

Low-power Configurable Multiple Function Gate

CJ74LVC1G97

Logic

1 Introduction

The CJ74LVC1G97 is a configurable multiple function gate with Schmitt-trigger inputs.

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.

2 Available Packages

| PART NUMBER | PACKAGE |
|-------------|--------------|
| CJ74LVC1G97 | SOT-23-6L |
| | SOT-363 |
| | DFN1.45x1-6L |
| | SOT-563 |

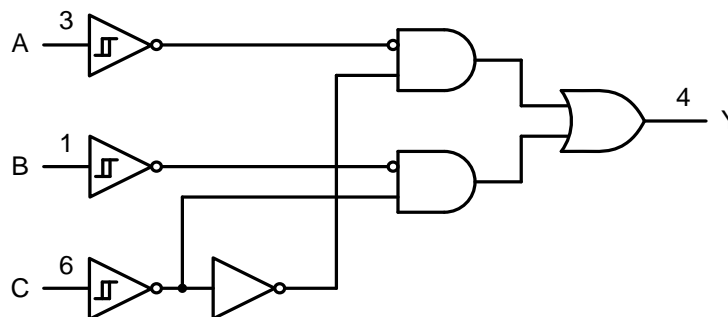
Note: For all available packages, please refer to the part Orderable Information.

3 Features

- Wide supply voltage range from 1.65V to 5.5V
- Inputs accept voltages to 5.5 V
- $\pm 24\text{mA}$ output drive at 3.0V
- High-impedance when $V_{CC}=0\text{V}$
- Temperature range: -40°C to $+125^{\circ}\text{C}$

4 Applications

- Barcode Scanners
- Cable Solutions
- E-Books
- Embedded PCs
- Field Transmitter: Temperature or Pressure Sensors
- Fingerprint Biometrics
- HVAC: Heating, Ventilating, and Air Conditioning
- Network-Attached Storage (NAS)
- Server Motherboards and PSUs
- Software Defined Radios (SDR)
- TVs: High Definition (HDTV), LCD, and Digital
- Video Communications Systems
- Wireless Data Access Cards, Headsets, Keyboard, Mouse, and LAN Cards



Logic diagram

5 Orderable Information

| DEVICE | PACKAGE | OP TEMP | ECO PLAN | MSL | PACKING OPTION | SORT |
|----------------|--------------|-----------|--------------|------------------|------------------------------------|--------|
| CJ74LVC1G97M6N | SOT-23-6L | -40~125°C | RoHS & Green | Level 3 168HR | Tape and Reel 3000 Units / Reel | Active |
| CJ74LVC1G97R6N | SOT-363 | -40~125°C | RoHS & Green | Level 3 168HR | Tape and Reel 3000 Units / Reel | Active |
| CJ74LVC1G97DNN | DFN1.45x1-6L | -40~125°C | RoHS & Green | Level 3 168HR | Tape and Reel 5000 Units / Reel | Active |
| CJ74LVC1G97S6N | SOT-563 | -40~125°C | RoHS & Green | Level 3 168HR | Tape and Reel 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

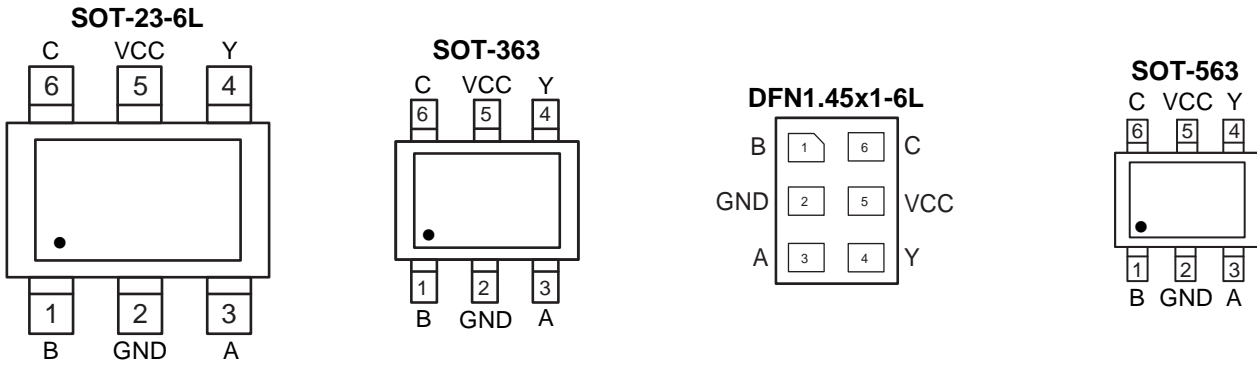


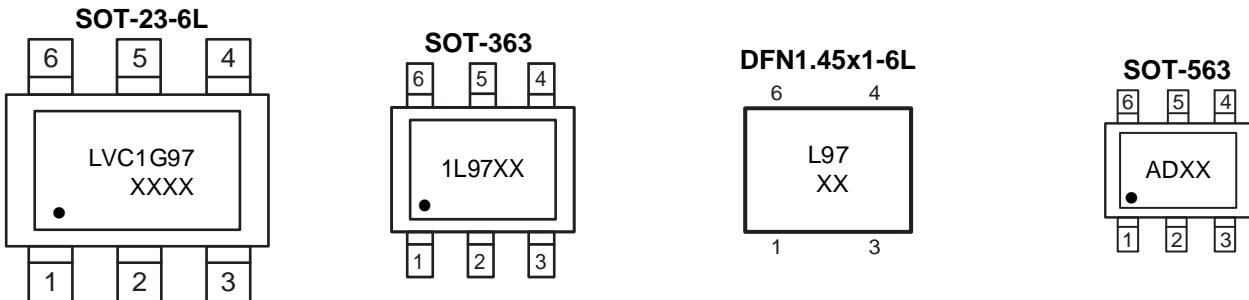
Figure 6-1 Pin configuration

6.2 Pin Function

| PIN | | I/O ⁽¹⁾ | DESCRIPTION |
|-----|------|--------------------|----------------|
| No. | NAME | | |
| 1 | B | I | Data input |
| 2 | GND | G | Ground (0V) |
| 3 | A | I | Data input |
| 4 | Y | O | Data output |
| 5 | VCC | P | Supply voltage |
| 6 | C | I | Data input |

(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 _{CC} | Supply current | - | - | 100 | mA |
| I _{GND} | Ground current | - | -100 | - | mA |
| I _{IK} | Input clamping current | V _I < 0V | -50 | - | mA |
| I _O | Output current | V _O =0V to V _{CC} | - | ±50 | mA |
| I _{OK} | Output clamping current | V _O > V _{CC} or V _O < 0V | - | ±50 | mA |
| T _{stg} | Storage temperature | - | -65 | +150 | °C |
| 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 Electrical Characteristics
7.3.1 DC Characteristics 1
 $T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, voltages are referenced to GND (ground=0V), unless otherwise specified.

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

Note: Typical values are measured at $T_{amb} = 25^{\circ}\text{C}$.

7.3.2 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 _{IH} or V _{IL} | 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 _{IH} or V _{IL} | 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 |
| ΔI _{CC} | Additional supply current | V _I =V _{CC} -0.6V; I _O =0A; V _{CC} =2.3V to 5.5V | | - | - | 500 | uA |

7.3.3 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. ⁽¹⁾ | MAX. | UNIT | |
|-------------------------------------|--------------------------|----------------|---------------------------------|---------------------|------|------|----|
| t _{PLH} , t _{PHL} | A to Y propagation delay | See Figure 8-3 | V _{CC} =1.65V to 1.95V | - | 6.0 | 14.4 | ns |
| | | | V _{CC} =2.3V to 2.7V | - | 3.5 | 8.3 | ns |
| | | | V _{CC} =2.7V | - | 4.2 | 8.5 | ns |
| | | | V _{CC} =3.0V to 3.6V | - | 3.8 | 6.3 | ns |
| | | | V _{CC} =4.5V to 5.5V | - | 3.0 | 5.1 | ns |

(1) Typical values are measured at T_{amb}=25°C and V_{CC}=1.8V, 2.5V, 2.7V, 3.3V and 5.0V respectively.

7.3.4 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} , t _{PHL} | A to Y propagation delay | See Figure 8-3 | V _{CC} =1.65V to 1.95V | - | - | 18 | ns |
| | | | V _{CC} =2.3V to 2.7V | - | - | 10.4 | ns |
| | | | V _{CC} =2.7V | - | - | 10.6 | ns |
| | | | V _{CC} =3.0V to 3.6V | - | - | 7.9 | ns |
| | | | V _{CC} =4.5V to 5.5V | - | - | 6.4 | ns |

8 Detailed Description

8.1 Overview

The CJ74LVC1G97 is a configurable multiple function gate with Schmitt-trigger inputs.

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.

8.2 Functional Block Diagram

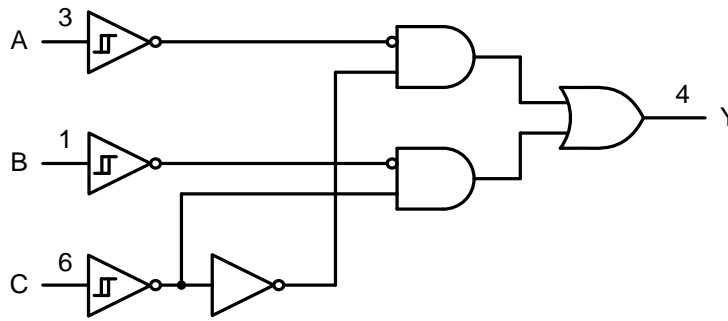


Figure 8-1 Logic diagram

8.3 Function Table

| INPUT | | | OUTPUT |
|-------|---|---|--------|
| C | B | A | Y |
| L | L | L | L |
| L | L | H | L |
| L | H | L | H |
| L | H | H | H |
| H | L | L | L |
| H | L | H | H |
| H | H | L | L |
| H | H | H | H |

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

8.4 Testing Circuit

8.4.1 AC Testing Circuit

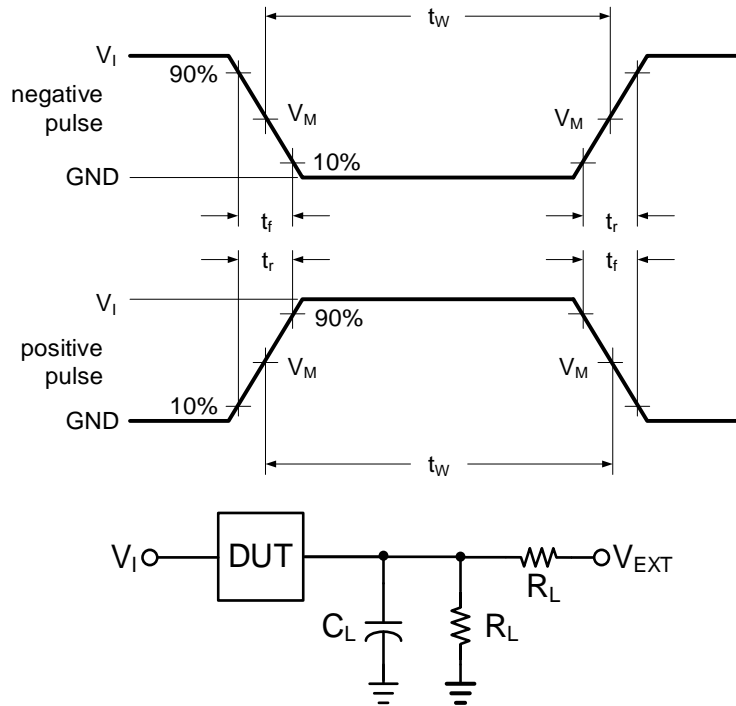


Figure 8-2 Test circuit for measuring switching times

Definitions for test circuit:

C_L includes probe and jig capacitance.

R_L =Load resistance.

8.4.2 AC Testing Waveforms

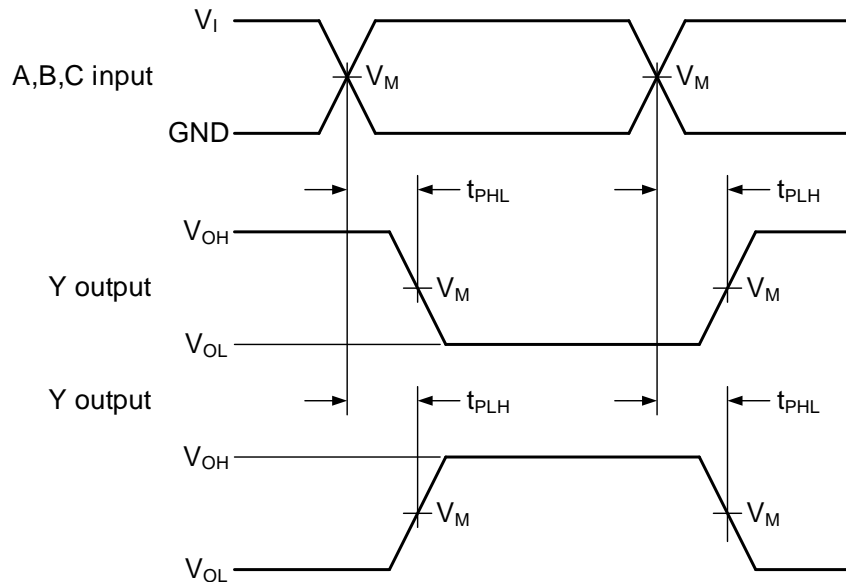


Figure 8-3 The data input (A, B, C) to output (Y) propagation delays

8.4.3 Measurement Points

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

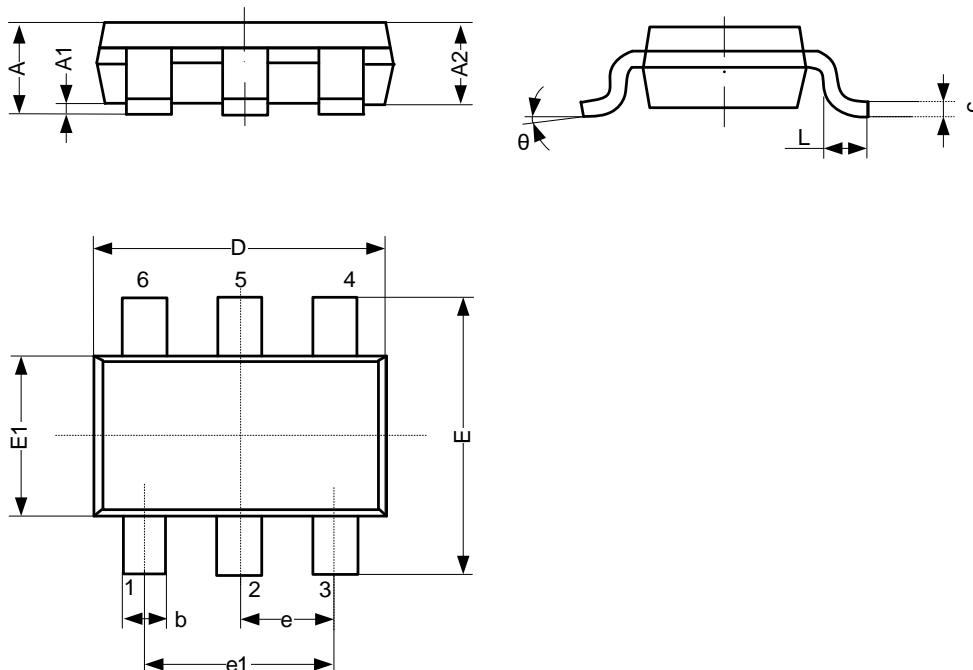
8.4.4 Test Data

| SUPPLY VOLTAGE | INPUT | | LOAD | | V_{EXT} | | |
|----------------|----------|-------------|-------|--------------|-------------------|-------------------|-------------------|
| | V_I | $t_r = t_f$ | C_L | R_L | t_{PLH}/t_{PHL} | t_{PLZ}/t_{PZL} | t_{PHZ}/t_{PZH} |
| 1.65V to 1.95V | V_{CC} | $\leq 3ns$ | 30pF | 1k Ω | Open | $2 \times V_{CC}$ | GND |
| 2.3V to 2.7V | V_{CC} | $\leq 3ns$ | 30pF | 500 Ω | Open | $2 \times V_{CC}$ | GND |
| 2.7V | V_{CC} | $\leq 3ns$ | 50pF | 500 Ω | Open | $2 \times V_{CC}$ | GND |
| 3.0V to 3.6V | V_{CC} | $\leq 3ns$ | 50pF | 500 Ω | Open | $2 \times V_{CC}$ | GND |
| 4.5V to 5.5V | V_{CC} | $\leq 3ns$ | 50pF | 500 Ω | Open | $2 \times V_{CC}$ | GND |

9 Mechanical Information

9.1 SOT-23-6L Mechanical Information

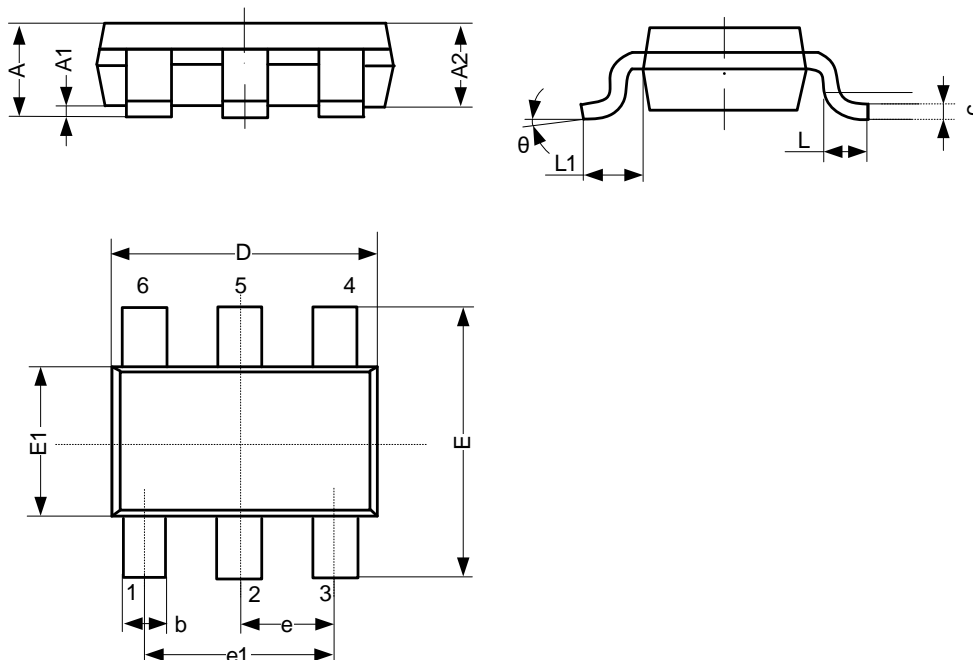
9.1.1 SOT-23-6L Outline Dimensions



| SYMBOL | Dimensions In Millimeters | | |
|----------|---------------------------|------|------|
| | Min. | Typ. | Max. |
| A | - | - | 1.25 |
| 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-363 Mechanical Information

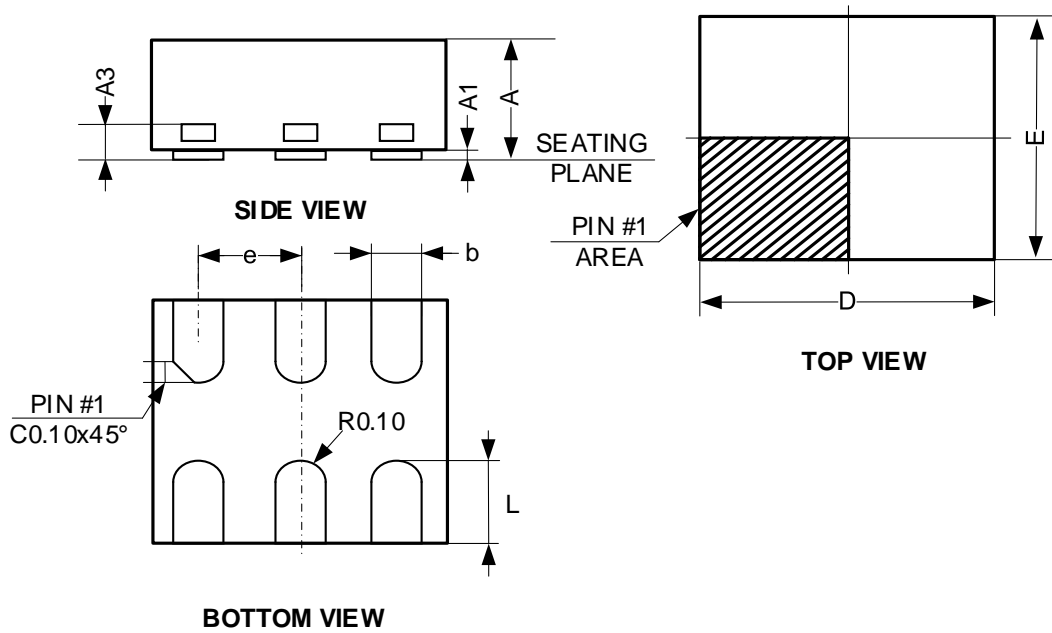
9.2.1 SOT-363 Outline Dimensions



| 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 | 0.26 | - | 0.46 |
| L1 | - | 0.525 | - |
| θ | 0° | - | 8° |
| Unit: mm | | | |

9.3 DFN1.45x1-6L Mechanical Information

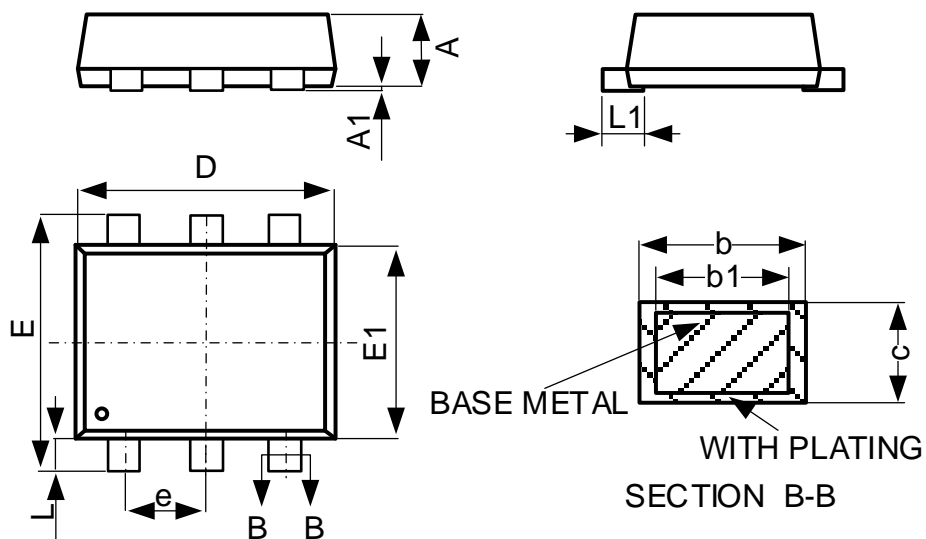
9.3.1 DFN1.45x1-6L Outline Dimensions



| SYMBOL | Dimensions In Millimeters | | |
|----------|---------------------------|------|------|
| | Min. | Typ. | Max. |
| A | 0.51 | - | 0.60 |
| A1 | 0.00 | - | 0.05 |
| A3 | - | 0.15 | - |
| b | 0.15 | - | 0.25 |
| D | - | 1.45 | - |
| E | - | 1.00 | - |
| e | 0.50 BSC | | |
| L | 0.25 | - | 0.45 |
| Unit: mm | | | |

9.4 SOT-563 Mechanical Information

9.4.1 SOT-563 Outline Dimensions



| SYMBOL | Dimensions In Millimeters | | |
|--------|---------------------------|------|------|
| | Min. | Typ. | Max. |
| A | 0.525 | - | 0.60 |
| A1 | 0.00 | - | 0.05 |
| b | 0.19 | - | 0.27 |
| b1 | 0.18 | - | 0.23 |
| c | 0.09 | - | 0.16 |
| D | 1.50 | - | 1.70 |
| E | 1.50 | - | 1.70 |
| E1 | 1.10 | - | 1.30 |
| e | 0.45 | - | 0.55 |
| L | 0.10 | - | 0.30 |
| L1 | 0.20 | - | 0.40 |

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

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