

## General Description

This single 3-input positive-NOR gate is designed for 1.65-V to 5.5-V Vcc operation.

The SN74LVC1G332 device performs the Boolean function  $Y = A + B + C$  or  $Y = \overline{A} \cdot \overline{B} \cdot \overline{C}$  in positive logic. The CMOS device has high output drive while maintaining low static power dissipation over a broad Vcc operating range. This device is fully specified for partial-power-down applications using I<sub>off</sub>. The I<sub>off</sub> circuitry prevents damaging current backflow through the device when the gate is powered down and its output is floating.

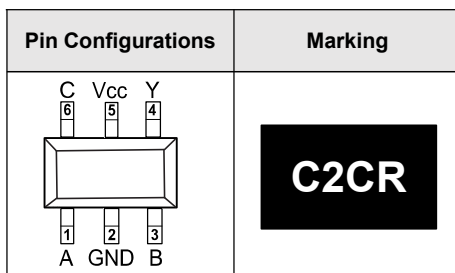
## Features

- Operate from 1.65 V to 5.5V
- Supports 5-V VCC operation
- Specified from -40°C to 85°C
- Provides down translation to Vcc
- Max tpd of 5.4 ns at 3.3 V
- ±24mA output drive at 3.3 V

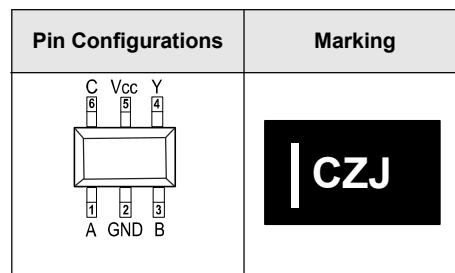
## Applications

- Personal digital assistant devices
- AV receiver
- MP3 player/recorder
- Solid state drive (SSD): client and enterprise
- Power: telecom/server AC/DC supply
- TV: LCD/digital and high-definition (HDTV)

## Pinning and Marking



SOT23-6



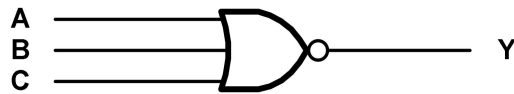
SC70-6

## Pin Functions

| Pin  |                | I/O | Description    |
|------|----------------|-----|----------------|
| Name | SOT23-6/SC70-6 |     |                |
| A    | 1              | I   | Data Input     |
| GND  | 2              | -   | Ground         |
| B    | 3              | I   | Data Input     |
| Y    | 4              | O   | Data Output    |
| VCC  | 5              | -   | Supply Voltage |
| C    | 6              | I   | Data Input     |

## Order information

| Orderable Device | Package | Packing Option |
|------------------|---------|----------------|
| SN74LVC1G332DBVR | SOT23-6 | 3000PCS        |
| SN74LVC1G332DCKR | SC70-6  | 3000PCS        |



## Absolute Maximum Ratings

| Parameters                                        |                                                                                             |                   | Min  | Max.                 | Unit |
|---------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------|------|----------------------|------|
| V <sub>CC</sub>                                   | Supply voltage range                                                                        |                   | -0.5 | 6.5                  | V    |
| V <sub>I</sub>                                    | Input voltage range                                                                         |                   | -0.5 | 6.5                  | V    |
| V <sub>O</sub>                                    | Voltage range applied to any output in the high-impedance or power-off state <sup>(2)</sup> |                   | -0.5 | 6.5                  | V    |
| V <sub>O</sub>                                    | Voltage range applied to any output in the high or low state <sup>(2)(3)</sup>              |                   | -0.5 | V <sub>CC</sub> +0.5 | V    |
| I <sub>IK</sub>                                   | Input clamp current                                                                         | V <sub>I</sub> <0 |      | -50                  | mA   |
| I <sub>OK</sub>                                   | Output clamp current                                                                        | V <sub>O</sub> <0 |      | -50                  | mA   |
| I <sub>O</sub>                                    | Continuous output current                                                                   |                   |      | ±50                  | mA   |
| Continuous current through V <sub>CC</sub> or GND |                                                                                             |                   |      | ±100                 | mA   |
| T <sub>J</sub>                                    | Junction temperature under bias                                                             |                   |      | 85                   | °C   |
| T <sub>stg</sub>                                  | Storage temperature range                                                                   |                   | -65  | 150                  | °C   |

(1) Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

(3) The output positive-voltage rating may be exceeded up to 6.5 V maximum if the output current rating is observed.

## Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)

| Symbol              | Parameter                          |                                        | Min                  | Max                  | Units |
|---------------------|------------------------------------|----------------------------------------|----------------------|----------------------|-------|
| $V_{CC}$            | Supply Voltage                     | Operating                              | 1.65                 | 5.5                  | V     |
| $V_{IH}$            | High-Level Input Voltage           | $V_{CC}=1.65V$ to $1.95V$              | $0.65 \times V_{CC}$ |                      | V     |
|                     |                                    | $V_{CC}=2.3V$ to $2.7V$                | 1.7                  |                      |       |
|                     |                                    | $V_{CC}=3V$ to $3.6V$                  | 2                    |                      |       |
|                     |                                    | $V_{CC}=4.5V$ to $5.5V$                | $0.7 \times V_{CC}$  |                      |       |
| $V_{IL}$            | Low-Level Input Voltage            | $V_{CC}=1.65V$ to $1.95V$              |                      | $0.35 \times V_{CC}$ | V     |
|                     |                                    | $V_{CC}=2.3V$ to $2.7V$                |                      | 0.7                  |       |
|                     |                                    | $V_{CC}=3V$ to $3.6V$                  |                      | 0.8                  |       |
|                     |                                    | $V_{CC}=4.5V$ to $5.5V$                |                      | $0.3 \times V_{CC}$  |       |
| $V_I$               | Input Voltage                      |                                        | 0                    | 5.5                  | V     |
| $V_O$               | Output Voltage                     |                                        | 0                    | $V_{CC}$             | V     |
| $I_{OH}$            | High-Level Output Current          | $V_{CC}=1.65V$                         |                      | -4                   | mA    |
|                     |                                    | $V_{CC}=2.3V$                          |                      | -8                   |       |
|                     |                                    | $V_{CC}=3V$                            |                      | -16                  |       |
|                     |                                    | $V_{CC}=4.5V$                          |                      | -24                  |       |
| $I_{OL}$            | Low-Level Output Current           | $V_{CC}=1.65V$                         |                      | 4                    | mA    |
|                     |                                    | $V_{CC}=2.3V$                          |                      | 8                    |       |
|                     |                                    | $V_{CC}=3V$                            |                      | 16                   |       |
|                     |                                    | $V_{CC}=4.5V$                          |                      | 24                   |       |
| $\Delta t/\Delta v$ | Input Transition Rise or Fall Rate | $V_{CC}=1.8V \pm 0.15V, 2.5V \pm 0.2V$ |                      | 20                   | ns/V  |
|                     |                                    | $V_{CC}=3.3V \pm 0.3V$                 |                      | 10                   |       |
|                     |                                    | $V_{CC}=5V \pm 0.5V$                   |                      | 5                    |       |
| $T_A$               | Operating Free-air Temperature     | All Other Packages                     | -40                  | 125                  | °C    |

(1) All unused digital inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation.

## Thermal Information

| Package Type | $\theta_{JA}$ | $\theta_{JC}$ | Unit |
|--------------|---------------|---------------|------|
| SOT23-6      | 196           | 81            | °C/W |
| SC70-6       | 178           | 98            | °C/W |

## Electrical Characteristics

$V_{CC}=1.65V$  to  $5.5V$ , FULL= $-40^{\circ}C$  to  $+85^{\circ}C$ . Typical values are at  $T_A=+25^{\circ}C$  (unless otherwise noted)<sup>(1)</sup>

| Parameter             | Symbol          | Test Conditions                                                 | $V_{CC}$      | $T_A$ | Min          | Typ | Max      | Units   |
|-----------------------|-----------------|-----------------------------------------------------------------|---------------|-------|--------------|-----|----------|---------|
| Output                |                 |                                                                 |               |       |              |     |          |         |
| Output High Voltage   | $V_{OH}$        | $I_{OH}=-100\mu A$                                              | 1.65V to 5.5V | FULL  | $V_{CC}-0.1$ |     |          | V       |
|                       |                 | $I_{OH}=-4mA$                                                   | 1.65V         | FULL  | 1.2          |     |          | V       |
|                       |                 | $I_{OH}=-8mA$                                                   | 2.3V          | FULL  | 1.9          |     |          | V       |
|                       |                 | $I_{OH}=-16mA$                                                  | 3V            | FULL  | 2.4          |     |          | V       |
|                       |                 | $I_{OH}=-24mA$                                                  |               | FULL  | 2.3          |     |          | V       |
|                       |                 | $I_{OH}=-32mA$                                                  | 4.5V          | FULL  | 3.8          |     |          | V       |
| Output Low Voltage    | $V_{OL}$        | $I_{OL}=100\mu A$                                               | 1.65V to 5.5V | FULL  |              |     | 0.1      | V       |
|                       |                 | $I_{OL}=4mA$                                                    | 1.65V         | FULL  |              |     | 0.45     | V       |
|                       |                 | $I_{OL}=8mA$                                                    | 2.3V          | FULL  |              |     | 0.3      | V       |
|                       |                 | $I_{OL}=16mA$                                                   | 3V            | FULL  |              |     | 0.4      | V       |
|                       |                 | $I_{OL}=24mA$                                                   |               | FULL  |              |     | 0.55     | V       |
|                       |                 | $I_{OL}=32mA$                                                   | 4.5V          | FULL  |              |     | 0.55     | V       |
| Off-State Current     | $I_{off}$       | $V_I$ or $V_O=5.5V$                                             | 0V            | FULL  |              |     | $\pm 10$ | $\mu A$ |
| Input                 |                 |                                                                 |               |       |              |     |          |         |
| Input Leakage Current | $I_I$           | $V_I=5.5V$ or GND                                               | 0V to 5.5V    | FULL  |              |     | $\pm 5$  | $\mu A$ |
| Input Capacitance     | $C_I$           | $V_I=V_{CC}$ or GND                                             | 3.3V          | FULL  |              | 3.5 |          | pF      |
| Power Supply          |                 |                                                                 |               |       |              |     |          |         |
| Power Supply Range    | $V_{CC}$        |                                                                 | 1.65V to 5.5V | FULL  | 1.65         |     | 5.5      | V       |
| Power Supply Current  | $I_{CC}$        | $V_I=V_{CC}$ or GND, $I_O=0$                                    | 5.5V          | FULL  |              |     | 10       | $\mu A$ |
| Delta Power Current   | $\Delta I_{CC}$ | One Input at $V_{CC}-0.6V$ ,<br>Other Inputs at $V_{CC}$ or GND | 3V to 5.5V    | FULL  |              |     | 500      | $\mu A$ |

(1) All unused digital inputs of the device must be held at  $V_{CC}$  or GND to ensure proper device operation.

## Switching Characteristics

Over recommended operating free-air temperature range,  $C_L=30pF$  or  $50pF$  (unless otherwise noted)

| Parameter       | From(Input) | To(Output) | −40°C to +125°C             |     |                            |     |                            |     |                          |     | Units |
|-----------------|-------------|------------|-----------------------------|-----|----------------------------|-----|----------------------------|-----|--------------------------|-----|-------|
|                 |             |            | V <sub>CC</sub> =1.8V±0.15V |     | V <sub>CC</sub> =2.5V±0.2V |     | V <sub>CC</sub> =3.3V±0.3V |     | V <sub>CC</sub> =5V±0.5V |     |       |
|                 |             |            | Min                         | Max | Min                        | Max | Min                        | Max | Min                      | Max |       |
| t <sub>pd</sub> | A or B or C | Y          | 2.2                         | 11  | 1.4                        | 8.8 | 1.3                        | 5.4 | 1                        | 4.7 | ns    |

## Operating Characteristics

$T_A=-40^{\circ}C$  to  $+125^{\circ}C$

| Parameter |                               | Test Conditions | $V_{CC}=1.8V$ | $V_{CC}=2.5V$ | $V_{CC}=3.3V$ | $V_{CC}=5V$ | Units |
|-----------|-------------------------------|-----------------|---------------|---------------|---------------|-------------|-------|
|           |                               |                 | Typ           | Typ           | Typ           | Typ         |       |
| $C_{pd}$  | Power Dissipation Capacitance | $f=10MHz$       | 23            | 23            | 23            | 31          | pF    |

## Typical Characteristics

$V_{CC}=1.65V$  or  $5.5V$ , FULL= $-40^{\circ}C$  to  $+125^{\circ}C$ . Typical values are at  $T_A=+25^{\circ}C$  (unless otherwise noted)

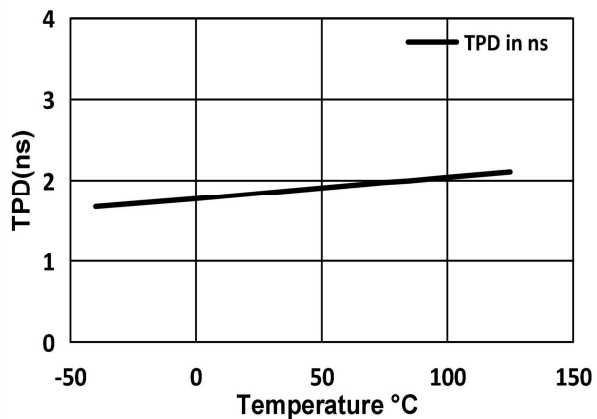


Fig.8-1. TPD Across Temperature at 3.3V  $V_{CC}$

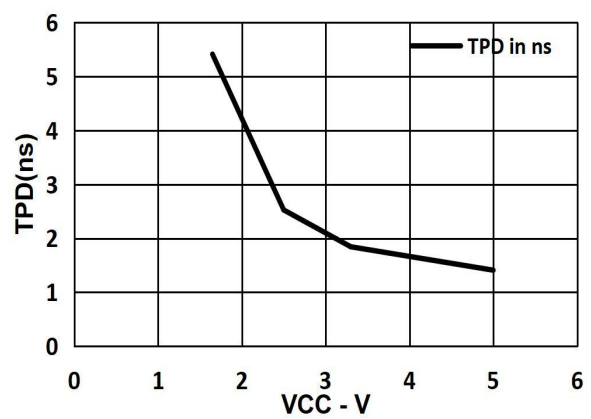
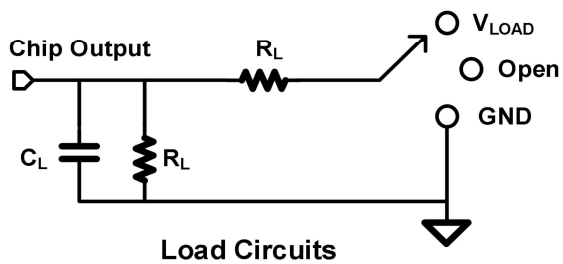


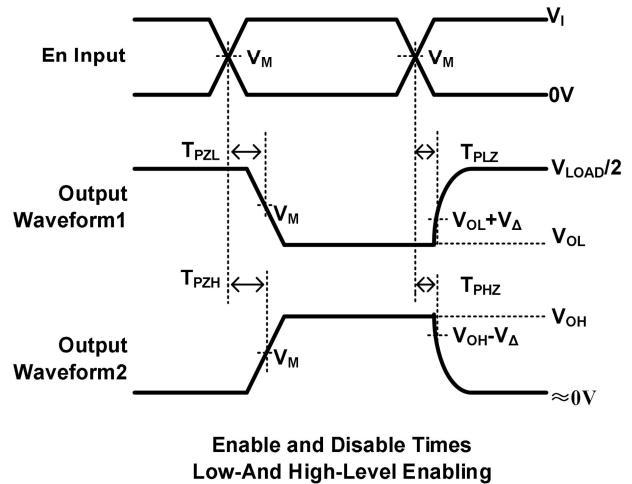
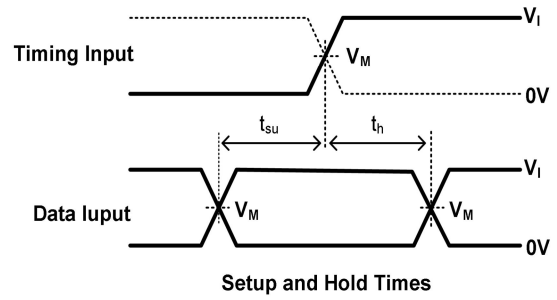
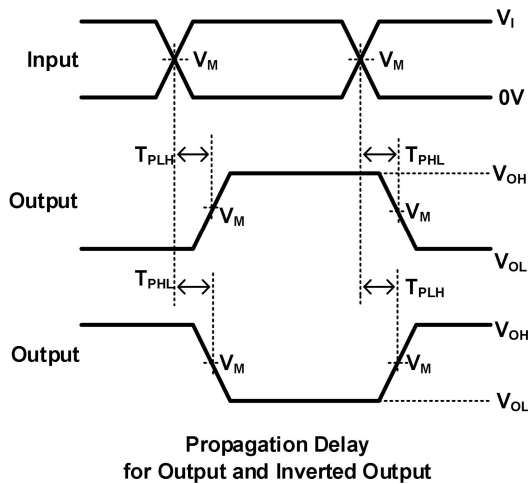
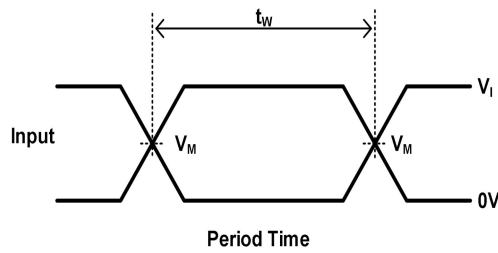
Fig.8-2. TPD Across  $V_{CC}$  at  $25^{\circ}C$

## Parameter Measurement Information



| TEST              | S1         |
|-------------------|------------|
| $T_{PHL}/T_{PLH}$ | OPEN       |
| $T_{PLZ}/T_{PZL}$ | $V_{LOAD}$ |
| $T_{PHZ}/T_{PZH}$ | GND        |

| $V_{CC}$         | Inputs   |              | $V_M$      | $V_{LOAD}$        | $C_L$ | $R_L$        | $V_{\Delta}$ |
|------------------|----------|--------------|------------|-------------------|-------|--------------|--------------|
|                  | $V_I$    | $T_r/T_f$    |            |                   |       |              |              |
| $1.8V \pm 0.15V$ | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 30pF  | 1k $\Omega$  | 0.15V        |
| $2.5V \pm 0.15V$ | $V_{CC}$ | $\leq 2ns$   | $V_{CC}/2$ | $2 \times V_{CC}$ | 30pF  | 500 $\Omega$ | 0.15V        |
| $3.3V \pm 0.15V$ | 3V       | $\leq 2.5ns$ | 1.5V       | 6V                | 50pF  | 500 $\Omega$ | 0.3V         |
| $5V \pm 0.15V$   | $V_{CC}$ | $\leq 2.5ns$ | $V_{CC}/2$ | $2 \times V_{CC}$ | 50pF  | 500 $\Omega$ | 0.3V         |

**Parameter Measurement Information(Continued)**


Notes:A.  $C_L$  includes probe and jig capacitance.

B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.

C. All input pulses are supplied by generators having the following characteristics: PRR 10 MHz,  $Z = 50 \Omega$ .

D. The outputs are measured one at a time, with one transition per measurement.

E.  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .

F.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .

G.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .

H. All parameters and waveforms are not applicable to all devices.

**Feature Description**

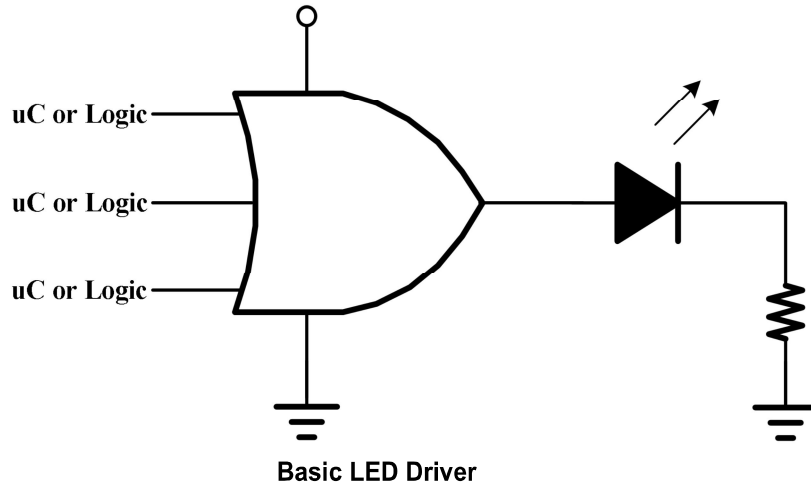
- Wide operating voltage range.
- Operates from 1.65 V to 5.5 V.
- Allows down voltage translation.
- Inputs accept voltages to 5.5 V.
- $I_{off}$  feature allows voltages on the inputs and outputs, when  $V_{CC}$  is 0 V.

**Device Functional Modes**

| Inputs |   |   | Output |
|--------|---|---|--------|
| A      | B | C | Y      |
| H      | X | X | H      |
| X      | H | X | H      |
| X      | X | H | H      |
| L      | L | L | L      |

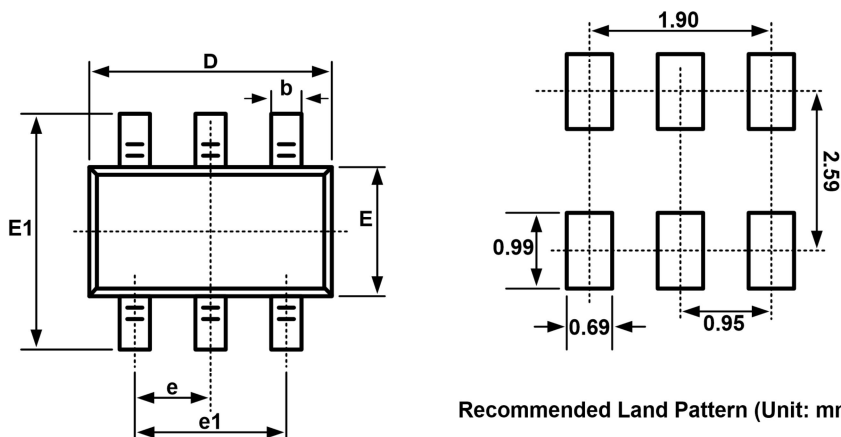
### Application Information

The SN74LVC1G332 is a high drive CMOS device that can be used for implement OR logic with a high output drive, such as an LED application. It can produce 24-mA of drive current at 3.3V making it Ideal for driving multiple outputs and good for high speed applications up to 100Mhz. The inputs are 5.5-V tolerant allowing translation down to  $V_{CC}$ .



This device uses CMOS technology and has balanced output drive. Care should be taken to avoid bus contention because it can drive currents that would exceed maximum limits. The high drive will also create fast edges into light loads, so routing and load conditions should be considered to prevent ringing.

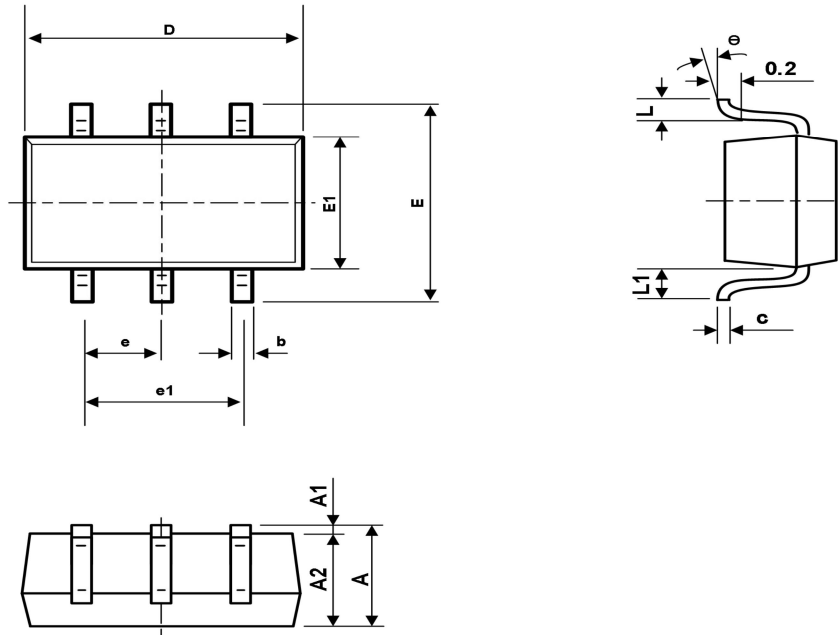
Each VCC pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, a 0.1- $\mu\text{F}$  capacitor is recommended. If there are multiple VCC pins, then a 0.01- $\mu\text{F}$  or 0.022- $\mu\text{F}$  capacitor is recommended for each power pin. It is ok to parallel multiple bypass capacitors to reject different frequencies of noise. A 0.1- $\mu\text{F}$  and 1- $\mu\text{F}$  capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.



Recommended Land Pattern (Unit: mm)



| Symbol   | Dimensions In Millimeters |       | Dimensions In Inches |       |
|----------|---------------------------|-------|----------------------|-------|
|          | Min                       | Max   | Min                  | Max   |
| A        | 1.050                     | 1.250 | 0.041                | 0.049 |
| A1       | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2       | 1.050                     | 1.150 | 0.041                | 0.045 |
| b        | 0.300                     | 0.500 | 0.012                | 0.020 |
| c        | 0.100                     | 0.200 | 0.004                | 0.008 |
| D        | 2.820                     | 3.020 | 0.111                | 0.119 |
| E        | 1.500                     | 1.700 | 0.059                | 0.067 |
| E1       | 2.650                     | 2.950 | 0.104                | 0.116 |
| e        | 0.950BSC                  |       | 0.037BSC             |       |
| e1       | 1.800                     | 2.000 | 0.071                | 0.079 |
| L        | 0.300                     | 0.600 | 0.012                | 0.024 |
| L1       | 0.600REF                  |       | 0.024REF             |       |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |

**Package Outline  
SC70-6**


| Symbol | Dimension In Millimeters |       | Dimensions In Inches |       |
|--------|--------------------------|-------|----------------------|-------|
|        | Min                      | Max   | Min                  | Max   |
| A      | 0.900                    | 1.100 | 0.035                | 0.043 |
| A1     | 0.000                    | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                    | 1.000 | 0.035                | 0.039 |
| b      | 0.150                    | 0.350 | 0.006                | 0.014 |
| c      | 0.110                    | 0.175 | 0.004                | 0.007 |
| D      | 2.000                    | 2.200 | 0.079                | 0.087 |
| E      | 2.150                    | 2.450 | 0.085                | 0.096 |
| E1     | 1.150                    | 1.350 | 0.045                | 0.053 |
| e      | 0.650TYP                 |       | 0.026TYP             |       |
| e1     | 1.200                    | 1.400 | 0.047                | 0.055 |
| L      | 0.260                    | 0.460 | 0.010                | 0.018 |
| L1     | 0.525REF                 |       | 0.021REF             |       |
| θ      | 0°                       | 8°    | 0°                   | 8°    |