

Outline:

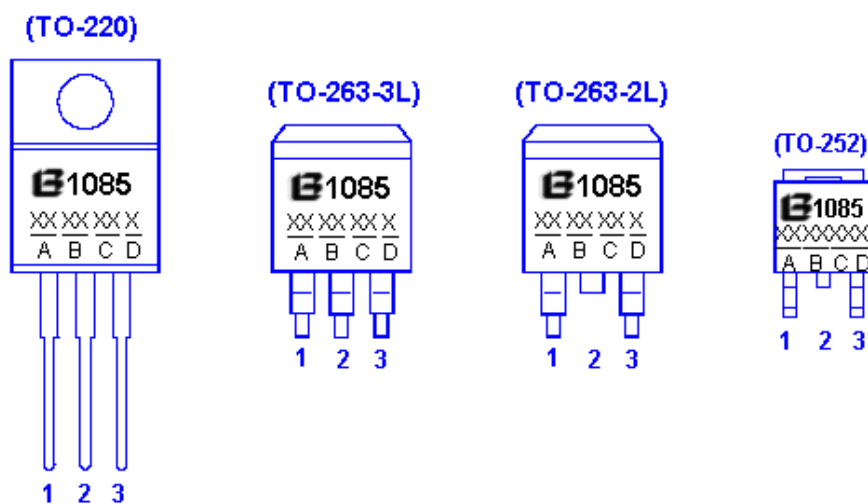
BL1085 is a series of low dropout three terminal regulators with a dropout of 1.3V at 3A load current.

Other than a fixed version ($V_{out} = 1.8V, 2.5V, 3.3V, 5.0V$), BL1085 has an adjustable version, The adjustable version can set the output voltage with two external resistors.

BL1085 offers thermal shut down and current limit functions, to assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within $\pm 2\%$.

The BL1085 series is available in standard packages of TO-263-2L, TO-263-3L, TO-220 and TO-252.

Pin Configuration:



Features:

- Other than a fixed version and an adjustable version, output value can be customized on command.
- Maximum output current is 3A
- Output voltage accuracy is within $\pm 2\%$ ($\pm 1\%$ Customized)
- Range of operation input voltage: Max 18V
- Line regulation: 0.2% (Typical)
- Load regulation: 0.2% (Typical)
- Environment Temperature: $-50^{\circ}\text{C} \sim 140^{\circ}\text{C}$

Applications:

- Power Management for Computer Mother Board, Graphic Card
- Battery Charger
- Post Regulators for Switching Supplies

Marking information:

- A: Means Manufacture weeks
- B: Means Manufacture LOT No.
- C: Means Output Voltage Value
- D: Means Temp. Range&Rohs Std

Pin Description:

Fixed Version

| Pin No. | Symbol | Definition |
|---------|--------|------------|
| 1 | GND | Ground |
| 2 | Vout | Output |
| 3 | Vin | Input |

Adjustable Version

| Pin No. | Symbol | Definition |
|---------|--------|------------|
| 1 | Adj. | Adjustable |
| 2 | Vout | Output |
| 3 | Vin | Input |

Ordering Information:

BL1085-XX X X

Package Type:

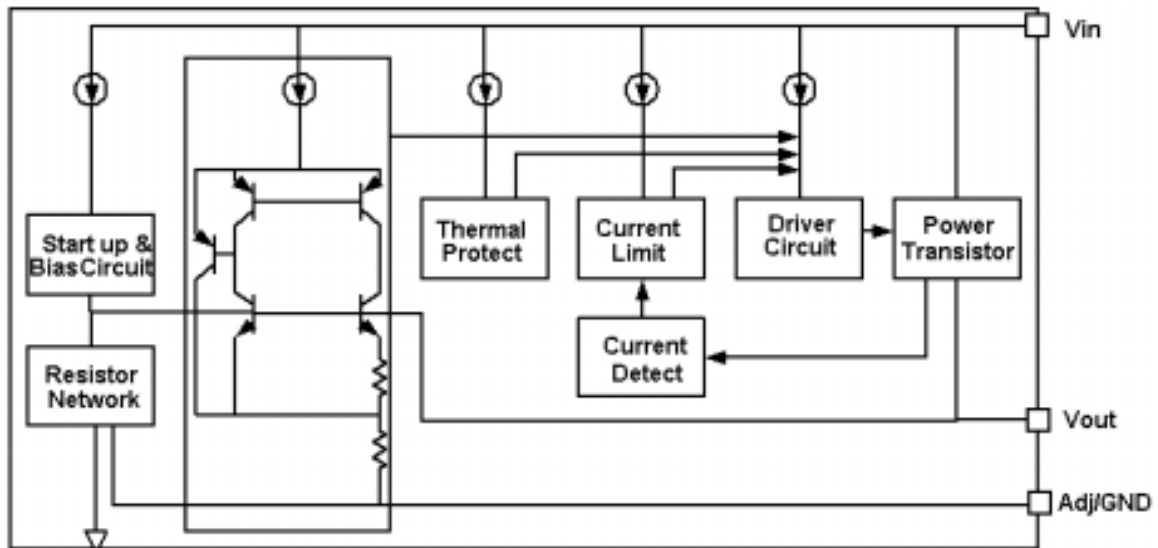
S: TO-263-2L
 S1: TO-263-3L
 Y: TO-252
 Z: TO-220

Temp. Range & Rohs Std.:

C: 140C & Pb-free Rhos Std
 Z: 140C & Pb/Sn Plating

Output Voltage:

18 1.8V
 25 2.5V
 33 3.3V
 50 5.0V
 Default: Adjustable
 Version

Block Diagrams:

Absolute Maximum Ratings:

| | |
|---|------------|
| Maximum Input Voltage | 18V |
| Junction Temperature (T _J) | 150°C |
| Environment Temperature (T _A) | 140°C |
| Storage Temperature (T _s) | -65~150°C |
| Lead Temperature and Time | 260°C, 10S |

Recommended Work Conditions:

| Item | Min | Recommended | Max | Unit |
|-------------------------|-----|-------------|-----|------|
| Input Voltage Range | | | 18 | V |
| Environment Temperature | -50 | | 140 | °C |

Electrical Characteristics (Table 1):

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|-------------------|---|----------------|--------------|----------------|------|
| V _{ref} | Reference Voltage | I _{out} =10mA, V _{in} -V _{out} =3V 10mA ≤ I _{out} ≤ 3A, 1.5V ≤ V _{in} -V _{out} ≤ 5V | 1.238 1.225 | 1.25 1.25 | 1.262 1.275 | V |
| V _{out} | Output Voltage | BL1085-1.80V I _{out} =0mA, V _{in} =4.8V, T _j =25°C 10mA ≤ I _{out} ≤ 3A, 3.4V ≤ V _{in} ≤ 7V | 1.782 1.764 | 1.80 1.80 | 1.818 1.836 | V |
| | | BL1085-2.50V I _{out} =0mA, V _{in} =4.8V, T _j =25°C 10mA ≤ I _{out} ≤ 3A, 4.1V ≤ V _{in} ≤ 7V | 2.475 2.45 | 2.50 2.50 | 2.525 2.55 | V |

| | | | | | | |
|------------------|----------------------------------|---|----------------|------------|----------------|----|
| | | BL1085-3.3V $I_{out}=0mA, V_{in}=6.3V, T_j=25^\circ C$ $10mA \leq I_{out} \leq 3A, 4.9V \leq V_{in} \leq 8V$ | 3.267 3.234 | 3.3 3.3 | 3.333 3.366 | V |
| | | BL1085-5.0V $I_{out}=0mA, V_{in}=8.0V, T_j=25^\circ C$ $10mA \leq I_{out} \leq 3A, 6.6V \leq V_{in} \leq 10V$ | 4.95 4.90 | 5.0 5.0 | 5.05 5.10 | V |
| ΔV_{out} | Line Regulation (note 1) | BL1085-ADJ $I_{out}=10mA$ $2.85V \leq V_{in} \leq 10V$ | | 0.035 | 0.2 | % |
| | | BL1085-1.8V $I_{out}=10mA$ $3.4V \leq V_{in} \leq 10V$ | | 1 | 5 | mV |
| | | BL1085-2.5V $I_{out}=10mA$ $4.1V \leq V_{in} \leq 10V$ | | 1 | 5 | mV |
| | | BL1085-3.3V $I_{out}=10mA$ $4.9V \leq V_{in} \leq 10V$ | | 1 | 5 | mV |
| | | BL1085-5.0V $I_{out}=10mA$ $6.6V \leq V_{in} \leq 10V$ | | 1 | 5 | mV |
| ΔV_{out} | Load Regulation (note 1,2) | BL1085-ADJ $V_{in}-V_{out}=3V, 10mA \leq I_{out} \leq 3A$ | | 0.2 | 0.4 | % |
| | | BL1085-1.8V $V_{in}-V_{out}=3V, 0 \leq I_{out} \leq 3A$ | | 3 | 15 | mV |
| | | BL1085-2.5V $V_{in}-V_{out}=3V, 0 \leq I_{out} \leq 3A$ | | 3 | 15 | mV |
| | | BL1085-3.3V $V_{in}-V_{out}=3V, 0 \leq I_{out} \leq 3A$ | | 3 | 15 | mV |
| | | BL1085-5.0V $V_{in}-V_{out}=3V, 0 \leq I_{out} \leq 3A$ | | 3 | 15 | mV |
| $V_{in}-V_{out}$ | Dropout Voltage (note 3) | $\Delta V_{out}, \Delta V_{ref}=1\%, I_{out}=3A$ | | 1.3 | 1.5 | V |
| I_{limit} | Current Limit | $V_{in}-V_{out}=3V, T_j=25^\circ C$ | 3.2 | 4.5 | | A |
| | Minimum Load Current (note 4) | BL1085-ADJ | | 3 | 10 | mA |

| | | | | | | |
|------------------|---|---|----|----------------|-----|-----------------|
| I_q | Quiescent Current | $V_{in}=10V$ | | 4 | 10 | mA |
| I_{Adj} | Adjust Pin Current (Adjustable Version) | $V_{in}=4.25V, I_{out}=10mA$ | | 45 | 110 | μA |
| Ripple Rejection | | $F=120Hz, C_{out}=25\mu F(\tan), I_{out}=3A, V_{in}-V_{out}=3V$ | 60 | | | dB |
| I_{change} | Adjust Pin Current Change | $10mA \leq I_{out} \leq 3A$ $1.5V \leq V_{in}-V_{out} \leq 6V$ | | 0.2 | 5 | μA |
| | Temperature Stability | $I_{out}=10mA, V_{in}-V_{out}=1.5V$ | | | 0.5 | % |
| θ_{JC} | Thermal Resistance junction to case | TO-252 TO-263 TO-220 | | 12.5 3 3 | | $^{\circ}C / W$ |

Note:

- Note1: The Parameters of Line Regulation and Load Regulation in Table1 are tested under constant junction temperature.
- Note2: When I_{out} varies between 0~3A, $V_{in}-V_{out}$ varies between 1.5V~6V under constant junction temperature, the parameter is satisfied the criterion in table. If temperature varies between $-50^{\circ}C \leq T_A \leq 140^{\circ}C$, it needs output current to be larger than 10mA to satisfy the criterion.
- Note3: Dropout Voltage is tested under $I_{out}=3A$ and the following testing conditions: First step is to find out the V_{out} value (V_{out1}) when $V_{in1}=V_{out1}+1.5V$, second step is to decrease V_{in} (V_{in2}) until V_{out} value is equal to $99\% * V_{out1}$ (V_{out2}). $V_{dropout}=V_{in2}-V_{out2}$.
- Note4: Minimum Load Current is defined as the minimum output current required to maintain regulation. When $1.5V \leq V_{in}-V_{out} \leq 6V$, the device is guaranteed to regulate if the output current is greater than 10mA.

Detailed Description:

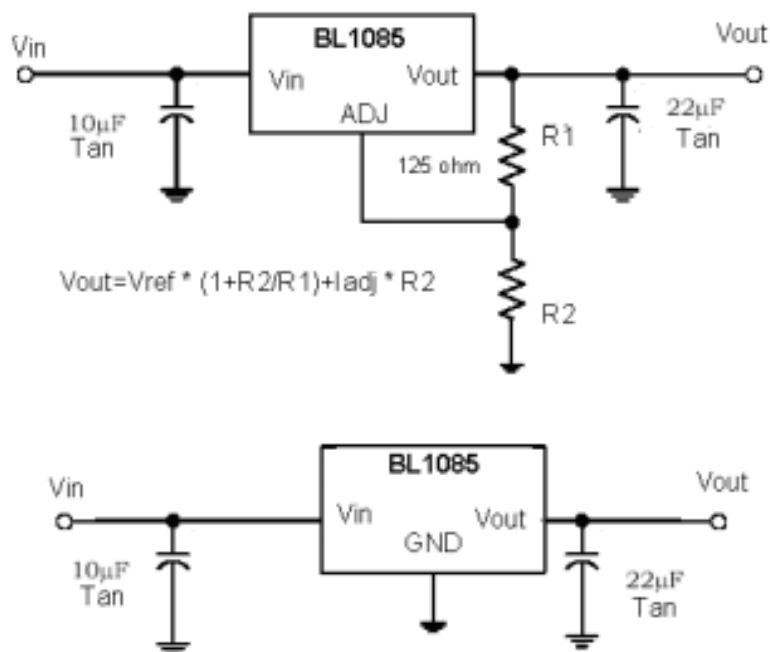
BL1085 is a series of low dropout voltage, three terminal regulators. Its application circuit is very simple: the fixed version only needs two capacitors and the adjustable version only needs two resistors and two capacitors to work. It is composed of some modules including start-up circuit, bias circuit, bandgap, thermal shutdown, current limit, power transistors and its driver circuit and so on.

The thermal shut down and current limit modules can assure chip and its application system working safety when the environment temperature is larger than $140^{\circ}C$ or output current is larger than 3.2A.

The bandgap module provides stable reference voltage, whose temperature coefficient is compensated by careful design considerations. The temperature coefficient is under $100ppm/^{\circ}C$. And the accuracy of output voltage is guaranteed by trimming technique.

Typical Application :

BL1085 has an adjustable version and fixed versions, Chart1 is its typical application:



Typical Application of BL1085

Application Hints:

1. Recommend using 10uF tan capacitor as bypass capacitor for all application circuit.
2. Recommend using 22uF tan capacitor to assure circuit stability.
3. Using a bypass capacitor(C_{Adj}) between the adjust terminal and ground can improve ripple rejection, This bypass capacitor prevents ripple from being amplified as the output voltage is increased. The impedance of C_{Adj} should be less than the resistor's($R1$) which is between output and adjust pins to prevent ripple from being amplified at any ripple frequency. As $R1$ is normally in the range of $120\Omega \sim 200\Omega$, the value of C_{Adj} should satisfy this equation: $2 * F_{ripple} * C_{Adj} < R1$. Recommend using 10uF tan capacitor.

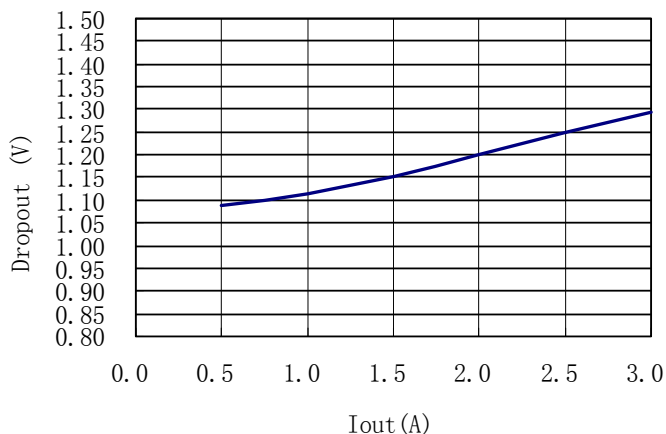
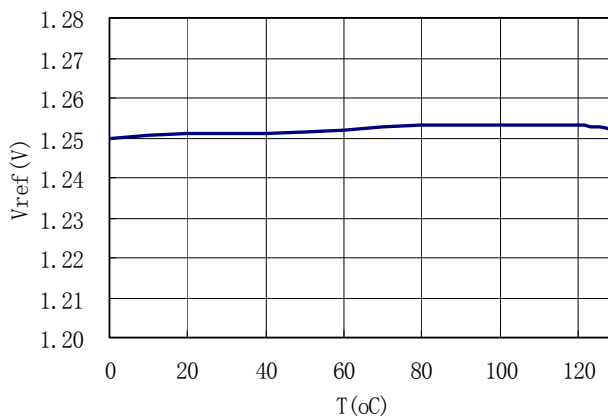
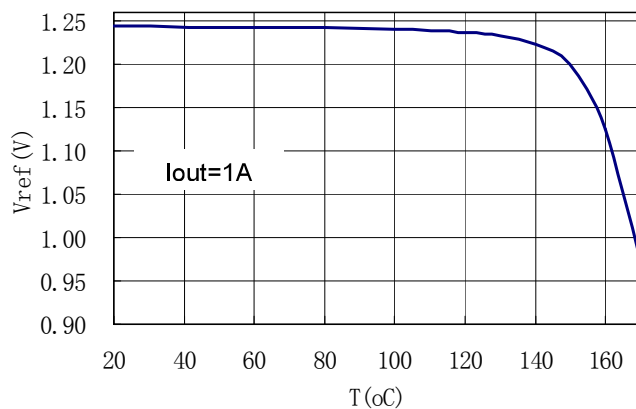
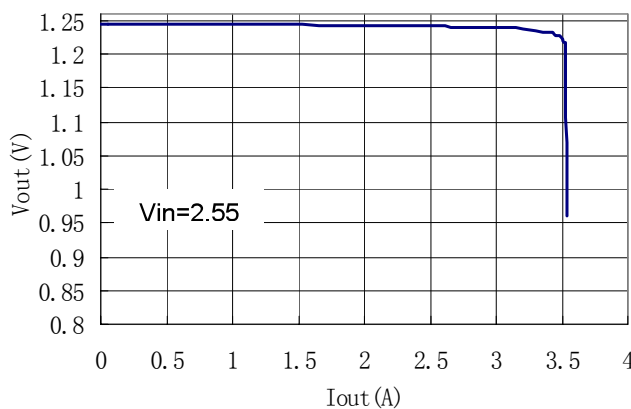
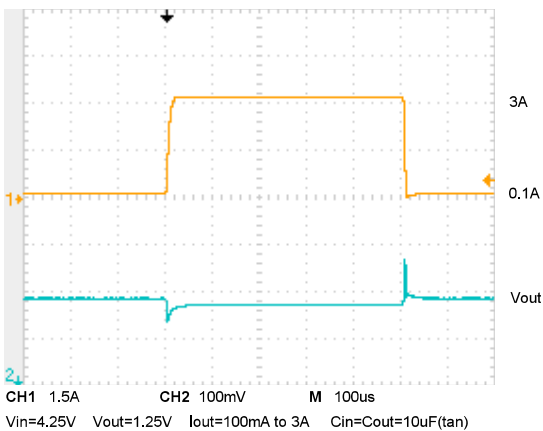
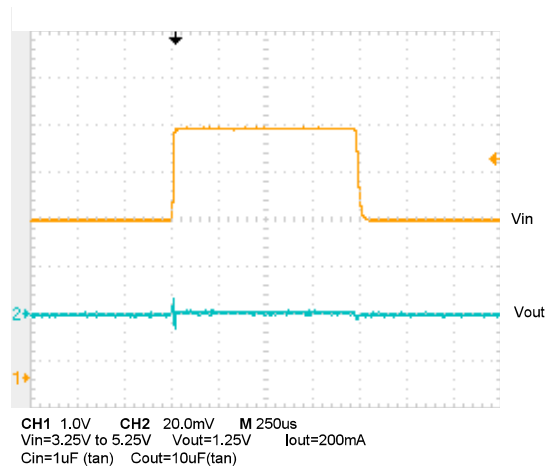
Output Voltage of Adjustable Version:

The BL1085 adjustable version provide 1.25V Reference Voltage. Any output voltage between 1.25V~13.8V can be available by choosing two external resistors (connection method is shown in chart 1). In chart 1, $R1, R2$ is the two external resistors.

Explanation :

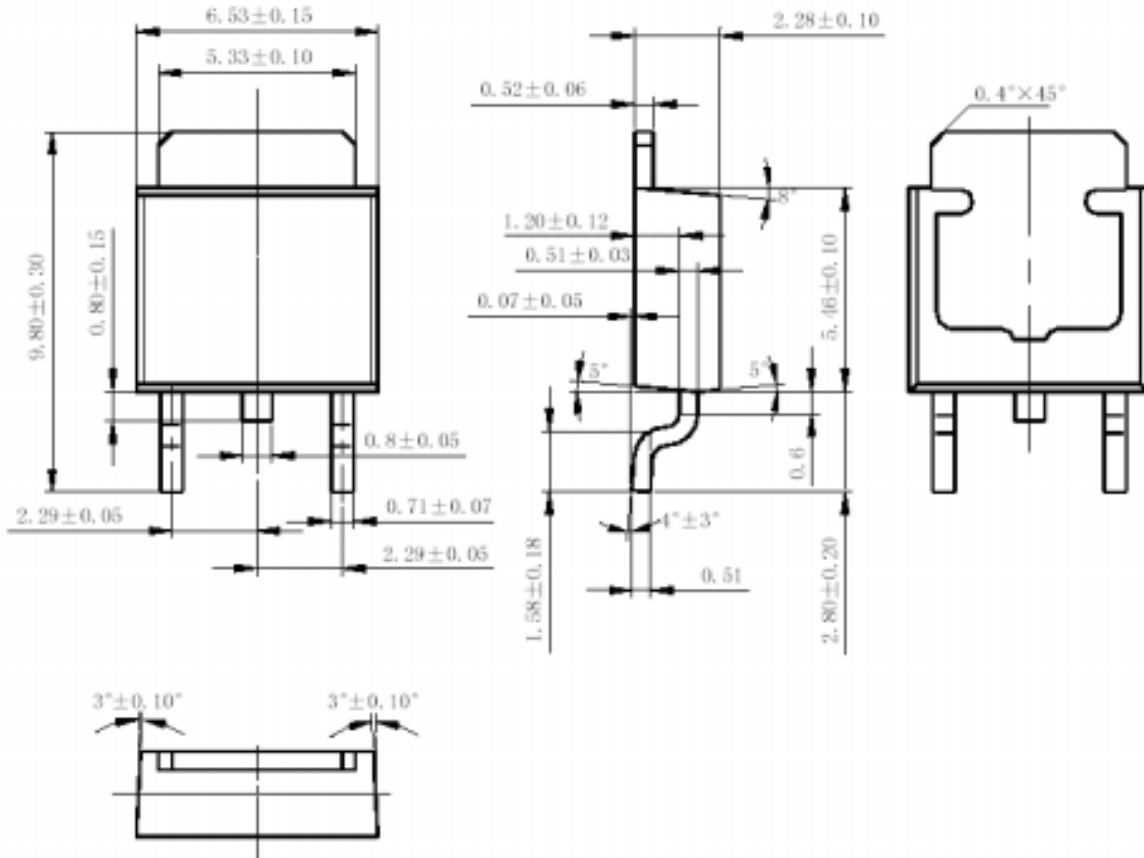
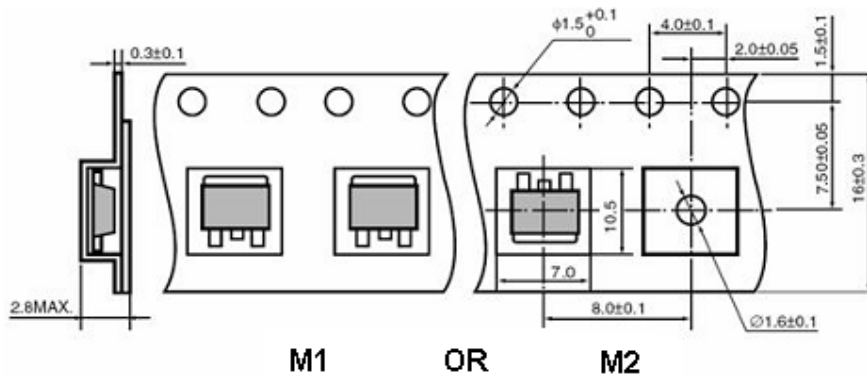
The output voltage of adjustable version satisfies this followed equation:
 $V_{Out} = V_{Ref} * (1 + R2/R1) + I_{Adj} * R2$. We can ignore I_{Adj} because I_{Adj} (about 50uA) is much less than the current of $R1$ (about 4mA).

How to choose $R1$: The value of $R1$ should be in the range of $120\Omega \sim 200\Omega$ to assure chip working normally without any load. To assure the electrical performance showed in table 1, the output current should be larger than 5mA. If $R1$ is too large, the minimum output current should be larger than 4mA, The best working condition is to assure that the output current exceeds 10mA.

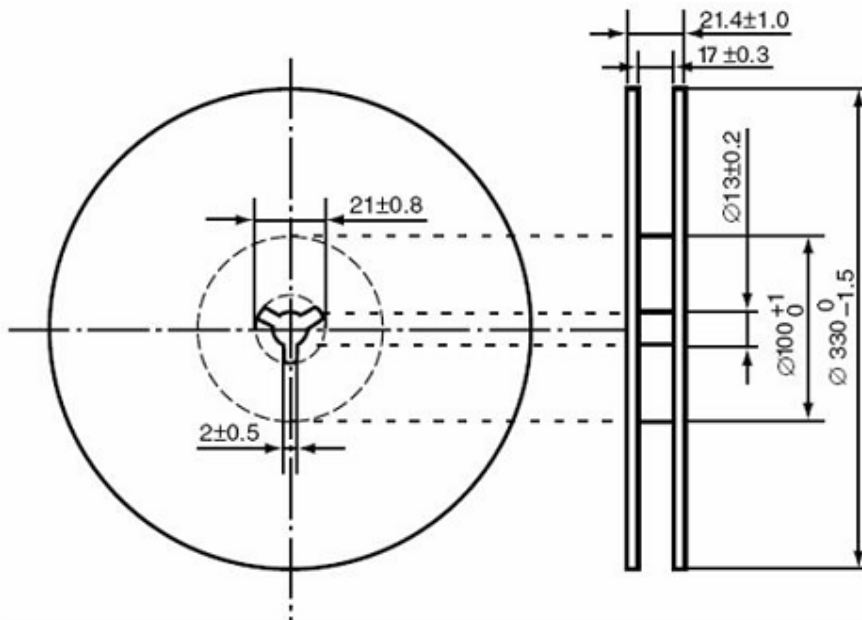
Typical Performance Characteristics:
Dropout Voltage VS. Output Current

Reference Voltage VS. Temperature

Reference Voltage VS. Thermal Protection

Output Voltage VS. Output Current

Load Transient Response

Line Transient Response


Package outline:
1.TO-252

| Package | TO-252 | Devices per reel | 2500 | Unit | mm |
|---------|--------|------------------|------|------|----|
|---------|--------|------------------|------|------|----|

Package specification:

Taping dimension: (M1: Standard Type , M2: Customized)


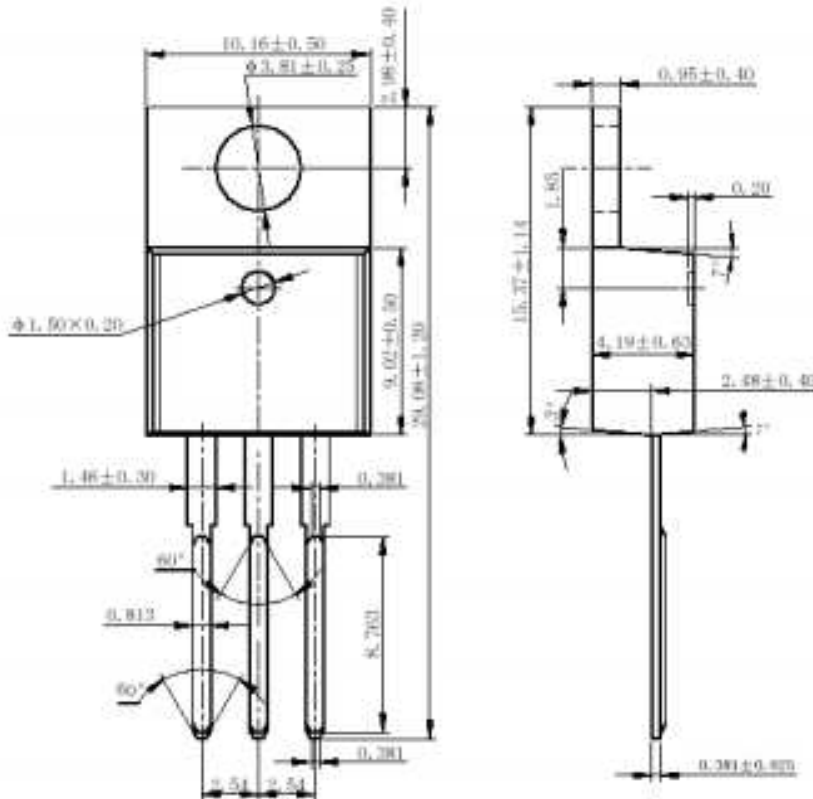
Taping reel dimension:



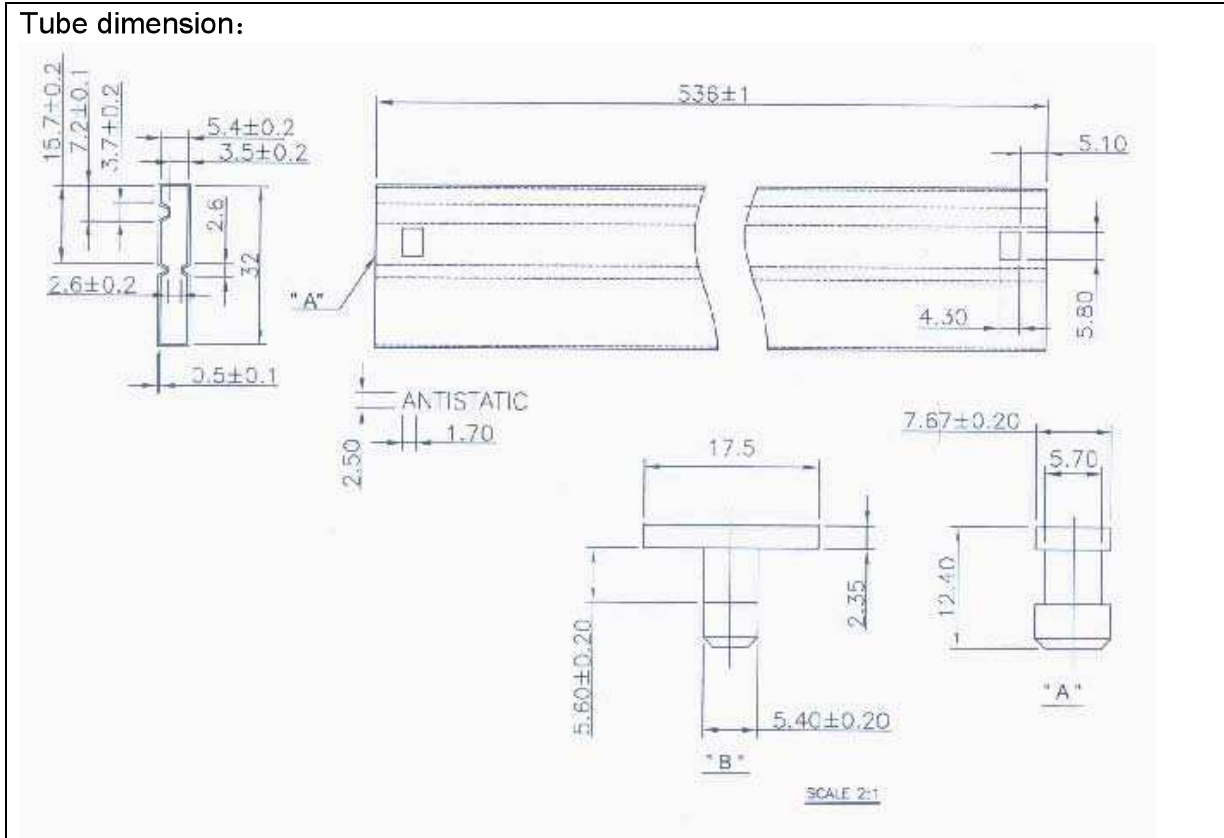
2.TO-220

| | | | | | |
|---------|--------|------------------|----|------|----|
| Package | TO-220 | Devices per tube | 50 | Unit | mm |
|---------|--------|------------------|----|------|----|

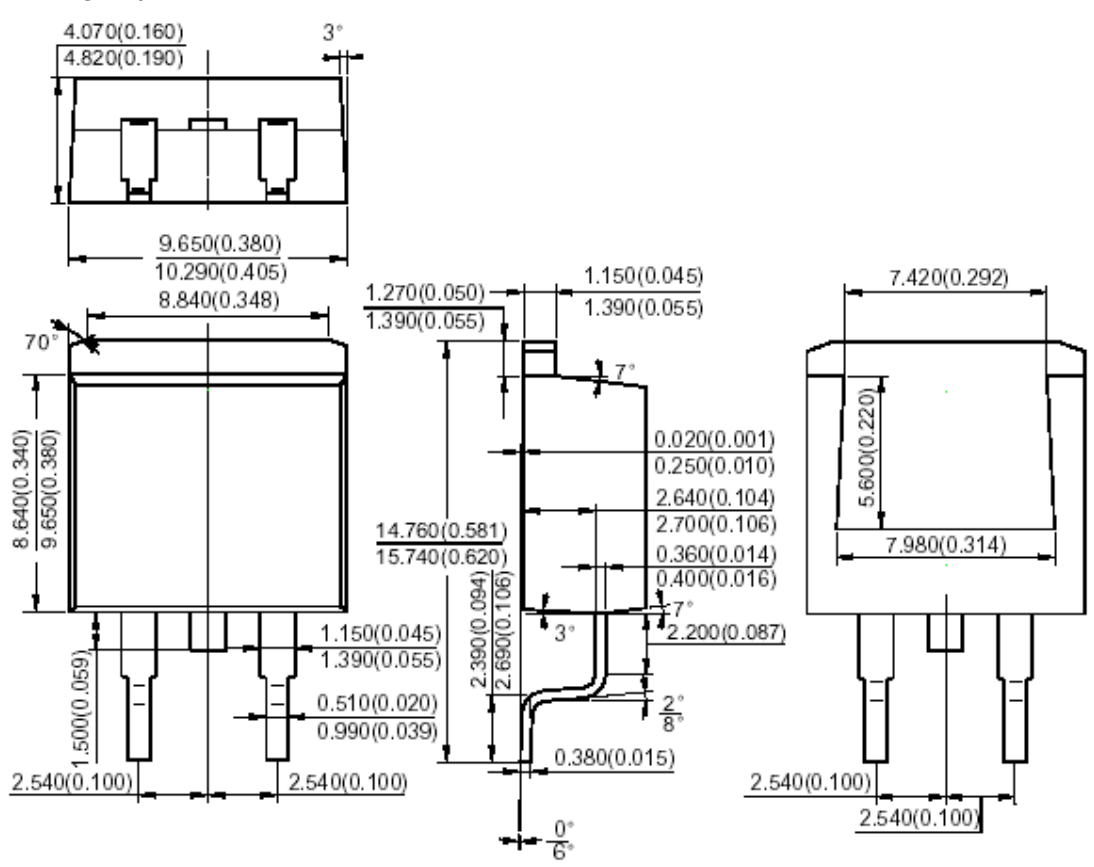
Package specification:



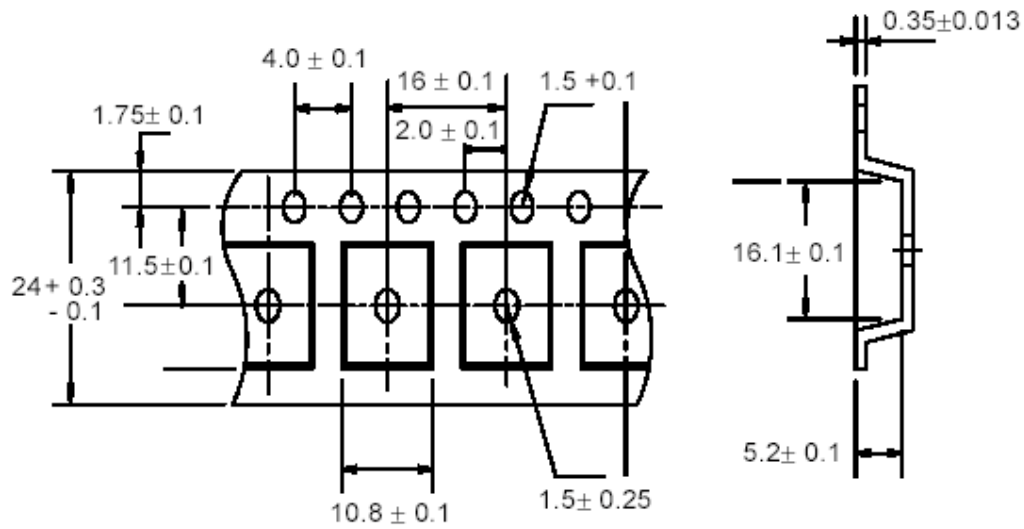
Tube dimension:



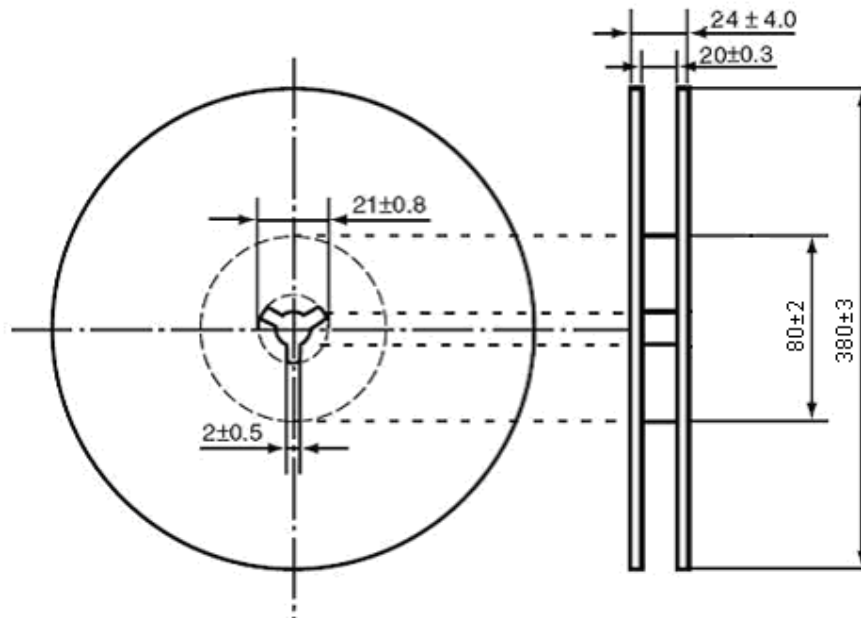
3.TO-263-2L

| Package | TO-263 | Devices per reel | 1000 | Unit | mm |
|--|--------|------------------|------|------|----|
| Package specification:  | | | | | |

Taping dimension:

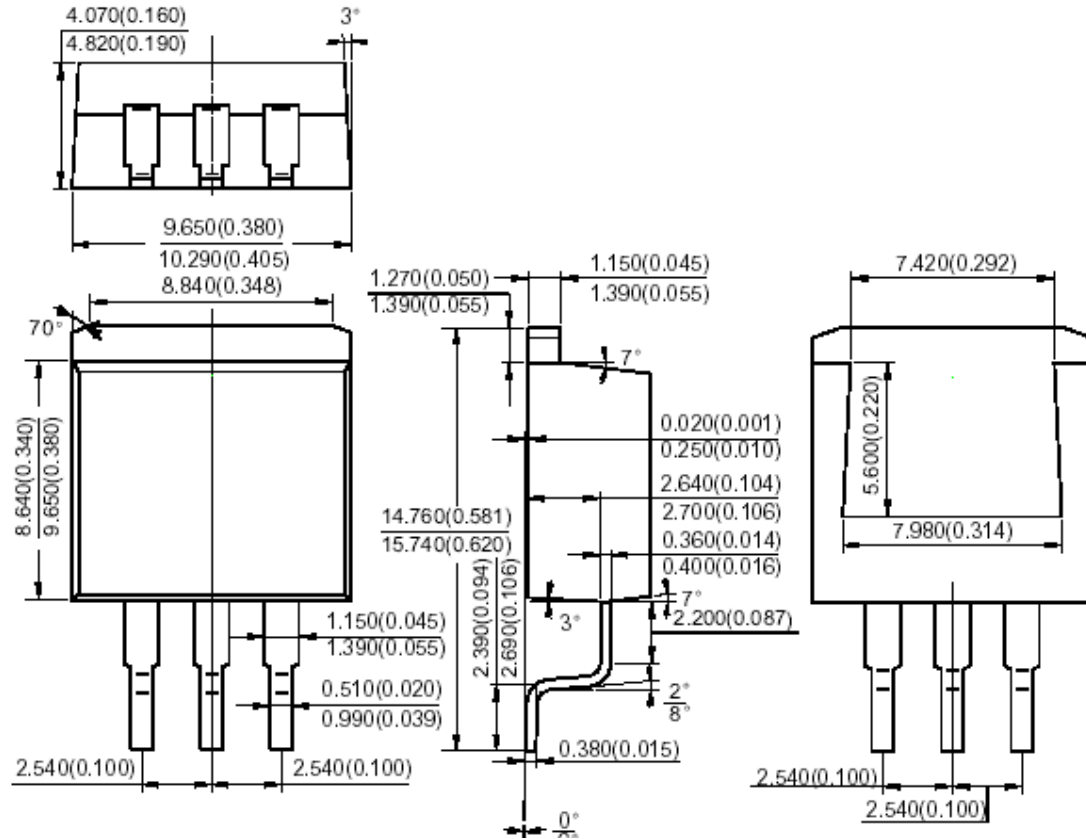
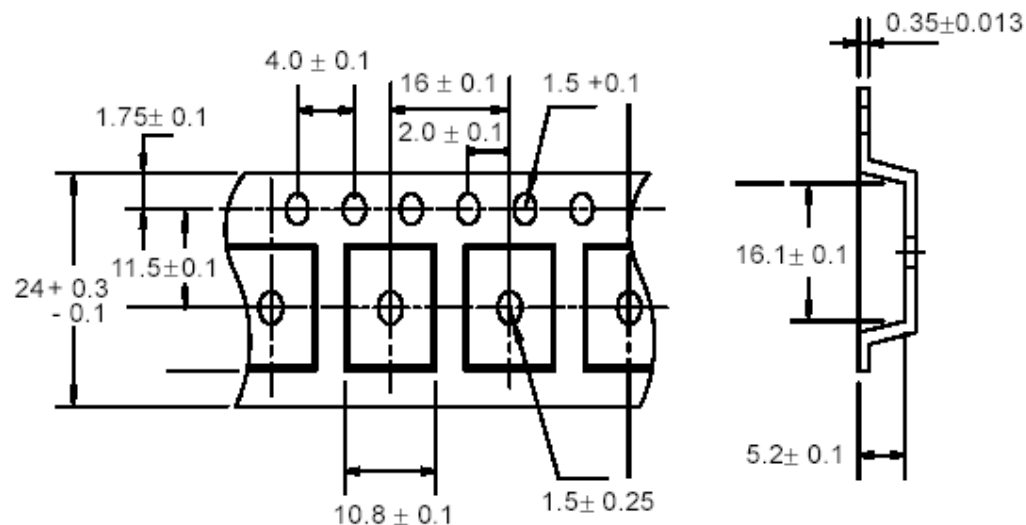


Taping reel dimension:



4.TO-263-3L

| | | | | | |
|---------|--------|------------------|------|------|----|
| Package | TO-263 | Devices per reel | 1000 | Unit | mm |
|---------|--------|------------------|------|------|----|

Package specification:

Taping dimension:


Taping reel dimension:

