



U74LVC2GU04

Preliminary

CMOS IC

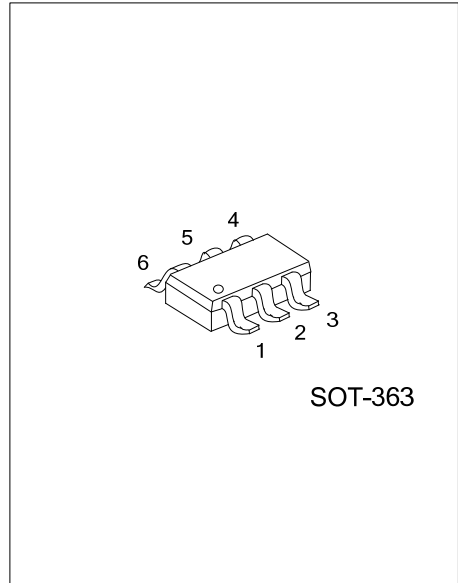
DUAL INVERTER GATE

DESCRIPTION

The **U74LVC2GU04** is a device contains two inverters with unbuffered outputs and performs the Boolean function $Y = \bar{A}$.

FEATURES

- * Wide Supply Voltage Range from 1.65V to 5.5V
- * Max t_{PD} of 3.7 ns at 3.3V
- * Up to 5.5V Inputs Accept Voltages
- * Low Power Consumption, $I_{CC} = 10 \mu A$ (Max.)
- * ± 24 mA Output Driver at 3.3V
- * Typical V_{OLP} (Output Ground Bounce) < 0.8V, $V_{CC} = 3.3$ V, $T_A = 25$ °C
- * Typical V_{OHV} (Output V_{OH} Undershoot) > 2V, $V_{CC} = 3.3$ V, $T_A = 25$ °C

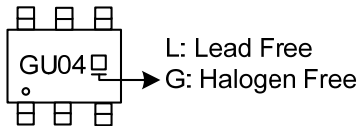


ORDERING INFORMATION

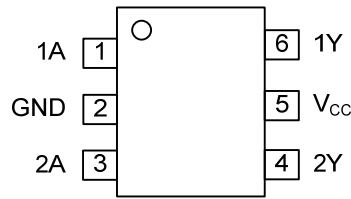
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC2GU04L-AL6-R	U74LVC2GU04G-AL6-R	SOT-363	Tape Reel

<p>U74LVC2GU04G-AL6-R</p> <pre> (1)Packing Type (2)Package Type (3)Green Package </pre>	<p>(1) R: Tape Reel</p> <p>(2) AL6: SOT-363</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



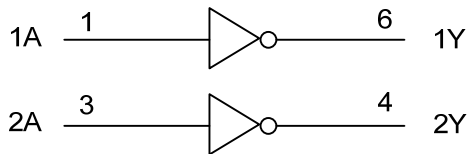
■ PIN CONFIGURATION



■ FUNCTION TABLE (Each Gate)

INPUTS	OUTPUT
A	Y
H	L
L	H

■ LOGIC DIAGRAM (Positive Logic)



■ ABSOLUTE MAXIMUM RATING (Unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	-0.5 ~ 6.5	V
Input Voltage	V_{IN}	-0.5 ~ 6.5	V
Voltage Range Applied to Any Output In the High or Low State (Note 2, 3)	V_{OUT}	-0.5 ~ $V_{CC}+0.5$	V
Input Clamp Current ($V_{IN}<0$)	I_{IK}	-50	mA
Output Clamp Current ($V_{OUT}<0$)	I_{OK}	-50	mA
Output Current	I_{OUT}	± 50	mA
Continuous Current Through V_{CC} or GND	I_{CC}	± 100	mA
Storage Temperature	T_{STG}	-65 ~ +150	$^{\circ}C$

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 negative-voltage and output voltage ratings may be exceeded if the input and output current ratings are observed.

3. The value of V_{CC} is provided in the recommended operating conditions table.

■ RECOMMENDED OPERATING CONDITIONS (Unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}		1.65		5.5	V
High-Level Input Voltage	V_{IH}	$I_O=-100\mu A$	$0.75 \times V_{CC}$			V
Low-Level Input Voltage	V_{IL}	$I_O=100\mu A$			$0.25 \times V_{CC}$	V
Input Voltage	V_{IN}		0		5.5	V
Output Voltage	V_{OUT}		0		V_{CC}	V
High-level Output Current	I_{OH}	$V_{CC}=1.65V$			-4	mA
		$V_{CC}=2.3V$			-8	mA
		$V_{CC}=3V$			-16	mA
		$V_{CC}=4.5V$			-24	mA
Low-level Output Current	I_{OL}	$V_{CC}=1.65V$			4	mA
		$V_{CC}=2.3V$			8	mA
		$V_{CC}=3V$			16	mA
		$V_{CC}=4.5V$			24	mA
Operating Temperature	T_A		-40		+125	$^{\circ}C$

■ ELECTRICAL CHARACTERISTICS ($V_{CC}=3.3V$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
High-Level Output Voltage	V_{OH}	$V_{CC}=1.65V\sim 5.5V$, $I_{OH}=-100\mu A$	$V_{IL}=0V$	$V_{CC}-0.1$		V	
		$V_{CC}=1.65V$, $I_{OH}=-4mA$		1.2		V	
		$V_{CC}=2.3V$, $I_{OH}=-8mA$		1.9		V	
		$V_{CC}=3V$ $I_{OH}=-16mA$ $I_{OH}=-24mA$		2.4		V	
		$V_{CC}=4.5V$, $I_{OH}=-32mA$		2.3		V	
Low-Level Output Voltage	V_{OL}	$V_{CC}=1.65V\sim 5.5V$, $I_{OL}=100\mu A$	$V_{IH}=V_{CC}$			0.1	V
		$V_{CC}=1.65V$, $I_{OL}=4mA$				0.45	V
		$V_{CC}=2.3V$, $I_{OL}=8mA$				0.3	V
		$V_{CC}=3V$ $I_{OL}=16mA$ $I_{OL}=24mA$				0.4	V
		$V_{CC}=4.5V$, $I_{OL}=32mA$				0.55	V
Input Leakage Current	$I_{I(LEAK)}$	$V_{IN}=5.5V$ or GND, $V_{CC}=0\sim 5.5V$			± 5	μA	
Quiescent Supply Current	I_{CC}	$V_{IN}=5.5V$ or GND, $V_{CC}=1.65\sim 5.5V$, $I_O=0A$			± 10	μA	
Input Capacitance	C_{IN}	$V_{IN}=V_{CC}$ or GND, $V_{CC}=3.3V$		7		pF	

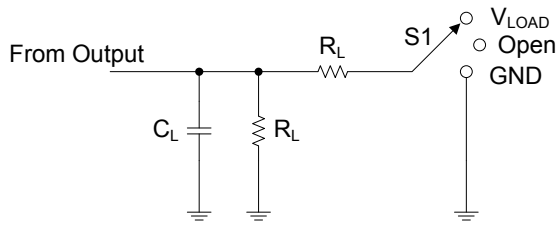
■ SWITCHING CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (A or B) to output (Y)	t_{PLH} / t_{PHL}	$V_{CC}=1.8\pm 0.15V$, $R_L=1K\Omega$	1.0		8.3	ns
		$V_{CC}=2.5\pm 0.2V$, $R_L=500\Omega$	1.0		6.5	ns
		$V_{CC}=3.3\pm 0.3V$, $R_L=500\Omega$	1.0		6.2	ns
		$V_{CC}=5\pm 0.5V$, $R_L=500\Omega$	1.0		5.5	ns

■ OPERATING CHARACTERISTICS ($f=10MHz$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	$V_{CC} = 1.8V$		7		pF
		$V_{CC} = 2.5V$		7		pF
		$V_{CC} = 3.3V$		8		pF
		$V_{CC} = 5V$		23		pF

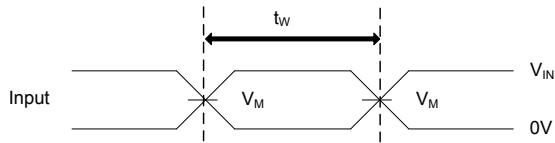
■ TEST CIRCUIT AND WAVEFORMS



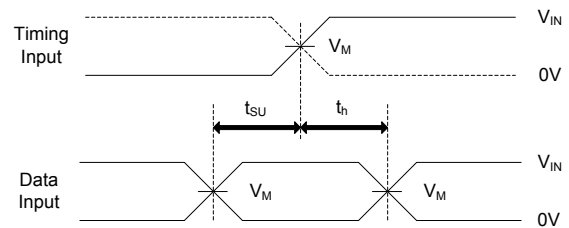
TEST CIRCUIT

TEST	S1
t_{PLH} / t_{PHL}	OPEN
t_{PLZ} / t_{PZL}	V_{LOAD}
t_{PHZ} / t_{PZH}	GND

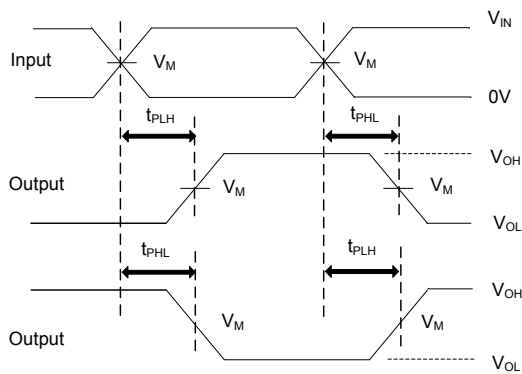
V_{CC}	Inputs		V_M	V_{LOAD}	C_L	R_L	V_{Δ}
	V_{IN}	t_r, t_f					
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	1K Ω	0.15V
$2.5V \pm 0.2V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	500 Ω	0.15V
$3.3V \pm 0.3V$	3V	$\leq 2.5ns$	1.5V	6V	50pF	500 Ω	0.3V
$5V \pm 0.5V$	V_{CC}	$\leq 2.5ns$	$V_{CC}/2$	$2 \times V_{CC}$	50pF	500 Ω	0.3V



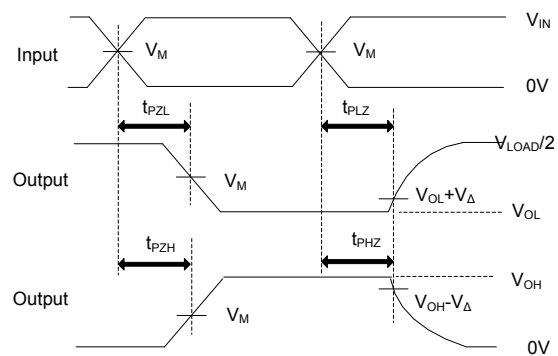
PULSE WIDTH



SETUP TIME AND HOLD TIME



PROPAGATION DELAY TIMES



ENABLE AND DISABLE TIMES

■ TEST CIRCUIT AND WAVEFORMS (Cont.)

Notes: 1. C_L includes probe and jig capacitance.

2. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control.

Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control

3. All input pulses are supplied by generators having the following characteristics: PRR 10 MHz, $Z = 50 \Omega$, slew rate 1 V/ns.

4. The outputs are measured one at a time, with one transition per measurement.

5. t_{PLH} and t_{PHZ} are the same as t_{dis} .

6. t_{PZL} and t_{PZH} are the same as t_{en} .

7. t_{PLH} and t_{PHL} are the same as t_{PD} .

8. All parameters and waveforms are not applicable to all devices.

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