



U74LVC1G00

CMOS IC

SINGLE 2-INPUT NAND GATE

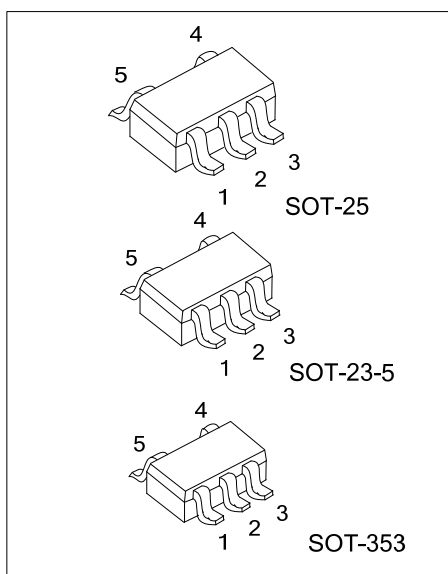
DESCRIPTION

The **U74LVC1G00** is a 2-input NAND gate device which provides the Function $Y=A \bullet B$ or $Y=\overline{A+B}$ in positive logic.

This device has power-down protective circuit preventing device from destruction when it is powered down.

FEATURES

- * Operate From 1.65V to 5.5V
- * Inputs Accept Voltages To 5.5V
- * High Noise Immunity
- * Low Power Dissipation
- * Max t_{PD} of 3.8 ns at 3.3V

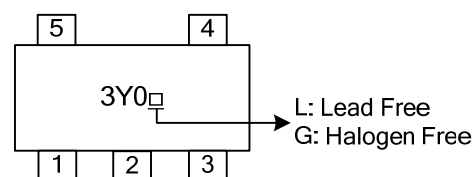


ORDERING INFORMATION

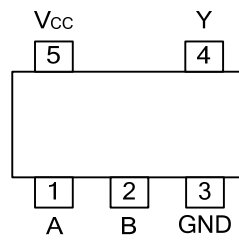
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC1G00L-AE5-R	U74LVC1G00G-AE5-R	SOT-23-5	Tape Reel
U74LVC1G00L-AF5-R	U74LVC1G00G-AF5-R	SOT-25	Tape Reel
U74LVC1G00L-AL5-R	U74LVC1G00G-AL5-R	SOT-353	Tape Reel

U74LVC1G00G-AE5-R	(1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) AE5: SOT-23-5, AF5: SOT-25, AL5: SOT-353 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING



■ PIN CONFIGURATION

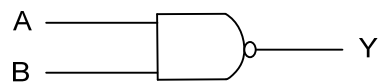


■ FUNCTION TABLE

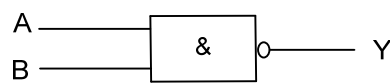
INPUT(A)	INPUT(B)	OUTPUT(Y)
H	H	L
H	L	H
L	H	H
L	L	H

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

■ LOGIC DIAGRAM (positive logic)



Logic symbol



IEC logic symbol

■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNIT
Supply Voltage	V_{CC}		-0.5 ~ +6.5	V
Input Voltage	V_{IN}		-0.5 ~ +6.5	V
Output Voltage	V_{OUT}	Output in the Power-off state	-0.5 ~ +6.5	V
		Output in the High or Low state	-0.5 ~ $V_{CC}+0.5$	V
V_{CC} or GND Current	I_{CC}	Output in the Power-off state	±100	mA
Continuous Output Current	I_{OUT}	$V_{OUT}=0\sim V_{CC}$	±50	mA
Input Clamp Current	I_{IK}	$V_{IN}<0$	-50	mA
Output Clamp Current	I_{OK}	$V_{OUT}<0$	-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.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-23-5	θ_{JA}	280	°C/W
	SOT-25		230	
	SOT-353		350	

■ 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		125	°C
Input Transition Rise or Fall Rate	t_R / t_F	$V_{CC}=1.8V\pm0.15V, 2.5V\pm0.2V$			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}	$V_{CC}=1.65\text{V}\sim 1.95\text{V}$	$0.65\times V_{CC}$			V
		$V_{CC}=2.3\text{V}\sim 2.7\text{V}$	1.7			V
		$V_{CC}=3\text{V}\sim 3.6\text{V}$	2			V
		$V_{CC}=4.5\text{V}\sim 5.5\text{V}$	$0.7\times V_{CC}$			V
Low-Level Input Voltage	V_{IL}	$V_{CC}=1.65\text{V}\sim 1.95\text{V}$			$0.35\times V_{CC}$	V
		$V_{CC}=2.3\text{V}\sim 2.7\text{V}$			0.7	V
		$V_{CC}=3\text{V}\sim 3.6\text{V}$			0.8	V
		$V_{CC}=4.5\text{V}\sim 5.5\text{V}$			$0.3\times V_{CC}$	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
		$V_{CC}=3.0\text{V}$, $I_{OH}=-16\text{mA}$	2.4			V
		$V_{CC}=3.0\text{V}$, $I_{OH}=-24\text{mA}$	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
		$V_{CC}=3.0\text{V}$, $I_{OL}=24\text{mA}$			0.55	V
		$V_{CC}=4.5\text{V}$, $I_{OL}=32\text{mA}$			0.55	V
Input Leakage Current	$I_{I(LEAK)}$	$V_{IN}=5.5\text{V}$ or GND, $V_{CC}=0\sim 5.5\text{V}$			± 5	μA
Power OFF Leakage Current	I_{OFF}	V_{IN} or $V_{OUT}=5.5\text{V}$, $V_{CC}=0\text{V}$			± 10	μA
Quiescent Supply Current	I_Q	$V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$, $V_{CC}=1.65\sim 5.5\text{V}$			10	μA
Additional Quiescent Supply Current Per Input Pin	ΔI_Q	$V_{CC}=3\sim 5.5\text{V}$, 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		4		pF

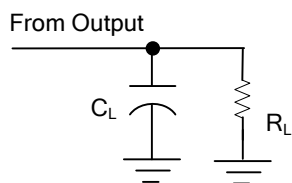
■ **SWITCHING CHARACTERISTICS** ($T_A=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (A or B) to output(Y)	t_{PLH} / t_{PHL}	$V_{CC}=1.8\pm 0.15\text{V}$	$C_L=15\text{pF}$ $R_L=1\text{M}\Omega$	2.2	7.2	ns
		$V_{CC}=2.5\pm 0.2\text{V}$		0.9	4.4	ns
		$V_{CC}=3.3\pm 0.3\text{V}$		0.8	3.8	ns
		$V_{CC}=5\pm 0.5\text{V}$		0.8	3.4	ns
		$V_{CC}=1.8\pm 0.15\text{V}$, $R_L=1\text{K}\Omega$	$C_L=30\text{pF}$	3.1	9	ns
		$V_{CC}=2.5\pm 0.2\text{V}$, $R_L=500\Omega$		1.3	5.5	ns
		$V_{CC}=3.3\pm 0.3\text{V}$, $R_L=500\Omega$		1	4.7	ns
		$V_{CC}=5\pm 0.5\text{V}$, $R_L=500\Omega$		1	4	ns

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

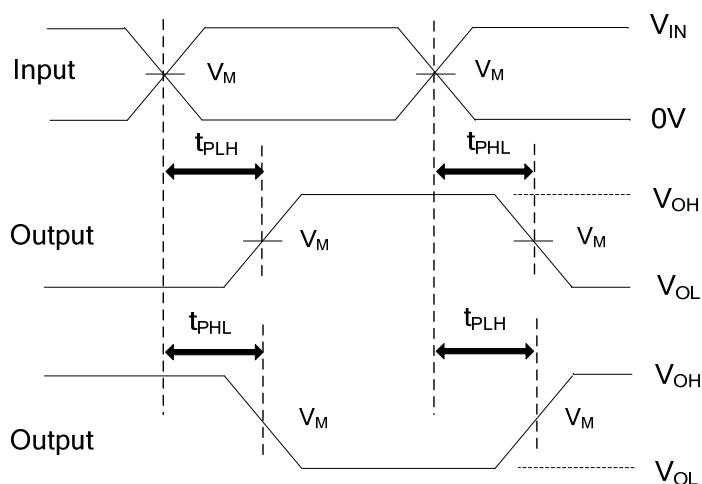
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	$V_{CC}=1.8\text{V}$		22		pF
		$V_{CC}=2.5\text{V}$		22		
		$V_{CC}=3.3\text{V}$		23		
		$V_{CC}=5.0\text{V}$		25		

■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT

V_{CC}	Inputs		V_M	C_L	R_L
	V_{IN}	t_R, t_F			
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	15pF	1M Ω
$2.5V \pm 0.2V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	15pF	1M Ω
$3.3V \pm 0.3V$	3V	$\leq 2.5ns$	1.5V	15pF	1M Ω
$5V \pm 0.5V$	V_{CC}	$\leq 2.5ns$	$V_{CC}/2$	15pF	1M Ω

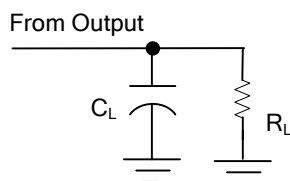


PROPAGATION DELAY TIMES

Note: C_L includes probe and jig capacitance.

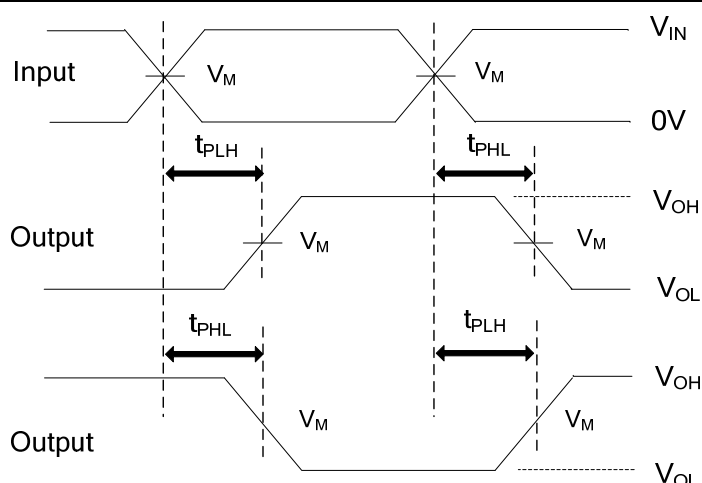
All input pulses are supplied by generators having the following characteristics: $P_{RR} \leq 10MHz$, $Z_O = 50\Omega$.

■ TEST CIRCUIT AND WAVEFORMS (Cont.)



TEST CIRCUIT

V_{CC}	Inputs		V_M	C_L	R_L
	V_{IN}	t_R, t_F			
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	30pF	1K Ω
$2.5V \pm 0.2V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	30pF	500 Ω
$3.3V \pm 0.3V$	3V	$\leq 2.5ns$	1.5V	50pF	500 Ω
$5V \pm 0.5V$	V_{CC}	$\leq 2.5ns$	$V_{CC}/2$	50pF	500 Ω



PROPAGATION DELAY TIMES

Note: C_L includes probe and jig capacitance.

All input pulses are supplied by generators having the following characteristics: $P_{RR} \leq 10MHz$, $Z_O = 50\Omega$.

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