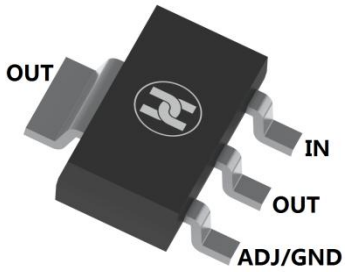
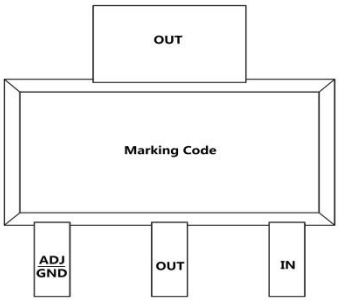
# LOW DROP LINEAR VOLTAGE REGULATORS

## FEATURES

- Low Dropout Voltage: 1.2V at 1A Output Current
- Three-Terminal Adjustable or Fixed :
  1.2V,1.5V,1.8V, 2.5V, 2.85V,3.0V,3.3V,3.6V,5V,ADJ
- Trimmed Current Limit
- On-Chip Thermal Shutdown
- Operation Junction Temperature: -25 ℃ to 125℃
- Surface Mount device




**SOT-223**



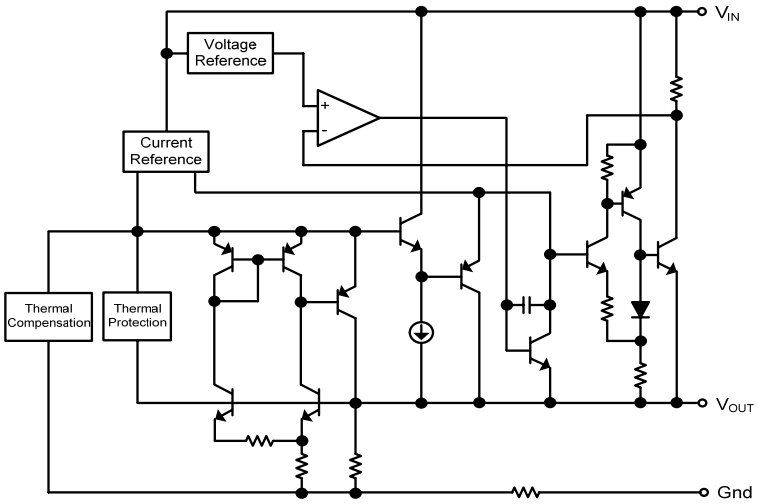

## APPLICATIONS

- PC Motherboard
- LCD Monitor
- Graphic Card
- DVD-Video Player
- NIC/Switch
- Telecom Modem
- ADSL Modem
- Printer and other peripheral Equipment

## MECHANICAL DATA

- Case: SOT-223
- Case Material: Molded Plastic. UL flammability
- Classification Rating: 94V-0
- Weight: 0.04 grams (approximate)

## SCHEMATIC DIAGRAM




## MARKING INFORMATION

| Marking | 1117-12 | 1117-15 | 1117-18 | 1117-25 | 1117-2J | 1117-30 | 1117-33 | 1117-36 | 1117-50 | 1117-ADJ |
|---|---|---|---|---|---|---|---|---|---|---|
| Vo Voltage | 1.2V | 1.5V | 1.8V | 2.5V | 2.85V | 3.0V | 3.3V | 3.6V | 5.0V | ADJ. |

**ABOSLUTE MAXIMUM RATINGS(Ta=25℃ unless otherwise noted)**

| Symbol | Parameter | Maximum | Units |
|---|---|---|---|
| $P_D$ | Power dissipation | Internally limited | W |
| $V_{IN}$ | Input voltage | 20 | V |
| $T_J$ | Operating junction temperature range | -40 to 125 | °C |
| $T_{STG}$ | Storage temperature | -65 to 150 | °C |
| $T_{LEAD}$ | Lead temperature (soldering, 10 sec) | 300 | °C |
| $V_{ESD}$ | Minimum ESD rating (HBM) | 3 | kV |

**DEVICE SELECTION GUIDE**

| Device | Output Voltage |
|---|---|
| 1117ADJ | Adj |
| 1117-1.2 | 1.2V |
| 1117-1.5 | 1.5V |
| 1117-1.8 | 1.8V |
| 1117-2.5 | 2.5V |
| 1117-2.85 | 2.85V |
| 1117-3.0 | 3.0V |
| 1117-3.3 | 3.3V |
| 1117-3.5 | 3.5V |
| 1117-5.0 | 5.0V |

Other fixed versions are available $V_{OUT}$ = 1.5V to 5.0V

## ELECTRICAL CHARACTERISTICS

The electrical characteristics at $I_{LOAD}$ = 0 mA and $T_J$ = +25°C, unless otherwise specified.

| Parameter | Device | Test Conditions | | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| Reference voltage, (Note 1) | 1117-ADJ | $V_{IN}$ = 5V, $I_{LOAD}$ = 10 mA | | 1.232 | 1.250 | 1.268 | V |
| | | 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V<br>$I_{LOAD}$ = 10 mA to 1A | * | 1.225 | 1.250 | 1.275 | |
| Output voltage (Note 1) | All fixed versions | $V_{IN}$ = $V_{OUT}$ +1.5V,<br>Varied from nominal $V_{OUT}$ | | -1.5 | | +1.5 | % |
| | | 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V,<br>$I_{LOAD}$= 0 mA to 1A, | | -3 | | +3 | |
| | $V_{OUT}$ =1.2V | Varied from nominal $V_{OUT}$ | | -3 | | +3 | |
| Accuracy of output voltage at wafer testing | All | $V_{IN}$ = $V_{OUT}$ +1.5V<br>$I_{LOAD}$ = 10 mA | | -0.2 | 0 | +0.2 | % |
| Line regulation | All | $I_{LOAD}$ = 10 mA, 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V | * | | 0.04 | 0.20 | % |
| Load regulation, (Note 1) | All | $V_{IN}$ = $V_{OUT}$ + 1.5V<br>$I_{LOAD}$ = 10 mA to 1A | * | | 0.2 | 0.40 | |
| Minimum load current | 1117-ADJ | $V_{IN}$ = 5V, $V_{ADJ}$ = 0V | * | | 2 | 7 | mA |
| GND pin current | All fixed versions | $V_{IN}$ = $V_{OUT}$ +1.5V<br>$I_{LOAD}$=10 mA to 1A | * | | 3.5 | 10 | mA |
| ADJ pin current | 1117-ADJ | 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V<br>$I_{LOAD}$=10 mA | * | | 35 | 60 | μA |
| Current limit | All | $V_{IN}$ - $V_{OUT}$ = 1.5V | * | 1 | 1.5 | 2 | A |
| Ripple rejection, (Note 2) | All | $V_{IN}$ - $V_{OUT}$ = 2.5 V<br>$I_{LOAD}$ = 1A | | 60 | | | dB |
| Dropout voltage, (Note 1, 3) | All | $I_{LOAD}$ = 1A | * | | 1.20 | 1.40 | V |
| Temperature coefficient | All | $V_{IN}$ - $V_{OUT}$ = 1.5V, $I_{LOAD}$ = 10 mA | * | | | 0.015 | %/°C |

Notes:

* denotes "apply over the full temperature range" – 40°C ≤ $T_J$ ≤ 125°C

1. Low duty pulse testing with Kelvin connections is required
2. 120Hz input ripple ($C_{ADJ}$ = 25μF for the Adj version)
3. $\Delta V_{OUT}$, $\Delta V_{REF}$ = 1%

# LOW DROP LINEAR VOLTAGE REGULATORS

## ELECTRICAL CHARACTERISTICS OF 1117/1.2

**($T_a$=25℃, refer to the test circuits, $T_J$=0 to 125°C, $C_o$=10μF unless otherwise specified )**

| Parameter | Device | Test Conditions | | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| Reference voltage, (Note 1) | 1117-1.2 | $V_{IN}$ = 3.2V, $I_{LOAD}$ = 10 mA | | 1.188 | 1.2 | 1.212 | V |
| | | 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V<br>$I_{LOAD}$ = 10 mA to 1A | | 1.176 | 1.2 | 1.224 | |
| Output voltage (Note 1) | 1117-1.2 | $V_{IN}$ = $V_{OUT}$ +1.5V,<br>Varied from nominal $V_{OUT}$ | | -1.5 | | +1.5 | % |
| | | 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V,<br>$I_{LOAD}$= 0 mA to 1A, | | -3 | | +3 | |
| | $V_{OUT}$ =1.2V | Varied from nominal $V_{OUT}$ | | -3 | | +3 | |
| Accuracy of output voltage at wafer testing | 1117-1.2 | $V_{IN}$ = $V_{OUT}$ +1.5V<br>$I_{LOAD}$ = 10 mA | | -0.2 | 0 | +0.2 | % |
| Line regulation | 1117-1.2 | $I_{LOAD}$ = 10 mA, 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V | * | | 0.04 | 0.20 | % |
| Load regulation, (Note 1) | 1117-1.2 | $V_{IN}$ = $V_{OUT}$ + 1.5V<br>$I_{LOAD}$ = 10 mA to 1A | * | | 0.2 | 0.40 | |
| Minimum load current | 1117-1.2 | $V_{IN}$ = 5V, $V_{ADJ}$ = 0V | * | | 2 | 7 | mA |
| GND pin current | 1117-1.2 | $V_{IN}$ = $V_{OUT}$ +1.5V<br>$I_{LOAD}$=10 mA to 1A | * | | 3.5 | 10 | mA |
| ADJ pin current | 1117-1.2 | 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V<br>$I_{LOAD}$=10 mA | * | | 35 | 60 | μA |
| Current limit | 1117-1.2 | $V_{IN}$ - $V_{OUT}$ = 1.5V | * | 1 | 1.5 | 2 | A |
| Ripple rejection, (Note 2) | 1117-1.2 | $V_{IN}$ - $V_{OUT}$ = 2.5 V<br>$I_{LOAD}$ = 1A | | 60 | | | dB |
| Dropout voltage, (Note 1, 3) | 1117-1.2 | $I_{LOAD}$ = 1A | * | | 1.20 | 1.40 | V |
| Temperature coefficient | 1117-1.2 | $V_{IN}$ - $V_{OUT}$ = 1.5V, $I_{LOAD}$ = 10 mA | * | | | 0.015 | %/°C |

| Parameter | Device | Test Conditions | | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| Reference voltage, (Note 1) | 1117-1.8 | $V_{IN}$ = 3.8V, $I_{LOAD}$ = 10 mA | | 1.780 | 1.8 | 1.820 | V |
| | | 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V<br>$I_{LOAD}$ = 10 mA to 1A | | 1.760 | 1.8 | 1.840 | |
| Output voltage (Note 1) | 1117-1.8 | $V_{IN}$ = $V_{OUT}$ +1.5V,<br>Varied from nominal $V_{OUT}$ | | -1.5 | | +1.5 | % |
| | | 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V,<br>$I_{LOAD}$= 0 mA to 1A, | | -3 | | +3 | |
| | $V_{OUT}$ =1.2V | Varied from nominal $V_{OUT}$ | | -3 | | +3 | |
| Accuracy of output voltage at wafer testing | 1117-1.8 | $V_{IN}$ = $V_{OUT}$ +1.5V<br>$I_{LOAD}$ = 10 mA | | -0.2 | 0 | +0.2 | % |
| Line regulation | 1117-1.8 | $I_{LOAD}$ = 10 mA, 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V | * | | 0.04 | 0.20 | % |
| Load regulation, (Note 1) | 1117-1.8 | $V_{IN}$ = $V_{OUT}$ + 1.5V<br>$I_{LOAD}$ = 10 mA to 1A | * | | 0.2 | 0.40 | |
| Minimum load current | 1117-1.8 | $V_{IN}$ = 5V, $V_{ADJ}$ = 0V | * | | 2 | 7 | mA |
| GND pin current | 1117-1.8 | $V_{IN}$ = $V_{OUT}$ +1.5V<br>$I_{LOAD}$=10 mA to 1A | * | | 3.5 | 10 | mA |
| ADJ pin current | 1117-1.8 | 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V<br>$I_{LOAD}$=10 mA | * | | 35 | 60 | μA |
| Current limit | 1117-1.8 | $V_{IN}$ - $V_{OUT}$ = 1.5V | * | 1 | 1.5 | 2 | A |
| Ripple rejection, (Note 2) | 1117-1.8 | $V_{IN}$ - $V_{OUT}$ = 2.5 V<br>$I_{LOAD}$ = 1A | | 60 | | | dB |
| Dropout voltage, (Note 1, 3) | 1117-1.8 | $I_{LOAD}$ = 1A | * | | 1.20 | 1.40 | V |
| Temperature coefficient | 1117-1.8 | $V_{IN}$ - $V_{OUT}$ = 1.5V, $I_{LOAD}$ = 10 mA | * | | | 0.015 | %/°C |

# LOW DROP LINEAR VOLTAGE REGULATORS

## ELECTRICAL CHARACTERISTICS OF 1117/2.5

**($T_a$=25℃, refer to the test circuits, $T_J$=0 to 125°C, $C_o$=10μF unless otherwise specified )**

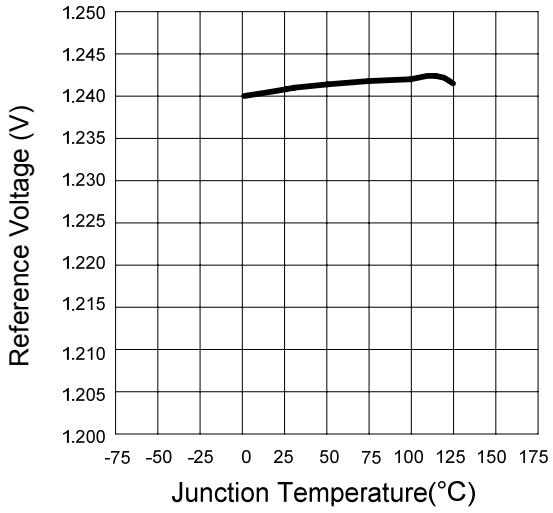
| Parameter | Device | Test Conditions | | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| Reference voltage, (Note 1) | 1117-2.5 | $V_{IN}$ = 4.5V, $I_{LOAD}$ = 10 mA | | 2.475 | 2.5 | 2.525 | V |
| | | 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V<br>$I_{LOAD}$ = 10 mA to 1A | | 2.450 | 2.5 | 2.550 | |
| Output voltage (Note 1) | 1117-2.5 | $V_{IN}$ = $V_{OUT}$ +1.5V,<br>Varied from nominal $V_{OUT}$ | | -1.5 | | +1.5 | % |
| | | 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V,<br>$I_{LOAD}$= 0 mA to 1A, | | -3 | | +3 | |
| | $V_{OUT}$ =1.2V | Varied from nominal $V_{OUT}$ | | -3 | | +3 | |
| Accuracy of output voltage at wafer testing | 1117-2.5 | $V_{IN}$ = $V_{OUT}$ +1.5V<br>$I_{LOAD}$ = 10 mA | | -0.2 | 0 | +0.2 | % |
| Line regulation | 1117-2.5 | $I_{LOAD}$ = 10 mA, 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V | * | | 0.04 | 0.20 | % |
| Load regulation, (Note 1) | 1117-2.5 | $V_{IN}$ = $V_{OUT}$ + 1.5V<br>$I_{LOAD}$ = 10 mA to 1A | * | | 0.2 | 0.40 | |
| Minimum load current | 1117-2.5 | $V_{IN}$ = 5V, $V_{ADJ}$ = 0V | * | | 2 | 7 | mA |
| GND pin current | 1117-2.5 | $V_{IN}$ = $V_{OUT}$ +1.5V<br>$I_{LOAD}$=10 mA to 1A | * | | 3.5 | 10 | mA |
| ADJ pin current | 1117-2.5 | 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V<br>$I_{LOAD}$=10 mA | * | | 35 | 60 | μA |
| Current limit | 1117-2.5 | $V_{IN}$ - $V_{OUT}$ = 1.5V | * | 1 | 1.5 | 2 | A |
| Ripple rejection, (Note 2) | 1117-2.5 | $V_{IN}$ - $V_{OUT}$ = 2.5 V<br>$I_{LOAD}$ = 1A | | 60 | | | dB |
| Dropout voltage, (Note 1, 3) | 1117-2.5 | $I_{LOAD}$ = 1A | * | | 1.20 | 1.40 | V |
| Temperature coefficient | 1117-2.5 | $V_{IN}$ - $V_{OUT}$ = 1.5V, $I_{LOAD}$ = 10 mA | * | | | 0.015 | %/°C |

| Parameter | Device | Test Conditions | | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| Reference voltage, (Note 1) | 1117-3.3 | $V_{IN}$ = 5.3V, $I_{LOAD}$ = 10 mA | | 3.267 | 3.3 | 3.333 | V |
| | | 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V<br>$I_{LOAD}$ = 10 mA to 1A | | 3.160 | 3.3 | 3.440 | |
| Output voltage (Note 1) | 1117-3.3 | $V_{IN}$ = $V_{OUT}$ +1.5V,<br>Varied from nominal $V_{OUT}$ | | -1.5 | | +1.5 | % |
| | | 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V,<br>$I_{LOAD}$= 0 mA to 1A, | | -3 | | +3 | |
| | $V_{OUT}$ =1.2V | Varied from nominal $V_{OUT}$ | | -3 | | +3 | |
| Accuracy of output voltage at wafer testing | 1117-3.3 | $V_{IN}$ = $V_{OUT}$ +1.5V<br>$I_{LOAD}$ = 10 mA | | -0.2 | 0 | +0.2 | % |
| Line regulation | 1117-3.3 | $I_{LOAD}$ = 10 mA, 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V | * | | 0.04 | 0.20 | % |
| Load regulation, (Note 1) | 1117-3.3 | $V_{IN}$ = $V_{OUT}$ + 1.5V<br>$I_{LOAD}$ = 10 mA to 1A | * | | 0.2 | 0.40 | |
| Minimum load current | 1117-3.3 | $V_{IN}$ = 5V, $V_{ADJ}$ = 0V | * | | 2 | 7 | mA |
| GND pin current | 1117-3.3 | $V_{IN}$ = $V_{OUT}$ +1.5V<br>$I_{LOAD}$=10 mA to 1A | * | | 3.5 | 10 | mA |
| ADJ pin current | 1117-3.3 | 1.5V ≤ $V_{IN}$ - $V_{OUT}$ ≤ 10V<br>$I_{LOAD}$=10 mA | * | | 35 | 60 | μA |
| Current limit | 1117-3.3 | $V_{IN}$ - $V_{OUT}$ = 1.5V | * | 1 | 1.5 | 2 | A |
| Ripple rejection, (Note 2) | 1117-3.3 | $V_{IN}$ - $V_{OUT}$ = 2.5 V<br>$I_{LOAD}$ = 1A | | 60 | | | dB |
| Dropout voltage, (Note 1, 3) | 1117-3.3 | $I_{LOAD}$ = 1A | * | | 1.20 | 1.40 | V |
| Temperature coefficient | 1117-3.3 | $V_{IN}$ - $V_{OUT}$ = 1.5V, $I_{LOAD}$ = 10 mA | * | | | 0.015 | %/°C |

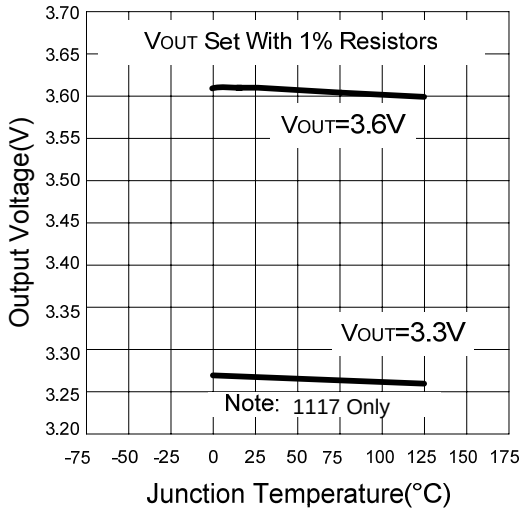
# LOW DROP LINEAR VOLTAGE REGULATORS

## Typical Characteristics

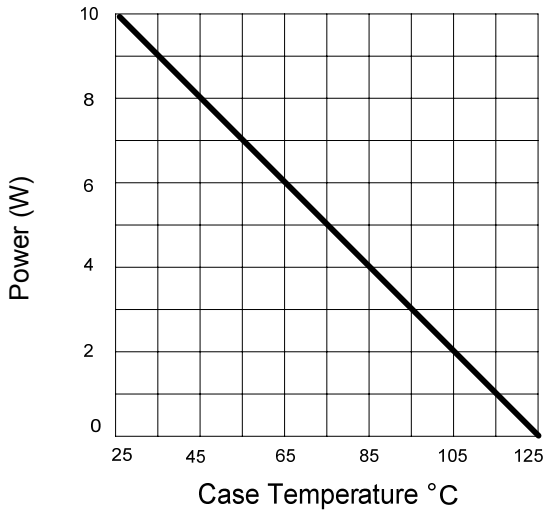
Reference Voltge vs. Temperature




Output Voltage vs. Temperautre

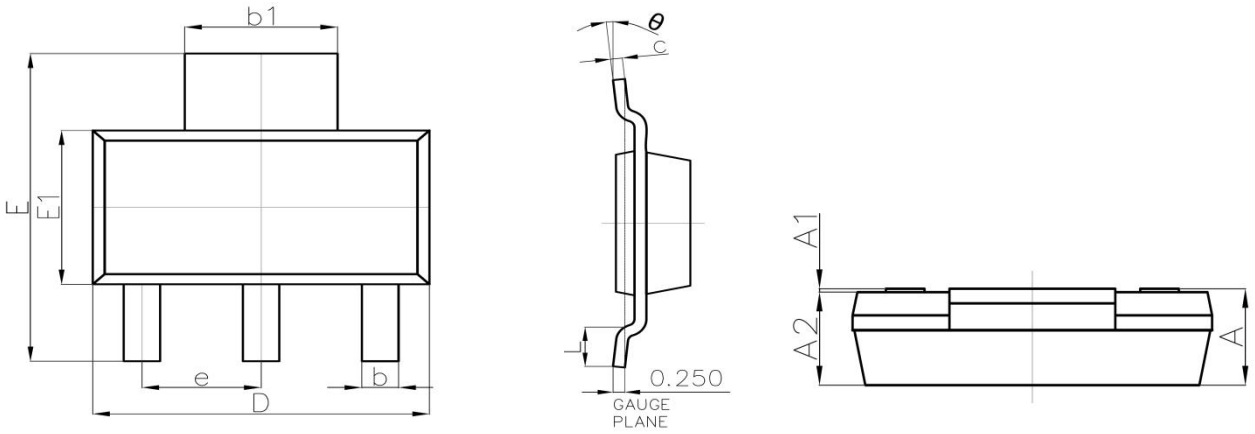



Maximum Power Dissipation



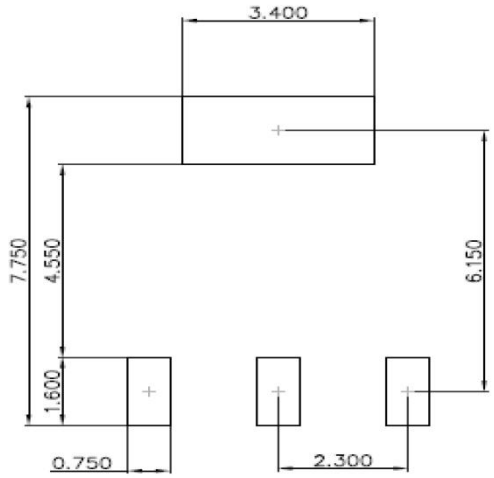
# LOW DROP LINEAR VOLTAGE REGULATORS

## 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:**

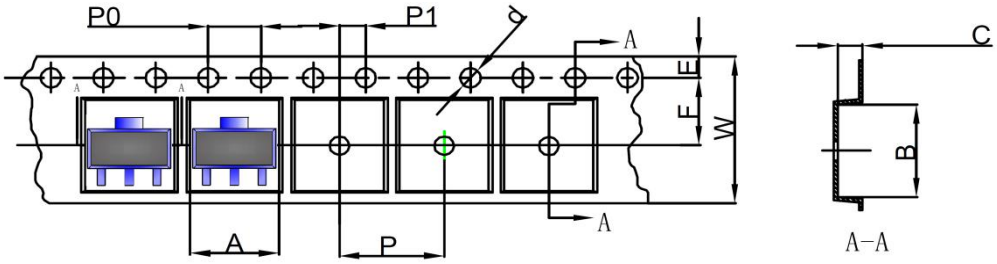
1.Controlling dimension: in millimeters

2.General tolerance: ±0.05mm

3.The pad layout is for reference purposes only

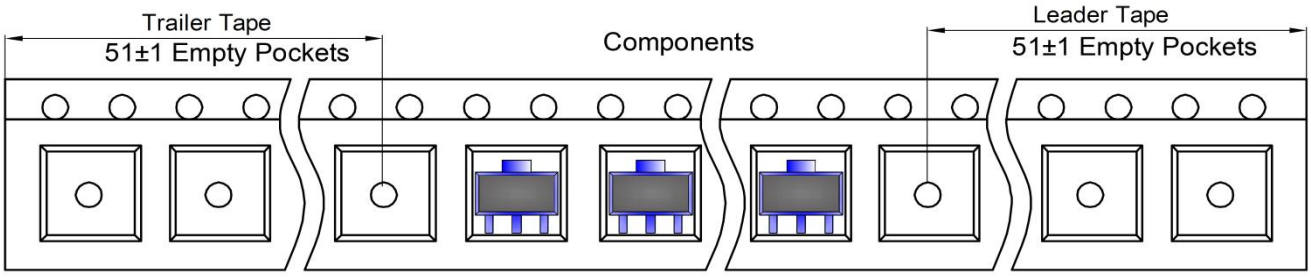
# SOT-223 Tape and Reel

## SOT-223 Embossed Carrier Tape

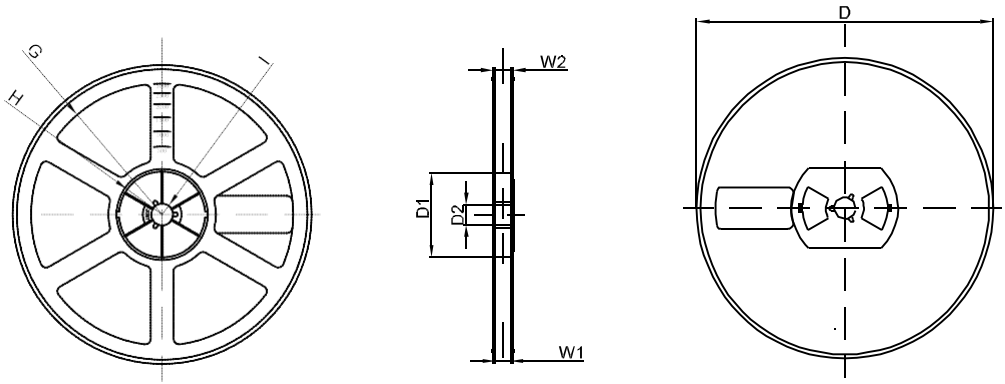



| | DIMENSIONS ARE IN MILLIMETER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TYPE | A | B | C | d | E | F | P0 | P | P1 | W |
| SOT-223 | 6.765 | 7.335 | 1.88 | Ø1.50 | 1.75 | 5.50 | 4.00 | 4.00 | 2.00 | 12.00 |
| TOLERANCE | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 | ±0.1 |

## SOT-223 Tape Leader and Trailer




## SOT-223 Reel




| | DIMENSIONS ARE IN MILLIMETER | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| REEL OPTION | D | D1 | D2 | G | H | I | W1 | W2 |
| 13” DIA | Ø330.00 | 100.00 | 13.00 | R151.00 | R56.00 | R6.50 | 12.40 | 17.60 |
| TOLERANCE | ±2 | ±1 | ±1 | ±1 | ±1 | ±1 | ±1 | ±1 |