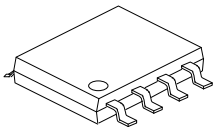
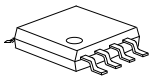
U74LVC2G00

CMOS IC

DUAL 2-INPUT POSITIVE-NAND GATE



SOP-8



MSOP-8

■ DESCRIPTION

The **U74LVC2G00** is a dual 2-input NAND gate which performs the function $Y=\overline{A*B}$ or $Y=\overline{A}+\overline{B}$. It is designed for 1.65V to 5.5V operation.

■ FEATURES

* Wide Supply Voltage Range from 1.65V to 5.5V
* Max t_{PD} of 4.3 ns at 3.3V
* Up to 5.5V Inputs Accept Voltages
* Low Power Consumption, I_{CC} = 10 μA (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

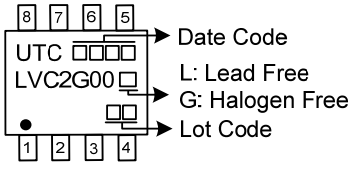
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC2G00L-S08-R	U74LVC2G00G-S08-R	SOP-8	Tape Reel
U74LVC2G00L-SM1-R	U74LVC2G00G-SM1-R	MSOP-8	Tape Reel

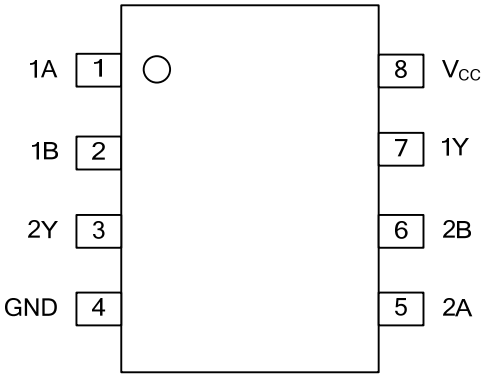
U74LVC2G00G-S08-R
(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel
(2) S08: SOP-8, SM1:MSOP-8
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



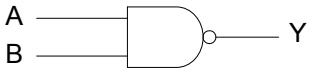
■ PIN CONFIGURATION



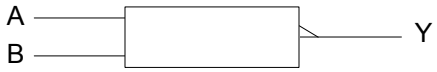
■ FUNCTION TABLE (Each Gate)

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

■ LOGIC DIAGRAM (Positive Logic)



Logic symbol



IEC symbol

■ 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 (any output in the high-impedance or power-off state)	V_{OUT}	-0.5 ~ 6.5	V
Output Voltage (any output in the high or low state)	V_{OUT}	-0.5 ~ V_{CC}+0.5	V
Input Clamp Current	I_{IK}	-50	mA
Output Clamp Current	I_{OK}	-50	mA
Output Current	I_{OUT}	±50	mA
V_{CC} or GND Current	I_{CC}	±100	mA
Storage Temperature	T_{STG}	-65 ~ +150	°C

Note: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. 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	MSOP-8	θ_{JA}	220	°C /W
	SOP-8		150	

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{CC}	Operating	1.65		5.5	V
		Data retention only	1.5			
High-Level Input Voltage	V_{IH}	V_{CC} = 1.65V to 1.95V	0.65× 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×V_{CC}			
Low-Level Input Voltage	V_{IL}	V_{CC} = 1.65V to 1.95V			0.35×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×V_{CC}	
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	
		V_{CC}=3V			-16	
					-24	
		V_{CC}=4.5V			-32	
Low-level Output Current	I_{OL}	V_{CC}=1.65V			4	mA
		V_{CC}=2.3V			8	
		V_{CC}=3V			16	
					24	
		V_{CC}=4.5V			32	
Input Transition Rise or Fall Rate	t_R / t_F	V_{CC}=1.8±0.15V, 2.5±0.2V			20	ns/V
		V_{CC}=3.3±0.3V			10	
		V_{CC}=5.0+0.5V			5	
Ambient Operating Temperature	T_{OPR}		-40		85	°C

■ ELECTRICAL CHARACTERISTICS (T_A =25°C, V_{CC} = 3.3 V, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
High-Level Output Voltage	V_{OH}	V_{CC} = 1.65V ~ 5.5V, I_{OH} = -100 μA		V_{CC} -0.1			V
		V_{CC} = 1.65V, I_{OH} = -4 mA		1.2			
		V_{CC} = 2.3V, I_{OH} = -8 mA		1.9			
		V_{CC} = 3V	I_{OH} = -16 mA	2.4			
			I_{OH} = -24 mA	2.3			
		V_{CC} = 4.5V, I_{OH} = -32 mA		3.8			
Low-Level Output Voltage	V_{OL}	V_{CC} = 1.65V ~ 5.5V, I_{OL} = 100 μA				0.1	V
		V_{CC} = 1.65V, I_{OL} = 4 mA				0.45	
		V_{CC} = 2.3V, I_{OL} = 8 mA				0.3	
		V_{CC} = 3V	I_{OL} = 16 mA			0.4	
			I_{OL} = 24 mA			0.55	
		V_{CC} = 4.5V, I_{OL} = 32 mA				0.55	
Input Leakage Current	$I_{I(LEAK)}$	V_{IN} = 5.5V or GND, V_{CC} = 0 to 5.5V				±5	μA
OFF-State Current	I_{OFF}	V_{IN} or V_O = 5.5V, V_{CC} = 0V				±10	μA
Quiescent Supply Current	I_Q	V_{IN} = 5.5V or GND, I_{OUT} = 0, V_{CC} = 1.65V to 5.5V				10	μA
Additional Quiescent Supply Current	ΔI_Q	One input at V_{CC} – 0.6V; other inputs at V_{CC} or GND; V_{CC}=3V to 5.5V				500	μA
Input Capacitance	C_{IN}	V_{IN} = V_{CC} or GND, V_{CC}=3.3V			5		pF

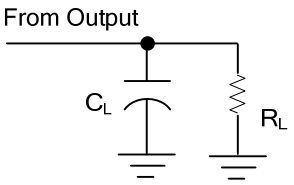
■ SWITCHING CHARACTERISTICS (T_A =25°C, unless otherwise specified)

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±0.15V, R_L=1KΩ	C_L=30pF	3.7		8.6	ns
		V_{CC}=2.5±0.2V, R_L=500Ω		1.6		4.8	
		V_{CC}=3.3±0.3V, R_L=500Ω	C_L=50pF	1.1		4.3	
		V_{CC}=5±0.5V, R_L=500Ω		1		3.3	

■ OPERATING CHARACTERISTICS (f=10MHz, T_A =25°C, unless otherwise specified)

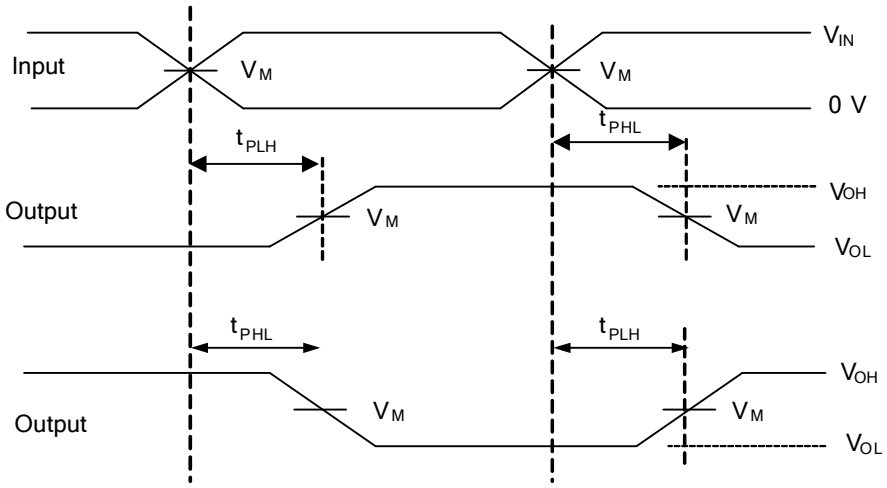
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	V_{CC} = 1.8V		19		pF
		V_{CC} = 2.5V		19		
		V_{CC} = 3.3V		20		
		V_{CC} = 5V		22		

■ TEST CIRCUIT AND WAVEFORMS



TEST CIRCUIT

V_{CC}	INPUTS		V_M	C_L	R_L
	V_{IN}	t_R, t_F			
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	30pF	1KΩ
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	30pF	500Ω
3.3V±0.3V	3V	≤2.5ns	1.5V	50pF	500Ω
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	50pF	500Ω



PROPAGATION DELAY TIMES

Notes: 1. C_L includes probe and jig capacitance.
2. All input pulses are supplied by generators having the following characteristics: PRR ≤10MHz, Z_O = 50Ω.