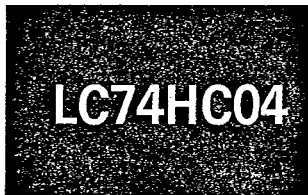


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3003A

CMOS High-Speed Standard Logic
LC74HC Series

Hex Inverter (Buffered)

©1758C

Features

- The LC74HC04 consists of 6 identical buffered inverters.
- Uses CMOS silicon gate process technology to achieve operating speeds similar to LS-TTL (74LS04) with the low power dissipation and high noise margin of standard CMOS IC's.
- All inputs and outputs are protected from damage.
- The LC74HC04 is functionally as well as pin-out compatible with the standard 54LS/74LS TTL logic family.

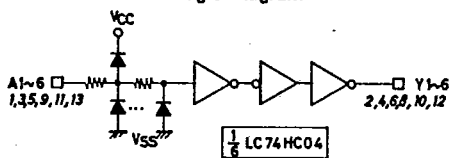
Absolute Maximum Ratings/ $T_a=25\pm 2^\circ\text{C}$, $V_{SS}=0\text{V}$

			unit
Maximum Supply Voltage	V_{CC} max	$V_{SS}-0.5$ to $V_{SS}+7.0$	V
Maximum Input Voltage	V_{IN} max	$V_{SS}-0.5$ to $V_{CC}+0.5$	V
Maximum Output Voltage	V_{OUT} max	$V_{SS}-0.5$ to $V_{CC}+0.5$	V
Maximum Output Current	I_{OUT}	Per output ± 25	mA
Current Dissipation	I_{CC}/I_{GND}	± 50	mA
Clamp Diode Current	I_K	Per input pin (Input protector) ± 10	mA
Allowable Power Dissipation	P_d max	Per package, $T_a \leq 85^\circ\text{C}$ 300	mW
Storage Temperature	T_{stg}	-65 to +150	$^\circ\text{C}$
Lead Temperature and Time	T_{sol}	$t=10\text{sec}$ 300	$^\circ\text{C}$

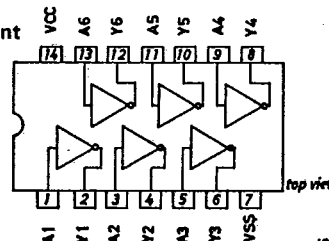
Allowable Operating Conditions/ $V_{SS}=0\text{V}$

			unit
Supply Voltage	V_{CC}	2.0 to 6.0	V
Input Voltage	V_{IN}	0 to V_{CC}	V
Output Voltage	V_{OUT}	0 to V_{CC}	V
Operating Temperature	T_{opg}	-40 to +85	$^\circ\text{C}$
Input Rise/Fall Time	t_r, t_f	0 to 500	ns

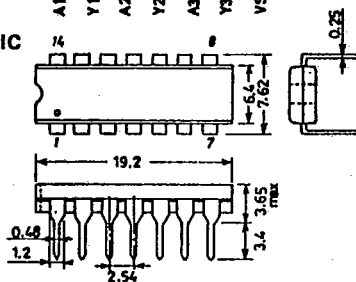
Equivalent Circuit and Logic Diagram



Pin Assignment



Case Outline 3003A-D141C (unit: mm)



SANYO: QIP14

LC74HC04

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Truth Table

A	Y	
0	1	'1': 'H' level
1	0	'0': 'L' level

Electrical Characteristics/T_a=25±2°C, V_{SS}=0V

		V _{CC}	min	typ	max	unit					
Input "H" Level Voltage	V _{IH}	2.0	1.5			V					
		4.5	3.15			V					
		5.0	3.5			V					
		5.5	3.85			V					
		6.0	4.2			V					
Input "L" Level Voltage	V _{IL}	2.0			0.6	V					
		4.5			1.35	V					
		5.0			1.5	V					
		5.5			1.65	V					
		6.0			1.8	V					
Output "H" Level Voltage	V _{OH}	V _{IN} =V _{IL} , I _{OH} =-20uA	4.5	4.4	4.5	V					
			5.0	4.9	5.0	V					
		"	"	5.5	5.4	5.5	V				
				6.0				V			
		"	V _{IN} =V _{IL} , I _{OH} =-4mA	4.5	4.1	4.3	V				
				5.0	4.6	4.8	V				
				5.5	5.1	5.3	V				
				6.0				V			
				Output "L" Level Voltage	V _{OL}	V _{IN} =V _{IH} , I _{OL} =20uA	4.5		0.0	0.1	V
							5.0		0.0	0.1	V
5.5		0.0	0.1				V				
	"	"	4.5					0.2	0.4	V	
			5.0					0.2	0.4	V	
Input Current	I _{IN}	V _{IN} =V _{CC} or V _{SS}	6.0			±0.1	μA				
			Quiescent Current	I _{CC}	V _{IN} =V _{CC} or V _{SS} , (output open)	6.0			1.0	μA	

Electrical Characteristics/T_a=-40°C, V_{SS}=0V

		V _{CC}	min	typ	max	unit				
Input "H" Level Voltage	V _{IH}	2.0	1.5			V				
		4.5	3.15			V				
		5.0	3.5			V				
		5.5	3.85			V				
		6.0	4.2			V				
Input "L" Level Voltage	V _{IL}	2.0			0.6	V				
		4.5			1.35	V				
		5.0			1.5	V				
		5.5			1.65	V				
		6.0			1.8	V				
Output "H" Level Voltage	V _{OH}	V _{IN} =V _{IL} , I _{OH} =-20uA	4.5	4.4		V				
			5.0	4.9		V				
		"	"	5.5	5.4		V			
				6.0				V		
		"	V _{IN} =V _{IL} , I _{OH} =-4mA	4.5	4.1		V			
				5.0	4.6		V			
				5.5	5.1		V			
				Output "L" Level Voltage	V _{OL}	V _{IN} =V _{IH} , I _{OL} =20uA	4.5		0.1	V
							5.0		0.1	V
							5.5		0.1	V
	"	"	4.5		0.4	V				
			5.0		0.4	V				
			5.5		0.4	V				
			Input Current	I _{IN}	V _{IN} =V _{CC} or V _{SS}	6.0			±0.1	μA
						Quiescent Current	I _{CC}	V _{IN} =V _{CC} or V _{SS} , (output open)	6.0	

LC74HC04

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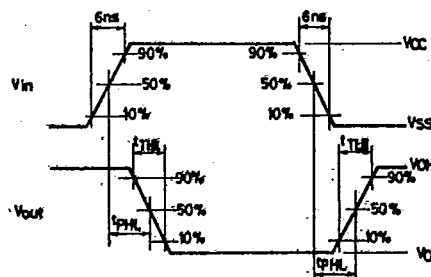
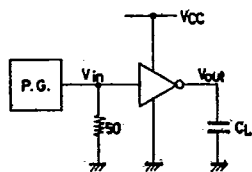
Electrical Characteristics/ $T_a=+85^{\circ}\text{C}$, $V_{SS}=0\text{V}$

			VCC	min	typ	max	unit
Input "H" Level Voltage	V_{IH}		2.0	1.5			V
			4.5	3.15			V
			5.0	3.5			V
			5.5	3.85			V
			6.0	4.2			V
Input "L" Level Voltage	V_{IL}		2.0		0.6		V
			4.5		1.35		V
			5.0		1.5		V
			5.5		1.65		V
			6.0		1.8		V
Output "H" Level Voltage	V_{OH}	$V_{IN}=V_{IL}, I_{OH}=-20\mu\text{A}$	4.5	4.4			V
		"	5.0	4.9			V
		"	5.5	5.4			V
		$V_{IN}=V_{IL}, I_{OH}=-4\text{mA}$	4.5	4.0			V
		"	5.0	4.5			V
		"	5.5	5.0			V
		"	6.0				V
Output "L" Level Voltage	V_{OL}	$V_{IN}=V_{IH}, I_{OL}=20\mu\text{A}$	4.5			0.1	V
		"	5.0			0.1	V
		"	5.5			0.1	V
		$V_{IN}=V_{IH}, I_{OL}=4\text{mA}$	4.5			0.5	V
		"	5.0			0.5	V
		"	5.5			0.5	V
		"	6.0			0.5	V
Input Current	I_{IN}	$V_{IN}=V_{CC}$ or V_{SS}	6.0			± 1.0	μA
Quiescent Current	I_{CC}	$V_{IN}=V_{CC}$ or V_{SS} , (output open)	6.0			10.0	μA

Switching Characteristics/ $T_a=25\pm 2^{\circ}\text{C}$, $V_{SS}=0\text{V}$, INPUT: $t_r, t_f=6\text{ns}$

			VCC	min	typ	max	unit
Output Rise Time	t_{TLH}	$CL=15\text{pF}$	5.0		4	8	ns
Output Fall Time	t_{THL}	"	5.0		4	8	ns
"H" Level Propagation Delay Time	t_{PLH}	"	5.0		8	15	ns
"L" Level Propagation Delay Time	t_{PHL}	"	5.0		8	15	ns
Output Rise Time	t_{TLH}	$CL=50\text{pF}$	5.0		8	15	ns
Output Fall Time	t_{THL}	"	5.0		8	15	ns
"H" Level Propagation Delay Time	t_{PLH}	"	5.0		10	20	ns
"L" Level Propagation Delay Time	t_{PHL}	"	5.0		10	20	ns

Test Circuit and Switching Waveforms



Switching Waveforms