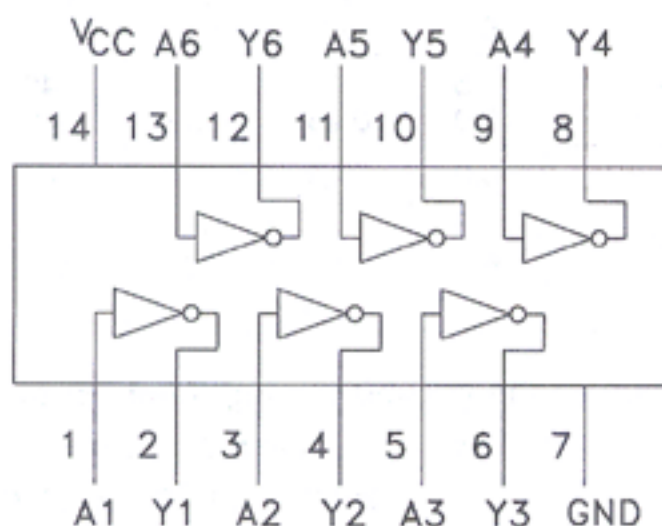
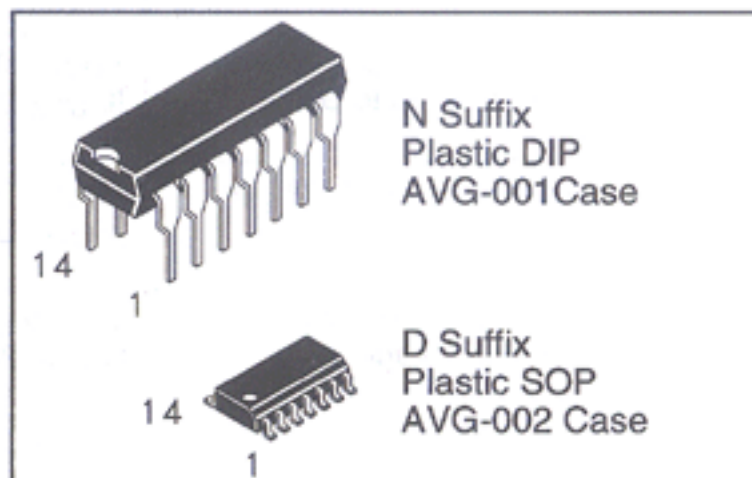


Hex Inverter

This device contains six independent three-stage inverters, each of which performs the logic INVERT function.

- Output Drive Capability: 10 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2 to 6 V for HC devices
- Low Input Current: 1 μ A
- DC, AC parameters guaranteed from -55°C to 125°C

DV74HC04A DV74HCT04A



TRUTH TABLE
Y = A

Inputs	Outputs
A	Y
L	H
H	L

H = High Logic Level
L = Low Logic Level

ABSOLUTE MAXIMUM RATINGS

Maximum ratings are those values beyond which damage to the device may occur.

Symbol	Parameter	Value	Unit
V _{CC}	DC Supply Voltage (Referenced to GND)	-0.5 to +7.0	V
V _{IN}	DC Input Voltage (Referenced to GND)	-1.5 to V _{CC} + 1.5	V
V _{OUT}	DC Output Voltage (Referenced to GND)	-0.5 to V _{CC} + 0.5	V
I _{IN}	DC Input Current, per Pin	± 20	mA
I _{OUT}	DC Output Current, per Pin	± 25	mA
I _{CC}	DC Supply Current, V _{CC} and GND Pins	± 50	mA
P _D	Power Dissipation in Still Air, Plastic DIP SOP Package	750 500	mW
T _{STG}	Storage Temperature Range	-65 to +150	°C
TL	Lead Temperature, 1mm from Case for 10 Seconds	260	°C

GUARANTEED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V _{CC}	DC Supply Voltage, HC (HCT), Referenced to GND	2.0 (4.5)	6.0 (5.5)	V
V _{IN} , V _{OUT}	DC Input Voltage, Output Voltage, Referenced to GND	0	V _{CC}	V
T _A	Ambient Temperature	-55	+125	°C
t _r , t _f	Input Rise and Fall Time: HC: V _{CC} =2.0V HCT: V _{CC} =5.5V / HC: V _{CC} =4.5V HC: V _{CC} =6.0V	0 0 0	1000 500 400	ns

HC-04A

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} V	Guaranteed Limits			Unit
				25°C to -55°C	≤85°C	≤125°C	
V _{IH}	High Level Input Voltage (Referenced to GND)	V _{OUT} = 0.1 V I _{OUT} ≤ 20 μA	2.0	1.5	1.5	1.5	V
			4.5	3.15	3.15	3.15	
			6.0	4.2	4.2	4.2	
V _{IL}	Low Level Input Voltage	V _{OUT} = V _{CC} - 0.1 V I _{OUT} ≤ 20 μA	2.0	0.5	0.5	0.5	V
			4.5	1.35	1.35	1.35	
			6.0	1.8	1.8	1.8	
V _{OH}	Minimum High Level Output Voltage	V _{IN} = V _{IL} I _{OUT} < 20 mA	2.0	1.9	1.9	1.9	V
			4.5	4.4	4.4	4.4	
		V _{IN} = V _{IL} , I _{OUT} < 4.0 mA I _{OUT} < 5.2 mA	4.5	3.98	3.84	3.70	V
			6.0	5.48	5.34	5.20	
V _{OL}	Maximum Low Level Output Voltage	V _{IN} = V _{IH} I _{OUT} ≤ 20 μA	2.0	0.1	0.1	0.1	V
			4.5	0.1	0.1	0.1	
		V _{IN} = V _{IH} , I _{OUT} < 4.0 mA I _{OUT} < 5.2 mA	4.5	0.26	0.33	0.40	V
			6.0	0.26	0.33	0.40	
I _{IN}	Maximum Input Leakage Current	V _{IN} = V _{CC} or GND	6.0	±0.1	±1.0	±1.0	μA
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND I _{OUT} ≤ 0 μA	6.0	1	10	40	μA

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SWITCHING CHARACTERISTICS over full operating conditions (C_L=50 pF, Input t_r=t_f=6ns)

Symbol	Parameter	V _{CC} V	Guaranteed Limit			Unit
			25°C to -55°C	≤85°C	≤125°C	
t _{PLH} , t _{PHL}	Propagation Delay Time, Input A To Output Y	2.0	75	95	110	ns
		4.5	15	19	22	
		6.0	13	16	19	
t _{TLH} , t _{THL}	Output Transition Time Any Output	2.0	75	95	110	ns
		4.5	15	19	22	
		6.0	13	16	19	
C _{IN}	Maximum Input Capacitance	—	10	10	10	pF

C _{PD}	Power Dissipation Capacitance (Per Inverter) Used to determine the no-load dynamic power consumption, P _D = C _{PD} V _{CC} ² f + I _{CC} V _{CC}	Typical @ 25°C, V _{CC} = 5 V			pF
		20			

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DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V _{CC} V	Guaranteed Limits			Unit
				25°C to -55°C	≤85°C	≤125°C	
V _{IH}	High Level Input Voltage (Referenced to GND)	V _{OUT} = 0.1 V I _{OUT} ≤ 20 μA	4.5	2	2	2	V
			5.5	2	2	2	
V _{IL}	Low Level Input Voltage	V _{OUT} = V _{CC} - 0.1 V I _{OUT} ≤ 20 μA	4.5	0.8	0.8	0.8	V
			5.5	0.8	0.8	0.8	

Symbol	Parameter	Conditions	V _{CC} V	Guaranteed Limits			Unit
				25°C to -55°C	≤85°C	≤125°C	
V _{OH}	Minimum High Level Output Voltage	V _{IN} = V _{IL} I _{OUT} ≤ 20 μA	4.5 5.5	4.4 5.4	4.4 5.4	4.4 5.4	V
		V _{IN} = V _{IL} I _{OUT} ≤ 4.0 mA	4.5	3.98	3.84	3.70	V
V _{OL}	Maximum Low Level Output Voltage	V _{IN} = V _{IH} I _{OUT} ≤ 20 μA	4.5 5.5	0.1 0.1	0.1 0.1	0.1 0.1	V
		V _{IN} = V _{IH} I _{OUT} ≤ 4.0 mA	4.5	0.26	0.33	0.40	V
I _{IN}	Maximum Input Leakage Current	V _{IN} = V _{CC} or GND	5.5	± 0.1	± 1.0	± 1.0	μA
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND I _{OUT} ≤ 0 μA	5.5	1	10	40	μA

Δ I _{CC}	Additional Quiescent Supply Current	V _{IN} =2.4 V, Any One Input V _{IN} =V _{CC} or GND, Other Inputs I _{out} =0μA	5.5	≥-55°C	25°C to 125°C	mA
				2.9	2.4	

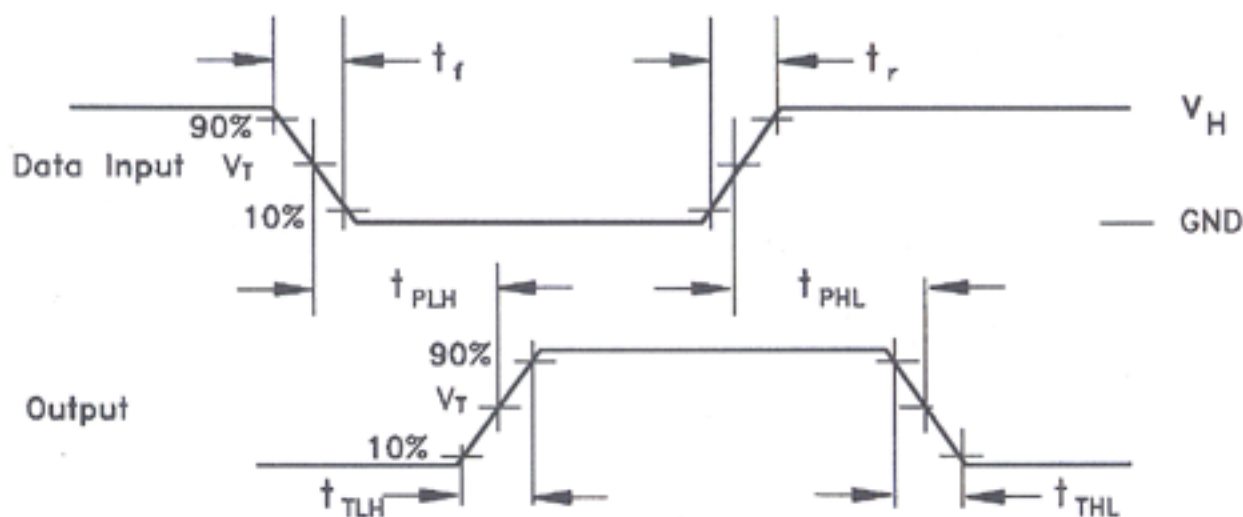
Total Supply Current = I_{CC}+ΣΔI_{CC}

SWITCHING CHARACTERISTICS over full operating conditions (C_L=50 pF, Input t_r=t_f=6ns)

Symbol	Parameter	Guaranteed Limit			Unit
		25°C to -55°C	≤85°C	≤125°C	
t _{PLH}	Propagation Delay Time, Input A To Output Y	15	19	22	ns
t _{PHL}		17	21	26	
t _{TLH} , t _{THL}	Output Transition Time Any Output	15	19	22	ns
C _{IN}	Maximum Input Capacitance	10	10	10	pF

C _{PD}	Power Dissipation Capacitance (Per Inverter) Used to determine the no-load dynamic power consumption, P _D = C _{PD} V _{CC} ² f + I _{CC} V _{CC}	Typical @ 25°C, V _{CC} = 5 V		pF
		22		

SWITCHING WAVEFORMS



Input and Output threshold voltage, V_T=50% V_{CC} for HC; 1.3V for HCT
V_H=V_{CC} for HC, 3V for HCT