



## U74LVC1G57

CMOS IC

### MULTIPLE-FUNCTION GATE

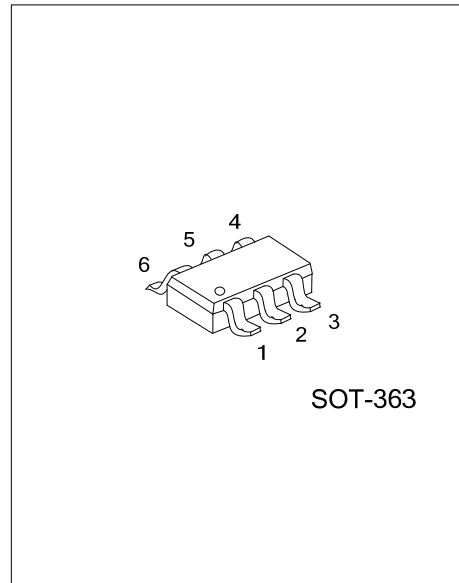
#### DESCRIPTION

The **U74LVC1G57** provides configurable multiple functions. The output state is determined by eight patterns of 3-bit input. The user can choose the logic functions AND, OR, NAND, NOR, XNOR, inverter, and buffer. All inputs can be connected to  $V_{CC}$  or GND.

This device functions as an independent gate, but because of Schmitt action, it may have different input threshold levels for positive-going ( $V_{T+}$ ) and negative-going ( $V_{T-}$ ) signals.

#### FEATURES

- \* Wide supply voltage range from 1.65V to 5.5V
- \* Inputs accept voltages up to 5.5V
- \*  $I_{OFF}$  supports partial-power-down mode
- \* Low static power consumption;  $I_{CC}=10\mu A$  (Max.)

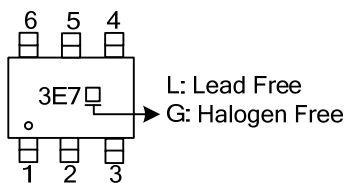


#### ORDERING INFORMATION

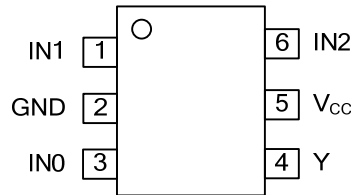
Ordering Number		Package	Packing
Lead Free	Halogen Free		
U74LVC1G57L-AL6-R	U74LVC1G57G-AL6-R	SOT-363	Tape Reel

<p>U74LVC1G57G-AL6-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AL6: SOT-363 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



■ PIN CONFIGURATION

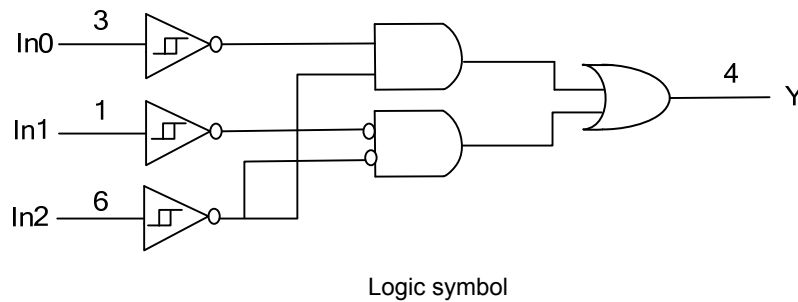


■ FUNCTION TABLE

INPUT(IN2)	INPUT(IN1)	INPUT(IN0)	OUTPUT(Y)
L	L	L	H
L	L	H	L
L	H	L	H
L	H	H	L
H	L	L	L
H	L	H	L
H	H	L	H
H	H	H	H

Note: H: High voltage level; L: Low voltage level.

■ LOGIC DIAGRAM (positive logic)



### ■ ABSOLUTE MAXIMUM RATING

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 ~ +6.5	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	$I_{OUT}$	$V_{OUT}=0V \sim V_{CC}$	±50	mA
Input Clamp Current	$I_{IK}$	$V_{IN}<0V$	-50	mA
Output Clamp Current	$I_{OK}$	$V_{OUT}>V_{CC}$ or $V_{OUT}<0V$	-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

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
Operating Temperature	$T_A$		-40		85	°C

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Positive-Going Input Threshold Voltage	$V_{T+}$	$V_{CC}=1.65V$	0.79		1.16	V
		$V_{CC}=2.3V$	1.11		1.56	V
		$V_{CC}=3V$	1.5		1.87	V
		$V_{CC}=4.5V$	2.16		2.74	V
		$V_{CC}=5.5V$	2.61		3.33	V
Negative-Going Input Threshold Voltage	$V_{T-}$	$V_{CC}=1.65V$	0.35		0.62	V
		$V_{CC}=2.3V$	0.58		0.87	V
		$V_{CC}=3V$	0.84		1.19	V
		$V_{CC}=4.5V$	1.41		1.9	V
		$V_{CC}=5.5V$	1.87		2.29	V
Hysteresis Voltage ( $V_{T+}-V_{T-}$ )	$\Delta V_T$	$V_{CC}=1.65V$	0.3		0.62	V
		$V_{CC}=2.3V$	0.4		0.8	V
		$V_{CC}=3V$	0.53		0.87	V
		$V_{CC}=4.5V$	0.71		1.04	V
		$V_{CC}=5.5V$	0.71		1.11	V
High-Level Output Voltage	$V_{OH}$	$V_{CC}=1.65 \sim 5.5V, I_{OH}=-100\mu A$	$V_{CC}-0.1$			V
		$V_{CC}=1.65V, I_{OH}=-4mA$	1.2			V
		$V_{CC}=2.3V, I_{OH}=-8mA$	1.9			V
		$V_{CC}=3.0V$   $I_{OH}=-16mA$	2.4			V
		$I_{OH}=-24mA$	2.3			V
$V_{CC}=4.5V, I_{OH}=-32mA$	3.8			V		
Low-Level Output Voltage	$V_{OL}$	$V_{CC}=1.65 \sim 5.5V, I_{OH}=100\mu A$			0.1	V
		$V_{CC}=1.65V, I_{OH}=4mA$			0.45	V
		$V_{CC}=2.3V, I_{OH}=8mA$			0.3	V
		$V_{CC}=3.0V$   $I_{OH}=16mA$			0.4	V
		$I_{OH}=24mA$			0.55	V
$V_{CC}=4.5V, I_{OH}=32mA$			0.55	V		

### ■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Leakage Current	$I_{I(LEAK)}$	$V_{CC}=0 \sim 5.5V$ , $V_{IN}=5.5V$ or GND			$\pm 1$	$\mu A$
Power OFF Leakage Current	$I_{off}$	$V_{CC}=0V$ , $V_{IN}$ or $V_{OUT}=5.5V$			$\pm 10$	$\mu A$
Quiescent Supply Current	$I_{CC}$	$V_{CC}=1.65 \sim 5.5V$ , $V_{IN}=5.5V$ or GND, $I_{OUT}=0A$			10	$\mu A$
Additional Quiescent Supply Current Per Input Pin	$\Delta I_{CC}$	$V_{CC}=3 \sim 5.5V$ , One input at $V_{CC}-0.6V$ , Other inputs at $V_{CC}$ or GND			500	$\mu A$
Input Capacitance	$C_I$	$V_{CC}=3.3V$ , $V_{IN}=V_{CC}$ or GND		3.5		pF

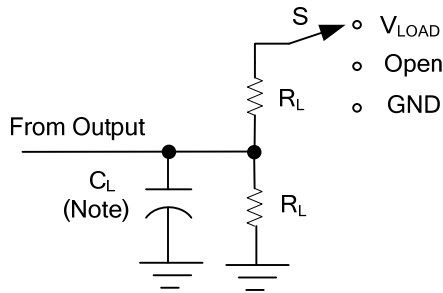
### ■ SWITCHING CHARACTERISTICS ( $T_A = 25^\circ C$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Propagation delay from input (A) to output(Y)	$t_{PD}$	$V_{CC}=1.8\pm 0.15V$ , $C_L=30pF$ , $R_L=1k\Omega$	3.2		14.4	ns
		$V_{CC}=2.5\pm 0.2V$ , $C_L=30pF$ , $R_L=500\Omega$	2		8.3	ns
		$V_{CC}=3.3\pm 0.3V$ , $C_L=50pF$ , $R_L=500\Omega$	1.5		6.3	ns
		$V_{CC}=5\pm 0.5V$ , $C_L=50pF$ , $R_L=500\Omega$	1.1		5.1	ns

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Dissipation Capacitance	$C_{PD}$	$V_{CC}=1.8V$		20		pF
		$V_{CC}=2.5V$		20		pF
		$V_{CC}=3.3V$		21		pF
		$V_{CC}=5V$		22		pF

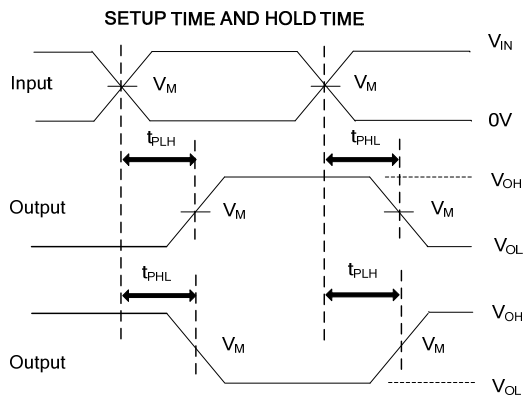
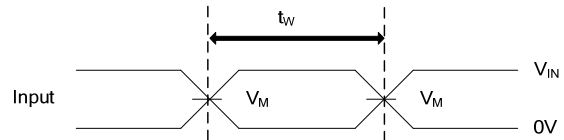
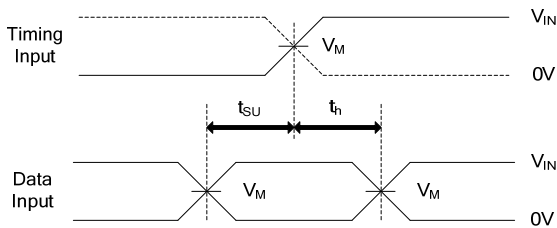
## TEST CIRCUIT AND WAVEFORMS



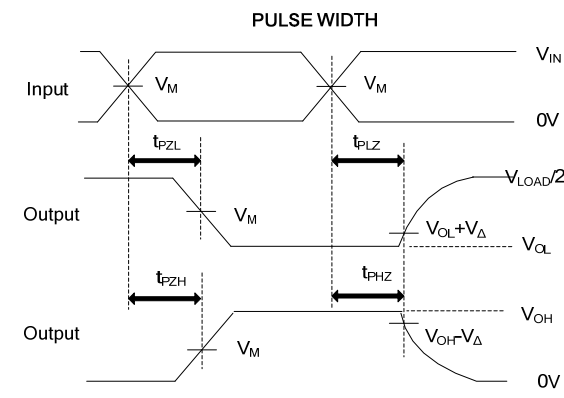
TEST	S
$t_{PLH}/t_{PHL}$	Open
$t_{PLZ}/t_{PZL}$	$V_{LOAD}$
$t_{PHZ}/t_{PZH}$	GND

Note:  $C_L$  includes probe and jig capacitance.

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



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  $\leq 10MHz$ ,  $Z_O = 50\Omega$ .

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