

MN74HC4002/MN74HC4002S

Dual 4-Input NOR Gates

Description

MN74HC4002/MN74HC4002S contain two 4-input positive isolation NOR gate circuits.

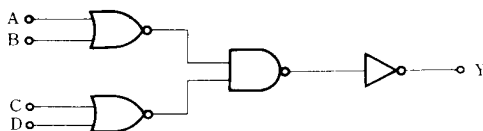
Adoption of a silicon gate CMOS process has made possible a low power dissipation, a high noise margin equivalent to a standard CMOS and an operation speed of LS TTL. Input/output transfer characteristics have been improved by applying a buffer to the gate output, and fluctuation of transfer time due 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 standard 54LS/74LS logic family.

Logic diagram



P-1



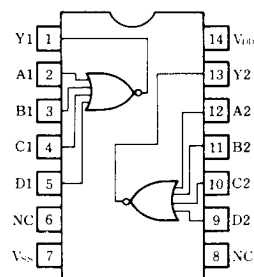
14-pin plastic DIL package

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14-pin Pinflat package (SO-14D)

Pin configuration (top view)



Absolute maximum ratings

Item			Sym.	Rating	Unit
Supply voltage			V_{DD}	$-0.5 \sim 7.0$	V
Input/output voltage			V_I, V_O	$-0.5 \sim V_{DD} + 0.5$	V
Input current			I_i	± 20	mA
Output current			I_o	± 25	mA
Power dissipation	MN74HC4002	$T_a = -40 \sim +60^{\circ}\text{C}$	P_D	400	mW
		$T_a = +60 \sim +85^{\circ}\text{C}$		Decrease to 200mW at the rate of $8\text{mW}/^{\circ}\text{C}$	
	MN74HC4002S	$T_a = -40 \sim +60^{\circ}\text{C}$	P_D	275	mW
		$T_a = +60 \sim +85^{\circ}\text{C}$		Decrease to 200mW at the rate of $3.8\text{mW}/^{\circ}\text{C}$	
Storage temperature range			T_{stg}	$-65 \sim +150$	$^{\circ}\text{C}$
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	°C
Input rise and fall time	t_r, t_f	0 ~ 500	ns

■ DC characteristics ($V_{DD}=5V \pm 10\%$, $V_{SS}=0V$)

Item	Sym.	Test conditions	$T_a = -40^\circ\text{C}$		$T_a = +25^\circ\text{C}$		$T_a = +85^\circ\text{C}$		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 \leq 1\mu\text{A}$	$V_{DD}=4.5V$	3.15	$V_{DD}=4.5V$	3.15	$V_{DD}=4.5V$	3.15	V
			$V_{DD}=5.0V$	3.50	$V_{DD}=5.0V$	3.50	$V_{DD}=5.0V$	3.50	
			$V_{DD}=5.5V$	3.85	$V_{DD}=5.5V$	3.85	$V_{DD}=5.5V$	3.85	
Low level input voltage	V_{IL}	$V_O = V_{DD} - 1.0V$ $ I_O \leq 1\mu\text{A}$	$V_{DD}=4.5V$	0.9	$V_{DD}=4.5V$	0.9	$V_{DD}=4.5V$	0.9	V
			$V_{DD}=5.0V$	1.0	$V_{DD}=5.0V$	1.0	$V_{DD}=5.0V$	1.0	
			$V_{DD}=5.5V$	1.1	$V_{DD}=5.5V$	1.1	$V_{DD}=5.5V$	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}	$V_I = V_{SS}$, $ I_O \leq 1\mu\text{A}$	$V_{DD}-0.05$		$V_{DD}-0.05$		$V_{DD}-0.05$		V
Low level output voltage	V_{OL}	$V_I = V_{DD}$ or V_{SS} , $ I_O \leq 1\mu\text{A}$		0.05		0.05		0.05	V
High level output current	I_{OH}	$V_I = V_{SS}$, $V_O = V_{DD} - 0.8V$	-6		-5		-4		mA
Low level output current	I_{OL}	$V_I = V_{DD}$ or V_{SS} , $V_O = 0.4V$	6		5		4		mA

■ AC characteristics ($V_{DD}=5V$, $V_{SS}=0V$, $T_a=25^\circ\text{C}$ Input transition time $\leq 6\text{ns}$, $C_L=50\text{pF}$)

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	ns
Propagation time (H→L)	t_{PHL}				15	ns

※ AC characteristics measurement waveform

