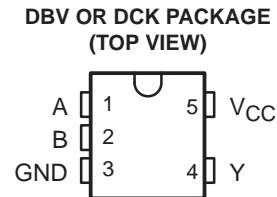


# SN74AHC1G32-Q1 SINGLE 2-INPUT POSITIVE-OR GATE

SCLS544 – SEPTEMBER 2003

- Qualification in Accordance With AEC-Q100†
- Qualified for Automotive Applications
- Customer-Specific Configuration Control Can Be Supported Along With Major-Change Approval
- ESD Protection Exceeds 1500 V Per MIL-STD-883, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)
- Operating Range of 2 V to 5.5 V
- Max  $t_{pd}$  of 6.5 ns at 5 V
- Low Power Consumption, 10- $\mu$ A Max  $I_{CC}$
- $\pm 8$ -mA Output Drive at 5 V
- Latch-Up Performance Exceeds 250 mA Per JESD 17

† Contact factory for details. Q100 qualification data available on request.



## description/ordering information

The SN74AHC1G32 is a single 2-input positive-OR gate. The device performs the Boolean function  $Y = A + B$  or  $Y = \overline{A} \cdot \overline{B}$  in positive logic.

## ORDERING INFORMATION

| $T_A$          | PACKAGE‡           |              | ORDERABLE PART NUMBER | TOP-SIDE MARKINGS§ |
|----------------|--------------------|--------------|-----------------------|--------------------|
| -40°C to 105°C | SOT (SOT-23) – DBV | Reel of 3000 | SN74AHC1G32TDBVRQ1    | A32__              |
|                | SOT (SC-70) – DCK  | Reel of 3000 | SN74AHC1G32TDCKRQ1    | AG__               |

‡ 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).

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

## FUNCTION TABLE

| INPUTS |   | OUTPUT |
|--------|---|--------|
| A      | B | Y      |
| H      | X | H      |
| X      | H | H      |
| L      | L | L      |

## logic diagram (positive logic)



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

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# SN74AHC1G32-Q1

## SINGLE 2-INPUT POSITIVE-OR GATE

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### absolute maximum ratings over operating free-air temperature (unless otherwise noted)<sup>†</sup>

|  |                            |
|--|----------------------------|
| Supply voltage range, $V_{CC}$                                     | –0.5 V to 7 V              |
| Input voltage range, $V_I$ (see Note 1)                            | –0.5 V to 7 V              |
| Output voltage range, $V_O$ (see Note 1)                           | –0.5 V to $V_{CC} + 0.5$ V |
| Input clamp current, $I_{IK}$ ( $V_I < 0$ )                        | –20 mA                     |
| Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ )     | ±20 mA                     |
| Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ )         | ±25 mA                     |
| Continuous current through $V_{CC}$ or GND                         | ±50 mA                     |
| Package thermal impedance, $\theta_{JA}$ (see Note 2): DBV package | 206°C/W                    |
| DCK package  | 252°C/W                    |
| Storage temperature range, $T_{stg}$                               | –65°C to 150°C             |

<sup>†</sup> 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 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                     | 2                        | 5.5      | V    |
| $V_{IH}$            | High-level input voltage           | $V_{CC} = 2$ V           | 1.5      | V    |
|                     |                                    | $V_{CC} = 3$ V           | 2.1      |      |
|                     |                                    | $V_{CC} = 5.5$ V         | 3.85     |      |
| $V_{IL}$            | Low-level input voltage            | $V_{CC} = 2$ V           | 0.5      | V    |
|                     |                                    | $V_{CC} = 3$ V           | 0.9      |      |
|                     |                                    | $V_{CC} = 5.5$ V         | 1.65     |      |
| $V_I$               | Input voltage                      | 0                        | 5.5      | V    |
| $V_O$               | Output voltage                     | 0                        | $V_{CC}$ | V    |
| $I_{OH}$            | High-level output current          | $V_{CC} = 2$ V           | –50      | μA   |
|                     |                                    | $V_{CC} = 3.3$ V ± 0.3 V | –4       | mA   |
|                     |                                    | $V_{CC} = 5$ V ± 0.5 V   | –8       |      |
| $I_{OL}$            | Low-level output current           | $V_{CC} = 2$ V           | 50       | μA   |
|                     |                                    | $V_{CC} = 3.3$ V ± 0.3 V | 4        | mA   |
|                     |                                    | $V_{CC} = 5$ V ± 0.5 V   | 8        |      |
| $\Delta t/\Delta v$ | Input transition rise or fall rate | $V_{CC} = 3.3$ V ± 0.3 V | 100      | ns/V |
|                     |                                    | $V_{CC} = 5$ V ± 0.5 V   | 20       |      |
| $T_A$               | Operating free-air temperature     | –40                      | 105      | °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.



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## SINGLE 2-INPUT POSITIVE-OR GATE

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

| PARAMETER       | TEST CONDITIONS   | V <sub>CC</sub> | T <sub>A</sub> = 25°C |     |     | MIN  | MAX | UNIT |
|-----------------|---|-----------------|-----------------------|-----|-----|------|-----|------|
|                 |   |                 | MIN                   | TYP | MAX |      |     |      |
| V <sub>OH</sub> | I <sub>OH</sub> = -50 µA                                    | 2 V             | 1.9                   | 2   |     | 1.9  |     | V    |
|                 |   | 3 V             | 2.9                   | 3   |     | 2.9  |     |      |
|                 |   | 4.5 V           | 4.4                   | 4.5 |     | 4.4  |     |      |
|                 | I <sub>OH</sub> = -4 mA                                     | 3 V             | 2.58                  |     |     | 2.48 |     |      |
|                 | I <sub>OH</sub> = -8 mA                                     | 4.5 V           | 3.94                  |     |     | 3.8  |     |      |
| V <sub>OL</sub> | I <sub>OL</sub> = 50 µA                                     | 2 V             | 0.1                   |     |     | 0.1  |     | V    |
|                 |   | 3 V             | 0.1                   |     |     | 0.1  |     |      |
|                 |   | 4.5 V           | 0.1                   |     |     | 0.1  |     |      |
|                 | I <sub>OL</sub> = 4 mA                                      | 3 V             | 0.36                  |     |     | 0.44 |     |      |
|                 | I <sub>OL</sub> = 8 mA                                      | 4.5 V           | 0.36                  |     |     | 0.44 |     |      |
| I <sub>I</sub>  | V <sub>I</sub> = 5.5 V or GND                               | 0 V to 5.5 V    | ±0.1                  |     |     | ±1   |     | µA   |
| I <sub>CC</sub> | V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0 | 5.5 V           | 1                     |     |     | 10   |     | µA   |
| C <sub>i</sub>  | V <sub>I</sub> = V <sub>CC</sub> or GND                     | 5 V             | 2 10                  |     |     | 10   |     | pF   |

switching characteristics over recommended operating free-air temperature range, V<sub>CC</sub> = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

| PARAMETER        | FROM (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE       | T <sub>A</sub> = 25°C |      |     | MIN | MAX | UNIT |
|------------------|--------------|-------------|------------------------|-----------------------|------|-----|-----|-----|------|
|                  |              |             |                        | MIN                   | TYP  | MAX |     |     |      |
| t <sub>PLH</sub> | A or B       | Y           | C <sub>L</sub> = 50 pF | 8                     | 11.4 |     | 1   | 13  | ns   |
| t <sub>PHL</sub> |              |             |                        | 8                     | 11.4 |     | 1   | 13  |      |

switching characteristics over recommended operating free-air temperature range, V<sub>CC</sub> = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)

| PARAMETER        | FROM (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE       | T <sub>A</sub> = 25°C |     |     | MIN | MAX | UNIT |
|------------------|--------------|-------------|------------------------|-----------------------|-----|-----|-----|-----|------|
|                  |              |             |                        | MIN                   | TYP | MAX |     |     |      |
| t <sub>PLH</sub> | A or B       | Y           | C <sub>L</sub> = 50 pF | 5.3                   | 7.5 |     | 1   | 8.5 | ns   |
| t <sub>PHL</sub> |              |             |                        | 5.3                   | 7.5 |     | 1   | 8.5 |      |

operating characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C

| PARAMETER                                     | TEST CONDITIONS    | TYP | UNIT |
|---|--------------------|-----|------|
| C <sub>pd</sub> Power dissipation capacitance | No load, f = 1 MHz | 14  | pF   |

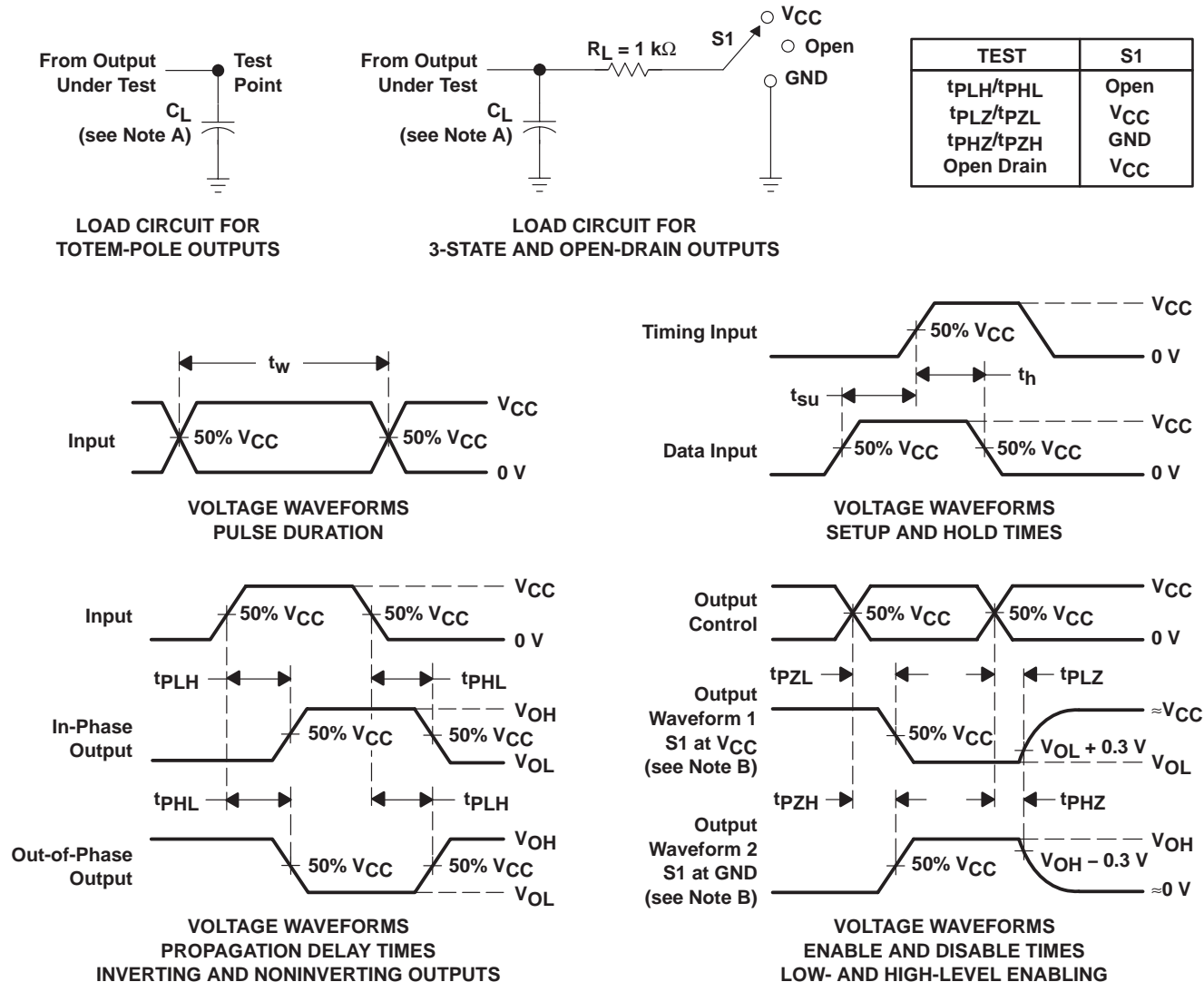


# SN74AHC1G32-Q1

## SINGLE 2-INPUT POSITIVE-OR GATE

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### PARAMETER MEASUREMENT INFORMATION

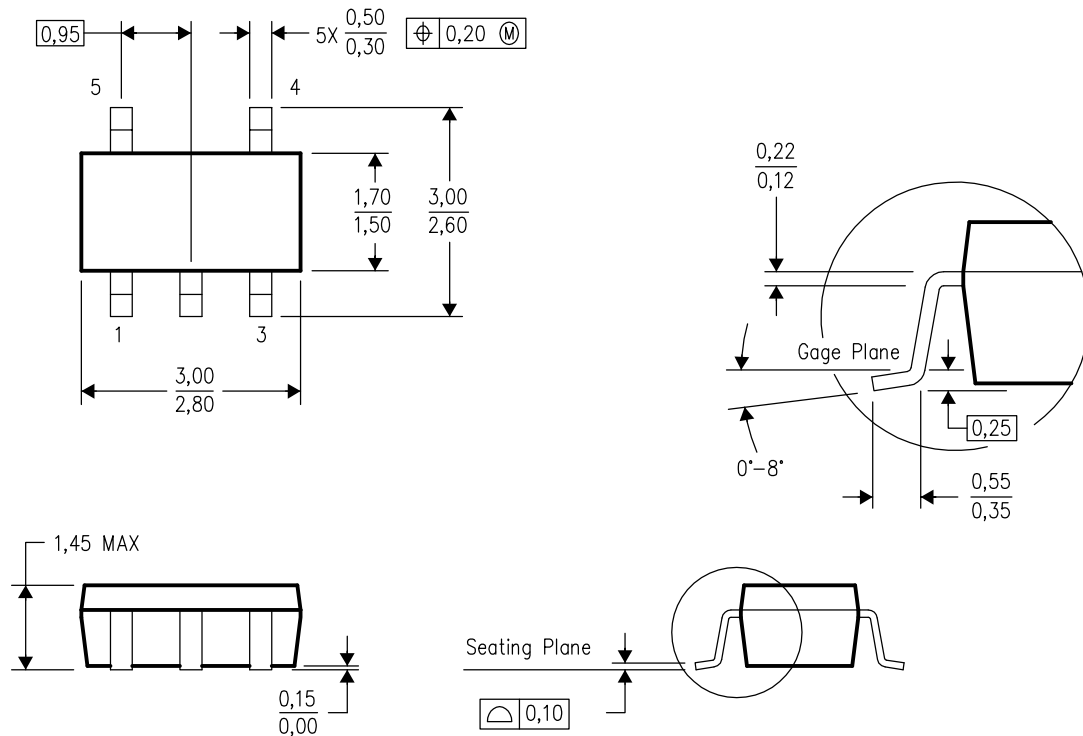


- NOTES:
- $C_L$  includes probe and jig capacitance.
  - Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
  - All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1\text{ MHz}$ ,  $Z_O = 50\ \Omega$ ,  $t_r \leq 3\text{ ns}$ ,  $t_f \leq 3\text{ ns}$ .
  - The outputs are measured one at a time with one input transition per measurement.
  - 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

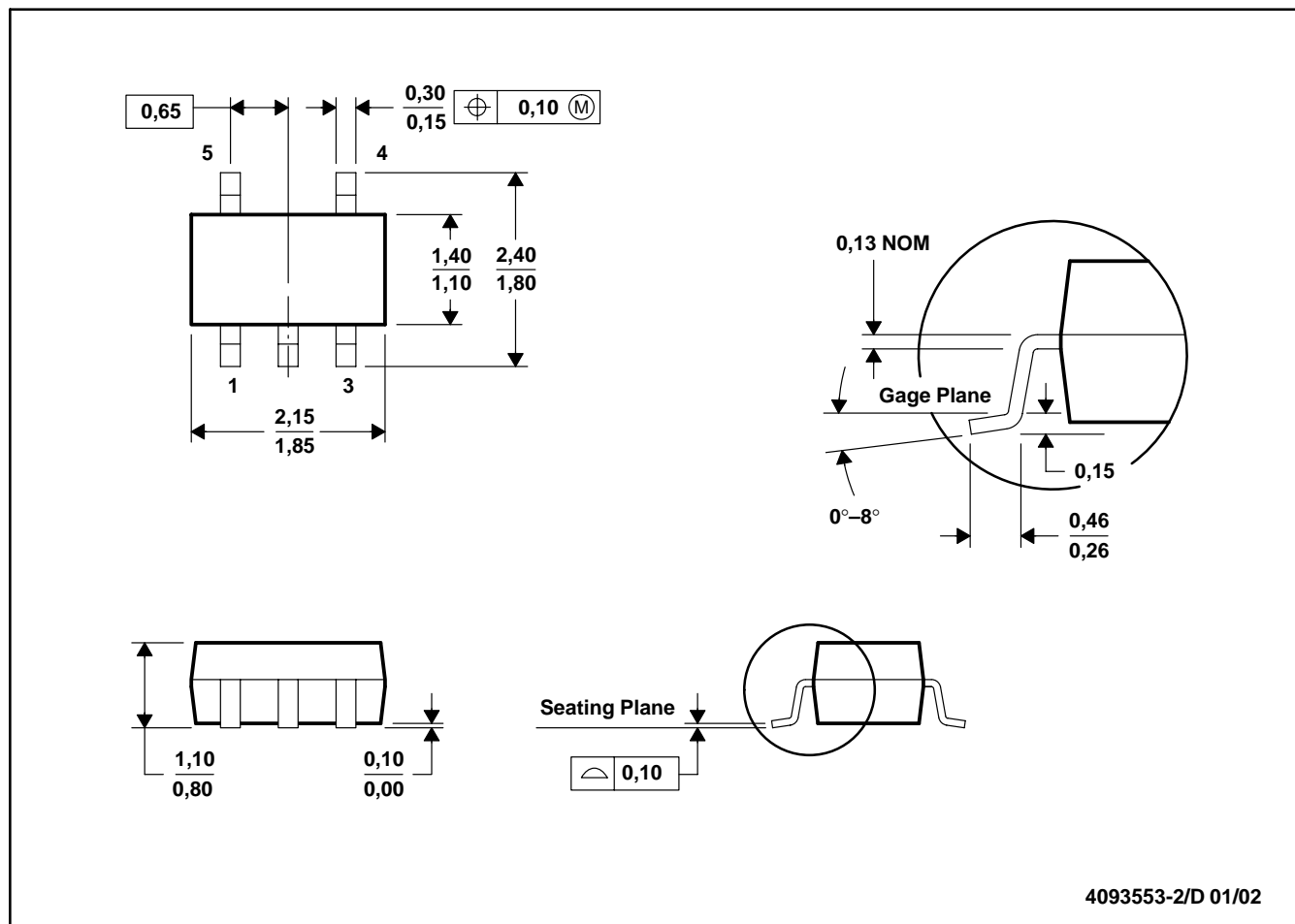


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- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion.
  - D. Falls within JEDEC MO-178 Variation AA.

## DCK (R-PDSO-G5)

## PLASTIC SMALL-OUTLINE PACKAGE



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