



## U74LVC1G02

CMOS IC

### SINGLE 2-INPUT NOR GATE

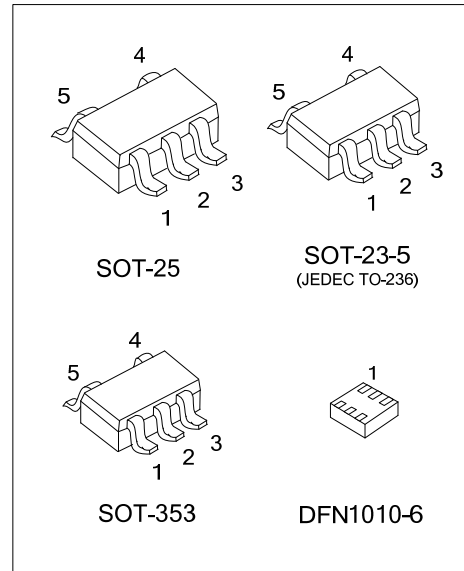
#### DESCRIPTION

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

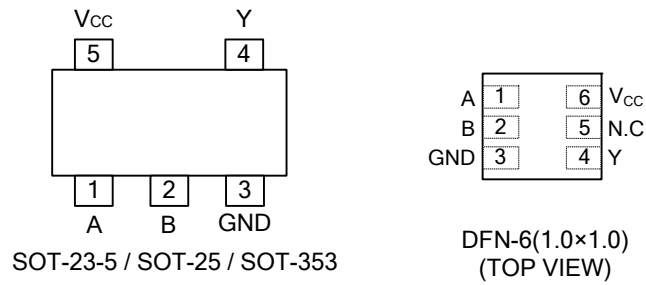
<p>U74LVC1G02G-AE5-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AE5: SOT-23-5, AF5: SOT-25, AL5: SOT-353 K06-1010: DFN1010-6 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING

SOT-23-5 / SOT-25 / SOT-353	DFN1010-6
<p>3Y2 □ L: Lead Free G: Halogen Free</p>	<p>Y2 □</p>



## ■ PIN CONFIGURATION

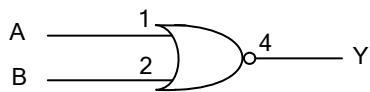


## ■ FUNCTION TABLE

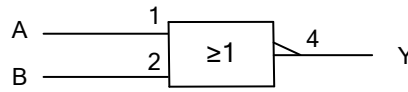
INPUT(A)	INPUT(B)	OUTPUT(Y)
H	H	L
H	L	L
L	H	L
L	L	H

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>OL</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	

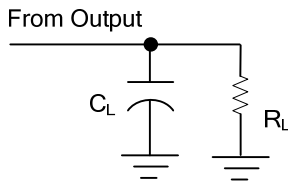
■ SWITCHING CHARACTERISTICS (T<sub>A</sub> =25°C, unless otherwise specified)

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)

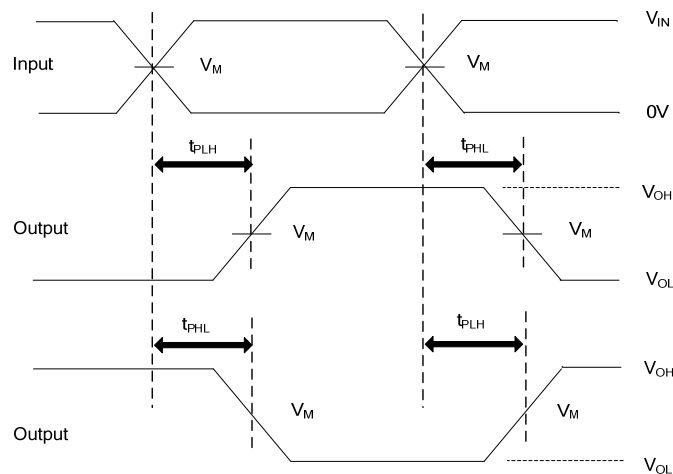
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C <sub>PD</sub>	V <sub>CC</sub> =1.8V		23		pF
		V <sub>CC</sub> =2.5V		23		pF
		V <sub>CC</sub> =3.3V		23		pF
		V <sub>CC</sub> =5.0V		25		pF

## ■ 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.

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