芯伯乐®
XINBOLE

# Product Specification

## XBLW SN74LVC1G14

Single Schmitt-Trigger Inverter

WEB | www.xinboleic.com

## Description

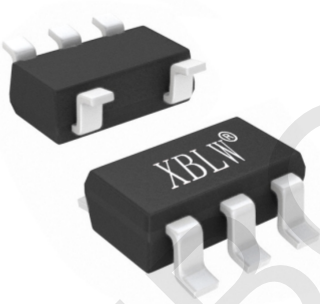
The SN74LVC1G14 provides the inverting buffer function with Schmitt-trigger input. It is capable of transforming slowly changing input signals into sharply defined, jitter-free output signals.

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 d vice wh n it is pow d down.

## Features

- Wide supply voltage range from 1.65V to 5.5V
- ±24mA output drive (VCC=3.0V)
- CMOS low power consumption
- Latch-up performance exceeds 250mA
- Direct interface with TTL levels
- Unlimited rise and fall times
- Input accepts voltages up to 5V
- Specified from -40°C to +105°C
- Packaging informati n: SOT-23-5/SOT-353



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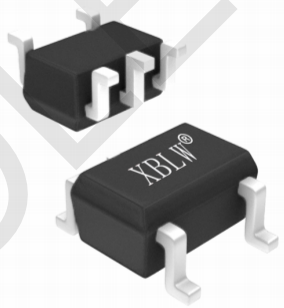


SOT-353

## Applications

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

## Ordering Information

| Product Model | Package Type | Marking | Packing | Packing Qty |
|---|---|---|---|---|
| XBLW SN74LVC1G14T235 | SOT-23-5 | AKXX | Tape | 3000Pcs/Reel |
| XBLW SN74LVC1G14T353 | SOT-353 | AKXX | Tape | 3000Pcs/Reel |

## Block Diagram

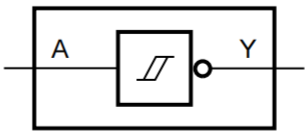
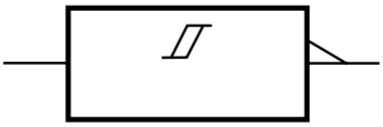



Figure 1. Logic symbol



Figu e 2. IEC logic symbol

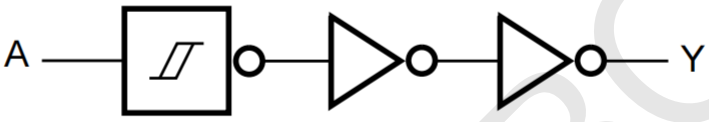
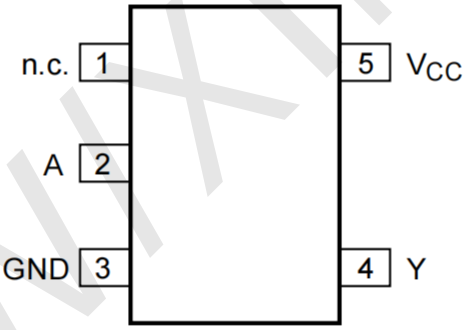



Figure 3. Logic diagram

## Pin Configurations




## Pin Description

| Pin No. | Pin Name | Description |
|---|---|---|
| 1 | n.c. | not connected |
| 2 | A | data input |
| 3 | GND | ground (0V) |
| 4 | Y | data output |
| 5 | $V_{CC}$ | supply voltage |

## Function Table

| Input | Output |
|---|---|
| **A** | **Y** |
| L | H |
| H | L |

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

# Electrical Parameter

**Absolute Maximum Ratings**

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

| Parameter | Symbol | Conditions | Min. | Max. | Unit |
|---|---|---|---|---|---|
| supply voltage | $V_{CC}$ | - | -0.5 | +6.5 | V |
| input voltage | $V_I$ | - | -0.5 | +6.5 | V |
| output voltage | $V_O$ | Active mode | -0.5 | $V_{CC}$+0.5 | V |
| | | Power-down mode; $V_{CC}$=0V | -0.5 | +6.5 | V |
| input clamping current | $I_{IK}$ | $V_I$ < 0V | -50 | - | mA |
| output clamping current | $I_{OK}$ | $V_O$ > $V_{CC}$ or $V_O$ < 0V | - | ±50 | mA |
| output current | $I_O$ | $V_O$=0V to $V_{CC}$ | | ±50 | mA |
| supply current | $I_{CC}$ | - | - | +100 | mA |
| ground current | $I_{GND}$ | - | -100 | - | mA |
| storage temperature | $T_{stg}$ | - | -65 | +150 | C |
| total power dissipation | Ptot | - | - | 250 | mW |
| Soldering temperature | TL | 10s | 250 | | ℃ |

**Recommended Operating Conditions**

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| supply voltage | $V_{CC}$ | - | 1.65 | - | 5.5 | V |
| input voltage | $V_I$ | - | 0 | - | 5.5 | V |
| output voltage | $V_O$ | Active mode | 0 | - | $V_{CC}$ | V |
| | | Power-down mode; $V_{CC}$=0V | 0 | - | 5.5 | V |
| ambient temperature | $T_{amb}$ | - | -40 | - | +105 | ℃ |

# ESD Ratings

| Parameter | | Defintion | Vaue | Unit |
|---|---|---|---|---|
| $V_{(ESD)}$ | Electrostatic discharge | Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins (1) | ±2000 | V |
| | | Charged device model (CDM), per JEDEC specification JESD22-C101, all pins (2) | ±1000 | |

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

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

## Electrical Characteristics

**DC Characteristics 1**

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

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| positive-going threshold voltage | $V_{T+}$ | $V_{CC}$=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 |
| negative-going threshold voltage | $V_{T-}$ | $V_{CC}$=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 |
| hysteresis voltage | $V_H$ | $V_{CC}$=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 |
| HIGH-level output voltage | $V_{OH}$ | $V_I = V_{T+}$ 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 |
| LOW-level output voltage | $V_{OL}$ | $V_I = V_{T+}$ 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 |
| input leakage current | $I_I$ | $V_I$=5.5V or GND; $V_{CC}$=0V to 5.5V | | - | - | ±1 | uA |
| power-off leakage current | $I_{OFF}$ | $V_I$ or $V_O$=5.5V; $V_{CC}$=0V | | - | - | ±2 | uA |
| supply current | $I_{CC}$ | $V_I$=5.5V or GND; $I_O$=0A; $V_{CC}$=1.65V to 5.5V | | - | - | 4 | uA |
| additional supply current | $\Delta I_{CC}$ | $V_I$=$V_{CC}$-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℃.

**DC Characteristics 2**

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

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| positive-going threshold voltage | $V_{T+}$ | $V_{CC}$=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 |
| negative-going threshold voltage | $V_{T-}$ | $V_{CC}$=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 |
| hysteresis voltage | $V_H$ | $V_{CC}$=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 |
| HIGH-level output voltage | $V_{OH}$ | $V_I = V_{T+}$ 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 |
| LOW-level output voltage | $V_{OL}$ | $V_I = V_{T+}$ 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 |
| input leakage current | $I_I$ | $V_I$=5.5V or GND; $V_{CC}$=0V to 5.5V | | - | - | ±1 | uA |
| power-off leakage current | $I_{OFF}$ | $V_I$ or $V_O$=5.5V; $V_{CC}$=0V | | - | - | ±2 | uA |
| supply current | $I_{CC}$ | $V_I$=5.5V or GND; $I_O$=0A; $V_{CC}$=1.65V to 5.5V | | - | - | 4 | uA |
| additional supply current | $\Delta I_{CC}$ | $V_I$=$V_{CC}$-0.6V; $I_O$=0A; $V_{CC}$=2.3V to 5.5V | | - | - | 500 | uA |

**AC Characteristics 1**

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

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| A to Y propagation delay | $t_{PLH}$ | see Figure 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 |
| A to Y propagation delay | $t_{PHL}$ | see Figure 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 |

**AC Characteristics 2**

($T_{amb}$=-40°Cto +105°C, voltages are referenced to GND (ground = 0V), unless otherwise specified.)

| Parameter | Symbol | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| A to Y propagation delay | $t_{PLH}$ | see Figure 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 |
| A to Y propagation delay | $t_{PHL}$ | see Figure 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 |

## Testing Circuit

### AC Testing Circuit

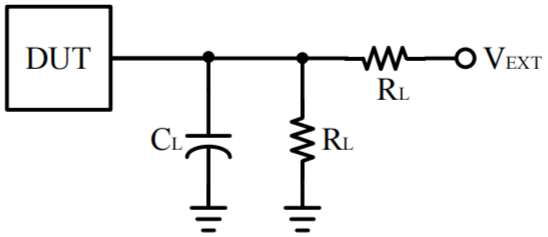



Figure 4. Test circuit for measuring switching times

Definitions for test circuit:

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

### AC Testing Waveforms

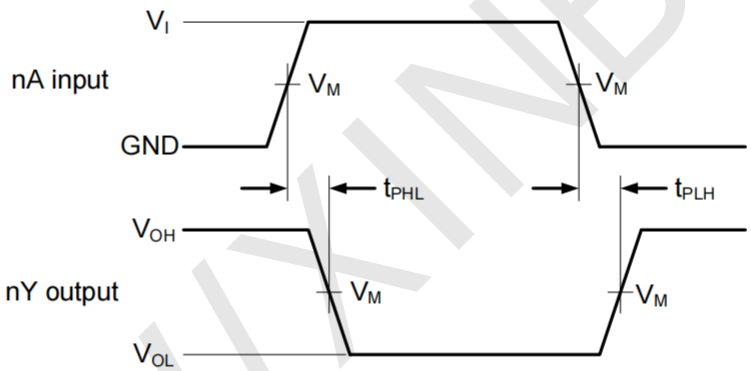



Figure 5. The data input (A) to output (Y) propagation delays

**Measurement Points**

| Supply voltage | Input | Output |
|---|---|---|
| $V_{CC}$ | $V_M$ | $V_M$ |
| 1.65V to 1.95 V | 0.5xVcc | 0.5xVcc |
| 2.3V to 2.7V | 0.5xVcc | 0.5xVcc |
| 2.7V | 1.5V | 1.5V |
| 3.0V to 3.6V | 1.5V | 1.5V |
| 4.5V to 5.5V | 0.5xVcc | 0.5xVcc |

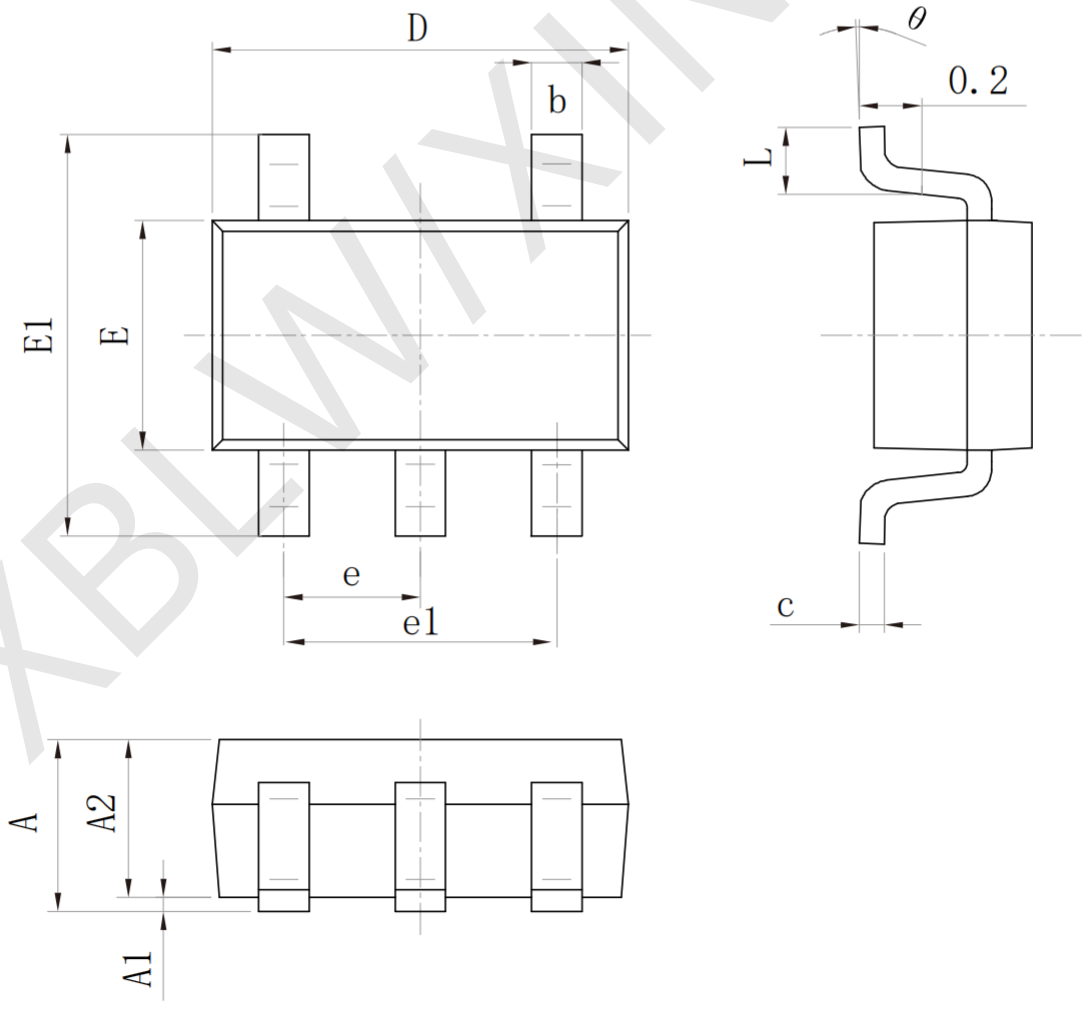
**Test Data**

| 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 1.95 V | Vcc | < 2.0ns | 30pF | 1kΩ | open |
| 2.3V to 2.7V | Vcc | < 2.0ns | 30pF | 500Ω | open |
| 2.7V | 2.7V | < 2.5ns | 50pF | 500Ω | open |
| 3.0V to 3.6V | 2.7V | < 2.5ns | 50pF | 500Ω | open |
| 4.5V to 5.5V | Vcc | < 2.5ns | 50pF | 500Ω | open |

## Package Information

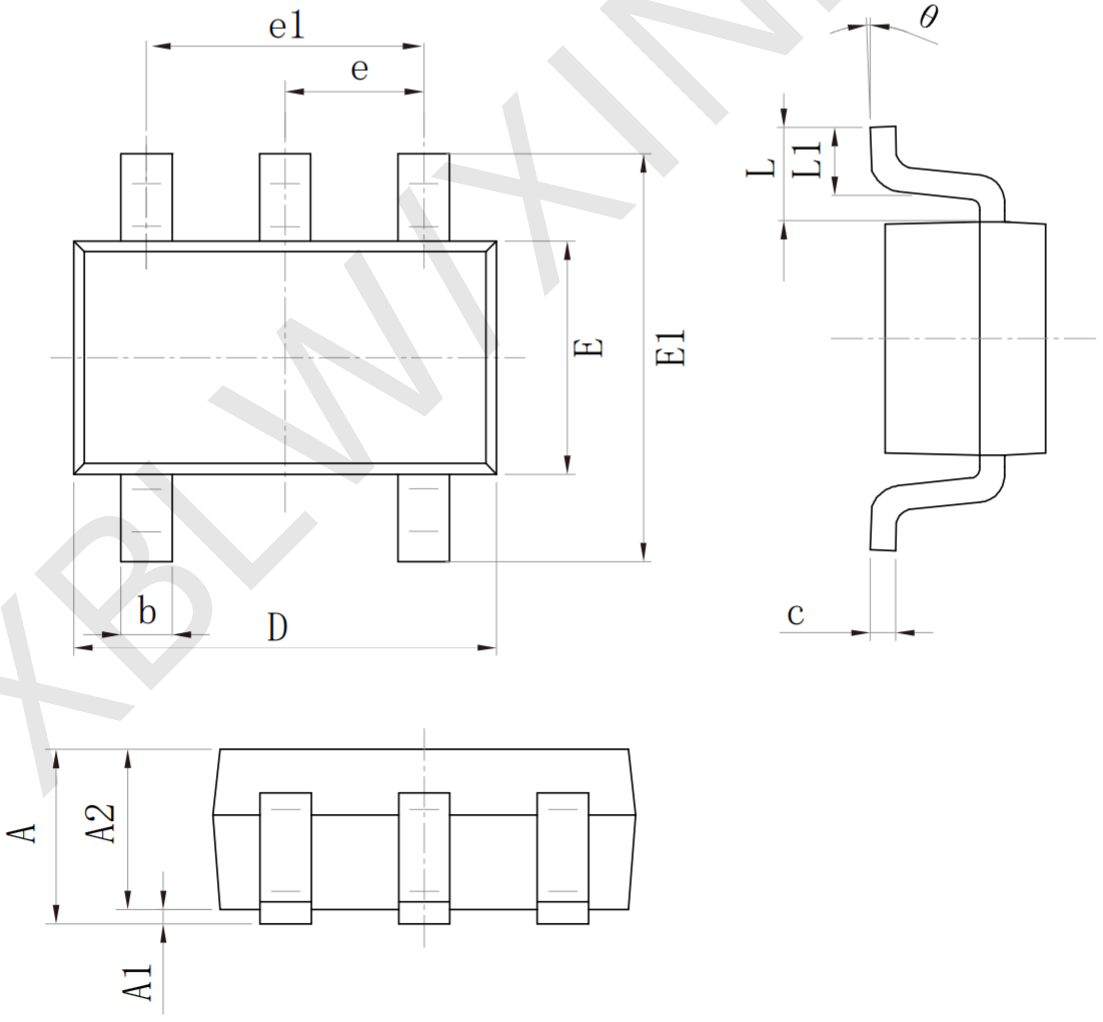
- SOT23-5

| SIZE / SYMBOL | Dimensions In Millimeters | | SIZE / SYMBOL | Dimensions In Inches | |
|---|---|---|---|---|---|
| | MIN(mm) | MAX(mm) | | MIN(in) | MAX(in) |
| A | 1.050 | 1.250 | A | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | A1 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | A2 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | b | 0.012 | 0.020 |
| c | 0.100 | 0.200 | c | 0.004 | 0.008 |
| D | 2.820 | 3.020 | D | 0.111 | 0.119 |
| E | 1.500 | 1.700 | E | 0.059 | 0.067 |
| E1 | 2.650 | 2.950 | E1 | 0.104 | 0.116 |
| e | 0.95(BSC) | | e | 0.037(BSC) | |
| e1 | 1.800 | 2.000 | e1 | 0.071 | 0.079 |
| L | 0.300 | 0.600 | L | 0.012 | 0.024 |
| θ | 0° | 8° | θ | 0° | 8° |



• SOT-353

| Size / Symbol | Dimensions In Millimeters | | Size / Symbol | Dimensions In Inches | |
|---|---|---|---|---|---|
| | Min(mm) | Max(mm) | | Min(in) | Max(in) |
| A | 0.900 | 1.100 | A | 0.035 | 0.043 |
| A1 | 0.000 | 0.100 | A1 | 0.000 | 0.004 |
| A2 | 0.900 | 1.000 | A2 | 0.035 | 0.039 |
| b | 0.150 | 0.350 | b | 0.006 | 0.014 |
| c | 0.080 | 0.150 | C | 0.003 | 0.006 |
| D | 2.000 | 2.200 | D | 0.079 | 0.087 |
| E | 1.150 | 1.350 | E | 0.045 | 0.053 |
| E1 | 2.150 | 2.450 | E1 | 0.085 | 0.096 |
| e | 0.650(TYP) | | e | 0.026(TYP) | |
| e1 | 1.200 | 1.400 | e1 | 0.047 | 0.055 |
| L | 0.525(REF) | | L | 0.021(REF) | |
| L1 | 0.260 | 0.460 | L1 | 0.010 | 0.018 |
| θ | 0° | 8° | θ | 0° | 8° |



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