

MN74HC4050/MN74HC4050S

Hex Logic Level Down Converters

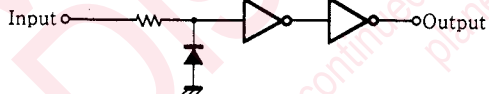
■ Outline

The MN74HC4050/MN74HC4050S consists of non-inverting logic level down converters of correction input protective structure. This structure serves as a logic level converter to convert a high voltage level logic into a low voltage level logic.

When using the power source whose voltage is 5V, for example, the 0~15V CMOS logic can be converted into a 0~5V logic. Since no diode is connected with the V_{CC} , the input voltage for correction input protection can be set higher than the source voltage. The Zener diode connected with the GND protects the input against the positive or negative electrostatic voltage. It is also usable as a simple inverter without involving any level conversion.

Owing to the silicon gate CMOS process, these converters have realized low power consumption and high noise immunity equivalent to those of a standard CMOS. The pin configuration and the function are the same as those of the standard CMOS logic 4000 family, and the operation speed is equivalent to that of an LS TTL.

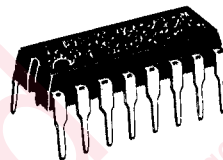
■ Logic Diagram



■ Absolute Maximum Ratings

Item		Symbol	Rating	Unit
Supply voltage		V_{CC}	-0.5~+7.0	V
Input voltage		V_I	+0.5~+16*	V
Output voltage		V_O	-0.5~ $V_{CC}+5$	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	MN74HC4050	$T_a = -40 \sim +60^{\circ}\text{C}$	400	mW
		$T_a = +60 \sim +85^{\circ}\text{C}$		
	MN74HC4050S	$T_a = -40 \sim +60^{\circ}\text{C}$	275	mW
		$T_a = +60 \sim +85^{\circ}\text{C}$		

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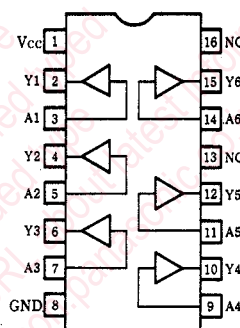
16-pin plastic DIL package

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16-pin PANAFLAT package (SO-16D)

Pin Configuration



■ Recommended Operating Conditions

Item	Symbol	V _{CC} (V)	Rating	Unit
Operating power supply voltage	V _{CC}		1.4~6.0	V
Input voltage	V _I		0~+15.0	V
Output voltage	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					Unit
			V _I	V _O	Unit	T _a =25°C			T _a =-40~+85°C		
						min.	typ.	max.	min.	max.	
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	3.98			3.84		
		6.0		-5.2	mA	5.48			5.34		
Output voltage low level	V _{OL}	2.0	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	
6.0	V _I =15V or GND					±0.5	±5.0				
Static supply current	I _{CC}	5.5	V _I =V _{CC} or GND, I _O =0				8.0		80.0	μA	

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

Item	Symbol	V _{CC} (V)	Test Condition	Temperature					Unit
				T _a =25°C			T _a =-40~+85°C		
				min.	typ.	max.	min.	max.	
Output rise time	t _{TLH}	2.0			21	75		95	ns
		4.5			8	15		19	
		6.0			7	13		16	
Output fall time	t _{THL}	2.0			13	75		95	ns
		4.5			7	15		19	
		6.0			5	13		16	
Propagation time (L→H)	t _{PLH}	2.0			39	75		95	ns
		4.5			8	15		19	
		6.0			7	13		16	
Propagation time (H→L)	t _{PHL}	2.0			10	75		95	ns
		4.5			8	15		19	
		6.0			6	13		16	

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