



## U74LVC1G00

CMOS IC

### SINGLE 2-INPUT NAND GATE

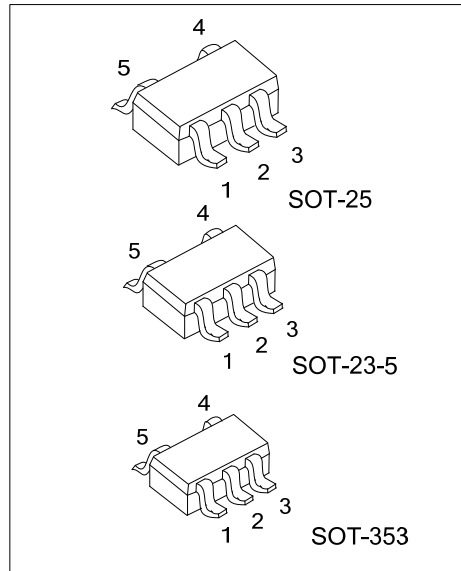
#### DESCRIPTION

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

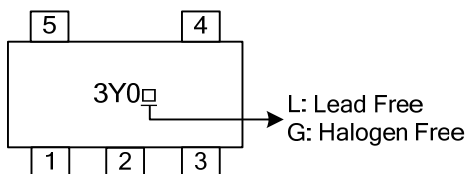


#### ORDERING INFORMATION

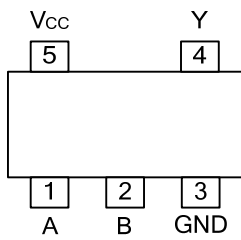
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC1G00L-AE5-R	U74LVC1G00G-AE5-R	SOT-23-5	Tape Reel
U74LVC1G00L-AF5-R	U74LVC1G00G-AF5-R	SOT-25	Tape Reel
U74LVC1G00L-AL5-R	U74LVC1G00G-AL5-R	SOT-353	Tape Reel

<p>U74LVC1G00L-AE5-R</p> <p>(1) Packing Type (2) Package Type (3) Lead Free</p>	<p>(1) R: Tape Reel (2) AE5: SOT-23-5, AF5: SOT-25, AL5: SOT-353 (3) L: Lead Free, G: Halogen Free</p>
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#### MARKING



■ PIN CONFIGURATION

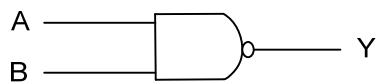


■ FUNCTION TABLE

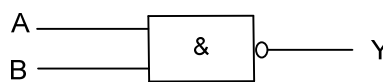
INPUT(A)	INPUT(B)	OUTPUT(Y)
H	H	L
H	L	H
L	H	H
L	L	H

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

■ LOGIC DIAGRAM (positive logic)



Logic symbol



IEC logic symbol

■ ABSOLUTE MAXIMUM RATING (unless otherwise specified)

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 ~ +0.5	V
	Output in the high-impedance or power-off state		-0.5 ~ +6.5	V
$V_{CC}$ or GND Current (Output in the power-off state)		$I_{CC}$	±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.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-23-5	$\theta_{JA}$	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		85	°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<sub>A</sub> = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
High-Level Input Voltage	V <sub>IH</sub>	V <sub>CC</sub> =1.65V ~ 1.95V	0.65*V <sub>CC</sub>			V
		V <sub>CC</sub> =2.3V ~ 2.7V	1.7			V
		V <sub>CC</sub> =3V ~ 3.6V	2			V
		V <sub>CC</sub> =4.5V ~ 5.5V	0.7*V <sub>CC</sub>			V
Low-Level Input Voltage	V <sub>IL</sub>	V <sub>CC</sub> =1.65V ~ 1.95V			0.35*V <sub>CC</sub>	V
		V <sub>CC</sub> =2.3V ~ 2.7V			0.7	V
		V <sub>CC</sub> =3V ~ 3.6V			0.8	V
		V <sub>CC</sub> =4.5V ~ 5.5V			0.3*V <sub>CC</sub>	V
High-Level Output Voltage	V <sub>OH</sub>	I <sub>OH</sub> =-100μA, V <sub>CC</sub> =1.65 ~ 5.5V	V <sub>CC</sub> -0.1			V
		I <sub>OH</sub> =-4mA, V <sub>CC</sub> =1.65V	1.2			V
		I <sub>OH</sub> =-8mA, V <sub>CC</sub> =2.3V	1.9			V
		I <sub>OH</sub> =-16mA, V <sub>CC</sub> =3.0V	2.4			V
		I <sub>OH</sub> =-24mA, V <sub>CC</sub> =3.0V	2.3			V
		I <sub>OH</sub> =-32mA, V <sub>CC</sub> =4.5V	3.8			V
Low-Level Output Voltage	V <sub>OL</sub>	I <sub>OL</sub> =100μA, V <sub>CC</sub> =1.65 ~ 5.5V			0.1	V
		I <sub>OL</sub> =4mA, V <sub>CC</sub> =1.65V			0.45	V
		I <sub>OL</sub> =8mA, V <sub>CC</sub> =2.3V			0.3	V
		I <sub>OL</sub> =16mA, V <sub>CC</sub> =3.0V			0.4	V
		I <sub>OL</sub> =24mA, V <sub>CC</sub> =3.0V			0.55	V
		I <sub>OL</sub> =32mA, V <sub>CC</sub> =4.5V			0.55	V
Input Leakage Current	I <sub>I(LEAK)</sub>	V <sub>IN</sub> =5.5V or GND, V <sub>CC</sub> =0 ~ 5.5V			±5	μA
Power OFF Leakage Current	I <sub>OFF</sub>	V <sub>IN</sub> or V <sub>OUT</sub> =5.5V, V <sub>CC</sub> =0V			±10	μA
Quiescent Supply Current	I <sub>Q</sub>	V <sub>IN</sub> =V <sub>CC</sub> or GND, I <sub>OUT</sub> =0, V <sub>CC</sub> =1.65~5.5V			10	μA
Additional Quiescent Supply Current Per Input Pin	ΔI <sub>Q</sub>	V <sub>CC</sub> =3 ~ 5.5V, One input at V <sub>CC</sub> -0.6V, Other inputs at V <sub>CC</sub> or GND			500	μA
Input Capacitance	C <sub>I</sub>	V <sub>CC</sub> =3.3V, V <sub>IN</sub> =V <sub>CC</sub> or GND		4		pF

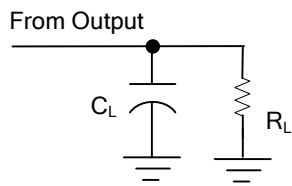
■ SWITCHING CHARACTERISTICS (T<sub>A</sub>=25°C)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (A or B) to output(Y)	t <sub>PLH</sub> / t <sub>PHL</sub>	V <sub>CC</sub> =1.8±0.15V	C <sub>L</sub> =15pF R <sub>L</sub> =1MΩ	2.2	7.2	ns
		V <sub>CC</sub> =2.5±0.2V		0.9	4.4	ns
		V <sub>CC</sub> =3.3±0.3V		0.8	3.8	ns
		V <sub>CC</sub> =5±0.5V		0.8	3.4	ns
		V <sub>CC</sub> =1.8±0.15V, R <sub>L</sub> =1KΩ	C <sub>L</sub> =30pF	3.1	9	ns
		V <sub>CC</sub> =2.5±0.2V, R <sub>L</sub> =500Ω		1.3	5.5	ns
		V <sub>CC</sub> =3.3±0.3V, R <sub>L</sub> =500Ω		1	4.7	ns
		V <sub>CC</sub> =5±0.5V, R <sub>L</sub> =500Ω		1	4	ns

■ OPERATING CHARACTERISTICS (T<sub>A</sub>=25°C)

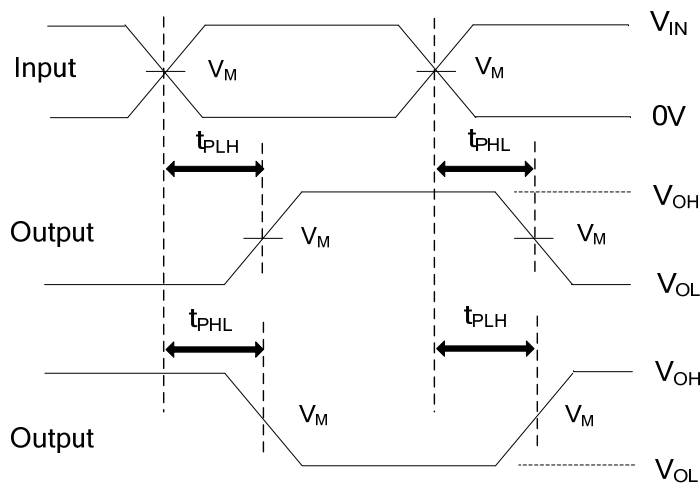
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C <sub>PD</sub>	V <sub>CC</sub> =1.8V	f=10MHz	22		pF
		V <sub>CC</sub> =2.5V		22		
		V <sub>CC</sub> =3.3V		23		
		V <sub>CC</sub> =5.0V		25		

## ■ TEST CIRCUIT AND WAVEFORMS



**TEST CIRCUIT**

V <sub>CC</sub>	Inputs		V <sub>M</sub>	C <sub>L</sub>	R <sub>L</sub>
	V <sub>IN</sub>	t <sub>r</sub> , t <sub>f</sub>			
1.8V±0.15V	V <sub>CC</sub>	≤2ns	V <sub>CC</sub> /2	15pF	1MΩ
2.5V±0.2V	V <sub>CC</sub>	≤2ns	V <sub>CC</sub> /2	15pF	1MΩ
3.3V±0.3V	3V	≤2.5ns	1.5V	15pF	1MΩ
5V±0.5V	V <sub>CC</sub>	≤2.5ns	V <sub>CC</sub> /2	15pF	1MΩ

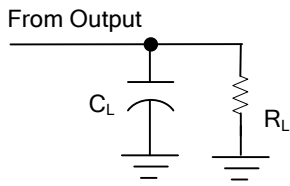


**PROPAGATION DELAY TIMES**

Note: C<sub>L</sub> includes probe and jig capacitance.

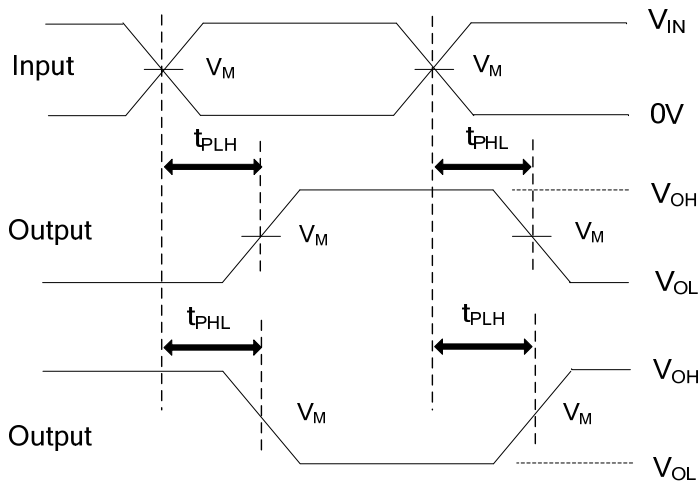
All input pulses are supplied by generators having the following characteristics: P<sub>RR</sub> ≤10MHz, Z<sub>O</sub> = 50Ω.

■ TEST CIRCUIT AND WAVEFORMS(Cont.)



**TEST CIRCUIT**

V <sub>CC</sub>	Inputs		V <sub>M</sub>	C <sub>L</sub>	R <sub>L</sub>
	V <sub>IN</sub>	t <sub>R</sub> , t <sub>F</sub>			
1.8V±0.15V	V <sub>CC</sub>	≤2ns	V <sub>CC</sub> /2	30pF	1KΩ
2.5V±0.2V	V <sub>CC</sub>	≤2ns	V <sub>CC</sub> /2	30pF	500Ω
3.3V±0.3V	3V	≤2.5ns	1.5V	50pF	500Ω
5V±0.5V	V <sub>CC</sub>	≤2.5ns	V <sub>CC</sub> /2	50pF	500Ω



**PROPAGATION DELAY TIMES**

Note: C<sub>L</sub> includes probe and jig capacitance.

All input pulses are supplied by generators having the following characteristics: P<sub>RR</sub> ≤10MHz, Z<sub>O</sub> = 50Ω.

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