GD54/74HC11, GD54/74HCT11

TRIPLE 3-INPUT AND GATES

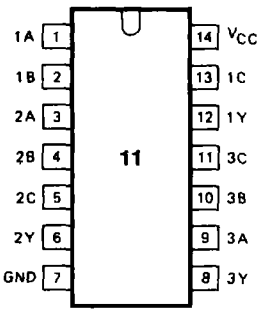
General Description

These devices are identical in pinout to the 54/74LS11. They contain three independent 3-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 Diagram

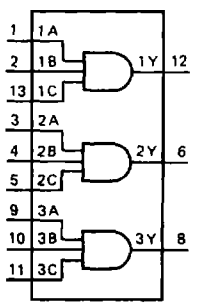


Fig. 1 Logic symbol

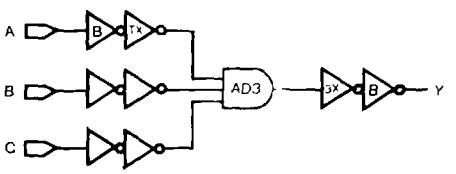


Fig. 2 Logic diagram (one gate)

Function Table

INPUT			OUTPUT
nA	nB	nC	nY
L	L	L	L
L	L	H	L
L	H	L	L
L	H	H	L
H	L	L	L
H	L	H	L
H	H	L	L
H	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 MIN.	LIMITS MAX.	UNITS
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			GD74HC11		GD54HC11		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} or V_{IL}	I_{OH}=−20μA	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
			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}=20μA	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}=0μA		6.0			2		20		40	μA

DC Electrical Characteristics for HCT

SYMBOL	PARAMETER	TEST CONDITION		V_{CC} (V)	T_A=25°C			GD74HCT11		GD54HCT11		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}=−20μA	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}=20μA	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}=0μA		5.5			2		20		40	μA

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

SYMBOL	PARAMETER	V_{CC} (V)	$T_A = 25°C$			GD74HC11		GD54HC11		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{PLH} / t_{PHL}	Propagation delay time nA, nB, nC to nY	2.0		30	95		190		150	ns
		4.5		11	19		24		29	
		6.0		9	16		20		25	
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)	$T_A = 25°C$			GD74HCT11		GD54HCT11		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t_{PLH} / t_{PHL}	Propagation delay time nA, nB, nC to nY	4.5		18	35		44		42	ns
t_{TLH} / t_{THL}	Output transition time	4.5		7	15		19		22	ns

AC Waveform

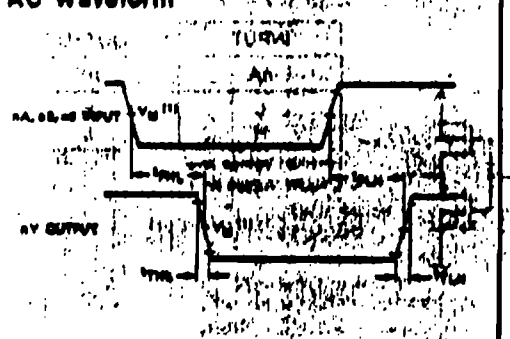


Fig. 3 Waveforms showing the input (nA, nB, nC) to output (nY) propagation delays and the output transition times.

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.