

GD54/74HC00, GD54/74HCT00

QUAD 2-INPUT NAND GATES

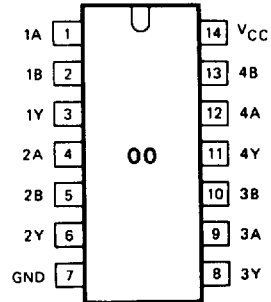
General Description

These devices are identical in pinout to the 54/74LS00. They contain four independent 2-input NAND gates. These devices are characterized for operation over wide temperature ranges to meet industry and military specifications.

Features

- Low Power consumption characteristic of CMOS devices
- Output drive capability: 10 LS TTL Loads Min.
- Operating speed superior to LS TTL
- Wide operating voltage range: for HC 2 to 6 volts
for HCT 4.5 to 5.5 volts
- Low input current: $1\mu\text{A}$ Max.
- Low quiescent current: $20\mu\text{A}$ Max. (74HC)
- High noise immunity characteristic of CMOS
- Diode protection on all inputs

Pin Configuration



Suffix-Blank Plastic Dual In Line Package
 Suffix-J Ceramic Dual In Line Package
 Suffix-D Small Outline Package

Logic Symbol and Logic Diagram

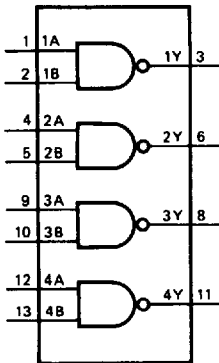


Fig. 1 Logic Symbol

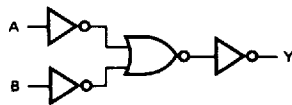


Fig. 2 Logic diagram (one gate)

Function Table

INPUTS		OUTPUT
nA	nB	nY
L	L	H
L	H	H
H	L	H
H	H	L

H=HIGH voltage level
 L=LOW voltage level

GD54/74HC00, GD54/74HCT00

Absolute Maximum Ratings

SYMBOL	PARAMETER	CONDITIONS	MIN	MAX	UNIT
V_{CC}	DC Supply voltage		-0.5	+7	V
$I_{IK} I_{OK}$	DC input or output diode current	for $V_I < -0.5$ or $V_I > V_{CC} + 0.5V$		20	mA
I_O	DC output source or sink current	for $-0.5V < V_O < V_{CC} + 0.5V$		25	mA
I_{CC}	DC V_{CC} or GND current			50	mA
T_{stg}	Storage temperature range		-65	150	°C
P_D	Power dissipation per package	above +70°C derate linearly with 8mW/K		500	mW
T_L	Lead temperature	At distance 1/16 ± 1/32 in from case for 60 sec(CERAMIC) 10 sec(PLASTIC)		300 260	°C

Recommended Operating Conditions

CHARACTERISTIC	LIMITS		UNITS
	MIN	MAX	
Supply-Voltage Range V_{CC} : GD54/74HC Types GD54/74HCT Types	2 4.5	6 5.5	V
DC Input or Output Voltage V_I, V_O	0	V_{CC}	V
Operating Temperature T_A : GD74 Types GD54 Types	-40 -55	+85 +125	°C
Input Rise and Fall times t_r, t_f : GD54/74HC Types at 2V at 4.5V at 6V GD54/74HCT Types at 4.5V		1000 500 400 500	ns

DC Electrical Characteristics for HC

SYMBOL	PARAMETER	TEST CONDITION	V _{CC} (V)	T _A = 25°C			GD74HC00		GD54HC00		UNIT
				MIN	TYP	MAX.	MIN	MAX	MIN	MAX	
V _{IH}	HIGH level input voltage		2 0 4 5 6 0	1 5 3 15 4 2			1 5 3 15 4 2		1 5 3 15 4 2		V
V _{IL}	LOW level input voltage		2 0 4 5 6 0			0 3 0 9 1 2		0 3 0 9 1 2		0 3 0 9 1 2	V
V _{OH}	HIGH level output voltage	V _{IN} = V _{IH}	2 0 4 5 6 0	1 9 4 4 5 9	2 0 4 5 6 0		1 9 4 4 5 9		1 9 4 4 5 9		V
		or V _{IL}									
		I _{OH} = -20μA I _{OH} = -4mA I _{OH} = -5 2mA	4 5 6 0	3 98 5 48	4 3 5 2		3 84 5 34		3 7 5 2		
V _{OL}	LOW level output voltage	V _{IN} = V _{IH}	2 0 4 5 6 0			0 1 0 1 0 1		0 1 0 1 0 1		0 1 0 1 0 1	V
		or V _{IL}									
		I _{OL} = 20μA I _{OL} = 4mA I _{OL} = 5 2mA	4 5 6 0		0 17 0 15	0 26 0 26		0 33 0 33		0 4 0 4	
I _{IN}	Input leakage current	V _{IN} = V _{CC} or GND	6 0			0 1		1 0		1 0	μA
I _{CC}	Quiescent supply current	V _{IN} = V _{CC} or GND I _{out} = 0μA	6 0			2		20		40	μA

DC Electrical Characteristics for HCT

SYMBOL	PARAMETER	TEST CONDITION	V _{CC} (V)	T _A = 25°C			GD74HCT00		GD54HCT00		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V _{IH}	HIGH level input voltage		4 5 to 5 5	2 0			2 0		2 0		V
V _{IL}	LOW level input voltage		4 5 to 5 5			0 8		0 8		0 8	V
V _{OH}	HIGH level output voltage	V _{IN} = V _{IH}	4 5	4 4	4 5		4 4		4 4		V
		or V _{IL}	4 5	3 98	4 3		3 84		3 7		
V _{OL}	LOW level output voltage	V _{IN} = V _{IH}	4 5			0 1		0 1		0 1	V
		or V _{IL}	4 5		0 17	0 26		0 33		0 4	
I _{IN}	Input leakage current	V _{IN} = V _{CC} or GND	5 5			0 1		1 0		1 0	μA
I _{CC}	Quiescent supply current	V _{IN} = V _{CC} or GND I _{out} = 0μA	5 5			2		20		40	μA

AC Characteristics for HC : $t_r=t_f=6\text{ns}$ $C_L=50\text{pF}$

SYMBOL	PARAMETER	V_{CC} (V)	$T_A=25^{\circ}\text{C}$			GD74HC00		GD54HC00		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$t_{PLH}/$ t_{PHL}	Propagation delay time nA, nB, to nY	2 0 4 5 6 0		25 9 7	90 18 15		115 23 20		135 27 23	ns
$t_{TLH}/$ t_{THL}	Output transition time	2 0 4 5 6.0		18 7 6	72 14 13		95 19 16		110 22 19	ns

AC Characteristics for HCT : $t_r=t_f=6\text{ns}$ $C_L=50\text{pF}$

SYMBOL	PARAMETER	V_{CC} (V)	$T_A=25^{\circ}\text{C}$			GD74HCT00		GD54HCT00		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$t_{PLH}/$ t_{PHL}	Propagation delay time nA, nB, to nY	4.5		10	19		24		29	ns
$t_{TLH}/$ t_{THL}	Output transition time	4 5		7	15		19		22	ns

AC Waveform

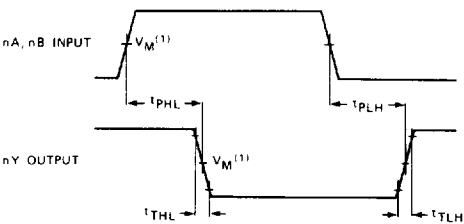


Fig. 3 Waveforms showing the input (nA, nB) to output (nY) propagation delays and the output transition times.

Note to AC waveform

- (1) HC $V_M=50\%$ $V_L=\text{GND to } V_{CC}$
HCT $V_M=1.3\text{V}$ $V_L=\text{GND to } 3\text{V}$