![UTC] **UNISONIC TECHNOLOGIES CO., LTD**

U74AUP1G02
CMOS IC

SINGLE 2-INPUT NOR GATE

SOT-23-5
(JEDEC TO-236)

SOT-353

DFN-6(1.0×1.0)

■ DESCRIPTION

The **U74AUP1G02** is a low-power single 2-input positive-NOR gate which provides the Function $Y=\overline{A+B}$ or $Y=\overline{A} \cdot \overline{B}$ in positive logic.

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}=0.5μA (Max.)
* Optimized for 3.3V Operation
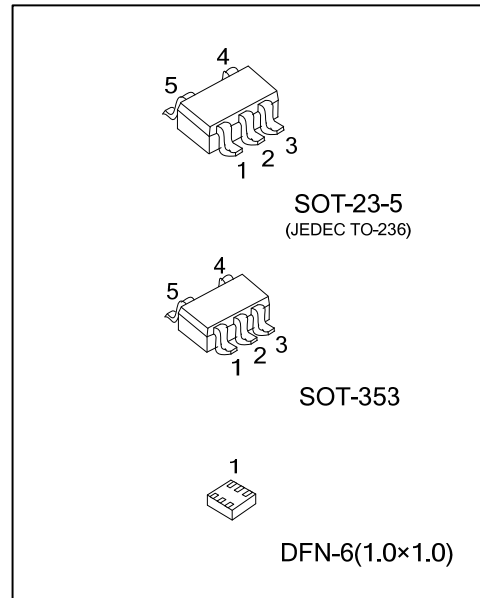
■ ORDERING INFORMATION

Ordering Number	Package	Packing
U74AUP1G02G-AE5-R	SOT-23-5	Tape Reel
U74AUP1G02G-AL5-R	SOT-353	Tape Reel
U74AUP1G02G-K06-1010-R	DFN-6(1.0×1.0)	Tape Reel

U74AUP1G02<u>G</u>-<u>AE5</u>-<u>R</u>
  (1)Packing Type
  (2)Package Type
  (3)Green Package

(1) R: Tape Reel
(2) AE5: SOT-23-5, AL5: SOT-353,
   K06-1010: DFN-6(1.0×1.0)
(3) G: Halogen Free and Lead Free
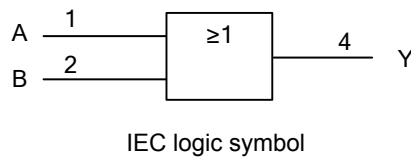
■ MARKING

SOT-23-5 / SOT-353	DFN-6(1.0×1.0)
5 4 P02 1 2 3	P2 •

■ **PIN CONFIGURATION**

SOT-23-5 / SOT-353
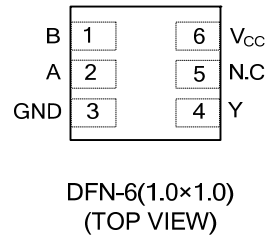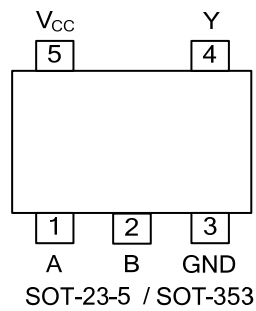
DFN-6(1.0×1.0)
(TOP VIEW)

■ **FUNCTION TABLE**

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

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

■ **FUNCTION TABLE** (positive logic)

For SOT-23-5/SOT-353

Logic symbol

IEC logic symbol

For DFN-6(1.0×1.0)

Logic symbol

IEC logic symbol

U74AUP1G02 *CMOS IC*
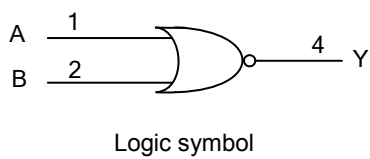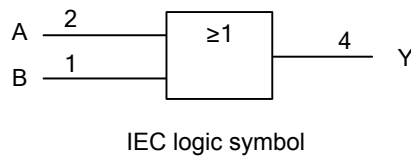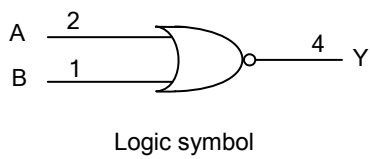
■ **ABSOLUTE MAXIMUM RATING**

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 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 ~ V_{CC}	±20	mA
Input Clamp Current	I_{IK}	V_{IN}<0	-50	mA
Output Clamp Current	I_{OK}	V_O>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	Δt/Δv	V_{CC}=0.8V ~ 3.6V			200	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}=0.8V		V_{CC}			V
		V_{CC}=1.1V ~ 1.95V		0.65×V_{CC}			V
		V_{CC}=2.3V ~ 2.7V		1.6			V
		V_{CC}=3V ~ 3.6V		2			
Low-level Input Voltage	V_{IL}	V_{CC}=0.8V				0	V
		V_{CC}=1.1V ~ 1.95V				0.35×V_{CC}	V
		V_{CC}=2.3V ~ 2.7V				0.7	V
		V_{CC}=3V ~ 3.6V				0.9	
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}=3V	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_{OH}=-20µA				0.1	V
		V_{CC}=1.1V, I_{OH}=-1.1mA				0.3×V_{CC}	V
		V_{CC}=1.4V, I_{OH}=-1.7mA				0.31	V
		V_{CC}=1.65V, I_{OH}=-1.9mA				0.31	V
		V_{CC}=2.3V	I_{OH}=2.3mA			0.31	V
			I_{OH}=3.1mA			0.44	V
		V_{CC}=3V	I_{OH}=2.7mA			0.31	V
			I_{OH}=4mA			0.44	V

■ **ELECTRICAL CHARACTERISTICS (Cont.)**

| PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=0 \sim 3.6V$, $V_{IN}=GND \sim 3.6V$			±0.1	μA
Power OFF Leakage Current	I_{off}	$V_{CC}=0$ V, V_{IN} or $V_{OUT}=0 \sim 3.6V$			±0.2	μA
Additional Power OFF Leakage Current	ΔI_{off}	$V_{CC}=0$ V~0.2V, V_{IN} or $V_{OUT}=0 \sim 3.6V$			±0.2	μA
Quiescent Supply Current	I_{CC}	$V_{CC}=0.8 \sim 3.6V$, $V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$			0.5	μA
Additional Quiescent Supply Current Per Input Pin	ΔI_{CC}	$V_{CC}=3.3$ V, $V_{IN}=V_{CC}-0.6V$, $I_{OUT}=0$			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		1.5		pF
Output Capacitance	C_{OUT}	$V_{CC}=0V$, $V_{OUT}=GND$		3		pF

■ **SWITCHING CHARACTERISTICS** ($R_L=1M\Omega$, $T_A=25°C$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Propagation delay from input (A or B) to output(Y)	t_{PLH} / t_{PHL}	$C_L=5pF$, $R_L=1M\Omega$	$V_{CC}=0.8V$		19.3		ns
			$V_{CC}=1.2\pm0.1V$	2.6	7.3		ns
			$V_{CC}=1.5\pm0.1V$	1.4	5.2		ns
			$V_{CC}=1.8\pm0.15V$	1	4.2		ns
			$V_{CC}=2.5\pm0.2V$	1	3		ns
			$V_{CC}=3.3\pm0.3V$	1	2.4		ns
		$C_L=10pF$, $R_L=1M\Omega$	$V_{CC}=0.8V$		22.3		ns
			$V_{CC}=1.2\pm0.1V$	1.5	8.5		ns
			$V_{CC}=1.5\pm0.1V$	1	6.2		ns
			$V_{CC}=1.8\pm0.15V$	1	5		ns
			$V_{CC}=2.5\pm0.2V$	1	3.6		ns
			$V_{CC}=3.3\pm0.3V$	1	2.9		ns
		$C_L=15pF$, $R_L=1M\Omega$	$V_{CC}=0.8V$		25		ns
			$V_{CC}=1.2\pm0.1V$	3.6	9.9		ns
			$V_{CC}=1.5\pm0.1V$	2.3	7.2		ns
			$V_{CC}=1.8\pm0.15V$	1.6	5.8		ns
			$V_{CC}=2.5\pm0.2V$	1	4.3		ns
			$V_{CC}=3.3\pm0.3V$	1	3.4		ns
		$C_L=30pF$, $R_L=1M\Omega$	$V_{CC}=0.8V$		34.6		ns
			$V_{CC}=1.2\pm0.1V$	4.9	13.1		ns
			$V_{CC}=1.5\pm0.1V$	3.4	9.5		ns
			$V_{CC}=1.8\pm0.15V$	2.5	7.7		ns
			$V_{CC}=2.5\pm0.2V$	1.8	5.7		ns
			$V_{CC}=3.3\pm0.3V$	1.5	4.7		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}	$V_{CC}=0.8V$		4.1		pF
		$V_{CC}=1.2\pm0.1V$		4.1		pF
		$V_{CC}=1.5\pm0.1V$		4.1		pF
		$V_{CC}=1.8\pm0.15V$		4.1		pF
		$V_{CC}=2.5\pm0.2V$		4.2		pF
		$V_{CC}=3.3\pm0.3V$		4.3		pF

■ **TEST CIRCUIT AND WAVEFORMS**

From Output

(Note 1) C_L

R_L

TEST CIRCUIT
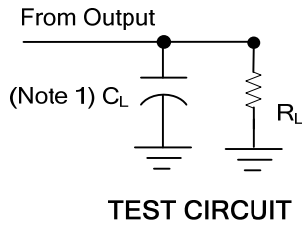
V_{CC}	V_{IN}	t_R / t_F	V_M	C_L	R_L
0.8V	V_{CC}	≤3ns	V_{CC}/2	5,10,15,30pF	1MΩ
1.2V±0.1V	V_{CC}	≤3ns	V_{CC}/2	5,10,15,30pF	1MΩ
1.5V±0.1V	V_{CC}	≤3ns	V_{CC}/2	5,10,15,30pF	1MΩ
1.8V±0.15V	V_{CC}	≤3ns	V_{CC}/2	5,10,15,30pF	1MΩ
2.5V±0.2V	V_{CC}	≤3ns	V_{CC}/2	5,10,15,30pF	1MΩ
3.3V±0.3V	V_{CC}	≤3ns	V_{CC}/2	5,10,15,30pF	1MΩ

Input V_M V_M V_{IN} 0V

t_{PLH} t_{PHL}

Output V_M V_M V_{OH} V_{OL}

t_{PHL} t_{PLH}

Output V_M V_M V_{OH} V_{OL}

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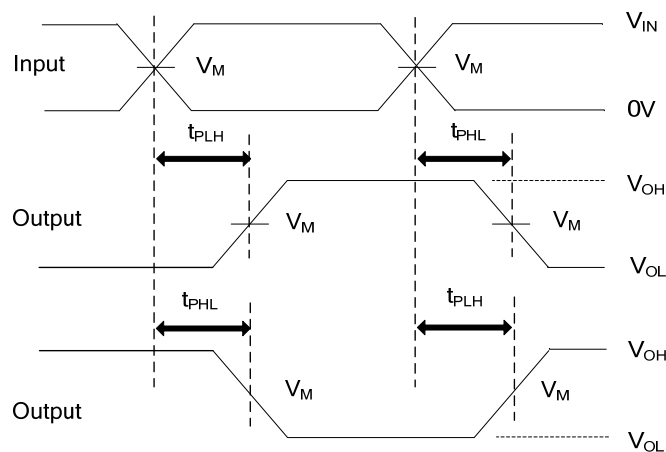
Notes: 1. C_L includes probe and jig capacitance.
 2. All input pulses are supplied by generators having the following characteristics: PRR ≤10MHz, Z_O = 50Ω.