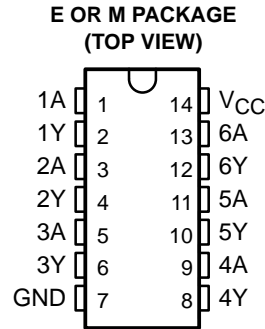


- Inputs Are TTL-Voltage Compatible
- Speed of Bipolar F, AS, and S, With Significantly Reduced Power Consumption
- Greater Noise Immunity Than Standard Inverters
- Operates With Much Slower Than Standard Input Rise and Fall Slew Rates
- $\pm 24$ -mA Output Drive Current
  - Fanout to 15 F Devices
- SCR Latchup-Resistant CMOS Process and Circuit Design
- Exceeds 2-kV ESD Protection Per MIL-STD-883, Method 3015



### description/ordering information

The CD74ACT14 contains six independent inverters. This device performs the Boolean function  $Y = \bar{A}$ . Each circuit functions as an independent inverter, but because of the Schmitt action, the inverters have different input threshold levels for positive-going ( $V_{T+}$ ) and negative-going ( $V_{T-}$ ) signals.

### ORDERING INFORMATION

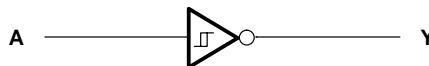
T <sub>A</sub>	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–55°C to 125°C	PDIP – E	Tube	CD74ACT14E	CD74ACT14E
	SOIC – M	Tube	CD74ACT14M	ACT14M
		Tape and reel	CD74ACT14M96	

† 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).

### FUNCTION TABLE (each inverter)

INPUT A	OUTPUT Y
H	L
L	H

### logic diagram, each inverter (positive logic)



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.

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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# CD74ACT14

## HEX SCHMITT-TRIGGER INVERTER

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

Supply voltage range, $V_{CC}$	-0.5 V to 6 V
Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ ) (see Note 1)	$\pm 20$ mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) (see Note 1)	$\pm 50$ mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ )	$\pm 50$ mA
Continuous current through $V_{CC}$ or GND	$\pm 100$ mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): E package	80°C/W
M package	86°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 51-7.

### recommended operating conditions (see Note 3)

	$T_A = 25^\circ\text{C}$		$-55^\circ\text{C to } 125^\circ\text{C}$		$-40^\circ\text{C to } 85^\circ\text{C}$		UNIT
	MIN	MAX	MIN	MAX	MIN	MAX	
$V_{CC}$ Supply voltage	4.5	5.5	4.5	5.5	4.5	5.5	V
$V_{IH}$ High-level input voltage	2		2		2		V
$V_{IL}$ Low-level input voltage		0.8		0.8		0.8	V
$V_I$ Input voltage	0	$V_{CC}$	0	$V_{CC}$	0	$V_{CC}$	V
$V_O$ Output voltage	0	$V_{CC}$	0	$V_{CC}$	0	$V_{CC}$	V
$I_{OH}$ High-level output current		-24		-24		-24	mA
$I_{OL}$ Low-level output current		24		24		24	mA
$\Delta t/\Delta v$ Input transition rise or fall rate		20		20		20	ns/V

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 <sub>CC</sub>	T <sub>A</sub> = 25°C		-55°C to 125°C		-40°C to 85°C		UNIT
				MIN	MAX	MIN	MAX	MIN	MAX	
V <sub>T+</sub> Positive-going threshold			5 V	1.4	2	1.4	2	1.4	2	V
V <sub>T-</sub> Negative-going threshold			5 V	0.8	1.3	0.8	1.3	0.8	1.3	V
ΔV <sub>T</sub> Hysteresis (V <sub>T+</sub> - V <sub>T-</sub> )			5 V	0.4		0.4		0.4		V
V <sub>OH</sub>	V <sub>I</sub> = V <sub>T+</sub>	I <sub>OH</sub> = -50 μA	4.5 V	4.4		4.4		4.4		V
		I <sub>OH</sub> = -24 mA	4.5 V	3.94		3.7		3.8		
		I <sub>OH</sub> = -50 mA <sup>†</sup>	5.5 V			3.85				
		I <sub>OH</sub> = -75 mA <sup>†</sup>	5.5 V					3.85		
V <sub>OL</sub>	V <sub>I</sub> = V <sub>T-</sub>	I <sub>OL</sub> = 50 μA	4.5 V		0.1		0.1		0.1	V
		I <sub>OL</sub> = 24 mA	4.5 V		0.36		0.5		0.44	
		I <sub>OL</sub> = 50 mA <sup>†</sup>	5.5 V				1.65			
		I <sub>OL</sub> = 75 mA <sup>†</sup>	5.5 V						1.65	
I <sub>I</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND		5.5 V		±0.1		±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		4		80		40	μA
ΔI <sub>CC</sub> <sup>‡</sup>	V <sub>I</sub> = V <sub>CC</sub> - 2.1 V		4.5 V to 5.5 V		2.4		3		2.8	mA
C <sub>i</sub>					10		10		10	pF

<sup>†</sup> Test one output at a time, not exceeding 1-second duration. Measurement is made by forcing indicated current and measuring voltage to minimize power dissipation. Test verifies a minimum 50-Ω transmission-line drive capability at 85°C and 75-Ω transmission-line drive capability at 125°C.

<sup>‡</sup> Additional quiescent supply current per input pin, TTL inputs high, 1 unit load

**ACT INPUT LOAD TABLE**

INPUT	UNIT LOAD
A	0.21

Unit Load is ΔI<sub>CC</sub> limit specified in electrical characteristics table (e.g., 2.4 mA at 25°C).

**switching characteristics over recommended operating free-air temperature range, V<sub>CC</sub> = 5 V ± 0.5 V, C<sub>L</sub> = 50 pF (unless otherwise noted) (see Figure 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	-55°C to 125°C		-40°C to 85°C		UNIT
			MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A	Y	3.6	14.5	3.7	13.2	ns
t <sub>PHL</sub>			2.4	9.5	2.4	8.6	

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

PARAMETER	TYP	UNIT
C <sub>pd</sub> Power dissipation capacitance	45	pF

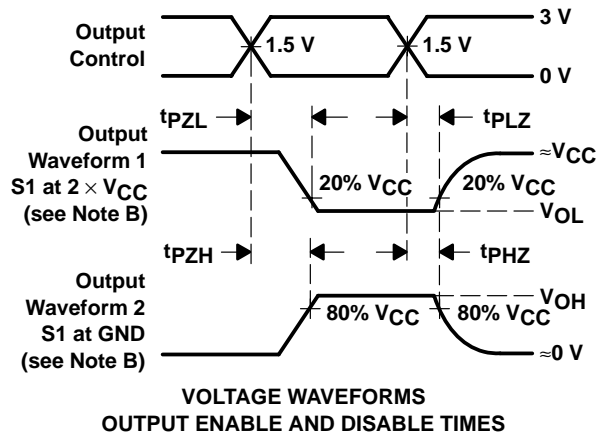
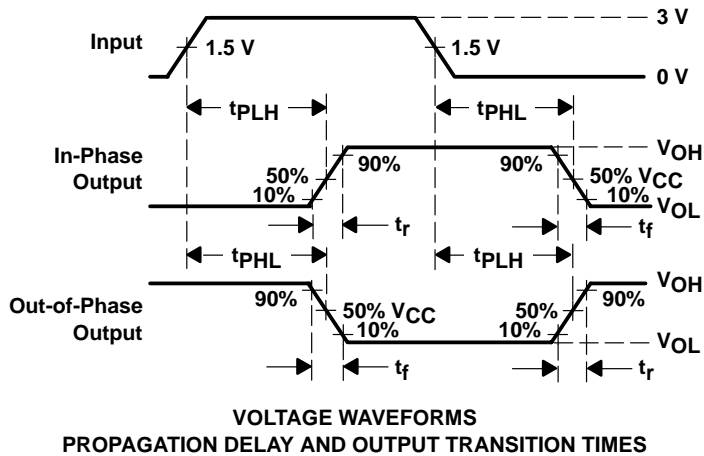
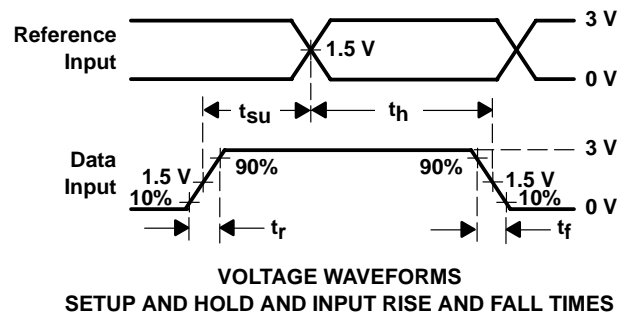
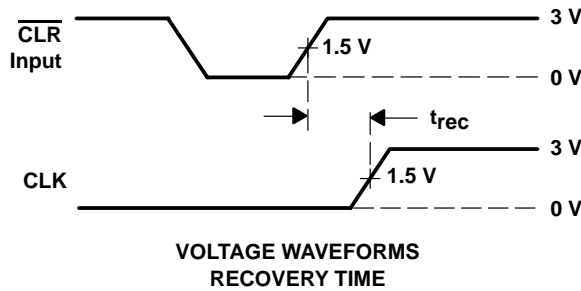
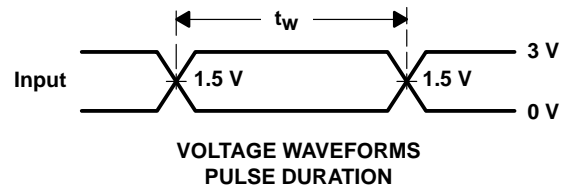
# CD74ACT14 HEX SCHMITT-TRIGGER INVERTER

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## PARAMETER MEASUREMENT INFORMATION



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



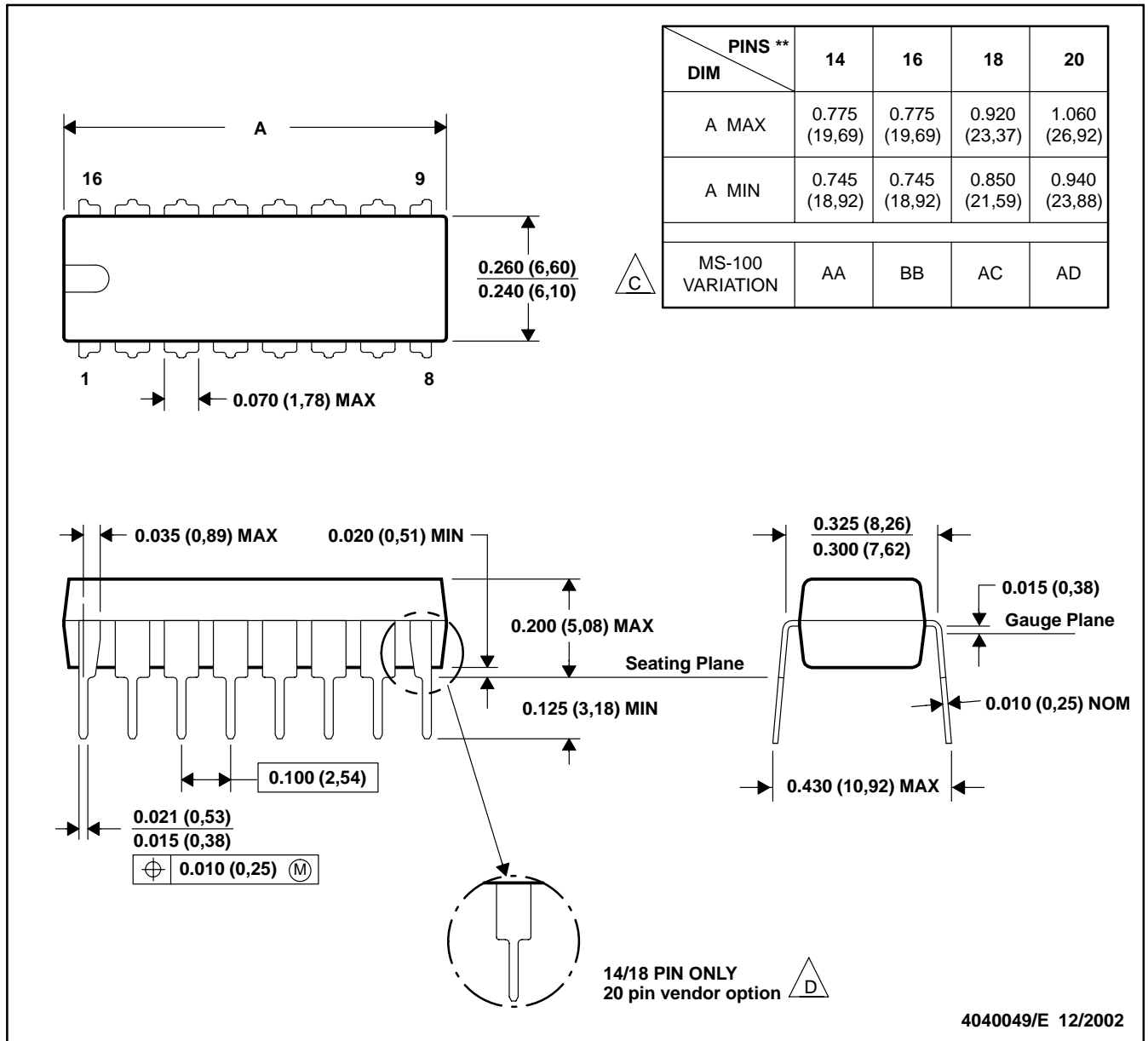
- NOTES:
- $C_L$  includes probe and test-fixture capacitance.
  - Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
  - All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1 \text{ MHz}$ ,  $Z_O = 50 \Omega$ ,  $t_r = 3 \text{ ns}$ ,  $t_f = 3 \text{ ns}$ . Phase relationships between waveforms are arbitrary.
  - For clock inputs,  $f_{max}$  is measured with the input duty cycle at 50%.
  - The outputs are measured one at a time with one input transition per measurement.
  - $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .
  - $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
  - $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .

Figure 1. Load Circuit and Voltage Waveforms

N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES: A. All linear dimensions are in inches (millimeters).  
 B. This drawing is subject to change without notice.  
**C** Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).  
**D** The 20 pin end lead shoulder width is a vendor option, either half or full width.

D (R-PDSO-G\*\*)

PLASTIC SMALL-OUTLINE PACKAGE

8 PINS SHOWN



4040047/E 09/01

- NOTES: A. All linear dimensions are in inches (millimeters).  
 B. This drawing is subject to change without notice.  
 C. Body dimensions do not include mold flash or protrusion, not to exceed 0.006 (0,15).  
 D. Falls within JEDEC MS-012

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