



U74AUP1T08N

CMOS IC

LOW-POWER 2-INPUT AND GATE WITH VOLTAGE-LEVEL TRANSLATOR

DESCRIPTION

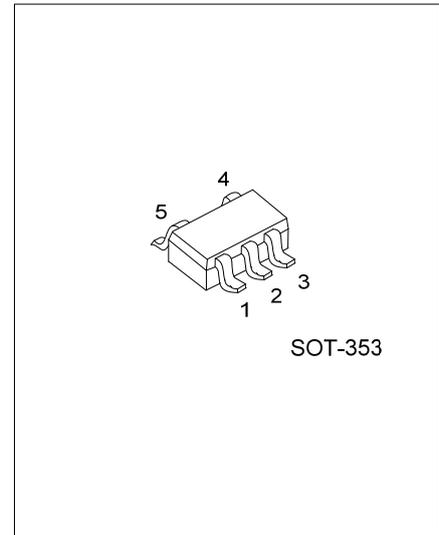
The UTC **U74AUP1T08N** provides the single 2-input AND function. This device ensures a very low static and dynamic power consumption across the entire V_{CC} range from 2.3V to 3.6V.

Designed for logic-level translation applications, the UTC **U74AUP1T08N** accepts with input switching levels compatible with 1.8V low-voltage CMOS signals, while operating from either a single 2.5V or 3.3V supply voltage.

A wide supply voltage range allows stable operation even as battery voltage decreases from 3.6V to 2.3V.

The device is fully specified for partial power-down operation using I_{OFF} . When powered down, the I_{OFF} circuitry disables the output and prevents damaging backflow current through the device.

Schmitt trigger inputs provide tolerance to slower input rise and fall times over the entire V_{CC} range.



FEATURES

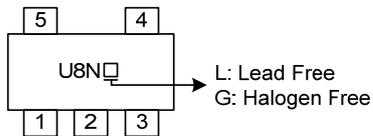
- * Low power dissipation
- * Wide supply voltage range from 2.3V to 3.6V
- * Inputs accept voltages up to 3.6V
- * I_{OFF} supports partial-power-down mode
- * High noise immunity

ORDERING INFORMATION

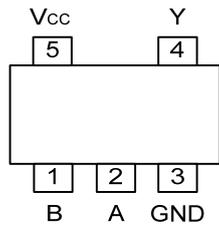
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74AUP1T08NL-AL5-R	U74AUP1T08NG-AL5-R	SOT-353	Tape Reel

<p>U74AUP1T08NG-AL5-R</p> <ul style="list-style-type: none"> (1)Packing Type (2)Package Type (3)Green Package 	<ul style="list-style-type: none"> (1) R: Tape Reel (2) AL5: SOT-353 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING



PIN CONFIGURATION



PIN DESCRIPTION

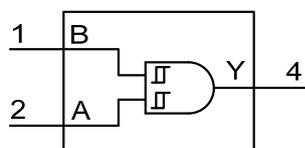
PIN NO.	PIN NAME	DESCRIPTION
1	B	Logic Input
2	A	Logic Input
3	GND	Ground
4	Y	Logic output
5	V _{CC}	Supply Voltage

FUNCTION TABLE

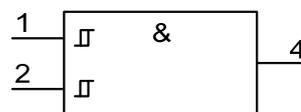
INPUT		OUTPUT
A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

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

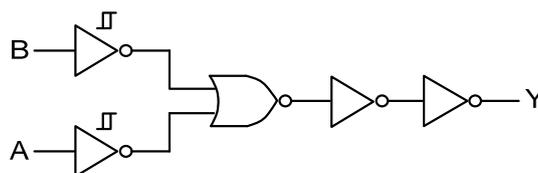
LOGIC DIAGRAM (positive logic)



Logic Symbol



IEC Logic Symbol



Logic Diagram

■ ABSOLUTE MAXIMUM RATING (T_A=25°C, unless otherwise specified) (Note 1)

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNIT
Supply Voltage	V _{CC}		-0.5 ~ +4.6	V
Input Voltage (Note 2)	V _{IN}		-0.5 ~ +4.6	V
Output Voltage (Note 2)	V _{OUT}	Active mode and power-down mode	-0.5 ~ +4.6	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} <0 V	-50	mA
Ground Current	I _{GND}		-50	mA
Storage Temperature Range	T _{STG}		-65 ~ +150	°C

Notes: 1. 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.

2. The minimum input and output voltage ratings may be exceeded if the input and output current ratings are observed.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V _{CC}		2.3		3.6	V
Input Voltage	V _{IN}		0		3.6	V
Output Voltage	V _{OUT}	Active mode	0		V _{CC}	V
		Power-down mode, V _{CC} =0V	0		3.6	V
Operating Temperature	T _A		-40		+125	°C

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

PARAMETER	SYMBOL	TEST CONDITIONS	T _A =25°C			T _A =-40~+125°C			UNIT	
			MIN	TYP	MAX	MIN	TYP	MAX		
Positive-Going Input Threshold Voltage	V _{T+}	V _{CC} =2.3V~2.7V	0.6		1.1	0.6		1.1	V	
		V _{CC} =3.0V~3.6V	0.75		1.16	0.75		1.19	V	
Negative-Going Input Threshold Voltage	V _{T-}	V _{CC} =2.3V~2.7V	0.35		0.6	0.33		0.64	V	
		V _{CC} =3.0V~3.6V	0.5		0.85	0.46		0.85	V	
Hysteresis Voltage (V _{T+} -V _{T-})	ΔV _T	V _{CC} =2.3V~2.7V	0.23		0.6	0.1		0.6	V	
		V _{CC} =3.0V~3.6V	0.25		0.56	0.15		0.56	V	
High-Level Output Voltage	V _{OH}	V _{CC} =2.3V ~3.6V, I _{OH} =-20μA	V _{CC} -0.1			V _{CC} -0.11			V	
		V _{CC} =2.3V	I _{OH} =-2.3mA	2.05			1.77			V
			I _{OH} =-3.1mA	1.9			1.67			V
		V _{CC} =3.0V	I _{OH} =-2.7mA	2.72			2.4			V
I _{OH} =-4.0mA	2.6				2.3			V		
Low-Level Output Voltage	V _{OL}	V _{CC} =2.3V ~3.6V, I _{OL} =20μA			0.1			0.11	V	
		V _{CC} =2.3V	I _{OL} =2.3mA			0.31			0.36	V
			I _{OL} =3.1mA			0.44			0.5	V
		V _{CC} =3.0V	I _{OL} =2.7mA			0.31			0.36	V
I _{OL} =4.0mA				0.44			0.5	V		
Input Leakage Current	I _{I(LEAK)}	V _{CC} =0V ~3.6V, V _{IN} =GND to 3.6V			±0.1			±0.75	μA	
Power OFF Leakage Current	I _{OFF}	V _{CC} =0V, V _{IN} or V _{OUT} =0V ~3.6V			±0.1			±0.75	μA	
Additional Power-OFF Leakage Current	ΔI _{OFF}	V _{CC} =0V ~0.2V, V _{IN} or V _{OUT} =0V ~3.6V			±0.1			±0.75	μA	
Quiescent Supply Current	I _{CC}	V _{CC} =2.3V~3.6V, V _{IN} =GND or V _{CC} , I _{OUT} =0A			2			3.5	μA	
Additional Supply Current	ΔI _{CC}	V _{CC} =2.3V ~2.7V, I _{OUT} =0A (Note 1)		0.3				4	μA	
		V _{CC} =3V ~3.6V, I _{OUT} =0A (Note 2)		1.1				18	μA	

Notes: 1. One input at 0.3V or 1.1V, other input at V_{CC} or GND.
 2. One input at 0.45V or 1.2V, other input at V_{CC} or GND.

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

PARAMETER	SYMBOL	TEST CONDITIONS	T _A =25°C			T _A =-40~+125°C			UNIT	
			MIN	TYP	MAX	MIN	TYP	MAX		
Propagation Delay From Input (A, B) to Output (Y) (Note 1)	t _{PD}	V _{CC} =2.5V±0.2V V _{IN} =1.8V±0.15V	C _L =5pF	2.0		15.2	0.5		17.5	ns
			C _L =10pF	2.3		16	1.0		18.7	ns
			C _L =15pF	2.7		16.6	1.0		19.6	ns
			C _L =30pF	3.5		18.1	1.5		21.9	ns
		V _{CC} =2.5V±0.2V V _{IN} =2.5V±0.2V	C _L =5pF	1.6		15.2	0.5		16.6	ns
			C _L =10pF	1.9		16	1.0		17.9	ns
			C _L =15pF	2.3		16.6	1.0		18.7	ns
			C _L =30pF	3.1		18.1	1.5		21	ns
		V _{CC} =2.5V±0.2V V _{IN} =3.3V±0.3V	C _L =5pF	1.2		14.7	0.5		16.1	ns
			C _L =10pF	1.6		15.4	1.0		17.2	ns
			C _L =15pF	1.9		16.1	1.0		18.2	ns
			C _L =30pF	2.7		17.5	1.5		20.5	ns
		V _{CC} =3.3V±0.3V V _{IN} =1.8V±0.15V	C _L =5pF	1.8		13.8	0.5		18.8	ns
			C _L =10pF	2.3		14.5	1.0		19.4	ns
			C _L =15pF	2.6		15	1.0		20.1	ns
			C _L =30pF	3.4		16.5	1.5		20.8	ns
		V _{CC} =3.3V±0.3V V _{IN} =2.5V±0.2V	C _L =5pF	1.5		14	0.5		15.9	ns
			C _L =10pF	1.9		14.8	1.0		16.8	ns
			C _L =15pF	2.1		15.4	1.0		17.5	ns
			C _L =30pF	2.9		16.9	1.5		19.4	ns
		V _{CC} =3.3V±0.3V V _{IN} =3.3V±0.3V	C _L =5pF	1.1		14.1	0.5		15.2	ns
			C _L =10pF	1.5		14.8	1.0		16.3	ns
			C _L =15pF	1.8		15.5	1.0		16.9	ns
			C _L =30pF	2.5		17	1.5		18.6	ns

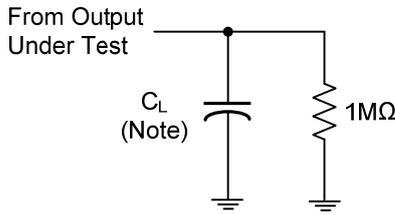
Note: t_{PD} is the same as t_{PLH} and t_{PHL}.

■ OPERATING CHARACTERISTICS (f=1MHz, V_I=GND to V_{CC}, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation	C _{PD}	V _{CC} =2.3V to 2.7V		4.0		pF
Capacitance (Note)		V _{CC} =3.0V to 3.6V		5.0		pF

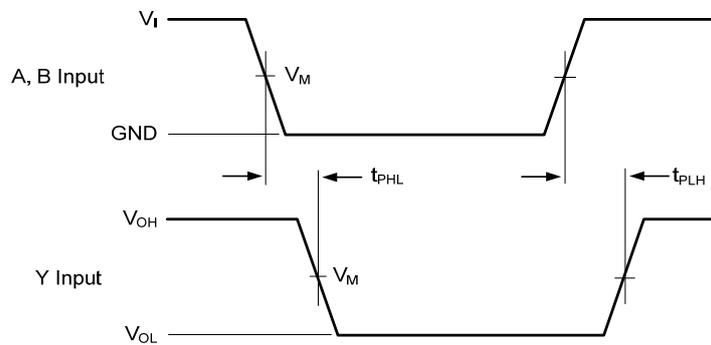
Note: CPD is used to determine the dynamic power dissipation (P_D in μW).

■ TEST CIRCUIT AND WAVEFORMS



LOAD CIRCUIT

Note: C_L includes probe and jig capacitance.



Propagation Delay Times

Supply Voltage	Output	Input			Load	
V_{CC}	V_M	V_M	V_i	$t_r = t_f$	C_L	R_L
2.3V ~ 3.6V	$0.5 \times V_{CC}$	$0.5 \times V_i$	1.65V ~ 3.6V	$\leq 3.0ns$	5,10,15,30pF	$1M\Omega$

Note: For measuring propagation delays, setup and hold times and pulse width $R_L = 1 M\Omega$.

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