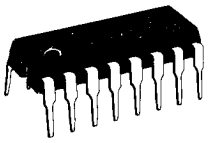
MN74HC133/MN74HC133S

13-Input NAND Gate

■ Description

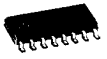
MN74HC133/MN74HC133S contain 13-input positive isolation NAND gates.
Adoption of a silicon gate CMOS process has resulted in low power dissipation, a high noise margin equivalent to a standard CMOS, and an operation speed of LS TTL. Input/output transfer characteristics have been improved by applying a buffer to the gate output, and fluctuation of transfer time due to increased load capacitance is limited to the minimum. LS TTL 10-inputs can be directly driven.
Resistors and diodes are provided in V_{DD} and V_{SS} for protection of the input/output against damage by static electricity. Same pin configuration and function as the standard 54LS/74LS logic family.

P-3



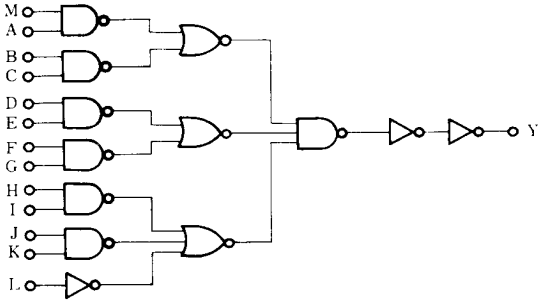
16-pin plastic DIL package

P-4

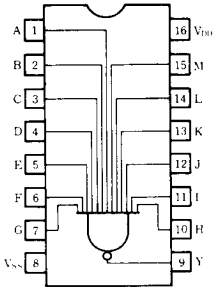


16-pin Panaflat package (SO-16D)

■ Logic diagram



Pin configuration (top view)



■ Absolute maximum ratings

Item			Sym.	Rating	Unit
Supply voltage			V_{DD}	−0.5~7.0	V
Input/output voltage			V_I, V_O	−0.5~V_{DD}+0.5	V
Input current			I_I	±20	mA
Output current			I_O	±25	mA
Power dissipation	MN74HC133	Ta=−40~+60℃	P_D	400	mW
		Ta=+60~+85℃		Decrease to 200mW at the rate of 8mW/℃	
	MN74HC133S	Ta=−40~+60℃	P_D	275	mW
		Ta=+60~+85℃		Decrease to 200mW at the rate of 3.8mW/℃	
Storage temperature range			T_{stg}	−65~+150	℃
Supply current			I_{DD}, I_{SS}	±50	mA

■ Recommended operating conditions

Item	Sym.	Rating	Unit
Operating supply voltage	V_{DD}	1.4～6.0	V
Input voltage	V_I	0～V_{DD}	V
Operating temperature range	T_{opr}	−40～+85	℃
Input rise and fall time	t_r, t_f	0～500	ns

■ DC characteristics ($V_{DD}=5V\pm10\%$, $V_{SS}=0V$)

Item	Sym.	Test conditions		Ta=−40℃		Ta=+25℃		Ta=+85℃		Unit
				Min.	Max.	Min.	Max.	Min.	Max.	
Quiescent supply current	I_{DD}	$V_I=V_{DD}$ or V_{SS}			2		2		20	μA
High level input voltage	V_{IH}	$V_O=0.5V$, $\|I_O\|\leqq1\mu A$	$V_{DD}=4.5V$	3.15		3.15		3.15		V
			$V_{DD}=5.0V$	3.50		3.50		3.50		
			$V_{DD}=5.5V$	3.85		3.85		3.85		
Low level input voltage	V_{IL}	$V_O=V_{DD}-1.0V$, $\|I_O\|\leqq1\mu A$	$V_{DD}=4.5V$		0.9		0.9		0.9	V
			$V_{DD}=5.0V$		1.0		1.0		1.0	
			$V_{DD}=5.5V$		1.1		1.1		1.1	
Input current	$\pm I_I$	$V_I=V_{DD}$ or V_{SS}			0.3		0.3		1	μA
High level output voltage	V_{OH}	$V_I=V_{DD}$ or V_{SS}, $\|I_O\|\leqq1\mu A$		$V_{DD}-0.05$		$V_{DD}-0.05$		$V_{DD}-0.05$		V
Low level output voltage	V_{OL}	$V_I=V_{DD}$, $\|I_O\|\leqq1\mu A$			0.05		0.05		0.05	V
High level output current	I_{OH}	$V_I=V_{DD}$ or V_{SS}, $V_O=V_{DD}-0.8V$		−6		−5		−4		mA
Low level output current	I_{OL}	$V_I=V_{DD}$, $V_O=0.4V$		6		5		4		mA

■ AC characteristics ($V_{DD}=5V$, $V_{SS}=0V$, Ta=25℃ Input transition time ≦6ns, $C_L=50pF$)

Item	Sym.	Test conditions	Min.	Typ	Max.	Unit
Output rise time	t_{TLH}			8	15	ns
Output fall time	t_{THL}			6	15	ns
Propagation time (L→H)	t_{PLH}			15	25	ns
Propagation time (H→L)	t_{PHL}			12	20	ns

※ AC characteristics measurement waveform