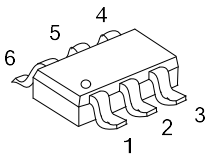
# U74LVC1G0832

*CMOS IC*

# SINGLE 3-INPUT POSITIVE AND-OR GATE




SOT-363

## ■ DESCRIPTION

This device is designed for 1.65V to 5.5V $V_{CC}$ operation.

The **U74LVC1G0832** device is a single 3-input positive AND-OR gate. it performs the Boolean function Y=(A • B) + C in positive logic.

By tying one input to GND or $V_{CC}$, the **U74LVC1G0832** device offers two more functions. When C is tied to GND, this device performs as a 2-input AND gate (Y=A • B). When A is tied to $V_{CC}$, the device works as a 2-input OR gate (Y=B+C). This device also works as a 2-input OR gate when B is tied to $V_{CC}$ (Y=A+C).

## ■ 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; $I_{CC}$=10μA (Max.)

## ■ ORDERING INFORMATION

| Ordering Number | | Package | Packing |
|---|---|---|---|
| Lead Free | Halogen Free | | |
| U74LVC1G0832L-AL6-R | U74LVC1G0832G-AL6-R | SOT-363 | Tape Reel |

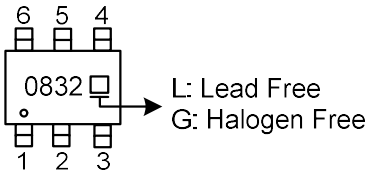
U74LVC1G0832G-AL6-R
(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel

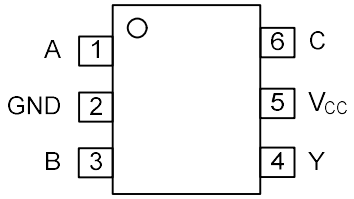
(2) AL6: SOT-363

(3) G: Halogen Free and Lead Free, L: Lead Free

## ■ MARKING



## ■ PIN CONFIGURATION

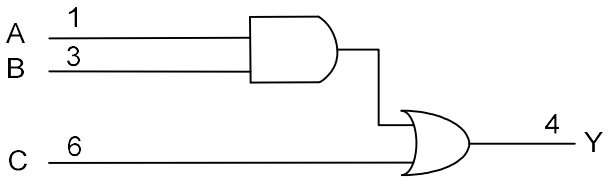



## ■ FUNCTION TABLE

| INPUT | | | OUTPUT(Y) |
|---|---|---|---|
| A | B | C | Y |
| X | X | H | H |
| H | H | X | H |
| X | L | L | L |
| L | X | L | L |

Note: H: High voltage level; L: Low voltage level; X: Valid H or L

## ■ LOGIC DIAGRAM (positive logic)



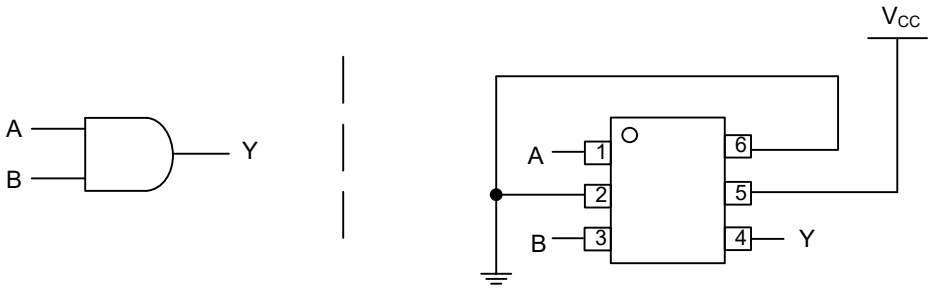

Logic symbol

## ■ FUNCTION SELECTION TABLE

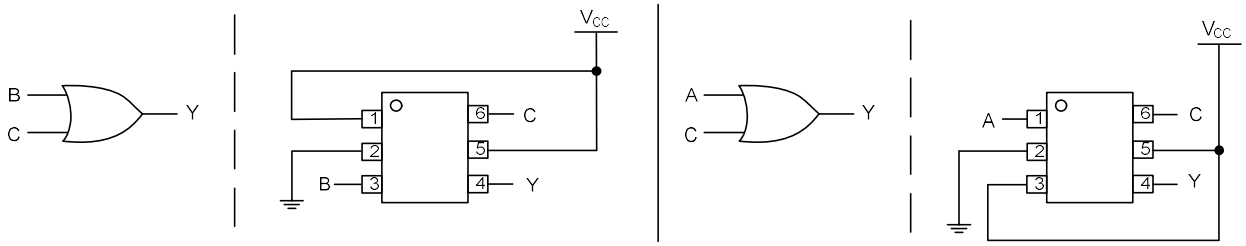
| LOGIC FUNCTION |
|---|
| 2-Input AND Gate |
| 2-Input OR Gate |
| Y = (A • B) + C |

## ■ LOGIC FUNCTION

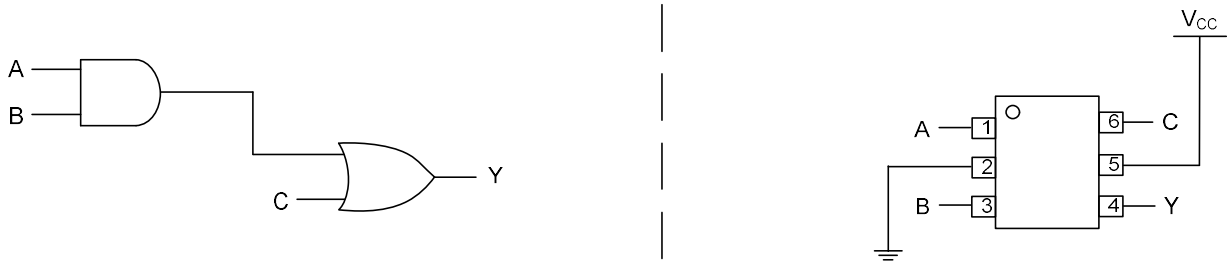
**2-Input AND Gate**




**2-Input OR Gate**




**Y = (A • B) + C**



## ■ ABSOLUTE MAXIMUM RATINGS

| 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

| 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 |
| High-level input voltage | $V_{IH}$ | $V_{CC}$=1.8±0.15V | 0.65×$V_{CC}$ | | 5.5 | V |
| | | $V_{CC}$=2.5±0.2V | 1.7 | | 5.5 | V |
| | | $V_{CC}$=3.3±0.3V | 2 | | 5.5 | V |
| | | $V_{CC}$=5±0.5V | 0.7×$V_{CC}$ | | 5.5 | V |
| Low-level input voltage | $V_{IL}$ | $V_{CC}$=1.8±0.15V | 0 | | 0.35×$V_{CC}$ | V |
| | | $V_{CC}$=2.5±0.2V | 0 | | 0.7 | V |
| | | $V_{CC}$=3.3±0.3V | 0 | | 0.8 | V |
| | | $V_{CC}$=5±0.5V | 0 | | 0.3×$V_{CC}$ | 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 ($V_{CC}$=3.3V, $T_A$ =25°C , unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| High-Level Output Voltage | $V_{OH}$ | $V_{IN}$=5.5V or GND | $V_{CC}$=1.65 ~ 5.5V, $I_{OH}$=-100μA | $V_{CC}$-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 |
| | | | $V_{CC}$=3.0V, $I_{OH}$=-24mA | 2.3 | | | V |
| | | | $V_{CC}$=4.5V, $I_{OH}$=-32mA | 3.8 | | | V |
| Low-Level Output Voltage | $V_{OL}$ | $V_{IN}$=5.5V or GND | $V_{CC}$=1.65 ~ 5.5V, $I_{OL}$=100μA | | | 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 |
| | | | $V_{CC}$=3.0V, $I_{OL}$=24mA | | | 0.55 | V |
| | | | $V_{CC}$=4.5V, $I_{OL}$=32mA | | | 0.55 | V |
| Input Leakage Current (A, B or C inputs) | $I_{I(LEAK)}$ | $V_{CC}$=0 ~ 5.5V, $V_{IN}$=5.5V or GND | | | | ±5 | 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 ~ 5.5V, $V_{IN}$=5.5V or GND, $I_{OUT}$=0A | | | | 10 | μA |
| Additional Quiescent Supply Current Per Input Pin | $\Delta I_{CC}$ | $V_{CC}$=3 ~ 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 | | | 7 | | pF |

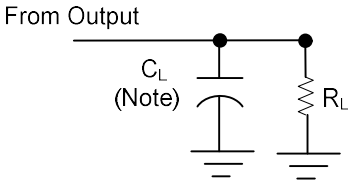
## ■ SWITCHING CHARACTERISTICS ($T_A$ =25°C , unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|---|
| Propagation delay from input (A, B or C) to output(Y) | $t_{PD}$ | $C_L$=15pF, $R_L$=1MΩ | $V_{CC}$=1.8±0.15V | 3.7 | | 14 | ns |
| | | | $V_{CC}$=2.5±0.2V | 2.4 | | 7 | ns |
| | | | $V_{CC}$=3.3±0.3V | 1.7 | | 5 | ns |
| | | | $V_{CC}$=5±0.5V | 1.2 | | 3.4 | ns |
| | | $C_L$=30pF, $R_L$=1KΩ | $V_{CC}$=1.8±0.15V | 2.5 | | 17.5 | ns |
| | | $C_L$=30pF, $R_L$=500Ω | $V_{CC}$=2.5±0.2V | 1.8 | | 7.6 | ns |
| | | $C_L$=50pF, $R_L$=500Ω | $V_{CC}$=3.3±0.3V | 1.8 | | 5.9 | ns |
| | | | $V_{CC}$=5±0.5V | 1.3 | | 4.5 | ns |

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

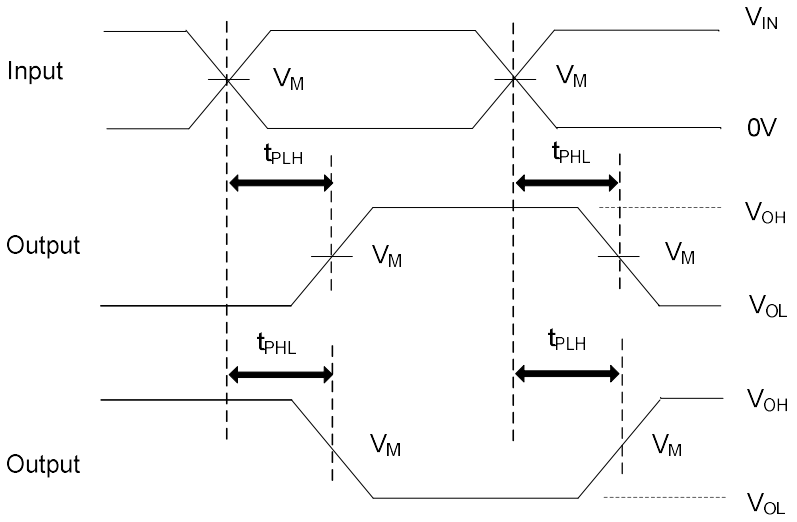
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Power Dissipation Capacitance | $C_{PD}$ | $V_{CC}$=1.8V | | 15 | | pF |
| | | $V_{CC}$=2.5V | | 15 | | pF |
| | | $V_{CC}$=3.3V | | 16 | | pF |
| | | $V_{CC}$=5V | | 18 | | pF |

## ■ TEST CIRCUIT AND WAVEFORMS




Note: $C_L$ includes probe and jig capacitance.

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




**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.