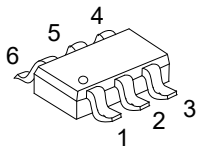
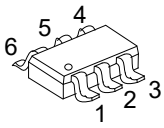
U74AUP1G97

CMOS IC

LOW-POWER CONFIGURABLE MULTIPLE-FUNCTION GATE



SOT-26



SOT-363

■ DESCRIPTION

The **U74AUP1G97** ensures a very low static- and dynamic-power consumption across the entire V_{CC} range of 0.8V to 3.6V, resulting in increased battery life. This product also maintains excellent signal integrity.

The **U74AUP1G97** features configurable multiple functions. The output state is determined by eight patterns of 3-bit input. The user can choose the logic functions MUX, AND, OR, NAND, NOR, inverter, and noninverter. All inputs can be connected to V_{CC} or GND.

The device functions as an independent gate with Schmitt-trigger inputs, which allows for slow input transition and better switching-noise immunity at the input.

This device is fully specified for partial-power-down applications using Ioff. The Ioff circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

■ FEATURES

* Single-Supply Voltage Translator
* Low power dissipation
* Wide supply voltage range from 0.8V to 3.6V
* Inputs accept voltages up to 3.6V
* I_{OFF} supports partial-power-down mode
* Optimized for 3.3V Operation

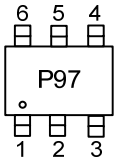
■ ORDERING INFORMATION

Ordering Number		Package	Packing
U74AUP1G97L-AL6-R	U74AUP1G97G-AL6-R	SOT-363	Tape Reel
U74AUP1G97L-AG6-R	U74AUP1G97G-AG6-R	SOT-26	Tape Reel

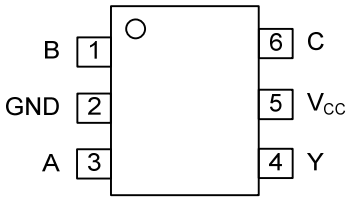
U74AUP1G97G-AL6-R

(1)Packing Type	(1) R: Tape Reel
(2)Package Type	(2) AL6: SOT-363, AG6: SOT-26
(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ PIN CONFIGURATION



■ PIN DESCRIPTION

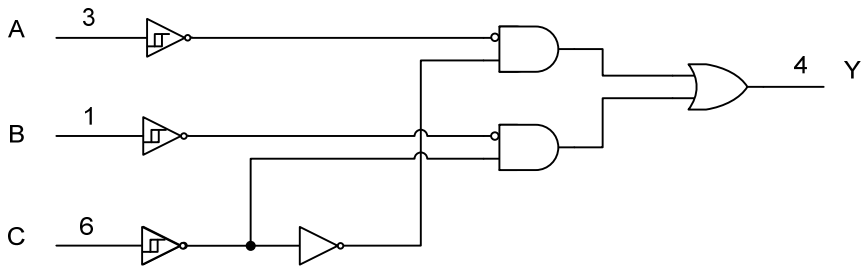
PIN NO.	PIN NAME	I/O	DESCRIPTION
1	B	I	Logic Input 1
2	GND	-	Ground
3	A	I	Logic Input 0
4	Y	O	Logic Output
5	V_{CC}	-	Power
6	C	I	Logic Input 2

■ FUNCTION TABLE

INPUT			OUTPUT
C	B	A	Y
L	L	L	L
L	L	H	L
L	H	L	H
L	H	H	H
H	L	L	L
H	L	H	H
H	H	L	L
H	H	H	H

Note: H: High voltage level; L: Low voltage level.

■ LOGIC DIAGRAM (positive logic)



■ FUNCTION SELECTION TABLE

LOGIC FUNCTION	FIGURE NO.
2-to-1 Data Selector	1
2-Input AND gate	2
2-Input OR Gate With One Inverted Input	3
2-Input NAND Gate With One Inverted Input	3
2-Input AND Gate With One Inverted Input	4
2-Input NOR Gate With One Inverted Input	4
2-Input OR Gate	5
Inverter	6
Noninverted Buffer	7

■ FUNCTION SELECTION TABLE

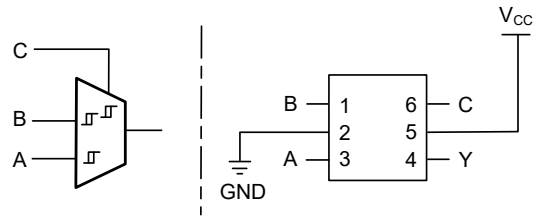


Figure 1. 2 to 1 Data Selector When C is L, Y=B;
When C is H, Y=A

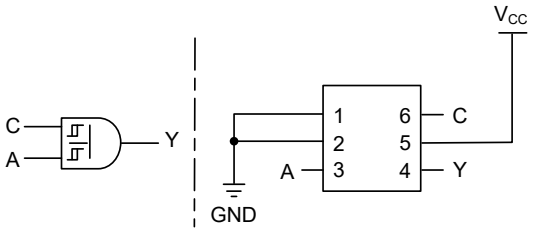


Figure 2. 2-Input AND Gate

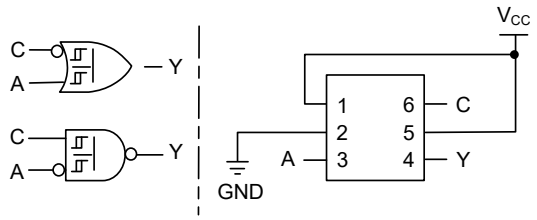


Figure 3. Input OR Gate With One Inverted Input
2-Input NAND Gate With One Inverted Input

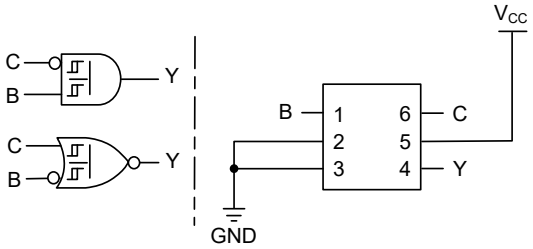


Figure 4. 2-Input AND Gate With One Inverted Input
2-Input NOR Gate With One Inverted Input

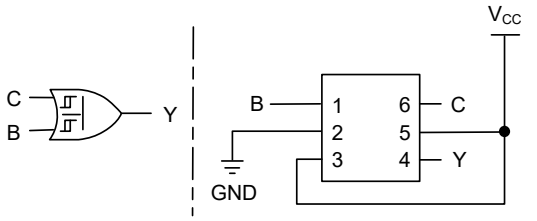


Figure 5. 2-Input OR Gate

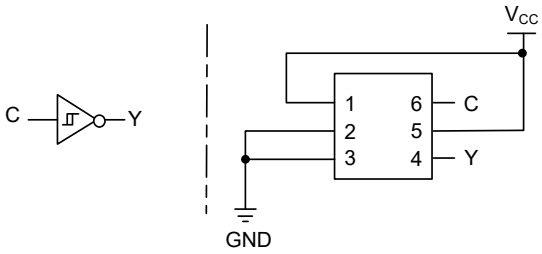


Figure 6. Inverter

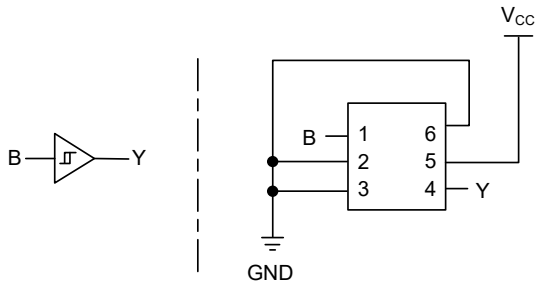


Figure 7. Noninverted Buffer

■ ABSOLUTE MAXIMUM RATING (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	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 power-off state	-0.5 ~ +4.6	V
		Output in the high or low state	-0.5 ~ V_{CC}+0.5	V
Continuous V_{CC} or GND Current	I_{CC}		±50	mA
Continuous Output Current	I_{OUT}		±20	mA
Input Clamp Current	I_{IK}	V_{IN}<0V	-50	mA
Output Clamp Current	I_{OK}	V_{OUT}<0V	-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}		0.8		3.6	V
Input Voltage	V_{IN}		0		3.6	V
High-Level Output Current	I_{OH}	V_{CC}=0.8V			-20	μA
		V_{CC}=1.1V			-1.1	mA
		V_{CC}=1.4V			-1.7	mA
		V_{CC}=1.65V			-1.9	mA
		V_{CC}=2.3V			-3.1	mA
		V_{CC}=3V			-4	mA
Low-Level Output Current	I_{OL}	V_{CC}=0.8V			20	μA
		V_{CC}=1.1V			1.1	mA
		V_{CC}=1.4V			1.7	mA
		V_{CC}=1.65V			1.9	mA
		V_{CC}=2.3V			3.1	mA
		V_{CC}=3V			4	mA
Output Voltage	V_{OUT}		0		V_{CC}	V
Operating Temperature	T_A		-40		+125	°C

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

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Positive-Going Input Threshold Voltage	V_{T+}	V_{CC}=0.8V		0.3		0.6	V
		V_{CC}=1.1V		0.53		0.9	V
		V_{CC}=1.4V		0.74		1.11	V
		V_{CC}=1.65V		0.91		1.29	V
		V_{CC}=2.3V		1.37		1.77	V
		V_{CC}=3.0V		1.88		2.29	V
Negative-Going Input Threshold Voltage	V_{T-}	V_{CC}=0.8V		0.1		0.6	V
		V_{CC}=1.1V		0.26		0.65	V
		V_{CC}=1.4V		0.39		0.75	V
		V_{CC}=1.65V		0.47		0.84	V
		V_{CC}=2.3V		0.69		1.04	V
		V_{CC}=3.0V		0.88		1.24	V
Hysteresis Voltage (V_{T+}-V_{T-})	$\triangle V_T$	V_{CC}=0.8V		0.07		0.5	V
		V_{CC}=1.1V		0.08		0.46	V
		V_{CC}=1.4V		0.18		0.56	V
		V_{CC}=1.65V		0.27		0.66	V
		V_{CC}=2.3V		0.53		0.92	V
		V_{CC}=3.0V		0.79		1.31	V
High-Level Output Voltage	V_{OH}	V_{CC}=0.8~3.6V, I_{OH}=-20μA		V_{CC}-0.1			V
		V_{CC}=1.1V, I_{OH}=-1.1mA		0.75×V_{CC}			V
		V_{CC}=1.4V, I_{OH}=-1.7mA		1.11			V
		V_{CC}=1.65V, I_{OH}=-1.9mA		1.32			V
		V_{CC}=2.3V	I_{OH}=-2.3mA	2.05			V
			I_{OH}=-3.1mA	1.9			V
		V_{CC}=3.0V	I_{OH}=-2.7mA	2.72			V
			I_{OH}=-4mA	2.6			V
Low-Level Output Voltage	V_{OL}	V_{CC}=0.8~3.6V, I_{OL}=20μA				0.1	V
		V_{CC}=1.1V, I_{OL}=1.1mA				0.3×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}=4mA			0.44	V
Input Leakage Current (All Inputs)	$I_{I(LEAK)}$	V_{CC}=0~3.6V, V_{IN}=GND~3.6V				0.1	μA
Power OFF Leakage Current	I_{OFF}	V_{CC}=0V, V_{IN} or V_{OUT}=GND~3.6V				0.2	μA
Additional Power-OFF Leakage Current	ΔI_{OFF}	V_{CC}=0~0.2V, V_{IN} or V_{OUT}=GND~3.6V				0.2	μA
Quiescent Supply Current	I_{CC}	V_{CC}=0.8~3.6V, V_{IN}=GND or (V_{CC}~3.6V), I_{OUT}=0A				0.5	μA
Additional Quiescent Supply Current Per Input Pin	ΔI_{CC}	V_{CC}=3.3V, V_{IN}=V_{CC}-0.6V (Note.) I_{OUT}=0A				40	μA
Input Capacitance	C_I	V_{CC}=0V or 3.6V, V_{IN}=V_{CC} or GND			1.5		pF
Output Capacitance	C_O	V_{CC}=0V, V_{OUT}=GND			3		pF

Note: One input at V_{CC} – 0.6 V, other inputs at V_{CC} or GND

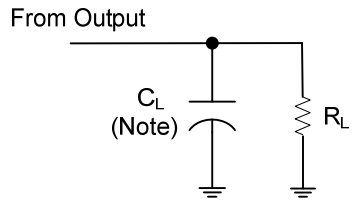
■ SWITCHING CHARACTERISTICS (R_L=1MΩ, T_A=25°C , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Propagation delay from input (A, B or C) to output(Y)	t_{PD}	C_L=5pF	V_{CC}=0.8V		23.1		ns
			V_{CC}=1.2V±0.1V	3.1	9.1	13.9	ns
			V_{CC}=1.5V±0.1V	2.1	6.4	9.4	ns
			V_{CC}=1.8V±0.15V	1.6	5.1	7.5	ns
			V_{CC}=2.5V±0.2V	1.1	3.6	5.7	ns
			V_{CC}=3.3V±0.3V	1	2.8	4.7	ns
		C_L=10pF	V_{CC}=0.8V		26.2		ns
			V_{CC}=1.2V±0.1V	5.2	10.4	15.4	ns
			V_{CC}=1.5V±0.1V	4	7.4	10.7	ns
			V_{CC}=1.8V±0.15V	3.1	6	8.6	ns
			V_{CC}=2.5V±0.2V	2.7	4.3	6.5	ns
			V_{CC}=3.3V±0.3V	2.5	3.4	5.4	ns
		C_L=15pF	V_{CC}=0.8V		28.9		ns
			V_{CC}=1.2V±0.1V	4.1	11.5	16.8	ns
			V_{CC}=1.5V±0.1V	3	8.3	11.8	ns
			V_{CC}=1.8V±0.15V	2.3	6.7	9.5	ns
			V_{CC}=2.5V±0.2V	1.7	4.8	7.2	ns
			V_{CC}=3.3V±0.3V	1.4	3.9	6	ns
		C_L=30pF	V_{CC}=0.8V		36.7		ns
			V_{CC}=1.2V±0.1V	5.5	14.6	21.4	ns
			V_{CC}=1.5V±0.1V	4.1	10.5	14.8	ns
			V_{CC}=1.8V±0.15V	3.3	8.6	11.8	ns
			V_{CC}=2.5V±0.2V	2.5	6.3	8.8	ns
			V_{CC}=3.3V±0.3V	2.1	5.1	7.3	ns

■ OPERATING CHARACTERISTICS (f=10MHz, T_A=25°C , unless otherwise specified)

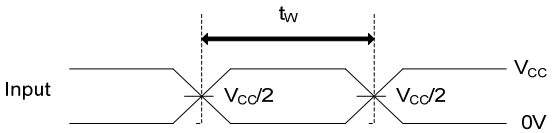
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	V_{CC}=0.8V		4.0		pF
		V_{CC}=1.2V±0.1V		4.0		pF
		V_{CC}=1.5V±0.1V		4.0		pF
		V_{CC}=1.8V±0.15V		4.0		pF
		V_{CC}=2.5V±0.2V		4.4		pF
		V_{CC}=3.3V±0.3V		4.8		pF

■ TEST CIRCUIT AND WAVEFORMS

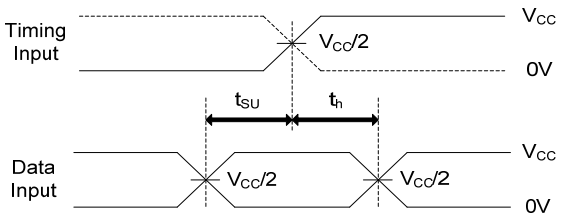


TEST CIRCUIT

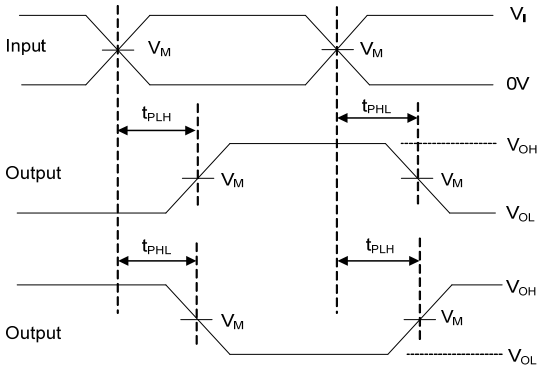
V_{CC}	C_L	V_M	V_I
0.8V	5,10,15,30pF	$V_{CC}/2$	V_{CC}
1.2V±0.1V	5,10,15,30pF	$V_{CC}/2$	V_{CC}
1.5V±0.1V	5,10,15,30pF	$V_{CC}/2$	V_{CC}
1.8V±0.15V	5,10,15,30pF	$V_{CC}/2$	V_{CC}
2.5V±0.2V	5,10,15,30pF	$V_{CC}/2$	V_{CC}
3.3V±0.3V	5,10,15,30pF	$V_{CC}/2$	V_{CC}



VOLTAGE WAVEFORMS PULSE DURATION



VOLTAGE WAVEFORMS SETUP AND HOLD TIMES



Voltage Waveforms Propagation Delay Times

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