GD54/74HC08, GD54/74HCT08

QUAD 2-INPUT AND GATES

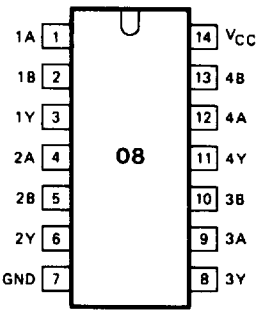
General Description

These devices are identical in pinout to the 54/74LS08. They contain four independent 2-input AND 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: 1μA Max.
- Low quiescent current: 20μA 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

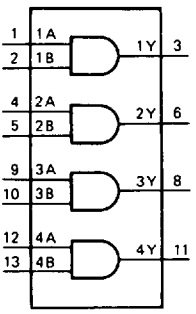


Fig. 1 Logic symbol

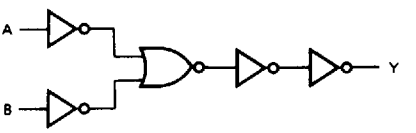


Fig. 2 Logic diagram (one gate)

Function Table

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

H= HIGH voltage level
L= LOW voltage level

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	2	6	V
GD54/74HCT Types	4.5	5 5	
DC Input or Output Voltage V_I, V_O	0	V_{CC}	V
Operating Temperature T_A: GD74 Types	−40	+85	°C
GD54 Types	−55	+125	
Input Rise and Fall times t_r, t_f: GD54/74HC Types at 2V		1000	ns
at 4 5V		500	
at 6V		400	
GD54/74HCT Types at 4 5V		500	

DC Electrical Characteristics for HC

SYMBOL	PARAMETER	TEST CONDITION		V_{CC} (V)	T_A=25°C			GD74HC08		GD54HC08		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	$V_{IN}=V_{IH}$	$I_{OH}=-20\mu A$	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}	$I_{OH}=-4mA$ $I_{OH}=-5$ 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	$V_{IN}=V_{IH}$	$I_{OL}=20\mu A$	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}	$I_{OL}=4mA$ $I_{OL}=5.2mA$	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 $I_{out}=0\mu A$		6.0			2		20		40	μA

DC Electrical Characteristics for HCT

SYMBOL	PARAMETER	TEST CONDITION		V_{CC} (V)	T_A=25°C			GD74HCT08		GD54HCT08		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	$V_{IN}=V_{IH}$	$I_{OH}=-20\mu A$	4 5	4 4	4 5		4 4		4 4		V
		or V_{IL}	$I_{OH}=-4mA$	4 5	3 98	4 3		3 84		3 7		
V_{OL}	LOW level output voltage	$V_{IN}=V_{IH}$	$I_{OL}=20\mu A$	4 5			0 1		0 1		0 1	V
		or V_{IL}	$I_{OL}=4mA$	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 $I_{out}=0\mu A$		5 5			2		20		40	μA

AC Characteristics for HC: $t_r=t_f=6ns$ $C_L=50pF$

SYMBOL	PARAMETER	V_{CC} (V)	$T_A=25°C$			GD74HC08		GD54HC08		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}/ t_{PHL}	Propagation delay time nA, nB to nY	2 0		25	90		115		135	ns
		4 5		9	18		23		27	
		6 0		7	15		20		23	
t_{TLH}/ t_{THL}	Output transition time	2 0		19	75		95		110	ns
		4 5		7	15		19		22	
		6 0		6	13		16		19	

AC Characteristics for HCT: $t_r=t_f=6ns$ $C_L=50pF$

SYMBOL	PARAMETER	V_{CC} (V)	$T_A=25°C$			GD74HCT08		GD54HCT08		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}/ t_{PHL}	Propagation delay time nA, nB, to nY	4 5		14	24		30		36	ns
t_{TLH}/ t_{THL}	Output transition time	4 5		7	15		19		22	ns

AC Waveform

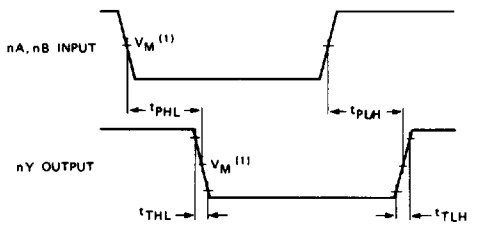


Fig. 3 Waveforms showing the input (nA, nB) to output (nY) propagation delays and the output transition times

Note to AC waveform

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