.8\text{ V}$<br>$\pm 0.15\text{ V}$ |     | $V_{CC} = 2.5\text{ V}$<br>$\pm 0.2\text{ V}$ |     | $V_{CC} = 3.3\text{ V}$<br>$\pm 0.3\text{ V}$ |     | $V_{CC} = 5\text{ V}$<br>$\pm 0.5\text{ V}$ |     | UNIT |
|-----------|-----------------|----------------|------------------------------------------------|-----|-----------------------------------------------|-----|-----------------------------------------------|-----|---------------------------------------------|-----|------|
|           |                 |                | MIN                                            | MAX | MIN                                           | MAX | MIN                                           | MAX | MIN                                         | MAX |      |
| $t_{pd}$  | A               | Y              | 2.8                                            | 9.9 | 1.6                                           | 5.5 | 1.5                                           | 4.6 | 0.9                                         | 4.4 | ns   |

## Switching Characteristics

over recommended operating free-air temperature range,  $C_L = 30$  pF or 50 pF (unless otherwise noted) (see [Figure 2](#) )

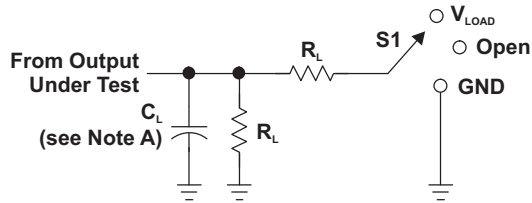
| PARAMETER | FROM<br>(INPUT) | TO<br>(OUTPUT) | $V_{CC} = 1.8\text{ V}$<br>$\pm 0.15\text{ V}$ |     | $V_{CC} = 2.5\text{ V}$<br>$\pm 0.2\text{ V}$ |     | $V_{CC} = 3.3\text{ V}$<br>$\pm 0.3\text{ V}$ |     | $V_{CC} = 5\text{ V}$<br>$\pm 0.5\text{ V}$ |     | UNIT |
|-----------|-----------------|----------------|------------------------------------------------|-----|-----------------------------------------------|-----|-----------------------------------------------|-----|---------------------------------------------|-----|------|
|           |                 |                | MIN                                            | MAX | MIN                                           | MAX | MIN                                           | MAX | MIN                                         | MAX |      |
| $t_{pd}$  | A               | Y              | 3.8                                            | 11  | 2                                             | 6.5 | 1.8                                           | 5.5 | 1.2                                         | 5   | ns   |

## Operating Characteristics

$T_A = 25^\circ\text{C}$

| PARAMETER |                               | TEST<br>CONDITIONS  | $V_{CC} = 1.8\text{ V}$ | $V_{CC} = 2.5\text{ V}$ | $V_{CC} = 3.3\text{ V}$ | $V_{CC} = 5\text{ V}$ | UNIT |
|-----------|-------------------------------|---------------------|-------------------------|-------------------------|-------------------------|-----------------------|------|
|           |                               |                     | TYP                     | TYP                     | TYP                     | TYP                   |      |
| $C_{pd}$  | Power dissipation capacitance | $f = 10\text{ MHz}$ | 20                      | 21                      | 22                      | 26                    | pF   |

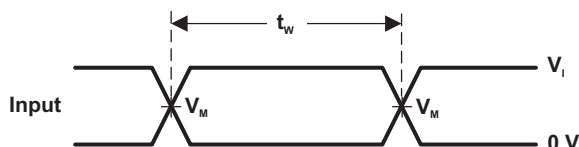
## PARAMETER MEASUREMENT INFORMATION



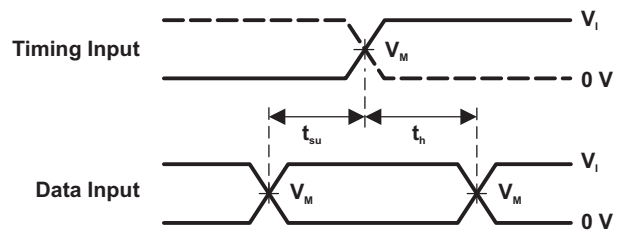
LOAD CIRCUIT

| TEST              | S1         |
|-------------------|------------|
| $t_{PLH}/t_{PHL}$ | Open       |
| $t_{PLZ}/t_{PZL}$ | $V_{LOAD}$ |
| $t_{PHZ}/t_{PZH}$ | GND        |

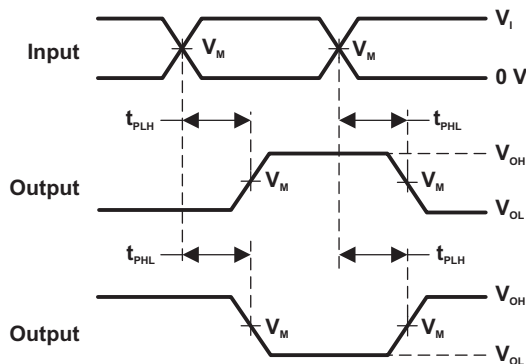
| $V_{CC}$                         | INPUTS   |                      | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|----------------------------------|----------|----------------------|------------|-------------------|-------|--------------|--------------|
|                                  | $V_I$    | $t_f/t_r$            |            |                   |       |              |              |
| $1.8\text{ V} \pm 0.15\text{ V}$ | $V_{CC}$ | $\leq 2\text{ ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 15 pF | 1 M $\Omega$ | 0.15 V       |
| $2.5\text{ V} \pm 0.2\text{ V}$  | $V_{CC}$ | $\leq 2\text{ ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 15 pF | 1 M $\Omega$ | 0.15 V       |
| $3.3\text{ V} \pm 0.3\text{ V}$  | 3 V      | $\leq 2.5\text{ ns}$ | 1.5 V      | 6 V               | 15 pF | 1 M $\Omega$ | 0.3 V        |
| $5\text{ V} \pm 0.5\text{ V}$    | $V_{CC}$ | $\leq 2.5\text{ ns}$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 15 pF | 1 M $\Omega$ | 0.3 V        |



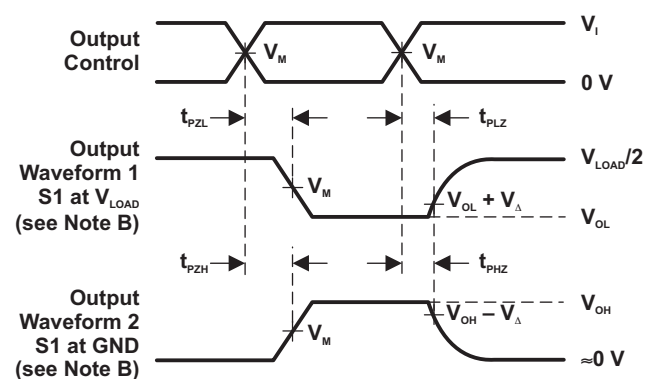
VOLTAGE WAVEFORMS  
PULSE DURATION



VOLTAGE WAVEFORMS  
SETUP AND HOLD TIMES



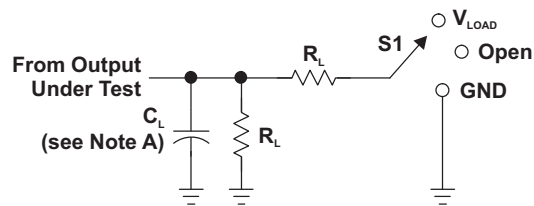
VOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES  
INVERTING AND NONINVERTING OUTPUTS



VOLTAGE WAVEFORMS  
ENABLE AND DISABLE TIMES  
LOW- AND HIGH-LEVEL ENABLING

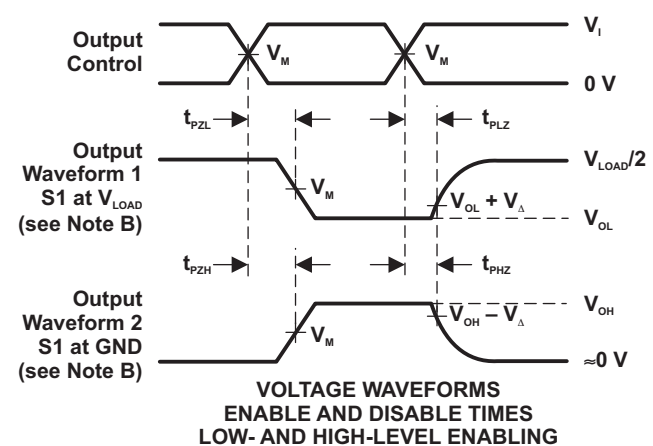
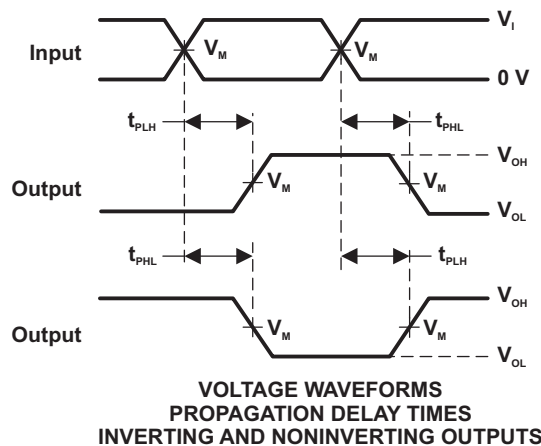
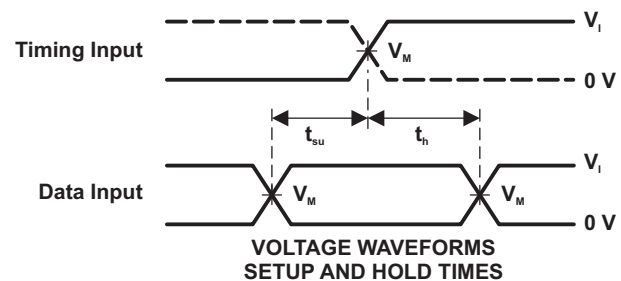
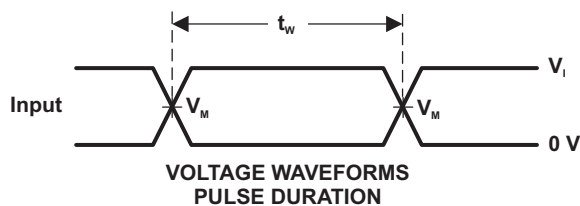
- NOTES:
- $C_L$  includes probe and jig capacitance.
  - Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
  - All input pulses are supplied by generators having the following characteristics: PRR  $\leq 10\text{ MHz}$ ,  $Z_o = 50\ \Omega$ .
  - The outputs are measured one at a time, with one transition per measurement.
  - $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
  - $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
  - $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
  - All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

**PARAMETER MEASUREMENT INFORMATION (continued)****LOAD CIRCUIT**

| TEST              | S1         |
|-------------------|------------|
| $t_{PLH}/t_{PHL}$ | Open       |
| $t_{PLZ}/t_{PZL}$ | $V_{LOAD}$ |
| $t_{PHZ}/t_{PZH}$ | GND        |

| $V_{CC}$                         | INPUTS   |                      | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|----------------------------------|----------|----------------------|------------|-------------------|-------|--------------|--------------|
|                                  | $V_i$    | $t_i/t_f$            |            |                   |       |              |              |
| $1.8\text{ V} \pm 0.15\text{ V}$ | $V_{CC}$ | $\leq 2\text{ ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 30 pF | 1 k $\Omega$ | 0.15 V       |
| $2.5\text{ V} \pm 0.2\text{ V}$  | $V_{CC}$ | $\leq 2\text{ ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 30 pF | 500 $\Omega$ | 0.15 V       |
| $3.3\text{ V} \pm 0.3\text{ V}$  | 3 V      | $\leq 2.5\text{ ns}$ | 1.5 V      | 6 V               | 50 pF | 500 $\Omega$ | 0.3 V        |
| $5\text{ V} \pm 0.5\text{ V}$    | $V_{CC}$ | $\leq 2.5\text{ ns}$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 50 pF | 500 $\Omega$ | 0.3 V        |



- NOTES: 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  $\leq 10\text{ MHz}$ ,  $Z_o = 50\ \Omega$ .
- D. The outputs are measured one at a time, with one 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  $t_{pd}$ .
- H. All parameters and waveforms are not applicable to all devices.

**Figure 2. Load Circuit and Voltage Waveforms**



**PACKAGING INFORMATION**

| Orderable Device  | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup>    | Lead/<br>Ball Finish | MSL Peak Temp <sup>(3)</sup> | Samples<br>(Requires Login) |
|-------------------|-----------------------|--------------|-----------------|------|-------------|----------------------------|----------------------|------------------------------|-----------------------------|
| SN74LVC1G17DBVR   | ACTIVE                | SOT-23       | DBV             | 5    | 3000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DBVRE4 | ACTIVE                | SOT-23       | DBV             | 5    | 3000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DBVRG4 | ACTIVE                | SOT-23       | DBV             | 5    | 3000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DBVT   | ACTIVE                | SOT-23       | DBV             | 5    | 250         | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DBVTE4 | ACTIVE                | SOT-23       | DBV             | 5    | 250         | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DBVTG4 | ACTIVE                | SOT-23       | DBV             | 5    | 250         | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DCKR   | ACTIVE                | SC70         | DCK             | 5    | 3000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DCKRE4 | ACTIVE                | SC70         | DCK             | 5    | 3000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DCKRG4 | ACTIVE                | SC70         | DCK             | 5    | 3000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DCKT   | ACTIVE                | SC70         | DCK             | 5    | 250         | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DCKTE4 | ACTIVE                | SC70         | DCK             | 5    | 250         | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DCKTG4 | ACTIVE                | SC70         | DCK             | 5    | 250         | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DRLR   | ACTIVE                | SOT          | DRL             | 5    | 4000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DRLRG4 | ACTIVE                | SOT          | DRL             | 5    | 4000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DRYR   | ACTIVE                | SON          | DRY             | 6    | 5000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DRYRG4 | ACTIVE                | SON          | DRY             | 6    | 5000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17DSFR   | ACTIVE                | SON          | DSF             | 6    | 5000        | Green (RoHS<br>& no Sb/Br) | CU NIPDAU            | Level-1-260C-UNLIM           |                             |

| Orderable Device | Status <sup>(1)</sup> | Package Type | Package Drawing | Pins | Package Qty | Eco Plan <sup>(2)</sup>    | Lead/<br>Ball Finish | MSL Peak Temp <sup>(3)</sup> | Samples<br>(Requires Login) |
|------------------|-----------------------|--------------|-----------------|------|-------------|----------------------------|----------------------|------------------------------|-----------------------------|
| SN74LVC1G17YZPR  | ACTIVE                | DSBGA        | YZP             | 5    | 3000        | Green (RoHS<br>& no Sb/Br) | SNAGCU               | Level-1-260C-UNLIM           |                             |
| SN74LVC1G17YZVR  | ACTIVE                | DSBGA        | YZV             | 4    | 3000        | Green (RoHS<br>& no Sb/Br) | SNAGCU               | Level-1-260C-UNLIM           |                             |

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

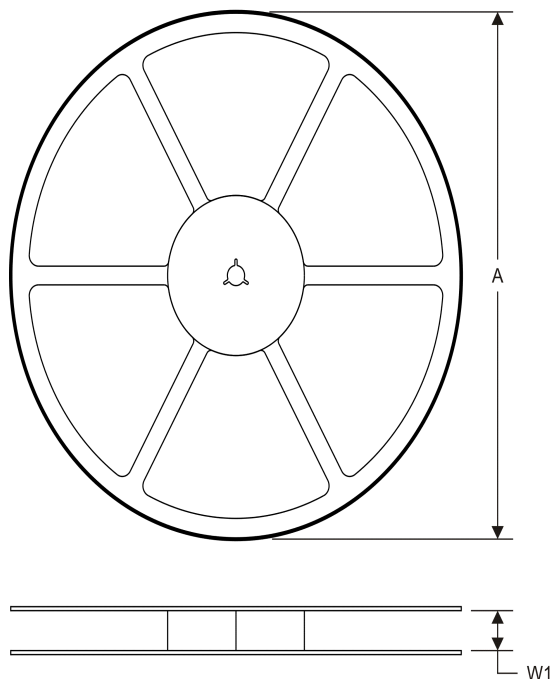
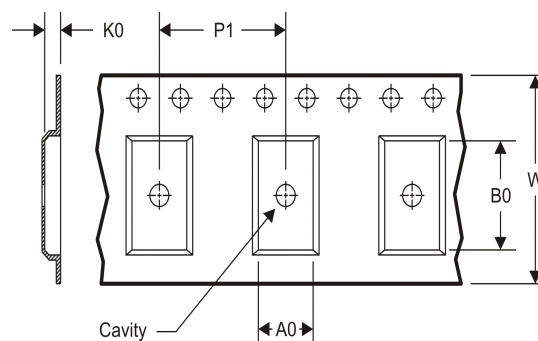
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

#### OTHER QUALIFIED VERSIONS OF SN74LVC1G17 :

- Automotive: [SN74LVC1G17-Q1](#)
- Enhanced Product: [SN74LVC1G17-EP](#)

NOTE: Qualified Version Definitions:

- 
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
  - Enhanced Product - Supports Defense, Aerospace and Medical Applications

**TAPE AND REEL INFORMATION**
**REEL DIMENSIONS**

**TAPE DIMENSIONS**


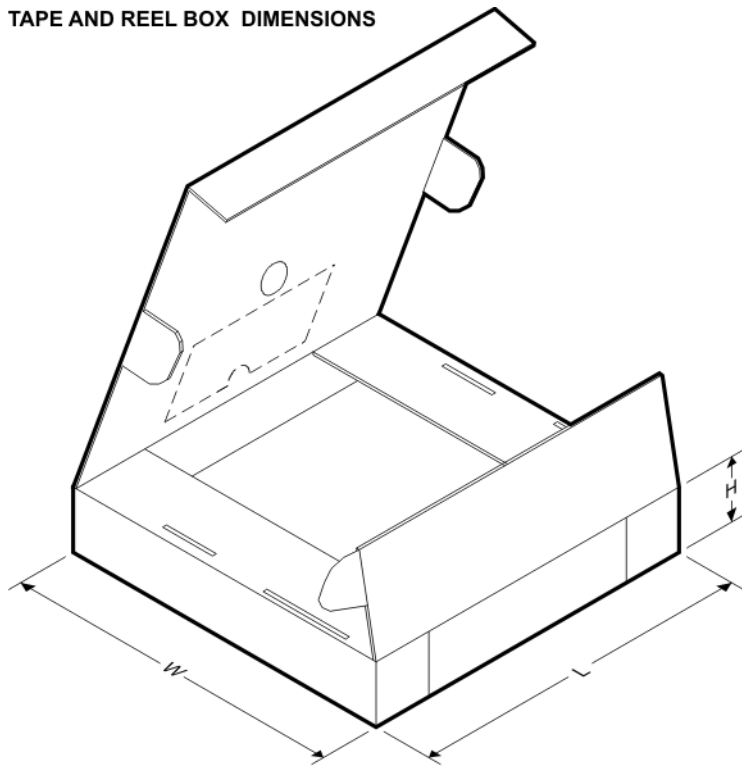
|    |                                                           |
|----|-----------------------------------------------------------|
| A0 | Dimension designed to accommodate the component width     |
| B0 | Dimension designed to accommodate the component length    |
| K0 | Dimension designed to accommodate the component thickness |
| W  | Overall width of the carrier tape                         |
| P1 | Pitch between successive cavity centers                   |

**TAPE AND REEL INFORMATION**

\*All dimensions are nominal

| Device          | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|-----------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| SN74LVC1G17DBVR | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.2                | 3.3     | 3.2     | 1.55    | 4.0     | 8.0    | Q3            |
| SN74LVC1G17DBVR | SOT-23       | DBV             | 5    | 3000 | 180.0              | 9.2                | 3.17    | 3.23    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74LVC1G17DBVR | SOT-23       | DBV             | 5    | 3000 | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74LVC1G17DBVT | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.2                | 3.3     | 3.2     | 1.55    | 4.0     | 8.0    | Q3            |
| SN74LVC1G17DBVT | SOT-23       | DBV             | 5    | 250  | 180.0              | 9.2                | 3.17    | 3.23    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74LVC1G17DBVT | SOT-23       | DBV             | 5    | 250  | 178.0              | 9.0                | 3.23    | 3.17    | 1.37    | 4.0     | 8.0    | Q3            |
| SN74LVC1G17DCKR | SC70         | DCK             | 5    | 3000 | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |
| SN74LVC1G17DCKR | SC70         | DCK             | 5    | 3000 | 178.0              | 9.0                | 2.4     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74LVC1G17DCKT | SC70         | DCK             | 5    | 250  | 178.0              | 9.2                | 2.4     | 2.4     | 1.22    | 4.0     | 8.0    | Q3            |
| SN74LVC1G17DCKT | SC70         | DCK             | 5    | 250  | 178.0              | 9.0                | 2.4     | 2.5     | 1.2     | 4.0     | 8.0    | Q3            |
| SN74LVC1G17DCKT | SC70         | DCK             | 5    | 250  | 180.0              | 9.2                | 2.3     | 2.55    | 1.2     | 4.0     | 8.0    | Q3            |
| SN74LVC1G17DRLR | SOT          | DRL             | 5    | 4000 | 180.0              | 8.4                | 1.98    | 1.78    | 0.69    | 4.0     | 8.0    | Q3            |
| SN74LVC1G17DRLR | SOT          | DRL             | 5    | 4000 | 180.0              | 9.5                | 1.78    | 1.78    | 0.69    | 4.0     | 8.0    | Q3            |
| SN74LVC1G17DRYR | SON          | DRY             | 6    | 5000 | 180.0              | 9.5                | 1.15    | 1.6     | 0.75    | 4.0     | 8.0    | Q1            |
| SN74LVC1G17DRYR | SON          | DRY             | 6    | 5000 | 179.0              | 8.4                | 1.2     | 1.65    | 0.7     | 4.0     | 8.0    | Q1            |
| SN74LVC1G17DSFR | SON          | DSF             | 6    | 5000 | 180.0              | 9.5                | 1.16    | 1.16    | 0.5     | 4.0     | 8.0    | Q2            |
| SN74LVC1G17YZPR | DSBGA        | YZP             | 5    | 3000 | 180.0              | 8.4                | 1.02    | 1.52    | 0.63    | 4.0     | 8.0    | Q1            |
| SN74LVC1G17YZVR | DSBGA        | YZV             | 4    | 3000 | 180.0              | 8.4                | 1.02    | 1.02    | 0.63    | 4.0     | 8.0    | Q1            |

## TAPE AND REEL BOX DIMENSIONS

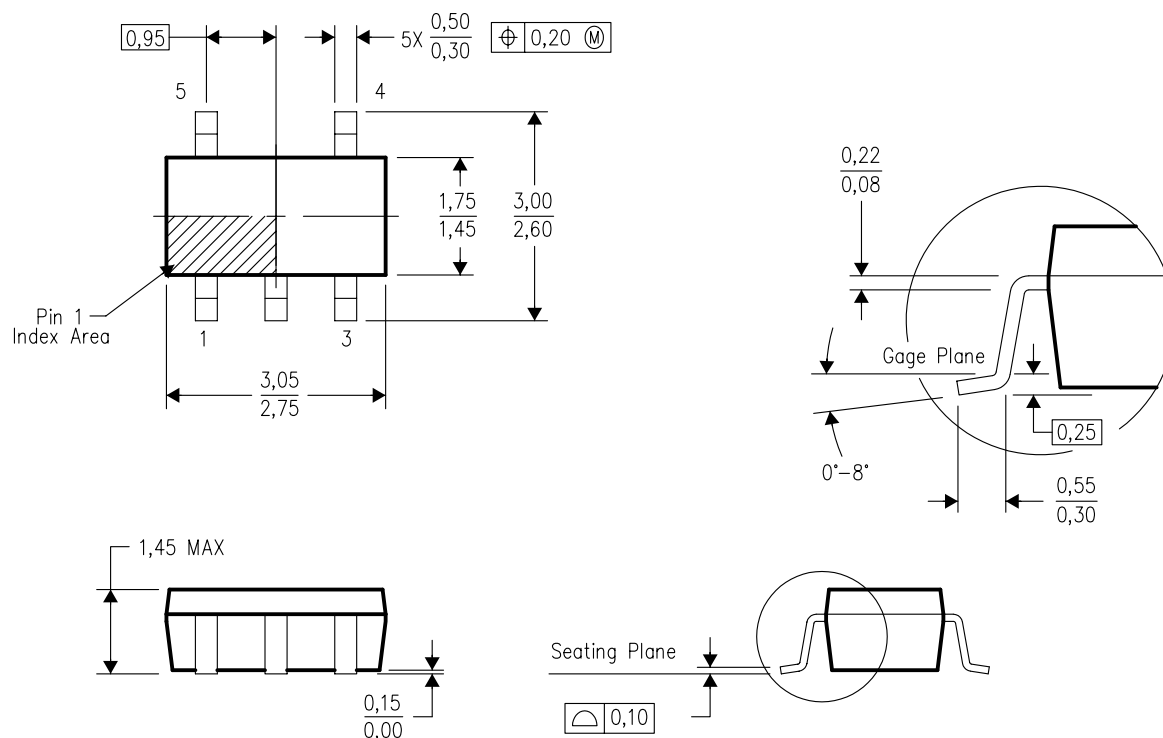


\*All dimensions are nominal

| Device          | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|-----------------|--------------|-----------------|------|------|-------------|------------|-------------|
| SN74LVC1G17DBVR | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74LVC1G17DBVR | SOT-23       | DBV             | 5    | 3000 | 205.0       | 200.0      | 33.0        |
| SN74LVC1G17DBVR | SOT-23       | DBV             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74LVC1G17DBVT | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74LVC1G17DBVT | SOT-23       | DBV             | 5    | 250  | 205.0       | 200.0      | 33.0        |
| SN74LVC1G17DBVT | SOT-23       | DBV             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74LVC1G17DCKR | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74LVC1G17DCKR | SC70         | DCK             | 5    | 3000 | 180.0       | 180.0      | 18.0        |
| SN74LVC1G17DCKT | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74LVC1G17DCKT | SC70         | DCK             | 5    | 250  | 180.0       | 180.0      | 18.0        |
| SN74LVC1G17DCKT | SC70         | DCK             | 5    | 250  | 205.0       | 200.0      | 33.0        |
| SN74LVC1G17DRLR | SOT          | DRL             | 5    | 4000 | 202.0       | 201.0      | 28.0        |
| SN74LVC1G17DRLR | SOT          | DRL             | 5    | 4000 | 180.0       | 180.0      | 30.0        |
| SN74LVC1G17DRYR | SON          | DRY             | 6    | 5000 | 180.0       | 180.0      | 30.0        |
| SN74LVC1G17DRYR | SON          | DRY             | 6    | 5000 | 203.0       | 203.0      | 35.0        |
| SN74LVC1G17DSFR | SON          | DSF             | 6    | 5000 | 180.0       | 180.0      | 30.0        |
| SN74LVC1G17YZPR | DSBGA        | YZP             | 5    | 3000 | 220.0       | 220.0      | 34.0        |
| SN74LVC1G17YZVR | DSBGA        | YZV             | 4    | 3000 | 220.0       | 220.0      | 34.0        |

## DBV (R-PDSO-G5)

## PLASTIC SMALL-OUTLINE PACKAGE

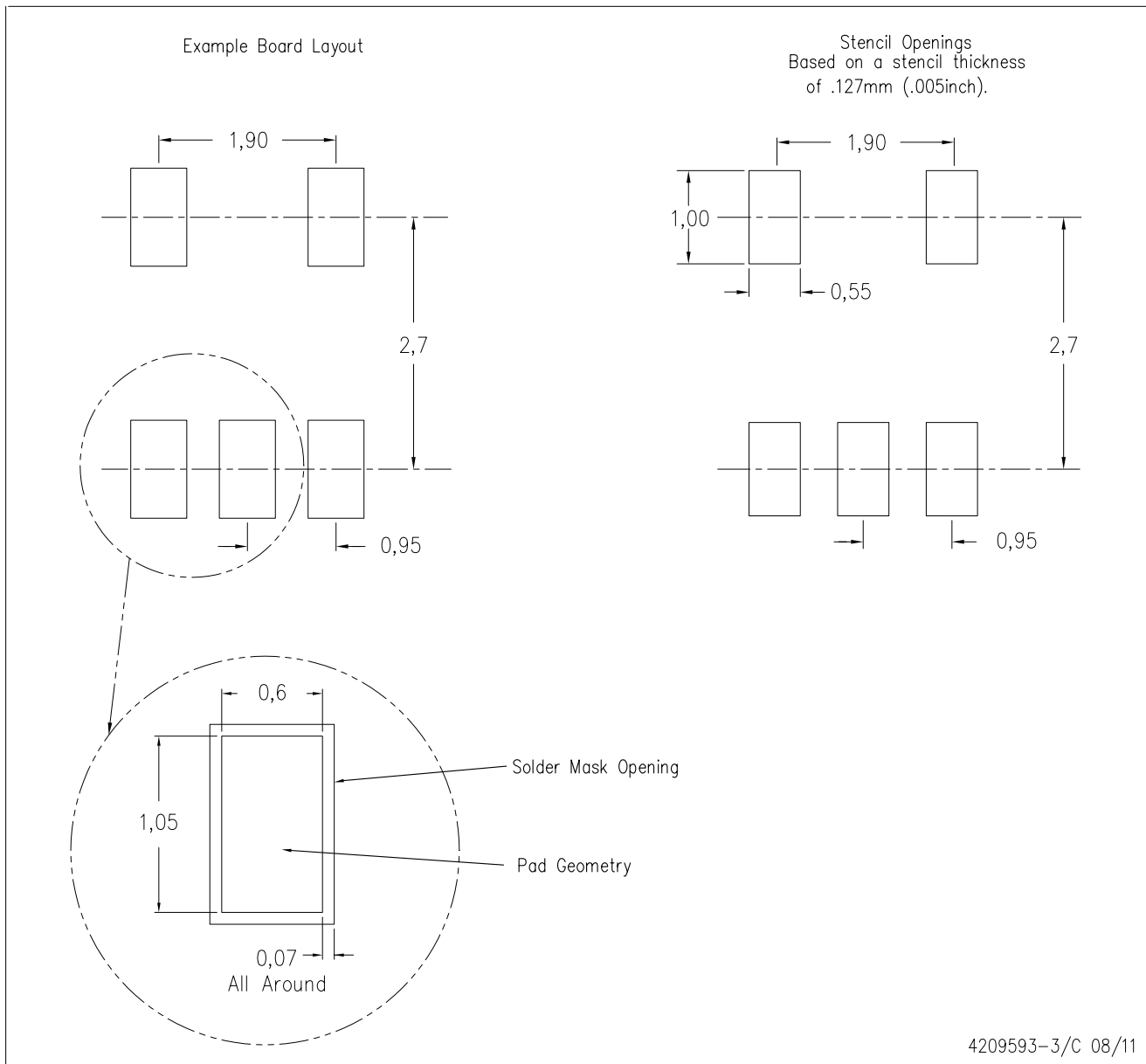


4073253-4/K 03/2006

- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
  - D. Falls within JEDEC MO-178 Variation AA.

DBV (R-PDSO-G5)

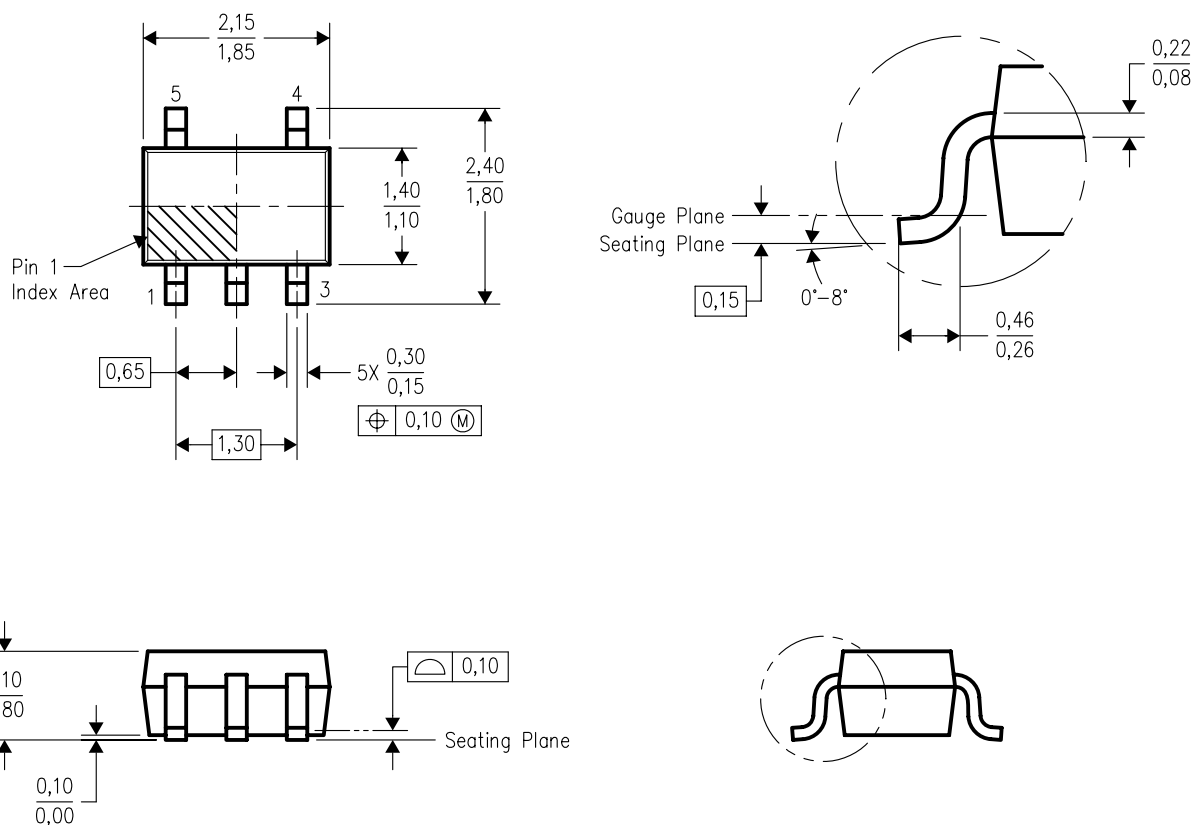
PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
  - D. Publication IPC-7351 is recommended for alternate designs.
  - E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.

## DCK (R-PDSO-G5)

## PLASTIC SMALL-OUTLINE PACKAGE



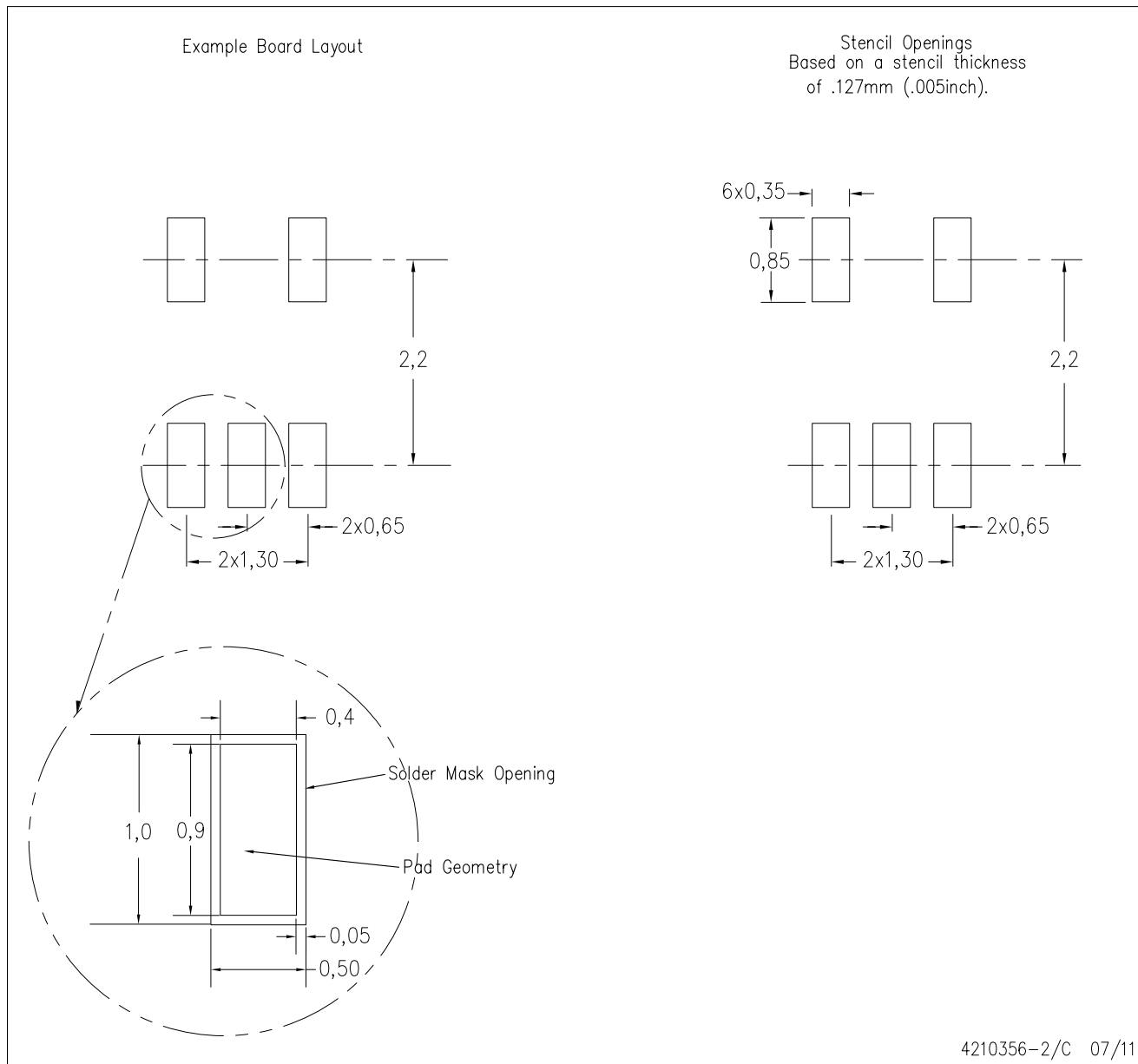
4093553-3/G 01/2007

- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
  - Falls within JEDEC MO-203 variation AA.

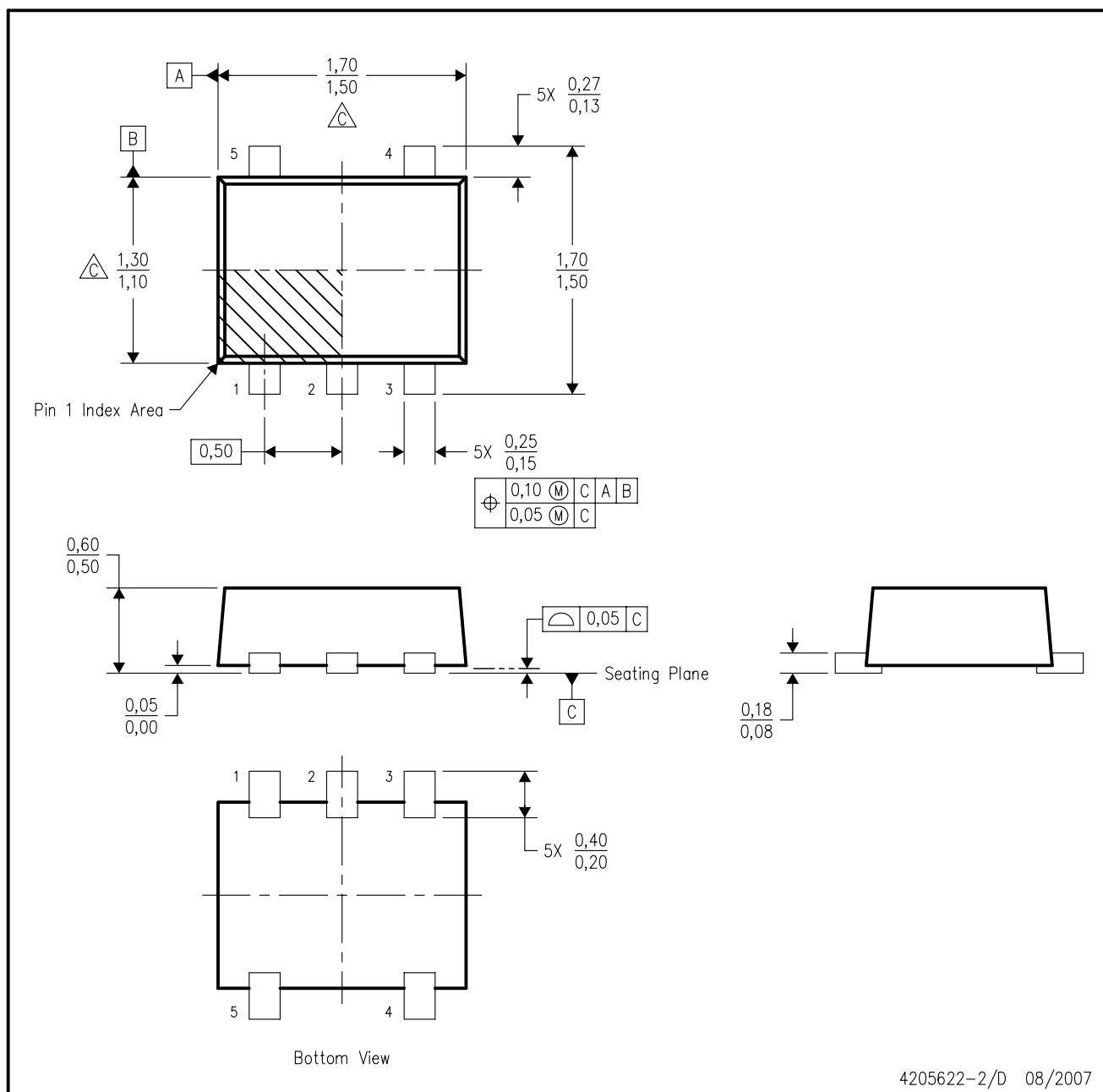


DCK (R-PDSO-G5)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
  - D. Publication IPC-7351 is recommended for alternate designs.
  - E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.



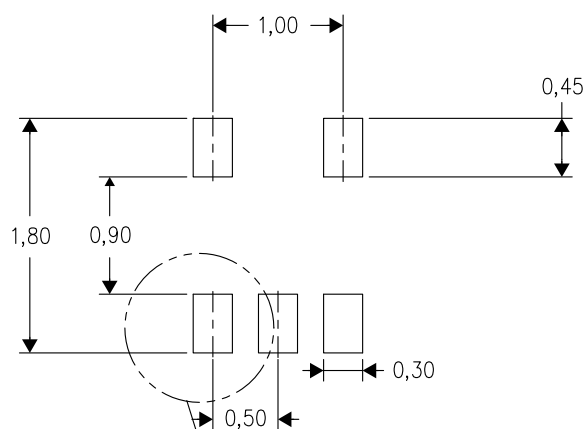
4205622-2/D 08/2007

- NOTES:
- All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - This drawing is subject to change without notice.
  - Body dimensions do not include mold flash, interlead flash, protrusions, or gate burrs. Mold flash, interlead flash, protrusions, or gate burrs shall not exceed 0,15 per end or side.
  - JEDEC package registration is pending.

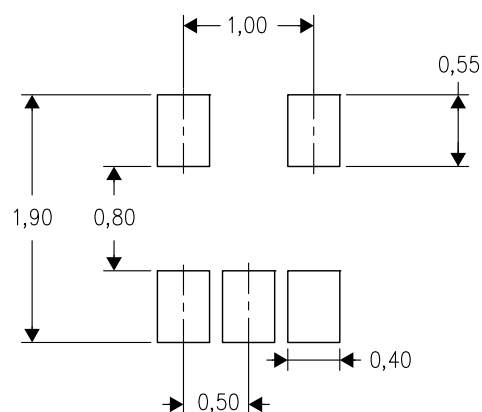
DRL (R-PDSO-N5)

PLASTIC SMALL OUTLINE

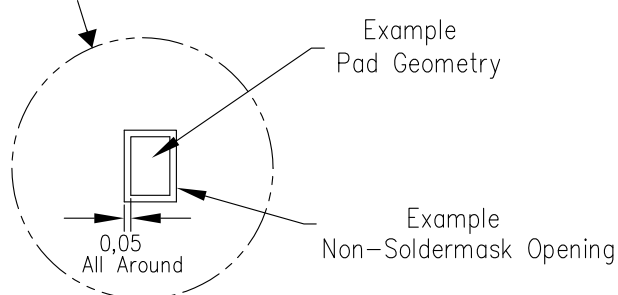
Example Board Layout



Example Stencil Design  
(Note E)



Example  
Non-Soldermask Defined Pad

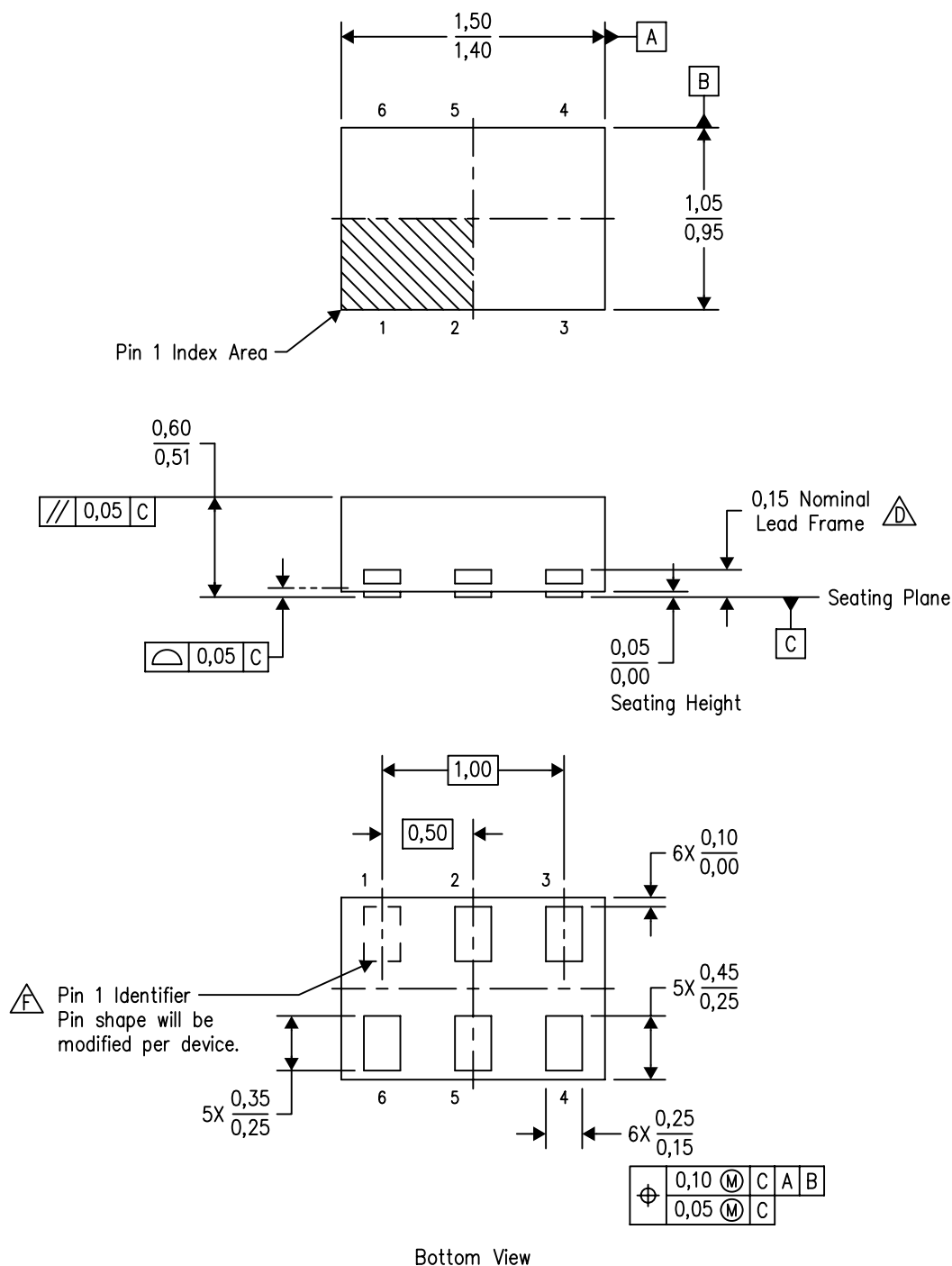


4208207-2/E 06/12

- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.
  - E. Maximum stencil thickness 0,127 mm (5 mils). All linear dimensions are in millimeters.
  - F. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
  - G. Side aperture dimensions over-print land for acceptable area ratio > 0.66. Customer may reduce side aperture dimensions if stencil manufacturing process allows for sufficient release at smaller opening.

DRY (R-PUSON-N6)

PLASTIC SMALL OUTLINE NO-LEAD

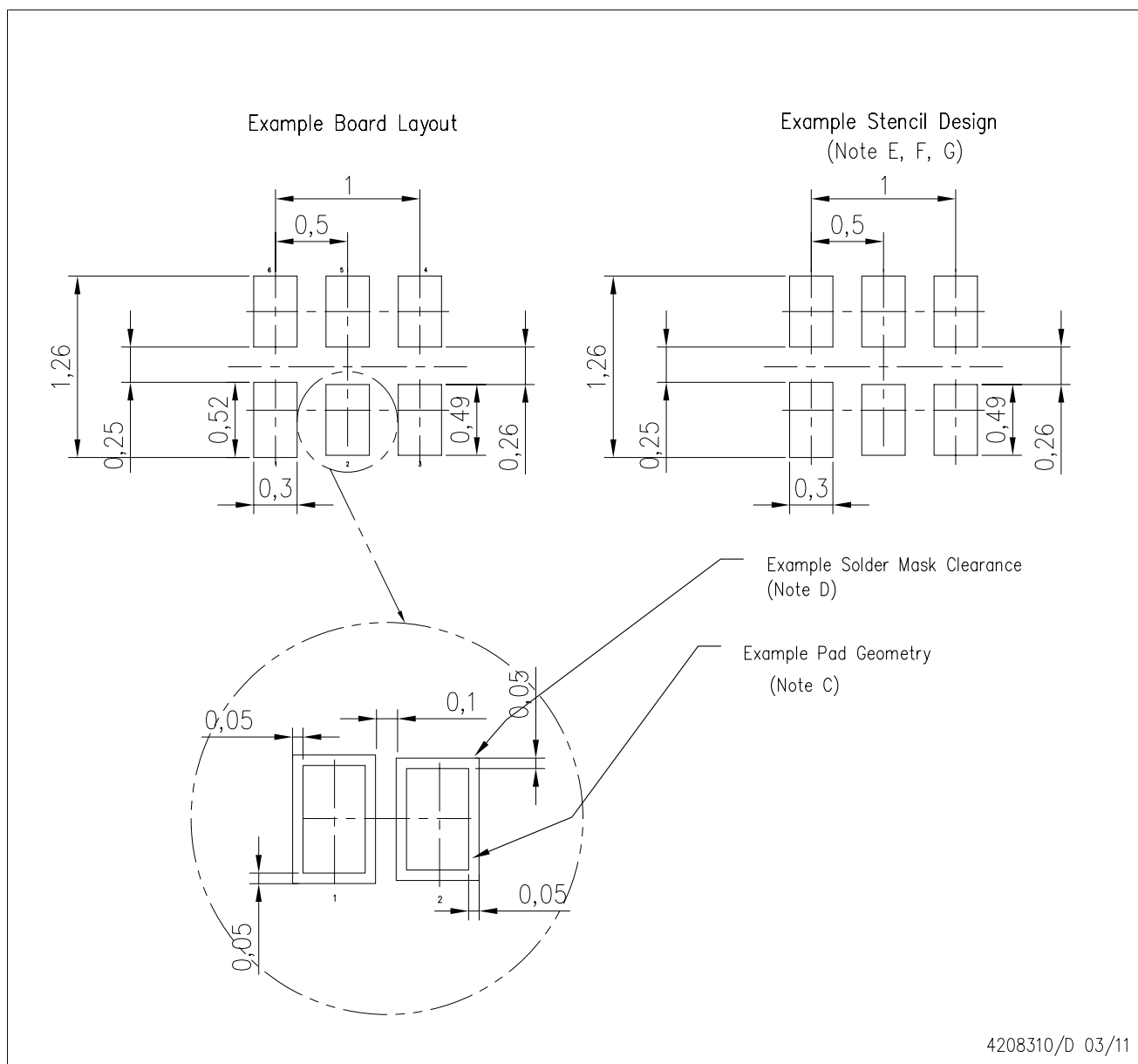


4207181/F 12/11

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. SON (Small Outline No-Lead) package configuration.
  - $\triangle D$  The exposed lead frame feature on side of package may or may not be present due to alternative lead frame designs.
  - E. This package complies to JEDEC MO-287 variation UFAD.
  - $\triangle F$  See the additional figure in the Product Data Sheet for details regarding the pin 1 identifier shape.

DRY (S-PUSON-N6)

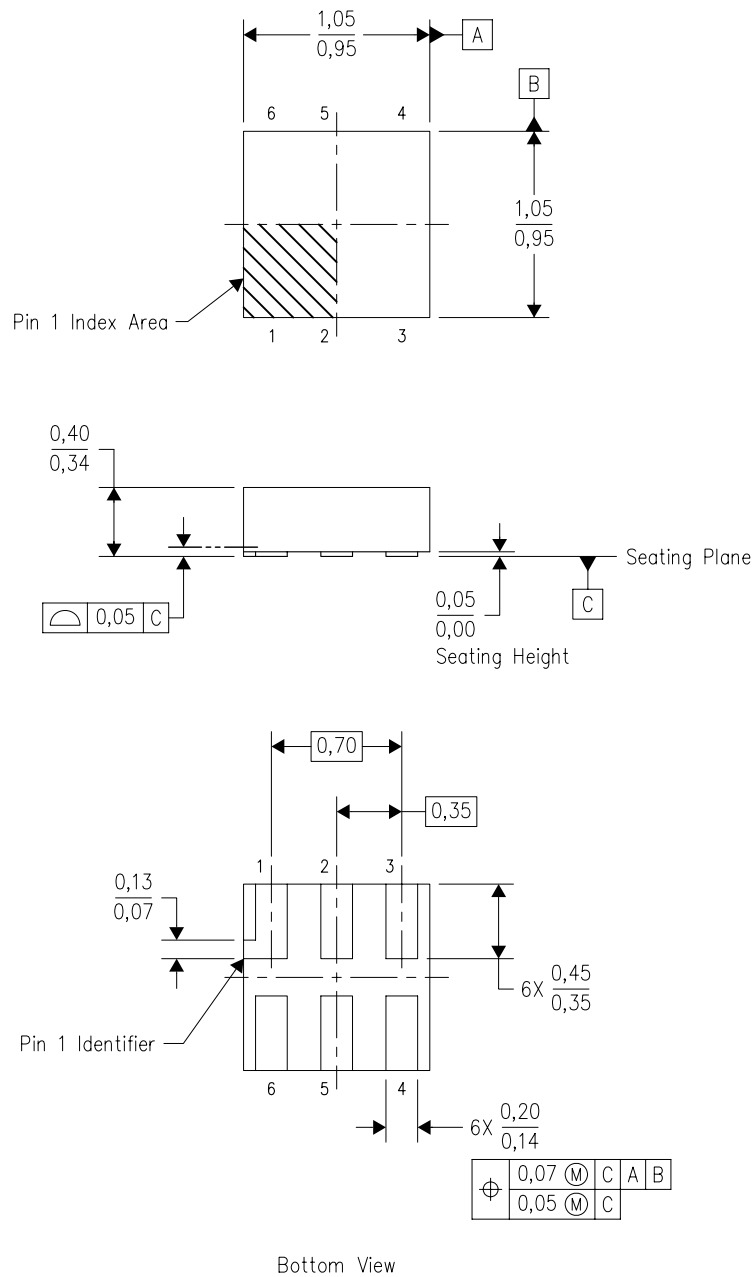
PLASTIC SMALL OUTLINE NO-LEAD



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads.
  - E. Maximum stencil thickness 0,127 mm (5 mils). All linear dimensions are in millimeters.
  - F. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
  - G. Side aperture dimensions over-print land for acceptable area ratio > 0.66. Customer may reduce side aperture dimensions if stencil manufacturing process allows for sufficient release at smaller opening.

DSF (S-PX2SON-N6)

PLASTIC SMALL OUTLINE NO-LEAD

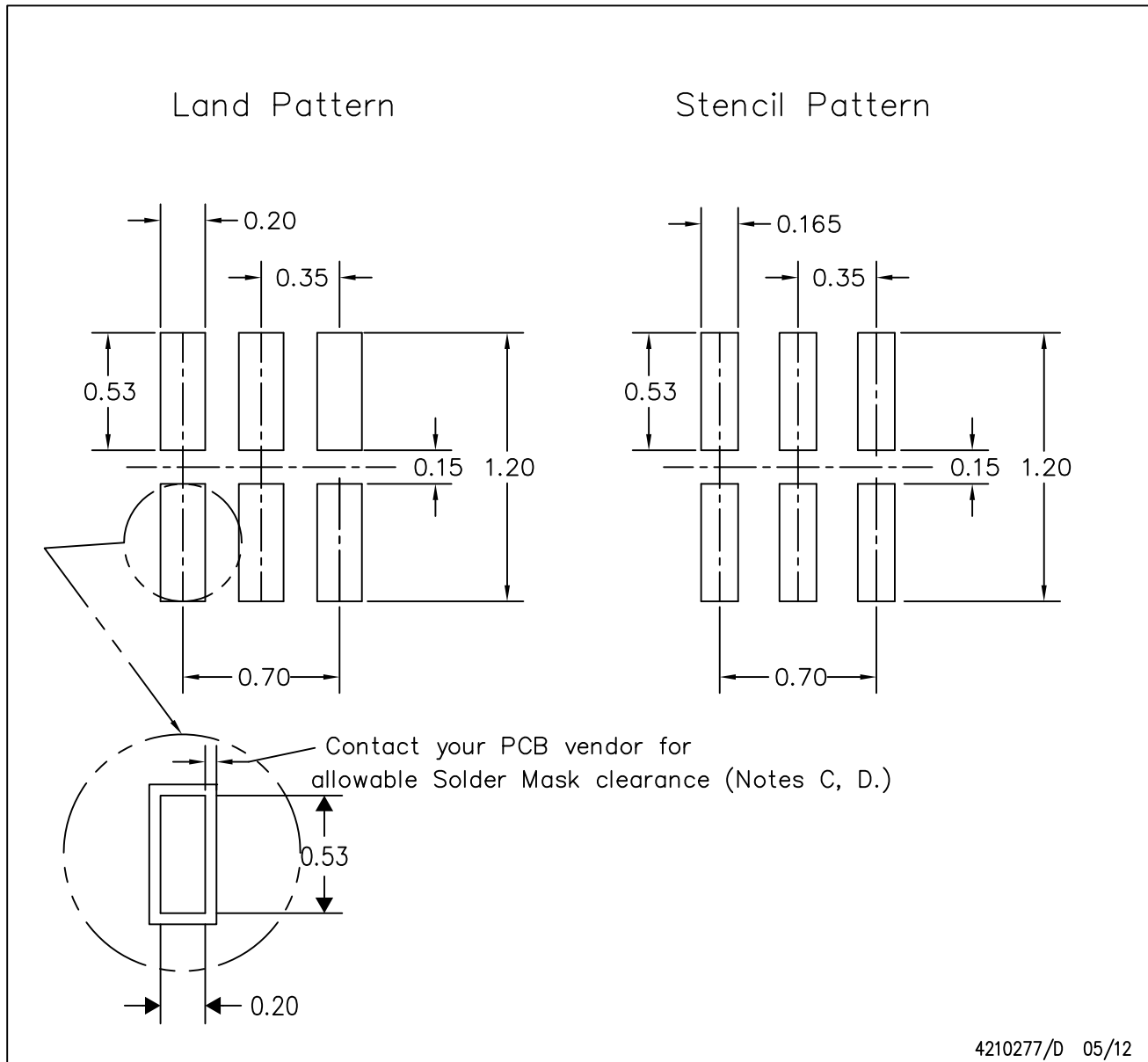


4208186/E 03/11

- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. SON (Small Outline No-Lead) package configuration.
  - D. This package complies to JEDEC MO-287 variation X2AAF.

DSF (S-PX2SON-N6)

PLASTIC SMALL OUTLINE NO-LEAD

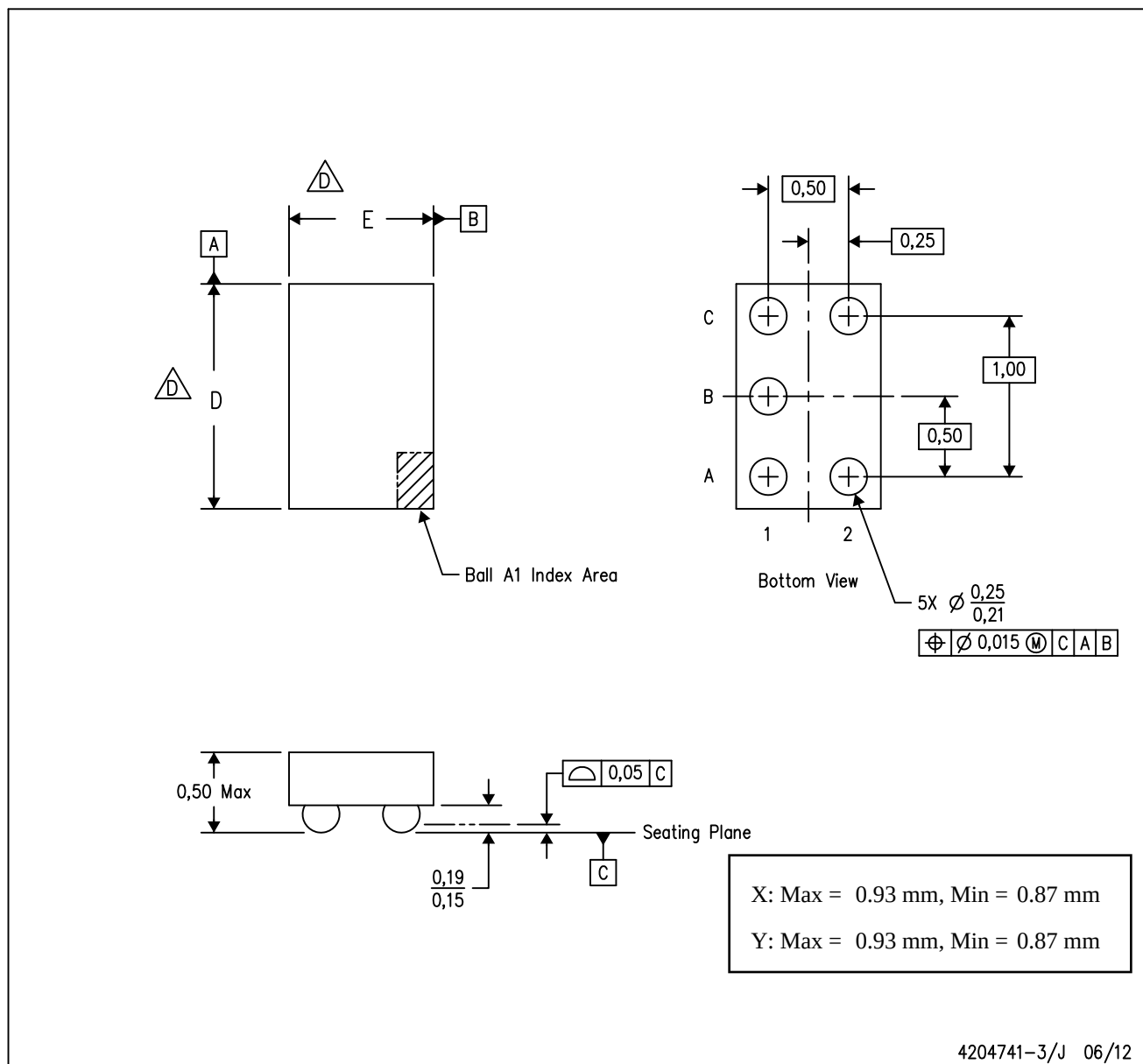


4210277/D 05/12

- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Customers should contact their board fabrication site for minimum solder mask web tolerances between signal pads. If 2 mil solder mask is outside PCB vendor capability, it is advised to omit solder mask.
  - E. Maximum stencil thickness 0,1016 mm (4 mils). All linear dimensions are in millimeters.
  - F. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC 7525 for stencil design considerations.
  - G. Suggest stencils cut with lasers such as Fiber Laser that produce the greatest positional accuracy.
  - H. Component placement force should be minimized to prevent excessive paste block deformation.

YZP (R-XBGA-N5)

DIE-SIZE BALL GRID ARRAY



4204741-3/J 06/12

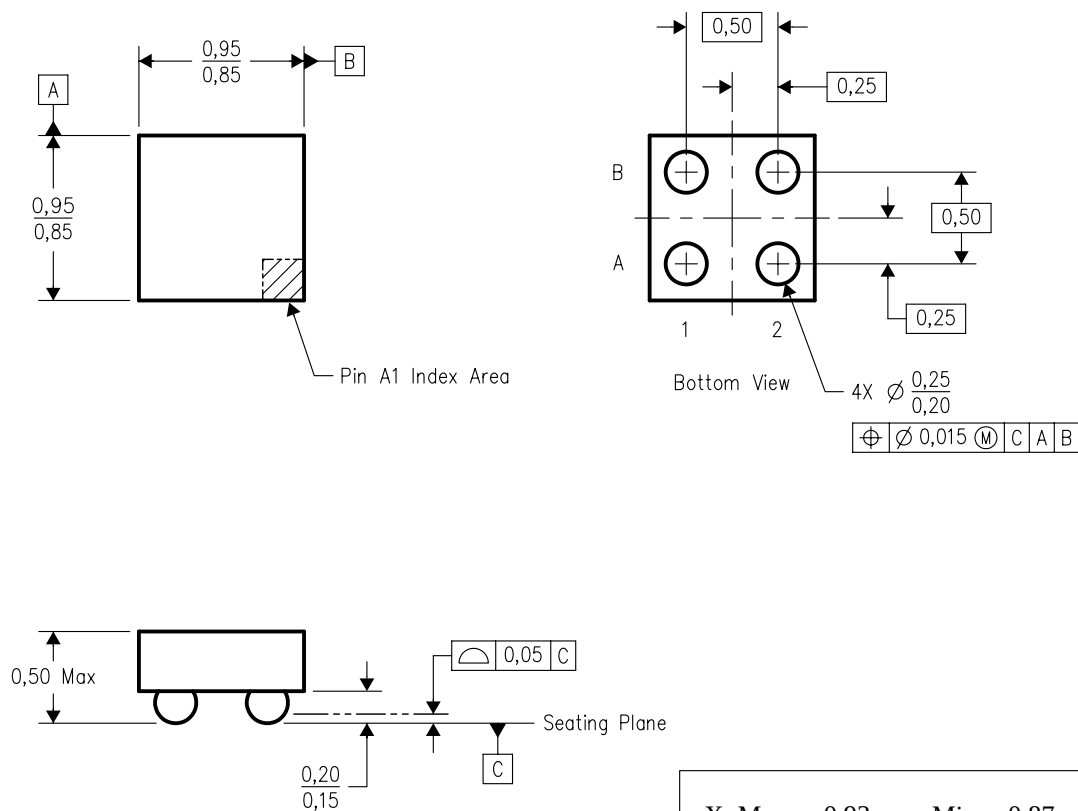
- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
  - B. This drawing is subject to change without notice.
  - C. NanoFree™ package configuration.
  - The package size (Dimension D and E) of a particular device is specified in the device Product Data Sheet version of this drawing, in case it cannot be found in the product data sheet please contact a local TI representative.
  - E. This package is a Pb-free solder ball design. Refer to the 5 YEP package (drawing 4204725) for tin-lead (SnPb).

NanoFree is a trademark of Texas Instruments.



## YZV (S-XBGA-N4)

## DIE-SIZE BALL GRID ARRAY



X: Max = 0.93 mm, Min = 0.87 mm

Y: Max = 0.93 mm, Min = 0.87 mm

4206083/A 05/2004

- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. NanoFree™ package configuration.
  - D. This package contains lead-free balls. Refer to the 4 YEV package (drawing 4206082) for tin-lead (SnPb) balls.

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|                               |                                                                                          |
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