

GD54/74HC132, GD54/74HCT132

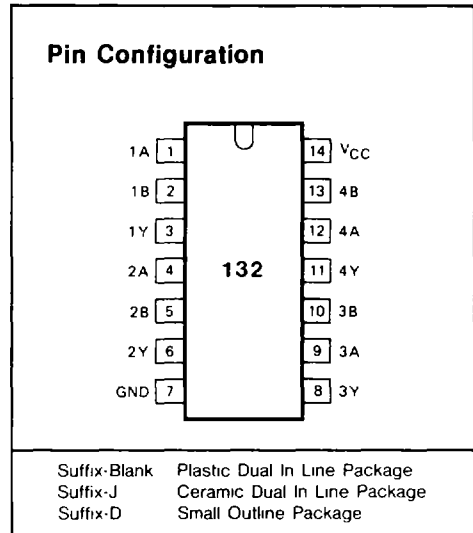
QUAD 2-INPUT SCHMITT-TRIGGER NAND GATES

General Description

These devices are identical in pinout to the 54/74LS132. They contain four independent 2-Input NAND gates. Each input has hysteresis and can, therefore, be used to enhance noise immunity or to square up slowly changing waveforms. 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



Logic Symbol and Diagram

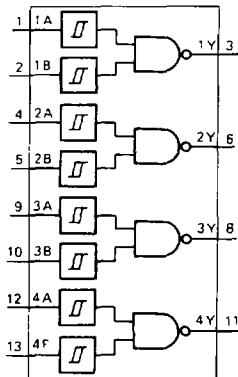


Fig. 1 Logic symbol

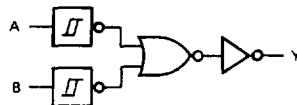


Fig. 2 Logic diagram (one schmitt trigger)

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

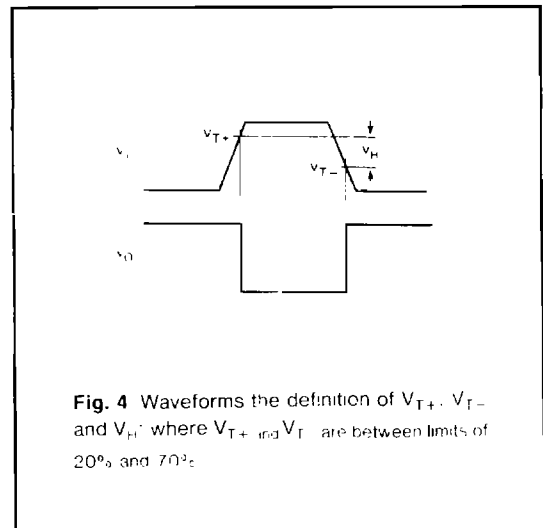
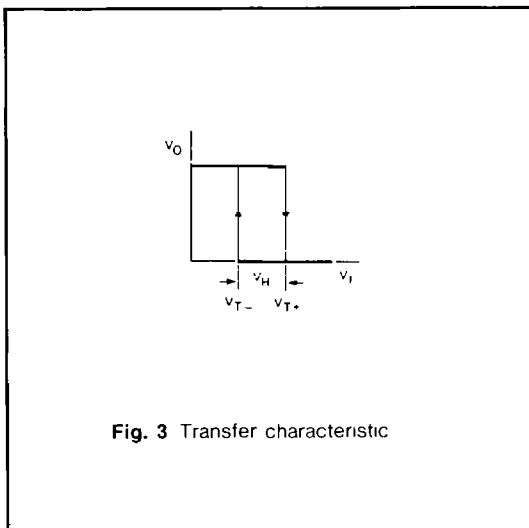
Absolute Maximum Ratings

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 $V_I > V_{CC} + 0.5$ V		20	mA
I_O	DC output source or sink current	for -0.5 V < V_O < $V_{CC} + 0.5$ V		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 5V GD54/74HCT Types at 4.5V		1000 500 400 500	ns

Transfer Characteristic Waveforms



DC Electrical Characteristics for HC

SYMBOL	PARAMETER	TEST CONDITION	V _{CC} (V)	T _A =25°C			GD74HC132		GD54HC132		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}	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	
	or V _{IL}	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}	I _{OL} =20μA	2.0			0.1		0.1		V
				4.5			0.1		0.1		
				6.0			0.1		0.1		
	or V _{IL}	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		μA	
I _{CC}	Quiescent Supply Current	V _{IN} =V _{CC} or GND I _{out} =0μA	6.0			2		20		μA	

DC Electrical Characteristics for HCT

SYMBOL	PARAMETER	TEST CONDITION	V _{CC} (V)	T _A =25°C			GD74HCT132		GD54HCT132		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
V _{IH}	HIGH level input Voltage		4.5								V
			to 5.5	2.0			2.0		2.0		
V _{IL}	LOW level input voltage		4.5								V
			to 5.5			0.8		0.8		0.8	
V _{OH}	HIGH level output voltage	V _{IN} =V _{IH}	I _{OH} =-20μA	4.5	4.4	4.5		4.4		4.4	V
				4.5	3.98	4.3		3.84		3.7	
	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		V
				4.5			0.1		0.1		
	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		μA	
I _{CC}	Quiescent Supply Current	V _{IN} =V _{CC} or GND I _{out} =0μA	5.5			2		20		μA	

Transfer Characteristic for HC

SYMBOL	PARAMETER	TEST CONDITION	V _{CC} (V)	T _A =25°C			GD74HC132		GD54HC132		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
V _{T+}	Positive-going threshold		2.0	0.7	1.2	1.5	0.7	1.5	0.7	1.5	V
			4.5	1.7	2.4	3.15	1.7	3.15	1.7	3.15	
			6.0	2.1	3.2	4.2	2.1	4.2	2.1	4.2	
V _{T-}	negative-going threshold		2.0	0.3	0.65	1.0	0.3	1.0	0.3	1.0	V
			4.5	0.9	1.7	2.2	0.9	2.2	0.9	2.2	
			6.0	1.2	2.1	3.0	1.2	3.0	1.2	3.0	
V _H	Hysteresis(V _{T+} -V _{T-})		2.0	0.2	0.6	1.0	0.2	1.0	0.2	1.0	V
			4.5	0.4	0.9	1.4	0.4	1.4	0.4	1.4	
			6.0	0.5	1.3	1.7	0.5	1.7	0.5	1.7	

Transfer Characteristics for HCT

SYMBOL	PARAMETER	TEST CONDITION	V _{CC} (V)	T _A =25°C			GD74HCT132		GD54HCT132		UNIT
				MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
V _{T+}	Positive-going threshold		4.5	1.2	1.55	1.9	1.2	1.9	1.2	1.9	V
			5.5	1.4	1.75	2.1	1.4	2.1	1.4	2.1	
V _{T-}	Negative-going threshold		4.5	0.5	0.85	1.2	0.5	1.2	0.5	1.2	V
			5.5	0.6	1.0	1.4	0.6	1.4	0.6	1.4	
V _H	Hysteresis(V _{T+} -V _{T-})		4.5	0.4	0.9	1.4	0.4	1.4	0.4	1.4	V
			5.5	0.5	1.0	1.5	0.5	1.5	0.5	1.5	

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

SYMBOL	PARAMETER	V _{CC} (V)	T _A =25°C			GD74HC132		GD54HC132		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t _{PLH} / t _{PHL}	Propagation delay time nA, nB to nY	2.0		36	125		155		190	ns
		4.5		12	25		30		36	
		6.0		10	21		25		30	
t _{PLH} / t _{THL}	Output transition time	2.0		28	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=50 pF

SYMBOL	PARAMETER	V _{CC} (V)	T _A =25°C			GD74HCT132		GD54HCT132		UNIT
			MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	
t _{PLH} / t _{PHL}	Propagation delay time nA, nB to nY	4.5		18	30		38		45	ns
t _{PLH} / t _{THL}	Output transition time	4.5		7	15		19		22	ns