74HC00D-HX/74HC00N-HX QUADRUPLE 2-INPUT POSITIVE-NAND GATES

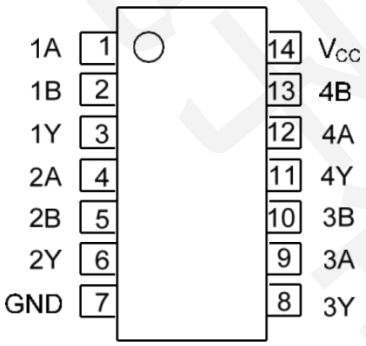
DESCRIPTION

The 74HC00D-HX/74HC00N-HX is a Quadruple 2-input positive-NAND gate that implements the logic function $Y = A \times B$ (i.e., $Y = \overline{A \text{ AND } B}$), or equivalently, $Y = \overline{A} + \overline{B}$ in negative-logic notation.Encapsulated with SOP-14, DIP-14.

FEATURES

- Operation voltage range: 2.0 V ~ 6.0 V
- Low Quiescent Current: I_{CC}=2μA (Max.)

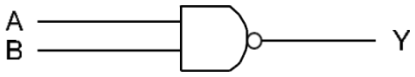
PIN CONFIGURATION



FUNCTION TABLE

INPUT		OUTPUT
A	**B**	**Y**
H	H	L
L	X	H
X	L	H

LOGIC DIAGRAM (positive logic)



ABSOLUTE MAXIMUM RATINGS (Note 2)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ 7.0	V
Input Clamp Current	I_{IK}	±20	mA
Output Clamp Current	I_{OK}	±20	mA
Output Current	I_{OUT}	±25	mA
VCC or GND Current	I_{CC}	±50	mA
Storage Temperature	T_{STG}	-65 ~ +150	°C

Notes:

1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	DIP-14	θJA	90	°C/W
	SOP-14U		95	°C/W

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		2		6	V
Input Voltage	V_{IN}		0		V_{CC}	V
Output Voltage	V_{OUT}		0		V_{CC}	V
Input Transition Rise or Fall Rate	t_R, t_F	V_{CC}= 2 V			1000	ns
		V_{CC}= 4.5V			500	ns
		V_{CC}= 6 V			400	ns
Operating Temperature	T_A		-40		+125	°C

Note: All unused inputs ofthe device must be held at VCC or GND to ensure proper device operation.

STATIC CHARACTERISTICS (T_A=25°C ,unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Input Voltage	V_{IH}	V_{CC}=2V	1.5			V
		V_{CC}=4.5V	3.15			V
		V_{CC}=6V	4.2			V
Low-Level Input Voltage	V_{IL}	V_{CC}=2V			0.5	V
		V_{CC}=4.5V			1.35	V
		V_{CC}=6V			1.8	V
High-Level Output Voltage	V_{OH}	V_{CC}=2V, V_{IN}=V_{IH} or V_{IL}, I_{OH}=_20μA	1.9	1.998		V
		V_{CC}=4.5V, V_{IN}=V_{IH} or V_{IL}, I_{OH}=-20μA	4.4	4.499		V
		V_{CC}=6V, V_{IN}=V_{IH} or V_{IL}, I_{OH}=_20μA	5.9	5.999		V
		V_{CC}=4.5V, V_{IN}=V_{IH} or V_{IL}, I_{OH}=_4mA	3.98	4.3		V
		V_{CC}=6V, V_{IN}=V_{IH} or V_{IL}, I_{OH}=_5.2mA	5.48	5.8		V
Low-Level Output Voltage	V_{OL}	V_{CC}=2V, V_{IN}=V_{IH} or V_{IL}, I_{OL}=20μA		0.002	0.1	V
		V_{CC}=4.5V, V_{IN}=V_{IH} or V_{IL}, I_{OL}=20μA		0.001	0.1	V
		V_{CC}=6V, V_{IN}=V_{IH} or V_{IL}, I_{OL}=20μA		0.001	0.1	V
		V_{CC}=4.5V, V_{IN}=V_{IH} or V_{IL}, I_{OL}=4mA		0.17	0.26	V
		V_{CC}=6V, V_{IN}=V_{IH} or V_{IL}, I_{OL}=5.2mA		0.15	0.26	V
Input Leakage Current	$I_{I(LEAK)}$	V_{CC}=6V, V_{IN}=V_{CC} or 0		±0.1	±100	nA
Quiescent Supply Current	I_Q	V_{CC}=6V, V_{IN}=V_{CC} or 0, I_{OUT}=0			2	μA
Input Capacitance	C_{IN}	V_{CC}=2V~6V		3	10	pF

DYNAMIC CHARACTERISTICS

(T_A=25°C, Input: t_R=t_F=6ns; PRR ≤1MHz, unless otherwise specified)

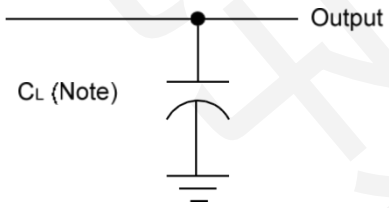
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation Delay, (A) or (B) to (Y)	t_{PLH}, t_{PHL}	V_{CC}=2V, C_L=50pF		45	90	ns
		V_{CC}=4.5V, C_L=50pF		9	18	ns
		V_{CC}=6V, C_L=50pF		8	15	ns
Output Transition Times	t_{TLH}, t_{THL}	V_{CC}=2V, C_L=50pF		38	75	ns
		V_{CC}=4.5V, C_L=50pF		8	15	ns
		V_{CC}=6V, C_L=50pF		6	13	ns

OPERATING CHARACTERISTICS (T_A=25°C, unless otherwise specified)

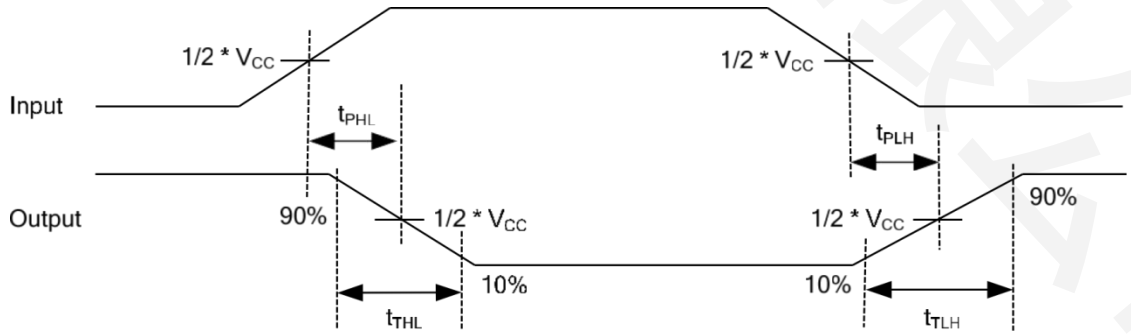
PARAMETER	SYMBOL	TEST CONDITION	RATINGS	UNIT
Power Dissipation Capacitance	C_{PD}	No Load	20	pF

Note: All unused inputs ofthe device must be held at V_{CC} or GND to ensure proper device operation.

TEST CIRCUIT AND WAVEFORMS

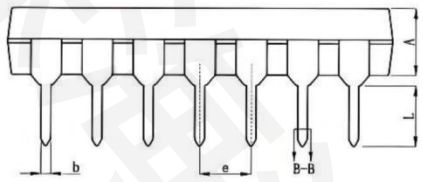


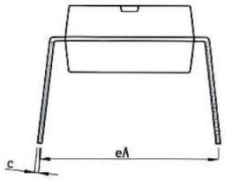
Note: C_L includes probe and jig capacitance.



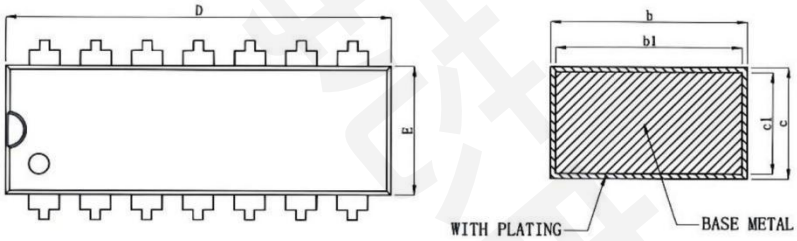
PACKAGE INFORMATION

74HC00N-HX DIP 14 package information



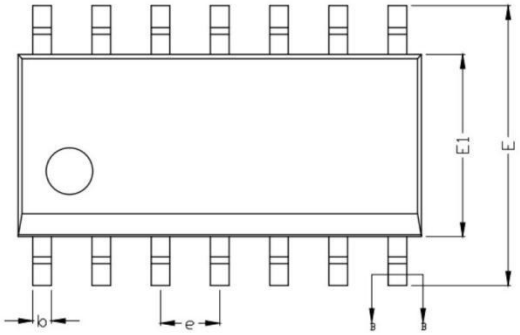


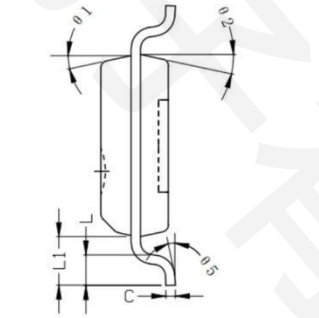
Symbol	Millimeter		
	Min	Nom	Max
A	3.20	3.30	3.40
b	0.44	---	0.53
b1	0.43	0.46	0.49
c	0.25	---	0.30
c1	0.24	0.25	0.26
D	18.95	19.05	19.15
E	6.25	6.35	6.45
e	2.54BSC		
eA	7.62	-----	9.50
L	3.00	-----	-----



SECTION B-B

74HC00D-HX SOP 14 package information





SECTION B-B

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	--	--	1.70
A1	0.10	0.15	0.21
A2	1.40	1.45	1.50
A3	0.60	0.65	0.70
b	0.33	--	0.47
b1	0.32	0.41	0.44
c	0.20	--	0.24
c1	0.19	0.20	0.21
D	8.45	8.60	8.75
E	5.80	6.00	6.20
E1	3.85	3.90	4.00
e	1.27(BSC)		
L	0.50	0.60	0.70
L1	1.10(BSC)		
θ1	8°	~	15°
θ2	8°	~	15°
θ3	8°	~	15°
θ4	8°	~	15°
θ5	0°	~	6°