



## U74LVC1G10

CMOS IC

### SINGLE 3-INPUT POSITIVE-NAND GATE

#### DESCRIPTION

The **U74LVC1G10** performs the Boolean function  $Y = A \cdot B \cdot C$  or  $Y = \overline{A + B + C}$  in positive logic.

The device is fully specified for partial-power-down applications using Ioff. The Ioff circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

#### FEATURES

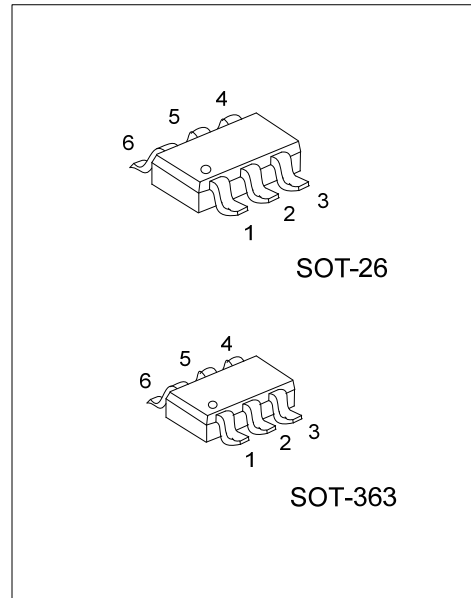
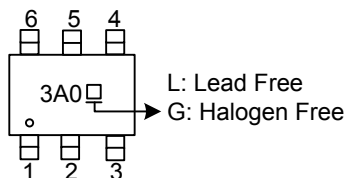
- \* Supports 5-V V<sub>CC</sub> Operation
- \* Inputs Accept Voltages to 5.5V
- \* Max t<sub>pd</sub> of 3.8ns at 3.3V
- \* Low power consumption, I<sub>CC</sub>=10μA (Max)
- \* I<sub>off</sub> supports Partial-Power-Down Mode
- \* ±24mA output drive at 3.3V

#### ORDERING INFORMATION

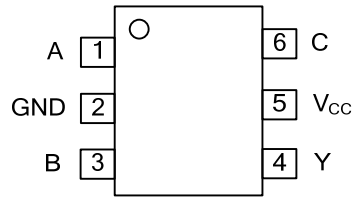
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC1G10L-AG6-R	U74LVC1G10G-AG6-R	SOT-26	Tape Reel
U74LVC1G10L-AL6-R	U74LVC1G10G-AL6-R	SOT-363	Tape Reel

<p>U74LVC1G10G-AG6-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) AG6: SOT-26, AL6: SOT-363</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



## ■ PIN CONFIGURATION

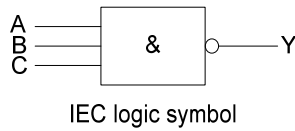
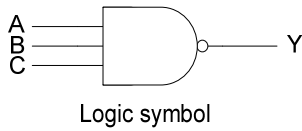


## ■ FUNCTION TABLE

INPUTS			OUTPUT Y
A	B	C	
H	H	H	L
L	X	X	H
X	L	X	H
X	X	L	H

Note: H: HIGH voltage level; L: LOW voltage level; X: Don't care.

## ■ 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
$V_{CC}$ 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
Operating Temperature		$T_A$	-40 ~ +85	°C
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-26	$\theta_{JA}$	230	°C/W
	SOT-363		350	°C/W

### ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{CC}$	Operating	1.65		5.5	V
Input Voltage	$V_{IN}$		0		5.5	V
Output Voltage	$V_{OUT}$	High or low state	0		$V_{CC}$	V
High-level input voltage	$V_{IH}$	$V_{CC}=1.65V$ to $1.95V$	$0.65 \times V_{CC}$			V
		$V_{CC}=2.3V$ to $2.7V$	1.7			
		$V_{CC}=3V$ to $3.6V$	2			
		$V_{CC}=4.5V$ to $5.5V$	$0.7 \times V_{CC}$			
Low-level input voltage	$V_{IL}$	$V_{CC}=1.65V$ to $1.95V$			$0.35 \times V_{CC}$	V
		$V_{CC}=2.3V$ to $2.7V$			0.7	
		$V_{CC}=3V$ to $3.6V$			0.8	
		$V_{CC}=4.5V$ to $5.5V$			$0.3 \times V_{CC}$	
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	
		$V_{CC}=5V \pm 0.5V$			10	

Note: All unused inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation.

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
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			0.30	V
		I <sub>OL</sub> =16mA, V <sub>CC</sub> =3.0V			0.40	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>CC</sub>	V <sub>IN</sub> =5.5V 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>CC</sub>	V <sub>CC</sub> =3 V~ 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		3.5		pF

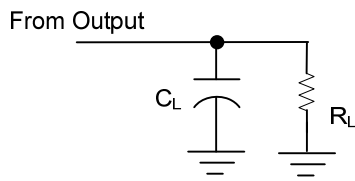
■ SWITCHING CHARACTERISTICS (T<sub>A</sub>=25°C)(see Figure 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Propagation delay from input (A,B or C) to output(Y)	t <sub>PLH</sub> /t <sub>PHL</sub>	V <sub>CC</sub> =1.8V±0.15V	C <sub>L</sub> =15pF	2		14.8	ns
			C <sub>L</sub> =30pF	2.5		18	
		V <sub>CC</sub> =2.5V±0.2V	C <sub>L</sub> =15pF	1.3		5.5	ns
			C <sub>L</sub> =30pF	1.6		6.5	
		V <sub>CC</sub> =3.3V±0.3V	C <sub>L</sub> =15pF	0.8		3.8	ns
			C <sub>L</sub> =50pF	1.4		5	
		V <sub>CC</sub> =5V±0.5V, C <sub>L</sub> =50pF	C <sub>L</sub> =15pF	0.6		2.7	ns
			C <sub>L</sub> =50pF	1		3.6	

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

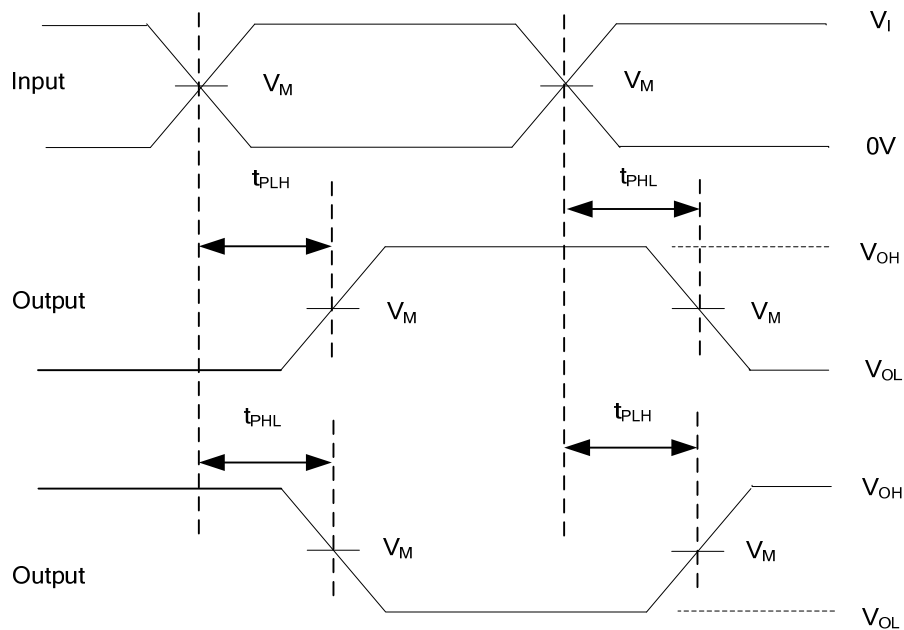
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C <sub>PD</sub>	f=10MHZ	V <sub>CC</sub> =1.8V		17	pF
			V <sub>CC</sub> =2.5V		18	pF
			V <sub>CC</sub> =3.3V		19	pF
			V <sub>CC</sub> =5.0V		22	pF

■ 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>I</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
				30pF	1KΩ
2.5V±0.2V	V <sub>CC</sub>	≤2ns	V <sub>CC</sub> /2	15pF	1MΩ
				30pF	500Ω
3.3V±0.3V	3V	≤2.5ns	1.5V	15pF	1MΩ
				50pF	500Ω
5V±0.5V	V <sub>CC</sub>	≤2.5ns	V <sub>CC</sub> /2	15pF	1MΩ
				50pF	500Ω



PROPAGATION DELAY TIMES

Figure 1. Test Circuit and Voltage Waveforms

- Note: 1. C<sub>L</sub> includes probe and jig capacitance.  
 2. All input pulses are supplied by generators having the following characteristics: PRR ≤10MHz, Z<sub>0</sub>=50Ω.

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