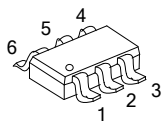
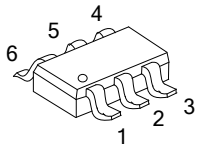
# U74LVC2G14

**CMOS IC**

# DUAL SCHMITT-TRIGGER INVERTER WITH 5V TOLERANT INPUT




SOT-363




SOT-26

## ■ DESCRIPTION

The UTC **U74LVC2G14** is a high-performance, low-power, low-voltage, Si-gate CMOS device which provides two inverters with Schmitt trigger action. It is capable of transforming slowly changed input signals into sharply defined, jitter-free output signals.

## ■ FEATURES

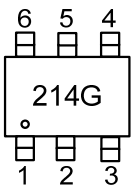
* Operate From 1.65V to 5.5V
* 5V Tolerant Input/Output for Interfacing with 5V logic
*±24mA Output Drive ($V_{CC}$ =3.3V)
* CMOS Low-Power Consumption and High Noise Immunity
* Halogen Free

## ■ ORDERING INFORMATION

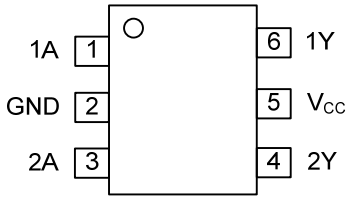
| Ordering Number | Package | Packing |
|---|---|---|
| U74LVC2G14G-AL6-R | SOT-363 | Tape Reel |
| U74LVC2G14G-AG6-R | SOT-26 | Tape Reel |

| | |
|---|---|
| U74LVC2G14G-AL6-R<br>(1)Packing Type<br>(2)Package Type<br>(3)Halogen Free | (1) R: Tape Reel<br>(2) AL6: SOT-363, AG6: SOT-26<br>(3) G: Halogen Free |

## ■ MARKING



## ■ PIN CONFIGURATION

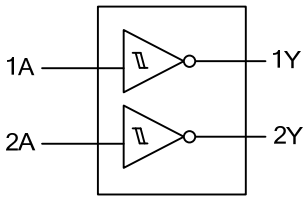



## ■ FUNCTION TABLE

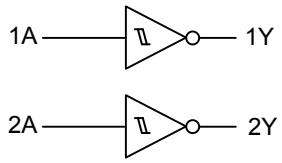
| INPUT(A) | OUTPUT(Y) |
|---|---|
| L | H |
| H | L |

H=High level
L=Low Level

## ■ LOGIC SYMBOL




## ■ FUNCTIONAL DIAGRAM



## ■ ABSOLUTE MAXIMUM RATING

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Supply Voltage | | $V_{CC}$ | -0.5 ~ +6.5 | V |
| Input Voltage | | $V_{IN}$ | -0.5 ~ +6.5 | V |
| Output Voltage | High-impedance | $V_{OUT}$ | -0.5 ~ 6.5 | V |
| | Power-off | | | |
| | High State | | -0.5 ~$V_{CC}$+0.5 | V |
| | Low State | | | |
| $V_{CC}$ or GND Current | | $I_{CC}$ | ±100 | mA |
| Continuous Output Current | | $I_O$ | ±50 | mA |
| Input Clamp Current | | $I_{IK}$ | -50 | mA |
| Output Clamp Current | | $I_{OK}$ | -50 | mA |
| Storage Temperature | | $T_{STG}$ | -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.

## ■ THERMAL DATA

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Junction to Ambient | SOT-363 | $\theta_{JA}$ | 259 | °C/W |
| | SOT-26 | | 250 | |

## ■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Supply Voltage | $V_{CC}$ | | 1.65 | | 5.5 | V |
| Positive-Going Input Threshold Voltage | VT+ | $V_{CC}$=1.65V | 0.70 | | 1.40 | V |
| | | $V_{CC}$=2.3V | 1.00 | | 1.70 | V |
| | | $V_{CC}$=3V | 1.30 | | 2.20 | V |
| | | $V_{CC}$=4.5V | 1.90 | | 3.10 | V |
| | | $V_{CC}$=5.5V | 2.20 | | 3.70 | V |
| Negative-Going Input Threshold Voltage | VT- | $V_{CC}$=1.65V | 0.30 | | 0.70 | V |
| | | $V_{CC}$=2.3V | 0.40 | | 1.00 | V |
| | | $V_{CC}$=3V | 0.60 | | 1.30 | V |
| | | $V_{CC}$=4.5V | 1.10 | | 2.00 | V |
| | | $V_{CC}$=5.5V | 1.40 | | 2.50 | V |
| Hysteresis Voltage(VT+ - VT-) | ΔVT | $V_{CC}$=1.65V | 0.30 | | 0.80 | V |
| | | $V_{CC}$=2.3V | 0.40 | | 0.90 | V |
| | | $V_{CC}$=3V | 0.40 | | 1.10 | V |
| | | $V_{CC}$=4.5V | 0.60 | | 1.30 | V |
| | | $V_{CC}$=5.5V | 0.70 | | 1.40 | V |
| Control 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 |
| Operating Temperature | $T_{OPR}$ | | -40 | | 85 | °C |

## ■ ELECTRICAL CHARACTERISTICS (Ta=25°C , unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| High-Level Output Voltage | $V_{OH}$ | $V_{CC}$=1.65~5.5V, $I_{OH}$=-100uA | $V_{CC}$-0.1 | | | V |
| | | $V_{CC}$=1.65V, $I_{OH}$=-4mA | 1.20 | | | V |
| | | $V_{CC}$=2.3V, $I_{OH}$=-8mA | 1.90 | | | V |
| | | $V_{CC}$=3V, $I_{OH}$=-16mA | 2.40 | | | V |
| | | $V_{CC}$=3V, $I_{OH}$=-24mA | 2.30 | | | V |
| | | $V_{CC}$=4.5V, $I_{OH}$=-32mA | 3.80 | | | V |
| Low-Level Output Voltage | $V_{OL}$ | $V_{CC}$=1.65~5.5V, $I_{OL}$ =100uA | | | 0.10 | V |
| | | $V_{CC}$=1.65V, $I_{OL}$ =4mA | | | 0.45 | V |
| | | $V_{CC}$=2.3V, $I_{OL}$ =8mA | | | 0.30 | V |
| | | $V_{CC}$=3V, $I_{OL}$ =12mA | | | 0.40 | V |
| | | $V_{CC}$=3V, $I_{OL}$ =24mA | | | 0.55 | V |
| | | $V_{CC}$=4.5V, $I_{OL}$ =32mA | | | 0.55 | V |
| Input Leakage Current | $I_{I(LEAK)}$ | $V_{CC}$=0V to 5.5V, $V_{IN}$=0 or 5.5V | | | ±5 | μA |
| Power OFF Leakage Current | $I_{OFF}$ | $V_{CC}$=0V, $V_{IN}$ or $V_{OUT}$=5.5V, | | | ±10 | μA |
| Quiescent Supply Current | $I_Q$ | $V_{CC}$=1.65V to 5.5V, $I_{OUT}$=0<br>$V_{IN}$=5.5V or GND | | 0.1 | 10 | μA |
| Additional Quiescent Supply Current Per Pin | $\Delta I_Q$ | $V_{CC}$=3V to 5.5V<br>One input at $V_{CC}$-0.6V,<br>Other inputs at $V_{CC}$ or GND, $I_{OUT}$ =0 | | | 500 | μA |
| Input Capacitance | $C_{IN}$ | $V_{CC}$=3.3V, $V_{IN}$ =$V_{CC}$ or GND | | 4 | | pF |

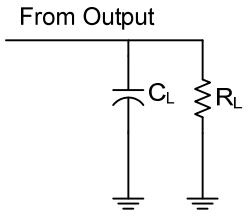
## ■ SWITCHING CHARACTERISTICS (see TEST CIRCUIT AND WAVEFORMS)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Propagation Delay from Input (nA) to Output(nY) | $t_{PLH}$ / $t_{PHL}$ | $V_{CC}$ =1.8V±0.15V, $V_{IN}$=$V_{CC}$<br>$C_L$=30pF, $R_L$=1KΩ | 3.90 | | 9.50 | ns |
| | | $V_{CC}$=2.5V±0.2V, $V_{IN}$=$V_{CC}$<br>$C_L$=30pF, $R_L$=500Ω | 1.90 | | 5.70 | ns |
| | | $V_{CC}$ =3.3V±0.3V, $V_{IN}$=3V<br>$C_L$=50pF, $R_L$=500Ω | 2.00 | | 5.40 | ns |
| | | $V_{CC}$=5V±0. 5V, $V_{IN}$=$V_{CC}$<br>$C_L$=50pF, $R_L$=500Ω | 1.5 | | 4.3 | ns |

## ■ OPERATING CHARACTERISTICS ($T_a$=25°C)

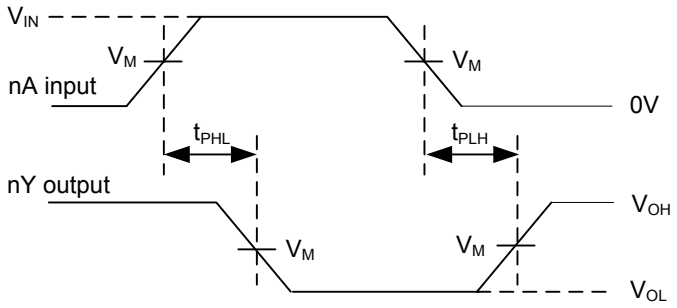
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Power Dissipation Capacitance | $C_{PD}$ | $V_{CC}$=1.8V,f=10MHz | | 16 | | pF |
| | | $V_{CC}$=2.5V,f=10MHz | | 17 | | pF |
| | | $V_{CC}$=3.3V,f=10MHz | | 18 | | pF |
| | | $V_{CC}$=5V,f=10MHz | | 21 | | pF |

## ■ TEST CIRCUITS AND WAVEFORMS




TEST CIRCUIT

| $V_{CC}$ | Inputs | | $V_M$ | $C_L$ | $R_L$ |
|---|---|---|---|---|---|
| | $V_{IN}$ | $t_R$, $t_F$ | | | |
| 1.8V±0.15V | $V_{CC}$ | ≤2ns | $V_{CC}/2$ | 30pF | 1kΩ |
| 2.5V±0.2V | $V_{CC}$ | ≤2ns | $V_{CC}/2$ | 30pF | 500Ω |
| 3.3V±0.3V | 3V | ≤2.5ns | 1.5V | 50pF | 500Ω |
| 5V±0. 5V | $V_{CC}$ | ≤2.5ns | $V_{CC}/2$ | 50pF | 500Ω |




PROPAGATION DELAY TIMES

Note: 1. $C_L$ includes probe and jig capacitance.
2. All input pulses are supplied by generators having the following characteristics:
PRR≤1MHz, $Z_O$ = 50Ω: $t_R$≤2ns, $t_F$ ≤2ns ($V_{CC}$=1.8V±0.15V and $V_{CC}$=2.5V±0.2V)
$t_R$ ≤2.5ns, $t_F$ ≤2.5ns ($V_{CC}$ =3.3V±0.3V and $V_{CC}$=5V±0. 5V)