

- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

**description**

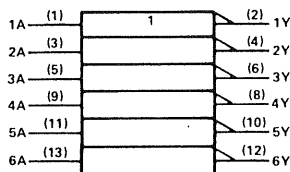
These devices contain six independent inverters. They perform the Boolean function  $Y = \bar{A}$ .

The SN54HC04 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74HC04 is characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

FUNCTION TABLE  
(each inverter)

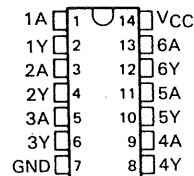
INPUT	OUTPUT
A	Y
H	L
L	H

**logic symbols†**

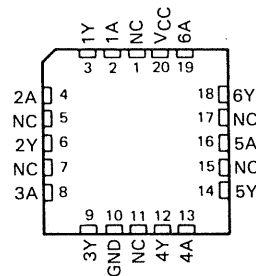


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. Pin numbers shown are for D, J, and N packages.

SN54HC04 . . . J PACKAGE  
SN74HC04 . . . D OR N PACKAGE  
(TOP VIEW)



SN54HC04 . . . FK PACKAGE  
(TOP VIEW)



NC—No internal connection

**logic diagram (positive logic)**



PRODUCTION DATA documents contain information 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.

TEXAS INSTRUMENTS  
POST OFFICE BOX 655012 • DALLAS, TEXAS 75265

Copyright © 1982, Texas Instruments Incorporated

**SN54HC04, SN74HC04  
HEX INVERTERS**

**absolute maximum ratings over operating free-air temperature range†**

Supply voltage, $V_{CC}$ .....	-0.5 V to 7 V
Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ ) .....	$\pm 20$ mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) .....	$\pm 20$ mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....	$\pm 25$ mA
Continuous current through $V_{CC}$ or GND pins .....	$\pm 50$ mA
Lead temperature 1,6 mm (1/16 in) from case for 60 s: FK or J package .....	300°C
Lead temperature 1,6 mm (1/16 in) from case for 10 s: D or N package .....	260°C
Storage temperature range .....	-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.

**recommended operating conditions**

		SN54HC04			SN74HC04			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
$V_{CC}$ Supply voltage		2	5	6	2	5	6	V
$V_{IH}$ High-level input voltage	$V_{CC} = 2$ V	1.5			1.5			V
	$V_{CC} = 4.5$ V	3.15			3.15			
	$V_{CC} = 6$ V	4.2			4.2			
$V_{IL}$ Low-level input voltage	$V_{CC} = 2$ V	0	0.3		0	0.3		V
	$V_{CC} = 4.5$ V	0	0.9		0	0.9		
	$V_{CC} = 6$ V	0	1.2		0	1.2		
$V_I$ Input voltage		0	$V_{CC}$		0	$V_{CC}$		V
$V_O$ Output voltage		0	$V_{CC}$		0	$V_{CC}$		V
$t_t$ Input transition (rise and fall) times	$V_{CC} = 2$ V	0	1000		0	1000		ns
	$V_{CC} = 4.5$ V	0	500		0	500		
	$V_{CC} = 6$ V	0	400		0	400		
$T_A$ Operating free-air temperature		-55	125		-40	85		°C

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

PARAMETER	TEST CONDITIONS	$V_{CC}$	$T_A = 25^\circ\text{C}$			SN54HC04		SN74HC04		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$V_{OH}$	$V_I = V_{IH}$ or $V_{IL}$ , $I_{OH} = -20 \mu\text{A}$	2 V	1.9	1.998		1.9		1.9	V	
		4.5 V	4.4	4.499		4.4		4.4		
		6 V	5.9	5.999		5.9		5.9		
	$V_I = V_{IH}$ or $V_{IL}$ , $I_{OH} = -4$ mA	4.5 V	3.98	4.30		3.7		3.84		
$V_{OL}$	$V_I = V_{IH}$ or $V_{IL}$ , $I_{OL} = 20 \mu\text{A}$	2 V		0.002	0.1		0.1		0.1	
		4.5 V		0.001	0.1		0.1		0.1	
		6 V		0.001	0.1		0.1		0.1	
	$V_I = V_{IH}$ or $V_{IL}$ , $I_{OL} = 4$ mA	4.5 V		0.17	0.26		0.4		0.33	
$I_I$	$V_I = 0$ or $V_{CC}$	6 V		$\pm 0.1$	$\pm 100$		$\pm 1000$		$\pm 1000$	nA
		6 V			2		40		20	$\mu\text{A}$
$I_{CC}$	$V_I = V_{CC}$ or 0, $I_O = 0$	6 V								$\mu\text{A}$
$C_i$		2 to 6 V		3	10		10		10	pF

switching characteristics (noted),  $C_L = 50$  pF (see 1)

PARAMETER	FROI (INPUT)
$t_{pd}$	A
$t_t$	

$C_{pd}$	Power dissipati
----------	-----------------

NOTE 1: Load circuit and voltage w

2 HCMOS Devices

switching characteristics over recommended operating free-air temperature range (unless otherwise noted),  $C_L = 50$  pF (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub>	T <sub>A</sub> = 25°C			SN54HC04		SN74HC04		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A	Y	2 V		45	95		145		120	ns
			4.5 V		9	19		29		24	
			6 V		8	16		25		20	
t <sub>t</sub>		Y	2 V		38	75		110		95	ns
			4.5 V		8	15		22		19	
			6 V		6	13		19		16	

C <sub>pd</sub>	Power dissipation capacitance per inverter	No load, T <sub>A</sub> = 25°C	20 pF typ
-----------------	--	--------------------------------	-----------

NOTE 1: Load circuit and voltage waveforms are shown in Section 1.

-0.5 V to 7 V  
... ±20 mA  
... ±20 mA  
... ±25 mA  
... ±50 mA  
... 300°C  
... 260°C  
... 5°C to 150°C

are stress ratings  
recommended operating  
reliability.

04	UNIT
MAX	V
6	V
	V
0.3	V
0.9	V
1.2	V
V <sub>CC</sub>	V
V <sub>CC</sub>	V
1000	ns
500	ns
400	ns
85	°C

less otherwise

4HC04	UNIT
MAX	V
	V
	V
0.1	V
0.1	V
0.1	V
0.33	V
0.33	V
±1000	nA
20	μA
10	pF