



# U74LVC1G02

**CMOS IC**

## SINGLE 2-INPUT NOR GATE

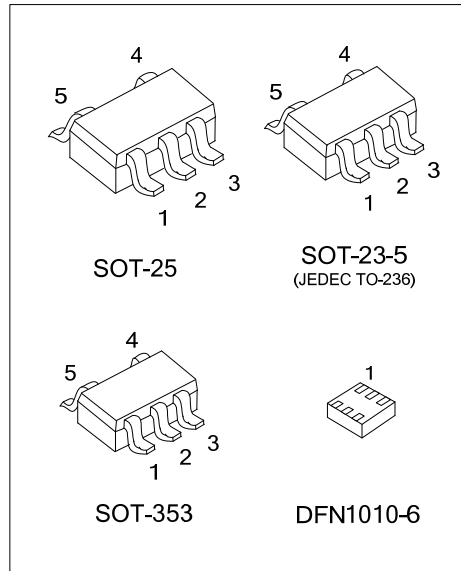
### DESCRIPTION

The **U74LVC1G02** is a 2-input NOR gate device which provides the Function  $Y=A+B$  in positive logic.

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

### FEATURES

- \* Operation Voltage Range: 1.6V ~ 5.5V
- \* Low Power Current:  $I_{CC}=10\mu A$  (Max.)
- \*  $\pm 24mA$  Output Drive ( $V_{CC}=3.0V$ )
- \* Power Down Protection



### ORDERING INFORMATION

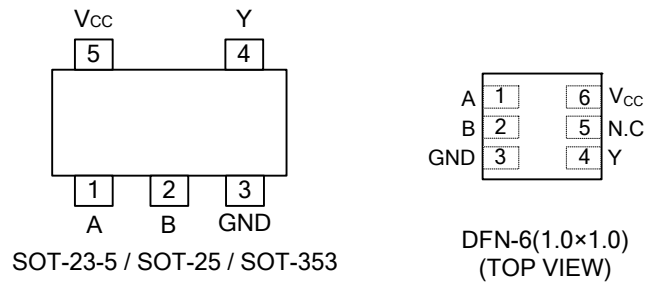
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC1L02L-AE5-R	U74LVC1G02G-AE5-R	SOT-23-5	Tape Reel
U74LVC1L02L-AF5-R	U74LVC1G02G-AF5-R	SOT-25	Tape Reel
U74LVC1L02L-AL5-R	U74LVC1G02G-AL5-R	SOT-353	Tape Reel
U74LVC1L02L-K06-1010-R	U74LVC1G02G-K06-1010-R	DFN1010-6	Tape Reel

<p>U74LVC1G02G-AE5-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AE5: SOT-23-5, AF5: SOT-25, AL5: SOT-353 K06-1010: DFN1010-6 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
---	--

### MARKING

SOT-23-5 / SOT-25 / SOT-353	DFN1010-6
<p>L: Lead Free G: Halogen Free</p>	

■ PIN CONFIGURATION

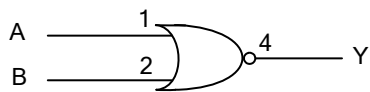


■ FUNCTION TABLE

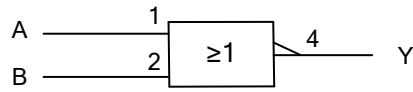
INPUT(A)	INPUT(B)	OUTPUT(Y)
H	H	L
H	L	L
L	H	L
L	L	H

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

■ LOGIC DIAGRAM (positive logic)



Logic Symbol



IEC Logic Symbol

### ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	TEST 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 high or low state	-0.5 ~ $V_{CC} + 0.5$	V
		Output in the power-off state	-0.5 ~ +6.5	V
Continuous $V_{CC}$ or GND Current	$I_{CC}$		±100	mA
Continuous Output Current	$I_{OUT}$	$V_{OUT}=0$ to $V_{CC}$	±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	280	°C/W
	SOT-25	230	°C/W
	SOT-353	350	°C/W
	DFN1010-6	250	°C/W

### ■ 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
Input Transition Rise or Fall Rate	$\Delta t/\Delta v$	$V_{CC}=1.8V\pm 0.15V, 2.5V\pm 0.2V$			20	ns/V
		$V_{CC}=3.3V\pm 0.3V$			10	ns/V
		$V_{CC}=5V\pm 0.5V$			5	ns/V
Operating Temperature	$T_A$		-40		125	°C

■ 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>	V <sub>CC</sub> =1.65 ~ 5.5V, I <sub>OH</sub> =-100μA	V <sub>CC</sub> -0.1			V	
		V <sub>CC</sub> =1.65V, I <sub>OH</sub> =-4mA	1.2			V	
		V <sub>CC</sub> =2.3V, I <sub>OH</sub> =-8mA	1.9			V	
		V <sub>CC</sub> =3.0V	I <sub>OH</sub> =-16mA	2.4			V
			I <sub>OH</sub> =-24mA	2.3			V
V <sub>CC</sub> =4.5V, I <sub>OH</sub> =-32mA	3.8			V			
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>CC</sub> =1.65 ~ 5.5V, I <sub>OL</sub> =100μA			0.1	V	
		V <sub>CC</sub> =1.65V, I <sub>OL</sub> =4mA			0.45	V	
		V <sub>CC</sub> =2.3V, I <sub>OL</sub> =8mA			0.3	V	
		V <sub>CC</sub> =3.0V	I <sub>OL</sub> =16mA			0.4	V
			I <sub>OL</sub> =24mA			0.55	V
V <sub>CC</sub> =4.5V, I <sub>OH</sub> =32mA				0.55	V		
Input Leakage Current	I <sub>I(LEAK)</sub>	V <sub>CC</sub> =0 ~ 5.5V, V <sub>IN</sub> =5.5V or GND			±5	μA	
Power OFF Leakage Current	I <sub>OFF</sub>	V <sub>CC</sub> =0V, V <sub>IN</sub> or V <sub>OUT</sub> =5.5V			±10	μA	
Quiescent Supply Current	I <sub>Q</sub>	V <sub>CC</sub> =1.65 ~ 5.5V, V <sub>IN</sub> =V <sub>CC</sub> or GND, I <sub>OUT</sub> =0A			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	

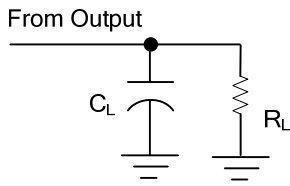
■ SWITCHING CHARACTERISTICS (T<sub>A</sub> =25°C, unless otherwise specified)

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>	C <sub>L</sub> =15pF R <sub>L</sub> =1MΩ	V <sub>CC</sub> =1.8±0.15V	1.9		7.2	ns
			V <sub>CC</sub> =2.5±0.2V	0.8		4.4	ns
			V <sub>CC</sub> =3.3±0.3V	0.8		3.6	ns
			V <sub>CC</sub> =5±0.5V	0.8		3.4	ns
	t <sub>PLH</sub> / t <sub>PHL</sub>	C <sub>L</sub> =30pF R <sub>L</sub> =500Ω	V <sub>CC</sub> =1.8±0.15V, R <sub>L</sub> =1KΩ	2.8		8	ns
			V <sub>CC</sub> =2.5±0.2V, R <sub>L</sub> =500Ω	1.2		5.5	ns
			V <sub>CC</sub> =3.3±0.3V	1		4.5	ns
			V <sub>CC</sub> =5±0.5v	1		4	ns

■ OPERATING CHARACTERISTICS (f=10MHz, T<sub>A</sub> =25°C, unless otherwise specified)

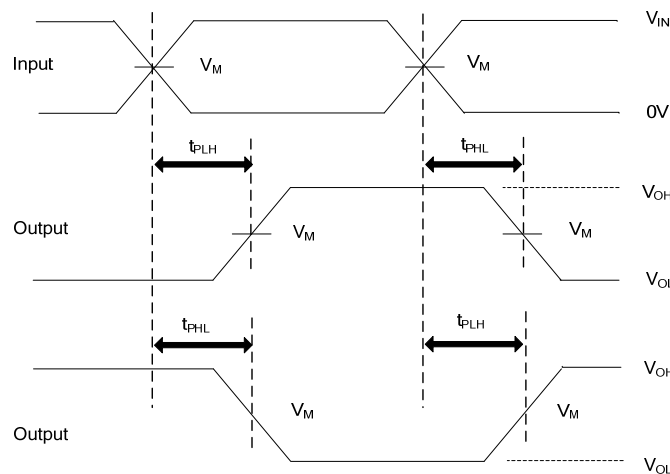
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C <sub>PD</sub>	V <sub>CC</sub> =1.8V		23		pF
		V <sub>CC</sub> =2.5V		23		pF
		V <sub>CC</sub> =3.3V		23		pF
		V <sub>CC</sub> =5.0V		25		pF

■ 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
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.

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.