

Quad 2-input NAND Schmitt trigger

74HC/HCT132

FEATURES

- Output capability: standard
- I_{CC} category: SSI

GENERAL DESCRIPTION

The 74HC/HCT132 are high-speed Si-gate CMOS devices and are pin compatible with low power Schottky TTL (LSTTL). They are specified in compliance with JEDEC standard no. 7A.

The 74HC/HCT132 contain four 2-input NAND gates which accept standard input signals. They are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals.

The gate switches at different points for positive and negative-going signals. The difference between the positive voltage V_{T+} and the negative voltage V_{T-} is defined as the hysteresis voltage V_H.

QUICK REFERENCE DATA

GND = 0 V; T_{amb} = 25 °C; t_r = t_f = 6 ns

SYMBOL	PARAMETER	CONDITIONS	TYPICAL		UNIT
			HC	HCT	
t _{PHL} / t _{PLH}	propagation delay nA, nB to nY	C _L = 15 pF; V _{CC} = 5 V	11	17	ns
C _I	input capacitance		3.5	3.5	pF
C _{PD}	power dissipation capacitance per gate	notes 1 and 2	24	20	pF

Notes

1. C_{PD} is used to determine the dynamic power dissipation (P_D in μW):

$$P_D = C_{PD} \times V_{CC}^2 \times f_i + \sum (C_L \times V_{CC}^2 \times f_o) \text{ where:}$$

f_i = input frequency in MHz

f_o = output frequency in MHz

∑ (C_L × V_{CC}² × f_o) = sum of outputs

C_L = output load capacitance in pF

V_{CC} = supply voltage in V

2. For HC the condition is V_I = GND to V_{CC}
For HCT the condition is V_I = GND to V_{CC} - 1.5 V

ORDERING INFORMATION

See "74HC/HCT/HCU/HCMOS Logic Package Information".

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DC CHARACTERISTICS FOR 74HC

For the DC characteristics see "*74HC/HCT/HCU/HCMOS Logic Family Specifications*". Transfer characteristics are given below.

Output capability: standard

I_{CC} category: SSI

Transfer characteristics for 74HC

Voltages are referenced to GND (ground = 0 V)

SYMBOL	PARAMETER	T _{amb} (°C)								UNIT	TEST CONDITIONS	
		74HC									V _{CC} (V)	WAVEFORMS
		+25			-40 to +85		-40 to +125					
		min.	typ.	max.	min.	max.	min.	max.				
V _{T+}	positive-going threshold	0.7	1.18	1.5	0.7	1.5	0.7	1.5	V	2.0	Figs 6 and 7	
		1.7	2.38	3.15	1.7	3.15	1.7	3.15		4.5		
		2.1	3.14	4.2	2.1	4.2	2.1	4.2		6.0		
V _{T-}	negative-going threshold	0.3	0.63	1.0	0.3	1.0	0.3	1.0	V	2.0	Figs 6 and 7	
		0.9	1.67	2.2	0.9	2.2	0.9	2.2		4.5		
		1.2	2.26	3.0	1.2	3.0	1.2	3.0		6.0		
V _H	hysteresis (V _{T+} - V _{T-})	0.2	0.55	1.0	0.2	1.0	0.2	1.0	V	2.0	Figs 6 and 7	
		0.4	0.71	1.4	0.4	1.4	0.4	1.4		4.5		
		0.6	0.88	1.6	0.6	1.6	0.6	1.6		6.0		

AC CHARACTERISTICS FOR 74HC

GND = 0 V; t_r = t_f = 6 ns; C_L = 50 pF

SYMBOL	PARAMETER	T _{amb} (°C)								UNIT	TEST CONDITIONS	
		74HC									V _{CC} (V)	WAVEFORMS
		+25			-40 TO +85		-40 TO +125					
		min.	typ.	max.	min.	max.	min.	max.				
t _{PHL} / t _{PLH}	propagation delay nA, nB to nY		36	125		155		190	ns	2.0	Fig.13	
			13	25		31		38		4.5		
			10	21		26		32		6.0		
t _{THL} / t _{TLH}	output transition time		19	75		95		110	ns	2.0	Fig.13	
			7	15		19		22		4.5		
			6	13		16		19		6.0		

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DC CHARACTERISTICS FOR 74HCT

For the DC characteristics see "*74HC/HCT/HCU/HCMOS Logic Family Specifications*". Transfer characteristics are given below.

Output capability: standard

I_{CC} category: SSI

Notes to HCT types

The value of additional quiescent supply current (ΔI_{CC}) for a unit load of 1 is given in the family specifications. To determine ΔI_{CC} per input, multiply this value by the unit load coefficient shown in the table below.

INPUT	UNIT LOAD COEFFICIENT
nA, nB	0.3

Transfer characteristics for 74HCT

Voltages are referenced to GND (ground = 0 V)

SYMBOL	PARAMETER	T_{amb} (°C)								UNIT	TEST CONDITIONS	
		74HCT									V_{CC} (V)	WAVEFORMS
		+25			-40 to +85		-40 to +125					
		min.	typ.	max.	min.	max.	min.	max.				
V_{T+}	positive-going threshold	1.2	1.41	1.9	1.2	1.9	1.2	1.9	V	4.5	Figs 6 and 7	
		1.4	1.59	2.1	1.4	2.1	1.4	2.1				
V_{T-}	negative-going threshold	0.5	0.85	1.2	0.5	1.2	0.5	1.2	V	4.5	Figs 6 and 7	
		0.6	0.99	1.4	0.6	1.4	0.6	1.4				
V_H	hysteresis ($V_{T+} - V_{T-}$)	0.4	0.56	–	0.4	–	0.4	–	V	4.5	Figs 6 and 7	
		0.4	0.60	–	0.4	–	0.4	–				

AC CHARACTERISTICS FOR 74HCT

GND = 0 V; $t_r = t_f = 6$ ns; $C_L = 50$ pF

SYMBOL	PARAMETER	T_{amb} (°C)								UNIT	TEST CONDITIONS	
		74HCT									V_{CC} (V)	WAVEFORMS
		+25			-40 to +85		-40 to +125					
		min.	typ.	max.	min.	max.	min.	max.				
t_{PHL} / t_{PLH}	propagation delay nA, nB to nY		20	33		41		50	ns	4.5	Fig.13	
t_{THL} / t_{TLH}	output transition time		7	15		19		22	ns	4.5	Fig.13	