



U74LVC1G86

CMOS IC

SINGLE 2-INPUT EXCLUSIVE-OR GATE

DESCRIPTION

The **U74LVC1G86** is a single 2-input EXCLUSIVE-OR gate which provides the Function $Y = A \oplus B$ or $Y = \overline{A}B + A\overline{B}$ in positive logic. Inputs can be driven from either 3.3V or 5V devices. These features allow the use of these devices in a mixed 3.3V and 5V environment.

This device is fully specified for partial Power-down applications using I_{OFF} . The I_{OFF} circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

FEATURES

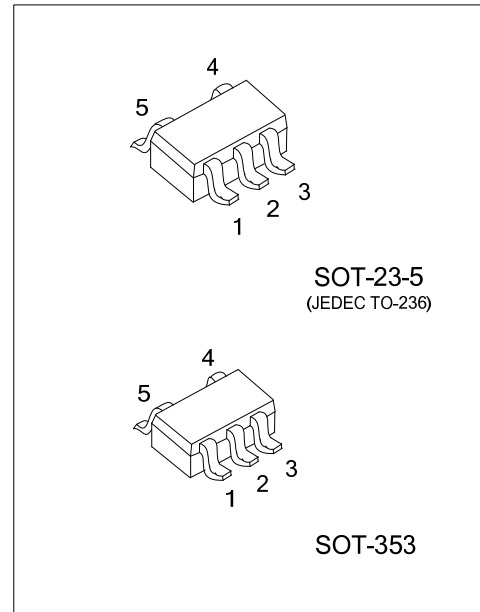
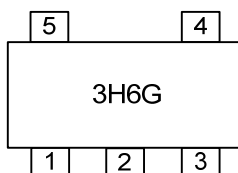
- * Operate from 1.65V to 5.5V
- * Inputs accept voltages to 5.5V
- * I_{OFF} supports partial-power-down mode
- * Low power dissipation
- * Max t_{PD} of 4 ns at 3.3V

ORDERING INFORMATION

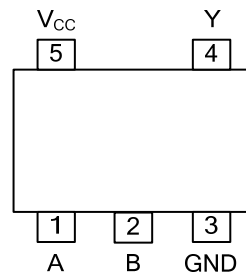
Ordering Number	Package	Packing
U74LVC1G86G-AE5-R	SOT-23-5	Tape Reel
U74LVC1G86G-AL5-R	SOT-353	Tape Reel

U74LVC1G86G-AE5-R	(1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) AE5: SOT-23-5, AL5: SOT-353 (3) G: Halogen Free and Lead Free
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MARKING



■ PIN CONFIGURATION

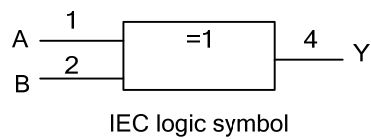
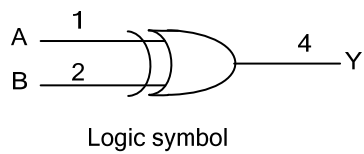


■ FUNCTION TABLE

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

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

■ LOGIC DIAGRAM (positive logic)



■ ABSOLUTE MAXIMUM RATING

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		V_{CC}	-0.5 ~ +6.5	V
Input Voltage		V_{IN}	-0.5 ~ +6.5	V
Output Voltage	Output in the high or low state	V_{OUT}	-0.5 ~ $V_{CC}+0.5$	V
	Output in the high-impedance or power-off state		-0.5 ~ +6.5	V
Continuous V_{CC} or GND Current		I_{CC}	±100	mA
Continuous Output Current ($V_{OUT}=0$ to V_{CC})		I_{OUT}	±50	mA
Input Clamp Current ($V_{IN}<0$)		I_{IK}	-50	mA
Output Clamp Current ($V_{OUT}<0$)		I_{OK}	-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	1.65		5.5	V
		Data retention only	1.5			V
Input Voltage	V_{IN}		0		5.5	V
Output Voltage	V_{OUT}	High or low state	0		V_{CC}	V
High-level Output Current	I_{OH}	$V_{CC}=1.65V$			-4	mA
		$V_{CC}=2.3V$			-8	mA
		$V_{CC}=3V$			-16	mA
		$V_{CC}=3V$			-24	mA
		$V_{CC}=4.5V$			-32	mA
Low-level Output Current	I_{OL}	$V_{CC}=1.65V$			4	mA
		$V_{CC}=2.3V$			8	mA
		$V_{CC}=3V$			16	mA
		$V_{CC}=3V$			24	mA
		$V_{CC}=4.5V$			32	mA
Operating Temperature	T_A		-40		85	°C
Input Transition Rise or Fall Rate	$\Delta t/\Delta v$	$V_{CC}=1.8V\pm0.15V, 2.5V\pm0.2V$			20	ns/V
		$V_{CC}=3.3V\pm0.3V$			10	ns/V
		$V_{CC}=5V\pm0.5V$			5	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}	$V_{CC}=1.65\text{V to }1.95\text{V}$	$0.65 \times V_{CC}$			V
		$V_{CC}=2.3\text{V to }2.7\text{V}$	1.7			V
		$V_{CC}=3\text{V to }3.6\text{V}$	2			V
		$V_{CC}=4.5\text{V to }5.5\text{V}$	$0.7 \times V_{CC}$			V
Low-level Input Voltage	V_{IL}	$V_{CC}=1.65\text{V to }1.95\text{V}$			$0.35 \times V_{CC}$	V
		$V_{CC}=2.3\text{V to }2.7\text{V}$			0.7	V
		$V_{CC}=3\text{V to }3.6\text{V}$			0.8	V
		$V_{CC}=4.5\text{V to }5.5\text{V}$			$0.3 \times V_{CC}$	V
High-Level Output Voltage	V_{OH}	$V_{CC}=1.65 \sim 5.5\text{V}$, $I_{OH}=-100\mu\text{A}$	$V_{CC}-0.1$			V
		$V_{CC}=1.65\text{V}$, $I_{OH}=-4\text{mA}$	1.2			V
		$V_{CC}=2.3\text{V}$, $I_{OH}=-8\text{mA}$	1.9			V
		$V_{CC}=3.0\text{V}$	$I_{OL}=16\text{mA}$	2.4		V
			$I_{OL}=24\text{mA}$	2.3		V
		$V_{CC}=4.5\text{V}$, $I_{OH}=-32\text{mA}$	3.8			V
Low-Level Output Voltage	V_{OL}	$V_{CC}=1.65 \sim 5.5\text{V}$, $I_{OL}=100\mu\text{A}$			0.1	V
		$V_{CC}=1.65\text{V}$, $I_{OL}=4\text{mA}$			0.45	V
		$V_{CC}=2.3\text{V}$, $I_{OL}=8\text{mA}$			0.3	V
		$V_{CC}=3.0\text{V}$	$I_{OL}=16\text{mA}$		0.4	V
			$I_{OL}=24\text{mA}$		0.55	V
		$V_{CC}=4.5\text{V}$, $I_{OL}=32\text{mA}$			0.55	V
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=0 \sim 5.5\text{V}$, $V_{IN}=5.5\text{V}$ or GND			± 5	μA
Power OFF Leakage Current	I_{off}	$V_{CC}=0\text{V}$, V_{IN} or $V_{OUT}=5.5\text{V}$			± 10	μA
Quiescent Supply Current	I_{CC}	$V_{CC}=1.65 \sim 5.5\text{V}$, $V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$			10	μA
Additional Quiescent Supply Current Per Input Pin	ΔI_{CC}	$V_{CC}=3 \sim 5.5\text{V}$, One input at $V_{CC}-0.6\text{V}$, Other inputs at V_{CC} or GND			500	μA
Input Capacitance	C_I	$V_{CC}=3.3\text{V}$, $V_{IN}=V_{CC}$ or GND		6		pF

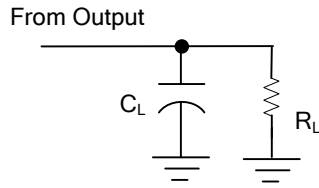
■ SWITCHING CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input to output	t_{PLH} t_{PHL}	$V_{CC}=1.8 \pm 0.15\text{V}$, $C_L=15\text{pF}$, $R_L=1\text{M}\Omega$	2.1		9.1	ns
		$V_{CC}=2.5 \pm 0.2\text{V}$, $C_L=15\text{pF}$, $R_L=1\text{M}\Omega$	1		4.5	ns
		$V_{CC}=3.3 \pm 0.3\text{V}$, $C_L=15\text{pF}$, $R_L=1\text{M}\Omega$	0.6		4	ns
		$V_{CC}=5 \pm 0.5\text{V}$, $C_L=15\text{pF}$, $R_L=1\text{M}\Omega$	0.8		3.3	ns
Propagation delay from input to output	t_{PLH} t_{PHL}	$V_{CC}=1.8 \pm 0.15\text{V}$, $C_L=30\text{pF}$, $R_L=1\text{K}\Omega$	3.5		9.9	ns
		$V_{CC}=2.5 \pm 0.2\text{V}$, $C_L=30\text{pF}$, $R_L=500\Omega$	1.8		5.5	ns
		$V_{CC}=3.3 \pm 0.3\text{V}$, $C_L=50\text{pF}$, $R_L=500\Omega$	1.3		5	ns
		$V_{CC}=5 \pm 0.5\text{V}$, $C_L=50\text{pF}$, $R_L=500\Omega$	1		4	ns

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

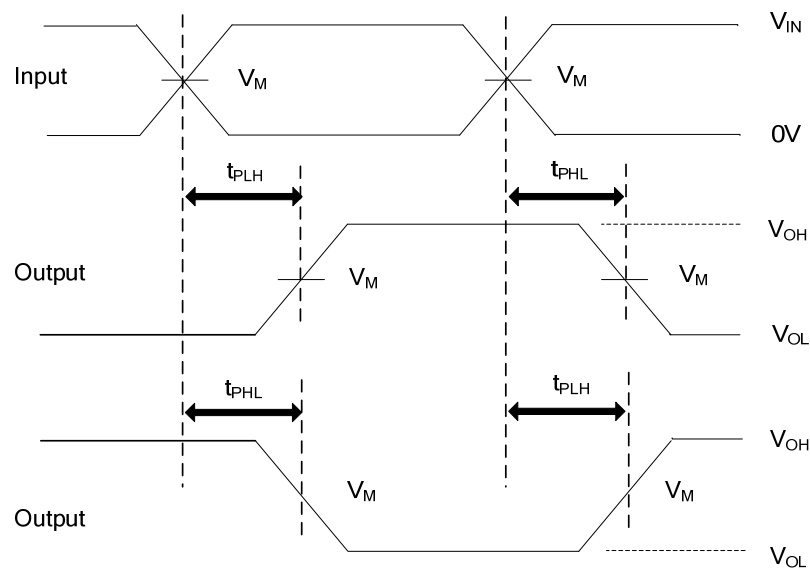
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	$V_{CC}=1.8\text{V}$		22		pF
		$V_{CC}=2.5\text{V}$		22		pF
		$V_{CC}=3.3\text{V}$		22		pF
		$V_{CC}=5\text{V}$		24		pF

■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT

V_{CC}	Inputs		V_M	C_L	R_L
	V_{IN}	t_R, t_F			
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	15pF	1MΩ
				30pF	1KΩ
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	15pF	1MΩ
				30pF	500Ω
3.3V±0.3V	3V	≤2.5ns	1.5V	15pF	1MΩ
				50pF	500Ω
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	15pF	1MΩ
				50pF	500Ω



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, $Z_O = 50\Omega$.

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