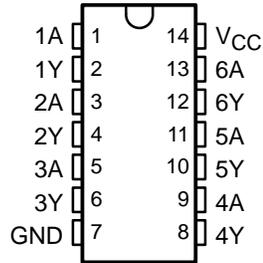


SN54HCU04, SN74HCU04 HEX INVERTERS

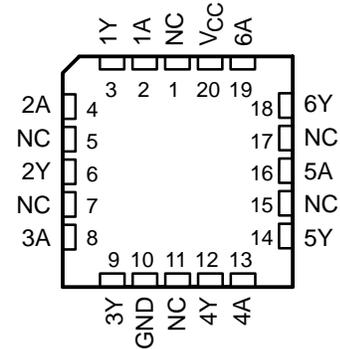
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- Wide Operating Voltage Range of 2 V to 6 V
- Outputs Can Drive Up To 10 LSTTL Loads
- Low Power Consumption, 20- μ A Max I_{CC}
- Typical $t_{pd} = 7$ ns
- ± 4 -mA Output Drive at 5 V
- Low Input Current of 1 μ A Max
- Unbuffered Outputs

SN54HCU04 . . . J OR W PACKAGE
SN74HCU04 . . . D, DB, N, NS, OR PW PACKAGE
(TOP VIEW)



SN54HCU04 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

description/ordering information

The 'HCU04 devices contain six independent inverters. They perform the Boolean function $Y = \bar{A}$ in positive logic.

ORDERING INFORMATION

T _A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	PDIP – N	Tube	SN74HCU04N	SN74HCU04N
	SOIC – D	Tube	SN74HCU04D	HCU04
		Tape and reel	SN74HCU04DR	
	SOP – NS	Tape and reel	SN74HCU04NSR	HCU04
	SSOP – DB	Tape and reel	SN74HCU04DBR	HU04
	TSSOP – PW	Tape and reel	SN74HCU04PWR	HCU04
-55°C to 125°C	CDIP – J	Tube	SNJ54HCU04J	SNJ54HCU04J
	CFP – W	Tube	SNJ54HCU04W	SNJ54HCU04W
	LCCC – FK	Tube	SNJ54HCU04FK	SNJ54HCU04FK

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION TABLE
(each inverter)

INPUT A	OUTPUT Y
H	L
L	H



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.

 **TEXAS
INSTRUMENTS**

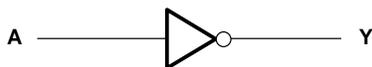
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SN54HCU04, SN74HCU04 HEX INVERTERS

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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 clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) (see Note 1)	± 20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) (see Note 1)	± 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, θ_{JA} (see Note 2): D package	86°C/W
DB package	96°C/W
N package	80°C/W
NS package	76°C/W
PW package	113°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)

		SN54HCU04			SN74HCU04			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		1.7	1.7		V	
		$V_{CC} = 4.5$ V		3.6	3.6			
		$V_{CC} = 6$ V		4.8	4.8			
V_{IL}	Low-level input voltage	$V_{CC} = 2$ V			0.5	0.5	V	
		$V_{CC} = 4.5$ V			1.35	1.35		
		$V_{CC} = 6$ V			1.8	1.8		
V_I	Input voltage	0		V_{CC}	0		V_{CC}	V
V_O	Output voltage	0		V_{CC}	0		V_{CC}	V
$\Delta t/\Delta v$	Input transition rise/fall time	$V_{CC} = 2$ V			1000	1000	ns	
		$V_{CC} = 4.5$ V			500	500		
		$V_{CC} = 6$ V			400	400		
T_A	Operating free-air temperature	-55		125	-40		85	°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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electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS		V _{CC}	T _A = 25°C			SN54HCU04		SN74HCU04		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V _{OH}	V _I = V _{CC} or GND	I _{OH} = -20 μA	2 V	1.8			1.8		1.8	V	
			4.5 V	4			4		4		
			6 V	5.5			5.5		5.5		
		I _{OH} = -4 mA	4.5 V	3.98			3.7		3.84		
		I _{OH} = -5.2 mA	6 V	5.48			5.2		5.34		
V _{OL}	V _I = V _{CC} or GND	I _{OL} = 20 μA	2 V			0.2		0.2	0.2	V	
			4.5 V			0.5		0.5	0.5		
			6 V			0.5		0.5	0.5		
		I _{OL} = 4 mA	4.5 V			0.26		0.4	0.33		
		I _{OL} = 5.2 mA	6 V			0.26		0.4	0.33		
I _I	V _I = V _{CC} or 0		6 V			±100		±1000	±1000	nA	
I _{CC}	V _I = V _{CC} or 0, I _O = 0		6 V			2		40	20	μA	
C _i			2 V to 6 V		3	10		10	10	pF	

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC}	T _A = 25°C			SN54HCU04		SN74HCU04		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{pd}	A	Y	2 V		40	80		120		100	ns
			4.5 V		8	16		24		20	
			6 V		7	14		20		17	
t _f		Y	2 V		38	75		110		95	ns
			4.5 V		8	15		22		19	
			6 V		6	13		19		16	

operating characteristics, T_A = 25°C

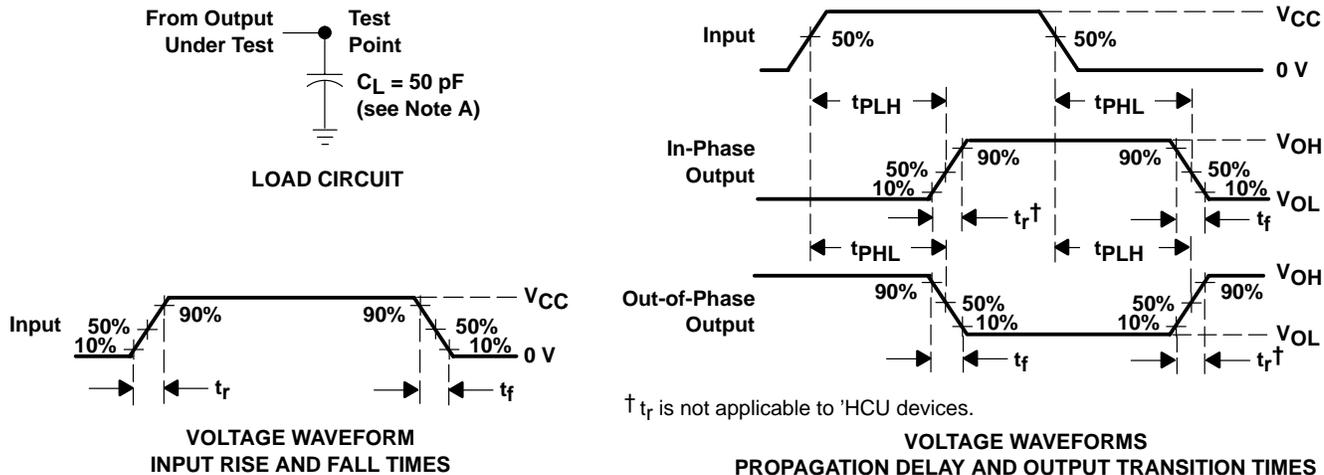
PARAMETER	TEST CONDITIONS	TYP	UNIT
C _{pd} Power dissipation capacitance per inverter	No load	20	pF



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PARAMETER MEASUREMENT INFORMATION



- NOTES:
- A. C_L includes probe and test-fixture capacitance.
 - B. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r = 6 \text{ ns}$, $t_f = 6 \text{ ns}$.
 - C. The outputs are measured one at a time with one input transition per measurement.
 - D. t_{PLH} and t_{PHL} are the same as t_{pd} .

Figure 1. Load Circuit and Voltage Waveforms

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