



## U74AUP1G06

CMOS IC

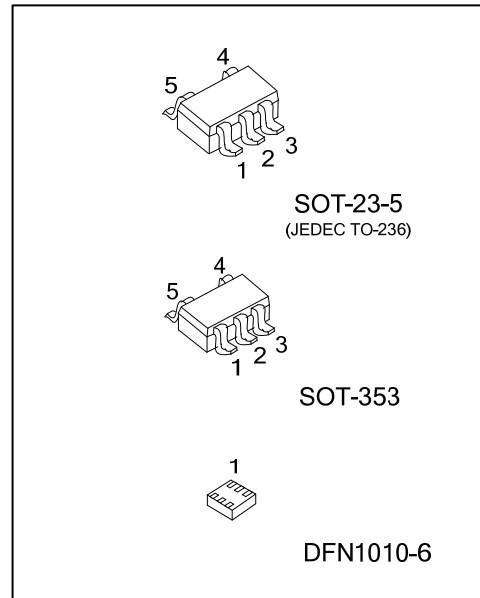
### LOW-POWER SINGLE INVERTER BUFFER/DRIVER WITH OPEN-DRAIN OUTPUTS

#### DESCRIPTION

The **U74AUP1G06** is a single inverting buffer with open-drain outputs and it provides the function  $Y = \overline{A}$  in positive logic. The output of this device is open-drain, and can be connected to other open-drain outputs to implement active-low wired-OR or active-high wired-AND functions.

This device ensures a very low static and dynamic power consumption across the entire  $V_{CC}$  range from 0.8V to 3.6V.

This device has power-down protective circuit, preventing device destruction when it is powered down.



#### FEATURES

- \* Wide supply voltage range from 0.8V to 3.6V
- \* Inputs accept voltages up to 3.6V
- \*  $I_{OFF}$  supports partial-power-down mode
- \* Low static power consumption;  $I_{CC} = 0.5\mu A$  (Max.)
- \* Optimized for 3.3V Operation

#### ORDERING INFORMATION

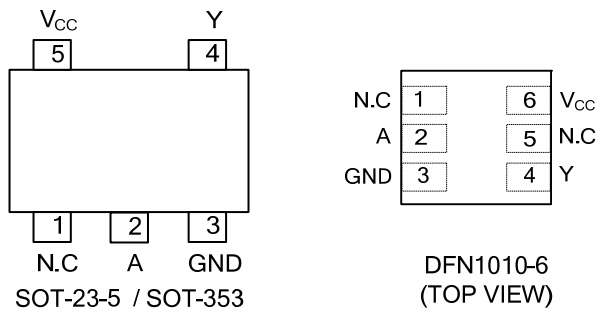
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74AUP1G06L-AE5-R	U74AUP1G06G-AE5-R	SOT-23-5	Tape Reel
U74AUP1G06L-AL5-R	U74AUP1G06G-AL5-R	SOT-353	Tape Reel
U74AUP1G06L-K06-1010-R	U74AUP1G06G-K06-1010-R	DFN1010-6	Tape Reel

<p>U74AUP1G06G-AE5-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AE5: SOT-23-5, AL5: SOT-353, K06-1010: DFN1010-6 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING

SOT-23-5 / SOT-353	DFN1010-6

■ PIN CONFIGURATION

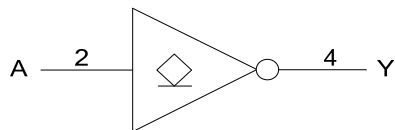


■ FUNCTION TABLE

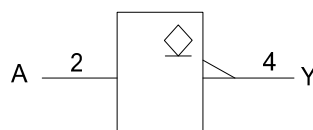
INPUT(A)	OUTPUT(Y)
H	L
L	Z

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

■ LOGIC DIAGRAM (positive logic)



Logic symbol



IEC logic symbol

## ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	TEST CONDITIONS	RATINGS	UNIT
Supply Voltage	$V_{CC}$		-0.5 ~ +4.6	V
Input Voltage	$V_{IN}$		-0.5 ~ +4.6	V
Output Voltage	$V_{OUT}$	Output in the high or low state	-0.5 ~ $V_{CC} + 0.5$	V
		Output in the power-off state	-0.5 ~ +4.6	V
Continuous $V_{CC}$ or GND Current	$I_{CC}$		±50	mA
Continuous Output Current	$I_{OUT}$	$V_{OUT}=0 \sim V_{CC}$	±20	mA
Input Clamp Current	$I_{IK}$	$V_{IN} < 0$	-50	mA
Output Clamp Current	$I_{OK}$	$V_{OUT} > V_{CC}$ or $V_{OUT} < 0$	-50	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	0.8		3.6	V
Input Voltage	$V_{IN}$		0		3.6	V
Output Voltage	$V_{OUT}$	High or low state	0		$V_{CC}$	V
Operating Temperature	$T_A$		-40		85	°C
Input Transition Rise or Fall Rate	$\Delta t/\Delta v$	$V_{CC}=0.8V \sim 3.6V$			200	ns/V

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
High-level Input Voltage	$V_{IH}$	$V_{CC}=0.8V$	$V_{CC}$			V	
		$V_{CC}=1.1V \sim 1.95V$	$0.65 \times V_{CC}$			V	
		$V_{CC}=2.3V \sim 2.7V$	1.6			V	
		$V_{CC}=3.0V \sim 3.6V$	2			V	
Low-level Input Voltage	$V_{IL}$	$V_{CC}=0.8V$			0	V	
		$V_{CC}=1.1V \sim 1.95V$			$0.35 \times V_{CC}$	V	
		$V_{CC}=2.3V \sim 2.7V$			0.7	V	
		$V_{CC}=3.0V \sim 3.6V$			0.9	V	
Low-Level Output Voltage	$V_{OL}$	$V_{CC}=0.8V \sim 3.6V, I_{OL}=20\mu A$			0.1	V	
		$V_{CC}=1.1V, I_{OL}=1.1mA$			$0.3 \times V_{CC}$	V	
		$V_{CC}=1.4V, I_{OL}=1.7mA$			0.31	V	
		$V_{CC}=1.65V, I_{OL}=1.9mA$			0.31	V	
		$V_{CC}=2.3V$	$I_{OL}=2.3mA$			0.31	V
			$I_{OL}=3.1mA$			0.44	v
		$V_{CC}=3.0V$	$I_{OL}=2.7mA$			0.31	V
	$I_{OL}=4.0mA$			0.44	v		
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=0V \sim 3.6V, V_{IN}=GND \sim 3.6$			±0.1	μA	
Power OFF Leakage Current	$I_{off}$	$V_{CC}=0V, V_{IN}$ or $V_{OUT}=0V \sim 3.6V$			±0.2	μA	
Additional Power OFF Leakage Current	$\Delta I_{off}$	$V_{CC}=0V \sim 0.2V, V_{IN}$ or $V_{OUT}=0V \sim 3.6V$			±0.2	μA	
Quiescent Supply Current	$I_{CC}$	$V_{CC}=0.8V \sim 3.6V, I_{OUT}=0, V_{IN}=GND$ or $V_{CC} \sim 3.6V$			0.5	μA	
Additional Quiescent Supply Current Per Input Pin	$\Delta I_{CC}$	$V_{CC}=3.3V, V_{IN}=V_{CC}-0.6V, I_{OUT}=0$			40	μA	
Input Capacitance	$C_I$	$V_{CC}=0V, V_{IN}=V_{CC}$ or GND		1.5		pF	
		$V_{CC}=3.6V, V_{IN}=V_{CC}$ or GND		1.7		pF	
Output Capacitance	$C_{OUT}$	$V_{CC}=0V, V_{OUT}=GND$		1.7		pF	

■ SWITCHING CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , Input:  $t_R/t_F=3\text{ns}$ , unless otherwise specified)

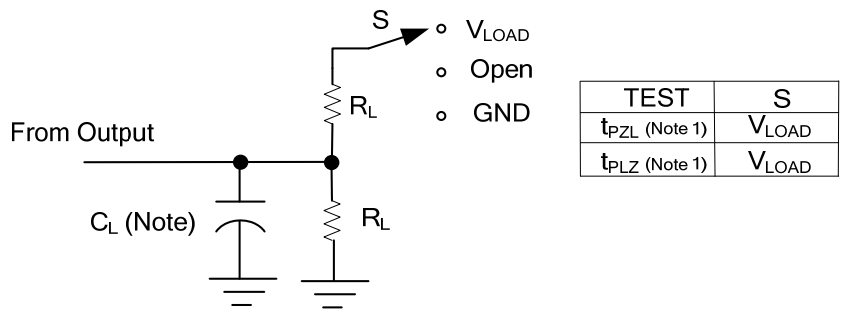
See Fig. 1 and Fig. 2 for test circuit and waveforms.

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT		
Propagation delay from input (A) to output(Y)	$t_{PD}$	$C_L=5\text{pF}$ , $R_L=5\text{k}\Omega$	$V_{CC}=0.8\text{V}$		12.8		ns	
			$V_{CC}=1.1\text{V}\pm 0.1\text{V}$	2.3	12		ns	
			$V_{CC}=1.5\text{V}\pm 0.1\text{V}$	1.8	3.5		ns	
			$V_{CC}=1.8\text{V}\pm 0.15\text{V}$	1.5	3.1		ns	
			$V_{CC}=2.5\text{V}\pm 0.2\text{V}$	1.2	2.2		ns	
				$V_{CC}=3.3\text{V}\pm 0.3\text{V}$	1.1	2.2		ns
		$C_L=10\text{pF}$ , $R_L=5\text{k}\Omega$	$V_{CC}=0.8\text{V}$			15.8		ns
			$V_{CC}=1.1\text{V}\pm 0.1\text{V}$	2.7	12		ns	
			$V_{CC}=1.5\text{V}\pm 0.1\text{V}$	2.2	4.3		ns	
			$V_{CC}=1.8\text{V}\pm 0.15\text{V}$	1.9	3.9		ns	
			$V_{CC}=2.5\text{V}\pm 0.2\text{V}$	1.9	2.9		ns	
				$V_{CC}=3.3\text{V}\pm 0.3\text{V}$	1.6	3.0		ns
		$C_L=15\text{pF}$ , $R_L=5\text{k}\Omega$	$V_{CC}=0.8\text{V}$			18.8		ns
			$V_{CC}=1.1\text{V}\pm 0.1\text{V}$	3.2	12		ns	
			$V_{CC}=1.5\text{V}\pm 0.1\text{V}$	2.6	5.0		ns	
			$V_{CC}=1.8\text{V}\pm 0.15\text{V}$	2.3	4.8		ns	
			$V_{CC}=2.5\text{V}\pm 0.2\text{V}$	2.1	3.5		ns	
				$V_{CC}=3.3\text{V}\pm 0.3\text{V}$	2.0	3.8		ns
		$C_L=30\text{pF}$ , $R_L=5\text{k}\Omega$	$V_{CC}=0.8\text{V}$			27.8		ns
			$V_{CC}=1.1\text{V}\pm 0.1\text{V}$	4.4	12		ns	
$V_{CC}=1.5\text{V}\pm 0.1\text{V}$	3.6		7.6		ns			
$V_{CC}=1.8\text{V}\pm 0.15\text{V}$	3.2		7.4		ns			
$V_{CC}=2.5\text{V}\pm 0.2\text{V}$	2.9		5.4		ns			
		$V_{CC}=3.3\text{V}\pm 0.3\text{V}$	2.9	6.5		ns		

■ OPERATING CHARACTERISTICS ( $f=10\text{MHz}$ ,  $T_A=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	$C_{PD}$	$V_{CC}=0.8\text{V}$		1.0		pF
		$V_{CC}=1.1\text{V}\pm 0.1\text{V}$		1.0		pF
		$V_{CC}=1.5\text{V}\pm 0.1\text{V}$		1.0		pF
		$V_{CC}=1.8\text{V}\pm 0.15\text{V}$		1.0		pF
		$V_{CC}=2.5\text{V}\pm 0.2\text{V}$		1.0		pF
		$V_{CC}=3.3\text{V}\pm 0.3\text{V}$		1.0		pF

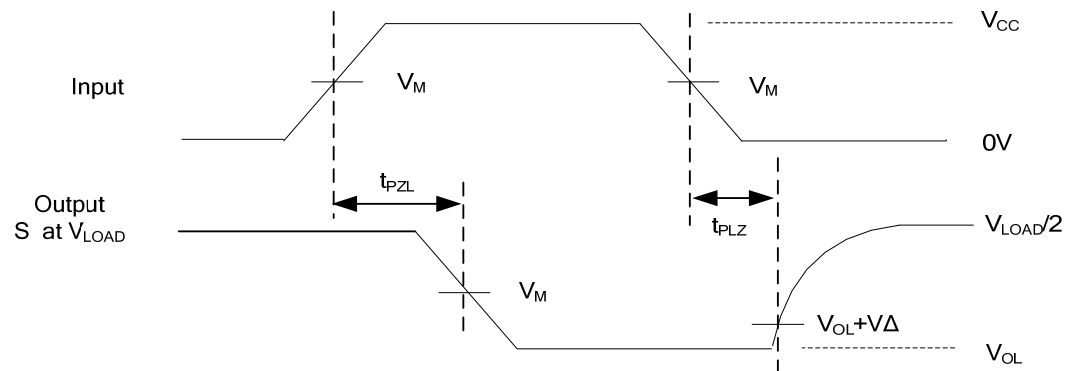
## ■ TEST CIRCUIT AND WAVEFORMS



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**

$V_{CC}$	$V_{IN}$	$t_R / t_F$	$V_M$	$V_{LOAD}$	$C_L$	$R_L$	$V_{\Delta}$
0.8	$V_{CC}$	3ns	$V_{CC}/2$	$2 \times V_{CC}$	5,10,15,30pF	5k $\Omega$	0.1V
$1.2 \pm 0.1V$	$V_{CC}$	3ns	$V_{CC}/2$	$2 \times V_{CC}$	5,10,15,30pF	5k $\Omega$	0.1V
$1.5 \pm 0.1V$	$V_{CC}$	3ns	$V_{CC}/2$	$2 \times V_{CC}$	5,10,15,30pF	5k $\Omega$	0.1V
$1.8 \pm 0.15V$	$V_{CC}$	3ns	$V_{CC}/2$	$2 \times V_{CC}$	5,10,15,30pF	5k $\Omega$	0.15V
$2.5 \pm 0.2V$	$V_{CC}$	3ns	$V_{CC}/2$	$2 \times V_{CC}$	5,10,15,30pF	5k $\Omega$	0.15V
$3.3 \pm 0.3V$	$V_{CC}$	3ns	$V_{CC}/2$	$2 \times V_{CC}$	5,10,15,30pF	5k $\Omega$	0.3V



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

- Notes: 1.  $C_L$  includes probe and jig capacitance.
- 2. All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  10MHz,  $Z_O = 50\Omega$ .

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