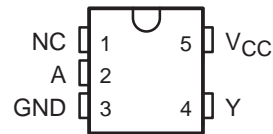


SN74AUC1G17 SINGLE SCHMITT-TRIGGER BUFFER

SCES376J – SEPTEMBER 2001 – REVISED OCTOBER 2003

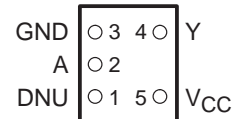
- Available in the Texas Instruments NanoStar™ and NanoFree™ Packages
- Optimized for 1.8-V Operation and Is 3.6-V I/O Tolerant to Support Mixed-Mode Signal Operation
- I_{off} Supports Partial-Power-Down Mode Operation
- Sub 1-V Operable
- Max t_{pd} of 2.4 ns at 1.8 V
- Low Power Consumption, 10- μ A 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.

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SN74AUC1G17

SINGLE SCHMITT-TRIGGER BUFFER

SCES376J – SEPTEMBER 2001 – REVISED OCTOBER 2003

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, θ_{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.

SN74AUC1G17 SINGLE SCHMITT-TRIGGER BUFFER

SCES376J – SEPTEMBER 2001 – REVISED OCTOBER 2003

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.

SN74AUC1G17

SINGLE SCHMITT-TRIGGER BUFFER

SCES376J – SEPTEMBER 2001 – REVISED OCTOBER 2003

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 | |
| ΔV _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 |



SN74AUC1G17 SINGLE SCHMITT-TRIGGER BUFFER

SCES376J – SEPTEMBER 2001 – REVISED OCTOBER 2003

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

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

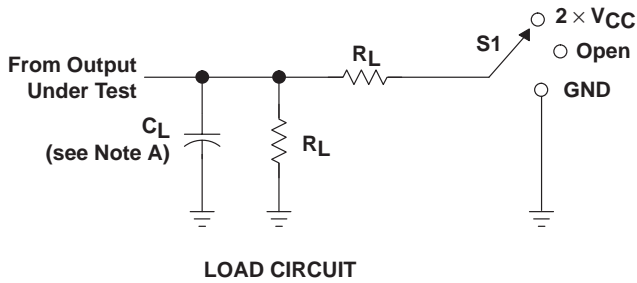
operating characteristics, $T_A = 25^\circ\text{C}$

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

SN74AUC1G17 SINGLE SCHMITT-TRIGGER BUFFER

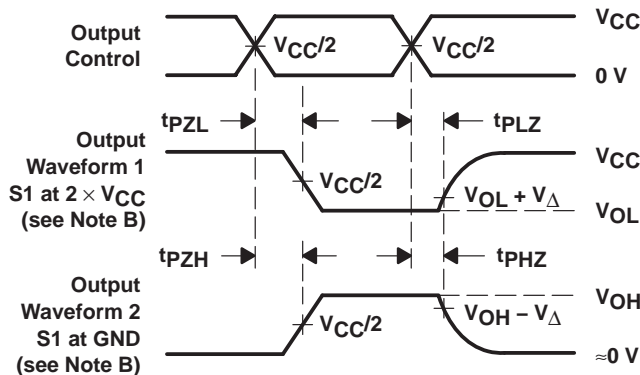
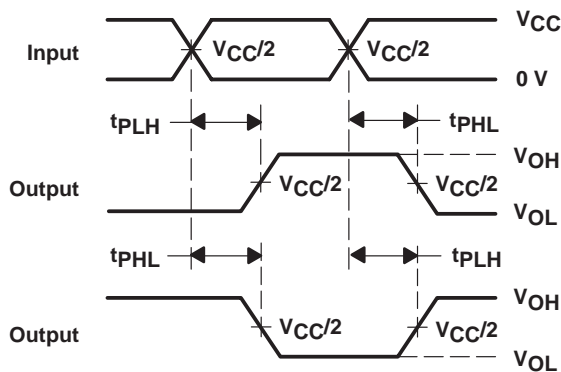
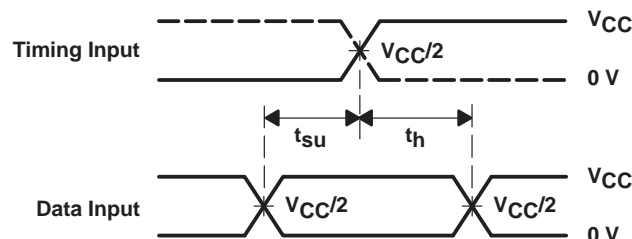
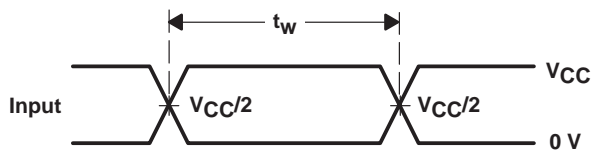
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PARAMETER MEASUREMENT INFORMATION



| 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_{Δ} |
|--------------------|-------|--------------|--------------|
| 0.8 V | 15 pF | 2 k Ω | 0.1 V |
| 1.2 V \pm 0.1 V | 15 pF | 2 k Ω | 0.1 V |
| 1.5 V \pm 0.1 V | 15 pF | 2 k Ω | 0.1 V |
| 1.8 V \pm 0.15 V | 15 pF | 2 k Ω | 0.15 V |
| 2.5 V \pm 0.2 V | 15 pF | 2 k Ω | 0.15 V |
| 1.8 V \pm 0.15 V | 30 pF | 1 k Ω | 0.15 V |
| 2.5 V \pm 0.2 V | 30 pF | 500 Ω | 0.15 V |



- 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 MHz, $Z_O = 50 \Omega$, slew rate ≥ 1 V/ns.
 - 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

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

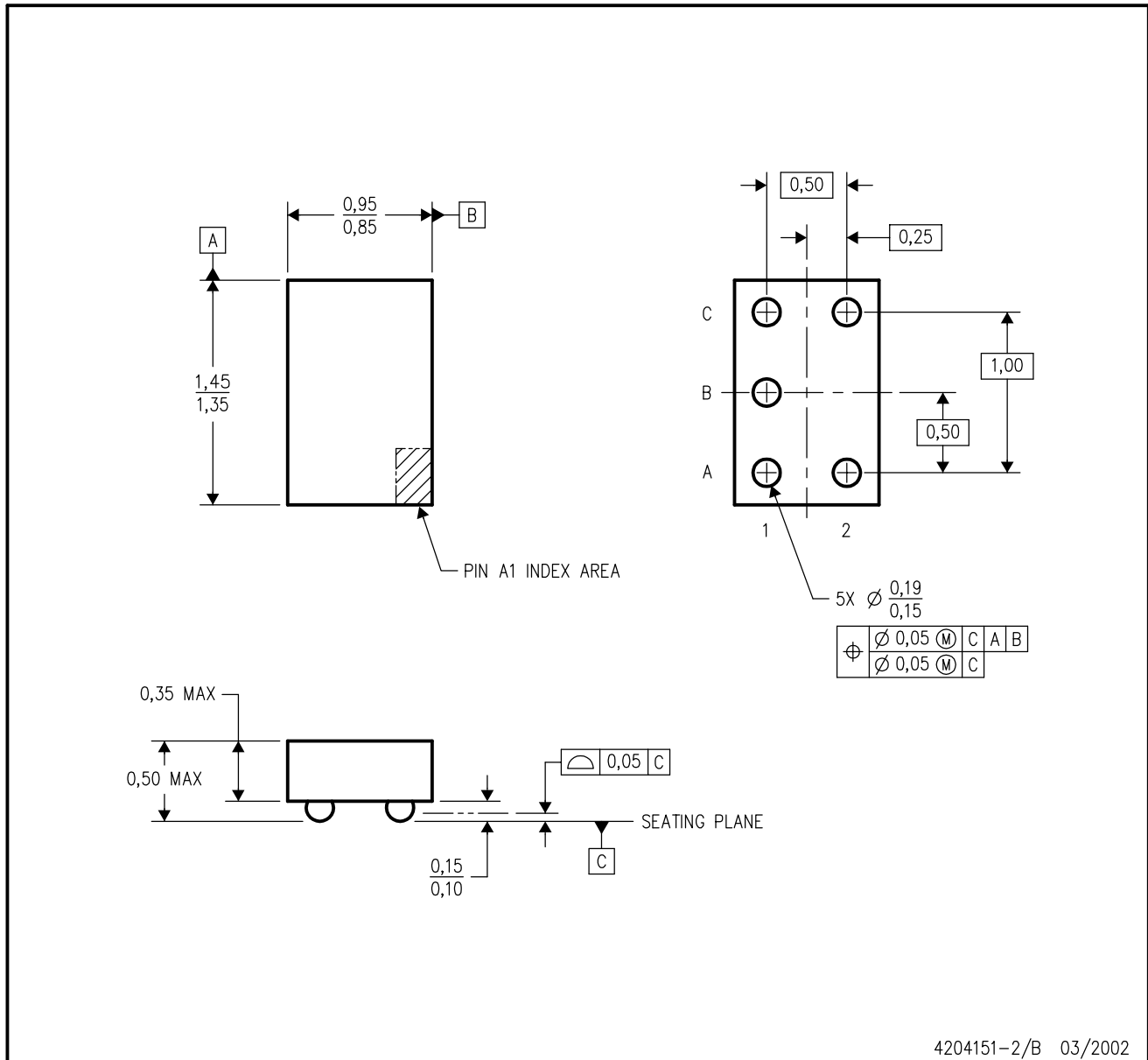


- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. NanoStar™ package configuration.
 - D. Package complies to JEDEC MO-211 variation EA.
 - E. This package is tin-lead (SnPb). Refer to the 5 YZA package (drawing 4204151) for lead-free.

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YZA (R-XBGA-N5)

DIE-SIZE BALL GRID ARRAY

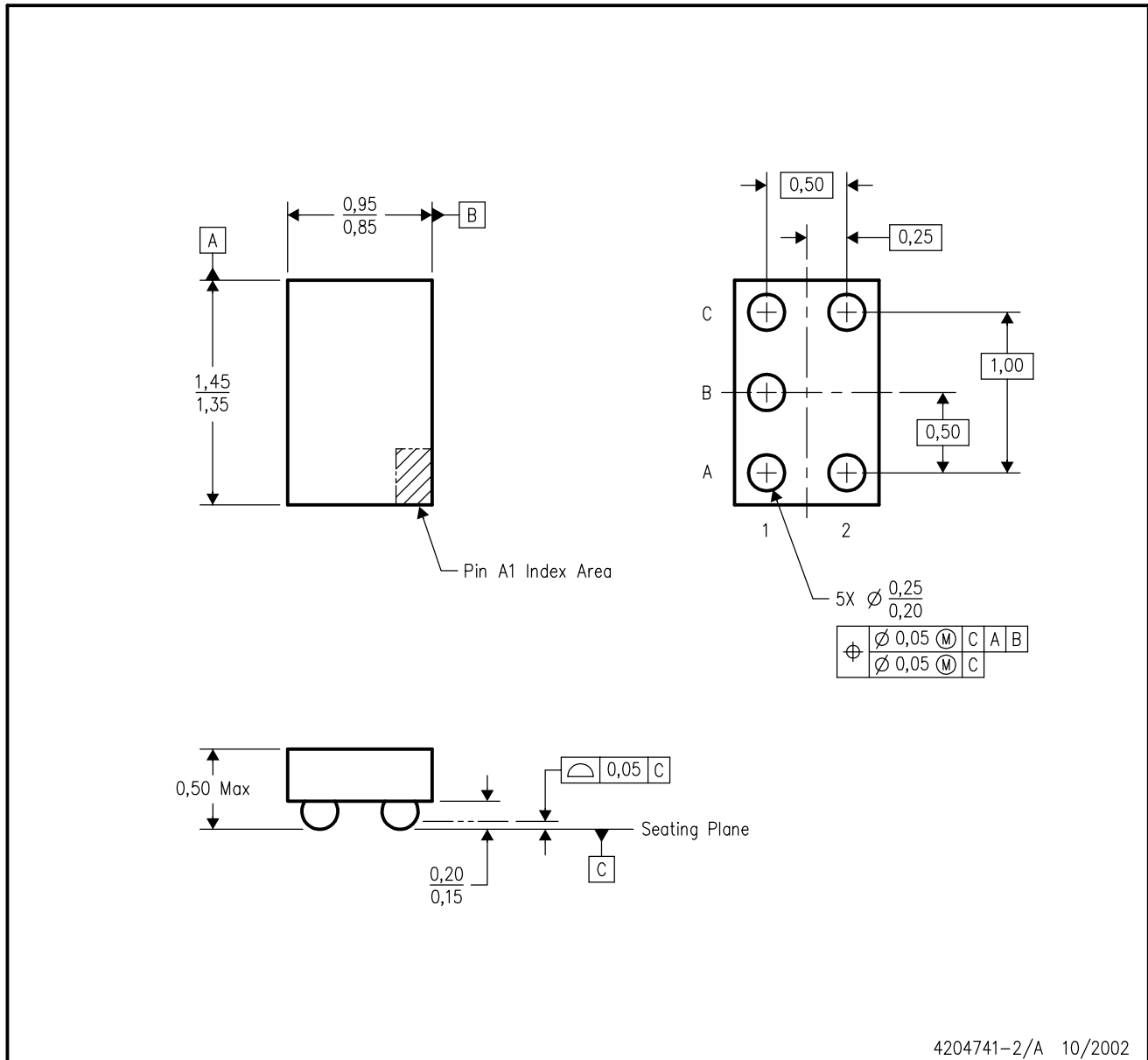


- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. NanoFree™ package configuration.
 - D. Package complies to JEDEC MO-211 variation EA.
 - E. This package is lead-free. Refer to the 5 YEA package (drawing 4203167) for tin-lead (SnPb).

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YZP (R-XBGA-N5)

DIE-SIZE BALL GRID ARRAY

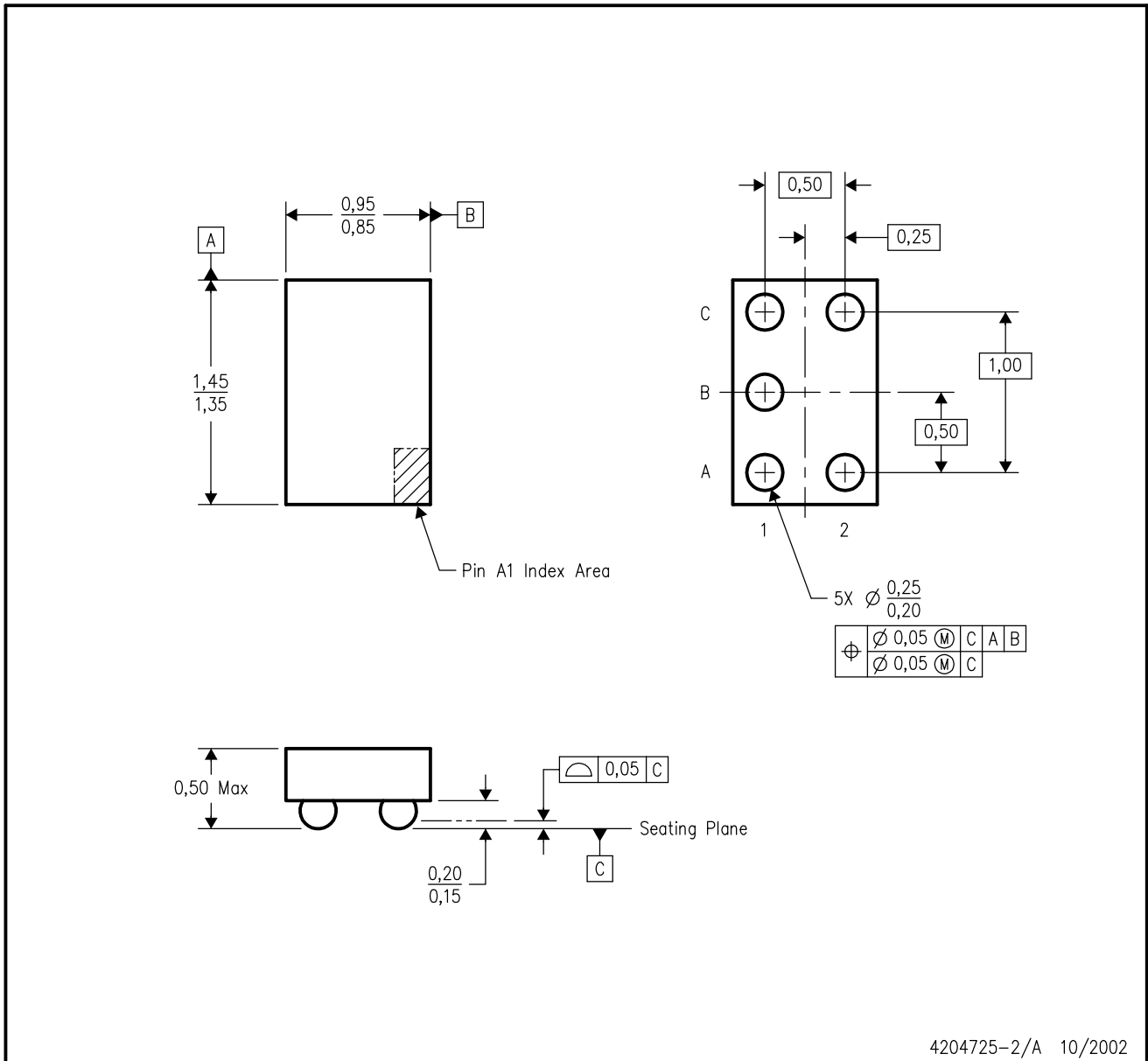


- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. NanoFree™ package configuration.
 - D. This package is lead-free. Refer to the 5 YEP package (drawing 4204725) for tin-lead (SnPb).

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YEP (R-XBGA-N5)

DIE-SIZE BALL GRID ARRAY



4204725-2/A 10/2002

- 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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