

## Current1A High Voltage40V Low Power LDO

### SSP7903

#### General Description

The SSP7903 series is a group of positive voltage output, three-pin regulators, that provide a high current even when the input/output voltage differential is small. Low power consumption and high accuracy is achieved through CMOS and laser trimming technologies.

The SSP7903 consists of a high-precision voltage reference, an error amplification circuit, and a current limited output driver. Transient response to load variations have improved in comparison to the existing series.



#### Features

- Low Quiescent Current: 1.6 $\mu$ A
- Temperature Stability:  $\pm 50$ ppm/ $^{\circ}$ C
- High input voltage: 40V
- Output voltage accuracy: tolerance  $\pm 2\%$
- Low temperature coefficient
- Dropout Voltage: 20mV@IOUT=10mA
- Large Output Current: 1A
- Packages: SOT89-3L, SOT223 and TO252

#### Applications

- Industrial control
- Smart meters, instruments and meters
- Battery supply set
- Wireless communication equipment
- Automotive electronics

**Order information**

| Product model | Package  | Manner of packing | Minimum packing quantity |
|---------------|----------|-------------------|--------------------------|
| SSP7903Pxxxx  | SOT89-3L | reel              | 1000                     |
|               | SOT223   |                   | 2500                     |
|               | TO252    | Tube              | 2500                     |

**Selection Guide Table**

SSP7903P①②③④

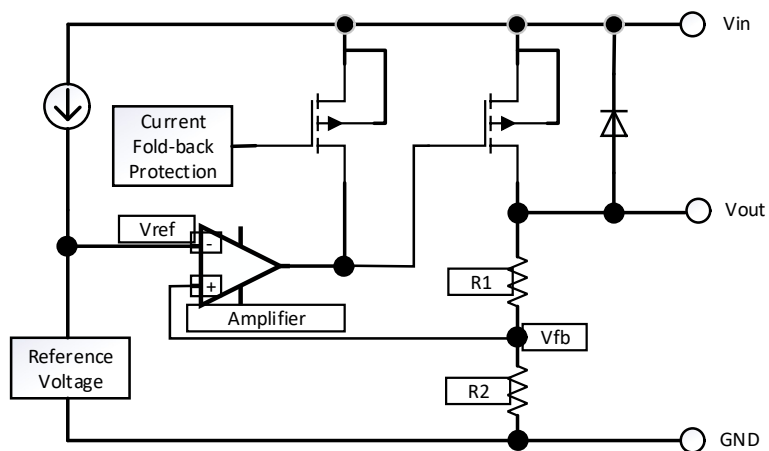
| Designator | Symbol  | Description                |
|------------|---------|----------------------------|
| ① ②        | Integer | Output Voltage(3.0V~12.0V) |
| ③          | P       | Package:SOT89-3L           |
|            | F       | Package:SOT223             |
|            | J       | Package: TO252             |
| ④          | R       | RoHS / Pb Free             |
|            | G       | Halogen Free               |

Note: "① ②" stands for output voltages. Other voltages can be specially customized.

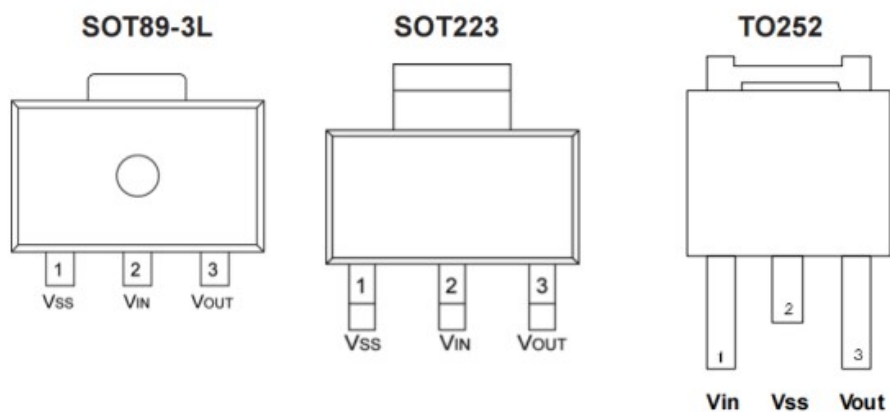
| Part No.     | Output Voltage | Package  | Marking |
|--------------|----------------|----------|---------|
| SSP7903P30PR | 3.0V           | SOT89-3L | XXXX    |
| SSP7903P33PR | 3.3V           | SOT89-3L | XXXX    |
| SSP7903P36PR | 3.6V           | SOT89-3L | XXXX    |
| SSP7903P40PR | 4.0V           | SOT89-3L | XXXX    |
| SSP7903P50PR | 5.0V           | SOT89-3L | XXXX    |
| SSP7903P12PR | 12.0V          | SOT89-3L | XXXX    |
| SSP7903P30FR | 3.0V           | SOT223   | XXXX    |
| SSP7903P33FR | 3.3V           | SOT223   | XXXX    |
| SSP7903P36FR | 3.6V           | SOT223   | XXXX    |
| SSP7903P40FR | 4.0V           | SOT223   | XXXX    |

|              |       |        |      |
|--------------|-------|--------|------|
| SSP7903P50FR | 5.0V  | SOT223 | XXXX |
| SSP7903P12FR | 12.0V | SOT223 | XXXX |
| SSP7903P30JR | 3.0V  | TO252  | XXXX |
| SSP7903P33JR | 3.3V  | TO252  | XXXX |
| SSP7903P36JR | 3.6V  | TO252  | XXXX |
| SSP7903P40JR | 4.0V  | TO252  | XXXX |
| SSP7903P50JR | 5.0V  | TO252  | XXXX |
| SSP7903P12JR | 12.0V | TO252  | XXXX |

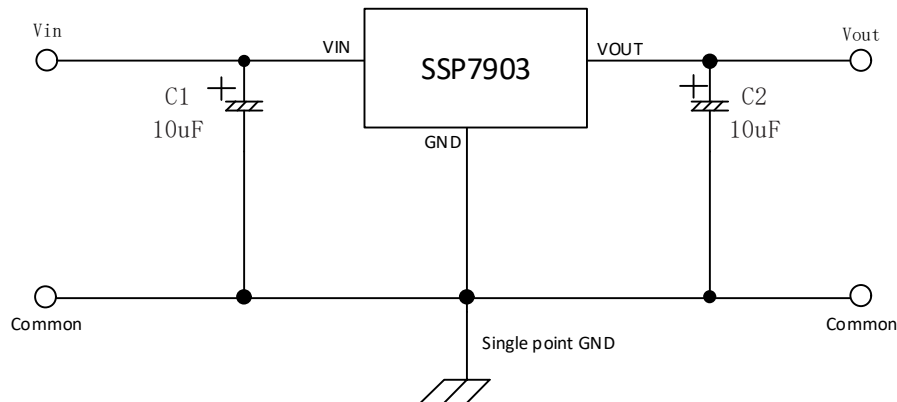
### Functional Block Diagram



### Pin Assignment (TOP VIEW)



## Application Circuits



## Absolute Maximum Ratings

(Unless otherwise indicated:  $T_a=25^{\circ}\text{C}$ )

| PARAMETER                     | SYMBOL    | MIN          | MAX  | UNITS              |
|-------------------------------|-----------|--------------|--|--------------------|
| Input Voltage                 | $V_{IN}$  | -0.3         | 40   | V                  |
| Output Voltage                | $V_{OUT}$ | $V_{SS}-0.3$ | $V_{IN}+0.3V$                              |                    |
| Power Dissipation             | $P_D$ (1) |              | SOT 89 1000<br>TO 252 1800<br>SOT 223 1500 | mW                 |
| Operating Ambient Temperature | $T_{opr}$ | -40          | 85   | $^{\circ}\text{C}$ |
| Storage Temperature           | $T_{stg}$ | -40          | 125  |                    |
| ESD Protection                | ESD HBM   |              | 2000                                       | V                  |

Note: These are just the limit parameters. Beyond the range specified in the Absolute Maximum Ratings may cause serious damage to the equipment. Long exposure to extreme conditions may affect the reliability of the device.

(1) Increasing the welding area of package is beneficial to increase power consumption

**Electrical Characteristics**

 SSP7903 Series (Unless otherwise indicated:  $T_a=25^{\circ}\text{C}$ )

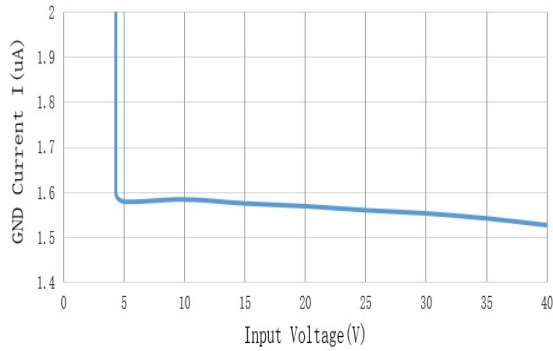
| PARAMETER                    | SYMBOL  | CONDITIONS  | MIN                            | TYP          | MAX                      | UNIT                    |               |
|------------------------------|---|---|--------------------------------|--------------|--------------------------|-------------------------|---------------|
| Output Voltage <sup>1</sup>  | $V_{OUT(S)}$  | $V_{IN}=V_{OUT(S)}+2V, I_{OUT}=10\text{mA}$   | $V_{OUT(S)} \times 0.98$       | $V_{OUT(S)}$ | $V_{OUT(S)} \times 1.02$ | V                       |               |
| Dropout Voltage <sup>2</sup> | $V_{DROP}$  | $I_{OUT}=1\text{mA}$  |                                | 4            | 8                        | mV                      |               |
|                              |   | $I_{OUT}=1\text{A}$   |                                | 1000         | 1500                     |                         |               |
| Line Regulation              | $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | $V_{OUT(S)}+2V \leq V_{IN} \leq 40V$<br>$I_{OUT}=1\text{mA}$  |                                | 0.01         | 0.02                     | %/V                     |               |
| Load Regulation              | $\Delta V_{OUT2}$                                     | $V_{IN}=V_{OUT(S)}+2V$   $V_{OUT(S)} \leq 10V$  |                                | 20           | 80                       | mV                      |               |
|                              |   | $1\text{mA} \leq I_{OUT} \leq 300\text{mA}$   $V_{OUT(S)} > 10V$                                      |                                | 85           | 150                      |                         |               |
| Temperature Stability        | $\frac{\Delta V_{OUT}}{\Delta T_a}$                   | $V_{IN}=V_{OUT(S)}+2V, I_{OUT}=10\text{mA}$<br>$-40^{\circ}\text{C} \leq T_a \leq 85^{\circ}\text{C}$ |                                | $\pm 50$     |                          | ppm/ $^{\circ}\text{C}$ |               |
| GND Current                  | $I_{GND}$   | no load   | $V_{OUT(S)} < 3.0V$            | 0.8          | 1.2                      | 2                       | $\mu\text{A}$ |
|                              |   |   | $3.0 \leq V_{OUT(S)} \leq 40V$ | 1            | 1.6                      | 3                       |               |
|                              |   | $I_{OUT}=100\text{mA}$  |                                | 370          |                          |                         |               |
| Input Voltage                | $V_{IN}$  | ---   | 2.2                            |              | 40                       | V                       |               |
| Maximum Output Current       | $I_{OUTMAX}$  |   |                                |              | 1                        | A                       |               |
| Current Limit <sup>3</sup>   | $I_{LIM}$   | $V_{IN}=V_{OUT(S)}+2V,$<br>$V_{OUT}=0.9 \times V_{OUT(S)}$  |                                | 1.8          |                          | A                       |               |
| Short Circuit Current        | $I_{SHORT}$   | $V_{IN}=V_{OUT(S)}+2V, V_{OUT}=0V$  |                                | 120          |                          | mA                      |               |
| Power Supply Rejection Ratio | PSRR  | $f=10\text{Hz}, V_{OUT(S)}=3.6V$  |                                | 73.2         |                          | dB                      |               |
|                              |   | $f=100\text{Hz}, V_{OUT(S)}=3.6V$   |                                | 72.2         |                          |                         |               |
|                              |   | $f=1\text{kHz}, V_{OUT(S)}=3.6V$  |                                | 54.5         |                          |                         |               |
| Over Temperature Protection  | OTP   | $I_{OUT}=10\text{mA}$   |                                | 145          |                          | $^{\circ}\text{C}$      |               |

Notes:

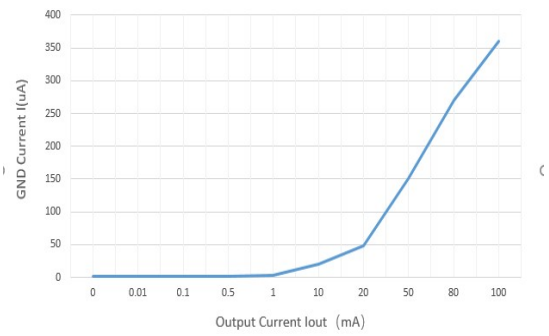
- $V_{OUT(S)}$ : Output voltage when  $V_{IN}=V_{out}+2V, I_{out}=1\text{mA}$ .
- $V_{DROP}=V_{in1} - (V_{out(S)} \times 0.98)$  where  $V_{in1}$  is the input voltage when  $V_{out} = V_{out(S)} \times 0.98$ .
- $I_{LIM}$ : Output current when  $V_{in}=V_{out(S)}+2V$  and  $V_{out} = 0.95 \times V_{out(S)}$ .

## Typical Performance Characteristics

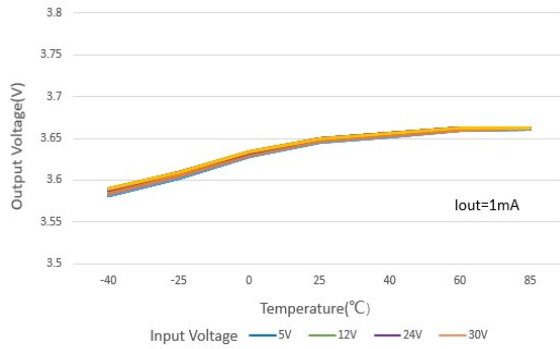
Test Conditions: SSP7903P36  $C_{IN}=4.7\mu F$ ,  $C_{OUT}=4.7\mu F$ , unless otherwise indicated.



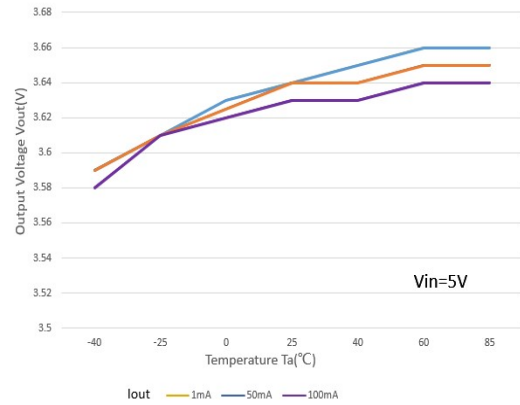
GND Current vs Input Voltage  
SSP7903P36



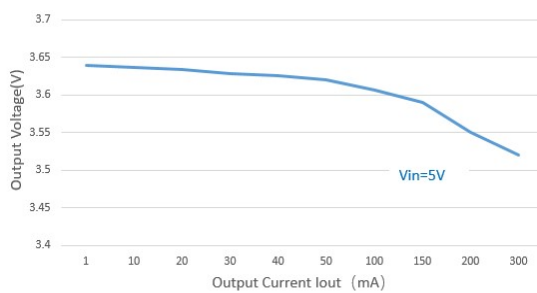
GND Current vs Output Current  
SSP7903P36



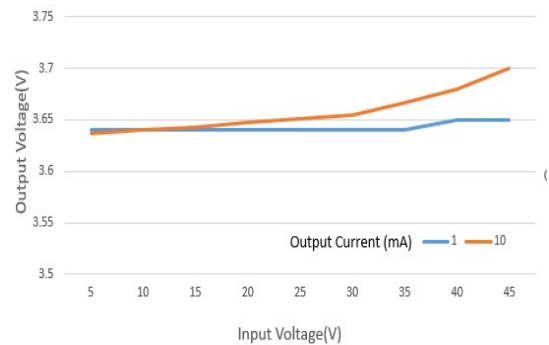
V<sub>OUT</sub> vs Temperature  
SSP7903P36



V<sub>OUT</sub> vs Temperature  
SSP7903P36



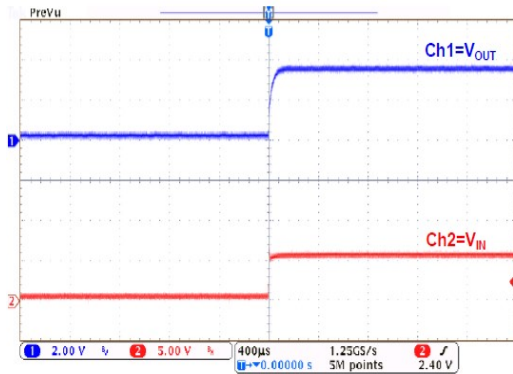
V<sub>OUT</sub> vs Current out  
SSP7903P36



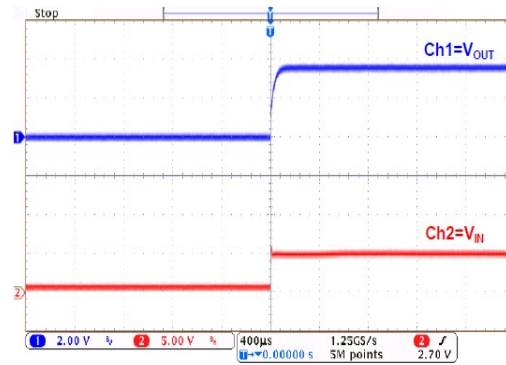
V<sub>OUT</sub> vs Input Voltage  
SSP7903P36

## Typical Performance Characteristics

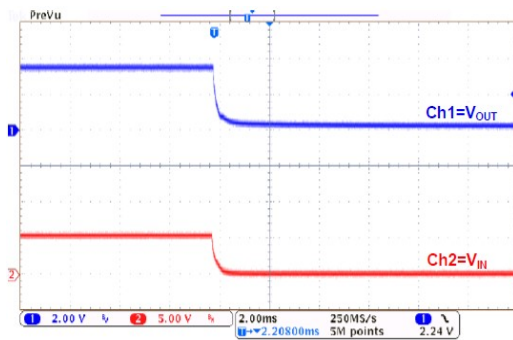
Test Conditions:  $V_{IN}=V_{OUT}+2.0V$ ,  $C_{IN}=2.2\mu F$ ,  $C_{OUT}=2.2\mu F$ , unless otherwise indicated.



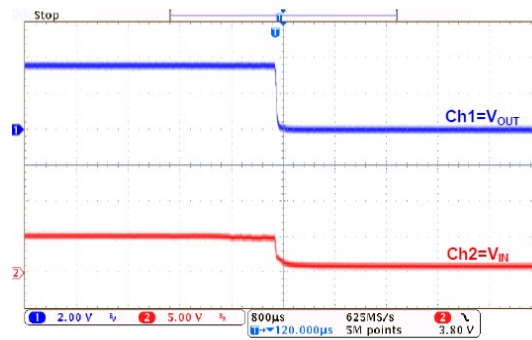
Power-Up at  $V_{OUT}=3.6V$  SSP7903P36  
( $I_{OUT}=0mA$ )



Power-Up at  $V_{OUT}=3.6V$  SSP7903P36  
( $I_{OUT}=1A$ )



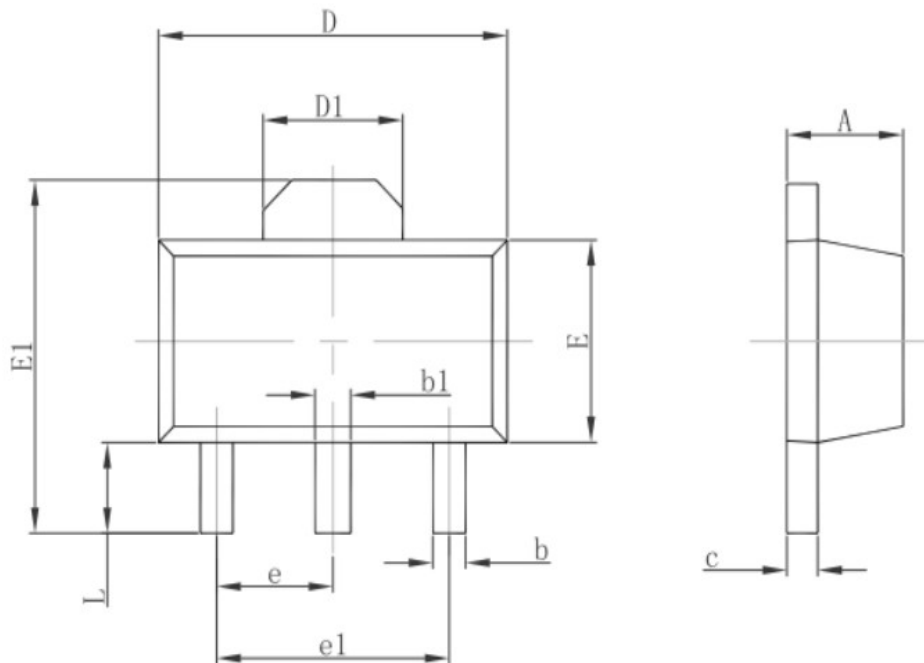
Power- Down at  $V_{OUT}=3.6V$  SSP7903P36  
( $I_{OUT}=0mA$ )



Power- Down at  $V_{OUT}=3.6V$  SSP7903P36  
( $I_{OUT}=1A$ )

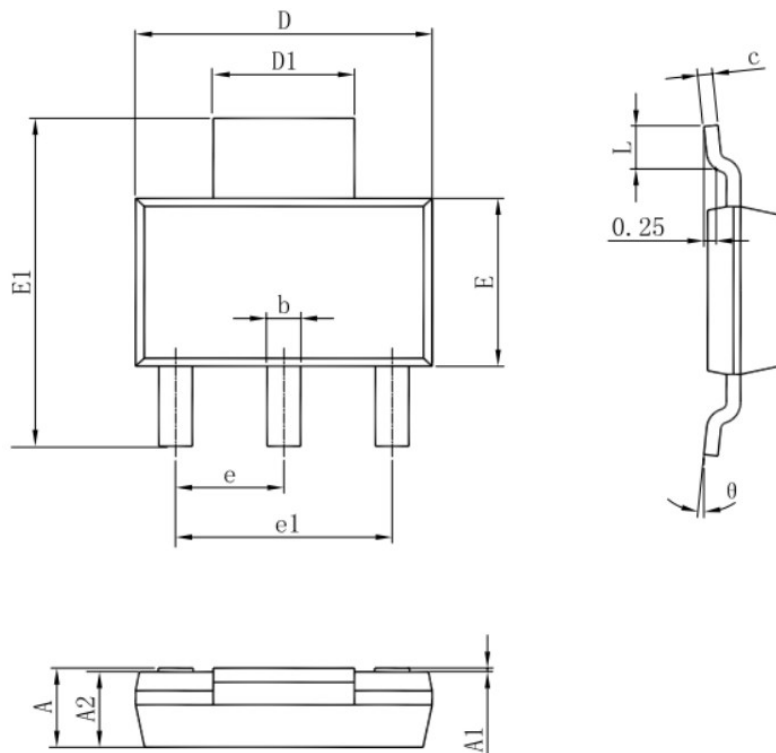
## Package Information

### SOT89-3L Package Outline Dimensions

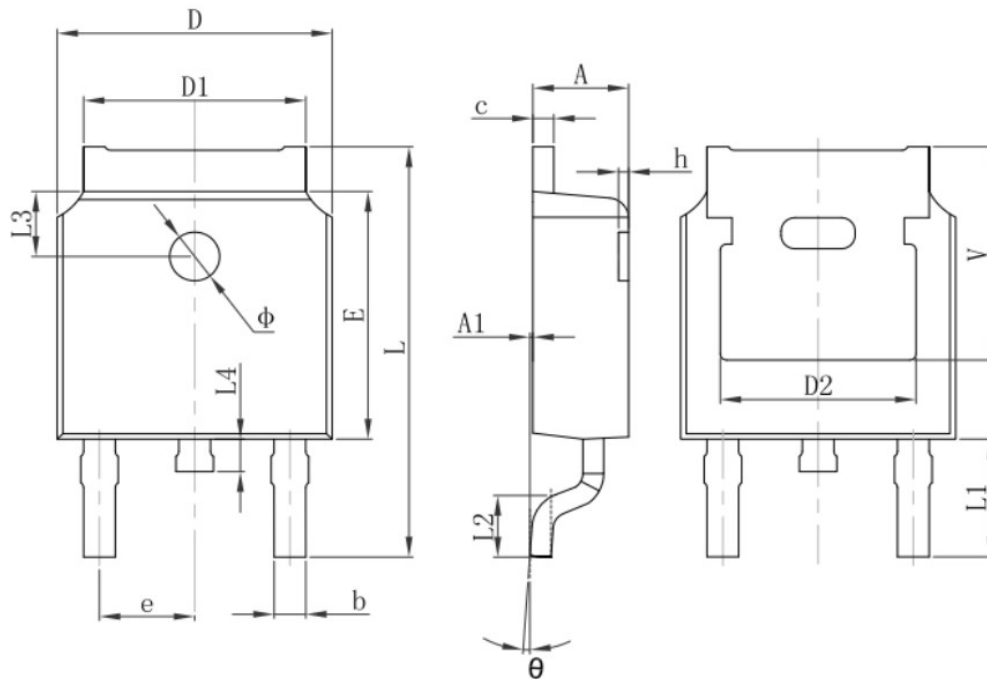


| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.400                     | 1.600 | 0.055                | 0.063 |
| b      | 0.320                     | 0.520 | 0.013                | 0.020 |
| 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 |



**SOT223 Package Outline Dimensions**


| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.520                     | 1.800 | 0.060                | 0.071 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 1.500                     | 1.700 | 0.059                | 0.067 |
| b      | 0.660                     | 0.820 | 0.026                | 0.032 |
| c      | 0.250                     | 0.350 | 0.010                | 0.014 |
| D      | 6.200                     | 6.400 | 0.244                | 0.252 |
| D1     | 2.900                     | 3.100 | 0.114                | 0.122 |
| E      | 3.300                     | 3.700 | 0.130                | 0.146 |
| E1     | 6.830                     | 7.070 | 0.269                | 0.278 |
| e      | 2.300(BSC)                |       | 0.091(BSC)           |       |
| e1     | 4.500                     | 4.700 | 0.177                | 0.185 |
| L      | 0.900                     | 1.150 | 0.035                | 0.045 |
| θ      | 0°                        | 10°   | 0°                   | 10°   |

**TO252 Package Outline Dimensions**


| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min                       | Max    | Min                  | Max   |
| A      | 2.200                     | 2.400  | 0.087                | 0.094 |
| A1     | 0.000                     | 0.127  | 0.000                | 0.005 |
| b      | 0.660                     | 0.860  | 0.026                | 0.034 |
| c      | 0.460                     | 0.580  | 0.018                | 0.023 |
| D      | 6.500                     | 6.700  | 0.256                | 0.264 |
| D1     | 5.100                     | 5.460  | 0.201                | 0.215 |
| D2     | 4.830 REF                 |        | 0.190 REF            |       |
| E      | 6.000                     | 6.200  | 0.236                | 0.244 |
| e      | 2.186                     | 2.386  | 0.086                | 0.094 |
| L      | 9.800                     | 10.400 | 0.386                | 0.409 |
| L1     | 2.900 REF                 |        | 0.114 REF            |       |
| L2     | 1.400                     | 1.700  | 0.055                | 0.067 |
| L3     | 1.600 REF                 |        | 0.063 REF            |       |
| L4     | 0.600                     | 1.000  | 0.024                | 0.039 |
| Φ      | 1.100                     | 1.300  | 0.043                | 0.051 |
| θ      | 0°                        | 8°     | 0°                   | 8°    |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |
| V      | 5.350 REF                 |        | 0.211 REF            |       |

## Special Version

The company reserves the right of final interpretation of this specification.

## Version Change Description

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Versions: V1.2

Writer: Si Yuan Wu

Time: 2021.10.29