**Single Inverter Schmitt Trigger**

# CJ74LVC1G14 Logic

## 1 Introduction

The CJ74LVC1G14 provides the inverting buffer function with Schmitt-trigger input. It is capable of transforming slowly changing input signals into sharply defined, jitter-free output signals.

The input can be driven from either 3.3V or 5V devices. This feature allows the use of this device in a mixed 3.3V and 5V environment. Schmitt-trigger action at the input makes the circuit tolerant for slower input rise and fall time.

This device is fully specified for partial power-down applications using $I_{OFF}$. The $I_{OFF}$ circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

## 2 Available Packages

| PART NUMBER | PACKAGE |
|---|---|
| CJ74LVC1G14 | SOT-23-5L |
| | SOT-353 |

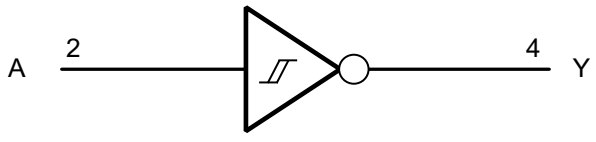
**Note:** For all available packages, please refer to the part Orderable Information.

## 3 Features

- Wide supply voltage range from 1.65V to 5.5V
- ±24mA output drive ($V_{CC}$=3.0V)
- CMOS low power consumption
- Direct interface with TTL levels
- Unlimited rise and fall times
- Input accepts voltages up to 5V
- Specified from -40°C to +125°C

## 4 Applications

- AV Receiver
- Audio Dock: Portable
- Blu-ray Player and Home Theater
- Embedded PC
- MP3 Player/Recorder (Portable Audio)
- Personal Digital Assistant (PDA)
- Power: Telecom/Server AC/DC Supply: Single Controller: Analog and Digital
- Solid State Drive (SSD): Client and Enterprise
- TV: LCD/Digital and High-Definition (HDTV)
- Tablet: Enterprise
- Video Analytics: Server
- Wireless Headset, Keyboard, and Mouse




Simplified schematic

## 5 Orderable Information

| DEVICE | PACKAGE | OP TEMP | ECO PLAN | MSL | PACKING OPTION | SORT |
|---|---|---|---|---|---|---|
| CJ74LVC1G14M5N | SOT-23-5L | -40~125°C | RoHS & Green | Level 3<br>168HR | Tape and Reel<br>3000 Units / Reel | Active |
| CJ74LVC1G14R5N | SOT-353 | -40~125°C | RoHS & Green | Level 3<br>168HR | Tape and Reel<br>3000 Units / Reel | Active |

**Note:**

**ECO PLAN:** For the RoHS and Green certification standards of this product, please refer to the official report provided by JSCJ.

**MSL:** Moisture Sensitivity Level. Determined according to JEDEC industry standard classification.

**SORT:** Specifically defined as follows:
Active: Recommended for new products;
Customized: Products manufactured to meet the specific needs of customers;
Preview: The device has been released and has not been fully mass produced. The sample may or may not be available;
NoRD: It is not recommended to use the device for new design. The device is only produced for the needs of existing customers;
Obsolete: The device has been discontinued.

# 6 Pin Configuration and Marking Information

## 6.1 Pin Configuration

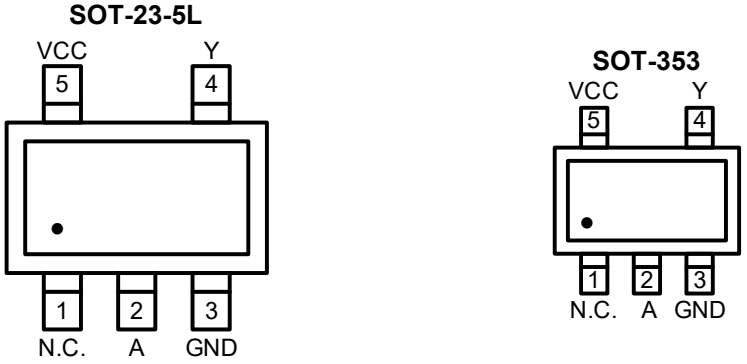


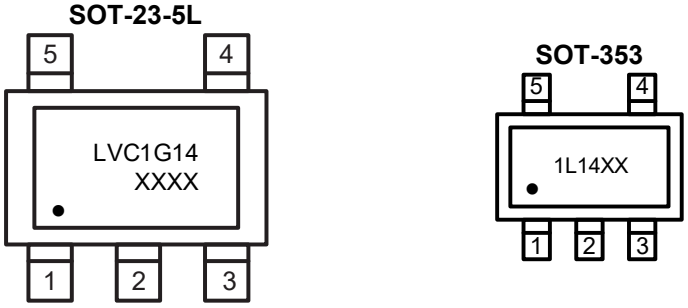

**Figure 6-1 Pin configuration**

## 6.2 Pin Function

| PIN | | I/O(1) | DESCRIPTION |
|---|---|---|---|
| No. | NAME | | |
| 1 | N.C. | - | Not connected |
| 2 | A | I | Data input |
| 3 | GND | G | Ground (0V) |
| 4 | Y | O | Data output |
| 5 | VCC | P | Supply voltage |

(1) I-Input, O-Output, P-Power, G-Ground

## 6.3 Marking Information




XXXX or XX: Code, indicates weekly record information.

# 7 Specifications

## 7.1 Absolute Maximum Ratings

Voltages are referenced to GND (ground=0V), unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| $V_{CC}$ | Supply voltage | - | -0.5 | +6.5 | V |
| $V_I$ | Input voltage | - | -0.5 | +6.5 | V |
| $V_O$ | Output voltage | Active mode | -0.5 | $V_{CC}$+0.5 | V |
| | | Power-down mode; $V_{CC}$=0V | -0.5 | +6.5 | V |
| $I_{IK}$ | Input clamping current | $V_I$ < 0V | -50 | - | mA |
| $I_{OK}$ | Output clamping current | $V_O$ > $V_{CC}$ or $V_O$ < 0V | - | ±50 | mA |
| $I_O$ | Output current | $V_O$=0V to $V_{CC}$ | - | ±50 | mA |
| $I_{CC}$ | Supply current | - | - | +100 | mA |
| $I_{GND}$ | Ground current | - | -100 | - | mA |
| $T_{stg}$ | Storage temperature | - | -65 | +150 | °C |
| $P_{tot}$ | Total power dissipation | - | - | 250 | mW |
| $T_L$ | Soldering temperature | 10s | - | 260 | °C |

**Note:** Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to GND. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

## 7.2 Recommended Operating Conditions

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $V_{CC}$ | Supply voltage | - | 1.65 | - | 5.5 | V |
| $V_I$ | Input voltage | - | 0 | - | 5.5 | V |
| $V_O$ | Output voltage | Active mode | 0 | - | $V_{CC}$ | V |
| | | Power-down mode; $V_{CC}$=0V | 0 | - | 5.5 | V |
| $T_{amb}$ | Ambient temperature | - | -40 | - | +125 | °C |

## 7.3 ESD Ratings

| SYMBOL | ESD RATINGS | | VALUE | UNIT |
|---|---|---|---|---|
| $V_{ESD-HBM}$ | Electrostatic discharge | Human body model (HBM)(1) | ±2000 | V |

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

## 7.4 Electrical Characteristics

### 7.4.1 DC Characteristics 1

$T_{amb}$=-40°C to +85°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| $V_{T+}$ | Positive-going threshold voltage | $V_{CC}$=1.8V | | 0.82 | 1.02 | 1.2 | V |
| | | $V_{CC}$=2.3V | | 1.03 | 1.25 | 1.45 | V |
| | | $V_{CC}$=3.0V | | 1.29 | 1.5 | 1.71 | V |
| | | $V_{CC}$=4.5V | | 1.84 | 2.15 | 2.41 | V |
| | | $V_{CC}$=5.5V | | 2.19 | 2.6 | 2.91 | V |
| $V_{T-}$ | Negative-going threshold voltage | $V_{CC}$=1.8V | | 0.45 | 0.6 | 0.75 | V |
| | | $V_{CC}$=2.3V | | 0.64 | 0.8 | 0.96 | V |
| | | $V_{CC}$=3.0V | | 0.86 | 1.1 | 1.34 | V |
| | | $V_{CC}$=4.5V | | 1.35 | 1.75 | 2.09 | V |
| | | $V_{CC}$=5.5V | | 1.61 | 2.15 | 2.59 | V |
| $V_H$ | Hysteresis voltage | $V_{CC}$=1.8V | | 0.24 | 0.4 | 0.54 | V |
| | | $V_{CC}$=2.3V | | 0.26 | 0.4 | 0.57 | V |
| | | $V_{CC}$=3.0V | | 0.27 | 0.42 | 0.64 | V |
| | | $V_{CC}$=4.5V | | 0.28 | 0.45 | 0.65 | V |
| | | $V_{CC}$=5.5V | | 0.29 | 0.47 | 0.75 | V |
| $V_{OH}$ | HIGH-level output voltage | $V_I$ = $V_{T+}$ or $V_{T-}$ | $I_O$=-100uA; $V_{CC}$=1.65V to 5.5V | $V_{CC}$ - 0.1 | - | - | V |
| | | | $I_O$=-4mA; $V_{CC}$=1.65V | 1.2 | 1.54 | - | V |
| | | | $I_O$=-8mA; $V_{CC}$=2.3V | 1.9 | 2.15 | - | V |
| | | | $I_O$=-12mA; $V_{CC}$=2.7V | 2.2 | 2.50 | - | V |
| | | | $I_O$=-24mA; $V_{CC}$=3.0V | 2.3 | 2.62 | - | V |
| | | | $I_O$=-32mA; $V_{CC}$=4.5V | 3.8 | 4.11 | - | V |
| $V_{OL}$ | LOW-level output voltage | $V_I$ = $V_{T+}$ or $V_{T-}$ | $I_O$=100uA; $V_{CC}$=1.65V to 5.5V | - | - | 0.10 | V |
| | | | $I_O$=4mA; $V_{CC}$=1.65V | - | 0.07 | 0.45 | V |
| | | | $I_O$=8mA; $V_{CC}$=2.3V | - | 0.12 | 0.30 | V |
| | | | $I_O$=12mA; $V_{CC}$=2.7V | - | 0.17 | 0.40 | V |
| | | | $I_O$=24mA; $V_{CC}$=3.0V | - | 0.33 | 0.55 | V |
| | | | $I_O$=32mA; $V_{CC}$=4.5V | - | 0.39 | 0.55 | V |
| $I_I$ | Input leakage current | $V_I$=5.5V or GND; $V_{CC}$=0V to 5.5V | | - | - | ±1 | uA |
| $I_{OFF}$ | Power-off leakage current | $V_I$ or $V_O$=5.5V; $V_{CC}$=0V | | - | - | ±2 | uA |
| $I_{CC}$ | Supply current | $V_I$=5.5V or GND; $I_O$=0A; $V_{CC}$=1.65V to 5.5V | | - | - | 4 | uA |
| $\Delta I_{CC}$ | Additional supply current | $V_I$=$V_{CC}$-0.6V; $I_O$=0A; $V_{CC}$=2.3V to 5.5V | | - | - | 500 | uA |

**Note:** All typical values are measured at maximum $V_{CC}$ and $T_{amb}$=25°C.

### 7.4.2 DC Characteristics 2

$T_{amb}$=-40°C to +125°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| $V_{T+}$ | Positive-going threshold voltage | $V_{CC}$=1.8V | | 0.79 | - | 1.2 | V |
| | | $V_{CC}$=2.3V | | 1.00 | - | 1.45 | V |
| | | $V_{CC}$=3.0V | | 1.26 | - | 1.71 | V |
| | | $V_{CC}$=4.5V | | 1.81 | - | 2.41 | V |
| | | $V_{CC}$=5.5V | | 2.16 | - | 2.91 | V |
| $V_{T-}$ | Negative-going threshold voltage | $V_{CC}$=1.8V | | 0.45 | - | 0.78 | V |
| | | $V_{CC}$=2.3V | | 0.64 | - | 0.99 | V |
| | | $V_{CC}$=3.0V | | 0.86 | - | 1.37 | V |
| | | $V_{CC}$=4.5V | | 1.35 | - | 2.12 | V |
| | | $V_{CC}$=5.5V | | 1.61 | - | 2.62 | V |
| $V_H$ | Hysteresis voltage | $V_{CC}$=1.8V | | 0.17 | - | 0.54 | V |
| | | $V_{CC}$=2.3V | | 0.20 | - | 0.57 | V |
| | | $V_{CC}$=3.0V | | 0.21 | - | 0.64 | V |
| | | $V_{CC}$=4.5V | | 0.22 | - | 0.65 | V |
| | | $V_{CC}$=5.5V | | 0.23 | - | 0.75 | V |
| $V_{OH}$ | HIGH-level output voltage | $V_I = V_{T+}$ or $V_{T-}$ | $I_O$=-100uA; $V_{CC}$=1.65V to 5.5V | $V_{CC}$ - 0.1 | - | - | V |
| | | | $I_O$=-4mA; $V_{CC}$=1.65V | 0.95 | - | - | V |
| | | | $I_O$=-8mA; $V_{CC}$=2.3V | 1.7 | - | - | V |
| | | | $I_O$=-12mA; $V_{CC}$=2.7V | 1.9 | - | - | V |
| | | | $I_O$=-24mA; $V_{CC}$=3.0V | 2.0 | - | - | V |
| | | | $I_O$=-32mA; $V_{CC}$=4.5V | 3.4 | - | - | V |
| $V_{OL}$ | LOW-level output voltage | $V_I = V_{T+}$ or $V_{T-}$ | $I_O$=100uA; $V_{CC}$=1.65V to 5.5V | - | - | 0.10 | V |
| | | | $I_O$=4mA; $V_{CC}$=1.65V | - | - | 0.70 | V |
| | | | $I_O$=8mA; $V_{CC}$=2.3V | - | - | 0.45 | V |
| | | | $I_O$=12mA; $V_{CC}$=2.7V | - | - | 0.60 | V |
| | | | $I_O$=24mA; $V_{CC}$=3.0V | - | - | 0.80 | V |
| | | | $I_O$=32mA; $V_{CC}$=4.5V | - | - | 0.80 | V |
| $I_I$ | Input leakage current | $V_I$=5.5V or GND; $V_{CC}$=0V to 5.5V | | - | - | ±1 | uA |
| $I_{OFF}$ | Power-off leakage current | $V_I$ or $V_O$=5.5V; $V_{CC}$=0V | | - | - | ±2 | uA |
| $I_{CC}$ | Supply current | $V_I$=5.5V or GND; $I_O$=0A; $V_{CC}$=1.65V to 5.5V | | - | - | 4 | uA |
| $\Delta I_{CC}$ | Additional supply current | $V_I$=$V_{CC}$-0.6V; $I_O$=0A; $V_{CC}$=2.3V to 5.5V | | - | - | 500 | uA |

### 7.4.3 AC Characteristics 1

$T_{amb}$=-40°C to +85°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| $t_{PLH}$ | A to Y propagation delay | See Figure 8-4 | $V_{CC}$=1.65V to 1.95V | - | 14 | 21 | ns |
| | | | $V_{CC}$=2.3V to 2.7V | - | 10 | 15 | ns |
| | | | $V_{CC}$=2.7V | - | 9 | 13.5 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | 8 | 12 | ns |
| | | | $V_{CC}$=4.5V to 5.5V | - | 7 | 10.5 | ns |
| $t_{PHL}$ | A to Y propagation delay | See Figure 8-4 | $V_{CC}$=1.65V to 1.95V | - | 12.5 | 18.8 | ns |
| | | | $V_{CC}$=2.3V to 2.7V | - | 11 | 16.5 | ns |
| | | | $V_{CC}$=2.7V | - | 11 | 16.5 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | 11 | 16.5 | ns |
| | | | $V_{CC}$=4.5V to 5.5V | - | 10 | 15 | ns |

### 7.4.4 AC Characteristics 2

$T_{amb}$=-40°C to +125°C, voltages are referenced to GND (ground=0V), unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| $t_{PLH}$ | A to Y propagation delay | See Figure 8-4 | $V_{CC}$=1.65V to 1.95V | - | - | 23 | ns |
| | | | $V_{CC}$=2.3V to 2.7V | - | - | 17 | ns |
| | | | $V_{CC}$=2.7V | - | - | 15.5 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | - | 14 | ns |
| | | | $V_{CC}$=4.5V to 5.5V | - | - | 12.5 | ns |
| $t_{PHL}$ | A to Y propagation delay | See Figure 8-4 | $V_{CC}$=1.65V to 1.95V | - | - | 20.8 | ns |
| | | | $V_{CC}$=2.3V to 2.7V | - | - | 18.5 | ns |
| | | | $V_{CC}$=2.7V | - | - | 18.5 | ns |
| | | | $V_{CC}$=3.0V to 3.6V | - | - | 18.5 | ns |
| | | | $V_{CC}$=4.5V to 5.5V | - | - | 17 | ns |

# 8 Detailed Description

## 8.1 Overview

The CJ74LVC1G14 provides the inverting buffer function with Schmitt-trigger input. It is capable of transforming slowly changing input signals into sharply defined, jitter-free output signals.

The input can be driven from either 3.3V or 5V devices. This feature allows the use of this device in a mixed 3.3V and 5V environment. Schmitt-trigger action at the input makes the circuit tolerant for slower input rise and fall time.

This device is fully specified for partial power-down applications using $I_{OFF}$. The $I_{OFF}$ circuitry disables the output, preventing the damaging backflow current through the device when it is powered down.

## 8.2 Functional Block Diagram

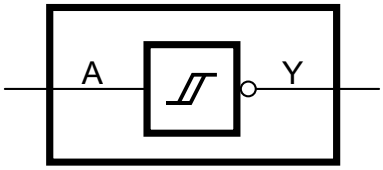



**Figure 8-1 Logic symbol**

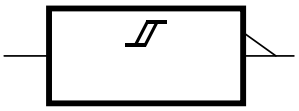


**Figure 8-2 IEC logic symbol**

## 8.3 Function Table(1)

| INPUT | OUTPUT |
|---|---|
| **A** | **Y** |
| L | H |
| H | L |

(1) H=HIGH voltage level; L=LOW voltage level.

## 8.4 Testing Circuit

### 8.4.1 AC Testing Circuit

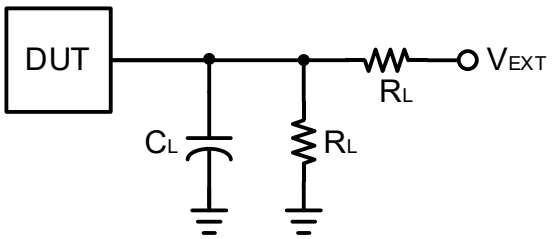



**Figure 8-3 Test circuit for measuring switching times**

Definitions for test circuit:

$C_L$=Load capacitance including jig and probe capacitance.

### 8.4.2 AC Testing Waveforms

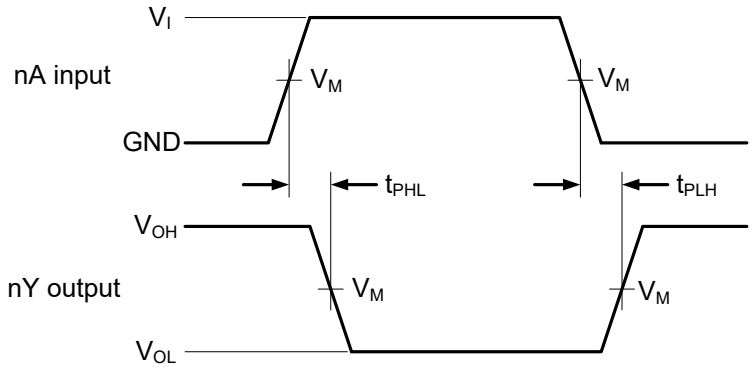



**Figure 8-4 The data input (A) to output (Y) propagation delays**

### 8.4.3 Measurement Points

| SUPPLY VOLTAGE | INPUT | OUTPUT |
|---|---|---|
| $V_{CC}$ | $V_M$ | $V_M$ |
| 1.65V to 1.95V | 0.5x$V_{CC}$ | 0.5x$V_{CC}$ |
| 2.3V to 2.7V | 0.5x$V_{CC}$ | 0.5x$V_{CC}$ |
| 2.7V | 1.5V | 1.5V |
| 3.0V to 3.6V | 1.5V | 1.5V |
| 4.5V to 5.5V | 0.5x$V_{CC}$ | 0.5x$V_{CC}$ |

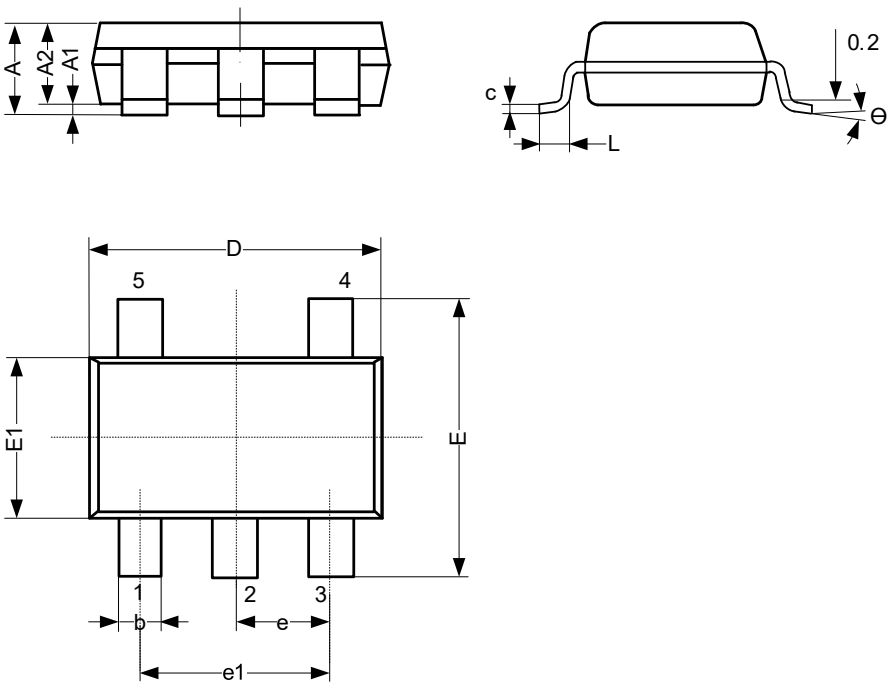
### 8.4.4 Test Data

| SUPPLY VOLTAGE | INPUT | | LOAD | | $V_{EXT}$ |
|---|---|---|---|---|---|
| $V_{CC}$ | $V_I$ | $t_r = t_f$ | $C_L$ | $R_L$ | $t_{PLH}$, $t_{PHL}$ |
| 1.65V to 1.95V | $V_{CC}$ | ≤ 3ns | 30pF | 1kΩ | Open |
| 2.3V to 2.7V | $V_{CC}$ | ≤ 3ns | 30pF | 500Ω | Open |
| 2.7V | 2.7V | ≤ 3ns | 50pF | 500Ω | Open |
| 3.0V to 3.6V | 2.7V | ≤ 3ns | 50pF | 500Ω | Open |
| 4.5V to 5.5V | $V_{CC}$ | ≤ 3ns | 50pF | 500Ω | Open |

# 9 Mechanical Information

## 9.1 SOT-23-5L Mechanical Information

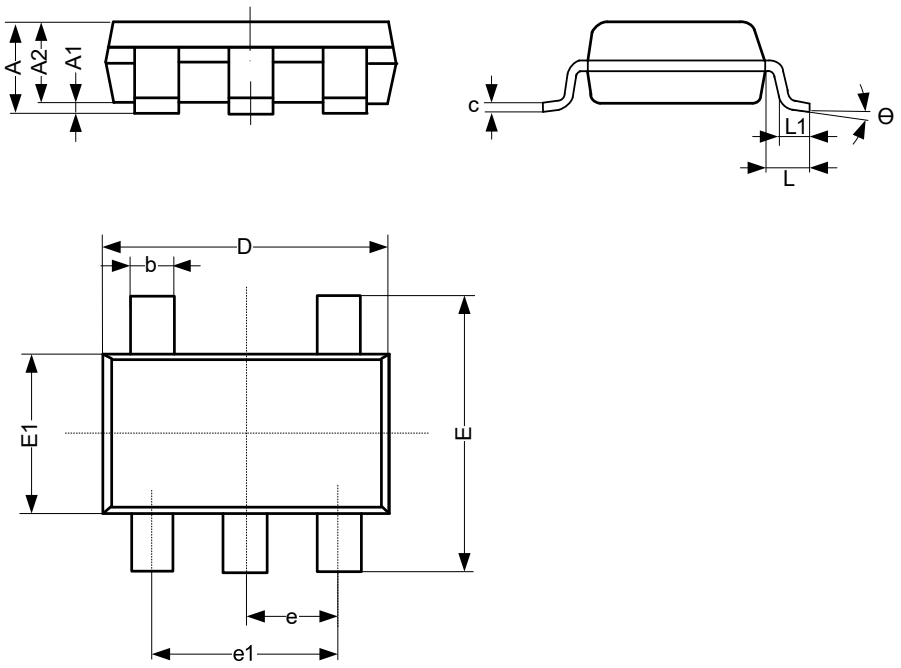
### 9.1.1 SOT-23-5L Outline Dimensions




| SYMBOL | Dimensions In Millimeters | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| A | - | - | 1.26 |
| A1 | 0.00 | - | 0.12 |
| A2 | 1.00 | - | 1.20 |
| b | 0.30 | - | 0.50 |
| c | 0.10 | - | 0.20 |
| D | 2.82 | - | 3.02 |
| E | 2.60 | - | 3.00 |
| E1 | 1.50 | - | 1.70 |
| e | 0.95 BSC | | |
| e1 | 1.80 | - | 2.00 |
| L | 0.30 | - | 0.60 |
| Θ | 0° | - | 8° |
| Unit: mm | | | |

## 9.2 SOT-353 Mechanical Information

### 9.2.1 SOT-353 Outline Dimensions




| SYMBOL | Dimensions In Millimeters | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| A | 0.90 | - | 1.10 |
| A1 | 0.00 | - | 0.10 |
| A2 | 0.90 | - | 1.00 |
| b | 0.15 | - | 0.35 |
| c | 0.11 | - | 0.175 |
| D | 2.00 | - | 2.20 |
| E | 2.15 | - | 2.45 |
| E1 | 1.15 | - | 1.35 |
| e | 0.65 BSC | | |
| e1 | 1.20 | - | 1.40 |
| L | - | 0.525 | - |
| L1 | 0.26 | - | 0.46 |
| Θ | 0° | - | 8° |
| Unit: mm | | | |

# 10 Notes and Revision History

## 10.1 Associated Product Family and Others

To view other products of the same type or IC products of other types, click the official website of JSCJ -- ***https:www.jscj-elec.com*** for more details.

## 10.2 Notes

**Electrostatic Discharge Caution**

This IC may be damaged by ESD. Relevant personnel shall comply with correct installation and use specifications to avoid ESD damage to the IC. If appropriate measures are not taken to prevent ESD damage, the hazards caused by ESD include but are not limited to degradation of integrated circuit performance or complete damage of integrated circuit. For some precision integrated circuits, a very small parameter change may cause the whole device to be inconsistent with its published specifications.

# DISCLAIMER

**IMPORTANT NOTICE, PLEASE READ CAREFULLY**

The information in this data sheet is intended to describe the operation and characteristics of our products. JSCJ has the right to make any modification, enhancement, improvement, correction or other changes to any content in this data sheet, including but not limited to specification parameters, circuit design and application information, without prior notice.

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Official Website: www.jscj-elec.com