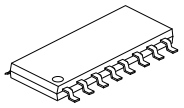
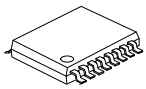
U74HC4049

CMOS IC

HEX INVERTING HIGH-TO-LOW LEVEL SHIFTER



SOP-16



TSSOP-16

■ DESCRIPTION

The **U74HC4049** is a high speed Si-gate CMOS device which contains six independent inverters and they perform the function $Y=\overline{A}$.

On the input circuit of this device has a modified input protection structure which has no diode connected to V_{CC}. Input voltages of up to 15-V may therefore be used.

This feature enables the inverters to be used as logic level translators, which will convert high level logic to low level logic, while operating from a low voltage power supply. For example15-V logic can be converted down to 2-V logic. At the same time each part can be used as a simple inverter without level translation.

■ FEATURES

* Inputs accept voltages to 15V
* Low power dissipation
* Enable to be used as a logic level translator

■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74HC4049L-S16-R	U74HC4049G-S16-R	SOP-16	Tape Reel
U74HC4049L-S16-T	U74HC4049G-S16-T	SOP-16	Tube
U74HC4049L-P16-R	U74HC4049G-P16-R	TSSOP-16	Tape Reel
U74HC4049L-P16-T	U74HC4049G-P16-T	TSSOP-16	Tube

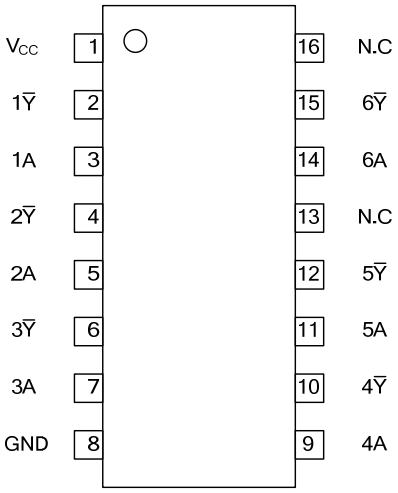
U74HC4049L-S16-R

(1)Packing Type — (1) T: Tube, R: Tape Reel

(2)Package Type — (2) S16: SOP-16, P16: TSSOP-16

(3)Lead Free — (3) L: Lead Free, G: Halogen Free

■ PIN CONFIGURATION



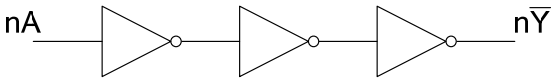
Note: The N.C is stand for that the pin is not connected.

■ FUNCTION TABLE

INPUT(nA)	OUTPUT(n$\overline{Y}$)
L	H
H	L

Note: H: HIGH voltage level; L: LOW voltage level

■ LOGIC DIAGRAM (positive logic)



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ +7.0	V
Input Voltage	V_{IN}	-0.5 ~ +16	V
V_{CC} or GND Current	I_{CC}	±50	mA
Continuous Output Current (V_{OUT}=0 to V_{CC})	I_{OUT}	±25	mA
Input Clamp Current (V_{IN}<-0.5)	I_{IK}	-20	mA
Output Clamp Current (V_{OUT}<-0.5 or V_{OUT}> V_{CC} +0.5)	I_{OK}	±20	mA
Storage Temperature Range	T_{STG}	-65 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}	Operating	2.0	5.0	6.0	V
Input Voltage	V_{IN}		0		15	V
Output Voltage	V_{OUT}	High or low state	0		V_{CC}	V
Operating Temperature	T_A		-40	+25	125	°C
Input Transition Rise or Fall Rate	Δt/Δv	V_{CC}=2.0V			1000	ns/V
		V_{CC}=4.5V			500	ns/V
		V_{CC}=6.0V			400	ns/V

■ ELECTRICAL CHARACTERISTICS (T_A =25°C , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-level Input Voltage	V_{IH}	V_{CC}=2.0V	1.5	1.3		V
		V_{CC}=4.5V	3.15	2.4		V
		V_{CC}=6.0V	4.2	3.1		V
Low-level Input Voltage	V_{IL}	V_{CC}=2.0V		0.7	0.5	V
		V_{CC}=4.5V		1.8	1.35	V
		V_{CC}=6.0V		2.3	1.8	V
High-Level Output Voltage	V_{OH}	V_{CC}=2.0V, I_{OL}=-20μA	1.9	2.0		V
		V_{CC}=4.5V, I_{OL}=-20μA	4.4	4.5		V
		V_{CC}=6.0V, I_{OL}=-20μA	5.9	6.0		V
		V_{CC}=4.5V, I_{OL}=-4.0mA	3.98			V
		V_{CC}=6.0V, I_{OL}=-5.2mA	5.48			V
Low-Level Output Voltage	V_{OL}	V_{CC}=2.0V, I_{OL}=20μA			0.1	V
		V_{CC}=4.5V, I_{OL}=20μA			0.1	V
		V_{CC}=6.0V, I_{OL}=20μA			0.1	V
		V_{CC}=4.5V, I_{OL}=4.0mA			0.26	V
		V_{CC}=6.0V, I_{OL}=5.2mA			0.26	V
Input Leakage Current	$I_{I(LEAK)}$	V_{CC}=6.0V, V_{IN}=V_{CC} or GND			±0.1	μA
		V_{CC}=6.0V, V_{IN}=15V			±0.5	μA
Quiescent Supply Current	I_{CC}	V_{CC}=6.0V, V_{IN}=15V or GND, I_{OUT}=0			2.0	μA
Input Capacitance	C_I			3.5		pF

■ SWITCHING CHARACTERISTICS (T_A=25°C, Input t_R/t_F =6ns)

See Fig. 1 and Fig. 2 for test circuit and waveforms.

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (nA) to output($n\overline{Y}$)	t_{PD}	V_{CC}=2.0V, C_L=50pF		28	85	ns
		V_{CC}=4.5V, C_L=50pF		10	17	ns
		V_{CC}=5.0V, C_L=15pF		8		ns
		V_{CC}=6.0V, C_L=50pF		8	14	ns
Output transition time ($n\overline{Y}$)	t_t	V_{CC}=2.0V, C_L=50pF		19	75	ns
		V_{CC}=4.5V, C_L=50pF		7	15	ns
		V_{CC}=6.0V, C_L=50pF		6	13	ns

■ OPERATING CHARACTERISTICS (T_A=25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	V_{IN}= GND to V_{CC}, f=1MH$_Z$, C_L=50pF		14		pF

■ TEST CIRCUIT AND WAVEFORMS

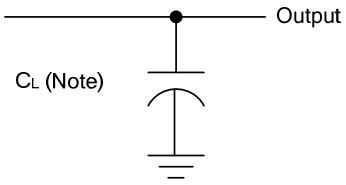
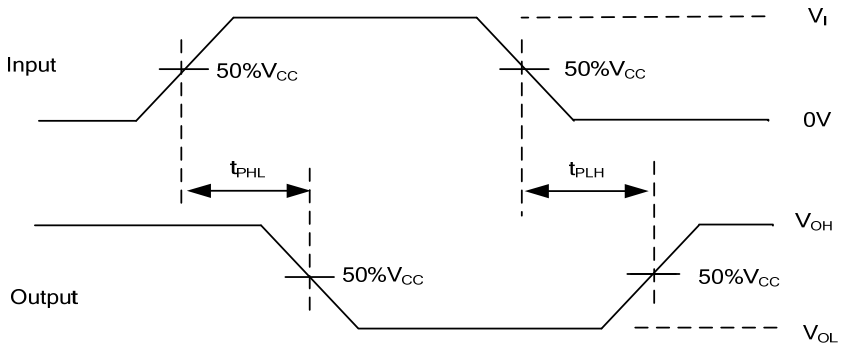


Fig. 1 Load circuitry for switching times



PROPAGATION DELAY TIMES

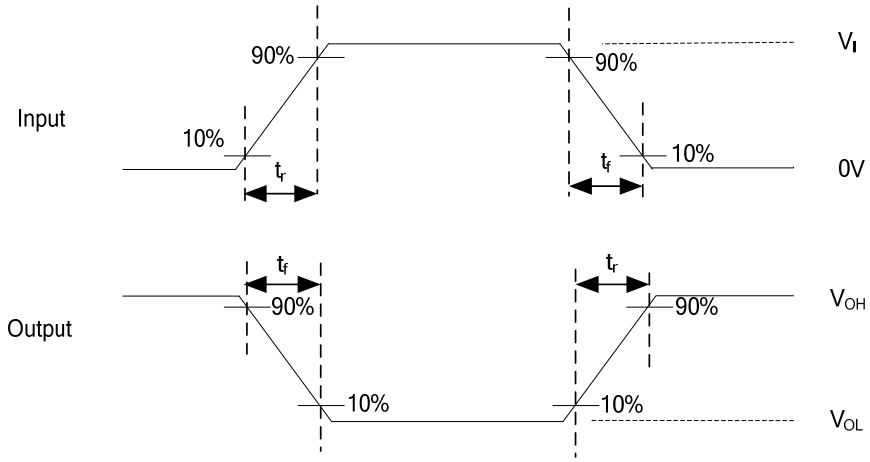


Fig. 2 Propagation delay from input(nA) to output(n$\overline{Y}$) and Output transition time

Note: C_L includes probe and jig capacitance.
All input pulses are supplied by generators having the following characteristics: PRR ≤10MHz, Z_O = 50Ω.