

DATA SHEET

For a complete data sheet, please also download:

- The IC06 74HC/HCT/HCU/HCMOS Logic Family Specifications
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Information
- The IC06 74HC/HCT/HCU/HCMOS Logic Package Outlines

74HC133 13-input NAND gate

Product specification
File under Integrated Circuits, IC06

September 1993

13-input NAND gate

74HC133

FEATURES

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

GENERAL DESCRIPTION

The HC133 is an high-speed Si-gate CMOS device and is pin compatible with low power Schottky TTL (LSTTL). It is specified in compliance with JEDEC standard no. 7A.

The 74HC133 provides the 13-input NAND function.

QUICK REFERENCE DATA

GND = 0 V; $T_{amb} = 25\text{ }^{\circ}\text{C}$; $t_r = t_f = 6\text{ ns}$

SYMBOL	PARAMETER	CONDITIONS	TYPICAL	UNIT
t_{PHL}/t_{PLH}	propagation delay A..M to Y	$C_L = 15\text{ pF}$; $V_{CC} = 5\text{ V}$	9	ns
C_I	input capacitance		3.5	pF
C_{PD}	power dissipation per gate	notes 1 and 2	19	pF

Notes to the quick reference data

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

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

f_i = input frequency in MHz; C_L = output load capacitance in pF;

f_o = output frequency in MHz; V_{CC} = supply voltage in V;

$\sum (C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

2. For HC the condition is $V_I = \text{GND to } V_{CC}$

ORDERING INFORMATION

TYPE NUMBER	PACKAGES			
	PINS	PIN POSITION	MATERIAL	CODE
74HC133N	16	DIL	plastic	SOT38
74HC133D	16	SO	plastic	SOT109A

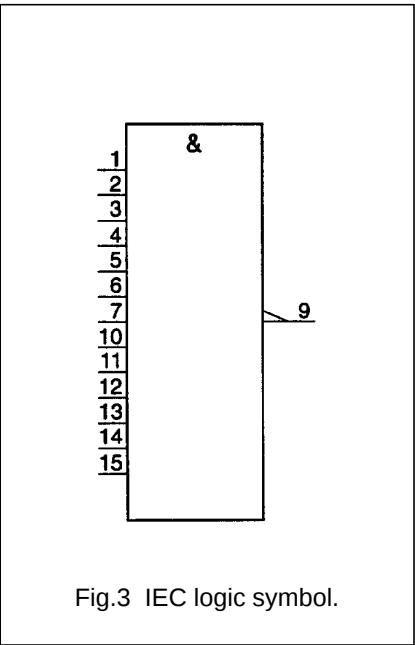
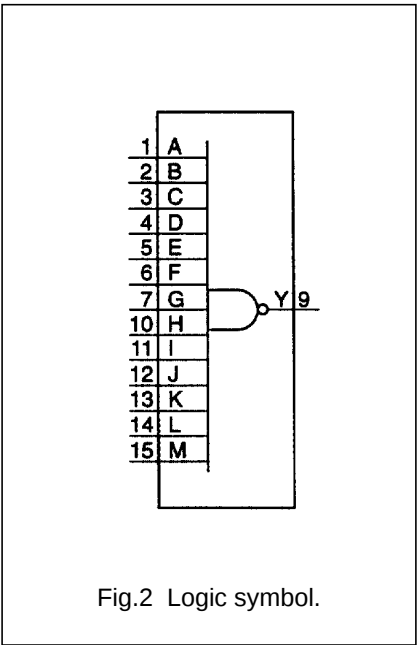
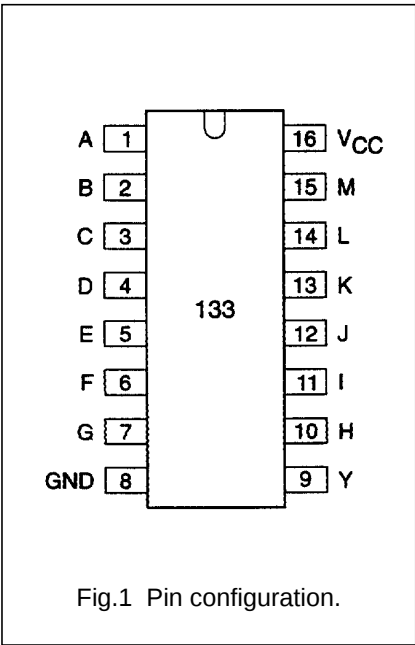
See also *"74HC/HCT/HCU/HCMOS Logic Package Information"*.

13-input NAND gate

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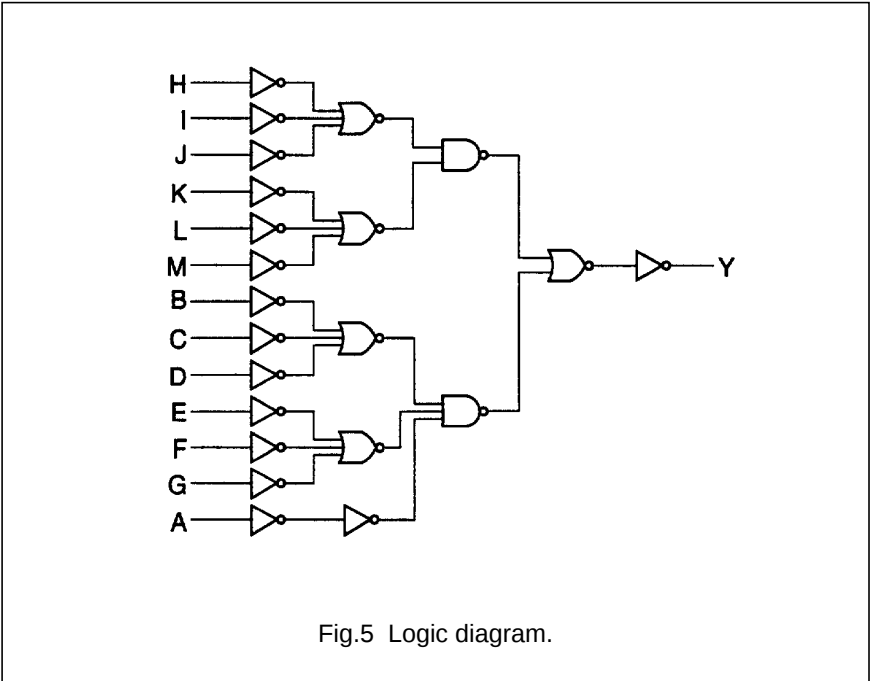
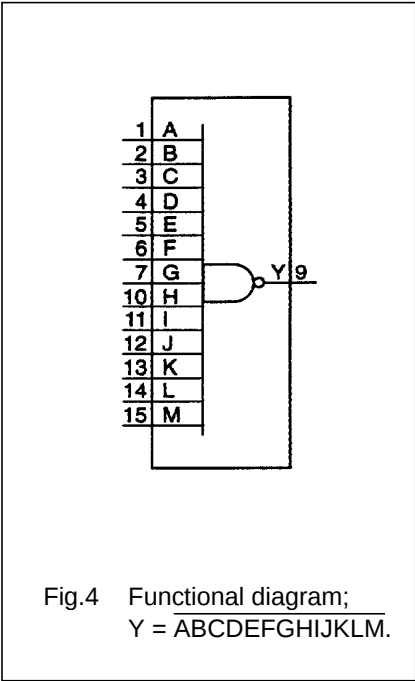
PINNING

PIN NO.	SYMBOL	NAME AND FUNCTION
1..7, 10.. 15	A.. G, H..M	data input
8	GND	ground (0 V)
9	Y	data output
16	V _{CC}	positive supply voltage



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FUNCTION TABLE

INPUTS													OUTPUT
A	B	C	D	E	F	G	H	I	J	K	L	M	Y
L	X	X	X	X	X	X	X	X	X	X	X	X	H
X	L	X	X	X	X	X	X	X	X	X	X	X	H
X	X	L	X	X	X	X	X	X	X	X	X	X	H
X	X	X	L	X	X	X	X	X	X	X	X	X	H
X	X	X	X	L	X	X	X	X	X	X	X	X	H
X	X	X	X	X	L	X	X	X	X	X	X	X	H
X	X	X	X	X	X	L	X	X	X	X	X	X	H
X	X	X	X	X	X	X	L	X	X	X	X	X	H
X	X	X	X	X	X	X	X	L	X	X	X	X	H
X	X	X	X	X	X	X	X	X	L	X	X	X	H
X	X	X	X	X	X	X	X	X	X	L	X	X	H
X	X	X	X	X	X	X	X	X	X	X	L	X	H
X	X	X	X	X	X	X	X	X	X	X	X	L	H
H	H	H	H	H	H	H	H	H	H	H	H	H	L

Notes

- 1. H = HIGH voltage level
L = LOW voltage level
X = don't care

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DC CHARACTERISTICS FOR 74HC

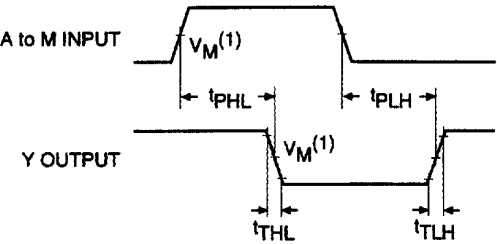
For the DC characteristics see *“74HC/HCT/HCU/HCMOS Logic Family Specifications”*.

Output capability: standard
I_{CC} category: SSI

AC CHARACTERISTICS FOR 74HC

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

SYMBOL	PARAMETER	T _{amb} (°C)							UNIT	TEST CONDITIONS	
		+25			−40 to +85		−40 to +125			V _{CC} (V)	WAVEFORMS
		MIN.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.			
t _{PHL} /t _{PLH}	propagation delay A..M to Y	−	36	110	−	140	−	165	ns	2.0	Fig.6
		−	13	22	−	28	−	33		4.5	
		−	10	19	−	23	−	28		6.0	
t _{THL} /t _{TLH}	output transition time	−	19	75	−	95	−	110	ns	2.0	Fig.6
		−	7	15	−	19	−	22		4.5	
		−	6	13	−	16	−	19		6.0	



(1) HC: $V_M = 50\%$; $V_I = \text{GND to } V_{CC}$.

Fig.6 Waveforms showing the input (A, B, C, D, E, F, G, H, I, J, K, L, M) to output (Y) propagation delays and the output transition times.

PACKAGE OUTLINES

See *“74HC/HCT/HCU/HCMOS Logic Package Outlines”*.