

TENTATIVE

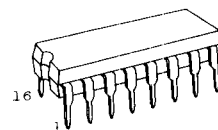
TC74HC4049P HEX BUFFER/CONVERTER (INVERTING)

TC74HC4050P HEX BUFFER/CONVERTER

The TC74HC4049 and the TC74HC4050 are high speed CMOS HEX BUFFER fabricated with silicon gate CMOS technology. It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation. The TC74HC4049 is an inverting buffer, while the TC74HC4050 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 other high speed CMOS IC's. They eliminate diodes of V_{CC} side and enable logic-level conversion from high-level voltage (up to 8V) to low-level voltage. These IC's are useful for battery back up circuits, because input voltage can be applied on IC's which is not biased by V_{CC} .

FEATURES:

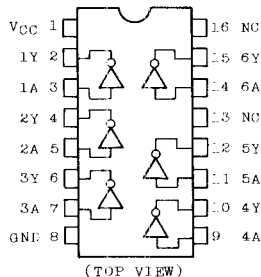
- High Speed..... $t_{pd}=10\text{ns}(\text{Typ.})$ at $V_{CC}=5\text{V}$
- Low Power Dissipation..... $I_{CC}=1\mu\text{A}(\text{Max.})$ at $T_a=25^\circ\text{C}$
- High Noise Immunity..... $V_{NIH}=V_{NIL}=28\% V_{CC}(\text{Min.})$
- Output Drive Capability.....15 LSTTL Loads
- Symmetrical Output Impedance... $|I_{OH}|=I_{OL}=6\text{mA}(\text{Min.})$
- Balanced Propagation Delays... $t_{PLH} \div t_{PHL}$
- Wide Operating Voltage Range... $V_{CC}(\text{opr})=2\text{V} \sim 6\text{V}$
- Pin and Function Compatible with 4049B, 4050B.



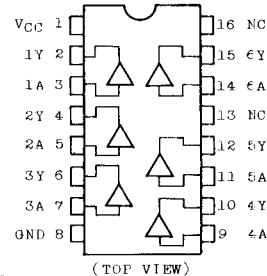
DIP (5-22E)

PIN ASSIGNMENT

TC74HC4049



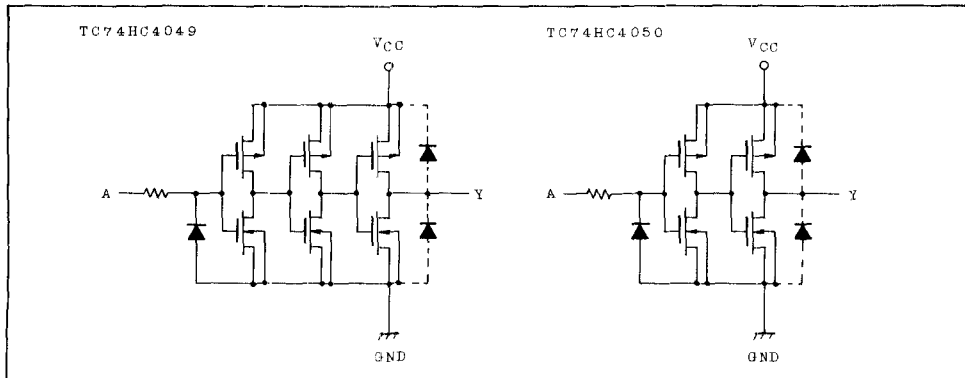
TC74HC4050



NC : No Connection

TC74HC4049P **TC74HC4050P**

CIRCUIT SCHEMATIC (per Gate)



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	-0.5 ~ 7	V
DC Input Voltage	V_{IN}	-0.5 ~ 10*	V
DC Output Voltage	V_{OUT}	-0.5 ~ $V_{CC}+0.5$	V
Input Diode Current	I_{IK}	-20	mA
Output Diode Current	I_{OK}	± 20	mA
DC Output Current	I_{OUT}	± 35	mA
DC V_{CC} /Ground Current	I_{CC}	± 70	mA
Power Dissipation	P_D	500**	mW
Storage Temperature	T_{stg}	-65 ~ 150	$^{\circ}C$
Lead Temperature 10sec	T_L	300	$^{\circ}C$

Note.

* DC input voltage is able to impress -0.5V to 10V based on GND without any relation to voltage of V_{CC} . Recommended operating condition is from 0V to 8V and it is possible to convert logic-level from 8V to 5V or 5V to 2V.

** 500mW in the range of $T_a = -40^{\circ}C \sim 65^{\circ}C$. and from $T_a = 65^{\circ}C$ up to $85^{\circ}C$ derating factor of -10mW/ $^{\circ}C$ shall be applied until 300mW.

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	LIMIT	UNIT
Supply Voltage	V_{CC}	2 ~ 6	V
Input Voltage	V_{IN}	0 ~ 8	V
Output Voltage	V_{OUT}	0 ~ V_{CC}	V
Operating Temperature	T_{opr}	-40 ~ 85	$^{\circ}C$
Input Rise and Fall Time	t_r, t_f	0 ~ 500	ns

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION		V _{CC}	Ta=25°C			Ta=-40~85°C		UNIT
					MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Input Voltage	V _{IH}			2.0	1.5	-	-	1.5	-	V
				4.5	3.15	-	-	3.15	-	
				6.0	4.2	-	-	4.2	-	
Low-Level Input Voltage	V _{IL}			2.0	-	-	0.5	-	0.5	V
				4.5	-	-	1.35	-	1.35	
				6.0	-	-	1.8	-	1.8	
High-Level Output Voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} =-20μA	2.0	1.9	2.0	-	1.9	-	V
				4.5	4.4	4.5	-	4.4	-	
				6.0	5.9	6.0	-	5.9	-	
		I _{OH} =-6mA I _{OH} =-7.8mA	4.5	4.18	4.31	-	4.13	-		
			6.0	5.68	5.80	-	5.63	-		
Low-Level Output Voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} =20μA	2.0	-	0.0	0.1	-	0.1	V
				4.5	-	0.0	0.1	-	0.1	
				6.0	-	0.0	0.1	-	0.1	
		I _{OL} =6mA I _{OL} =7.8mA	4.5	-	0.17	0.32	-	0.37		
			6.0	-	0.18	0.32	-	0.37		
Input Leakage Current	I _{IN}	V _{IN} =V _{CC} or GND		6.0	-	-	±0.1	-	±1.0	μA
Quiescent Supply Current	I _{CC}	V _{IN} =V _{CC} or GND		6.0	-	-	1.0	-	10.0	

TC74HC4049P **TC74HC4050P**

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

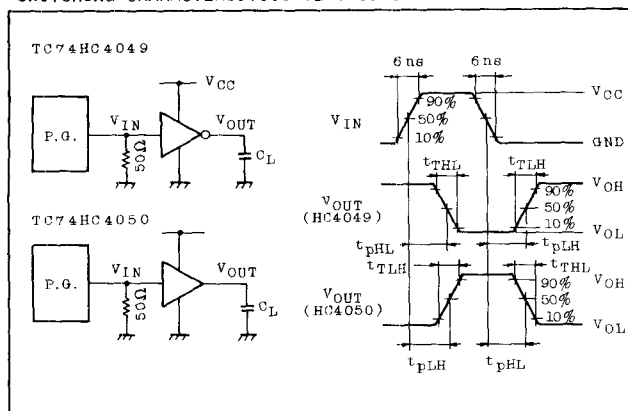
PARAMETER	SYMBOL	TEST CONDITION	Ta=25°C				Ta=-40~85°C		UNIT
			V _{CC}	MIN.	TYP.	MAX.	MIN.	MAX.	
Output Transition Time	t_{TLH}		2.0	-	24	60	-	75	ns
	t_{THL}		4.5	-	6	12	-	15	
			6.0	-	5	10	-	13	
Propagation Delay Time	t_{pLH}		2.0	-	35	100	-	120	ns
	t_{pHL}		4.5	-	12	20	-	24	
			6.0	-	10	17	-	21	
Input Capacitance	C_{IN}			-	5	10	-	10	pF
Power Dissipation Capacitance	$C_{PD}(1)$			-	25	-	-	-	

Note (1) C_{PD} is defined as the value of internal equivalent capacitance of IC which is calculated from the operating current consumption without load (refer to Test Circuit).

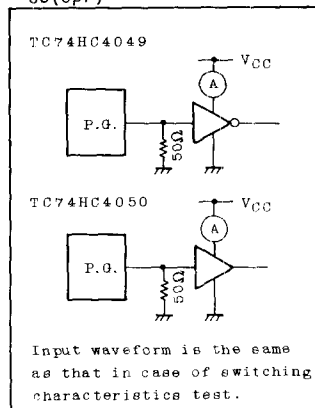
Average operating current can be obtained by the equation hereunder.

$$I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/6 \text{ (per Gate)}$$

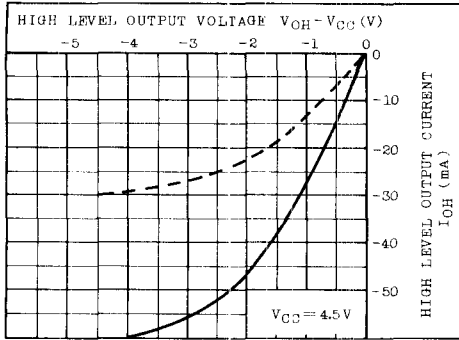
SWITCHING CHARACTERISTICS TEST CIRCUIT



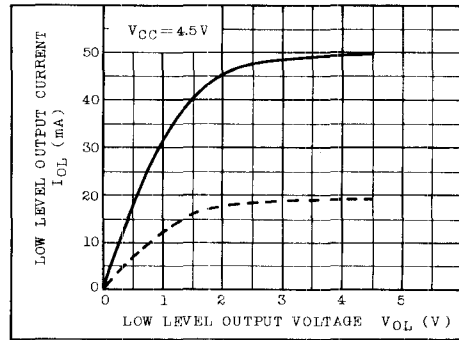
$I_{CC(opr)}$ TEST CIRCUIT



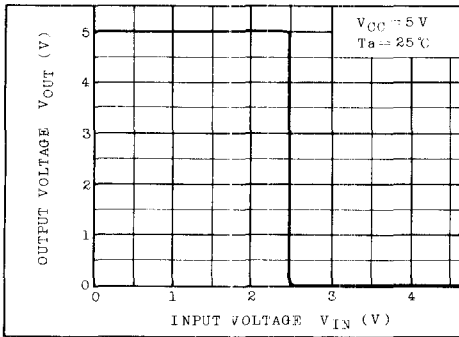
I_{OH} CHARACTERISTICS



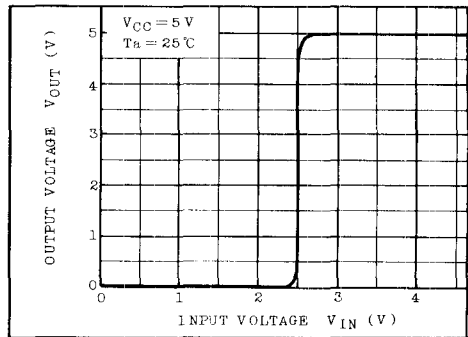
I_{OL} CHARACTERISTICS



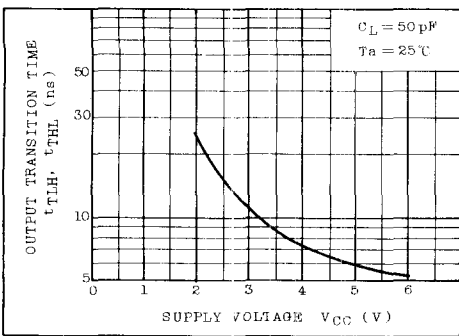
TC74HC4049P $V_{IN}-V_{OUT}$ CHARACTERISTICS (TYP.)



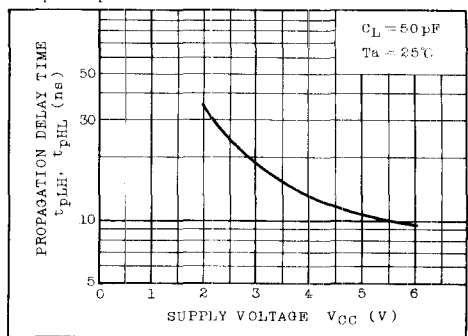
TC74HC4050P $V_{IN}-V_{OUT}$ CHARACTERISTICS (TYP.)



$t_{TLH}, t_{THL}-V_{CC}$ CHARACTERISTICS (TYP.)

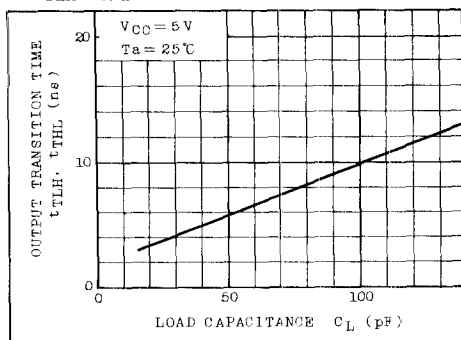


$t_{PLH}, t_{PHL}-V_{CC}$ CHARACTERISTICS (TYP.)



TC74HC4049P **TC74HC4050P**

$t_{TLH}, t_{THL}-C_L$ CHARACTERISTICS (TYP.)



$t_{PLH}, t_{PHL}-C_L$ CHARACTERISTICS (TYP.)

