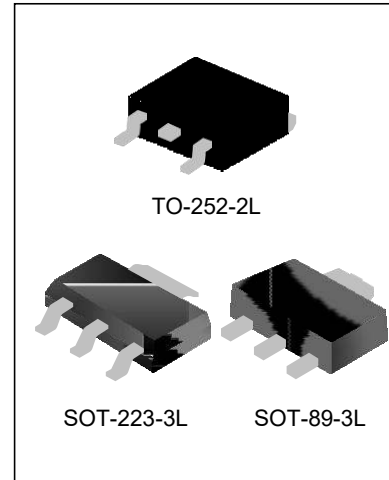


DESCRIPTION

The AMS1117 is a positive low voltage dropout regulator; typical voltage dropout is only 1.2V at 1A. AMS1117 provides two versions: fixed and adjustable versions. VOUT has a tolerance of less than 1.5% for fixed versions 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5.0V and adjustable version or 2% output accuracy for fixed version 1.2V. The AMS1117 offers some key features include thermal shutdown and current limiting. It is suitable for all electronic products.



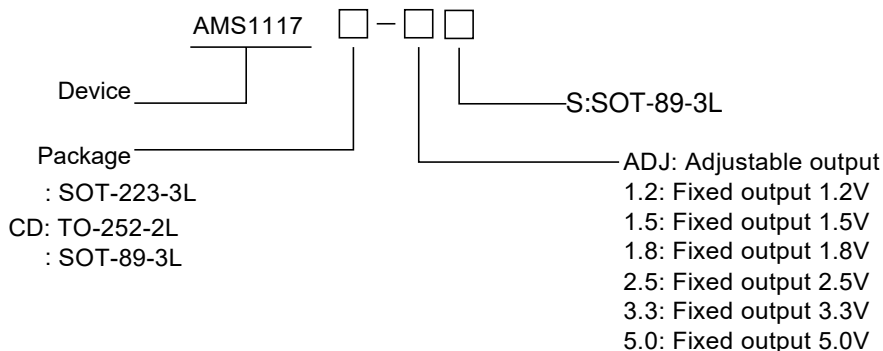
FEATURES

- ◆ 1.5% output accuracy for fixed versions 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5.0V and adjustable version
- ◆ Adjustable output voltage
- ◆ Low Dropout Voltage: Typical 1.2V@1A
- ◆ Current Limiting
- ◆ Thermal Shutdown
- ◆ Temperature Range: -40°C to 125°C

APPLICATIONS

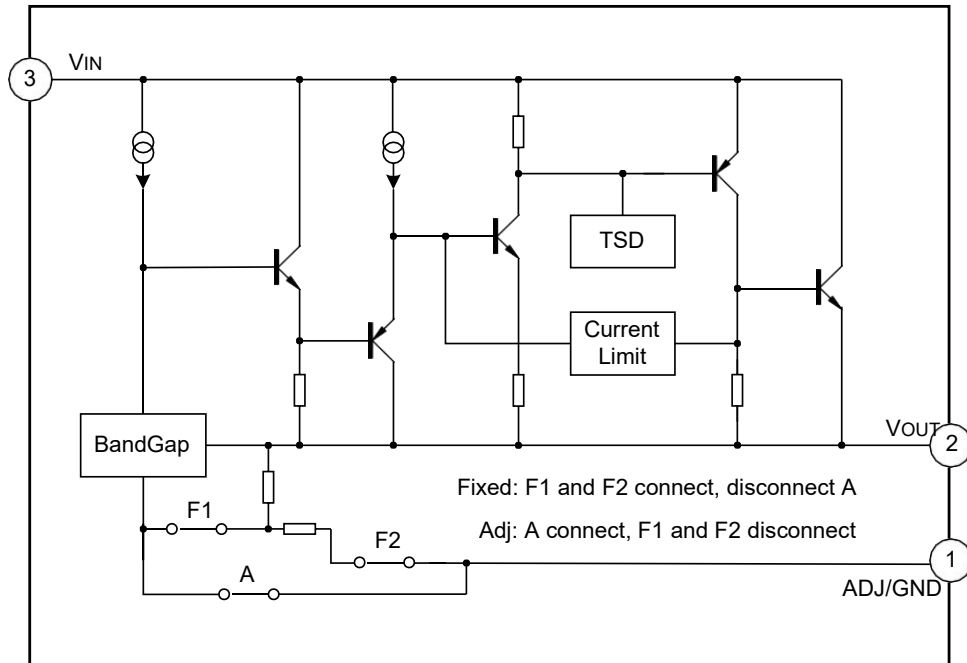
- ◆ Laptop, Palmtop, and Notebook Computers
- ◆ Battery Charger
- ◆ SCSI-II Active Terminator
- ◆ Cellular Phone
- ◆ Cordless Telephones
- ◆ Battery Powered Systems
- ◆ Portable Instrumentation
- ◆ SMPS Post-Regulator

NOMENCLATURE



## BLOCK DIAGRAM

## 1A LDO Voltage Regulator



## ABSOLUTE MAXIMUM RATINGS

| Characteristics                             |            | Symbol     | Rating                     | Unit |
|---|------------|------------|----------------------------|------|
| Input Supply Voltage                        |            | $V_{IN}$   | 18                         | V    |
| Lead Temperature (Soldering, 5 seconds)     |            | $T_{Lead}$ | 260                        | °C   |
| Operating Junction Temperature Range        |            | $T_J$      | 150                        | °C   |
| Storage Temperature Range                   |            | $T_{stg}$  | -65 ~ +150                 | V    |
| Power Dissipation                           |            | $P_D$      | Internally Limited (Note1) | mW   |
| Thermal Resistance from Junction to Ambient | SOT-223-3L | $R_{ja}$   | 88                         | °C/W |
|   | TO-252-2L  |            | 86                         |      |
|   | SOT-89-3L  |            | 102                        |      |
| ESD Tolerance (Minimum)                     |            | ESD        | 2000                       | V    |

**Note1:** The maximum allowable power dissipation is a function of maximum operating junction temperature,  $T_J$  (max), the junction to ambient thermal resistance,  $R_{ja}$ , and the ambient temperature  $T_{amb}$ . The maximum allowable power dissipation at any ambient temperature is given:  $P_{D(max)} = (T_J(max) - T_{amb}) / R_{ja}$ , exceeding the maximum allowable power limit will result in excessive die temperature; thus, the regulator will go into thermal shutdown. The junction to ambient thermal resistance,  $\theta_{JA}$  of some packages may be different, The value of  $\theta_{JA}$  depends on mounting technique.

## RECOMMENDED OPERATING CONDITIONS

| Characteristics                      | Symbol   | Rating     | Unit |
|--------------------------------------|----------|------------|------|
| Input voltage                        | $V_{IN}$ | 12         | V    |
| Operating Junction Temperature Range | $T_J$    | -40 ~ +125 | °C   |

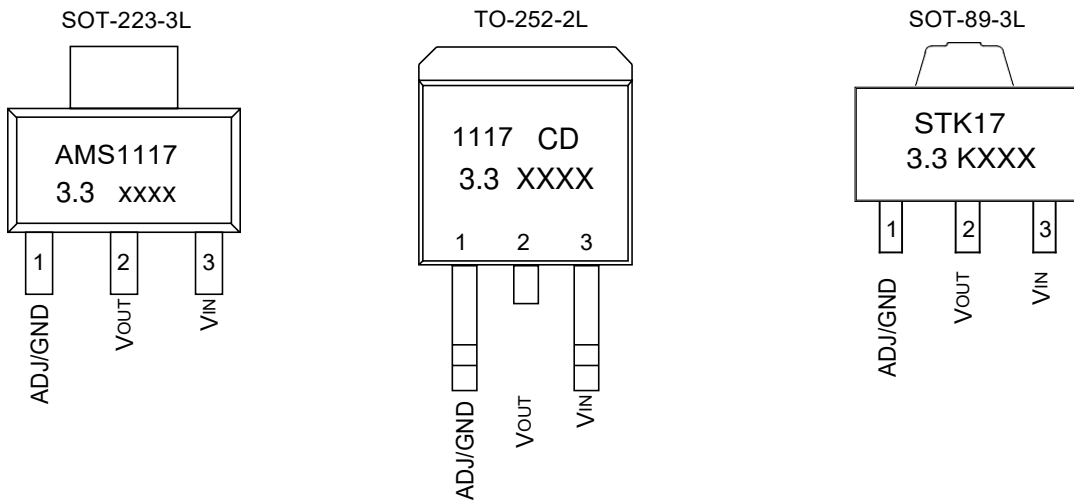
## 1A LDO Voltage Regulator

### ELECTRICAL CHARACTERISTICS

| Characteristics           | Symbol      | Conditions   | Min.           | Typ.           | Max.           | Unit        |
|---------------------------|-------------|--|----------------|----------------|----------------|-------------|
| Reference Voltage         | $V_{REF}$   | AMS1117-ADJ,<br>$I_{OUT}=10mA, V_{IN}-V_{OUT}=2V, T_J=25^{\circ}C$<br>$10mA \leq I_{OUT} \leq 1A, 1.4V \leq V_{IN}-V_{OUT} \leq 10V$ | 1.231<br>1.225 | 1.250<br>1.250 | 1.268<br>1.275 | V           |
| Output Voltage            | $V_{OUT}$   | AMS1117-1.2,<br>$I_{OUT}=10mA, V_{IN}=3.2V, T_J=25^{\circ}C$<br>$10mA \leq I_{OUT} \leq 1A, 3.0V \leq V_{IN} \leq 10V$               | 1.176<br>1.152 | 1.2<br>1.2     | 1.224<br>1.248 | V           |
|                           |             | AMS1117-1.5,<br>$I_{OUT}=10mA, V_{IN}=3.5V, T_J=25^{\circ}C$<br>$10mA \leq I_{OUT} \leq 1A, 3.0V \leq V_{IN} \leq 10V$               | 1.477<br>1.470 | 1.500<br>1.500 | 1.5221<br>.530 | V           |
|                           |             | AMS1117-1.8,<br>$I_{OUT}=10mA, V_{IN}=3.8V, T_J=25^{\circ}C,$<br>$0 \leq I_{OUT} \leq 1A, 3.2V \leq V_{IN} \leq 10V$                 | 1.7731<br>.746 | 1.800<br>1.800 | 1.827<br>1.854 | V           |
|                           |             | AMS1117-2.5,<br>$I_{OUT}=10mA, V_{IN}=4.5V, T_J=25^{\circ}C,$<br>$0 \leq I_{OUT} \leq 1A, 3.9V \leq V_{IN} \leq 10V$                 | 2.462<br>2.450 | 2.500<br>2.500 | 2.538<br>2.550 | V           |
|                           |             | AMS1117-3.3,<br>$I_{OUT}=10mA, V_{IN}=5V, T_J=25^{\circ}C,$<br>$0 \leq I_{OUT} \leq 1A, 4.75V \leq V_{IN} \leq 10V$                  | 3.250<br>3.235 | 3.300<br>3.300 | 3.349<br>3.365 | V           |
|                           |             | AMS1117-5.0,<br>$I_{OUT}=10mA, V_{IN}=7V, T_J=25^{\circ}C,$<br>$0 \leq I_{OUT} \leq 1A, 6.5V \leq V_{IN} \leq 12V$                   | 4.925<br>4.900 | 5.000<br>5.000 | 5.075<br>5.10  | V           |
|                           |             | Output Voltage Temperature Stability   | $TS_{OUT}$     |                | --             | 0.3         |
| Line Regulation           | $R_{line}$  | $V_{INMIN} \leq V_{IN} \leq 12V,$<br>$V_{OUT} = \text{Fixed/Adj}, I_{OUT} = 10mA$  | --             | 9              | 18             | mV          |
| Load Regulation           | $R_{load}$  | $10mA \leq I_{OUT} \leq 1A, V_{OUT} = \text{Fixed/Adj}$  | --             | 10             | 18             | mV          |
| Dropout Voltage           | $V_{drop}$  | $I_{OUT} = 100mA$  | --             | 1.00           | 1.20           | V           |
|                           |             | $I_{OUT} = 500mA$  | --             | 1.05           | 1.25           | V           |
|                           |             | $I_{OUT} = 1A$   | --             | 1.20           | 1.30           | V           |
| Quiescent Current         | $I_q$       | $4.25V \leq V_{IN} \leq 6.5V$  | --             | 5              | 10             | mA          |
| Ripple Rejection          | $P_{SRR}$   | $f_{RIPPLE} = 120Hz, (V_{IN}-V_{OUT}) = 3V,$<br>$V_{RIPPLE} = 1V_{PP}$   | 60             | 75             | --             | dB          |
| Adjust pin Current        | $I_{adj}$   |  | --             | 60             | 120            | $\mu A$     |
| Adjust pin Current Change |             | $0 \leq I_{OUT} \leq 1A, 1.4V \leq V_{IN}-V_{OUT} \leq 10V$  | --             | 0.2            | 5              | $\mu A$     |
| Thermal shutdown          | TSD         |  | --             | 150            | --             | $^{\circ}C$ |
| Current limiting          | $I_{limit}$ |  | 2.1            | --             | 2.5            | A           |
| Temperature Stability     |             |  | --             | 0.5            | --             | %           |
| Long Term Stability       |             | $T_A = 125^{\circ}C, 1000Hrs$  | --             | 0.3            | --             | %           |

| Characteristics  | Symbol | Conditions  | Min. | Typ.  | Max. | Unit |
|------------------|--------|---|------|-------|------|------|
| RMS Output Noise |        | % of $V_{OUT}$ , $10\text{Hz} \leq f \leq 10\text{kHz}$ | --   | 0.003 | --   | %    |

### PIN CONFIGURATION



### PIN DESCRIPTION

| Pin No. | Pin name         | I/O  | Functions            |
|---------|------------------|------|----------------------|
| 1       | GND/ADJ          | --/O | Ground/ADJ           |
| 2       | V <sub>OUT</sub> | O    | Output voltage       |
| 3       | V <sub>IN</sub>  | I    | Input supply voltage |

### FUNCTION DESCRIPTION

The AMS1117 is a LDO regulator, its pass transistor is made up of a single NPN transistor being driven by a PNP.

The dropout voltage is defined as:  $V_{DROP} = V_{BE} + V_{SAT}$ .

The AMS1117 series of fixed and adjustable regulators are easy to use. Output voltages are 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, and 5.0V. On-chip thermal shut down provides protection against any combination of overload and ambient temperature that would create excessive junction temperature.

The AMS1117 requires an output capacitor for device stability. Its value of 22 $\mu$ F tantalum covers all cases of bypassing the adjustment terminal. Without bypassing the adjustment terminal smaller capacitors can be used with equally good results which depend upon the application circuit. In general, linear regulator stability decreases with higher output currents.

TYPICAL APPLICATION CIRCUIT

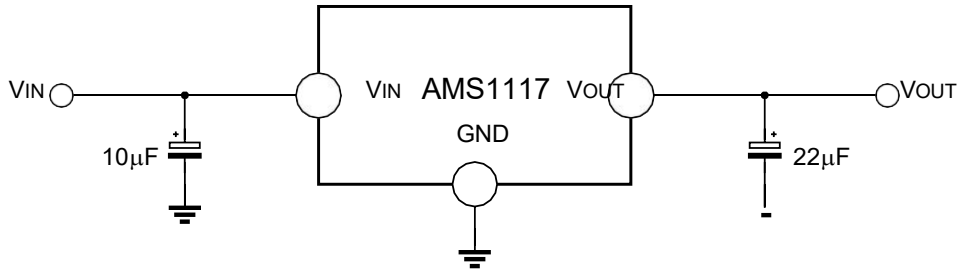


Figure 1. Typical Fixed Output Voltage

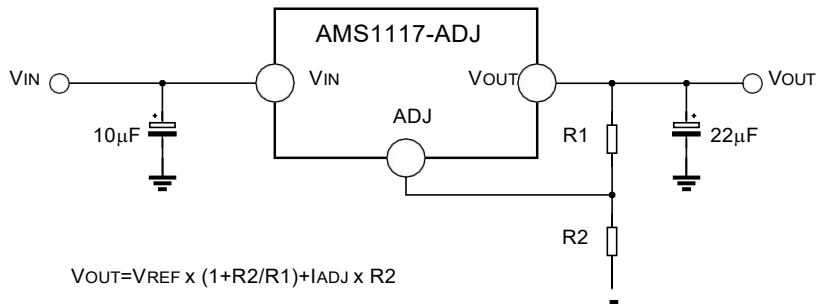
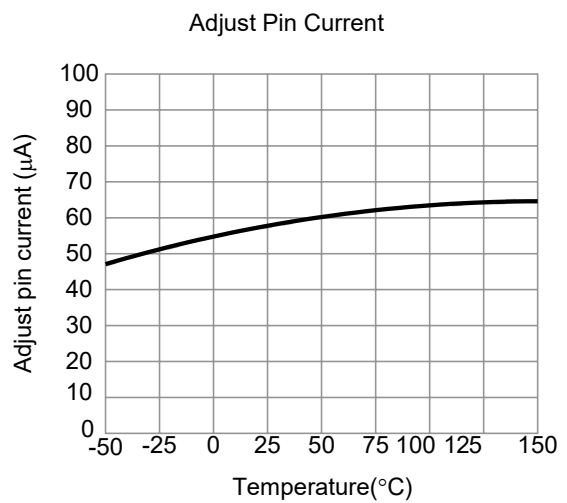
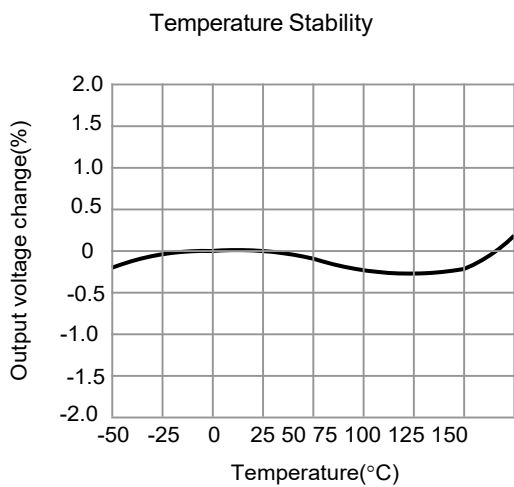


Figure 2. Typical Adjustable Output Voltage

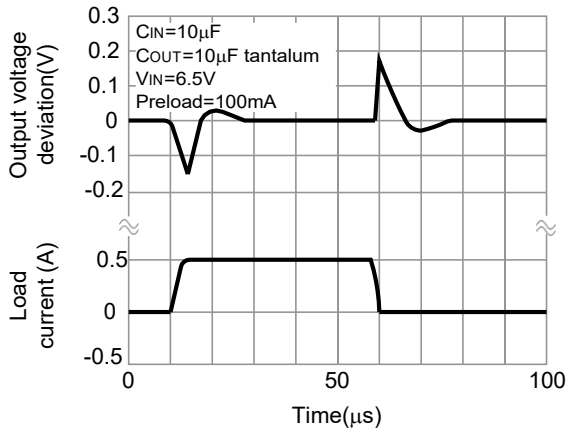
**Note:** The circuit and parameters are reference only, please set the parameters of the real application circuit based on the real test.

TYPICAL CHARACTERISTICS

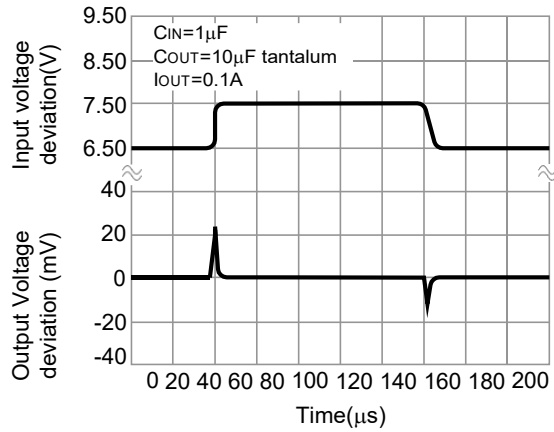


TYPICAL CHARACTERISTICS CURVES(continued)

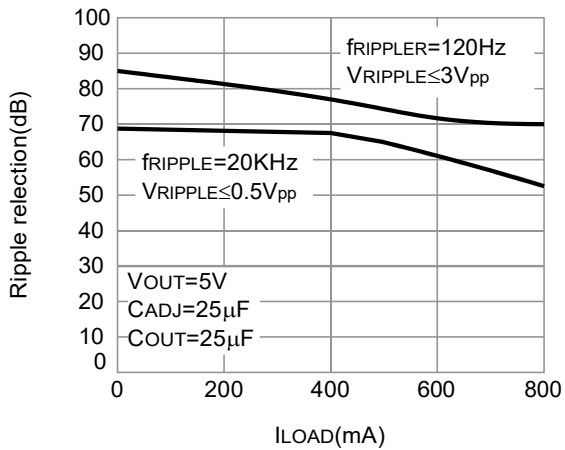
V<sub>OUT</sub>=5 V Load Transient Response



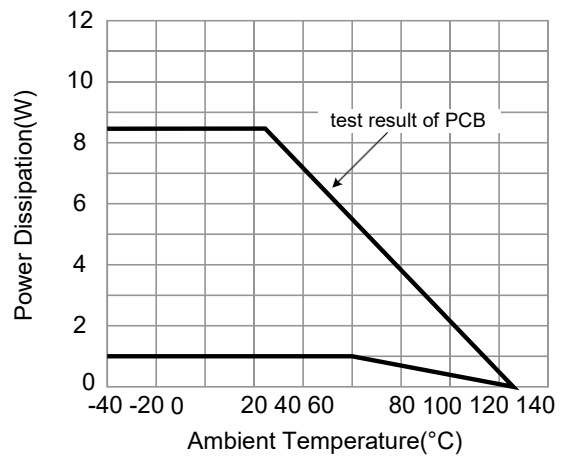
V<sub>OUT</sub>=5 V Line Transient Response



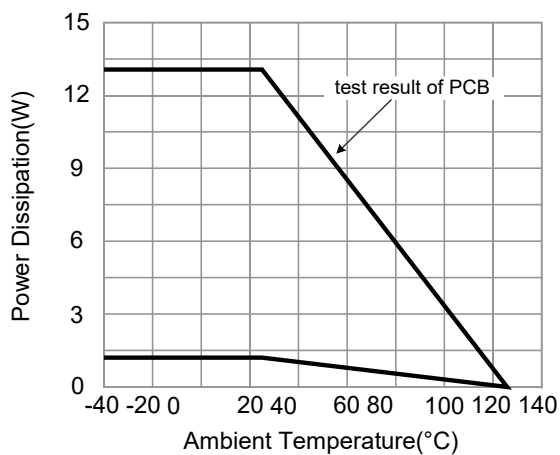
Ripple Rejection VS Current



Power Dissipation VS Ambient Temperature(SOT-223)



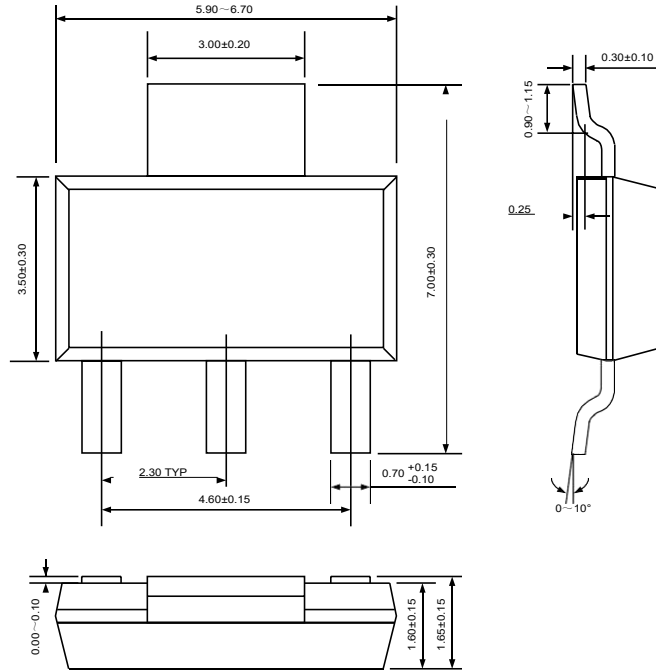
Power Dissipation VS Ambient Temperature(TO-252)



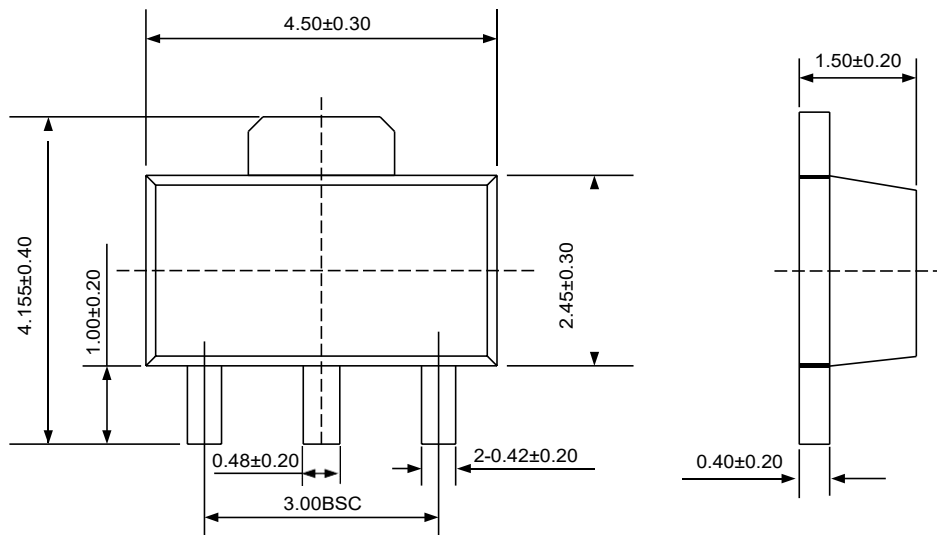
PACKAGE OUTLINE

1A LDO Voltage Regulator

SOT-223-3L UNIT: mm

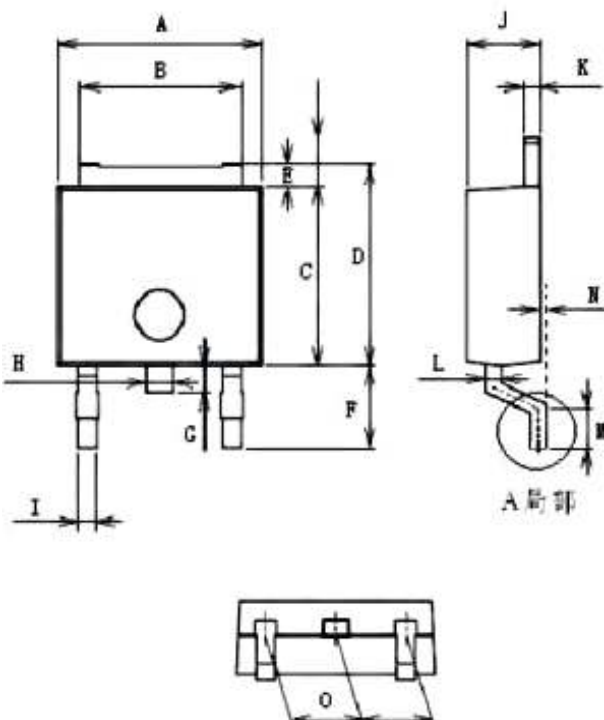


SOT-89-3L UNIT: mm



PACKAGE OUTLINE (continued)

TO-252-2L UNIT: mm



Unit: mm

| Item | Min  | Max  |
|------|------|------|
| A    | 6.40 | 6.70 |
| B    | 5.20 | 5.40 |
| C    | 6.00 | 6.30 |
| D    | 6.55 | 6.85 |
| E    | 0.45 | 0.60 |
| F    | 3.07 | 3.35 |
| G    | 0.85 | 1.05 |
| H    | 0.75 | 0.95 |
| I    | 0.55 | 0.75 |
| J    | 2.20 | 2.40 |
| K    | 0.43 | 0.58 |
| L    | 0.43 | 0.58 |
| M    | 0.90 | 1.10 |
| N    | 0.90 | 1.10 |
| O    | 2.20 | 2.40 |

NOTE1: There are two conditions for this position:has an eject pin or has no eject pin.