# TP74LVC2G14 Series

DUAL SCHMITT-TRIGGER INVERTER WITH 5V TOLERANT INPUT



## Features

- Operation Voltage Range: 1.65V ~ 5.5V
- 5V Tolerant Input/Output for Interfacing with 5V logic
- ±24mA Output Drive (VCC=3.0V)
- CMOS Low-Power Consumption and High Noise Immunity
- ESD Protection Exceeds JESD 22
  -2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  -1000-V Charged-Device Model (C101)

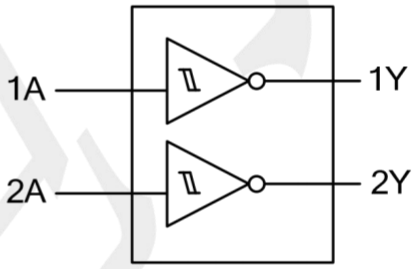
## Applications

- AV Receiver
- Audio Dock:Portable
- Blu-ray Player and Home Theater
- Embedded PC
- Personal Digital Assistant(PDA)
- Power:Telecom/Server AC/DC Supply:Single Controller:Analog and Digital

## General Description

The TP74LVC2G14 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.

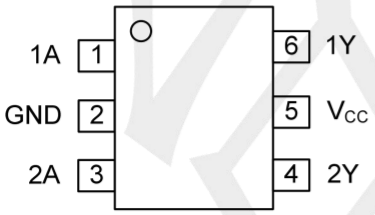
## Logic Diagram




## Ordering Information

| ORDER NUMBER | PACKAGE DESCRIPTION | PACKAGE OPTION | Marking |
|---|---|---|---|
| TP74LVC2G14S6 | SOT23-6 | Tape and Reel,3000 | S214 |
| TP74LVC2G14C6 | SOT363 | Tape and Reel,3000 | C214 |

## Pin Configuratio




SOT23-6

SOT363

## Function Table

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

**Note:H: HIGH voltage level;L: LOW voltage level.**

## Absolute Maximum Ratings (Unless otherwise specified)

| 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 | $V_{OUT}$ | High-impedance | -0.5 ~ +6.5 | V |
| | | Power-off | -0.5 ~ +6.5 | V |
| | | High State | -0.5 ~ $V_{CC+0.5}$ | V |
| | | Low State | -0.5 ~ $V_{CC+0.5}$ | V |
| VCC 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 Range | $T_{STG}$ | | -65 ~ +150 | ℃ |
| Junction to Ambient | $\theta_{JA}$ | SOT-23-6 | 230 | ℃/W |
| | | SOT363 | 280 | ℃/W |

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 |
| Input Voltage | $V_{IN}$ | | 0 | -- | 5.5 | V |
| Output Voltage | $V_{OUT}$ | High or low state | 0 | -- | VCC | V |
| High Level Output Current | $I_{OH}$ | $V_{CC}$ =1.65V | -- | -- | -4 | V |
| | | $V_{CC}$ =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 | $T_A$ | | -40 | -- | 125 | ℃ |

## Electrical Characteristics ( unless otherwise specified)

| PARAMETER | SYMBOL | TEST Conditions | TA =25°C | | | TA =-40°C~+125°C | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| Positive-Going Input Threshold Voltage | $V_{T+}$ | VCC=1.65V | 0.7 | 1.24 | 1.5 | 0.7 | -- | 1.7 | V |
| | | VCC=2.3V | 1.0 | 1.54 | 1.8 | 1.0 | -- | 2.0 | V |
| | | VCC=3V | 1.3 | 1.86 | 2.2 | 1.3 | -- | 2.4 | V |
| | | VCC=4.5V | 1.9 | 2.59 | 3.1 | 1.9 | -- | 3.3 | V |
| | | VCC=5.5V | 2.2 | 3.08 | 3.7 | 2.2 | -- | 3.8 | V |
| Negative-Going Input Threshold Voltage | $V_{T-}$ | $V_{CC}$=1.65V | 0.25 | 0.61 | 0.9 | 0.25 | -- | 1.1 | V |
| | | $V_{CC}$=2.3V | 0.4 | 0.82 | 1.15 | 0.4 | -- | 1.35 | V |
| | | $V_{CC}$=2.7V | 0.6 | 1.15 | 1.5 | 0.6 | -- | 1.7 | V |
| | | $V_{CC}$=4.5V | 1.0 | 1.73 | 2.0 | 1.0 | -- | 2.2 | V |
| | | $V_{CC}$=5.5V | 1.2 | 2.13 | 2.5 | 1.2 | -- | 2.5 | V |
| Hysteresis Voltage ($V_{T+}$-$V_{T-}$) | $\triangle V_T$ | $V_{CC}$=1.65V | 0.15 | 0.67 | 1.0 | 0.15 | -- | 1.2 | V |
| | | $V_{CC}$=2.3V | 0.25 | 0.72 | 1.1 | 0.25 | -- | 1.3 | V |
| | | $V_{CC}$=2.7V | 0.4 | 0.73 | 1.2 | 0.4 | -- | 1.4 | V |
| | | $V_{CC}$=4.5V | 0.6 | 0.92 | 1.5 | 0.6 | -- | 1.7 | V |
| | | $V_{CC}$=5.5V | 0.7 | 1.02 | 1.7 | 0.7 | -- | 1.9 | V |
| High-Level Output Voltage | $V_{OH}$ | $V_{CC}$=1.65 ~ 5.5V, $I_{OH}$=-100μA | **$V_{CC}$-0.1** | **--** | **--** | **$V_{CC}$-0.1** | -- | -- | V |
| | | $V_{CC}$=1.65V, $I_{OH}$=-4mA | 1.2 | -- | -- | 0.95 | -- | -- | V |
| | | $V_{CC}$=2.3V, $I_{OH}$=-8mA | 1.9 | -- | -- | 1.7 | -- | -- | V |
| | | $V_{CC}$=3.0V,$I_{OH}$=-16mA | 2.2 | -- | -- | 1.9 | -- | -- | V |
| | | $V_{CC}$=3.0V,$I_{OH}$=-24mA | 2.3 | -- | -- | 2.0 | -- | -- | V |
| | | $V_{CC}$=4.5V, $I_{OH}$=-32mA | 3.8 | -- | -- | 3.4 | -- | -- | V |
| Low-Level Output Voltage | $V_{OL}$ | $V_{CC}$=1.65 ~ 5.5V, $I_{OL}$=100μA | -- | -- | 0.1 | -- | -- | 0.1 | V |
| | | $V_{CC}$=1.65V, $I_{OL}$=4mA | -- | -- | 0.45 | -- | -- | 0.7 | V |
| | | $V_{CC}$=2.3V, $I_{OL}$=8mA | -- | -- | 0.3 | -- | -- | 0.45 | V |
| | | $V_{CC}$=3.0V,$I_{OH}$=16mA | -- | -- | 0.4 | -- | -- | 0.6 | V |
| | | $V_{CC}$=3.0V,$I_{OH}$=24mA | -- | -- | 0.55 | -- | -- | 0.8 | V |
| | | $V_{CC}$=4.5V, $I_{OH}$=32mA | -- | -- | 0.55 | -- | -- | 0.8 | V |
| Input Leakage Current | $I_{I(LEAK)}$ | $V_{CC}$=0 ~ 5.5V, $V_{IN}$=5.5V or GND | -- | -- | ±5 | -- | -- | ±5 | uA |
| Power OFF Leakage Current | $I_{OFF}$ | $V_{CC}$=0V, $V_{IN}$ or $V_{OUT}$=5.5V | -- | ±0.1 | ±10 | -- | -- | ±10 | uA |
| Quiescent Supply Current | $I_Q$ | VCC=1.65 ~ 5.5V, VIN=VCC or GND, IOUT=0A | -- | 0.1 | 10 | -- | -- | 10 | uA |
| Additional Quiescent Supply ent Per Input Pin | $\Delta I_Q$ | $V_{CC}$=3 ~ 5.5V, One input at $V_{CC}$-0.6V, Other inputs at $V_{CC}$ or GND， IOUT=0A | -- | 5 | 500 | -- | -- | 500 | uA |

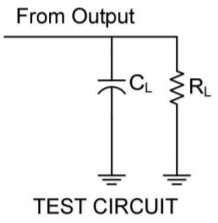
## OPERATING CHARACTERISTICS (f=10MHz, TA =25°C , unless otherwise specified)

| PARAMETER | SYMBOL | TEST Conditions | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Input Capacitance | $C_I$ | $V_{CC}$=3.3V, $V_{IN}$=$V_{CC}$ or GND | -- | 4 | -- | pF |
| 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 |

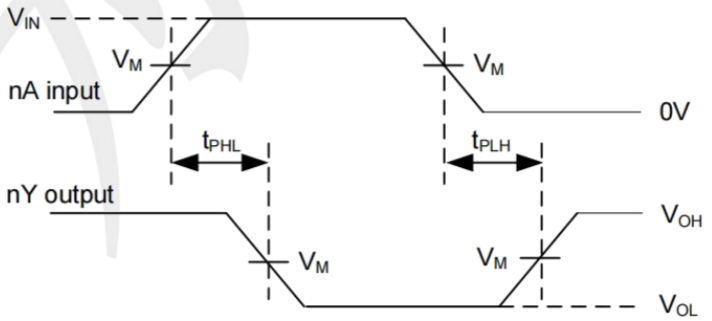
## SWITCHING CHARACTERISTICS (TA =25°C , unless otherwise specified)

| PARAMETER | SYMBOL | TEST Conditions | TA =25°C | | | TA =-40°C~+125°C | | | UNIT |
|---|---|---|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| Propagation delay from input (A or B) to output(Y) | $t_{PLH}$ / $t_{PHL}$ | $V_{CC}$ =1.8V±0.15V, $V_{IN}$=$V_{CC}$, $C_L$=30pF, $R_L$=1KΩ | 3.9 | -- | 13 | 1.0 | -- | 15 | nS |
| | | $V_{CC}$=2.5V±0.2V, $V_{IN}$=$V_{CC}$,$C_L$=30pF, $R_L$=500Ω | 1.9 | -- | 6.5 | 1.0 | -- | 8.5 | nS |
| | | $V_{CC}$ =3.3V±0.3V, $V_{IN}$=3V,$C_L$=50pF, $R_L$=500Ω | 2.0 | -- | 6.1 | 1.0 | -- | 8.1 | nS |
| | | $V_{CC}$=5V±0. 5V, $V_{IN}$=$V_{CC}$,$C_L$=50pF, $R_L$=500Ω | 1.5 | -- | 5 | 0.5 | -- | 6.0 | nS |

## TEST CIRCUIT AND WAVEFORMS




| $V_{CC}$ | 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 |

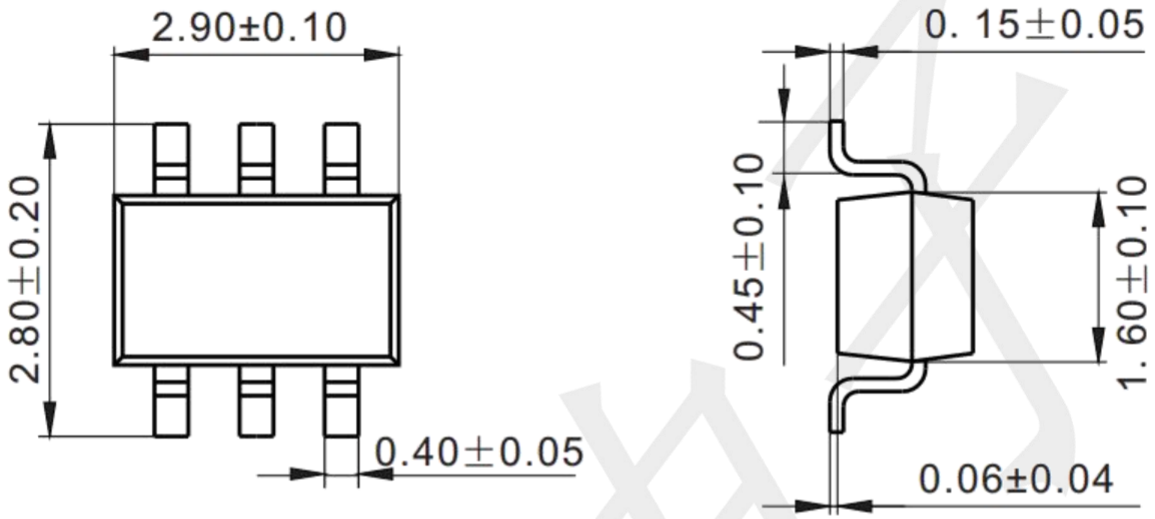


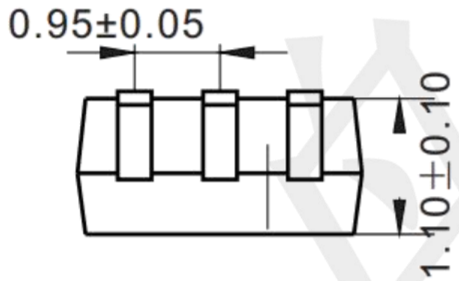

PROPAGATION DELAY TIMES

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)

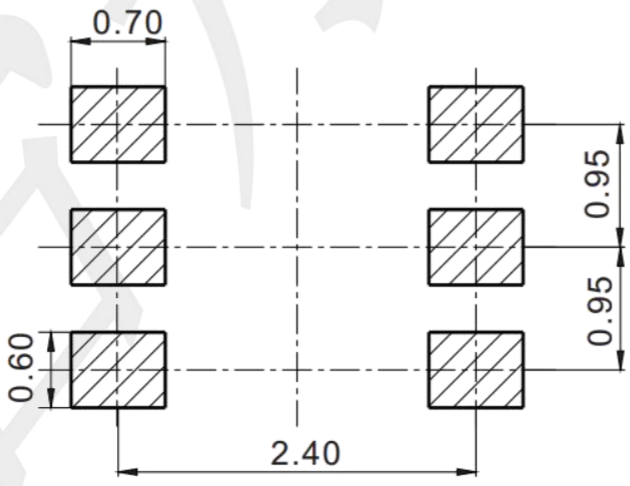
## Package information

**SOT23-6 (Unit: mm)**



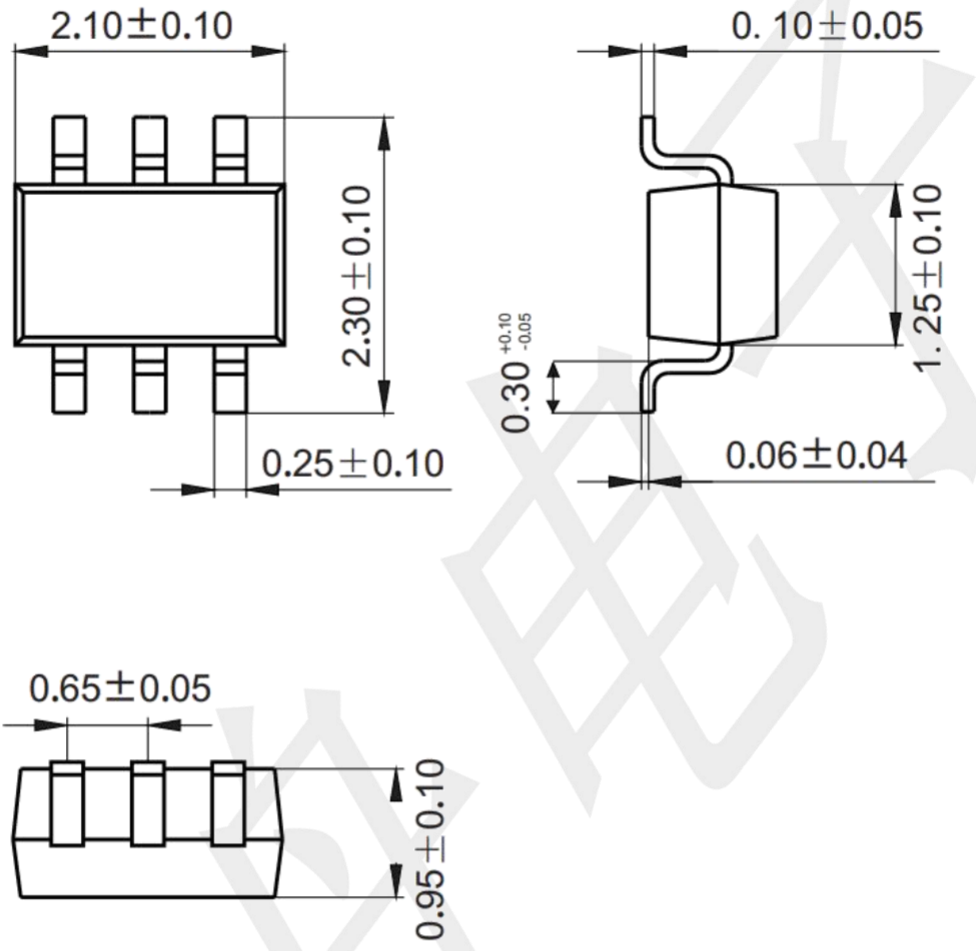




**Mounting Pad Layout (unit: mm)**



## Package information

**SOT363 (Unit: mm)**




## Mounting Pad Layout (unit: mm)