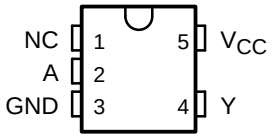
- **Operating Range 2-V to 5.5-V $V_{CC}$**
- ***EPIC***™ **(Enhanced-Performance Implanted CMOS) Process**
- **High Latch-Up Immunity Exceeds 250 mA Per JESD 17**
- **ESD Protection Exceeds 2000 V Per MIL-STD-883, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)**
- **Packaged in Plastic Small-Outline Transistor Package**

**DBV PACKAGE**
**(TOP VIEW)**




NC – No internal connection

## description

The SN74AHC1G14 contains one inverter gate. The device performs the Boolean function $Y = \overline{A}$.

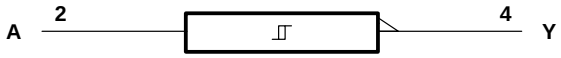
The device functions as an independent inverter gate, but because of the Schmitt action, gates may have different input threshold levels for positive- ($V_{T+}$) and negative-going ($V_{T-}$) signals.

The SN74AHC1G14 is characterized for operation from –40°C to 85°C.

**FUNCTION TABLE**

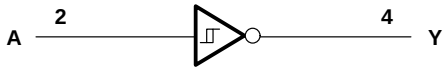
| INPUT A | OUTPUT Y |
|---|---|
| H | L |
| L | H |

## logic symbol†




† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

## 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 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) . . . . . 347°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 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.

## recommended operating conditions (see Note 3)

| | | | MIN | MAX | UNIT |
|---|---|---|---|---|---|
| $V_{CC}$ | Supply voltage | | 2 | 5.5 | V |
| $V_I$ | 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 | |
| $T_A$ | Operating free-air temperature | | –40 | 85 | °C |

NOTE 3: Unused inputs must be held high or low to prevent them from floating.

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

| PARAMETER | TEST CONDITIONS | $V_{CC}$ | $T_A$ = 25°C | | | MIN | MAX | UNIT |
|---|---|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | | | |
| $V_{T+}$ Positive-going input threshold voltage | | 3 V | | | 2.2 | | 2.2 | V |
| | | 4.5 V | | | 3.15 | | 3.15 | |
| | | 5.5 V | | | 3.85 | | 3.85 | |
| $V_{T-}$ Negative-going input threshold voltage | | 3 V | 0.9 | | | 0.9 | | V |
| | | 4.5 V | 1.35 | | | 1.35 | | |
| | | 5.5 V | 1.65 | | | 1.65 | | |
| $\Delta V_T$ Hysteresis ($V_{T+} – V_{T-}$) | | 3 V | 0.3 | | 1.2 | 0.3 | 1.2 | V |
| | | 4.5 V | 0.4 | | 1.4 | 0.4 | 1.4 | |
| | | 5.5 V | 0.5 | | 1.6 | 0.5 | 1.6 | |
| $V_{OH}$ | $I_{OH}$ = –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 | | |
| | $I_{OH}$ = –4 mA | 3 V | 2.58 | | | 2.48 | | |
| | $I_{OH}$ = –8 mA | 4.5 V | 3.94 | | | 3.8 | | |
| $V_{OL}$ | $I_{OL}$ = 50 μA | 2 V | | | 0.1 | | 0.1 | V |
| | | 3 V | | | 0.1 | | 0.1 | |
| | | 4.5 V | | | 0.1 | | 0.1 | |
| | $I_{OL}$ = 4 mA | 3 V | | | 0.36 | | 0.44 | |
| | $I_{OL}$ = 8 mA | 4.5 V | | | 0.36 | | 0.44 | |
| $I_I$ | $V_I = V_{CC}$ or GND | 5.5 V | | | ±0.1 | | ±1 | μA |
| $I_{CC}$ | $V_I = V_{CC}$ or GND, $I_O$ = 0 | 5.5 V | | | 1 | | 10 | μA |
| $C_i$ | $V_I = V_{CC}$ or GND | 5 V | | 2 | 10 | | 10 | pF |

## switching characteristics over recommended operating free-air temperature range, $V_{CC}$ = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE | $T_A$ = 25°C | | | MIN | MAX | UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | | MIN | TYP | MAX | | | |
| $t_{PLH}$ | A | Y | $C_L$ = 15 pF | | 8.3 | 12.8 | 1 | 15 | ns |
| $t_{PHL}$ | | | | | 8.3 | 12.8 | 1 | 15 | |
| $t_{PLH}$ | A | Y | $C_L$ = 50 pF | | 10.8 | 16.3 | 1 | 18.5 | ns |
| $t_{PHL}$ | | | | | 10.8 | 16.3 | 1 | 18.5 | |

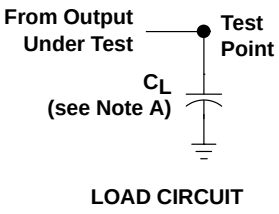
## switching characteristics over recommended operating free-air temperature range, $V_{CC}$ = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)

| PARAMETER | FROM (INPUT) | TO (OUTPUT) | LOAD CAPACITANCE | $T_A$ = 25°C | | | MIN | MAX | UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | | MIN | TYP | MAX | | | |
| $t_{PLH}$ | A | Y | $C_L$ = 15 pF | | 5.5 | 8.6 | 1 | 10 | ns |
| $t_{PHL}$ | | | | | 5.5 | 8.6 | 1 | 10 | |
| $t_{PLH}$ | A | Y | $C_L$ = 50 pF | | 7 | 10.6 | 1 | 12 | ns |
| $t_{PHL}$ | | | | | 7 | 10.6 | 1 | 12 | |

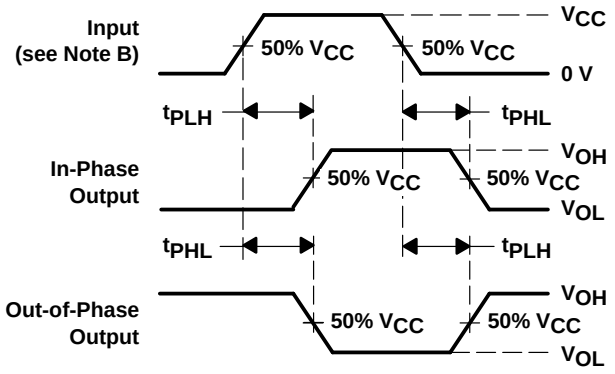
## operating characteristics, $V_{CC}$ = 5 V, $T_A$ = 25°C

| PARAMETER | | TEST CONDITIONS | | TYP | UNIT |
|---|---|---|---|---|---|
| $C_{pd}$ | Power dissipation capacitance | No load, | f = 1 MHz | 9 | pF |

## PARAMETER MEASUREMENT INFORMATION




LOAD CIRCUIT




VOLTAGE WAVEFORMS
DELAY TIMES

NOTES: A. $C_L$ includes probe and jig capacitance.
B. Input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, $Z_O$ = 50 Ω, $t_r$ = 3 ns, $t_f$ = 3 ns.
C. The output is measured with one input transition per measurement.

**Figure 1. Load Circuit and Voltage Waveforms**

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