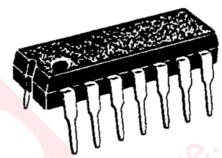
MN74HC4002/MN74HC4002S

Dual 4-Input NOR Gates

■ Outline

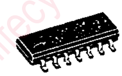
The MN74HC4002/MN74HC4002S consists of 4-input positive logic NOR gates, and has two built-in circuits in one chip.
Owing to the silicon gate CMOS process, these NOR gates have realized low power consumption and high noise immunity equivalent to those of a standard CMOS and the operation speed as high as of an LS TTL. The buffer added to each gate output improves the input/output transfer characteristic and minimizes the propagation delay time fluctuation caused by the load capacity increase. The resepctive output can directly drive ten LS TTL inputs.
To protect the input and output against electrostatic break-down, a resistor and a diode are used for the V_{CC} and the GND. The pin configuration and the function are the same as those of the standard CMOS logic 4000 family.

P-1



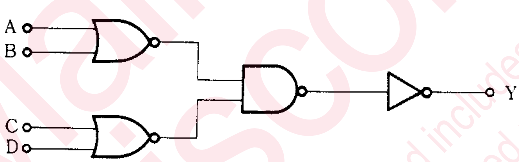
14-pin plastic DIL package

P-2

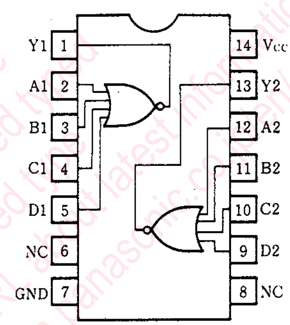


14-pin PANAFLAT package (SO-14D)

■ Logic Diagram



Pin Configuration



■ Absolute Maximum Ratings

Item			Symbol	Rating	Unit
Supply voltage			V_{CC}	−0.5～+7.0	V
Input output voltage			V_I, V_O	−0.5～V_{CC}+0.5	V
Input protective diode current			I_{IK}	±20	mA
Output parasitic diode current			I_{OK}	±20	mA
Output current			I_O	±25	mA
Supply current			I_{CC}, I_{GND}	±50	mA
Storage temperature			T_{stg}	−65～+150	°C
Power dissipation	MN74HC4002	Ta=−40～+60°C	P_D	400	mW
		Ta=+60～+85°C		Decrease to 200mW at the rate of 8mW/°C	
	MN74HC4002S	Ta=−40～+60°C	P_D	275	mW
		Ta=+60～+85°C		Decrease to 200mW at the rate of 3.8mW/°C	

■ Recommended Operating Conditions

Item	Symbol	V_{CC}(V)	Rating	Unit
Operating power supply voltage	V_{CC}		1.4~6.0	V
Input output voltage	V_I, V_O		0~V_{CC}	V
Operating temperature	T_A		−40~+85	°C
Input rise, fall time	t_r, t_f	2.0	0~1000	ns
		4.5	0~500	ns
		6.0	0~400	ns

■ DC Characteristics (GND=0V)

Item	Symbol	V_{CC} (V)	Test Condition			Temperature Ta=25°C min.	Ta=25°C typ.	Ta=25°C max.	Ta=−40~+85°C min.	Ta=−40~+85°C max.	Unit
			V_I	I_O	Unit						
Input voltage high level	V_{IH}	2.0				1.5			1.5		V
		4.5				3.15			3.15		
		6.0				4.2			4.2		
Input voltage low level	V_{IL}	2.0						0.3		0.3	V
		4.5						0.9		0.9	
		6.0						1.2		1.2	
Output voltage high level	V_{OH}	2.0	V_{IH}	−20.0	μA	1.9	2.0		1.9		V
		4.5		−20.0	μA	4.4	4.5		4.4		
		6.0		−20.0	μA	5.9	6.0		5.9		
		4.5		−4.0	mA	3.92			3.84		
		6.0		−5.2	mA	5.48			5.34		
Output voltage low level	V_{OL}	2.0	V_{IH} or V_{IL}	20.0	μA		0.0	0.1		0.1	V
		4.5		20.0	μA		0.0	0.1		0.1	
		6.0		20.0	μA		0.0	0.1		0.1	
		4.5		4.0	mA			0.26		0.33	
		6.0		5.2	mA			0.26		0.33	
Input leakage current	I_I	6.0	V_I=V_{CC} or GND					±0.1		±1.0	μA
Static supply current	I_{CC}	6.0	V_I=V_{CC} or GND, I_O=0					2.0		20.0	μA

■ AC Characteristics (GND=0V, Input transition time≦6ns, C_L=50pF)

Item	Symbol	V_{CC} (V)	Test Condition	Temperature Ta=25°C min.	Ta=25°C typ.	Ta=25°C max.	Ta=−40~+85°C min.	Ta=−40~+85°C max.	Unit
Output rise time	t_{TLH}	2.0			25	75		95	ns
		4.5			8	15		19	
		6.0			7	13		16	
Output fall time	t_{THL}	2.0			20	75		95	ns
		4.5			7	15		19	
		6.0			6	13		16	
Propagation time (L→H)	t_{PLH}	2.0			25	75		95	ns
		4.5			8	15		19	
		6.0			7	13		16	
Propagation time (H→L)	t_{PHL}	2.0			25	75		95	ns
		4.5			8	15		19	
		6.0			7	13		16	