



## U74LVC1G132

CMOS IC

### SINGLE 2-INPUT NAND GATE WITH SCHMITT-TRIGGER INPUTS

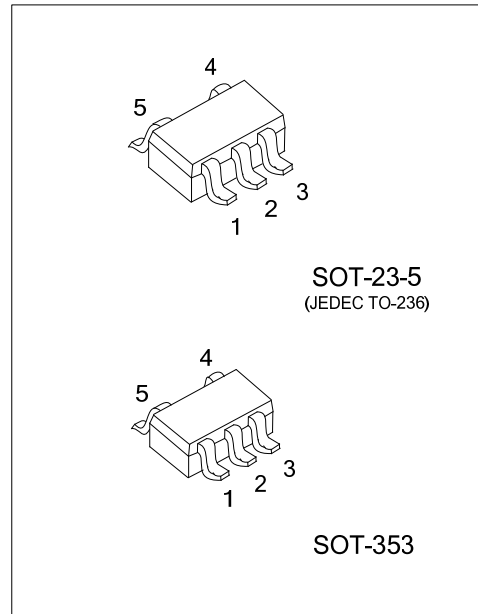
#### DESCRIPTION

The **U74LVC1G132** contains one 2-input NAND gate with Schmitt-trigger inputs designed for 1.65-V to 5.5V  $V_{CC}$  operation and performs the Boolean function  $Y = \overline{A \cdot B}$  or  $Y = \overline{\overline{A} + \overline{B}}$  in positive logic.

Because of Schmitt action, this device has different input threshold levels for positive-going ( $V_{T+}$ ) and negative-going ( $V_{T-}$ ) signals.

This device can be triggered from the slowest of input ramps and still give clean jitter-free output signals.

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



#### FEATURES

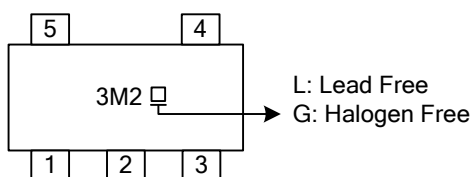
- \* Supports 5-V  $V_{CC}$  Operation
- \* Inputs Accept Voltages to 5.5V
- \* Max  $t_{pd}$  of 5.3ns at 3.3V
- \* Low power consumption,  $I_{CC}=10\mu A$  (Max)
- \*  $I_{off}$  supports Partial-Power-Down Mode
- \*  $\pm 24mA$  output drive at 3.3V

#### ORDERING INFORMATION

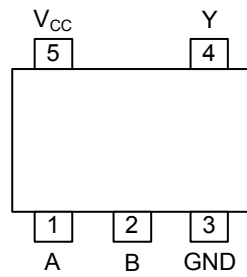
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC1G132G-AE5-R	U74LVC1G132G-AE5-R	SOT-23-5	Tape Reel
U74LVC1G132G-AL5-R	U74LVC1G132G-AL5-R	SOT-353	Tape Reel

<p>U74LVC1G132G-AE5-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AE5: SOT-23-5, AL5: SOT-353 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



## ■ PIN CONFIGURATION

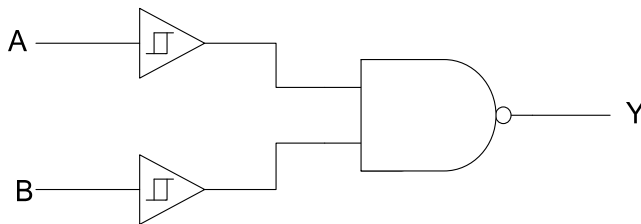


## ■ FUNCTION TABLE

INPUTS		OUTPUT Y
A	B	
L	L	H
L	H	H
H	L	H
H	H	L

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

## ■ 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	
$V_{CC}$ 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-23-5	$\theta_{JA}$	280	°C/W
	SOT-353		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

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

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

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Positive-going input threshold voltage	$V_{T+}$	$V_{CC}=1.65\text{V}$		0.79		1.16	V
		$V_{CC}=2.3\text{V}$		1.11		1.56	
		$V_{CC}=3\text{V}$		1.5		1.87	
		$V_{CC}=4.5\text{V}$		2.16		2.74	
		$V_{CC}=5.5\text{V}$		2.61		3.33	
Negative-going input threshold voltage	$V_{T-}$	$V_{CC}=1.65\text{V}$		0.39		0.62	V
		$V_{CC}=2.3\text{V}$		0.58		0.87	
		$V_{CC}=3\text{V}$		0.84		1.14	
		$V_{CC}=4.5\text{V}$		1.41		1.79	
		$V_{CC}=5.5\text{V}$		1.87		2.29	
Hysteresis ( $V_{T+} - V_{T-}$ )	$\Delta V_T$	$V_{CC}=1.65\text{V}$		0.37		0.62	V
		$V_{CC}=2.3\text{V}$		0.48		0.77	
		$V_{CC}=3\text{V}$		0.56		0.87	
		$V_{CC}=4.5\text{V}$		0.71		1.04	
		$V_{CC}=5.5\text{V}$		0.71		1.11	
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			
		$V_{CC}=2.3\text{V}$	$I_{OH}=-8\text{mA}$	1.9			
		$V_{CC}=3.0\text{V}$	$I_{OH}=-16\text{mA}$	2.4			
		$V_{CC}=4.5\text{V}$	$I_{OH}=-32\text{mA}$	3.8			

## ■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Low-Level Output Voltage	$V_{OL}$	$V_{CC}=1.65 \sim 5.5V$ $I_{OL}=100\mu A$			0.1	V	
		$V_{CC}=1.65V$ $I_{OL}=4mA$			0.45		
		$V_{CC}=2.3V$ $I_{OL}=8mA$			0.30		
		$V_{CC}=3.0V$	$I_{OL}=16mA$				0.40
			$I_{OL}=24mA$				0.55
$V_{CC}=4.5V$ $I_{OL}=32mA$				0.55			
Input Leakage Current	$I_{I(LEAK)}$	$V_{IN}=5.5V$ or GND, $V_{CC}=1.65V \sim 5.5V$			$\pm 1$	$\mu A$	
Power OFF Leakage Current	$I_{off}$	$V_{IN}$ or $V_{OUT}=5.5V$ , $V_{CC}=0V$			$\pm 10$	$\mu A$	
Quiescent Supply Current	$I_{CC}$	$V_{IN}=V_{CC}$ or GND, $I_{OUT}=0$ $V_{CC}=1.65 \sim 5.5V$			10	$\mu A$	
Additional Quiescent Supply Current Per Input Pin	$\Delta I_{CC}$	$V_{CC}=3V \sim 5.5V$ , One input at $V_{CC}=0.6V$ , Other inputs at $V_{CC}$ or GND			500	$\mu A$	
Input Capacitance	$C_I$	$V_{CC}=3.3V$ , $V_{IN}=V_{CC}$ or GND		3.5		pF	

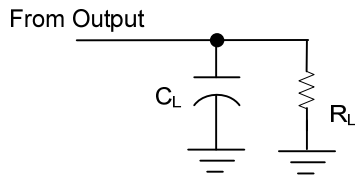
## ■ SWITCHING CHARACTERISTICS ( $T_A=25^\circ C$ )(see Figure 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Propagation delay from input (A or B) to output(Y)	$t_{PLH}/t_{PHL}$	$V_{CC}=1.8V \pm 0.15V$	$C_L=15pF$	4		16	ns
			$C_L=30pF$	4		16	
		$V_{CC}=2.5V \pm 0.2V$	$C_L=15pF$	2.5		7	ns
			$C_L=30pF$	3		7.5	
		$V_{CC}=3.3V \pm 0.3V$	$C_L=15pF$	2		5.3	ns
			$C_L=50pF$	2		6	
		$V_{CC}=5V \pm 0.5V$	$C_L=15pF$	1.5		4.4	ns
			$C_L=50pF$	2		5	

## ■ OPERATING CHARACTERISTICS ( $T_A=25^\circ C$ )

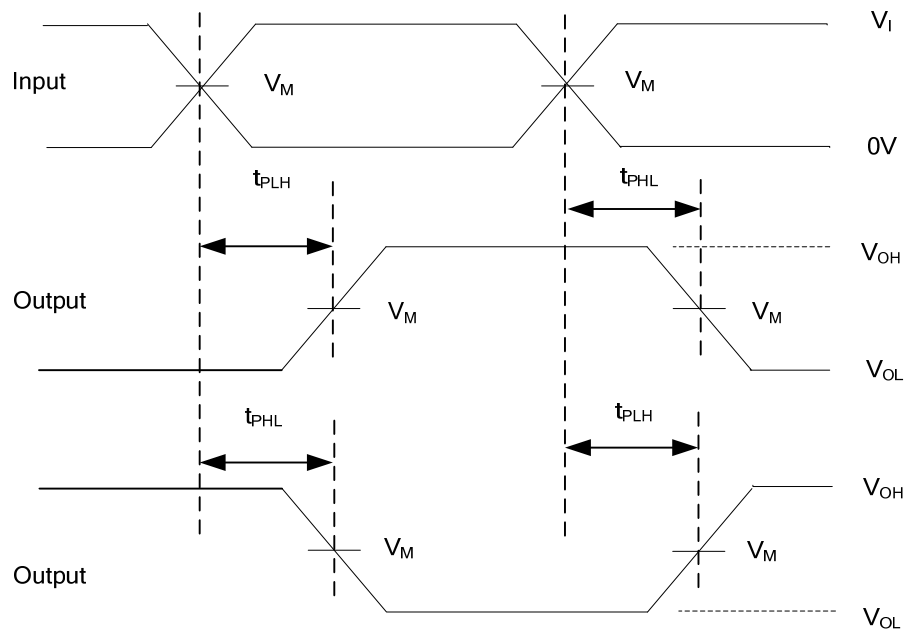
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	$C_{PD}$	$f=10MHz$	$V_{CC}=1.8V$		17	pF
			$V_{CC}=2.5V$		18	pF
			$V_{CC}=3.3V$		18	pF
			$V_{CC}=5.0V$		20	pF

## ■ TEST CIRCUIT AND WAVEFORMS



**TEST CIRCUIT**

$V_{CC}$	INPUTS		$V_M$	$C_L$	$R_L$
	$V_I$	$t_r / t_f$			
1.8V±0.15V	$V_{CC}$	≤2ns	$V_{CC}/2$	15pF	1MΩ
				30pF	1KΩ
2.5V±0.2V	$V_{CC}$	≤2ns	$V_{CC}/2$	15pF	1MΩ
				30pF	500Ω
3.3V±0.3V	3V	≤2.5ns	1.5V	15pF	1MΩ
				50pF	500Ω
5V±0.5V	$V_{CC}$	≤2.5ns	$V_{CC}/2$	15pF	1MΩ
				50pF	500Ω



**PROPAGATION DELAY TIMES**

**Figure 1. Test Circuit and Voltage Waveforms**

Note: 1.  $C_L$  includes probe and jig capacitance.

2. All input pulses are supplied by generators having the following characteristics: PRR ≤10MHz,  $Z_o=50\Omega$ .

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