



## U74HC1G06

CMOS IC

### SINGLE INVERTER WITH OPEN-DRAIN OUTPUTS

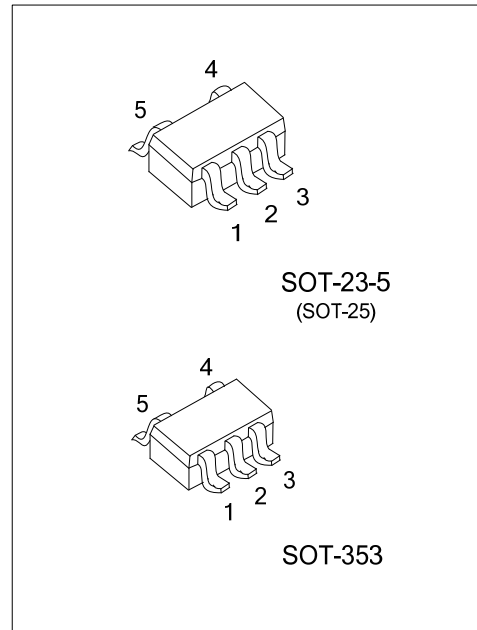
#### DESCRIPTION

The **U74HC1G06** is a single inverting buffer with open-drain outputs and it provides the function  $Y = \overline{A}$  in positive logic.

For digital operation the outputs of this device must have a pull-up resistor to establish a logic HIGH-level.

#### FEATURES

- \* Wide supply voltage range from 2V to 6V
- \* High noise immunity
- \* Low power dissipation;  $I_{CC} = 1\mu A$  (Max.)
- \* Typical  $t_{PD} = 6ns$  at  $V_{CC} = 6V$

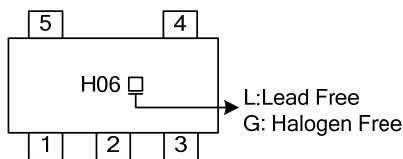


#### ORDERING INFORMATION

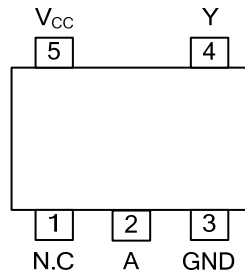
Ordering Number		Package	Packing
Lead Free Plating	Halogen Free		
U74HC1G06L-AE5-R	U74HC1G06G-AE5-R	SOT-23-5	Tape Reel
U74HC1G06L-AL5-R	U74HC1G06G-AL5-R	SOT-353	Tape Reel

<p>U74HC1G06G-AE5-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) AE5: SOT-23-5, AL5: SOT-353</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



■ PIN CONFIGURATION

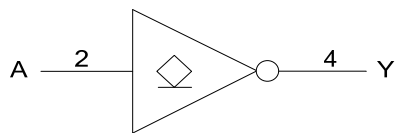


■ FUNCTION TABLE

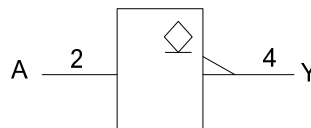
INPUT(A)	OUTPUT(Y)
H	L
L	Z

Note: H: HIGH voltage level; L: LOW voltage level; Z: high impedance state.

■ LOGIC DIAGRAM (positive logic)



Logic symbol



IEC logic symbol

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## ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	-0.5 ~ 7.0	V
Input Voltage	$V_{IN}$	-0.5 ~ $V_{CC} + 0.5$	V
Output Voltage	$V_{OUT}$	-0.5 ~ $V_{CC} + 0.5$	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 ( $V_{IN}<0$ )	$I_{IK}$	±20	mA
Output Clamp Current ( $V_{OUT}<0$ )	$I_{OK}$	±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	$V_{CC}$		2		6	V
Input Voltage	$V_{IN}$		0		$V_{CC}$	V
Output Voltage	$V_{OUT}$		0		$V_{CC}$	V
Low-level Output Current	$I_{OL}$	$V_{CC}=2.0V$			20	uA
		$V_{CC}=4.5V$			20	uA
		$V_{CC}=6.0V$			20	uA
		$V_{CC}=4.5V$			4.0	mA
		$V_{CC}=6.0V$			5.2	mA
Operating Temperature	$T_A$		-40		85	°C
Input Transition Rise or Fall Rate	$\Delta t/\Delta v$	$V_{CC}=2.0V$			500	ns/V
		$V_{CC}=4.5V$			112	
		$V_{CC}=6.0V$			67	

## ■ ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ C$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-level Input Voltage	$V_{IH}$	$V_{CC}=2.0V$	1.5			V
		$V_{CC}=4.5V$	3.15			V
		$V_{CC}=6.0V$	4.2			V
Low-level Input Voltage	$V_{IL}$	$V_{CC}=2.0V$			0.5	V
		$V_{CC}=4.5V$			1.35	V
		$V_{CC}=6.0V$			1.8	V
Low-Level Output Voltage	$V_{OL}$	$V_{CC}=2.0V$	$I_{OL}=20\mu A$	0	0.1	V
		$V_{CC}=4.5V$		0	0.1	V
		$V_{CC}=6.0V$		0	0.1	V
		$V_{CC}=4.5V$	$I_{OL}=4.0mA$	0.17	0.26	V
		$V_{CC}=6.0V$	$I_{OL}=5.2mA$	0.18	0.26	V
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=0\sim 6V, V_{IN}=V_{CC}$ or GND			±0.1	μA
Output Leakage Current	$I_{OZ}$	$V_{CC}=6.0V, V_{IN}=V_{IL}$ or $V_{IH}, V_{OUT}=V_{CC}$ or GND			±0.5	μA
Quiescent Supply Current	$I_{CC}$	$V_{CC}=6.0V, V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$			1.0	μA
Input Capacitance	$C_I$	$V_{CC}=5.0V$		5		pF
Output Capacitance	$C_{OUT}$	$V_{CC}=5.0V$		3		pF

■ SWITCHING CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

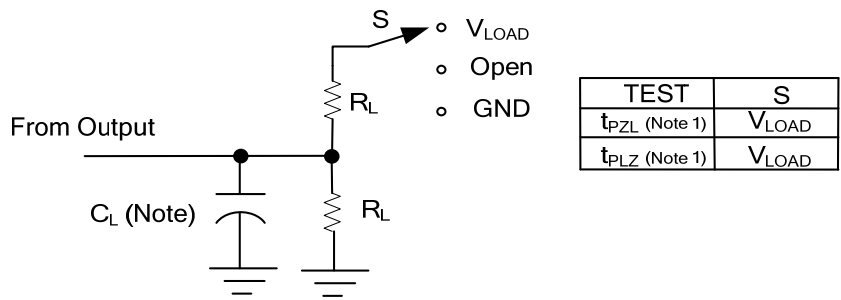
See Fig. 1 and Fig. 2 for test circuit and waveforms.

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output transition time	$t_{\text{THL}}$	$V_{\text{CC}}=2.0\text{V}$		30	75	ns
		$V_{\text{CC}}=4.5\text{V}$		8	15	
		$V_{\text{CC}}=6.0\text{V}$		7	13	
Propagation delay from input (A) to output(Y)	$t_{\text{PLZ}}$	$V_{\text{CC}}=2.0\text{V}$ , $C_L=50\text{pF}$ , $R_L=1\text{k}\Omega$		10	90	ns
		$V_{\text{CC}}=4.5\text{V}$		7	18	
		$V_{\text{CC}}=6.0\text{V}$		6	15	
Propagation delay from input (A) to output(Y)	$t_{\text{PZL}}$	$V_{\text{CC}}=2.0\text{V}$ , $C_L=50\text{pF}$ , $R_L=1\text{k}\Omega$		17	90	ns
		$V_{\text{CC}}=4.5\text{V}$		7	18	
		$V_{\text{CC}}=6.0\text{V}$		5	15	

■ OPERATING CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	$C_{\text{PD}}$	$V_{\text{CC}}=5.0\text{V}$ , $C_L=50\text{pF}$ , $f=1\text{MHz}$		4.0		pF

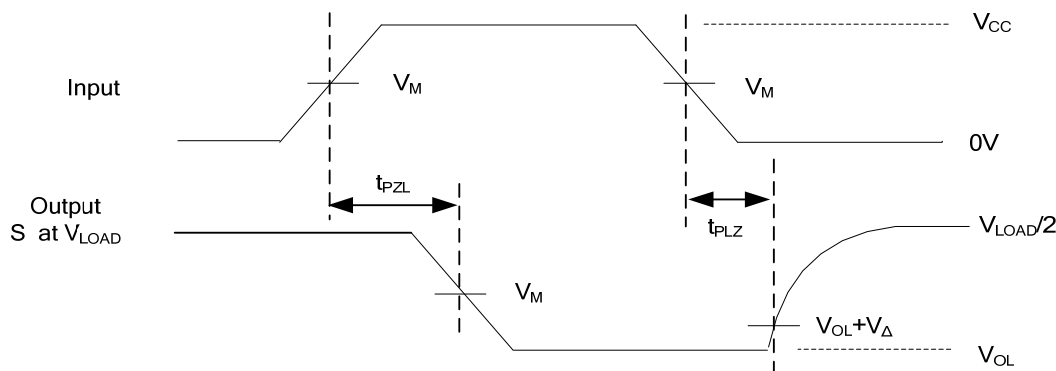
## ■ TEST CIRCUIT AND WAVEFORMS



Note: 1. Since this device has open drain outputs, the  $t_{PLZ}$  and  $t_{PZL}$  is the same as  $t_{PLH}$  and  $t_{PHL}$ .

**Fig. 1 LOAD CIRCUITRY FOR SWITCHING TIMES**

$V_{CC}$	$V_{IN}$	$t_r / t_f$	$V_M$	$V_{LOAD}$	$C_L$	$R_L$	$V_{\Delta}$
$V_{CC}=2.0V$	$V_{CC}$	6ns	$V_{CC}/2$	$2 \times V_{CC}$	50pF	1k $\Omega$	0.3V
$V_{CC}=4.5V$	$V_{CC}$	6ns	$V_{CC}/2$	$2 \times V_{CC}$	50pF	1k $\Omega$	0.3V
$V_{CC}=6.0V$	$V_{CC}$	6ns	$V_{CC}/2$	$2 \times V_{CC}$	50pF	1k $\Omega$	0.3V



**Fig. 2 PROPAGATION DELAY FROM INPUT(A) TO OUTPUT(Y) AND OUTPUT TRANSITION TIME**

Note: 1.  $C_L$  includes probe and jig capacitance.

2. All input pulses are supplied by generators having the following characteristics: PRR  $\leq 10$ MHz,  $Z_o = 50\Omega$ .

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