

250mA, 30V Vin, Output overshoot control LDO_ME6239

General Description

ME6239 series are low-dropout linear voltage regulators with a built-in voltage reference module, error amplifier module and feedback resistance network. ME6239 can deliver 250mA output current and allow an input voltage as high as 30V. This series has the function of internal feedback resistor setting from 1.5V to 12V.

Features

- High output accuracy: $\pm 1\%$
- Output voltage overshoot control
- Input voltage: up to 30 V
- Output voltage: 1.5V ~ 12V
- Ultra-low quiescent current (Typ.= 1.5 μ A)
- Output Current: $I_{OUT} = 250\text{mA}$
(When $V_{IN} = 6.5\text{V}$ and $V_{OUT} = 5.0\text{V}$)
- Short-circuit Current: (Typ.= 42mA)
- Low temperature coefficient
- Ceramic capacitor can be used

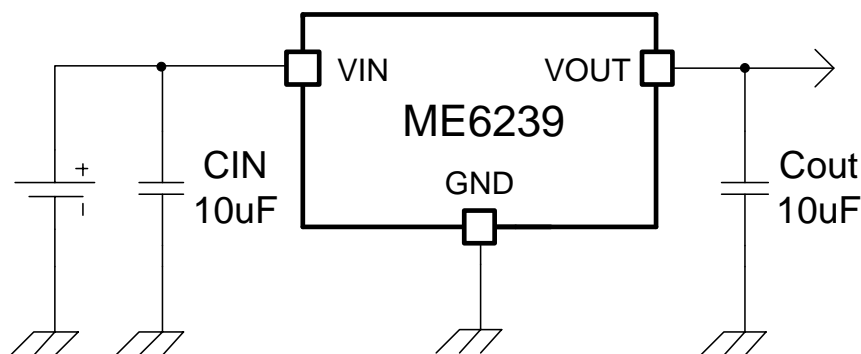
Typical Application

- Electronic weighbridge
- Water meters, power meters
- Plaything
- Phones, cordless phones

Package

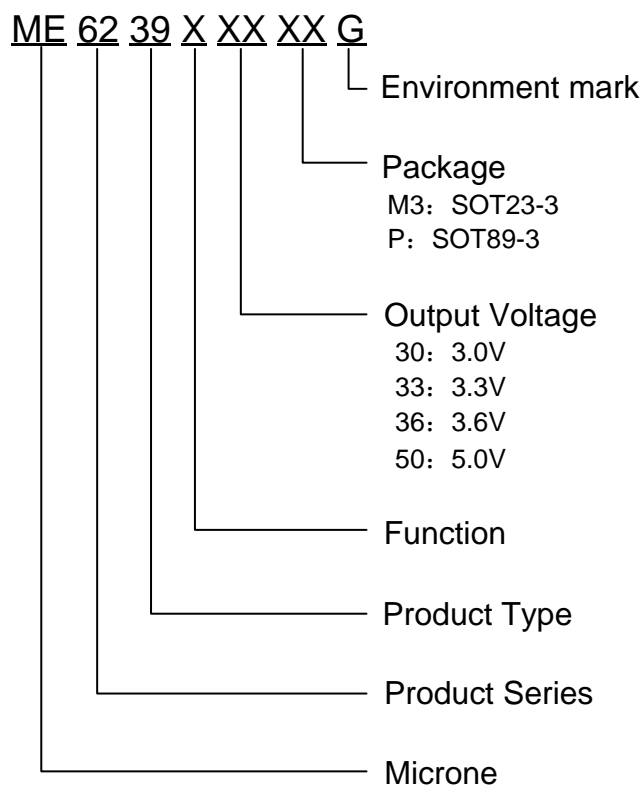
- 3-pin SOT23-3、SOT89-3

Typical Application Circuit



Suggesting: The circuit uses the electrolytic capacitors or tantalum capacitors in the best ,When V_{IN} is higher than 15V.

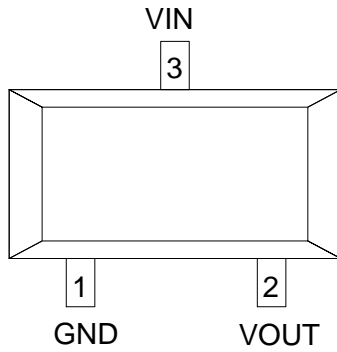
Selection Guide



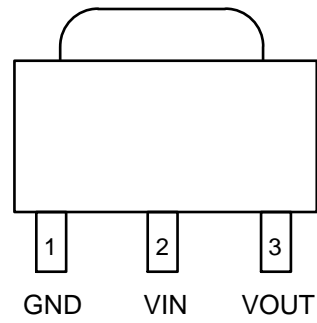
| product series | product description |
|----------------|--|
| ME6239A50M3G | V _{OUT} =5.0V; Package: SOT23-3 |
| ME6239A50PG | V _{OUT} =5.0V; Package: SOT89-3 |
| ME6239A36M3G | V _{OUT} =3.6V; Package: SOT23-3 |
| ME6239A36PG | V _{OUT} =3.6V; Package: SOT89-3 |
| ME6239A33M3G | V _{OUT} =3.3V; Package: SOT23-3 |
| ME6239A33PG | V _{OUT} =3.3V; Package: SOT89-3 |
| ME6239A30M3G | V _{OUT} =3.0V; Package: SOT23-3 |
| ME6239A30PG | V _{OUT} =3.0V; Package: SOT89-3 |

NOTE: If you need other voltage and package, please contact our sales staff.

Pin Configuration



SOT23-3

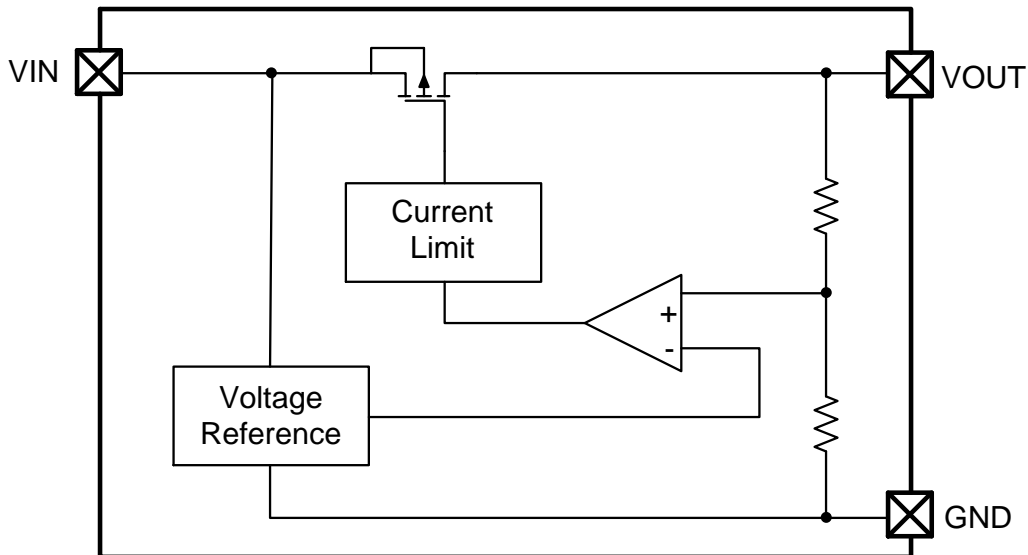


SOT89-3

Pin Assignment

| Pin Number | | Pin Name | Functions |
|------------|---------|----------|-------------|
| SOT89-3 | SOT23-3 | | |
| 1 | 1 | GND | Ground |
| 2 | 3 | VIN | Power Input |
| 3 | 2 | VOUT | Output |

Block Diagram



Absolute Maximum Ratings

| Parameter | Symbol | Ratings | Units |
|---|-----------|-------------------------|-------|
| Input Voltage | V_{IN} | 30 | V |
| Output Current | I_{OUT} | 250 | mA |
| Output Voltage | V_{OUT} | $V_{SS}-0.3-V_{IN}+0.3$ | V |
| Internal Power Dissipation | SOT23-3 | 300 | mW |
| | SOT89-3 | 500 | |
| Thermal resistance (Junction to air) | SOT23-3 | 330 | °C/W |
| | SOT89-3 | 200 | |
| Operating Ambient Temperature | T_{OPR} | -40~+85 | °C |
| Storage Temperature Range | T_{STG} | -55~+150 | °C |
| Maximum Junction Temperature Range | T_J | -40~+150 | °C |
| Lead Temperature | | 260°C, 10sec | |

Electrical Characteristics

ME6239A30

($V_{IN}=V_{OUT}+1.5V$, $C_{IN}=C_L=10\mu F$, $T_a=25^{\circ}C$, unless otherwise noted)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Units |
|-------------------------|---|--|--------|--------------------------|--------|---------|
| Output Voltage | $V_{OUT}(E)$ (Note 2) | $I_{OUT}=10mA$ | X 0.99 | $V_{OUT}(T)$ (Note 1) | X 1.01 | V |
| Input Voltage | V_{IN} | | 3.0 | - | 30 | V |
| Maximum Output Current | I_{OUT_max} | $V_{IN}=V_{OUT}+1.5V$ | - | 250 | - | mA |
| Load Regulation | ΔV_{OUT} | $V_{IN}=V_{OUT}+1.5V$, $1mA \leq I_{OUT} \leq 200mA$ | - | 30 | 60 | mV |
| | | $I_{OUT}=50mA$ | - | 170 | - | mV |
| Dropout Voltage(Note 3) | V_{DIF} | $I_{OUT}=100mA$ | - | 340 | - | mV |
| | | | | | | |
| Supply Current | I_{SS} | $V_{IN}=V_{OUT}+1.0V$ | - | 1.5 | 2.5 | μA |
| Line Regulations | $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | $I_{OUT}=1mA$ $V_{OUT}+1.0V \leq V_{IN} \leq 30V$ | - | 0.06 | 0.1 | %/V |
| Short-circuit Current | I_{SHORT} | $V_{OUT}=0V$ | - | 42 | 80 | mA |
| Temperature Coefficient | $\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta T_a}$ | $I_{OUT}=10mA$ $-40^{\circ}C \leq T_a \leq 85^{\circ}C$ | - | 65 | - | ppm/°C |

ME6239A33

($V_{IN}=V_{OUT}+1.5V$, $C_{IN}=C_L=10\mu F$, $T_a=25^{\circ}C$, unless otherwise noted)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Units |
|------------------------|--------------------------|-----------------------|--------|--------------------------|--------|-------|
| Output Voltage | $V_{OUT}(E)$ (Note 2) | $I_{OUT}=10mA$ | X 0.99 | $V_{OUT}(T)$ (Note 1) | X 1.01 | V |
| Input Voltage | V_{IN} | | 3.3 | - | 30 | V |
| Maximum Output Current | I_{OUT_max} | $V_{IN}=V_{OUT}+1.5V$ | - | 250 | - | mA |

| | | | | | | |
|-------------------------|---|--|---|------|-----|------------------|
| Load Regulation | ΔV_{OUT} | $V_{IN} = V_{OUT} + 1.5V$, $1mA \leq I_{OUT} \leq 200mA$ | - | 30 | 60 | mV |
| Dropout Voltage(Note 3) | V_{DIF} | $I_{OUT} = 50mA$ | - | 170 | - | mV |
| | | $I_{OUT} = 100mA$ | - | 340 | - | mV |
| Supply Current | I_{SS} | $V_{IN} = V_{OUT} + 1.0V$ | - | 1.5 | 2.5 | μA |
| Line Regulations | $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | $I_{OUT} = 1mA$ $V_{OUT} + 1.0V \leq V_{IN} \leq 30V$ | - | 0.06 | 0.1 | %/V |
| Short-circuit Current | I_{SHORT} | $V_{OUT} = 0V$ | - | 42 | 80 | mA |
| Temperature Coefficient | $\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta Ta}$ | $I_{OUT} = 10mA$ $-40^{\circ}C \leq Ta \leq 85^{\circ}C$ | - | 65 | - | ppm/ $^{\circ}C$ |

ME6239A36

($V_{IN} = V_{OUT} + 1.5V$, $C_{IN} = C_L = 10\mu F$, $T_a = 25^{\circ}C$, unless otherwise noted)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Units |
|-------------------------|---|--|--------|--------------------------|--------|------------------|
| Output Voltage | $V_{OUT(E)}$ (Note 2) | $I_{OUT} = 10mA$ | X 0.99 | $V_{OUT(T)}$ (Note 1) | X 1.01 | V |
| Input Voltage | V_{IN} | | 3.6 | - | 30 | V |
| Maximum Output Current | I_{OUT_max} | $V_{IN} = V_{OUT} + 1.5V$ | - | 250 | - | mA |
| Load Regulation | ΔV_{OUT} | $V_{IN} = V_{OUT} + 1.5V$, $1mA \leq I_{OUT} \leq 200mA$ | - | 30 | 60 | mV |
| Dropout Voltage(Note 3) | V_{DIF} | $I_{OUT} = 50mA$ | - | 170 | - | mV |
| | | $I_{OUT} = 100mA$ | - | 340 | - | mV |
| Supply Current | I_{SS} | $V_{IN} = V_{OUT} + 1.0V$ | - | 1.5 | 2.5 | μA |
| Line Regulations | $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | $I_{OUT} = 1mA$ $V_{OUT} + 1.0V \leq V_{IN} \leq 30V$ | - | 0.06 | 0.1 | %/V |
| Short-circuit Current | I_{SHORT} | $V_{OUT} = 0V$ | - | 42 | 80 | mA |
| Temperature Coefficient | $\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta Ta}$ | $I_{OUT} = 10mA$ $-40^{\circ}C \leq Ta \leq 85^{\circ}C$ | - | 65 | - | ppm/ $^{\circ}C$ |

ME6239A50

($V_{IN} = V_{OUT} + 1.5V$, $C_{IN} = C_L = 10\mu F$, $T_a = 25^{\circ}C$, unless otherwise noted)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Units |
|-------------------------|--------------------------|--|--------|--------------------------|--------|-------|
| Output Voltage | $V_{OUT(E)}$ (Note 2) | $I_{OUT} = 10mA$ | X 0.99 | $V_{OUT(T)}$ (Note 1) | X 1.01 | V |
| Input Voltage | V_{IN} | | 5.0 | - | 30 | V |
| Maximum Output Current | I_{OUT_max} | $V_{IN} = V_{OUT} + 1.5V$ | - | 250 | - | mA |
| Load Regulation | ΔV_{OUT} | $V_{IN} = V_{OUT} + 1.5V$, $1mA \leq I_{OUT} \leq 200mA$ | - | 30 | 60 | mV |
| Dropout Voltage(Note 3) | V_{DIF} | $I_{OUT} = 50mA$ | - | 190 | - | mV |
| | | $I_{OUT} = 100mA$ | - | 380 | - | mV |

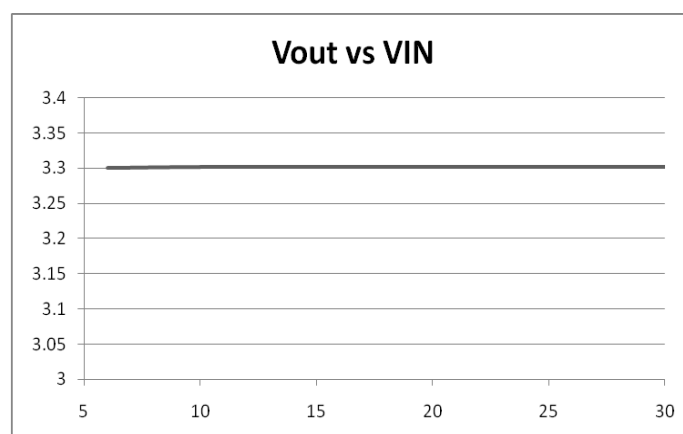
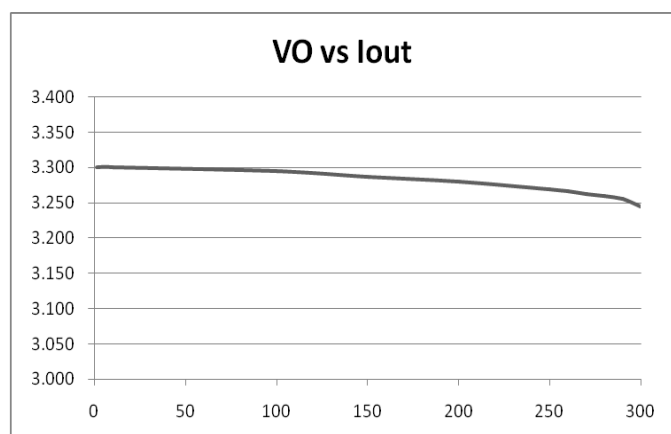
| | | | | | | |
|-------------------------|---|---|---|------|-----|------------------|
| Supply Current | I_{SS} | $V_{IN} = V_{OUT} + 1.0V$ | - | 1.5 | 2.5 | μA |
| Line Regulations | $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | $I_{OUT} = 1mA$ $V_{OUT} + 1.0V \leq V_{IN} \leq 30V$ | - | 0.06 | 0.1 | %/V |
| Short-circuit Current | I_{SHORT} | $V_{OUT} = 0V$ | - | 42 | 80 | mA |
| Temperature Coefficient | $\frac{\Delta V_{OUT}}{V_{OUT} \times \Delta Ta}$ | $I_{OUT} = 10mA$ $-40^{\circ}C \leq Ta \leq 85^{\circ}C$ | - | 65 | - | ppm/ $^{\circ}C$ |

Note :

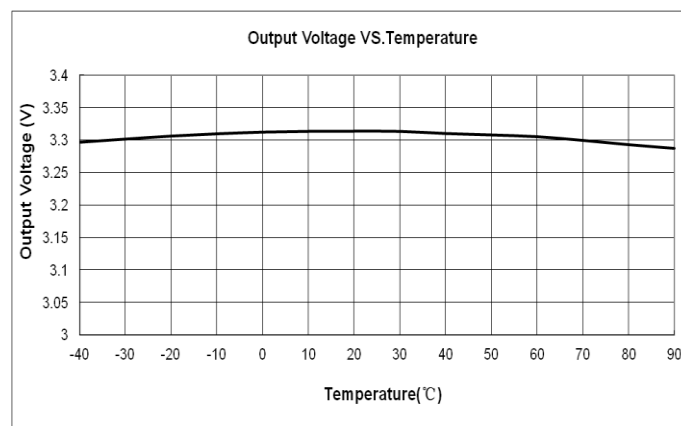
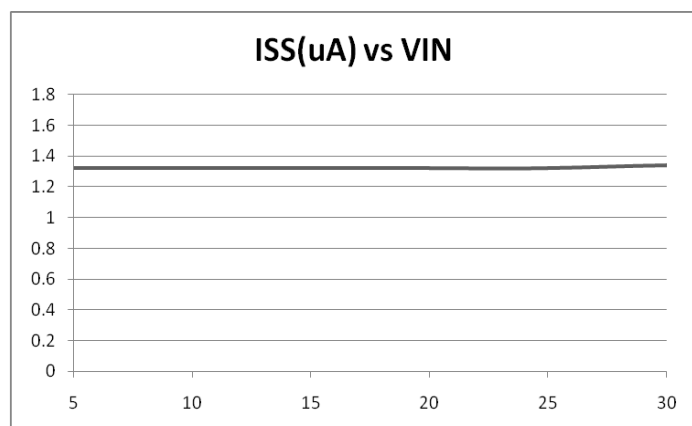
1. $V_{OUT}(T)$: Specified Output Voltage
2. $V_{OUT}(E)$: Effective Output Voltage (ie. The output voltage when " $V_{OUT}(T) + 2.0V$ " is provided at the V_{IN} pin while maintaining a certain I_{OUT} value.)
3. $V_{DIF} : V_{IN1} - V_{OUT}(E)$
 V_{IN1} : The input voltage when $V_{OUT}(E)$ appears as input voltage is gradually decreased.
 $V_{OUT}(E)$: A voltage equal to 98% of the output voltage whenever an amply stabilized I_{OUT} and $\{V_{OUT}(T) + 2.2V\}$ is input.

Type Characteristics

- (1) Output Voltage VS. Output Current ($T_a = 25^{\circ}C$) (2) Output Voltage VS. Input Voltage ($T_a = 25^{\circ}C$)
ME6239A33 ($V_{IN} = V_{OUT} + 1.5V$) **ME6228A33** ($I_{out} = 1mA$)



- (3) Quiescent Current VS. Input Voltage ($T_a = 25^{\circ}C$) (4) Output Voltage VS. Temperature
ME6228A33 **ME6239A33** ($I_{OUT} = 10mA$)



Applications Information

Input Capacitor and Output Capacitor

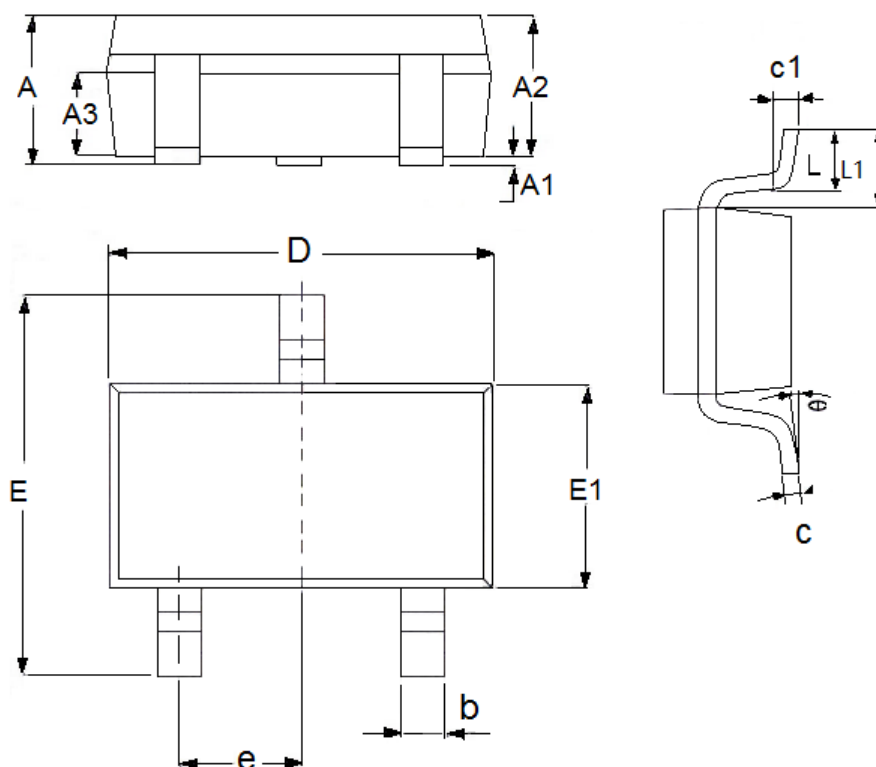
Ceramic capacitors are suitable for smaller volume applications because of its high capacitance and low cost. Its high ripple current, high voltage rating and low ESR make it more suitable for converter applications. The low output voltage ripple and small peripheral circuit size can be obtained by using ceramic capacitor. The X5R or X7R models are selected as output and input capacitors, which have better temperature and voltage characteristics.

When the VIN voltage is greater than 15V, if the input capacitor is ceramic capacitor, the high voltage spike generated at the VIN pin will exceed 40V, which may cause permanent damage to the chip. Therefore, we suggest that customers using electrolytic or tantalum capacitors with better power consumption in the application of VIN>15V, can effectively protect chips and improve system reliability.

When the VIN voltage is very fast, the internal circuit of the chip is too late to respond and the output voltage is prone to exceed the rated output voltage, that is, the output voltage overshoot., the overshoot of the output voltage is especially serious in the following: 1. VIN rising fast. 2. The output capacitance is small. 3. The output load is small. When the system has the output voltage overshoot, the customers can increase the output capacitance to alleviate this situation.

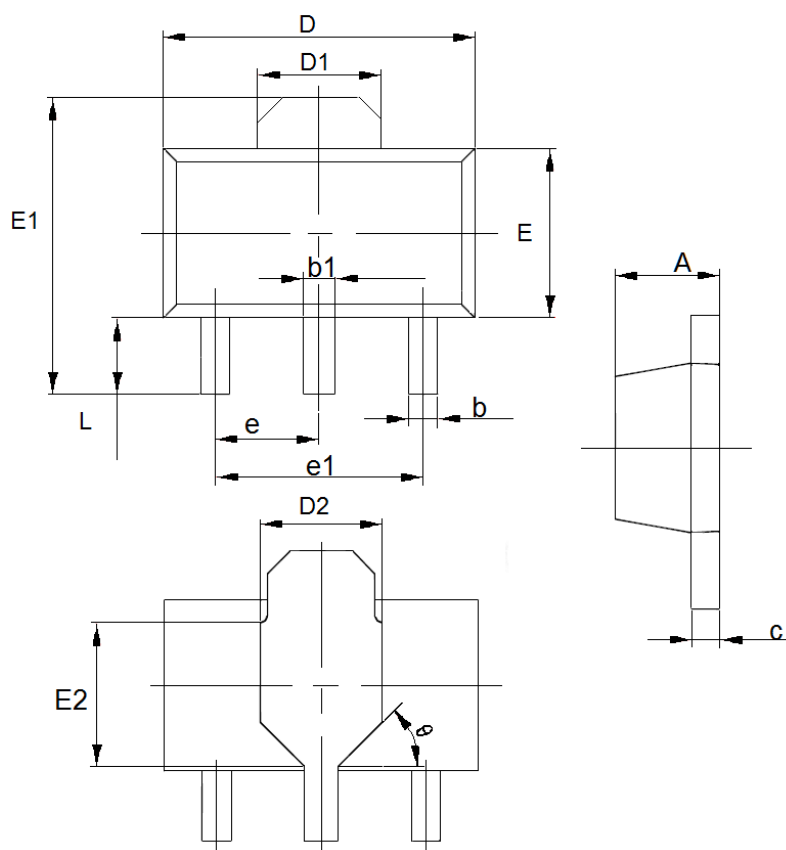
Packaging Information

- Packaging Type: SOT23-3



| DIM | Millimeters | | Inches | |
|-----|-------------|------|-------------|--------|
| | Min | Max | Min | Max |
| A | 1.05 | 1.45 | 0.0413 | 0.0571 |
| A1 | 0 | 0.15 | 0.0000 | 0.0059 |
| A2 | 0.9 | 1.3 | 0.0354 | 0.0512 |
| A3 | 0.6 | 0.7 | 0.0236 | 0.0276 |
| b | 0.25 | 0.5 | 0.0098 | 0.0197 |
| c | 0.1 | 0.25 | 0.0039 | 0.0098 |
| D | 2.8 | 3.1 | 0.1102 | 0.1220 |
| E | 2.6 | 3.1 | 0.1023 | 0.1220 |
| E1 | 1.5 | 1.8 | 0.0591 | 0.0709 |
| e | 0.95(TYP) | | 0.0374(TYP) | |
| L | 0.25 | 0.6 | 0.0098 | 0.0236 |
| L1 | 0.59(TYP) | | 0.0232(TYP) | |
| θ | 0 | 8° | 0.0000 | 8° |
| c1 | 0.2(TYP) | | 0.0079(TYP) | |

● Packaging Type: SOT89-3



| DIM | Millimeters | | Inches | |
|-----|-------------|------|-------------|--------|
| | Min | Max | Min | Max |
| A | 1.4 | 1.6 | 0.0551 | 0.0630 |
| b | 0.32 | 0.52 | 0.0126 | 0.0205 |
| b1 | 0.4 | 0.58 | 0.0157 | 0.0228 |
| c | 0.35 | 0.45 | 0.0138 | 0.0177 |
| D | 4.4 | 4.6 | 0.1732 | 0.1811 |
| D1 | 1.55(TYP) | | 0.061(TYP) | |
| D2 | 1.75(TYP) | | 0.0689(TYP) | |
| e1 | 3.0(TYP) | | 0.1181(TYP) | |
| E | 2.3 | 2.6 | 0.0906 | 0.1023 |
| E1 | 3.94 | 4.4 | 0.1551 | 0.1732 |
| E2 | 1.9(TYP) | | 0.0748(TYP) | |
| e | 1.5(TYP) | | 0.0591(TYP) | |
| L | 0.8 | 1.2 | 0.0315 | 0.0472 |
| θ | 45° | | 45° | |

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