



U74LVC1G57

CMOS IC

MULTIPLE-FUNCTION GATE

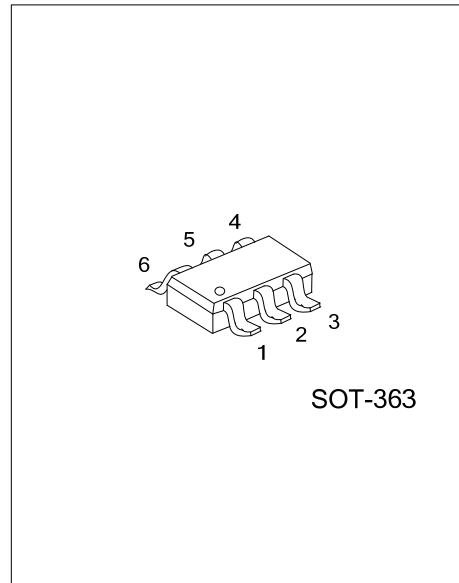
DESCRIPTION

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.)



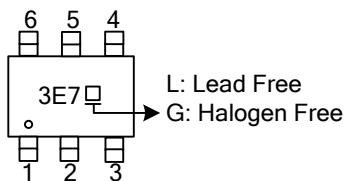
SOT-363

ORDERING INFORMATION

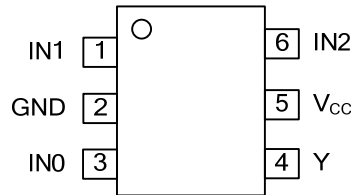
| Ordering Number | | Package | Packing |
|-------------------|-------------------|---------|-----------|
| Lead Free | Halogen Free | | |
| U74LVC1G57L-AL6-R | U74LVC1G57G-AL6-R | SOT-363 | Tape Reel |

| | |
|--|---|
| <p>U74LVC1G57G-AL6-R</p> <ul style="list-style-type: none"> (1) Packing Type (2) Package Type (3) Green Package | <ul style="list-style-type: none"> (1) R: Tape Reel (2) AL6: SOT-363 (3) G: Halogen Free and Lead Free, L: Lead Free |
|--|---|

MARKING



■ PIN CONFIGURATION

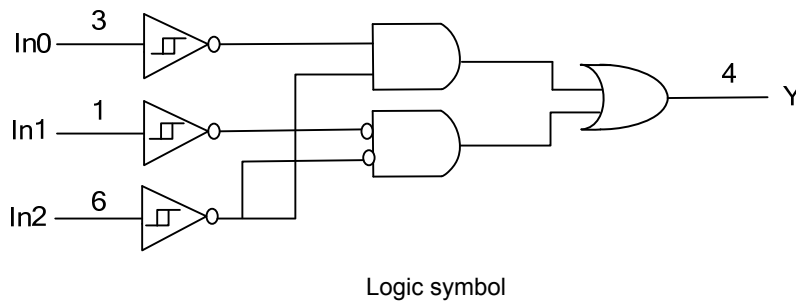


■ FUNCTION TABLE

| 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 ($V_{T+}-V_{T-}$) | ΔV_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} | $V_{CC}=1.65 \sim 5.5V, I_{OL}=100\mu A$ | | | 0.1 | V |
| | | $V_{CC}=1.65V, I_{OL}=4mA$ | | | 0.45 | V |
| | | $V_{CC}=2.3V, I_{OL}=8mA$ | | | 0.3 | V |
| | | $V_{CC}=3.0V$ $I_{OL}=16mA$ | | | 0.4 | V |
| | | $I_{OL}=24mA$ | | | 0.55 | V |
| $V_{CC}=4.5V, I_{OL}=32mA$ | | | 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 | | | ± 1 | μA |
| Power OFF Leakage Current | I_{off} | $V_{CC}=0V$, V_{IN} or $V_{OUT}=5.5V$ | | | ± 10 | μA |
| Quiescent Supply Current | I_{CC} | $V_{CC}=1.65 \sim 5.5V$, $V_{IN}=5.5V$ or GND, $I_{OUT}=0A$ | | | 10 | μA |
| Additional Quiescent Supply Current Per Input Pin | ΔI_{CC} | $V_{CC}=3 \sim 5.5V$, One input at $V_{CC}-0.6V$, Other inputs at V_{CC} or GND | | | 500 | μA |
| Input Capacitance | C_I | $V_{CC}=3.3V$, $V_{IN}=V_{CC}$ or GND | | 3.5 | | pF |

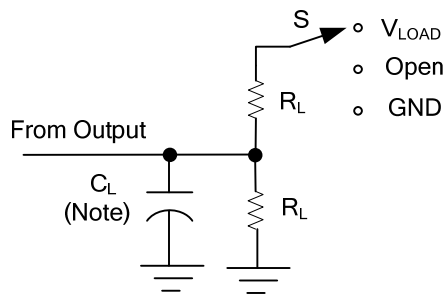
■ SWITCHING CHARACTERISTICS ($T_A = 25^\circ C$, unless otherwise specified)

| 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 |

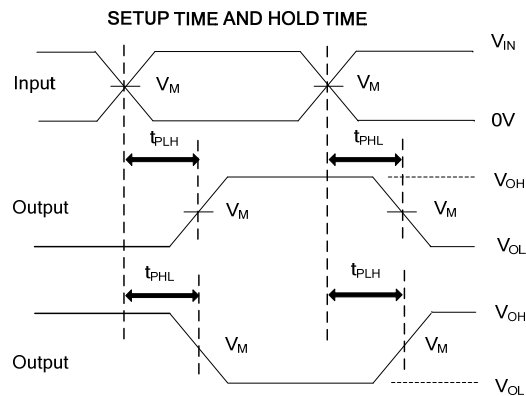
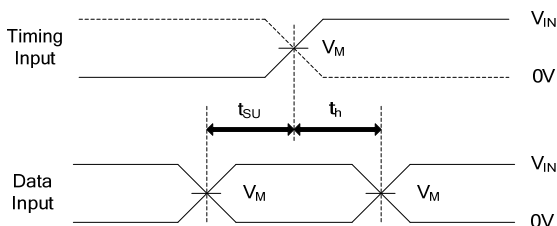
TEST CIRCUIT AND WAVEFORMS



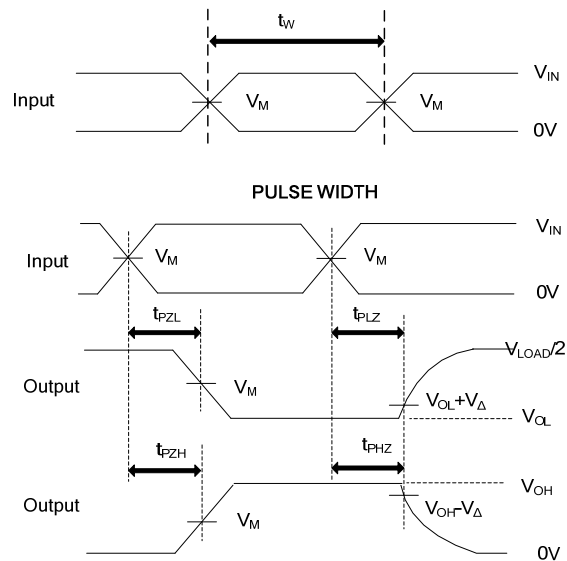
| TEST | S |
|-------------------|------------|
| t_{PLH}/t_{PHL} | Open |
| t_{PLZ}/t_{PZL} | V_{LOAD} |
| t_{PHZ}/t_{PZH} | GND |

Note: C_L includes probe and jig capacitance.

| V_{CC} | Inputs | | V_M | V_{LOAD} | C_L | R_L | V_{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 |



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 $\leq 10MHz$, $Z_0 = 50\Omega$.

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