

## FEATURES

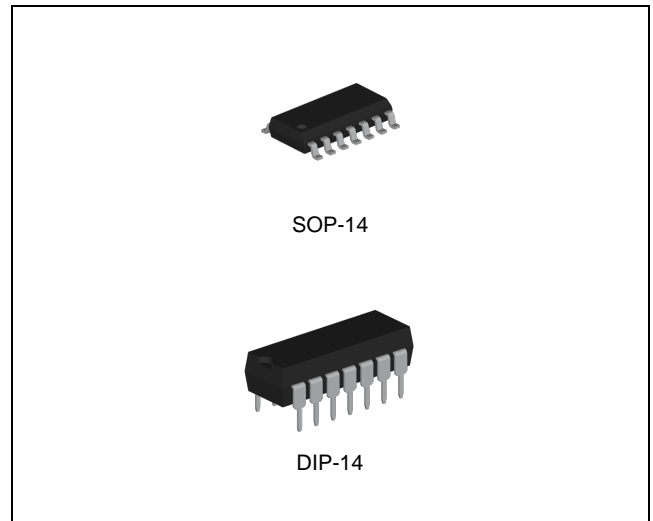
- Wide Operating Voltage Range of 2.0V to 6.0V
- Outputs Can Drive up to 10 LSTTL Loads
- Low Power Consumption, 20 $\mu$ A Maximum  $I_{CC}$
- Typical  $t_{pd}$ : 8ns
- $\pm 4$ mA Output Drive at 5.0V
- Low Input Current of 1 $\mu$ A Maximum

## APPLICATIONS

- Cameras
- E-Meters
- Ethernet Switches
- Infotainment

## DESCRIPTION

The 74HC04 types consist of six inverter circuits. They perform the Boolean function  $Y = \overline{A}$  in positive logic. Each of the six inverters is a single stage.



## ORDERING INFORMATION

Device	Package
74HC04D	SOP-14
74HC04N	DIP-14

## ABSOLUTE MAXIMUM RATINGS <sup>(Note 1)</sup>

CHARACTERISTIC		SYMBOL	MIN.	MAX.	UNIT
DC Supply Voltage		$V_{CC}$	-0.5	7	V
Input Clamp Current <sup>(Note 2)</sup>	$V_I < 0$ or $V_I > V_{CC}$	$I_{IK}$	-	$\pm 20$	mA
Output Clamp Current <sup>(Note 2)</sup>	$V_O < 0$	$I_{OK}$	-	$\pm 20$	mA
Continuous Output Current	$V_O = 0$ to $V_{CC}$	$I_{IN}$	-	$\pm 25$	mA
Continuous Current through $V_{CC}$ or GND			-	$\pm 50$	mA
Maximum Junction Temperature		$T_J$	-	150	$^{\circ}$ C
Storage Temperature		$T_{STG}$	-65	150	$^{\circ}$ C

Note 1. 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.

Note 2. The input and output negative-voltage ratings may be exceeded if the input and output clamp current ratings are observed.

**RECOMMENDED OPERATING CONDITIONS** (Note 3)

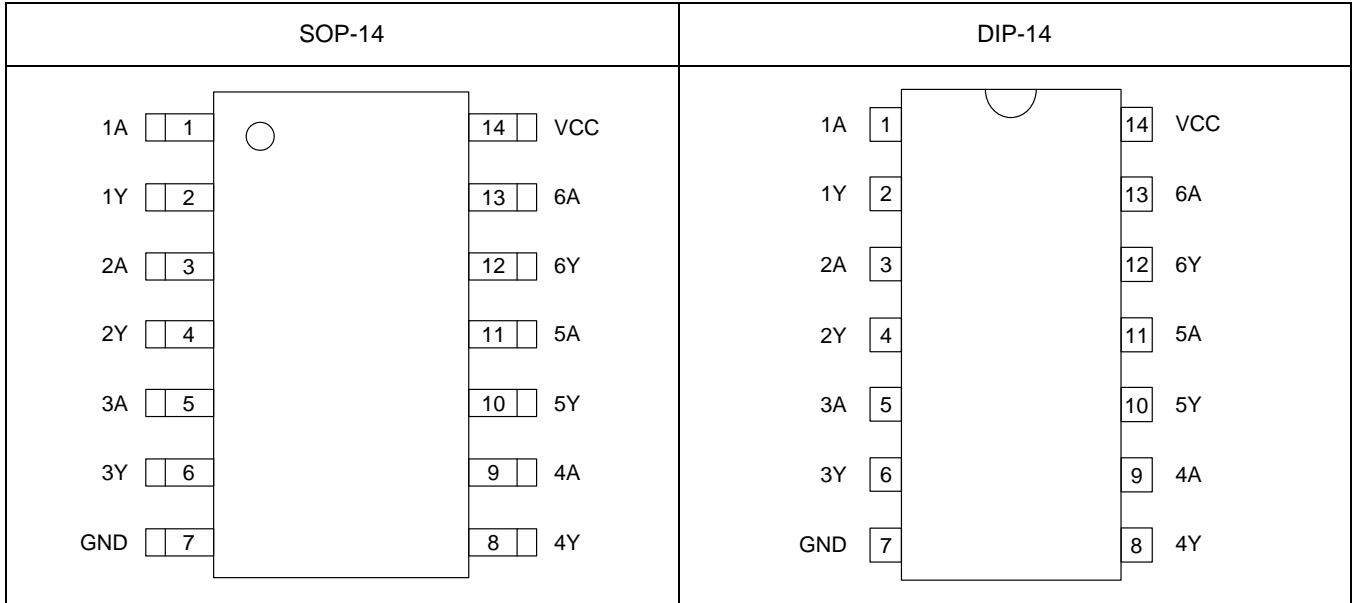
CHARACTERISTIC	SYMBOL	MIN.	MAX.	UNIT
Supply Voltage	V <sub>CC</sub>	2	6	V
DC Input Voltage	V <sub>IN</sub>	0	V <sub>CC</sub>	V
DC Output Voltage	V <sub>OUT</sub>	0	V <sub>CC</sub>	V
Operating Free-Air Temperature Range	T <sub>A</sub>	-40	85	°C

Note 3. The device is not guaranteed to function outside its operating ratings.

**ORDERING INFORMATION**

Package	Order No.	Description	Supplied As	Status
SOP-14	74HC04D	Hex Inverters	Tape & Reel	Active
DIP-14	74HC04N	Hex Inverters	Tube	Active

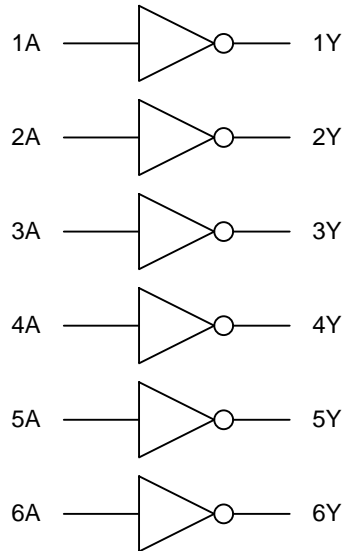
### PIN CONFIGURATION



### PIN DESCRIPTION

Pin No.		Pin Name	Pin Function
SOP-14	DIP-14		
1	1	1A	Input 1
2	2	1Y	Output 1
3	3	2A	Input 2
4	4	2Y	Output 2
5	5	3A	Input 3
6	6	3Y	Output 3
7	7	GND	Ground
8	8	4Y	Output 4
9	9	4A	Input 4
10	10	5Y	Output 5
11	11	5A	Input 5
12	12	6Y	Output 6
13	13	6A	Input 6
14	14	VCC	Power Supply

### BLOCK DIAGRAM



### DC ELECTRICAL CHARACTERISTICS

Over operating free-air temperature range (unless otherwise noted); Voltages referenced to GND.

SYMBOL	PARAMETER	TEST CONDITION	V <sub>CC</sub>	MIN	TYP	MAX	UNIT	
V <sub>IH</sub>	High-Level Input Voltage		2.0 V	1.5	1.2	-	V	
			4.5 V	3.15	2.4	-		
			6.0 V	4.2	3.2	-		
V <sub>IL</sub>	Low-Level Input Voltage		2.0 V	-	0.8	0.5	V	
			4.5 V	-	2.1	1.35		
			6.0 V	-	2.8	1.8		
V <sub>OH</sub>	High-Level Output Voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -20μA	2.0 V	1.9	2.0	-	V
				4.5 V	4.4	4.5	-	
				6.0 V	5.9	6.0	-	
			I <sub>OH</sub> = -4mA	4.5 V	3.98	4.32	-	
				6.0 V	5.48	5.81	-	
V <sub>OL</sub>	Low-Level Output Voltage	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = 20μA	2.0 V	-	0	0.1	V
				4.5 V	-	0	0.1	
				6.0 V	-	0	0.1	
			I <sub>OH</sub> = 4mA	4.5 V	-	0.15	0.26	
				6.0 V	-	0.16	0.26	
I <sub>IN</sub>	Input Leakage Current	V <sub>IN</sub> = V <sub>CC</sub> or GND	6.0 V	-	-	±0.1	μA	
I <sub>CC</sub>	Quiescent Supply Current	V <sub>IN</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0A	6.0 V	-	-	2.0	μA	

### AC ELECTRICAL CHARACTERISTICS

Over operating free-air temperature range (unless otherwise noted); C<sub>L</sub> = 50 pF, Z<sub>O</sub> = 50Ω, Input t<sub>r</sub> = t<sub>f</sub> = 6 ns

SYMBOL	PARAMETER	V <sub>CC</sub>	MIN	TYP	MAX	UNIT
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay, Input A to Output Y (Figure 1)	2.0 V	-	25	85	ns
		4.5 V	-	9	19	
		6.0 V	-	7	14	
t <sub>TLH</sub> , t <sub>THL</sub>	Transition Time, Any Output (Figure 1)	2.0 V	-	19	75	ns
		4.5 V	-	7	15	
		6.0 V	-	6	13	

### FUNCTION TABLE

Input (A)	Output (Y)
H	L
L	H

### SWITCHING WAVEFORMS

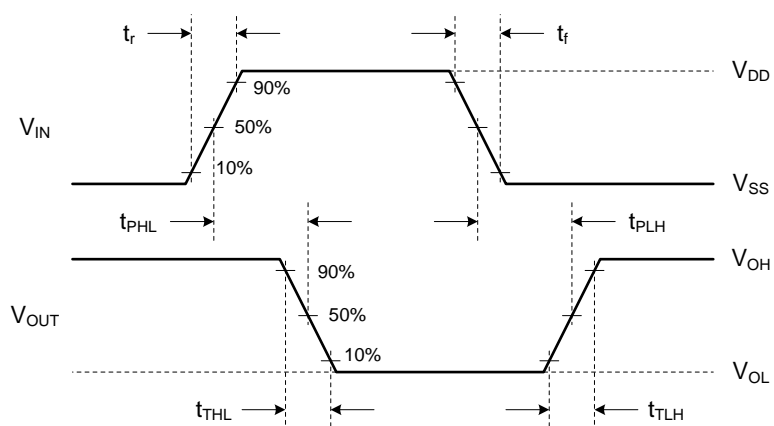


Fig. 1.