

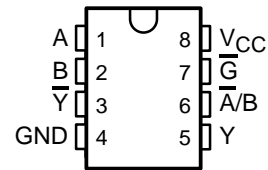
# SN74LVC2G157

## SINGLE 2-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER

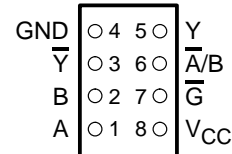
SCES207H – APRIL 1999 – REVISED JANUARY 2003

- Available in the Texas Instruments NanoStar™ and NanoFree™ Packages
- Supports 5-V  $V_{CC}$  Operation
- Inputs Accept Voltages to 5.5 V
- Max  $t_{pd}$  of 6 ns at 3.3 V
- Low Power Consumption, 10- $\mu$ A Max  $I_{CC}$
- $\pm 24$ -mA Output Drive at 3.3 V
- Typical  $V_{OLP}$  (Output Ground Bounce)  $< 0.8$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- Typical  $V_{OHV}$  (Output  $V_{OH}$  Undershoot)  $> 2$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- $I_{off}$  Supports Partial-Power-Down Mode Operation
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 1000-V Charged-Device Model (C101)

**DCT OR DCU PACKAGE  
(TOP VIEW)**



**YEA OR YZA PACKAGE  
(BOTTOM VIEW)**



### description/ordering information

This single 2-line to 1-line data selector/multiplexer is designed for 1.65-V to 5.5-V  $V_{CC}$  operation.

The SN74LVC2G157 features a common strobe ( $\bar{G}$ ) input. When the strobe is high, Y is low and  $\bar{Y}$  is high. When the strobe is low, a single bit is selected from one of two sources and is routed to the outputs. The device provides true and complementary data.

NanoStar™ and 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†                                  |                             | ORDERABLE PART NUMBER                | TOP-SIDE MARKING‡ |
|---------------|---|-----------------------------|--------------------------------------|-------------------|
| -40°C to 85°C | NanoStar™<br>WCSP (DSBGA) – YEA           | Reel of 3000                | SN74LVC2G157YEAR                     | ---C3_            |
|               | NanoFree™<br>WCSP (DSBGA) – YZA (Pb-free) | Reel of 3000                | SN74LVC2G157YZAR                     |                   |
|               | SSOP – DCT                                | Reel of 3000                | SN74LVC2G157DCTR                     | C57---            |
|               | VSSOP – DCU                               | Reel of 3000<br>Reel of 250 | SN74LVC2G157DCUR<br>SN74LVC2G157DCUT | C57_              |

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

‡ DCT: The actual top-side marking has three additional characters that designate the year, month, and assembly/test site.

DCU: The actual top-side marking has one additional character that designates the assembly/test site.

YEA/YZA: 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.



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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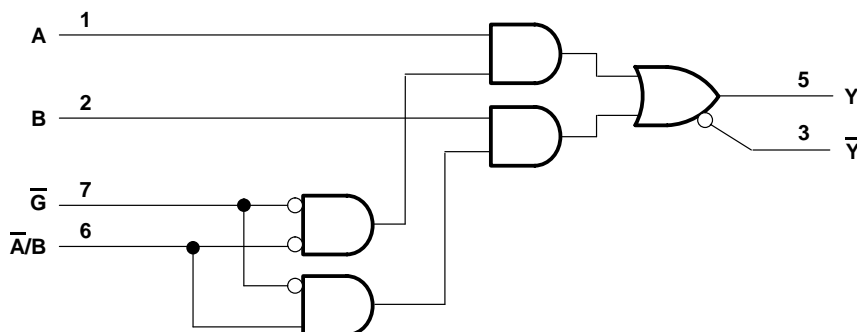
# SN74LVC2G157 SINGLE 2-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER

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FUNCTION TABLE

| INPUTS    |             |   |   | OUTPUTS |           |
|-----------|-------------|---|---|---------|-----------|
| $\bar{G}$ | $\bar{A}/B$ | A | B | Y       | $\bar{Y}$ |
| H         | X           | X | X | L       | H         |
| L         | L           | L | X | L       | H         |
| L         | L           | H | X | H       | L         |
| L         | H           | X | L | L       | H         |
| L         | H           | X | H | H       | 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 6.5 V            |
| Input voltage range, $V_I$ (see Note 1)   | -0.5 V to 6.5 V            |
| Voltage range applied to any output in the high-impedance or power-off state, $V_O$<br>(see Note 1) | -0.5 V to 6.5 V            |
| Voltage range applied to any output in the high or low state, $V_O$<br>(see Notes 1 and 2)          | -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, $I_O$  | $\pm 50$ mA                |
| Continuous current through $V_{CC}$ or GND  | $\pm 100$ mA               |
| Package thermal impedance, $\theta_{JA}$ (see Note 3): DCT package                                  | 220°C/W                    |
| DCU package   | 227°C/W                    |
| YEA/YZA package   | 140°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 value of  $V_{CC}$  is provided in the recommended operating conditions table.  
 3. The package thermal impedance is calculated in accordance with JESD 51-7.

# SN74LVC2G157

## SINGLE 2-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER

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### recommended operating conditions (see Note 4)

|                 |                                    | MIN   | MAX                    | UNIT |      |
|-----------------|------------------------------------|---|------------------------|------|------|
| V <sub>CC</sub> | Supply voltage                     | Operating                                       | 1.65                   | 5.5  | V    |
|                 |                                    | Data retention only                             | 1.5                    |      |      |
| V <sub>IH</sub> | High-level input voltage           | V <sub>CC</sub> = 1.65 V to 1.95 V              | 0.65 × V <sub>CC</sub> |      | V    |
|                 |                                    | V <sub>CC</sub> = 2.3 V to 2.7 V                | 1.7                    |      |      |
|                 |                                    | V <sub>CC</sub> = 3 V to 3.6 V                  | 2                      |      |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V to 5.5 V                | 0.7 × V <sub>CC</sub>  |      |      |
| V <sub>IL</sub> | Low-level input voltage            | V <sub>CC</sub> = 1.65 V to 1.95 V              | 0.35 × V <sub>CC</sub> |      | V    |
|                 |                                    | V <sub>CC</sub> = 2.3 V to 2.7 V                | 0.7                    |      |      |
|                 |                                    | V <sub>CC</sub> = 3 V to 3.6 V                  | 0.8                    |      |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V to 5.5 V                | 0.3 × V <sub>CC</sub>  |      |      |
| V <sub>I</sub>  | Input voltage                      | 0   | 5.5                    | V    |      |
| V <sub>O</sub>  | Output voltage                     | 0   | V <sub>CC</sub>        | V    |      |
| I <sub>OH</sub> | High-level output current          | V <sub>CC</sub> = 1.65 V                        | –4                     |      | mA   |
|                 |                                    | V <sub>CC</sub> = 2.3 V                         | –8                     |      |      |
|                 |                                    | V <sub>CC</sub> = 3 V                           | –16                    |      |      |
|                 |                                    |   | –24                    |      |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V                         | –32                    |      |      |
| I <sub>OL</sub> | Low-level output current           | V <sub>CC</sub> = 1.65 V                        | 4                      |      | mA   |
|                 |                                    | V <sub>CC</sub> = 2.3 V                         | 8                      |      |      |
|                 |                                    | V <sub>CC</sub> = 3 V                           | 16                     |      |      |
|                 |                                    |   | 24                     |      |      |
|                 |                                    | V <sub>CC</sub> = 4.5 V                         | 32                     |      |      |
| Δt/Δv           | Input transition rise or fall rate | V <sub>CC</sub> = 1.8 V ± 0.15 V, 2.5 V ± 0.2 V | 20                     |      | ns/V |
|                 |                                    | V <sub>CC</sub> = 3.3 V ± 0.3 V                 | 10                     |      |      |
|                 |                                    | V <sub>CC</sub> = 5 V ± 0.5 V                   | 5                      |      |      |
| T <sub>A</sub>  | Operating free-air temperature     | –40   | 85                     | °C   |      |

NOTE 4: All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.



# SN74LVC2G157

## SINGLE 2-LINE TO 1-LINE DATA SELECTOR/MULTIPLEXER

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

| PARAMETER        |                         | TEST CONDITIONS  | V <sub>CC</sub> | MIN                  | TYP† | MAX  | UNIT |
|------------------|-------------------------|--|-----------------|----------------------|------|------|------|
| 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, B, or Control inputs | 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 |                      |      | 10   | μA   |
| ΔI <sub>CC</sub> |                         | One input at V <sub>CC</sub> - 0.6 V, Other inputs at V <sub>CC</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           |                      |      | 5    | pF   |

† 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 (unless otherwise noted) (see Figure 1)

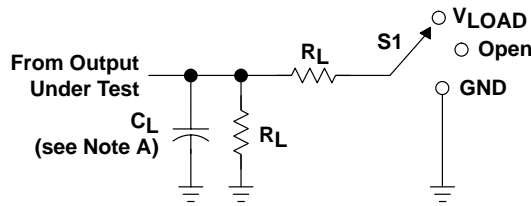
| PARAMETER       | FROM (INPUT)      | TO (OUTPUT)    | V <sub>CC</sub> = 1.8 V ± 0.15 V |     | V <sub>CC</sub> = 2.5 V ± 0.2 V |     | V <sub>CC</sub> = 3.3 V ± 0.3 V |     | V <sub>CC</sub> = 5 V ± 0.5 V |     | UNIT |
|-----------------|-------------------|----------------|----------------------------------|-----|---------------------------------|-----|---------------------------------|-----|-------------------------------|-----|------|
|                 |                   |                | MIN                              | MAX | MIN                             | MAX | MIN                             | MAX | MIN                           | MAX |      |
| t <sub>pd</sub> | A or B            | Y or $\bar{Y}$ | 4.4                              | 14  | 2.1                             | 8   | 2                               | 6   | 1.4                           | 4   | ns   |
|                 | $\bar{A}/\bar{B}$ |                | 4.9                              | 16  | 2.5                             | 9   | 2.1                             | 6   | 1.6                           | 4   |      |
|                 | $\bar{G}$         |                | 4.2                              | 14  | 2                               | 8   | 1.6                             | 6   | 1.3                           | 4   |      |

operating characteristics, T<sub>A</sub> = 25°C

| PARAMETER       | TEST CONDITIONS               | V <sub>CC</sub> = 1.8 V | V <sub>CC</sub> = 2.5 V | V <sub>CC</sub> = 3.3 V | V <sub>CC</sub> = 5 V | UNIT |    |
|-----------------|-------------------------------|-------------------------|-------------------------|-------------------------|-----------------------|------|----|
|                 |                               | TYP                     | TYP                     | TYP                     | TYP                   |      |    |
| C <sub>pd</sub> | Power dissipation capacitance | f = 10 MHz              | 35                      | 35                      | 37                    | 40   | pF |



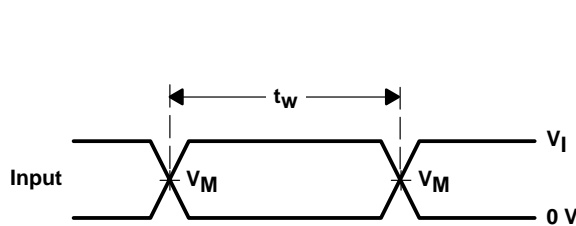
**PARAMETER MEASUREMENT INFORMATION**



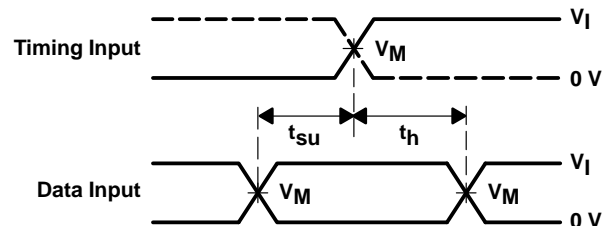
**LOAD CIRCUIT**

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

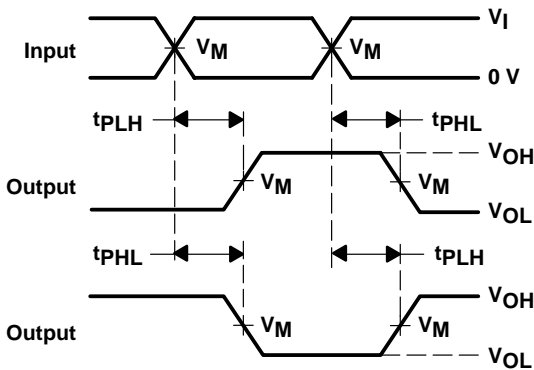
| $V_{CC}$                         | INPUTS   |                      | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|----------------------------------|----------|----------------------|------------|-------------------|-------|--------------|--------------|
|                                  | $V_I$    | $t_r/t_f$            |            |                   |       |              |              |
| $1.8\text{ V} \pm 0.15\text{ V}$ | $V_{CC}$ | $\leq 2\text{ ns}$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 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        |



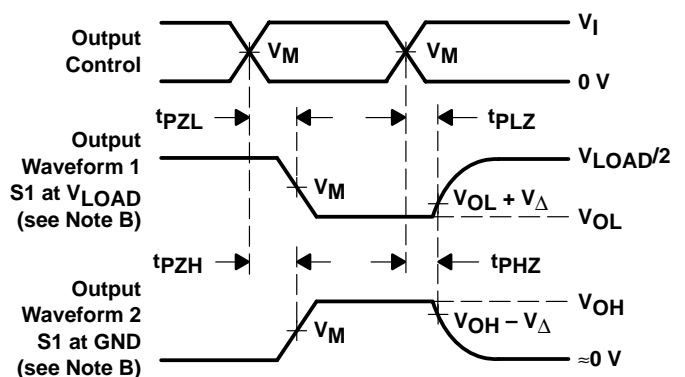
**VOLTAGE WAVEFORMS  
PULSE DURATION**



**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**

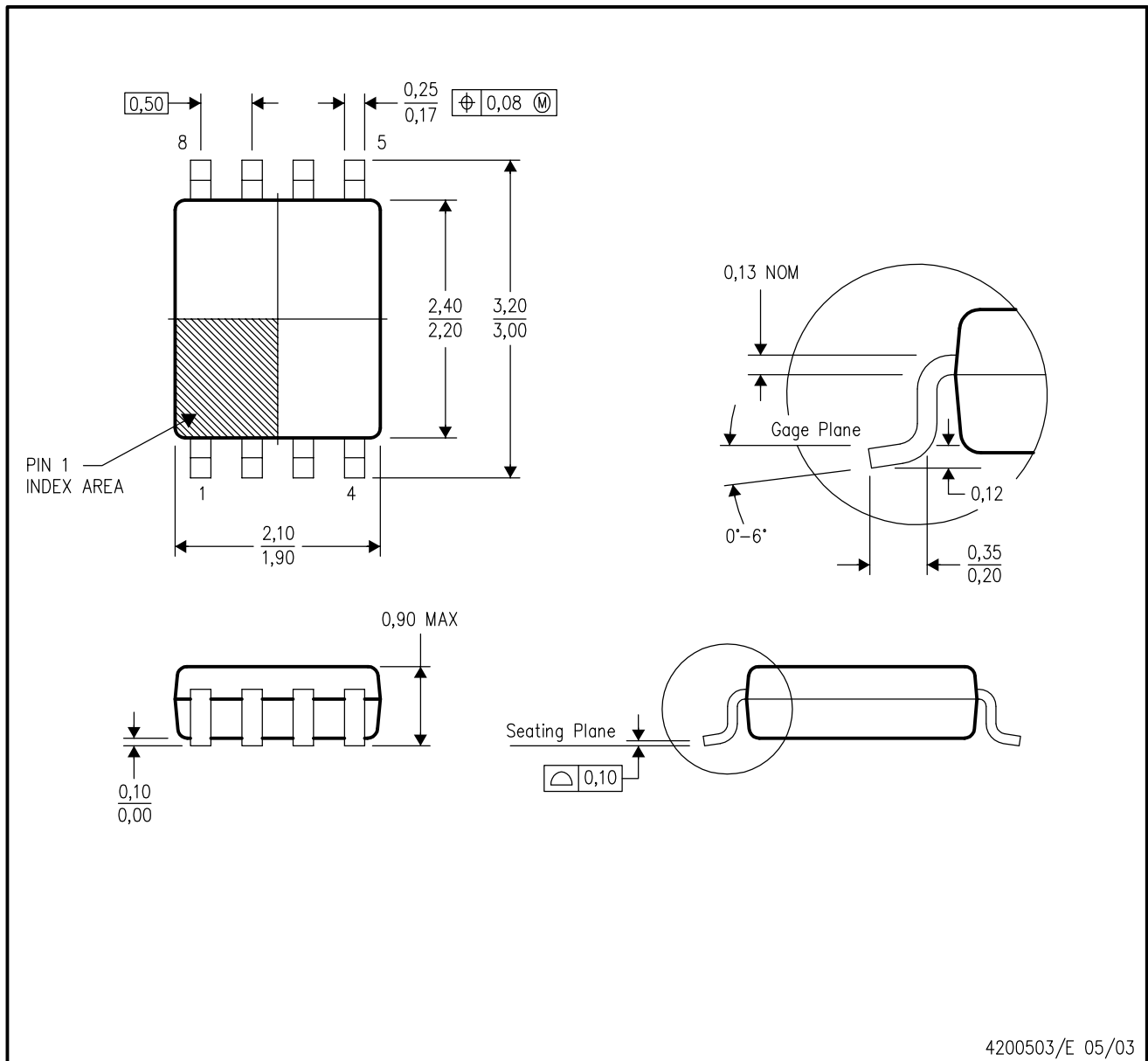
- NOTES:
- A.  $C_L$  includes probe and jig capacitance.
  - B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
  - C. All input pulses are supplied by generators having the following characteristics: PRR  $\leq 10$  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 1. Load Circuit and Voltage Waveforms**



DCU (R-PDSO-G8)

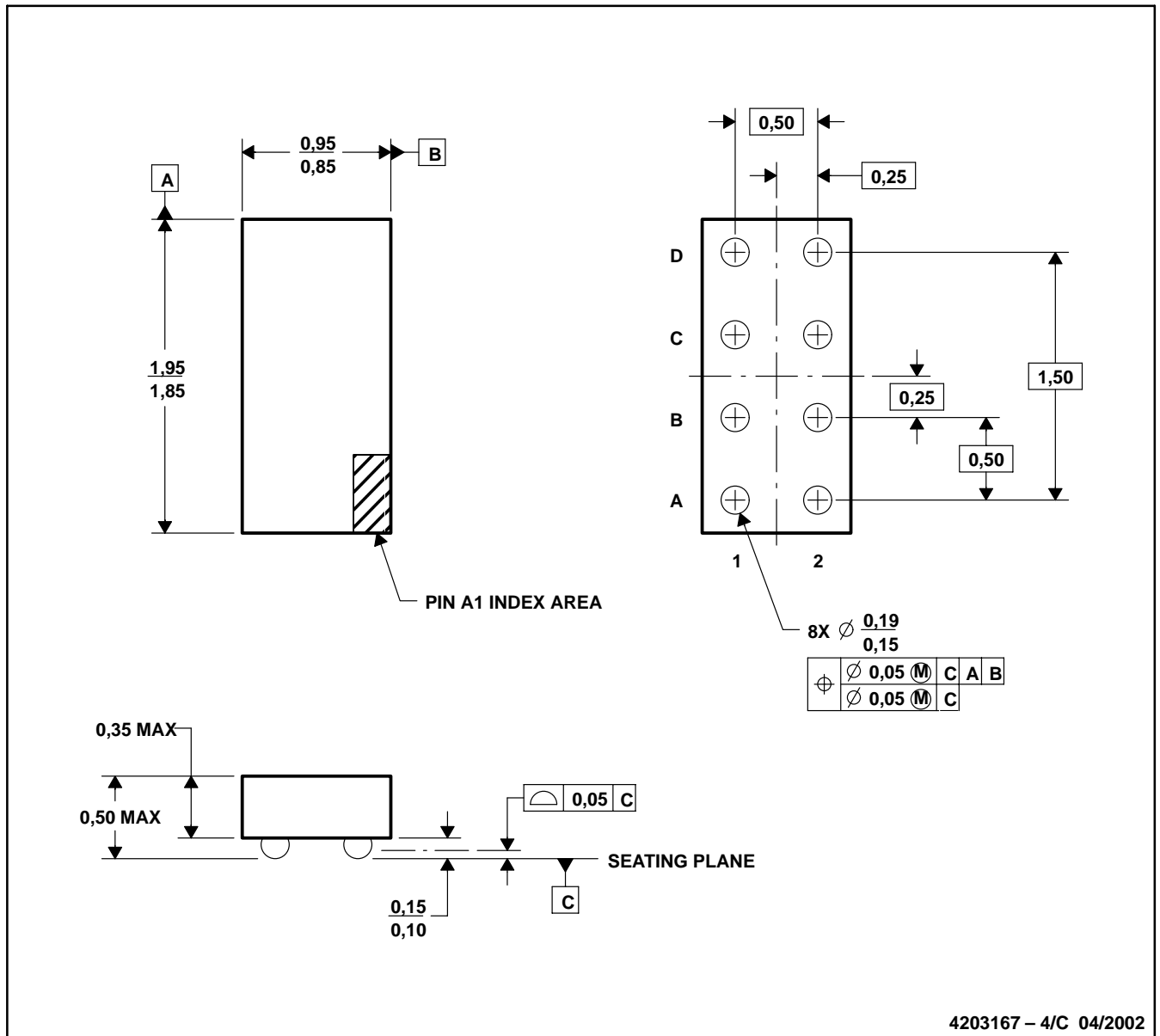
PLASTIC SMALL-OUTLINE PACKAGE (DIE DOWN)



- 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-187 variation CA.

YEA (R-XBGA-N8)

DIE-SIZE BALL GRID ARRAY



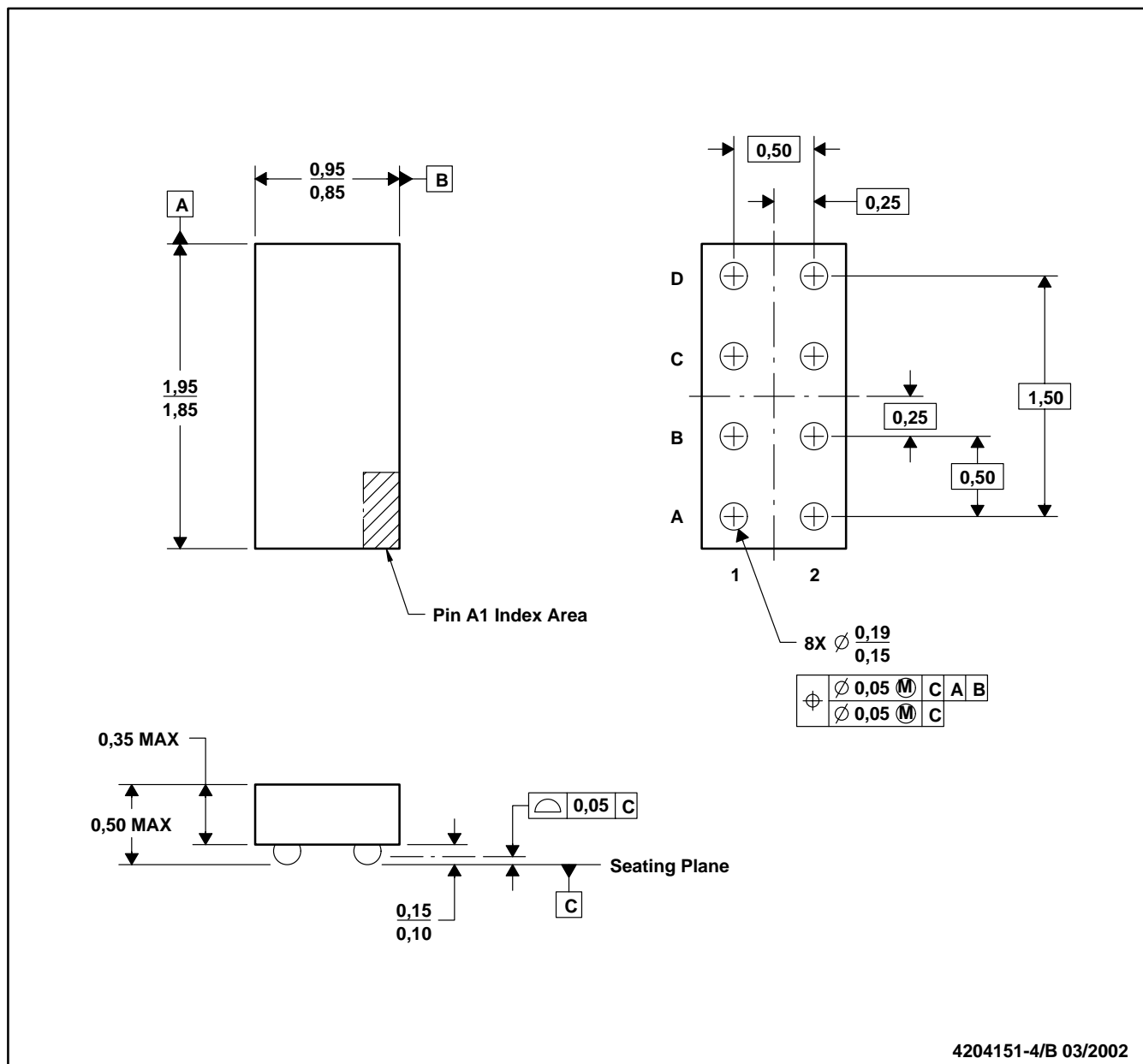
4203167 – 4/C 04/2002

- 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 EB.  
 E. This package is tin-lead (SnPb). Refer to the 8 YZA package (drawing 4204151) for lead-free.



YZA (R-XBGA-N8)

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 EB.  
 E. This package is lead-free. Refer to the 8 YEA package (drawing 4203167) for tin-lead (SnPb).

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