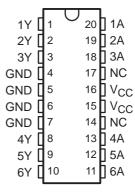
- Flow-Through Architecture Optimizes
  PCB Layout
- Center-Pin V<sub>CC</sub> and GND Configuration Minimizes High-Speed Switching Noise
- EPIC™ (Enhanced-Performance Implanted CMOS) 1-µm Process
- 500-mA Typical Latch-Up Immunity at
- Package Options Include Plastic Small-Outline (DW) and Shrink Small-Outline (DB) Packages, and Standard Plastic 300-mil DIPs (N)

# DB, DW, OR N PACKAGE (TOP VIEW)

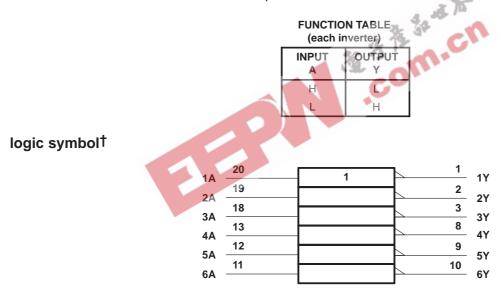


NC - No internal connection

### description

This device contains six independent inverters. It performs the Boolean function  $Y = \overline{A}$ .

The 74AC11004 is characterized for operation from -40°C to 85°C.



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

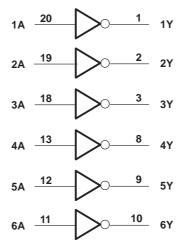


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### logic diagram (positive logic)



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

Supply voltage range, V <sub>CC</sub>	0.5 V to 7 V
Input voltage range, V <sub>I</sub> (see Note 1)	
Output voltage range, VO (see Note 1)	
Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ )	±20 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ )	±50 mA
Continuous output current, $I_O(V_O = 0 \text{ to } V_{CC})$	±50 mA
Continuous current through V <sub>CC</sub> or GND	±100 mA
Maximum power dissipation at $T_A = 55^{\circ}C$ (in still air) (see	ee Note 2): DW package 1.6 W
	DB package 0.6 W
	N package 1.3 W
Storage temperature range, T <sub>stq</sub>	–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 maximum package power dissipation is calculated using a junction temperature of 150 °C and a board trace length of 750 mils, except for the N package, which has a trace length of zero.



### 74AC11004 HEX INVERTER

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### recommended operating conditions

			MIN	NOM	MAX	UNIT	
Vcc	Supply voltage		3	5	5.5	V	
		V <sub>CC</sub> = 3 V	2.1				
V <sub>IH</sub> High-level input voltage	$V_{CC} = 4.5 \text{ V}$	3.15			V		
	$V_{CC} = 5.5 V$	3.85					
		V <sub>CC</sub> = 3 V			0.9		
$V_{IL}$	Low-level input voltage	$V_{CC} = 4.5 V$			1.35	V	
		V <sub>CC</sub> = 5.5 V			1.65		
٧ <sub>I</sub>	Input voltage	-	0		Vcc	V	
٧o	Output voltage		0		VCC	V	
		V <sub>CC</sub> = 3 V			-4		
loh	High-level output current	V <sub>CC</sub> = 4.5 V			-24	mA	
		V <sub>CC</sub> = 5.5 V			-24		
		V <sub>CC</sub> = 3 V			12		
IOL Low-level output current	Low-level output current	V <sub>CC</sub> = 4.5 V			24	mA	
		V <sub>CC</sub> = 5.5 V			24		
Δt/Δν	Input transition rise or fall rate	2. 30	0		10	ns/V	
T <sub>A</sub>	Operating free-air temperature	3.13	-40		85	°C	

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

PARAMETER	TEST CONDITIONS	Vac	T <sub>A</sub> = 25°C			MIN	MAX	UNIT	
FARAWETER		vcc	MIN	TYP	MAX	IVIIIV	WAX	UNIT	
		3 V	2.9			2.9			
	$I_{OH} = -50  \mu A$	4.5 V	4.4			4.4			
		5.5 V	5.4			5.4			
VOH	$I_{OH} = -4 \text{ mA}$	3 V	2.58			2.48		V	
		4.5 V	3.94			3.8			
	I <sub>OH</sub> = −24 mA	5.5 V	4.94			4.8			
	$I_{OH} = -75 \text{ mA}^{\dagger}$	5.5 V				3.85			
	I <sub>OL</sub> = 50 μA	3 V			0.1		0.1		
		4.5 V			0.1		0.1		
		5.5 V			0.1		0.1		
$V_{OL}$	I <sub>OL</sub> = 12 mA	3 V			0.36		0.44	V	
	I <sub>OL</sub> = 24 mA	4.5	4.5 V			0.36		0.44	
		5.5 V			0.36		0.44		
	$I_{OL} = 75 \text{ mA}^{\dagger}$	5.5 V					1.65		
lį	$V_I = V_{CC}$ or GND	5.5 V			±0.1		±1	μΑ	
Icc	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			4		40	μΑ	
C <sub>i</sub>	$V_I = V_{CC}$ or GND	5 V		3.5				pF	

<sup>†</sup> Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.



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

PARAMETER FROM (INPUT)	FROM	TO (OUTPUT)	T <sub>A</sub> = 25°C			MIN MAX	MAX	UNIT
	(INPUT)		MIN	TYP	MAX	IVIIIN	WAX	UNII
<sup>t</sup> PLH		V	1.5	6.1	9	1.5	10	200
<sup>t</sup> PHL	A	ſ	1.5	5.2	7.4	1.5	8.2	ns

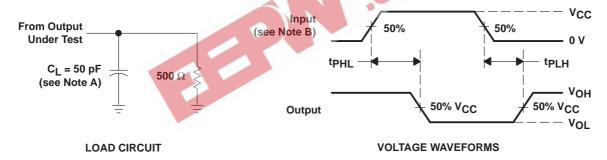
### switching characteristics over recommended operating free-air temperature range, $V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	T <sub>A</sub> = 25°C			MIN	MAX	UNIT
PARAMETER			MIN	TYP	MAX	IVIIIV	IVIAX	UNIT
t <sub>PLH</sub>	A	V	1.5	4.2	6.3	1.5	7.1	no
t <sub>PHL</sub>		ī	1.5	3.8	5.5	1.5	6	ns

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

PARAMETER		TEST CO	TYP	UNIT	
C <sub>pd</sub>	Power dissipation capacitance per inverter	C <sub>L</sub> = 50 pF,	f = 1 MHz	29	pF

### PARAMETER MEASUREMENT INFORMATION



NOTES: A. C<sub>L</sub> includes probe and jig capacitance.

- B. Input pulses are supplied by generators having the following characteristics: PRR  $\leq$  1 MHz,  $Z_O = 50 \Omega$ ,  $t_f = 3 \text{ ns}$ ,  $t_f = 3 \text{ ns}$ .
- C. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms



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