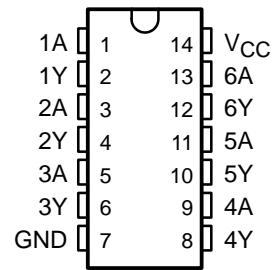


CD54ACT04, CD74ACT04 HEX INVERTERS

SCHS310B – JANUARY 2001 – REVISED JUNE 2002

- Inputs Are TTL-Voltage Compatible
- Speed of Bipolar F, AS, and S, With Significantly Reduced Power Consumption
- Balanced Propagation Delays
- ± 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

CD54ACT04 . . . F PACKAGE
CD74ACT04 . . . E OR M PACKAGE
(TOP VIEW)



description

The 'ACT04 devices contain six independent inverters. The devices perform the Boolean function $Y = \bar{A}$.

ORDERING INFORMATION

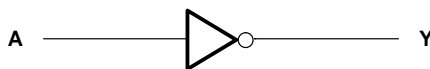
T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–55°C to 125°C	PDIP – E	Tube	CD74ACT04E	CD74ACT04E
	SOIC – M	Tube	CD74ACT04M	ACT04M
		Tape and reel	CD74ACT04M96	
	CDIP – F	Tube	CD54ACT04F3A	CD54ACT04F3A

† 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

logic diagram, each inverter (positive logic)



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 **TEXAS
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CD54ACT04, CD74ACT04 HEX INVERTERS

SCHS310B – JANUARY 2001 – REVISED JUNE 2002

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)	± 20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) (see Note 1)	± 50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	± 50 mA
Continuous current through V_{CC} or GND	± 100 mA
Package thermal impedance, θ_{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)

	$T_A = 25^\circ\text{C}$		$-40^\circ\text{C TO } 85^\circ\text{C}$		$-55^\circ\text{C TO } 125^\circ\text{C}$		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		10		10		10	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_{CC}	$T_A = 25^\circ\text{C}$		$-40^\circ\text{C TO } 85^\circ\text{C}$		$-55^\circ\text{C TO } 125^\circ\text{C}$		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
V_{OH}	$V_I = V_{IH}$ or V_{IL}	$I_{OH} = -50 \mu\text{A}$	4.5 V	4.4	4.4	4.4		V	
		$I_{OH} = -24 \text{ mA}$	4.5 V	3.94	3.8	3.7			
		$I_{OH} = -50 \text{ mA}^\ddagger$	5.5 V			3.85			
		$I_{OH} = -75 \text{ mA}^\ddagger$	5.5 V		3.85				
V_{OL}	$V_I = V_{IH}$ or V_{IL}	$I_{OL} = 50 \mu\text{A}$	4.5 V	0.1	0.1	0.1	V		
		$I_{OL} = 24 \text{ mA}$	4.5 V	0.36	0.44	0.5			
		$I_{OL} = 50 \text{ mA}^\ddagger$	5.5 V			1.65			
		$I_{OL} = 75 \text{ mA}^\ddagger$	5.5 V		1.65				
I_I	$V_I = V_{CC}$ or GND	5.5 V	± 0.1	± 1	± 1	μA			
I_{CC}	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V	4	40	80	μA			
ΔI_{CC}	$V_I = V_{CC} - 2.1 \text{ V}$	4.5 V to 5.5 V	2.4	2.8	3	mA			
C_i			10	10	10	pF			

[‡] 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.



ACT INPUT LOAD TABLE

INPUT	UNIT LOAD
A	0.18

Unit load is ΔI_{CC} limit specified in electrical characteristics table (e.g., 2.4 mA at 25°C).

switching characteristics over recommended operating free-air temperature range, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$, $C_L = 50\text{ pF}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	-40°C TO 85°C		-55°C TO 125°C		UNIT
			MIN	MAX	MIN	MAX	
t_{PLH}	A	Y	2.4	8.5	2.3	9.3	ns
t_{PHL}			2.4	8.5	2.3	9.3	

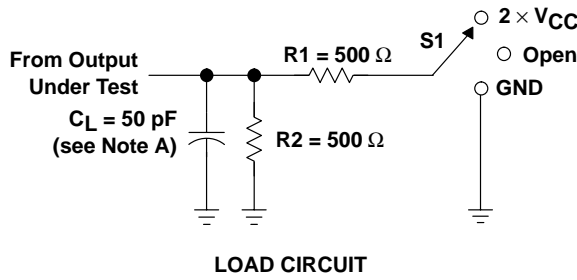
operating characteristics, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER	TYP	UNIT
C_{pd} Power dissipation capacitance	105	pF

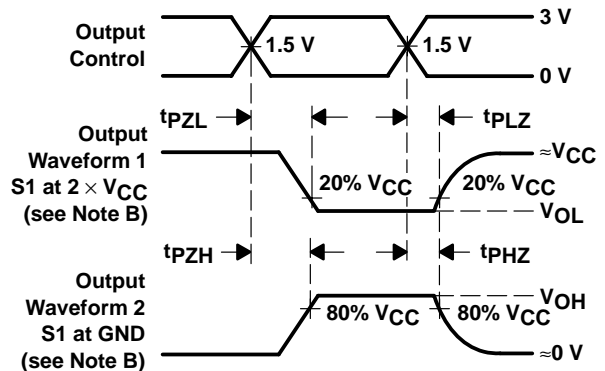
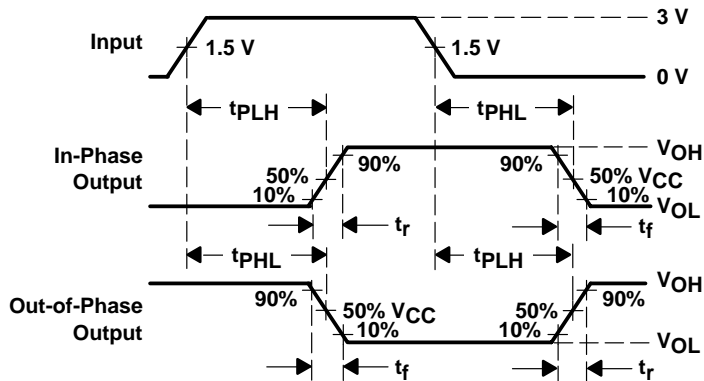
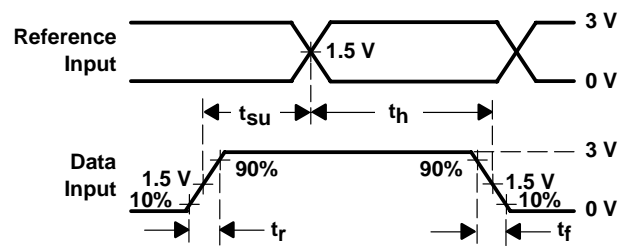
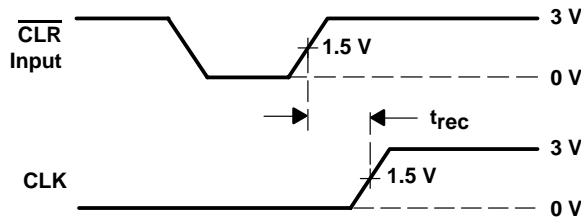
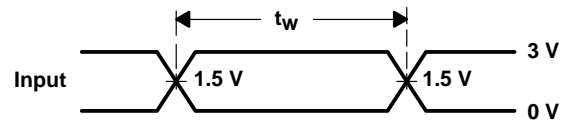
CD54ACT04, CD74ACT04 HEX INVERTERS

SCHS310B – JANUARY 2001 – REVISED JUNE 2002

PARAMETER MEASUREMENT INFORMATION



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



- NOTES: A. C_L includes probe and test-fixture capacitance.
 B. 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.
 C. 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.
 D. For clock inputs, f_{max} is measured with the input duty cycle at 50%.
 E. The outputs are measured one at a time with one input transition per measurement.
 F. t_{PLH} and t_{PHL} are the same as t_{pd} .
 G. t_{PZL} and t_{PZH} are the same as t_{en} .
 H. t_{PLZ} and t_{PHZ} are the same as t_{dis} .

Figure 1. Load Circuit and Voltage Waveforms

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