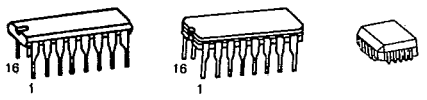
HS-C²MOS™ INTEGRATED CIRCUITS

M54/74HC4049
M54/74HC4050

HC 4049 HEX BUFFER/CONVERTER (INV.)
HC 4050 HEX BUFFER/CONVERTER

DESCRIPTION

The M54/74HC4049 and the M54/74HC4050 are high speed CMOS HEX BUFFER fabricated in silicon gate C²MOS technology.
They have the same high speed performance of LSTTL combined with true CMOS low power consumption.
The M54/75HC4049 is an inverting buffer, while the M54/74HC4050 is a non-inverting buffer.
The internal circuit is composed of 3 stage or 2-stage inverters, which enables high noise immunity and stable output.
Input protection circuits are different from those of ther high speed CMOS IC's.
The V_{CC} side diodes are emitted to allow logic-level convertion from high-level voltages (up to 8V) to low-level voltages.



B1 Plastic Package | **F1** Ceramic Package | **C1** Chip Carrier

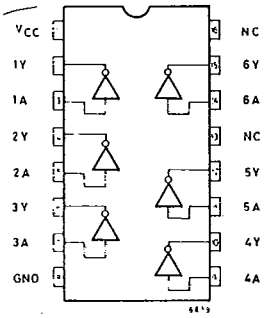
ORDERING NUMBERS: M54HCXXXX F1
M74HCXXXX B1
M74HCXXXX F1
M74HCXXXX C1

FEATURES

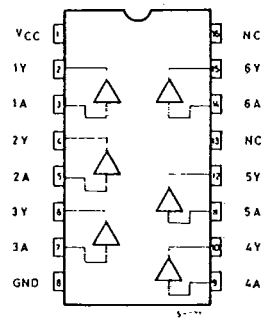
- High Speed
  t_{PD} = 10 ns (Typ.) at V_{CC} = 5V
- Low Power Dissipation
  I_{CC} = 1 μA (Max.) at T_A = 25°C
- High Noise Immunity
  $V_{NIH} = V_{NIL}$ = 28% V_{CC} (Min.)
- Output Drive Capability
  15 LSTTL Loads
- Symmetrical Output Impedance
  $|I_{OH}| = I_{OL}$ = 6 mA (Min.)
- Balanced Propagation Delays
  $t_{PLH} = t_{PHL}$
- Wide Operating Voltage Range
  V_{CC} (opr) = 2V to 6V
- Pin and Function compatible with 4049B / 4050B

PIN CONNECTIONS
(top view)

HC4049



HC4050



Dual in line

M54/74HC4049
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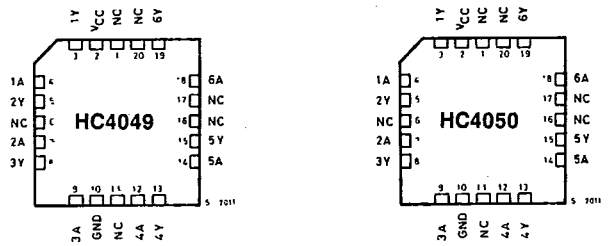
CHIP CARRIER



NC = No Internal Connection

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	−0.5 to 7	V
V_I	DC Input Voltage	−0.5 to V_{CC}+0.5	V
V_O	DC Output Voltage	−0.5 to V_{CC}+0.5	V
I_{IK}	DC Input Diode Current	± 20	mA
I_{OK}	DC Output Diode Current	± 20	mA
I_O	DC Output Source Sink Current Per Output Pin	± 35	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	± 70	mA
P_D	Power Dissipation	500 (*)	mW
T_{stg}	Storage Temperature	−65 to 150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

(*) 500 mW: ≅ 65°C derate to 300 mW by 10 mW/°C: 65°C to 85°C.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Limit		Unit
V_{CC}	Supply Voltage	2 to 6		V
V_I	Input Voltage	0 to V_{CC}		V
V_O	Output Voltage	0 to V_{CC}		V
T_A	Operating Temperature 74HC Series 54HC Series	− 40 to 85 −55 to 125		°C
t_r, t_f	Input Rise and Fall Time	V_{CC} 2 V	0 to 1000	ns
		V_{CC} 4.5V	0 to 500	
		V_{CC} 6 V	0 to 400	

DC SPECIFICATIONS

Symbol	Parameter	V_{CC}	Test Condition		T_A = 25°C 54HC and 74HC			−40 to 85°C 74HC		−55 to 125°C 54HC		Unit
					Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
V_{IH}	High Level Input Voltage	2.0			1.5	—	—	1.5	—	1.5	—	V
		4.5			3.15	—	—	3.15	—	3.15	—	
		6.0			4.2	—	—	4.2	—	4.2	—	
V_{IL}	Low Level Input Voltage	2.0			—	—	0.5	—	0.5	—	0.5	V
		4.5			—	—	1.35	—	1.35	—	1.35	
		6.0			—	—	1.8	—	1.8	—	1.8	
V_{OH}	High Level Output Voltage	2.0	V_I	I_O	1.9	2.0	—	1.9	—	1.9	—	V
		4.5	V_{IH} or V_{IL}	−20 μA	4.4	4.5	—	4.4	—	4.4	—	
		6.0			5.9	6.0	—	5.9	—	5.9	—	
		4.5		−6.0 mA	4.18	4.31	—	4.13	—	4.10	—	
		6.0		−7.8 mA	5.68	5.8	—	5.63	—	5.60	—	
V_{OL}	Low Level Output Voltage	2.0	V_{IH} or V_{IL}	20 μA	—	0	0.1	—	0.1	—	0.1	V
		4.5			—	0	0.1	—	0.1	—	0.1	
		6.0			—	0	0.1	—	0.1	—	0.1	
		4.5		6.0 mA	—	0.17	0.26	—	0.33	—	0.40	
		6.0		7.8 mA	—	0.18	0.26	—	0.33	—	0.40	
I_I	Input Leakage Current	6.0	V_I = V_{CC} or GND		—	—	±0.1	—	±1		±1	μA
I_{CC}	Quiescent Supply Current	6.0	V_I = V_{CC} or GND		—	—	1	—	10		20	μA

AC ELECTRICAL CHARACTERISTICS (V_{CC} = 5V, T_A = 25°C, C_L = 15pF, Input $t_r = t_f$ = 6ns)

Symbol	Parameter	54HC and 74HC			Unit
		MIN.	TYP.	MAX.	
t_{TLH} t_{THL}	Output Transition Time		7	11	ns
t_{PLH} t_{PHL}	Propagation Delay Time		11	18	ns

AC ELECTRICAL CHARACTERISTICS ($C_L = 50pF$, Input $t_r = t_f = 6ns$)

Symbol	Parameter	V_{CC}	Test Condition	T_A = 25°C 54HC and 74HC			−40 to 85°C 74HC		−55 to 125°C 54HC		Unit
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
t_{TLH} t_{THL}	Output Transition Time	2.0		—	24	60	—	75			ns
		4.5		—	6	12	—	15			
		6.0		—	5	10	—	13			
t_{PLH} t_{PHL}	Propagation Delay Time	2.0		—	35	100	—	120			ns
		4.5		—	12	20	—	24			
		6.0		—	10	17	—	21			
C_{IN}	Input Capacitance			—	5	10	—	10			pF
C_{PD} (*)	Power Dissipation Capacitance			—	25	—	—	—			

Note (*) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the following equation.
$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/6$ (per Gate).