

GD54/74HC03, GD54/74HCT03

QUAD 2-INPUT NAND GATES WITH OPEN-DRAIN OUTPUTS

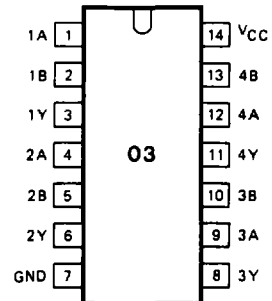
General Description

These devices are identical in pinout to the 54/74LS03. They contain four independent 2-Input NAND gates. The open-drain outputs require pull-up resistors to perform correctly. With suitable pull-up resistors, these devices can be used in active-low wired-OR or active-high wired-AND applications. 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 μ A Max.
- Low quiescent current: 20 μ 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 Diagram

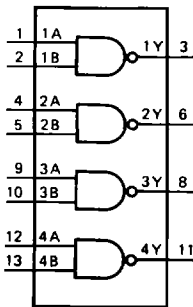


Fig. 1 Logic symbol

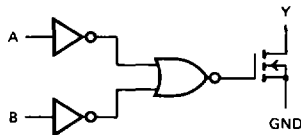


Fig. 2 Logic diagram (one gate)

Function Table

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

H=HIGH voltage level
 L=LOW voltage level
 Z=high impedance OFF-state

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			GD74HC03		GD54HC03		UNIT	
				MIN	TYP	MAX	MIN	MAX	MIN	MAX		
V _{IH}	HIGH level input Voltage		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		2.0			0.3		0.3		0.3	V	
			4.5			0.9		0.9		0.9		
			6.0			1.2		1.2		1.2		
V _{OH}	HIGH level output voltage	V _{IN} =V _{IH} or V _{IL}	I _{OH} =-20μA	2.0	1.9	2.0		1.9		1.9	V	
				4.5	4.4	4.5		4.4		4.4		
				6.0	5.9	6.0		5.9		5.9		
	I _{OH} =-4mA	4.5	3.98	4.3		3.84		3.7				
	I _{OH} =-5.2mA	6.0	5.48	5.2		5.34		5.2				
V _{OL}	LOW level output voltage	V _{IN} =V _{IH} or V _{IL}	I _{OL} =20μA	2.0			0.1		0.1		V	
				4.5			0.1		0.1			0.1
				6.0			0.1		0.1			0.1
	I _{OL} =4mA	4.5		0.17	0.26		0.33		0.4			
	I _{OL} =5.2mA	6.0		0.15	0.26		0.33		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	
I _{OH}	HIGH level output current	V _{IN} =V _{IH} or V _{IL} V _{out} =V _{CC}	6.0		0.01	0.5		5		10	μA	

DC Electrical Characteristics for HCT

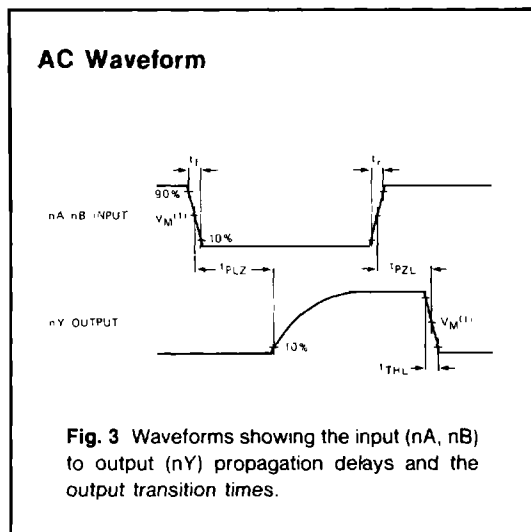
SYMBOL	PARAMETER	TEST CONDITION	V _{CC} (V)	T _A =25°C			GD74HCT03		GD54HCT03		UNIT	
				MIN	TYP	MAX	MIN	MAX	MIN	MAX		
V _{IH}	HIGH level input Voltage		4.5 to 5.5	2.0			2.0		2.0		V	
V _{IL}	LOW level input voltage		4.5 to 5.5			0.8		0.8		0.8	V	
V _{OH}	HIGH level output voltage	V _{IN} =V _{IH} or V _{IL}	I _{OH} =-20μA	4.5	4.4	4.5		4.4		4.4	V	
				4.5	3.98	4.3		3.84		3.7		
V _{OL}	LOW level output voltage	V _{IN} =V _{IH} or V _{IL}	I _{OL} =20μA	4.5			0.1		0.1		V	
				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	
I _{OH}	HIGH level output current	V _{IN} =V _{IH} or V _{IL} V _{out} =V _{CC}	4.5 to 5.5		0.01	0.5		5		10	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°C			GD74HC03		GD54HC03		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t _{PZL'} t _{PLZ}	Propagation delay time nA, nB to nY	2.0		25	90		110		130	ns
		4.5		9	18		22		26	
		6.0		8	15		20		23	
t _{THL}	Output transition time	2.0		25	70		85		100	ns
		4.5		8	15		18		22	
		6.0		7	13		16		19	

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

SYMBOL	PARAMETER	V _{CC} (V)	T _A =25°C			GD74HCT03		GD53HCT03		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t _{PZL'} t _{PLZ}	Propagation delay time nA, nB, to nY	4.5		12	20		24		28	ns
t _{THL}	Output transition time	4.5		8	15		19		22	ns



Note to AC waveform

- (1) HC V_M=50%, V_I=GND to V_{CC}
- HCT V_M=1.3V V_I=GND to 3V