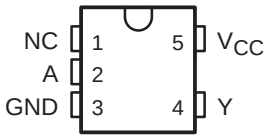
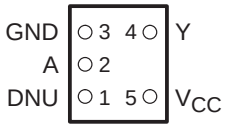
- **Available in the Texas Instruments NanoStar™ and NanoFree™ Packages**
- **Optimized for 1.8-V Operation and Is 3.6-V I/O Tolerant to Support Mixed-Mode Signal Operation**
- **$I_{off}$ Supports Partial-Power-Down Mode Operation**
- **Sub 1-V Operable**
- **Max $t_{pd}$ of 2.4 ns at 1.8 V**
- **Low Power Consumption, 10-μA Max $I_{CC}$**
- **±8-mA Output Drive at 1.8 V**
- **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)**

**DBV OR DCK PACKAGE**
**(TOP VIEW)**




NC − No internal connection

**YEA, YEP, YZA, OR YZP PACKAGE**
**(BOTTOM VIEW)**




DNU − Do not use

## description/ordering information

This single Schmitt-trigger buffer is operational at 0.8-V to 2.7-V $V_{CC}$, but is designed specifically for 1.65-V to 1.95-V $V_{CC}$ operation.

The SN74AUC1G17 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.

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

**ORDERING INFORMATION**

| $T_A$ | PACKAGE† | | ORDERABLE PART NUMBER | TOP-SIDE MARKING‡ |
|---|---|---|---|---|
| −40°C to 85°C | NanoStar™ − WCSP (DSBGA) 0.17-mm Small Bump − YEA | Tape and reel | SN74AUC1G17YEAR | _ _ _U7_ |
| | NanoFree™ − WCSP (DSBGA) 0.17-mm Small Bump − YZA (Pb-free) | | SN74AUC1G17YZAR | |
| | NanoStar™ − WCSP (DSBGA) 0.23-mm Large Bump − YEP | | SN74AUC1G17YEPR | |
| | NanoFree™ − WCSP (DSBGA) 0.23-mm Large Bump − YZP (Pb-free) | | SN74AUC1G17YZPR | |
| | SOT (SOT-23) − DBV | Tape and reel | SN74AUC1G17DBVR | U17_ |
| | SOT (SC-70) − DCK | Tape and reel | SN74AUC1G17DCKR | U7_ |

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

‡ DBV/DCK: The actual top-side marking has one additional character that designates the assembly/test site.
YEA/YZA, YEP/YZP: The actual top-side marking has three preceding characters to denote year, month, and sequence code, and one following character to designate the assembly/test site. Pin 1 identifier indicates solder-bump composition (1 = SnPb, • = Pb-free).



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.

NanoStar and NanoFree are trademarks of Texas Instruments.

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## description/ordering information (continued)

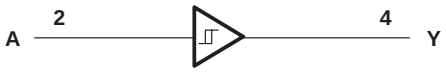
This device is fully specified for partial-power-down applications using $I_{off}$. The $I_{off}$ circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

For more information about AUC Little Logic devices, please refer to the TI application report, *Applications of Texas Instruments AUC Sub-1-V Little Logic Devices,* literature number SCEA027.

**FUNCTION TABLE**

| INPUT A | OUTPUT Y |
|---|---|
| H | H |
| L | L |

## logic diagram (positive logic)




## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, $V_{CC}$ . . . . . −0.5 V to 3.6 V
Input voltage range, $V_I$ (see Note 1) . . . . . −0.5 V to 3.6 V
Voltage range applied to any output in the high-impedance or power-off state, $V_O$ (see Note 1) . . . . . −0.5 V to 3.6 V
Output voltage range, $V_O$ (see Note 1) . . . . . −0.5 V to $V_{CC}$ + 0.5 V
Input clamp current, $I_{IK}$ ($V_I$ < 0) . . . . . −50 mA
Output clamp current, $I_{OK}$ ($V_O$ < 0) . . . . . −50 mA
Continuous output current, $I_O$ . . . . . ±20 mA
Continuous current through $V_{CC}$ or GND . . . . . ±100 mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): DBV package . . . . . 206°C/W
DCK package . . . . . 252°C/W
YEA/YZA package . . . . . 154°C/W
YEP/YZP package . . . . . 132°C/W
Storage temperature range, $T_{stg}$ . . . . . −65°C to 150°C

† 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.

NOTES: 1. The input negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

## recommended operating conditions (see Note 3)

| | | | MIN | MAX | UNIT |
|---|---|---|---|---|---|
| $V_{CC}$ | Supply voltage | | 0.8 | 2.7 | V |
| $V_I$ | Input voltage | | 0 | 3.6 | V |
| $V_O$ | Output voltage | | 0 | $V_{CC}$ | V |
| $I_{OH}$ | High-level output current | $V_{CC}$ = 0.8 V | | −0.7 | mA |
| | | $V_{CC}$ = 1.1 V | | −3 | |
| | | $V_{CC}$ = 1.4 V | | −5 | |
| | | $V_{CC}$ = 1.65 V | | −8 | |
| | | $V_{CC}$ = 2.3 V | | −9 | |
| $I_{OL}$ | Low-level output current | $V_{CC}$ = 0.8 V | | 0.7 | mA |
| | | $V_{CC}$ = 1.1 V | | 3 | |
| | | $V_{CC}$ = 1.4 V | | 5 | |
| | | $V_{CC}$ = 1.65 V | | 8 | |
| | | $V_{CC}$ = 2.3 V | | 9 | |
| $T_A$ | Operating free-air temperature | | −40 | 85 | °C |

NOTE 3: 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 | $V_{CC}$ | MIN | TYP† | MAX | UNIT |
|---|---|---|---|---|---|---|
| $V_{T+}$ Positive-going input threshold voltage | | 0.8 V | | 0.5 | | V |
| | | 1.1 V | 0.51 | | 0.86 | |
| | | 1.4 V | 0.65 | | 1 | |
| | | 1.65 V | 0.79 | | 1.16 | |
| | | 2.3 V | 1.11 | | 1.56 | |
| $V_{T-}$ Negative-going input threshold voltage | | 0.8 V | | 0.3 | | V |
| | | 1.1 V | 0.22 | | 0.53 | |
| | | 1.4 V | 0.3 | | 0.58 | |
| | | 1.65 V | 0.39 | | 0.62 | |
| | | 2.3 V | 0.58 | | 0.87 | |
| $\Delta V_T$ Hysteresis ($V_{T+} - V_{T-}$) | | 0.8 V | | 0.21 | | V |
| | | 1.1 V | 0.25 | | 0.38 | |
| | | 1.4 V | 0.31 | | 0.5 | |
| | | 1.65 V | 0.37 | | 0.62 | |
| | | 2.3 V | 0.48 | | 0.77 | |
| $V_{OH}$ | $I_{OH}$ = −100 µA | 0.8 V to 2.7 V | $V_{CC}$−0.1 | | | V |
| | $I_{OH}$ = −0.7 mA | 0.8 V | | 0.55 | | |
| | $I_{OH}$ = −3 mA | 1.1 V | 0.8 | | | |
| | $I_{OH}$ = −5 mA | 1.4 V | 1 | | | |
| | $I_{OH}$ = −8 mA | 1.65 V | 1.2 | | | |
| | $I_{OH}$ = −9 mA | 2.3 V | 1.8 | | | |
| $V_{OL}$ | $I_{OL}$ = 100 µA | 0.8 V to 2.7 V | | | 0.2 | V |
| | $I_{OL}$ = 0.7 mA | 0.8 V | | 0.25 | | |
| | $I_{OL}$ = 3 mA | 1.1 V | | | 0.3 | |
| | $I_{OL}$ = 5 mA | 1.4 V | | | 0.4 | |
| | $I_{OL}$ = 8 mA | 1.65 V | | | 0.45 | |
| | $I_{OL}$ = 9 mA | 2.3 V | | | 0.6 | |
| $I_I$ A input | $V_I = V_{CC}$ or GND | 0 to 2.7 V | | | ±5 | µA |
| $I_{off}$ | $V_I$ or $V_O$ = 2.7 V | 0 | | | ±10 | µA |
| $I_{CC}$ | $V_I = V_{CC}$ or GND, $I_O$ = 0 | 0.8 V to 2.7 V | | | 10 | µA |
| $C_i$ | $V_I = V_{CC}$ or GND | 2.5 V | | 3 | | pF |

† All typical values are at $T_A$ = 25°C.

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

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC}$ = 0.8 V | $V_{CC}$ = 1.2 V ± 0.1 V | | $V_{CC}$ = 1.5 V ± 0.1 V | | $V_{CC}$ = 1.8 V ± 0.15 V | | | $V_{CC}$ = 2.5 V ± 0.2 V | | UNIT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | TYP | MIN | MAX | MIN | MAX | MIN | TYP | MAX | MIN | MAX | |
| $t_{pd}$ | A | Y | 5.7 | 0.8 | 3.9 | 0.7 | 2.1 | 0.6 | 1.1 | 1.9 | 0.5 | 1.5 | ns |

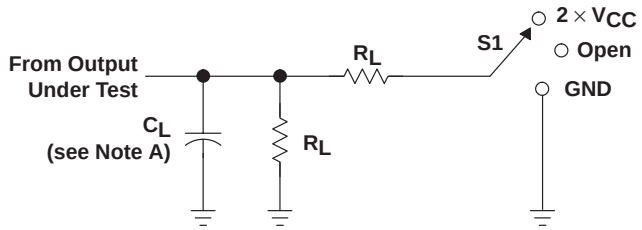
**switching characteristics over recommended operating free-air temperature range, $C_L$ = 30 pF (unless otherwise noted) (see Figure 1)**

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | $V_{CC}$ = 1.8 V ± 0.15 V | | | $V_{CC}$ = 2.5 V ± 0.2 V | | UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | MIN | MAX | |
| $t_{pd}$ | A | Y | 0.8 | 1.4 | 2.4 | 0.7 | 2.5 | ns |

**operating characteristics, $T_A$ = 25°C**

| PARAMETER | | TEST CONDITIONS | $V_{CC}$ = 0.8 V | $V_{CC}$ = 1.2 V | $V_{CC}$ = 1.5 V | $V_{CC}$ = 1.8 V | $V_{CC}$ = 2.5 V | UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | TYP | TYP | TYP | TYP | TYP | |
| $C_{pd}$ | Power dissipation capacitance | f = 10 MHz | 15 | 15 | 16 | 16 | 20 | pF |

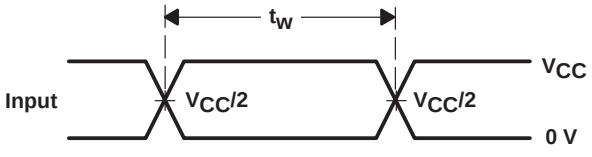
## PARAMETER MEASUREMENT INFORMATION



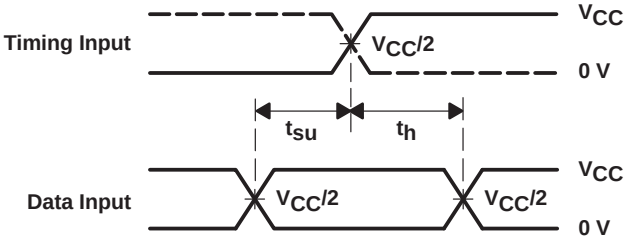

LOAD CIRCUIT

| TEST | S1 |
|---|---|
| $t_{PLH}/t_{PHL}$ | Open |
| $t_{PLZ}/t_{PZL}$ | $2 \times V_{CC}$ |
| $t_{PHZ}/t_{PZH}$ | GND |

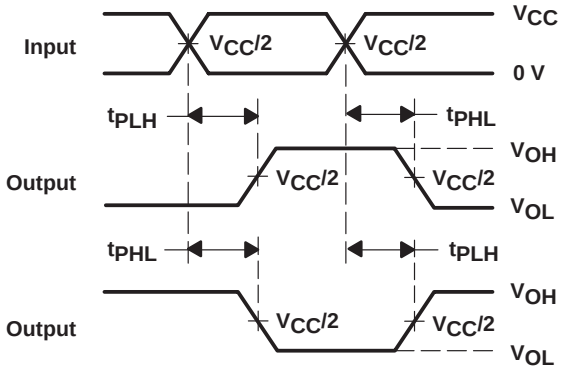
| $V_{CC}$ | $C_L$ | $R_L$ | $V_\Delta$ |
|---|---|---|---|
| 0.8 V | 15 pF | 2 kΩ | 0.1 V |
| 1.2 V ± 0.1 V | 15 pF | 2 kΩ | 0.1 V |
| 1.5 V ± 0.1 V | 15 pF | 2 kΩ | 0.1 V |
| 1.8 V ± 0.15 V | 15 pF | 2 kΩ | 0.15 V |
| 2.5 V ± 0.2 V | 15 pF | 2 kΩ | 0.15 V |
| 1.8 V ± 0.15 V | 30 pF | 1 kΩ | 0.15 V |
| 2.5 V ± 0.2 V | 30 pF | 500 Ω | 0.15 V |



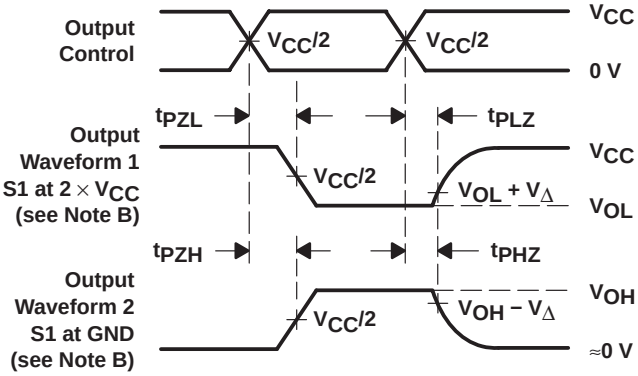

VOLTAGE WAVEFORMS
PULSE DURATION




VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES




VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS

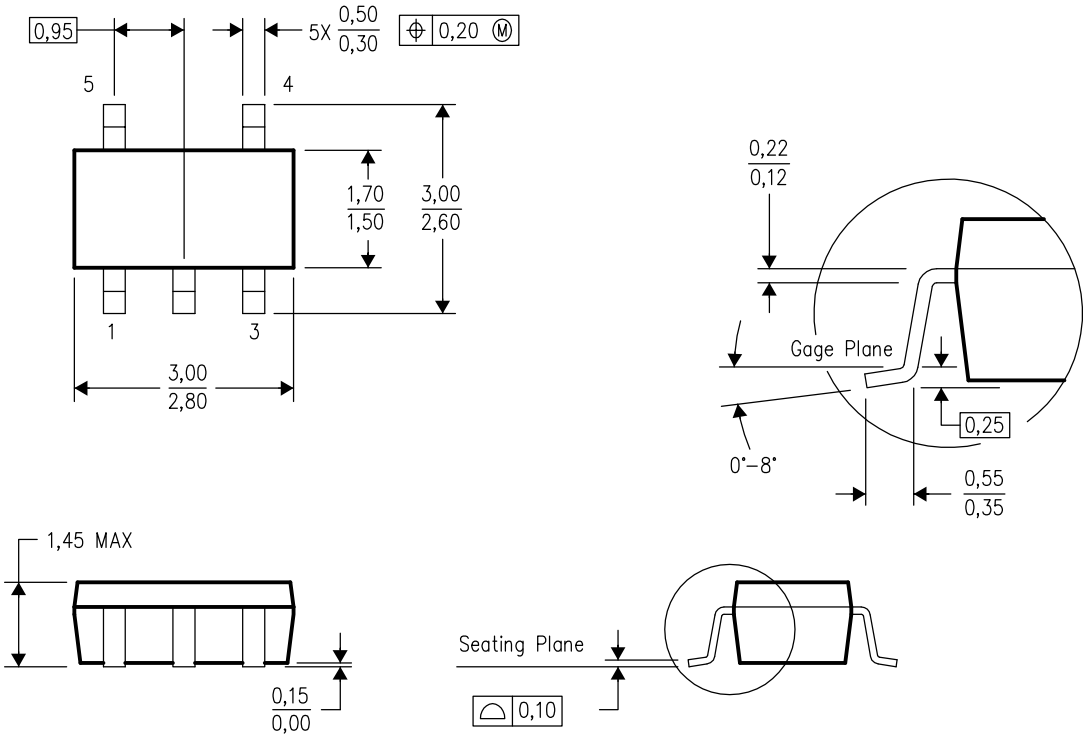



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES
LOW- AND HIGH-LEVEL ENABLING

NOTES: 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 ≤ 10 MHz, $Z_O$ = 50 Ω, slew rate ≥ 1 V/ns.
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 1. Load Circuit and Voltage Waveforms**

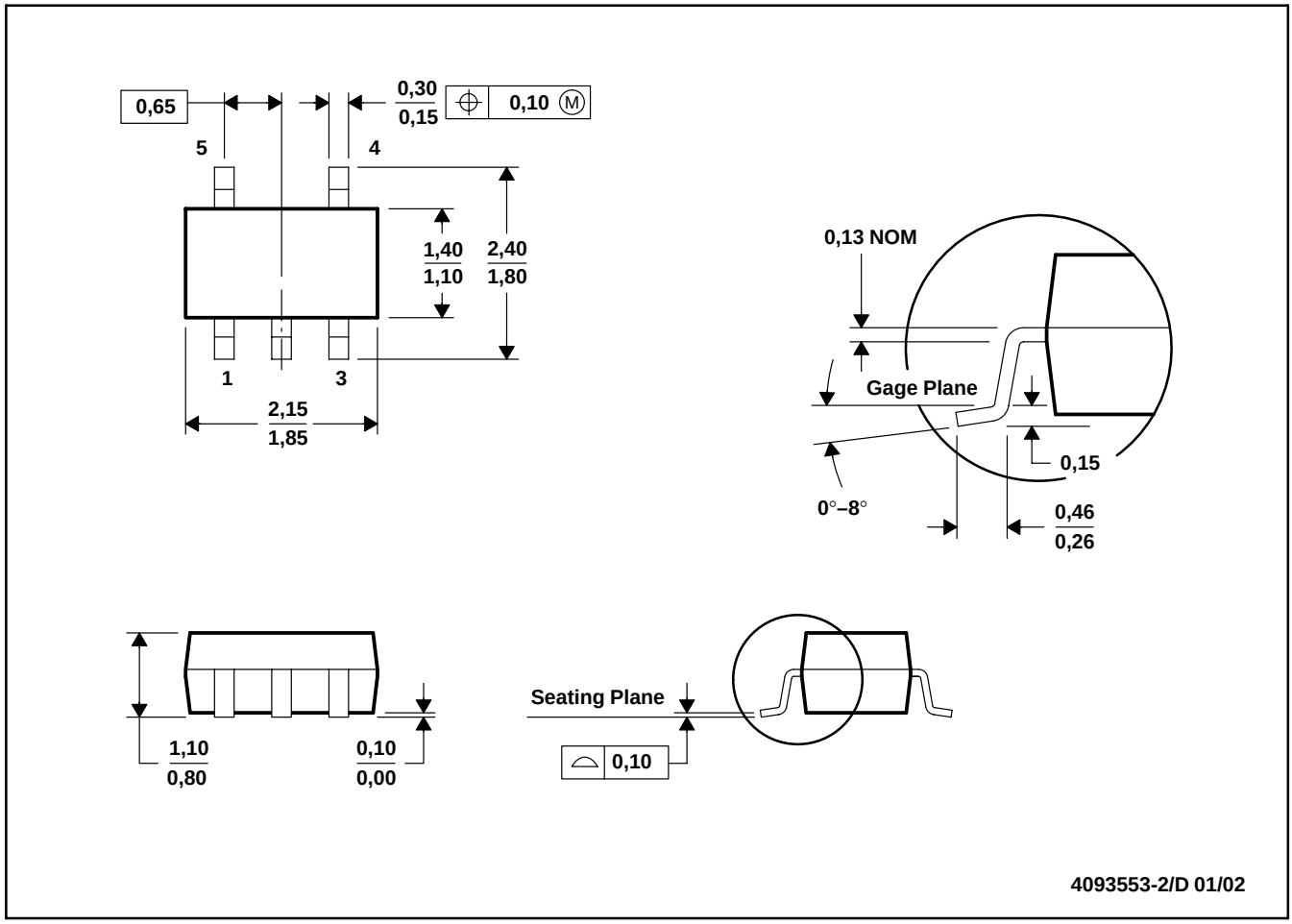
## DBV (R–PDSO–G5) PLASTIC SMALL–OUTLINE PACKAGE




4073253–4/H 10/2003

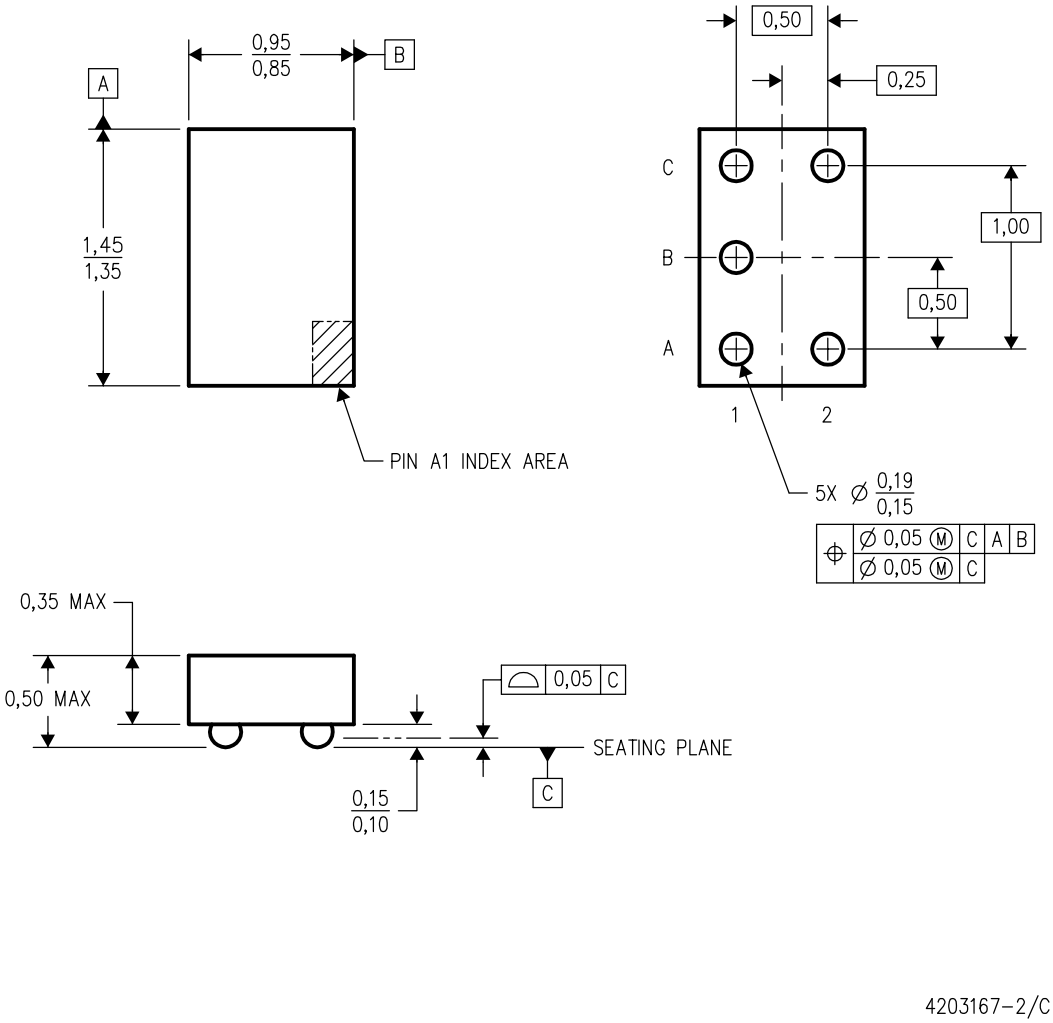
NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion.
D. Falls within JEDEC MO–178 Variation AA.

**DCK (R-PDSO-G5)** **PLASTIC SMALL-OUTLINE PACKAGE**




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.
D. Falls within JEDEC MO-203

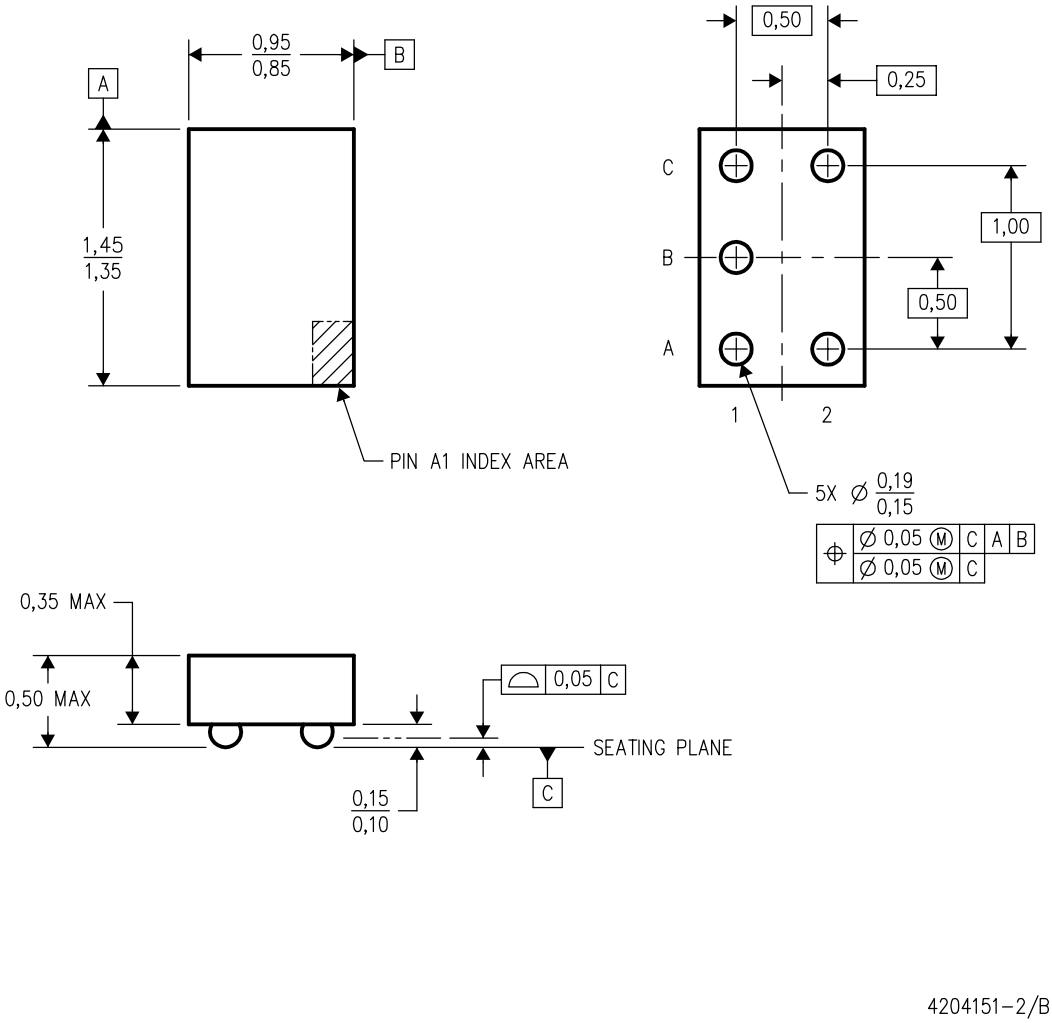
## YEA (R–XBGA–N5) DIE–SIZE BALL GRID ARRAY




NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. NanoStar™ package configuration.
D. Package complies to JEDEC MO–211 variation EA.
E. This package is tin–lead (SnPb). Refer to the 5 YZA package (drawing 4204151) for lead–free.

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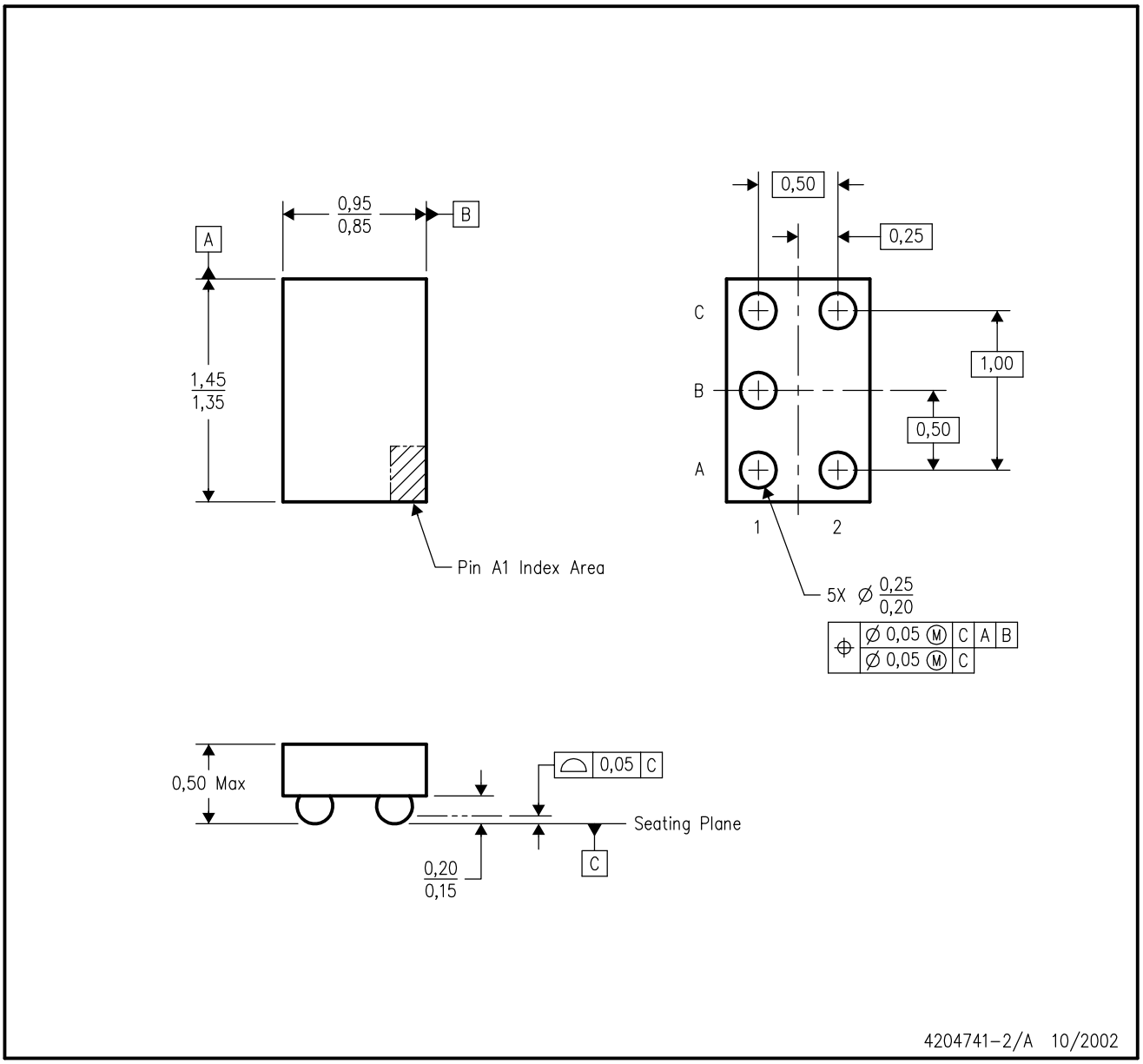
## YZA (R–XBGA–N5) DIE–SIZE BALL GRID ARRAY




NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. NanoFree™ package configuration.
D. Package complies to JEDEC MO–211 variation EA.
E. This package is lead–free. Refer to the 5 YEA package (drawing 4203167) for tin–lead (SnPb).

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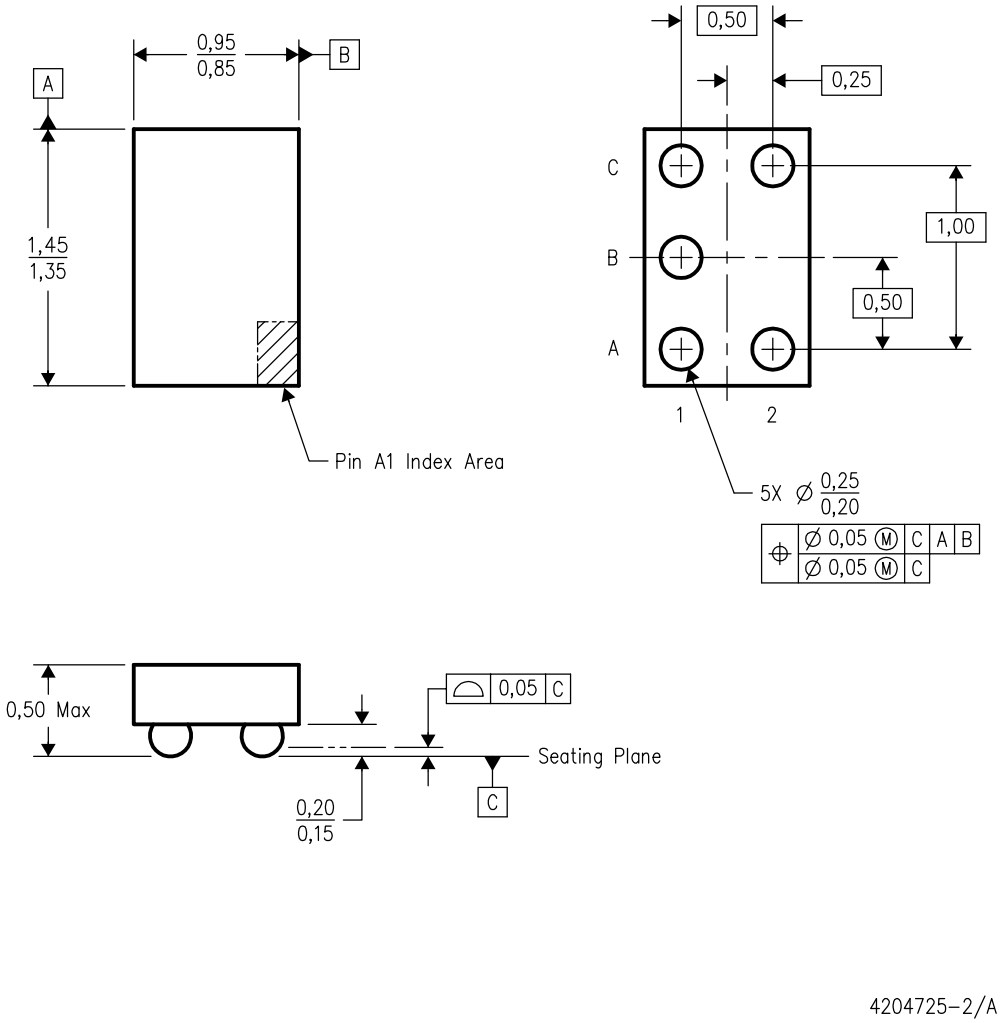
YZP (R–XBGA–N5) DIE–SIZE BALL GRID ARRAY




NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. NanoFree™ package configuration.
D. This package is lead–free. Refer to the 5 YEP package (drawing 4204725) for tin–lead (SnPb).

NanoFree is a trademark of Texas Instruments.

YEP (R–XBGA–N5) DIE–SIZE BALL GRID ARRAY




NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. NanoStar™ package configuration.
D. This package is tin–lead (SnPb). Refer to the 5 YZP package (drawing 4204741) for lead–free.

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