



# U74LVC1GU04

CMOS IC

## SINGLE POWER SUPPLY SINGLE INVERTER GATE

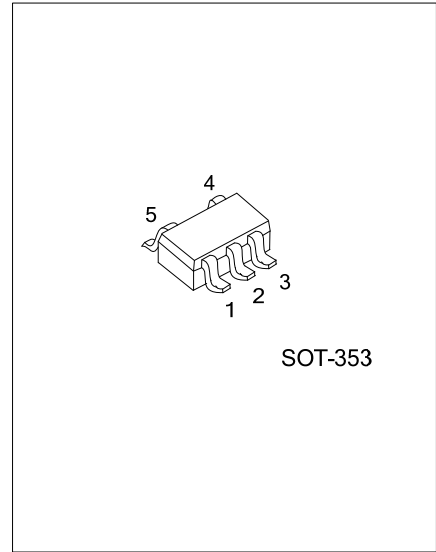
### DESCRIPTION

This single inverter gate is designed for 1.65V to 5.5V  $V_{CC}$  operation.

The **U74LVC1GU04** device contains one inverter with an unbuffered output and performs the Boolean function  $Y = \overline{A}$ .

### FEATURES

- \* Operation Voltage Range: 1.65V ~ 5.5V
- \* Low Power Current:  $I_{CC}=10\mu A$  (Max.)
- \*  $\pm 24mA$  Output Drive ( $V_{CC}=3.3V$ )
- \* Power Down Protection
- \* Unbuffered Output

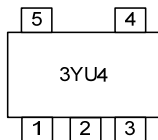


### ORDERING INFORMATION

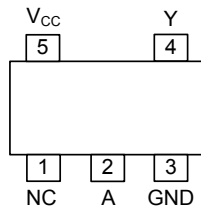
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC1GU04L-AL5-R	U74LVC1GU04G-AL5-R	SOT-353	Tape Reel

<p>U74LVC1GU04G-AL5-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AL5: SOT-353 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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### MARKING



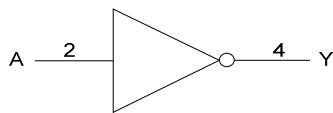
■ PIN CONFIGURATION



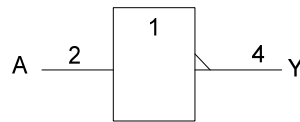
■ FUNCTION TABLE (each gate)

INPUT	OUTPUT
A	Y
H	L
L	H

■ LOGIC DIAGRAM (positive logic)



Logic symbol



IEC logic symbol

■ ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C, unless otherwise specified) (Note 2)

PARAMETER	SYMBOL	TEST CONDITIONS	RATINGS	UNIT
Supply Voltage	V <sub>CC</sub>		-0.5 ~ 6.5	V
Input Voltage (Note 2)	V <sub>IN</sub>		-0.5 ~ 6.5	V
Output Voltage (Note 2)	V <sub>OUT</sub>	Output in the high or low state	-0.5 ~ V <sub>CC</sub> +0.5	V
Continuous Output Current	I <sub>OUT</sub>		±50	mA
Continuous current through		V <sub>CC</sub> or GND	±100	mA
Input Clamp Current	I <sub>IK</sub>	V <sub>IN</sub> <0	-50	mA
Output Clamp Current	I <sub>OK</sub>	V <sub>OUT</sub> <0	-50	mA
Storage Temperature Range	T <sub>STG</sub>		-65 ~ +150	°C

Notes: 1. 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.

2. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V <sub>CC</sub>	Operating	1.65		5.5	V
Input Voltage	V <sub>IN</sub>		0		5.5	V
Output Voltage	V <sub>OUT</sub>		0		V <sub>CC</sub>	V
Input Transition Rise or Fall Rate	Δt/ΔV	V <sub>CC</sub> =1.6V ~ 2.7V			20	ns/V
		V <sub>CC</sub> =2.7V ~ 5.5V			10	ns/V
Operating Temperature	T <sub>A</sub>		-40		125	°C

■ STATIC 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~5.5V, I <sub>OH</sub> =-100μA	0.75×V <sub>CC</sub>			V	
Low-Level Input Voltage	V <sub>IL</sub>	V <sub>CC</sub> =1.65V~5.5V, I <sub>OL</sub> =-100μA			0.25×V <sub>CC</sub>	V	
High-Level Output Voltage	V <sub>OH</sub>	V <sub>IL</sub> =0V, V <sub>CC</sub> =1.65V ~ 5.5V, I <sub>OL</sub> =-100μA	V <sub>CC</sub> -0.1			V	
		V <sub>IL</sub> =0V, V <sub>CC</sub> =1.65V, I <sub>OH</sub> =-4mA	1.2			V	
		V <sub>IL</sub> =0V, V <sub>CC</sub> =2.3V, I <sub>OH</sub> =-8mA	1.9			V	
		V <sub>IL</sub> =0V, V <sub>CC</sub> =3V	I <sub>OH</sub> =-16mA	2.4			V
			I <sub>OH</sub> =-24mA	2.3			V
		V <sub>IL</sub> =0V, V <sub>CC</sub> =4.5V, I <sub>OH</sub> =-32mA	3.8				V
Low-Level Output Voltage	V <sub>OL</sub>	V <sub>IH</sub> =V <sub>CC</sub> , V <sub>CC</sub> =1.65V ~ 5.5V, I <sub>OL</sub> =100μA			0.1	V	
		V <sub>IH</sub> =V <sub>CC</sub> , V <sub>CC</sub> =1.65V, I <sub>OL</sub> =4mA			0.45	V	
		V <sub>IH</sub> =V <sub>CC</sub> , V <sub>CC</sub> =2.3V, I <sub>OL</sub> =8mA			0.3	V	
		V <sub>IH</sub> =V <sub>CC</sub> , V <sub>CC</sub> =3V	I <sub>OL</sub> =16mA			0.4	V
			I <sub>OL</sub> =24mA			0.55	V
		V <sub>IH</sub> =V <sub>CC</sub> , V <sub>CC</sub> =4.5V, I <sub>OL</sub> =32mA				0.55	V
A Input Leakage Current	I <sub>I(LEAK)</sub>	V <sub>CC</sub> =0V ~ 5.5V, V <sub>IN</sub> =5.5V or GND			±5	μA	
Quiescent Supply Current	I <sub>Q</sub>	V <sub>CC</sub> =1.65V~5.5V, V <sub>IN</sub> =5.5V or GND, I <sub>O</sub> =0			10	μA	
Input Capacitance	C <sub>IN</sub>	V <sub>CC</sub> =3.3V, V <sub>IN</sub> =V <sub>CC</sub> or GND (T <sub>A</sub> =-40~+85°C)		7		pF	

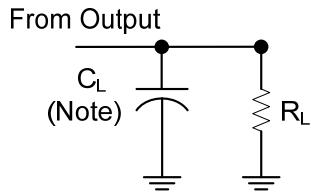
■ DYNAMIC CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (A) to output(Y)	$t_{PLH}/t_{PHL}$	$V_{CC}=1.8V\pm 0.15V$	1.3		5.5	ns
		$V_{CC}=2.5V\pm 0.2V$	1.0		4.5	ns
		$V_{CC}=3.3V\pm 0.3V$	1.1		4.2	ns
		$V_{CC}=5V\pm 0.5V$	1.0		3.5	ns

■ OPERATING CHARACTERISTICS ( $f=10\text{MHz}$ ,  $T_A=25^\circ\text{C}$ , unless otherwise specified)

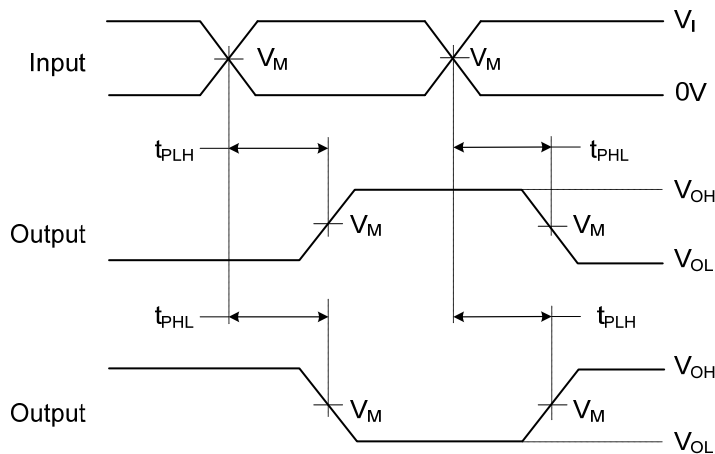
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	$C_{PD}$	$V_{CC}=1.8V\pm 0.15V$		9		pF
		$V_{CC}=2.5V\pm 0.2V$		11		pF
		$V_{CC}=3.3V\pm 0.3V$		13		pF
		$V_{CC}=5V\pm 0.5V$		27		pF

■ TEST CIRCUIT AND WAVEFORMS



Note:  $C_L$  includes probe and jig capacitance.

$V_{CC}$	INPUTS		$V_M$	$C_L$	$R_L$
	$V_{IN}$	$t_R, t_F$			
$1.8V \pm 0.15V$	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	30pF	1K $\Omega$
$2.5V \pm 0.2V$	$V_{CC}$	$\leq 2ns$	$V_{CC}/2$	30pF	500 $\Omega$
$3.3V \pm 0.3V$	3V	$\leq 2.5ns$	1.5V	50pF	500 $\Omega$
$5V \pm 0.5V$	$V_{CC}$	$\leq 2.5ns$	$V_{CC}/2$	50pF	500 $\Omega$



VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES INVERTING AND NONINVERTING OUTPUTS

- Notes: 1. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1MHz$ ,  $Z_o=50\Omega$ ,  $t_r \leq 3ns$ .  
 2. The outputs are measured one at a time, with one transition per measurement.

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