



U74AUP1G86

CMOS IC

SINGLE 2-INPUT EXCLUSIVE-OR GATE

DESCRIPTION

The **U74AUP1G86** is a single 2-input EXCLUSIVE-OR gate which provides the Function $Y = A \oplus B$ or $Y = \overline{AB} + A\overline{B}$ 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; $I_{CC}=0.5\mu A$ (Max.)
- * Optimized for 3.3V Operation

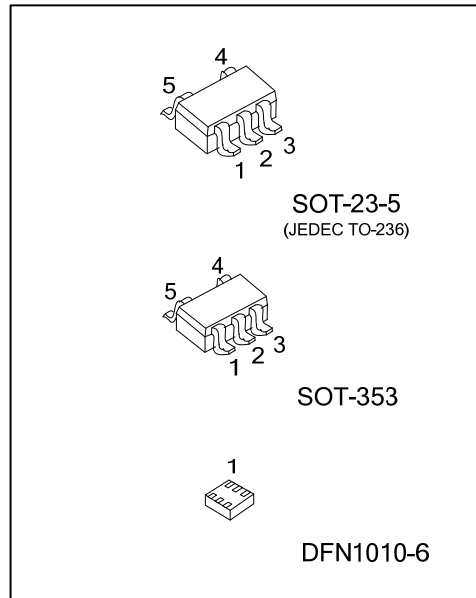
ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74AUP1G86L-AE5-R	U74AUP1G86G-AE5-R	SOT-23-5	Tape Reel
U74AUP1G86L-AL5-R	U74AUP1G86G-AL5-R	SOT-353	Tape Reel
U74AUP1G86L-K06-1010-R	U74AUP1G86G-K06-1010-R	DFN1010-6	Tape Reel

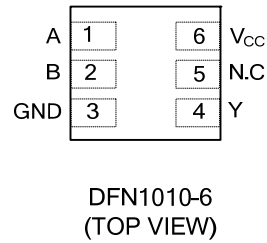
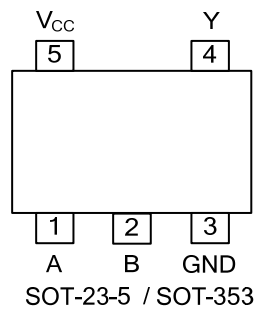
<p>U74AUP1G86G-AE5-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AE5: SOT-23-5, AL5: SOT-353, K06-1010: DFN1010-6 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING

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



■ PIN CONFIGURATION



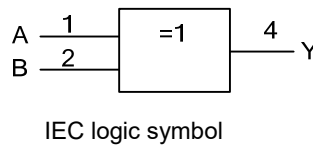
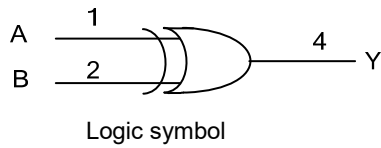
■ FUNCTION TABLE

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

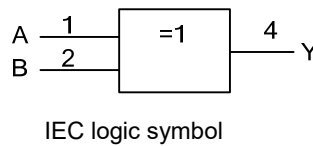
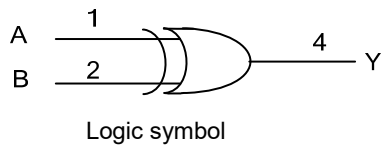
Note: H: HIGH voltage level; L: LOW voltage level.

■ LOGIC DIAGRAM (positive logic)

For SOT-23-5/SOT-353



For DFN1010-6



■ 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}	$V_{OUT}=0 \sim V_{CC}$	±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
Input Transition Rise or Fall Rate	$\Delta t/\Delta v$	$V_{CC}=0.8V \sim 3.6V$			200	ns/V
Operating Temperature	T_A		-40		+125	°C

■ 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	
		$V_{CC}=3V \sim 3.6V$	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	
		$V_{CC}=3V \sim 3.6V$			0.9	V	
High-Level Output Voltage	V_{OH}	$V_{CC}=0.8 \sim 3.6V, I_{OH}=-20\mu A$	$V_{CC}-0.1$			V	
		$V_{CC}=1.1V, I_{OH}=-1.1mA$	$0.75 \times V_{CC}$			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}	$V_{CC}=0.8 \sim 3.6V, I_{OL}=20\mu A$			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
		$V_{CC}=3V$	$I_{OL}=2.7mA$			0.31	V
	$I_{OL}=4mA$			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}	$V_{CC}=0V, V_{IN}$ or $V_{OUT}=0 \sim 3.6V$			± 0.2	μA
Additional Power OFF Leakage Current	ΔI_{off}	$V_{CC}=0V \sim 0.2V, V_{IN}$ 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}	$V_{CC}=3.3V, V_{IN}=V_{CC}-0.6V, I_{OUT}=0$			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		1.5		pF
Output Capacitance	C_{OUT}	$V_{CC}=0V, V_{OUT}=GND$		3		pF

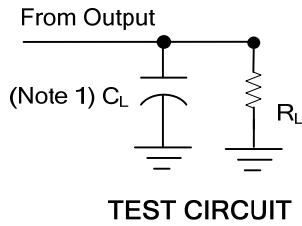
■ SWITCHING CHARACTERISTICS ($T_A = 25^\circ C$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Propagation delay from inputs (A or B) to output(Y)	t_{PD}	$C_L=5pF, R_L=1M\Omega$	$V_{CC}=0.8V$		21.2		ns
			$V_{CC}=1.2\pm 0.1V$	2.3	5.9		ns
			$V_{CC}=1.5\pm 0.1V$	1.8	4.1		ns
			$V_{CC}=1.8\pm 0.15V$	1.5	3.3		ns
			$V_{CC}=2.5\pm 0.2V$	1.2	2.6		ns
		$C_L=10pF, R_L=1M\Omega$	$V_{CC}=3.3\pm 0.3V$	1	2.3		ns
			$V_{CC}=0.8V$		24.7		ns
			$V_{CC}=1.2\pm 0.1V$	2.6	6.8		ns
			$V_{CC}=1.5\pm 0.1V$	2.2	4.8		ns
			$V_{CC}=1.8\pm 0.15V$	1.8	3.9		ns
		$C_L=15pF, R_L=1M\Omega$	$V_{CC}=2.5\pm 0.2V$	1.5	3.1		ns
			$V_{CC}=3.3\pm 0.3V$	1.3	2.9		ns
			$V_{CC}=0.8V$		28.2		ns
			$V_{CC}=1.2\pm 0.1V$	3.0	7.6		ns
			$V_{CC}=1.5\pm 0.1V$	2.4	5.3		ns
		$C_L=30pF, R_L=1M\Omega$	$V_{CC}=1.8\pm 0.15V$	2.1	4.4		ns
			$V_{CC}=2.5\pm 0.2V$	1.8	3.6		ns
			$V_{CC}=3.3\pm 0.3V$	1.6	3.3		ns
			$V_{CC}=0.8V$		38.5		ns
			$V_{CC}=1.2\pm 0.1V$	3.9	9.9		ns
			$V_{CC}=1.5\pm 0.1V$	3.2	6.9		ns
			$V_{CC}=1.8\pm 0.15V$	2.8	5.7		ns
			$V_{CC}=2.5\pm 0.2V$	2.4	4.7		ns
			$V_{CC}=3.3\pm 0.3V$	2.2	4.4		ns

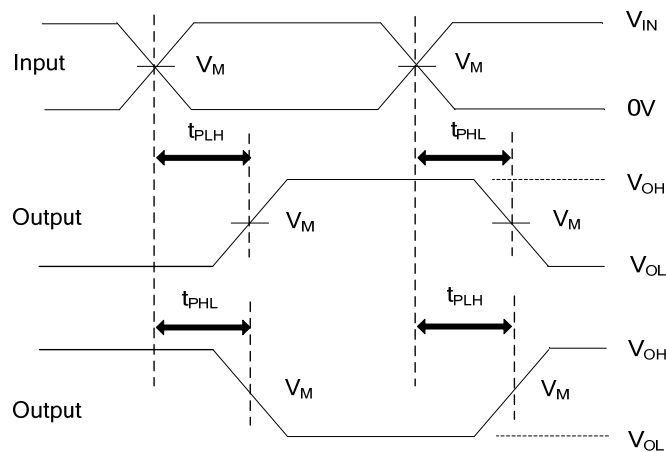
■ OPERATING CHARACTERISTICS ($f=1MHz, T_A = 25^\circ C$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	$V_{CC}=0.8V$		2.7		pF
		$V_{CC}=1.2\pm 0.1V$		2.9		pF
		$V_{CC}=1.5\pm 0.1V$		3.0		pF
		$V_{CC}=1.8\pm 0.15V$		3.1		pF
		$V_{CC}=2.5\pm 0.2V$		3.6		pF
		$V_{CC}=3.3\pm 0.3V$		4.2		pF

■ TEST CIRCUIT AND WAVEFORMS



V_{CC}	V_{IN}	t_R / t_F	V_M	C_L	R_L
0.8V	V_{CC}	$\leq 3\text{ns}$	$V_{CC}/2$	5, 10, 15, 30pF	1M Ω
1.2V \pm 0.1V	V_{CC}	$\leq 3\text{ns}$	$V_{CC}/2$	5, 10, 15, 30pF	1M Ω
1.5V \pm 0.1V	V_{CC}	$\leq 3\text{ns}$	$V_{CC}/2$	5, 10, 15, 30pF	1M Ω
1.8V \pm 0.15V	V_{CC}	$\leq 3\text{ns}$	$V_{CC}/2$	5, 10, 15, 30pF	1M Ω
2.5V \pm 0.2V	V_{CC}	$\leq 3\text{ns}$	$V_{CC}/2$	5, 10, 15, 30pF	1M Ω
3.3V \pm 0.3V	V_{CC}	$\leq 3\text{ns}$	$V_{CC}/2$	5, 10, 15, 30pF	1M Ω



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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