

## CJ6386 Series

### ■ INTRODUCTION

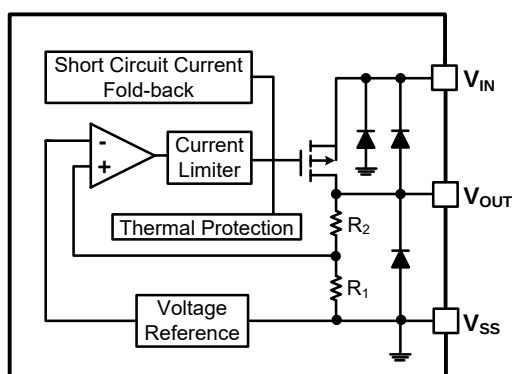
CJ6386 series is a group of positive voltage regulator made by CMOS technology. It has the characteristics of low power consumption and low voltage. Even if the difference between input voltage and output voltage is very small, it can still provide large output current. CJ6386 series can provide 250 mA output current, allowing input voltage up to 45V. Therefore, this series of products are very suitable for battery powered devices, such as RF applications and other systems requiring quiet voltage sources.

CJ6386 series provides: SOT-23-3L\5L, SOT-89-3L, SOT-223 and TO-92, which conform to the ROHS environmental protection standards.

### ■ APPLICATIONS

- Cordless Phones
- Radio control systems
- Laptop, Palmtops and PDAs
- Single-lens reflex DSC
- PC peripherals with memory

### ■ BLOCK DIAGRAM



### ■ FEATURES

- Low Quiescent Current: 2 $\mu$ A
- Operating Voltage Range: 2.5V ~ 45V
- Output Current: 250mA
- Low Dropout Voltage:  
700mV@100mA( $V_{OUT} = 3.3V$ )
- Output Voltage: 2.1 ~ 5.0V
- High Accuracy:  $\pm 2\%/\pm 1\%$ (Typ.)
- High Power Supply Rejection Ratio:  
70dB@1kHz
- Low Output Noise: 27 $\mu$ V<sub>RMS</sub>  
(10Hz ~100kHz)
- Excellent Line and Load Transient Response
- Built-in Current Limiter, Short-Circuit Protection
- Over-Temperature Protection
- Stable with Ceramic or Tantalum Capacitor

- LAN Cards
- Ultra Low Power Microcontrollers
- Wireless Communication Equipments
- Portable Audio Video Equipments
- Car Navigation Systems

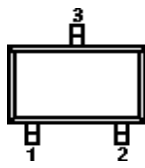
### ■ ORDER INFORMATION

CJ6386①②③④

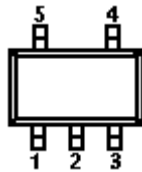
| DESIGNATOR | SYMBOL  | DESCRIPTION                         |
|------------|---------|-------------------------------------|
| ①          | A       | Standard                            |
| ②③         | Integer | Output Voltage<br>e.g.3.3V=②:3, ③:3 |
| ④          | M/MC/MY | Package:SOT-23-3L                   |
|            | MF/MR   | Package:SOT-23-5L                   |
|            | P/PT/PL | Package:SOT-89-3L                   |
|            | T/TA/TB | Package:TO-92                       |
|            | G/GW/GL | Package:SOT-223                     |

## Pin Configuration

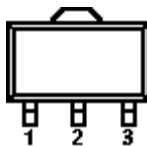
SOT-23-3L



SOT-23-5L



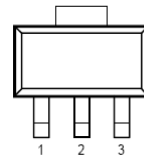
SOT-89-3L



TO-92



SOT-223



| PIN NUMBER       |    |    |                  |    |    |                  |    |    | PIN NAME         | FUNCTION    |
|------------------|----|----|------------------|----|----|------------------|----|----|------------------|-------------|
| CJ6386AxxM/MC/MY |    |    | CJ6386AxxP/PT/PL |    |    | CJ6386AxxT/TA/TB |    |    |                  |             |
| SOT-23-3L        |    |    | SOT-89-3L        |    |    | TO-92            |    |    |                  |             |
| M                | MC | MY | P                | PT | PL | T                | TA | TB |                  |             |
| 1                | 3  | 3  | 1                | 2  | 2  | 1                | 2  | 2  | V <sub>SS</sub>  | Ground      |
| 2                | 2  | 1  | 3                | 1  | 3  | 3                | 3  | 1  | V <sub>OUT</sub> | Output      |
| 3                | 1  | 2  | 2                | 3  | 1  | 2                | 1  | 3  | V <sub>IN</sub>  | Power Input |

SOT-23-5L

| PIN NUMBER     |     | PIN NAME         | FUNCTION      |
|----------------|-----|------------------|---------------|
| CJ6386AxxMF/MR |     |                  |               |
| MF             | MR  |                  |               |
| 1              | 2   | V <sub>IN</sub>  | Power Input   |
| 2              | 1   | V <sub>SS</sub>  | Ground        |
| 3/4            | 4/5 | NC               | No Connection |
| 5              | 3   | V <sub>OUT</sub> | Output        |

SOT-223

| PIN NUMBER       |    |    | PIN NAME         | FUNCTION    |
|------------------|----|----|------------------|-------------|
| CJ6386AxxG/GW/GL |    |    |                  |             |
| G                | GW | GL |                  |             |
| 1                | 3  | 2  | V <sub>IN</sub>  | Power input |
| 2                | 1  | 1  | V <sub>SS</sub>  | Ground      |
| 3                | 2  | 3  | V <sub>OUT</sub> | Output      |

### ■ ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

(Unless otherwise specified,  $T_A=25^{\circ}\text{C}$ )

| PARAMETER                                           |             | SYMBOL              | RATINGS | UNITS              |
|-----------------------------------------------------|-------------|---------------------|---------|--------------------|
| Input Voltage <sup>(2)</sup>                        |             | $V_{\text{IN}}$     | -0.3~50 | V                  |
| Output Voltage <sup>(2)</sup>                       |             | $V_{\text{OUT}}$    | -0.3~12 | V                  |
| Output Current                                      |             | $I_{\text{OUT}}$    | 250     | mA                 |
| Power Dissipation                                   | SOT-23-3/5L | $P_D$               | 0.3     | W                  |
|                                                     | SOT-89-3L   |                     | 0.6     | W                  |
|                                                     | TO-92       |                     | 0.4     | W                  |
|                                                     | SOT-223     |                     | 0.8     | W                  |
| Operating Junction Temperature Range <sup>(3)</sup> |             | $T_j$               | 150     | $^{\circ}\text{C}$ |
| Storage Temperature                                 |             | $T_{\text{stg}}$    | -65~150 | $^{\circ}\text{C}$ |
| Lead Temperature(Soldering, 10 sec)                 |             | $T_{\text{solder}}$ | 260     | $^{\circ}\text{C}$ |

(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) All voltages are with respect to network ground terminal.

(3) This IC includes over temperature protection that is intended to protect the device during momentary overload. Junction temperature will exceed  $125^{\circ}\text{C}$  when over temperature protection is active. Continuous operation above the specified maximum operating junction temperature may impair device reliability.

### ■ RECOMMENDED OPERATING CONDITIONS

| PARAMETER                                   | MIN. | NOM. | MAX. | UNITS              |
|---------------------------------------------|------|------|------|--------------------|
| Supply voltage at $V_{\text{IN}}$           | 2.5  |      | 45   | V                  |
| Operating junction temperature range, $T_j$ | -40  |      | 125  | $^{\circ}\text{C}$ |
| Operating free air temperature range, $T_A$ | -40  |      | 85   | $^{\circ}\text{C}$ |

## Electrical Characteristics

### CJ6386 Series

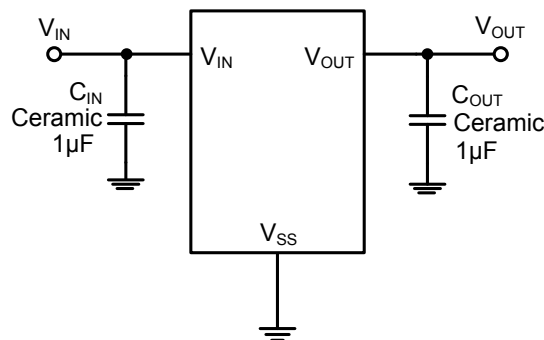
( $V_{IN}=V_{OUT}+2V$ ,  $C_{IN}=C_{OUT}=1\mu F$ ,  $T_A=25^\circ C$ , unless otherwise specified)

| PARAMETER                    | SYMBOL                                                | CONDITIONS                                             | MIN.   | TYP. <sup>(4)</sup> | MAX. | UNITS         |
|------------------------------|-------------------------------------------------------|--------------------------------------------------------|--------|---------------------|------|---------------|
| Input Voltage                | $V_{IN}$                                              |                                                        | 2.5    | —                   | 45   | V             |
| Output Voltage Range         | $V_{OUT}$                                             |                                                        | 2.1    | —                   | 5.0  | V             |
| DC Output Accuracy           |                                                       | $I_{OUT}=10mA$                                         | -2     | —                   | 2    | %             |
|                              |                                                       |                                                        | -1     | —                   | 1    | %             |
| Dropout Voltage              | $V_{dif}^{(5)}$                                       | $I_{OUT}=100mA, V_{OUT}=3.3V$                          | —      | 700                 | —    | mV            |
| Supply Current               | $I_{SS}$                                              | $I_{OUT}=0A$                                           | —      | 2                   | 10   | $\mu A$       |
| Line Regulation              | $\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta V_{IN}}$ | $I_{OUT}=10mA$<br>$V_{OUT}+1V \leq V_{IN} \leq 36V$    | —      | 0.01                | 0.3  | %/V           |
| Load Regulation              | $\Delta V_{OUT}$                                      | $V_{IN}=V_{OUT}+2V$ ,<br>$1mA \leq I_{OUT} \leq 100mA$ | —      | 8                   | —    | mV            |
| Temperature Coefficient      | $\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta T_A}$    | $I_{OUT}=40mA$ ,<br>$-40^\circ C < T_A < 85^\circ C$   |        | 50                  |      | ppm           |
| Output Current Limit         | $I_{LIM}$                                             | $V_{OUT}=0.5 \times V_{OUT(Normal)}$                   |        | 260                 |      | mA            |
| Short Current                | $I_{SHORT}$                                           | $V_{OUT}=V_{SS}$                                       | —      | 30                  | —    | mA            |
| Power Supply Rejection Ratio | PSRR                                                  | $I_{OUT}=50mA$                                         | 100Hz  |                     | 80   | dB            |
|                              |                                                       |                                                        | 1kHz   | —                   | 70   |               |
|                              |                                                       |                                                        | 10kHz  | —                   | 60   |               |
|                              |                                                       |                                                        | 100kHz | —                   | 50   |               |
| Output Noise Voltage         | $V_{ON}$                                              | BW=10Hz to 100kHz                                      | —      | $27 \times V_{OUT}$ | —    | $\mu V_{RMS}$ |
| Thermal Shutdown Temperature | $T_{SD}$                                              | $I_{LOAD}=30mA$                                        | —      | 160                 | —    | $^\circ C$    |
| Thermal Shutdown Hysteresis  | $\Delta T_{SD}$                                       | —                                                      | —      | 20                  | —    | $^\circ C$    |

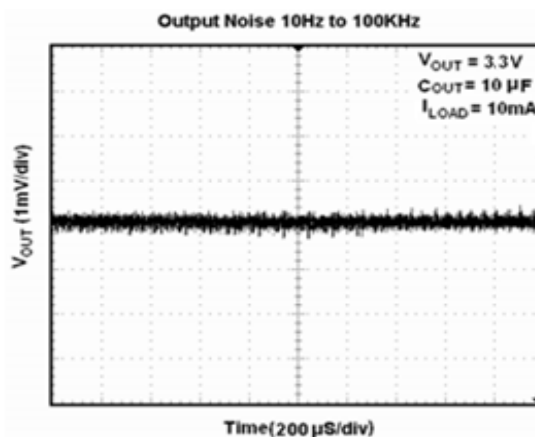
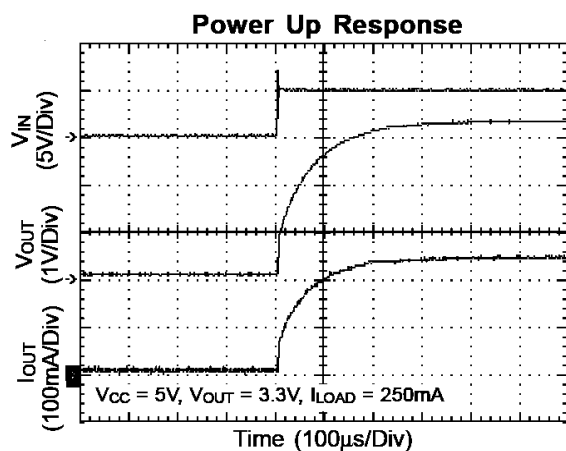
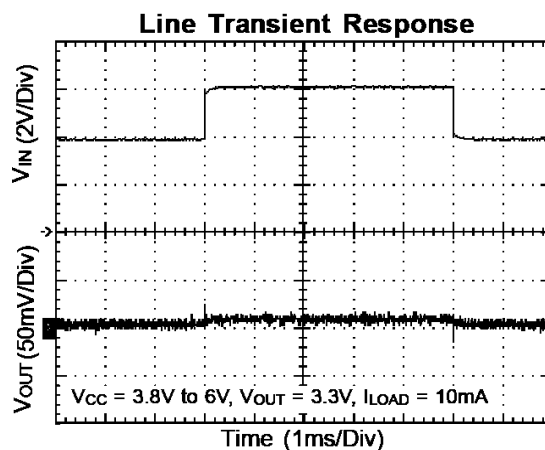
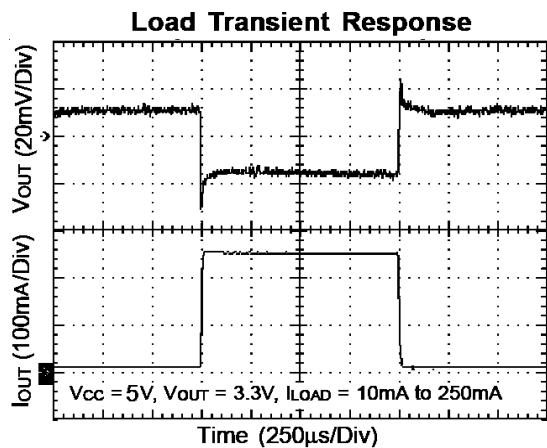
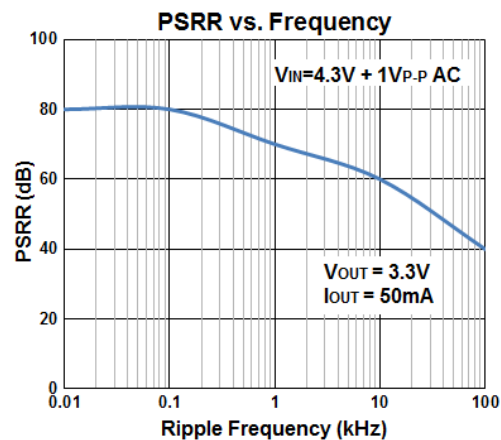
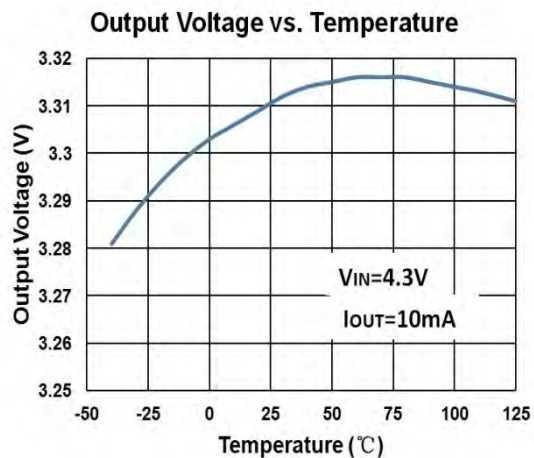
(4) Typical numbers are at  $25^\circ C$  and represent the most likely norm.

(5)  $V_{dif}$ : The Difference Of Output Voltage And Input Voltage When Input Voltage Is Decreased Gradually Till Output Voltage Equals To 98% Of  $V_{OUT}$  (E).

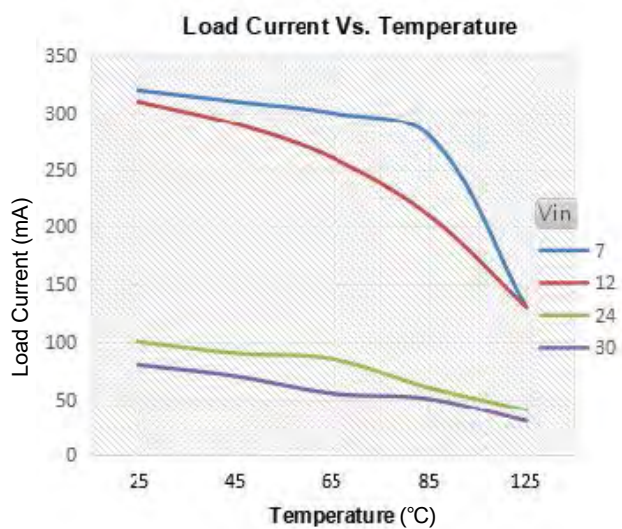
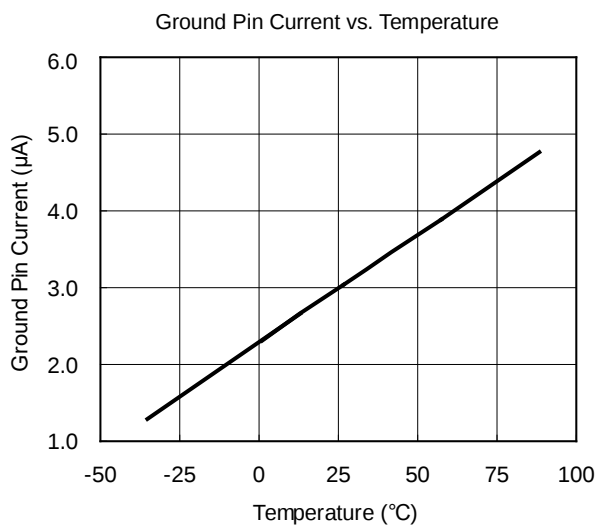
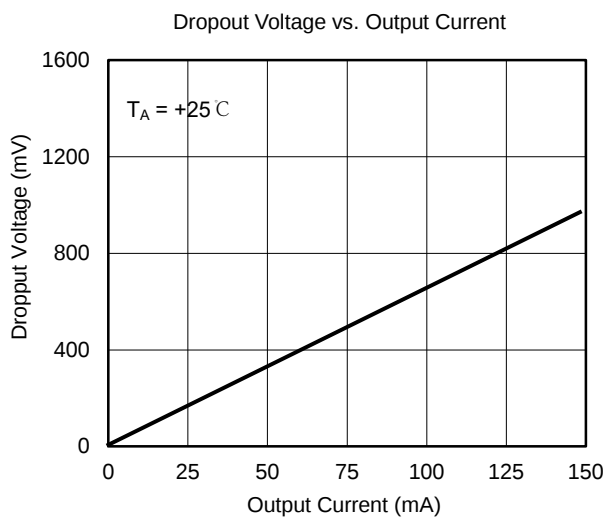
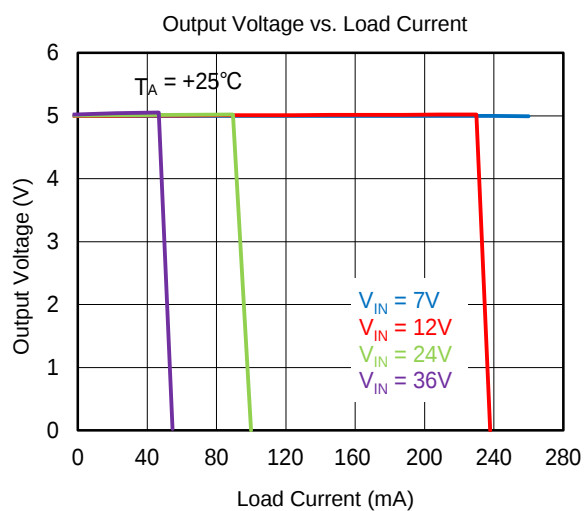
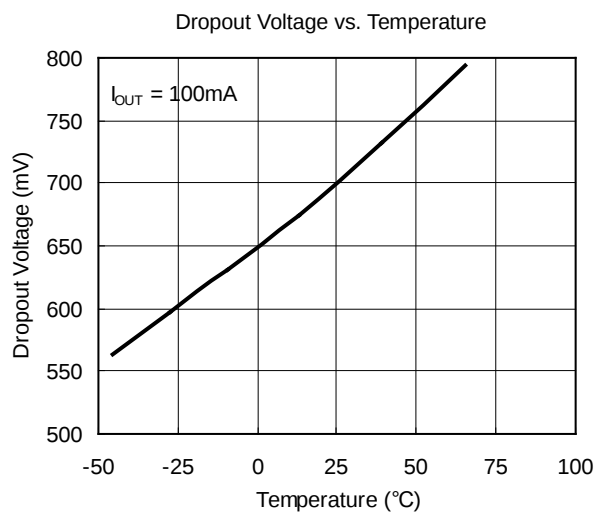
### ■ TYPICAL APPLICATION CIRCUIT



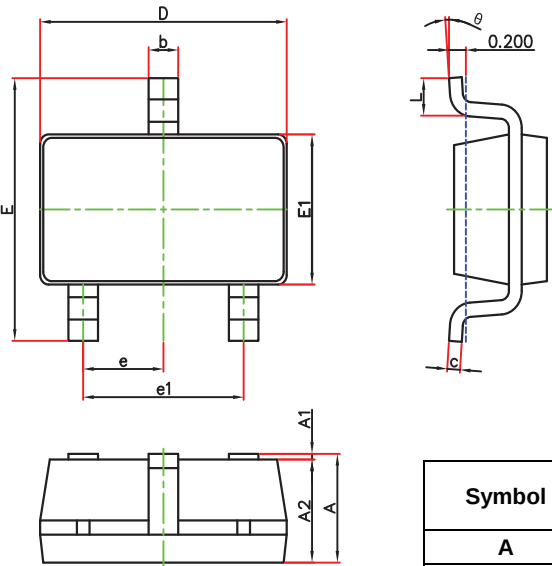
## Typical Characteristics



## Typical Characteristics

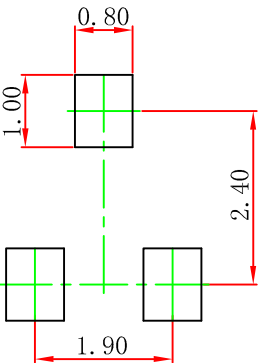


# SOT-23-3L Package Outline Dimensions



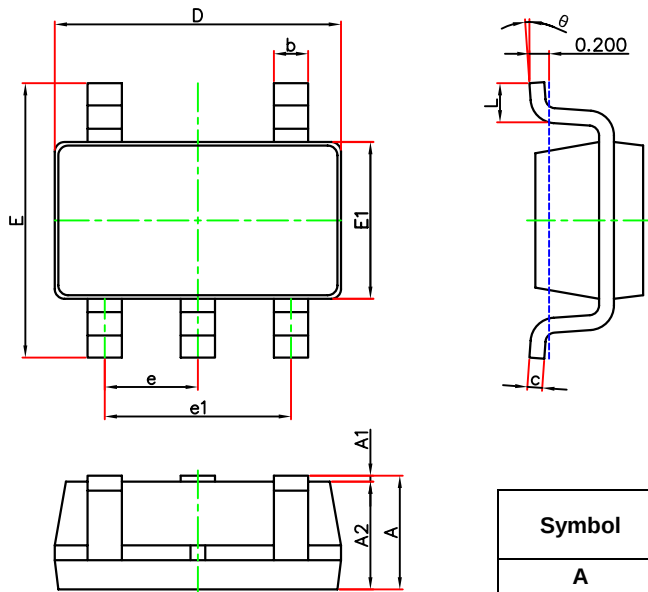
| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 1.050                     | 1.250 | 0.041                | 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      | 2.650                     | 2.950 | 0.104                | 0.116 |
| E1     | 1.500                     | 1.700 | 0.059                | 0.067 |
| e      | 0.950(BSC)                |       | 0.037(BSC)           |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.300                     | 0.600 | 0.012                | 0.024 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

# SOT-23-3L Suggested Pad Layout



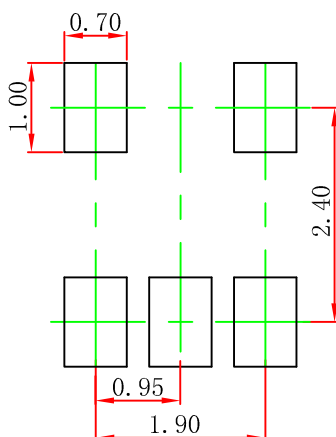
- Note:
- 1.Controlling dimemsion"in"milimeters.
  - 2.General tolerance: ±0.05mm.
  - 3.The pad layout is for reference purpose only.

## SOT-23-5L Package Outline Dimensions



| 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        | 2.650                     | 2.950 | 0.104                | 0.116 |
| E1       | 1.500                     | 1.700 | 0.059                | 0.067 |
| e        | 0.950(BSC)                |       | 0.037(BSC)           |       |
| e1       | 1.800                     | 2.000 | 0.071                | 0.079 |
| L        | 0.300                     | 0.600 | 0.012                | 0.024 |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |

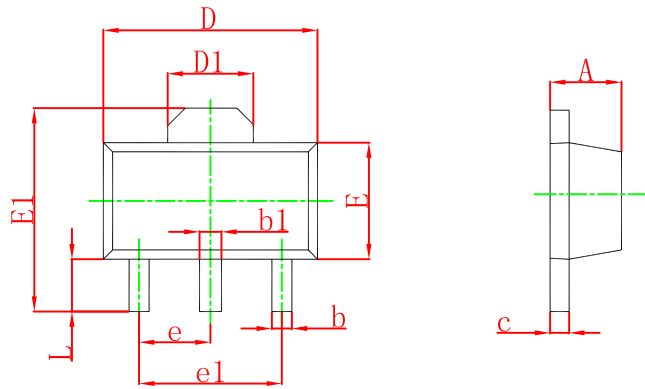
## SOT-23-5L Suggested Pad Layout



Note:

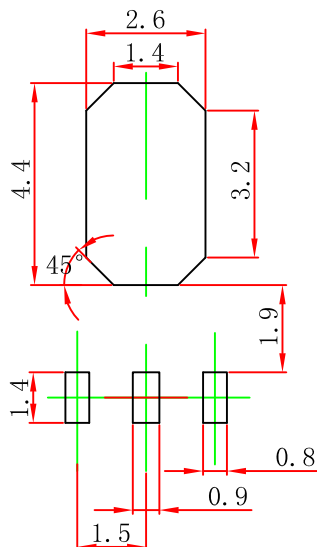
1. Controlling dimension "in" millimeters.
2. General tolerance:  $\pm 0.05$  mm.
3. The pad layout is for reference purpose only.

## SOT-89-3L Package Outline Dimensions



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 1.400                     | 1.600 | 0.055                | 0.063 |
| b      | 0.320                     | 0.520 | 0.013                | 0.197 |
| b1     | 0.400                     | 0.580 | 0.016                | 0.023 |
| c      | 0.350                     | 0.440 | 0.014                | 0.017 |
| D      | 4.400                     | 4.600 | 0.173                | 0.181 |
| D1     | 1.550 REF                 |       | 0.061 REF            |       |
| E      | 2.300                     | 2.600 | 0.091                | 0.102 |
| E1     | 3.940                     | 4.250 | 0.155                | 0.167 |
| e      | 1.500 TYP                 |       | 0.060 TYP            |       |
| e1     | 3.000 TYP                 |       | 0.118 TYP            |       |
| L      | 0.900                     | 1.200 | 0.035                | 0.047 |

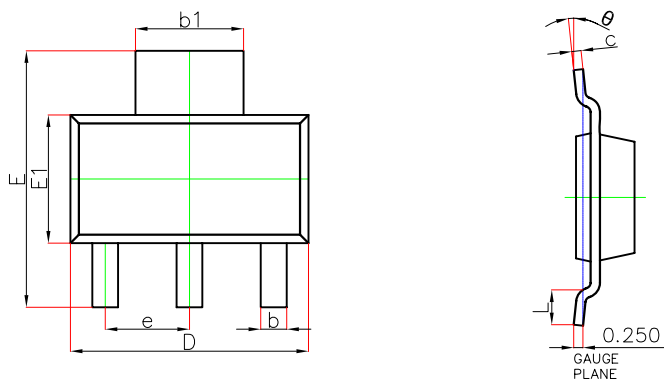
## SOT-89-3L Suggested Pad Layout



Note:

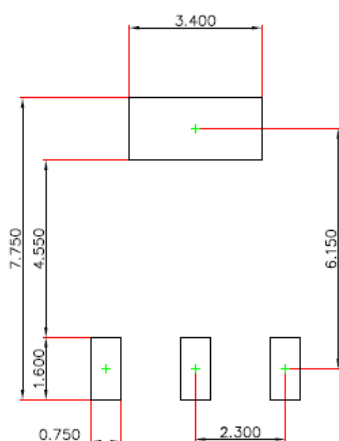
1. Controlling dimension in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purpose only.

## SOT-223 Package Outline Dimensions



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | —                         | 1.800 | —                    | 0.071 |
| A1     | 0.020                     | 0.100 | 0.001                | 0.004 |
| A2     | 1.500                     | 1.700 | 0.059                | 0.067 |
| b      | 0.660                     | 0.840 | 0.026                | 0.033 |
| b1     | 2.900                     | 3.100 | 0.114                | 0.122 |
| c      | 0.230                     | 0.350 | 0.009                | 0.014 |
| D      | 6.300                     | 6.700 | 0.248                | 0.264 |
| E      | 6.700                     | 7.300 | 0.264                | 0.287 |
| E1     | 3.300                     | 3.700 | 0.130                | 0.146 |
| e      | 2.300(BSC)                |       | 0.091(BSC)           |       |
| L      | 0.750                     | —     | 0.030                | —     |
| θ      | 0°                        | 10°   | 0°                   | 10°   |

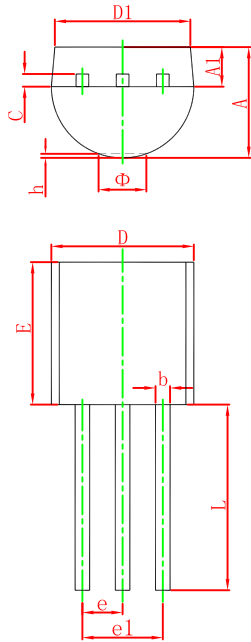
## SOT-223 Suggested Pad Layout



Note:

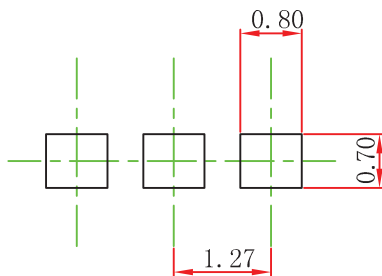
1. Controlling dimension in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purpose only.

## TO-92 Package Outline Dimensions



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 3.300                     | 3.700  | 0.130                | 0.146 |
| A1     | 1.100                     | 1.400  | 0.043                | 0.055 |
| b      | 0.380                     | 0.550  | 0.015                | 0.022 |
| c      | 0.360                     | 0.510  | 0.014                | 0.020 |
| D      | 4.400                     | 4.700  | 0.173                | 0.185 |
| D1     | 3.430                     |        | 0.135                |       |
| E      | 4.300                     | 1.400  | 0.169                | 0.185 |
| e      | 1.270 TYP                 |        | 0.050 TYP            |       |
| e1     | 2.440                     | 2.640  | 0.096                | 0.104 |
| L      | 14.100                    | 14.500 | 0.555                | 0.571 |
| Φ      |                           | 1.600  |                      | 0.063 |
| h      | 0.000                     | 0.380  | 0.000                | 0.015 |

## TO-92 Suggested Pad Layout



Note:

1. Controlling dimension in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purpose only.

# DISCLAIMER

## IMPORTANT NOTICE, PLEASE READ CAREFULLY

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Any person who purchases or uses JSCJ products for design shall: 1. Select products suitable for circuit application and design; 2. Design, verify and test the rationality of circuit design; 3. Procedures to ensure that the design complies with relevant laws and regulations and the requirements of such laws and regulations. JSCJ makes no warranty or representation as to the accuracy or completeness of the information contained in this data sheet and assumes no responsibility for the application or use of any of the products described in this data sheet.

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