



U74LVC2G38

Preliminary

CMOS IC

DUAL 2-INPUT NAND GATE WITH OPEN-DRAIN OUTPUTS

DESCRIPTION

The **U74LVC2G38** is designed for 1.65V to 5.5V V_{CC} operation.

This device is a dual two-input NAND buffer gate with open-drain outputs. It performs the Boolean function $Y=A \bullet B$ or $Y=\overline{A+B}$ in positive logic.

This device is fully specified for partial-power-down $V_{CC}=3.3V$, $T_A=25^\circ C$ applications using I_{OFF} . The I_{OFF} circuitry disables the outputs, preventing damaging current backflow $>2V$ at $V_{CC}=3.3V$, $T_A=25^\circ C$ through the device when it is powered down.

FEATURES

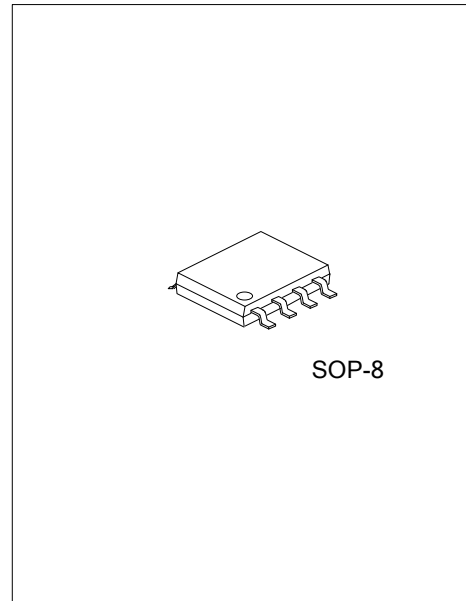
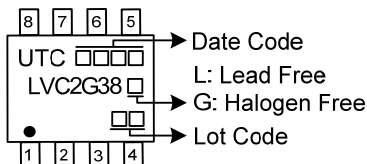
- * Wide supply voltage range from 1.65V to 5.5V
- * Inputs accept voltages up to 5.5V
- * I_{OFF} supports live insertion, partial-power-down mode, back-drive protection
- * Supports Down Translation to V_{CC}
- * Low static power consumption; $I_{CC}=\pm 10\mu A$ (Max.)
- * $\pm 24mA$ Output Drive at 3.3V

ORDERING INFORMATION

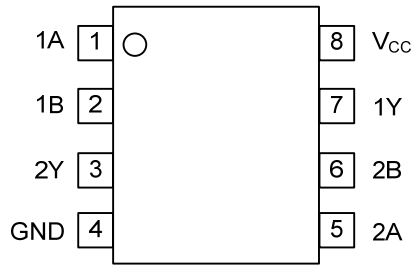
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC2G38L-S08-R	U74LVC2G38G-S08-R	SOP-8	Tape Reel

<p>U74LVC2G38G-S08-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) S08: SOP-8 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
---	--

MARKING



■ PIN CONFIGURATION

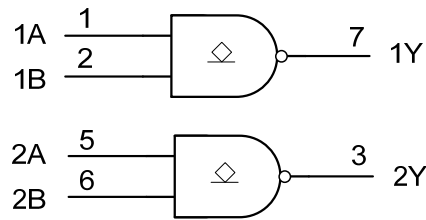


■ FUNCTION TABLE

INPUT		OUTPUT
A	B	Y
L	L	Z
L	H	Z
H	L	Z
H	H	L

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

■ LOGIC DIAGRAM (positive logic)



■ ABSOLUTE MAXIMUM RATING (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNIT
Supply Voltage	V _{CC}		-0.5 ~ +6.5	V
Input Voltage	V _{IN}		-0.5 ~ +6.5	V
Output Voltage	V _{OUT}	Output in the high or low state	-0.5 ~ V _{CC} +0.5	V
		Output in the power-off state	-0.5 ~ +6.5	V
Continuous V _{CC} or GND Current	I _{CC}		±100	mA
Continuous Output Current	I _{OUT}		±50	mA
Input Clamp Current	I _{IK}	V _{IN} <0V	-50	mA
Output Clamp Current	I _{OK}	V _{OUT} <0V	-50	mA
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.

■ RECOMMENDED OPERATING CONDITIONS (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V _{CC}	Operating	1.65		5.5	V
		Data retention only	1.5			V
Input Voltage	V _{IN}		0		5.5	V
Output Voltage	V _{OUT}		0		V _{CC}	V
Input Transition Rise or Fall Rate	Δt/Δv	V _{CC} =1.8V±0.15V, 2.5V±0.2V			20	ns/V
		V _{CC} =3.3V±0.3V			10	ns/V
		V _{CC} =5V±0.5V			5	ns/V
Operating Temperature	T _A		-40		+125	°C

■ ELECTRICAL CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	T _A =25°C			T _A =-40°C~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
High-level Input Voltage	V _{IH}	V _{CC} =1.8±0.15V	0.65×			0.65×			V
		V _{CC} =2.5±0.2V	1.7			1.7			V
		V _{CC} =3.3±0.3V	2			2			V
		V _{CC} =5±0.5V	0.7×			0.7×			V
Low-level Input Voltage	V _{IL}	V _{CC} =1.8±0.15V			0.35×			0.35×	V
		V _{CC} =2.5±0.2V			0.7			0.7	V
		V _{CC} =3.3±0.3V			0.8			0.8	V
		V _{CC} =5±0.5V			0.3×			0.3×	V
Low-Level Output Voltage	V _{OL}	V _{CC} =1.65 ~ 5.5V, I _{OL} =100μA			0.1			0.1	V
		V _{CC} =1.65V, I _{OL} =4mA			0.45			0.7	V
		V _{CC} =2.3V, I _{OL} =8mA			0.3			0.45	V
		V _{CC} =3.0V, I _{OH} =16mA			0.4			0.6	V
		V _{CC} =3.0V, I _{OH} =24mA			0.55			0.8	V
		V _{CC} =4.5V, I _{OL} =32mA			0.55			0.8	V

■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	T _A =25°C			T _A =-40°C~+125°C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
Input Leakage Current (A or B Input)	I _{I(LEAK)}	V _{CC} =0V ~ 5.5V V _{IN} =5.5V or GND			±1			±10	μA
Power Off Leakage Current	I _{OFF}	V _{CC} =0V, V _{IN} or V _{OUT} =5.5V			±10			±10	μA
Quiescent Supply Current	I _{CC}	V _{CC} =1.65 ~ 5.5V, V _{IN} =5.5V or GND, I _{OUT} =0			10			10	μA
Additional Quiescent Supply Current Per Input Pin	ΔI _{CC}	V _{CC} =3 ~ 5.5V, One input at V _{CC} -0.6V, other inputs at V _{CC} or GND			500			500	μA

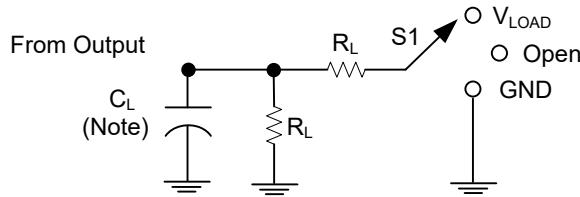
■ SWITCHING CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	T _A =25°C			T _A =-40°C~+125°C			UNIT	
			MIN	TYP	MAX	MIN	TYP	MAX		
Propagation Delay from Input (A, B or C) to Output (Y)	t _{PD}	V _{CC} =1.8V±0.15V	C _L =15pF	1		15	1		18	ns
		V _{CC} =2.5V±0.2V		1		8	1		9.5	ns
		V _{CC} =3.3V±0.3V		1		6	1		7.5	ns
		V _{CC} =5V±0.5V		0.5		4.5	0.5		5.5	ns
		V _{CC} =1.8V±0.15V	C _L =30pF or 50pF	1		17	1		20	ns
		V _{CC} =2.5V±0.2V		1		9.5	1		11	ns
		V _{CC} =3.3V±0.3V		1		7.5	1		9	ns
		V _{CC} =5V±0.5V		0.5		5.5	0.5		6.5	ns

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Capacitance	C _{IN}	V _{CC} =3.3V, V _{IN} =V _{CC} or GND		3.5		pF
Output Capacitance	C _{OUT}	V _{CC} =3.3V, V _{OUT} =V _{CC} or GND		4.5		pF
Power Dissipation Capacitance	C _{PD}	V _{CC} =1.8V, f=10MHz		6		pF
		V _{CC} =2.5V, f=10MHz		7		pF
		V _{CC} =3.3V, f=10MHz		7		pF
		V _{CC} =5V, f=10MHz		9		pF

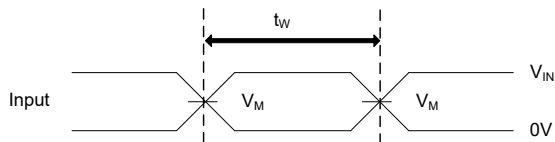
TEST CIRCUIT AND WAVEFORMS



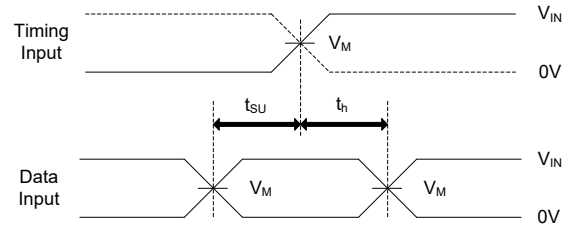
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

Note: C_L includes probe and jig capacitance.

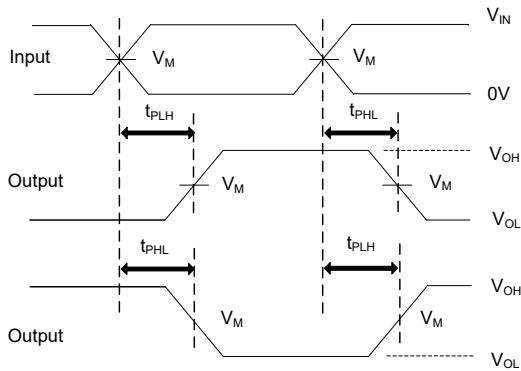
V_{CC}	Inputs		V_M	V_{LOAD}	C_L	R_L	V_{Δ}
	V_{IN}	t_R / t_F					
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	15pF	1M Ω	0.15V
$2.5V \pm 0.2V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	15pF	1M Ω	0.15V
$3.3V \pm 0.3V$	3V	$\leq 2.5ns$	1.5V	6V	15pF	1M Ω	0.3V
$5V \pm 0.5V$	V_{CC}	$\leq 2.5ns$	$V_{CC}/2$	$2 \times V_{CC}$	15pF	1M Ω	0.3V



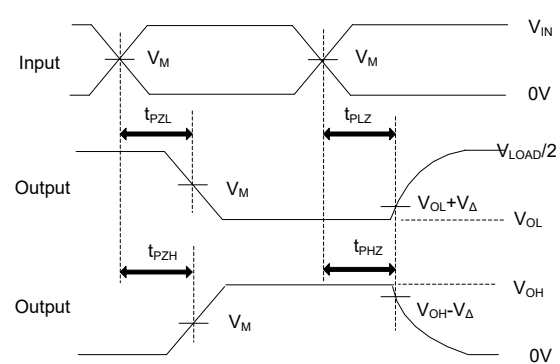
PULSE WIDTH



SETUP TIME AND HOLD TIME



PROPAGATION DELAY TIMES

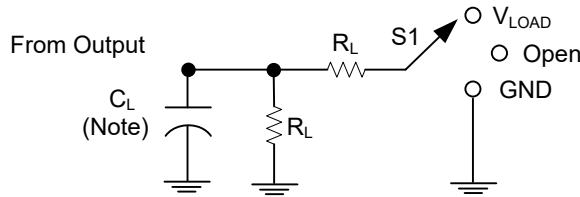


ENABLE AND DISABLE TIMES

Notes: 1. C_L includes probe and jig capacitance.

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

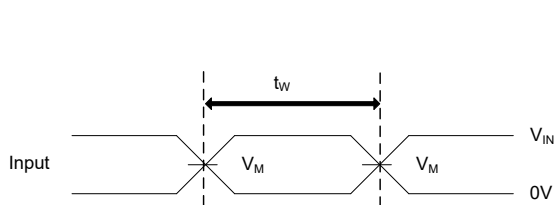
TEST CIRCUIT AND WAVEFORMS (Cont.)



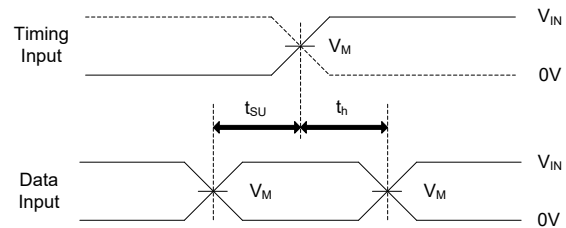
TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND

Note: C_L includes probe and jig capacitance.

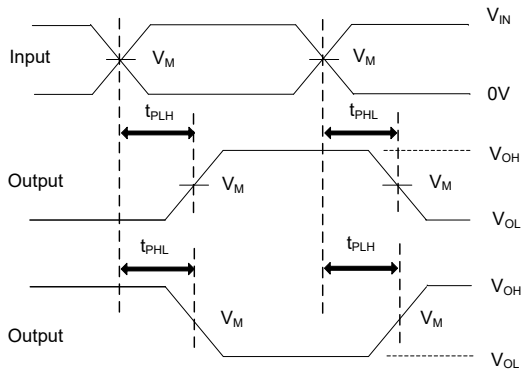
V_{CC}	Inputs		V_M	V_{LOAD}	C_L	R_L	V_{Δ}
	V_{IN}	t_R / t_F					
$1.8V \pm 0.15V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	1K Ω	0.15V
$2.5V \pm 0.2V$	V_{CC}	$\leq 2ns$	$V_{CC}/2$	$2 \times V_{CC}$	30pF	500 Ω	0.15V
$3.3V \pm 0.3V$	3V	$\leq 2.5ns$	1.5V	6V	50pF	500 Ω	0.3V
$5V \pm 0.5V$	V_{CC}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



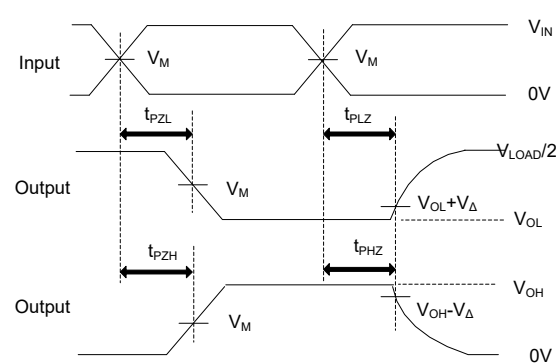
PULSE WIDTH



SETUP TIME AND HOLD TIME



PROPAGATION DELAY TIMES



ENABLE AND DISABLE TIMES

Notes: 1. C_L includes probe and jig capacitance.

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

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.