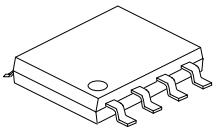
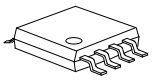
U74LVC1G99

CMOS IC

ULTRA-CONFIGURABLE MULTIPLE-FUNCTION GATE WITH 3-STATE OUTPUT



SOP-8



MSOP-8

■ DESCRIPTION

The **U74LVC1G99** is a configurable multiple functions with 3-state output device, and when output-enable (OE) input is high ,the output is disabled, when OE is low, the output state is determined by 16 patterns of 4-bit input. The user can choose different logic functions

Such as AND, OR, NAND, NOR, XOR, XNOR, MUX, inverter, and buffer, by changing the inputs' logic state. All inputs can be connected to V_{CC} or GND.

The device have different input threshold levels for positive-going (V_{T+}) and negative-going(V_{T-}) signals because of the Schmitt-trigger action in the input.

This device has power-down protective circuit, preventing device destruction when it is powered down.

■ FEATURES

* Operate from 1.65V to 5.5V
* Inputs accept voltages to 5.5V
* All inputs have Schmitt-trigger action
* I_{off} supports partial-power-down mode
* Low power dissipation: I_{CC}=10μA(Max.)
* Max t_{PD} of 6.7 ns at 3.3V
* ±24mA output drive(V_{CC}=3.3V)
* Offers nine different logic functions in a single package

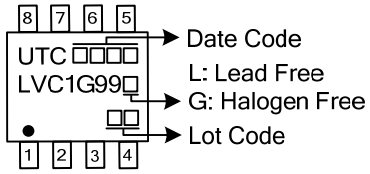
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC1G99L-S08-R	U74LVC1G99G-S08-R	SOP-8	Tape Reel
U74LVC1G99L-SM1-R	U74LVC1G99G-SM1-R	MSOP-8	Tape Reel

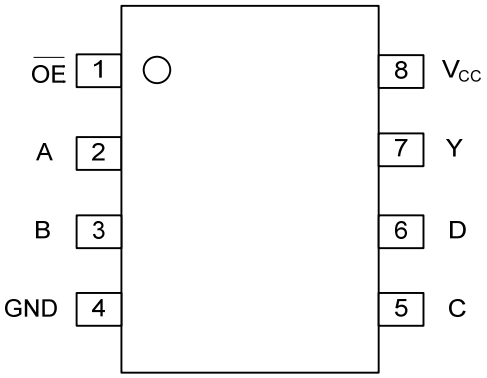
U74LVC1G99G-S08-R
(1)Packing Type
(2)Package Type
(3)Green Package

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

■ MARKING



■ PIN CONFIGURATION

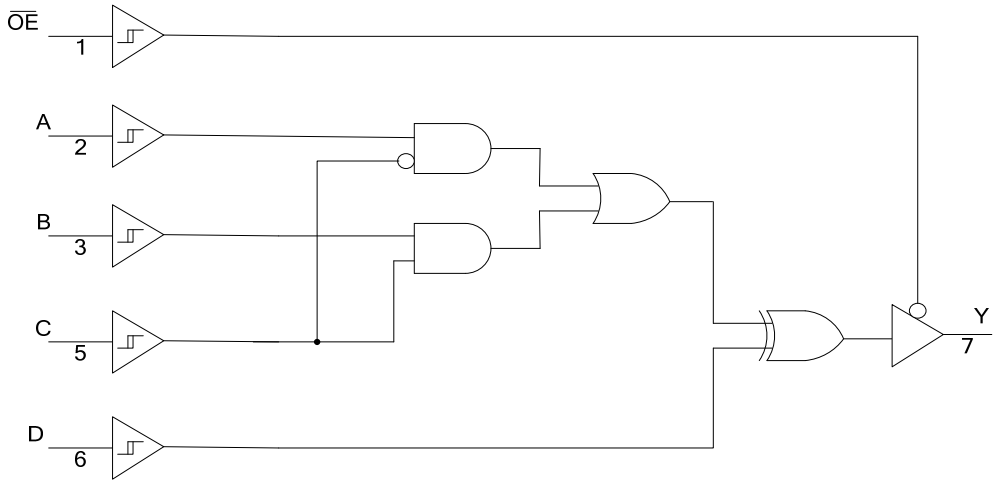


■ FUNCTION TABLE (EACH GATE)

INPUTS					OUTPUT
OE	D	C	B	A	Y
L	L	L	L	L	L
L	L	L	L	H	H
L	L	L	H	L	L
L	L	L	H	H	H
L	L	H	L	L	L
L	L	H	L	H	L
L	L	H	H	L	H
L	L	H	H	H	H
L	H	L	L	L	H
L	H	L	L	H	L
L	H	L	H	L	H
L	H	L	H	H	L
L	H	H	L	L	H
L	H	H	L	H	H
L	H	H	H	L	L
L	H	H	H	H	L
H	H or L	H or L	H or L	H or L	Z

Note: H: HIGH voltage level; L: LOW voltage level; Z: HIGH impedance state

■ 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
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
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
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 (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}	High or low state	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}=3V			-24	mA
		V_{CC}=4.5V			-32	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}=3V			24	mA
		V_{CC}=4.5V			32	mA
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	MIN	TYP	MAX	UNIT
Positive-Going Input Threshold Voltage	V_{T+}	V_{CC} =1.65V	0.79		1.26	V
		V_{CC} =2.3V	1.11		1.66	
		V_{CC} =3.0V	1.5		1.97	
		V_{CC} =4.5V	2.16		2.84	
		V_{CC} =5.5V	2.61		3.43	
Negative-Going Input Threshold Voltage	V_{T-}	V_{CC} =1.65V	0.39		0.72	V
		V_{CC} =2.3V	0.58		0.97	
		V_{CC} =3.0V	0.84		1.24	
		V_{CC} =4.5V	1.41		1.89	
		V_{CC} =5.5V	1.87		2.39	
Hysteresis Voltage (V_{T+}-V_{T-})	$\triangle V_T$	V_{CC} =1.65V	0.37		0.72	V
		V_{CC} =2.3V	0.48		0.87	
		V_{CC} =3.0V	0.56		0.97	
		V_{CC} =4.5V	0.71		1.14	
		V_{CC} =5.5V	0.71		1.21	
High-Level Output Voltage	V_{OH}	V_{CC} =1.65V ~ 5.5V, I_{OH}=-100μA	V_{CC}-0.1			V
		V_{CC} =1.65V, I_{OH}=-4mA	1.2			
		V_{CC} =2.3V, I_{OH}=-8mA	1.9			
		V_{CC} =3.0V, I_{OH}=-16mA	2.4			
		V_{CC} =3.0V, I_{OH}=-24mA	2.3			
		V_{CC} =4.5V, I_{OH}=-32mA	3.8			
Low-Level Output Voltage	V_{OL}	V_{CC} =1.65V ~ 5.5V, I_{OL}=-100μA			0.1	V
		V_{CC} =1.65V, I_{OL}=4mA			0.45	
		V_{CC} =2.3V, I_{OL}=8mA			0.3	
		V_{CC} =3.0V, I_{OL}=16mA			0.4	
		V_{CC} =3.0V, I_{OL}=24mA			0.55	
		V_{CC} =4.5V, I_{OL}=32mA			0.55	
Input Leakage Current	$I_{I(LEAK)}$	V_{CC} =0V ~ 5.5V, V_{IN}=V_{CC} or GND			±5	μA
Power OFF Leakage Current	I_{OFF}	V_{CC} =0V, V_{IN} or V_{OUT}=5.5V			±10	μA
High Impedance Output Leakage Current	Ioz	V_{OUT}=V_{CC} or GND, V_{CC} =1.65V ~5.5V			±10	μA
Quiescent Supply Current	I_{CC}	V_{CC} =1.65V ~ 5.5V, V_{IN}=5.5V or GND I_{OUT}=0			±10	μA
Additional Quiescent Supply Current	ΔI_{CC}	V_{CC} =3V ~ 5.5V, One input at V_{CC}-0.6V, other inputs at V_{CC} or GND			500	μA
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_{IN}=V_{CC} or GND		6		pF

■ SWITCHING CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (A) to output(Y)	t_{PLH}/t_{PHL} (A to Y)	V_{CC}=1.8V±0.15V, C_L=15pF	4.5		30.1	ns
		V_{CC}=2.5V±0.2V, C_L=15pF	2.5		11.3	
		V_{CC}=3.3V±0.3V, C_L=15pF	1.8		7.5	
		V_{CC}=5V±0.5V, C_L=15pF	1.3		4.8	
Propagation delay from input (B) to output(Y)	t_{PLH}/t_{PHL} (B to Y)	V_{CC}=1.8V±0.15V, C_L=15pF	4.4		28.3	ns
		V_{CC}=2.5V±0.2V, C_L=15pF	2.4		10.8	
		V_{CC}=3.3V±0.3V, C_L=15pF	1.8		7.2	
		V_{CC}=5V±0.5V, C_L=15pF	1.3		4.7	
Propagation delay from input (C) to output(Y)	t_{PLH}/t_{PHL} (C to Y)	V_{CC}=1.8V±0.15V, C_L=15pF	4.4		29.1	ns
		V_{CC}=2.5V±0.2V, C_L=15pF	2.4		11.7	
		V_{CC}=3.3V±0.3V, C_L=15pF	1.9		7.6	
		V_{CC}=5V±0.5V, C_L=15pF	1.3		5.0	
Propagation delay from input (D) to output(Y)	t_{PLH}/t_{PHL} (D to Y)	V_{CC}=1.8V±0.15V, C_L=15pF	4.3		25.1	ns
		V_{CC}=2.5V±0.2V, C_L=15pF	2.4		10.2	
		V_{CC}=3.3V±0.3V, C_L=15pF	1.7		6.7	
		V_{CC}=5V±0.5V, C_L=15pF	1.3		4.5	
Propagation delay from Output-enable(OE) to output(Y)	t_{PZL}/t_{PZH}	V_{CC}=1.8V±0.15V, C_L=15pF	3.4		24.7	ns
		V_{CC}=2.5V±0.2V, C_L=15pF	2.1		10.0	
		V_{CC}=3.3V±0.3V, C_L=15pF	1.3		5.8	
		V_{CC}=5V±0.5V, C_L=15pF	1.0		3.8	
Propagation delay from Output-enable(OE) to output(Y)	t_{PZL}/t_{PZH}	V_{CC}=1.8V±0.15V, C_L=15pF	4.0		15.5	ns
		V_{CC}=2.5V±0.2V, C_L=15pF	2.7		7.5	
		V_{CC}=3.3V±0.3V, C_L=15pF	3.5		7.0	
		V_{CC}=5V±0.5V, C_L=15pF	2		5.5	

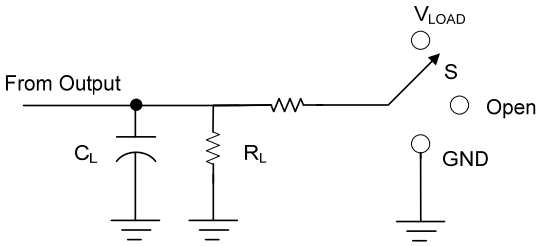
■ SWITCHING CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (A) to output(Y)	t_{PLH}/t_{PHL} (A to Y)	V_{CC}=1.8V±0.15V, C_L=50pF	4.6		30.8	ns
		V_{CC}=2.5V±0.2V, C_L=50pF	2.6		11.7	
		V_{CC}=3.3V±0.3V, C_L=50pF	2.4		8.4	
		V_{CC}=5V±0.5V, C_L=50pF	1.8		5.5	
Propagation delay from input (B) to output(Y)	t_{PLH}/t_{PHL} (B to Y)	V_{CC}=1.8V±0.15V, C_L=50pF	4.6		28.9	ns
		V_{CC}=2.5V±0.2V, C_L=50pF	2.6		11.3	
		V_{CC}=3.3V±0.3V, C_L=50pF	2.3		8.2	
		V_{CC}=5V±0.5V, C_L=50pF	1.8		5.4	
Propagation delay from input (C) to output(Y)	t_{PLH}/t_{PHL} (C to Y)	V_{CC}=1.8V±0.15V, C_L=50pF	4.4		29.8	ns
		V_{CC}=2.5V±0.2V, C_L=50pF	2.5		12.3	
		V_{CC}=3.3V±0.3V, C_L=50pF	2.5		8.6	
		V_{CC}=5V±0.5V, C_L=50pF	1.8		5.7	
Propagation delay from input (D) to output(Y)	t_{PLH}/t_{PHL} (D to Y)	V_{CC}=1.8V±0.15V, C_L=50pF	4.3		25.7	ns
		V_{CC}=2.5V±0.2V, C_L=50pF	2.5		10.7	
		V_{CC}=3.3V±0.3V, C_L=50pF	2.4		7.6	
		V_{CC}=5V±0.5V, C_L=50pF	1.6		5.2	
Propagation delay from Output-enable(OE) to output(Y)	t_{PZL}/t_{PZH}	V_{CC}=1.8V±0.15V, C_L=50pF	4.2		25.2	ns
		V_{CC}=2.5V±0.2V, C_L=50pF	2.4		11.3	
		V_{CC}=3.3V±0.3V, C_L=50pF	2.0		7.0	
		V_{CC}=5V±0.5V, C_L=50pF	1.7		4.7	
Propagation delay from Output-enable(OE) to output(Y)	t_{PZL}/t_{PZH}	V_{CC}=1.8V±0.15V, C_L=50pF	3.7		15	ns
		V_{CC}=2.5V±0.2V, C_L=50pF	2		5.8	
		V_{CC}=3.3V±0.3V, C_L=50pF	2.1		5.6	
		V_{CC}=5V±0.5V, C_L=50pF	1.0		4.5	

■ OPERATING CHARACTERISTICS (Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	C_{PD}	V_{CC}=3.3V, f=10MH$_Z$		22		pF

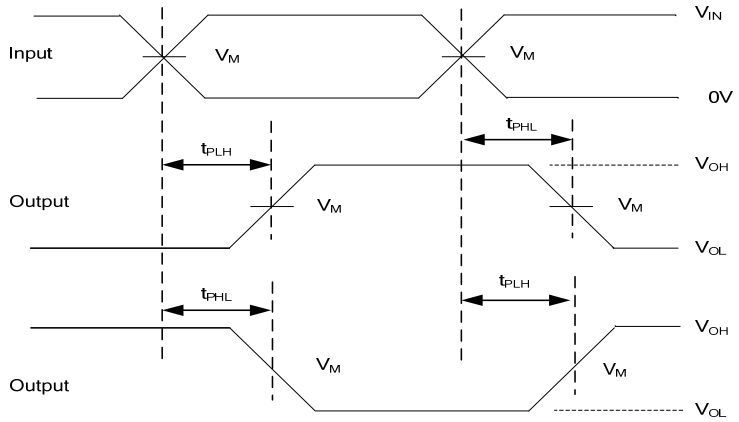
■ TEST CIRCUIT AND WAVEFORMS



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

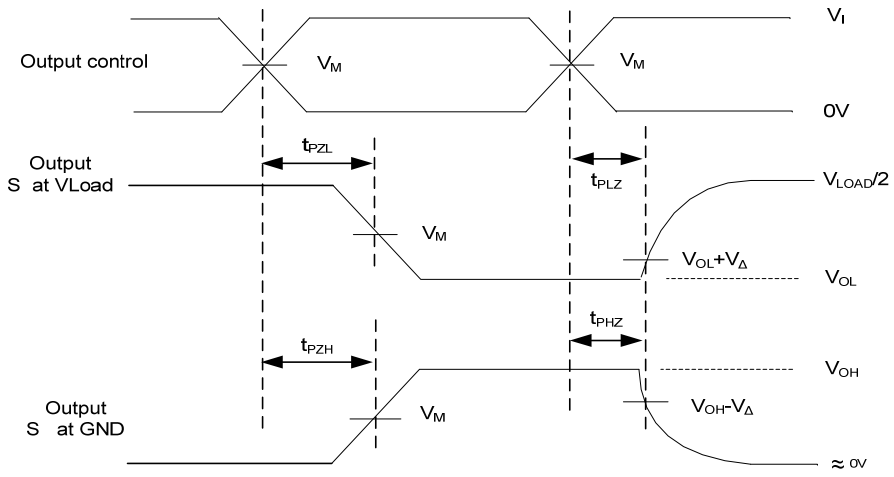
TEST CIRCUIT

V_{CC}	Inputs		V_M	V_{LOAD}	C_L	R_L	V_Δ
	V_{IN}	t_R, t_F					
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	$2\times V_{CC}$	15pF	1MΩ	0.15V
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	$2\times V_{CC}$	15pF	1MΩ	0.15V
3.3V±0.3V	3V	≤2.5ns	1.5V	6V	15pF	1MΩ	0.3V
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	$2\times V_{CC}$	15pF	1MΩ	0.3V
1.8V±0.15V	V_{CC}	≤2ns	$V_{CC}/2$	$2\times V_{CC}$	30pF	1KΩ	0.15V
2.5V±0.2V	V_{CC}	≤2ns	$V_{CC}/2$	$2\times V_{CC}$	30pF	500Ω	0.15V
3.3V±0.3V	3V	≤2.5ns	1.5V	6V	50pF	500Ω	0.3V
5V±0.5V	V_{CC}	≤2.5ns	$V_{CC}/2$	$2\times V_{CC}$	50pF	500Ω	0.3V



PROPAGATION DELAY TIMES

■ TEST CIRCUIT AND WAVEFORMS (Cont.)



ENABLE AND DISABLE TIMES

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