

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 °C; t_r = t_f = 6 ns

SYMBOL	PARAMETER	CONDITIONS	TYPICAL	UNIT
t _{PHL} /t _{PLH}	propagation delay A..M to Y	C _L = 15 pF; V _{CC} = 5 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)

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

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;

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

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

ORDERING INFORMATION

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

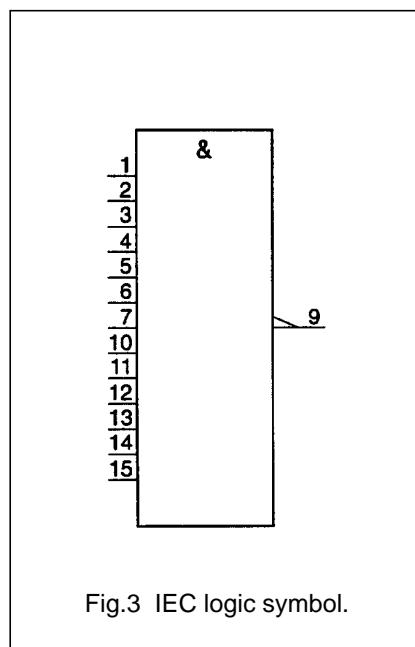
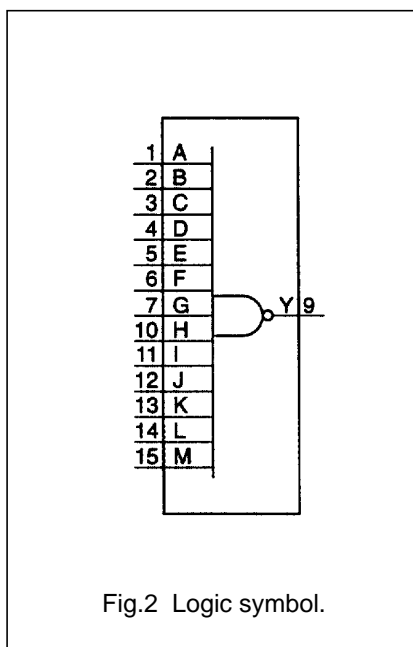
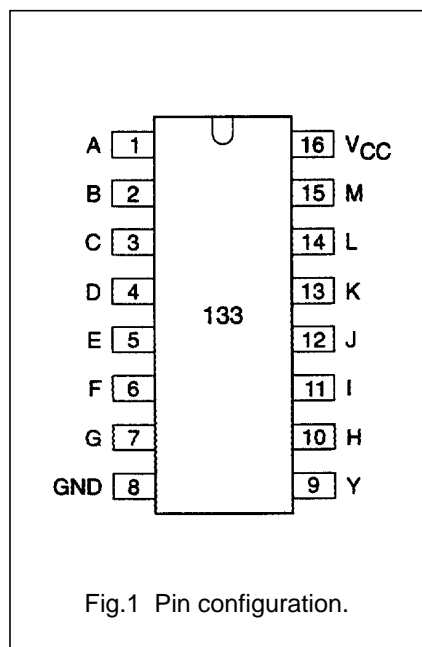
See also *"74HC/HCT/HCU/HCMOS Logic Package Information"*.

13-input NAND gate

74HC133

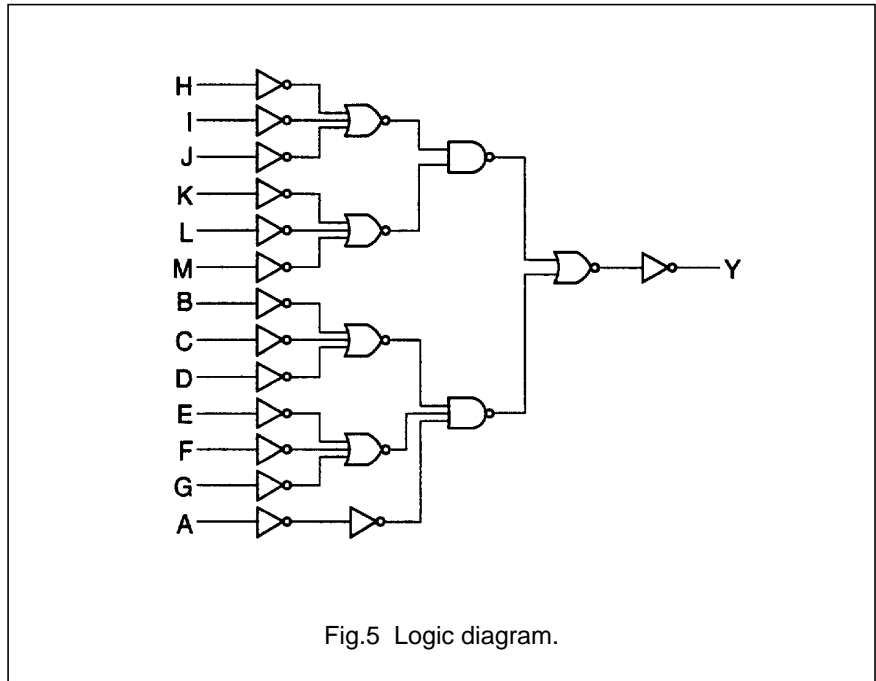
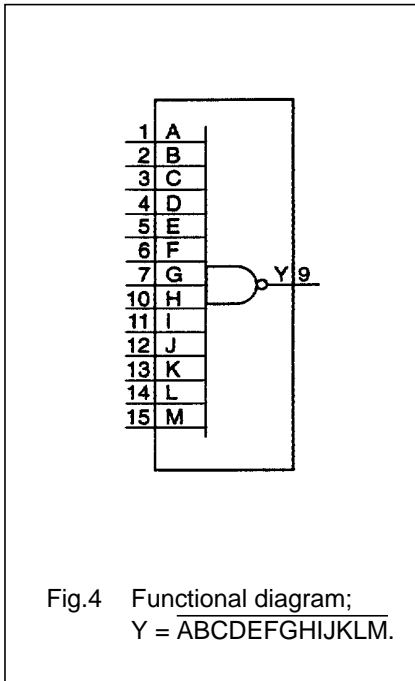
PINNING

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



13-input NAND gate

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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

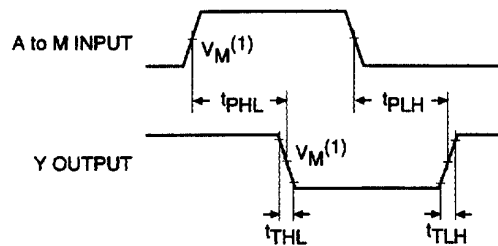
For the DC characteristics see *"74HC/HCT/HCU/HCMOS Logic Family Specifications"*.

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 4.5 6.0	Fig.6
t _{THL} /t _{TLH}	output transition time	–	19	75	–	95	–	110	ns	2.0 4.5 6.0	Fig.6
		–	10	19	–	23	–	28			
		–	7	15	–	19	–	22			
		–	6	13	–	16	–	19			



(1) HC: V_M = 50%; V_I = 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"*.