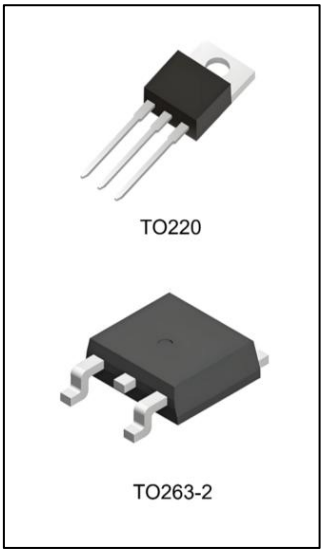
# Max.Input 35V Max.Current 1.5A Voltage regulator

# LM78XX

## General Description

LM78XX is three-terminal positive regulators. One of these regulators can deliver up to 1.5A of output current. The internal limiting of the regulator make them essentially immune to overload. When used as a replacement for a zener diode-resistor Combination, an effective improvement in output impedance can be obtained, together with lower quiescent current.




## Features

- Maximum Output current of 1.5A
- Maximum input voltage ： 35V
- Short circuit protection
- Built-in limited flow circuit
- Package：TO220 and TO263-2
- Output voltage accuracy: tolerance ±5%

## Order specification

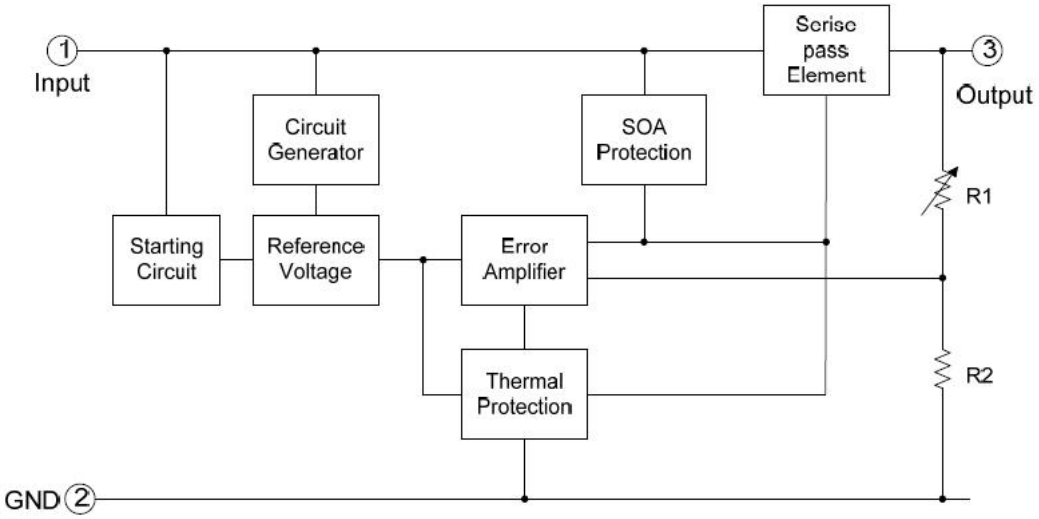
| Part No | Package | Manner of Packing | Devices per bag/reel |
|---|---|---|---|
| LM78XXCV | TO220 | Tube | 50PCS/tube |
| LM78XXCD | TO263-2 | Reel | 800PCS/reel |

Note: XX indicates output voltage. For example, 05 means product outputs 5.0V.

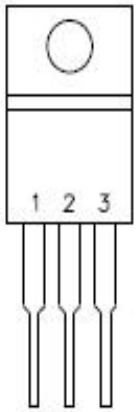
## Selection Table

| Part No. | Output Voltage | Package | Marking |
|---|---|---|---|
| LM7805 | 5.0V | TO220<br>TO263-2 | 7805 |
| LM7806 | 6.0V | | 7806 |
| LM7808 | 8.0V | | 7808 |
| LM7809 | 9.0V | | 7809 |
| LM7812 | 12V | | 7812 |

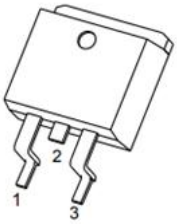
## Block Diagram




## Pin Assignment




TO-220




TO263-2

| PIN NO. | PIN NAME | FUNCTION |
|---|---|---|
| 1 | VIN | Input |
| 2 | GND | Ground |
| 3 | VOUT | Output |

## Functional Description

The LM78XX is three-terminal positive regulators. One of these regulators can deliver up to 1.5A of output current.

## Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Input Supply Voltage | $V_{IN}$ | 35 | V |
| Max. Output Current | $I_{OUT}$ | 1500 | mA |
| Power dissipation | $P_D$ | Internally limited | |
| Maximum Junction Temperature | Tj | -25~125 | ℃ |
| Storage Temperature | Tstr | -65~125 | ℃ |
| Soldering Temperature and Time | Tsol | 260(Recommended 10s) | ℃ |

Note: The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

## Electrical Characteristics

1、7805 (refer to the test circuits，TJ=-55 to 150℃，$V_I$=10V，$I_O$=500mA，$C_I$=0.33μF，$C_O$=0.1μF, unless otherwise specified.)

| Parameter | Symbol | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | TJ=+25℃ | | 4.8 | 5 | 5.2 | V |
| | | IO=5mA to 1A, PD≤15W, VI=8V to 20V | | 4.75 | 5 | 5.25 | V |
| Line Regulation (Note 1) | $\Delta V_O$ | TJ=+25℃ | VI=7V to 25V | - | - | 100 | mV |
| | | | VI=8V to 12V | - | - | 50 | mV |
| Load Regulation (Note 1) | $\Delta V_O$ | TJ=+25℃,IO=5mA to 1.2A | | - | - | 100 | mV |
| | | TJ=+25℃,IO=250mA to 750mA | | - | - | 50 | mV |
| Quiescent Current | $I_Q$ | TJ=+25℃ | | - | 2 | 6 | mA |
| Quiescent Current Change | $\Delta I_Q$ | IO=5mA to 1A | | - | - | 0.5 | mA |
| | | VI=8V to 25V | | - | - | 1.5 | mA |
| Quiescent Current Change | $\Delta V_O/\Delta T$ | IO=5mA | | - | 0.6 | - | mV/℃ |
| Short Circuit Current | $I_{SC}$ | TJ=+25℃,VI=35V | | - | 0.75 | 1.5 | A |

2、7806 (refer to the test circuits，TJ=-55 to 150℃，$V_I$ = 11 V，$I_O$=500mA，$C_I$=0.33μF，$C_O$=0.1μF, unless otherwise specified.)

| Parameter | Symbol | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | TJ=+25℃ | | 5.75 | 6 | 6.25 | V |
| | | IO=5mA to 1A, PD≤15W, VI=9V to 21V | | 5.65 | 6 | 6.35 | V |
| Line Regulation (Note 1) | $\Delta V_O$ | TJ=+25℃ | VI=8V to 25V | - | - | 100 | mV |
| | | | VI=9V to 13V | - | - | 50 | mV |
| Load Regulation (Note 1) | $\Delta V_O$ | TJ=+25℃,IO=5mA to 1.2A | | - | - | 100 | mV |
| | | TJ=+25℃,IO=250mA to 750mA | | - | - | 50 | mV |
| Quiescent Current | $I_Q$ | TJ=+25℃ | | - | 2 | 6 | mA |
| Quiescent Current Change | $\Delta I_Q$ | IO=5mA to 1A | | - | - | 0.5 | mA |
| | | VI=9V to 25V | | - | - | 0.8 | mA |
| Quiescent Current Change | $\Delta V_O/\Delta T$ | IO=5mA | | - | 0.7 | - | mV/℃ |
| Short Circuit Current | $I_{SC}$ | TJ=+25℃,VI=35V | | - | 0.75 | 1.5 | A |

3、7808 (refer to the test circuits，TJ=-55 to 150℃，$V_I$ = 14 V，$I_O$=500mA，$C_I$=0.33μF，$C_O$=0.1μF, unless otherwise specified.)

| Parameter | Symbol | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | TJ=+25℃ | | 7.7 | 8 | 8.3 | V |
| | | IO=5mA to 1A, PD≤15W, VI=11.5V to 23V | | 7.6 | 8 | 8.4 | V |
| Line Regulation (Note 1) | $\Delta V_O$ | TJ=+25℃ | VI=10.5V to 25V | - | - | 100 | mV |
| | | | VI=11V to 17V | - | - | 50 | mV |
| Load Regulation (Note 1) | $\Delta V_O$ | TJ=+25℃,IO=5mA to 1.2A | | - | - | 100 | mV |
| | | TJ=+25℃,IO=250mA to 750mA | | - | - | 50 | mV |
| Quiescent Current | $I_Q$ | TJ=+25℃ | | - | 2 | 6 | mA |
| Quiescent Current Change | $\Delta I_Q$ | IO=5mA to 1A | | - | - | 0.5 | mA |
| | | VI=11.5V to 25V | | - | - | 1 | mA |
| Quiescent Current Change | $\Delta V_O/\Delta T$ | IO=5mA | | - | 1 | - | mV/℃ |
| Short Circuit Current | $I_{SC}$ | TJ=+25℃,VI=35V | | - | 0.75 | 1.5 | A |

4、7809 (refer to the test circuits，TJ=-55 to 150℃，$V_I$ = 15 V，$I_O$=500mA，$C_I$=0.33μF，$C_O$=0.1μF, unless otherwise specified.)

| Parameter | Symbol | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | TJ=+25℃ | | 8.64 | 9 | 9.36 | V |
| | | IO=5mA to 1A, PD≤15W, VI=11.5V to 26V | | 8.55 | 9 | 9.45 | V |
| Line Regulation (Note 1) | $\Delta V_O$ | TJ=+25℃ | VI=11.5V to 26V | - | - | 100 | mV |
| | | | VI=12V to 18V | - | - | 50 | mV |
| Load Regulation (Note 1) | $\Delta V_O$ | TJ=+25℃,IO=5mA to 1.2A | | - | - | 100 | mV |
| | | TJ=+25℃,IO=250mA to 750mA | | - | - | 50 | mV |
| Quiescent Current | $I_Q$ | TJ=+25℃ | | - | 2 | 6 | mA |
| Quiescent Current Change | $\Delta I_Q$ | IO=5mA to 1A | | - | - | 0.5 | mA |
| | | VI=11.5V to 26V | | - | - | 1 | mA |
| Quiescent Current Change | $\Delta V_O/\Delta T$ | IO=5mA | | - | 1 | - | mV/℃ |
| Short Circuit Current | $I_{SC}$ | TJ=+25℃,VI=35V | | - | 0.75 | 1.5 | A |

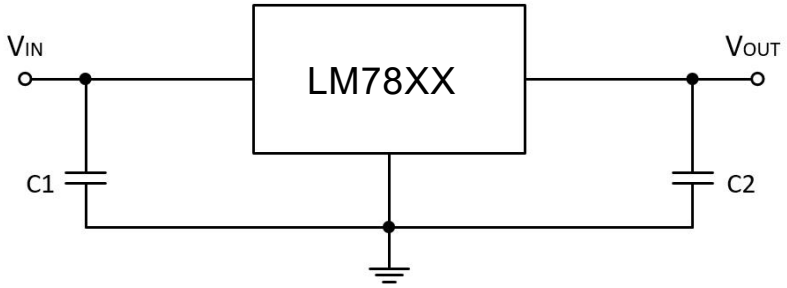
5、7812 (refer to the test circuits，TJ=-55 to 150℃，$V_I$ = 19V，$I_O$=500mA，$C_I$=0.33μF，$C_O$=0.1μF, unless otherwise specified.)

| Parameter | Symbol | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | TJ=+25℃ | | 11.5 | 12 | 12.5 | V |
| | | IO=5mA to 1A, PD≤15W, VI=15.5V to 27V | | 11.4 | 12 | 12.6 | V |
| Line Regulation (Note 1) | $\Delta V_O$ | TJ=+25℃ | VI=14.5V to 30V | - | - | 100 | mV |
| | | | VI=16V to 22V | - | - | 50 | mV |
| Load Regulation (Note 1) | $\Delta V_O$ | TJ=+25℃,IO=5mA to 1.2A | | - | - | 100 | mV |
| | | TJ=+25℃,IO=250mA to 750mA | | - | - | 50 | mV |
| Quiescent Current | $I_Q$ | TJ=+25℃ | | - | 2 | 6 | mA |
| Quiescent Current Change | $\Delta I_Q$ | IO=5mA to 1A | | - | - | 0.5 | mA |
| | | VI=15V to 30V | | - | - | 1 | mA |
| Quiescent Current Change | $\Delta V_O/\Delta T$ | IO=5mA | | - | 1.5 | - | mV/℃ |
| Short Circuit Current | $I_{SC}$ | TJ=+25℃,VI=35V | | - | 0.75 | 1.5 | A |

LNR: Line Regulation. The change in output voltage for a change in the input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that the average chip temperature is not significantly affected.

LDR: Load Regulation.The change in output voltage for a change in load current at constant chip temperature.

## Application Circuits




C1=C2=1uF

## Typical Performance Characteristics

Figure 1：Dropout voltage vs Junction temperature

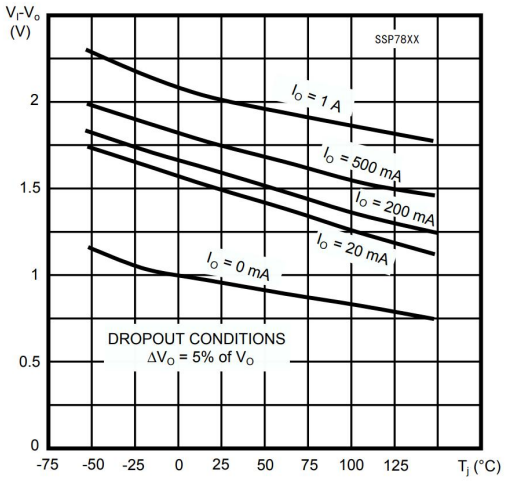



Figure 2：Peak output current vs Input/output differential voltage

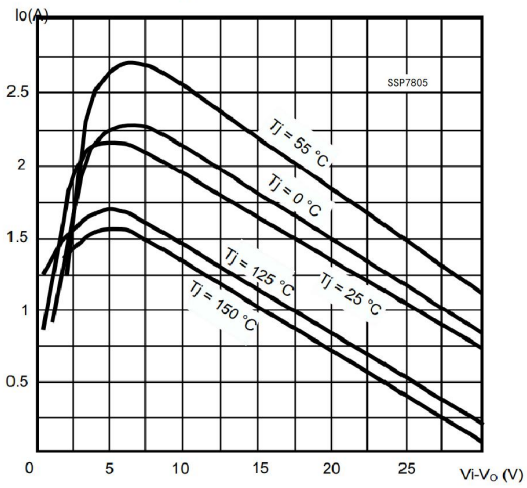



Figure 3：Supply voltage rejection vs Frequency temperature

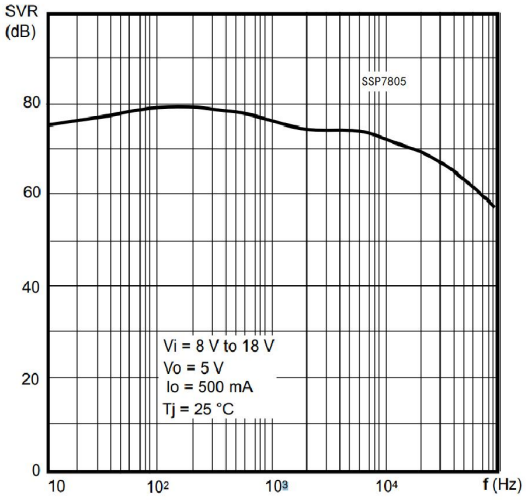



Figure 4：Quiescent current vs Junction

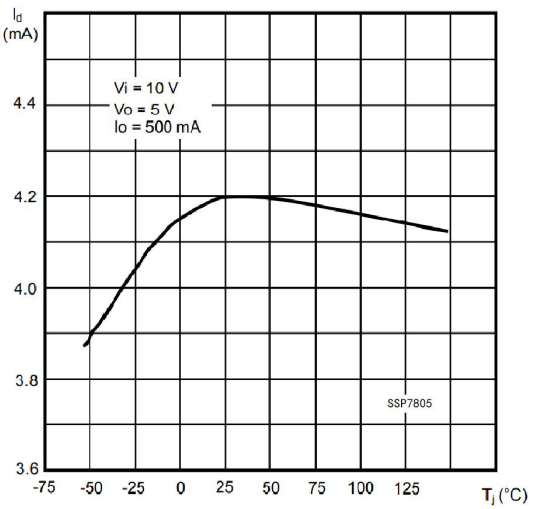


Figure 5：Output voltage vs Junction temperature

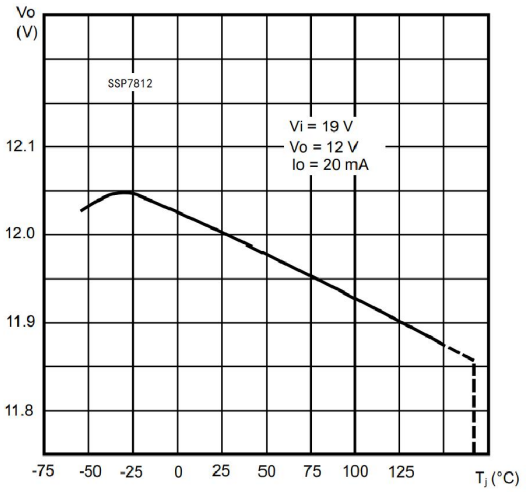



Figure 6：Load transient response

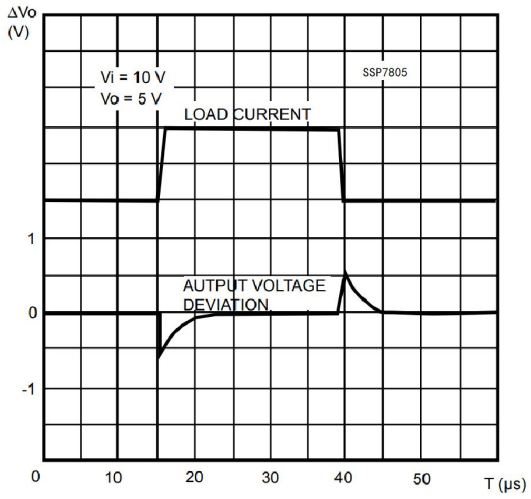



Figure 7：Output impedance vs Frequency

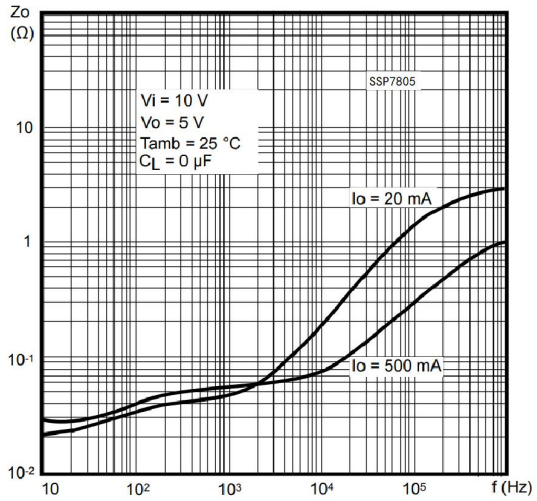



Figure 8：Line transient response

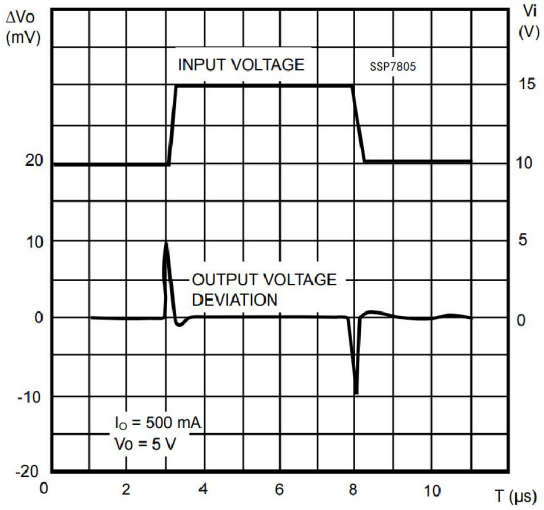
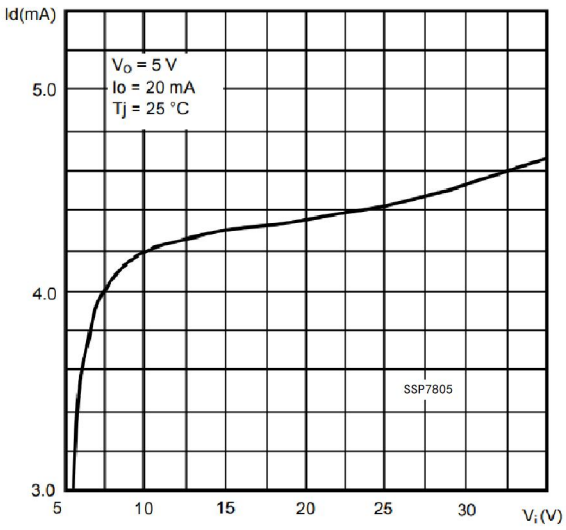
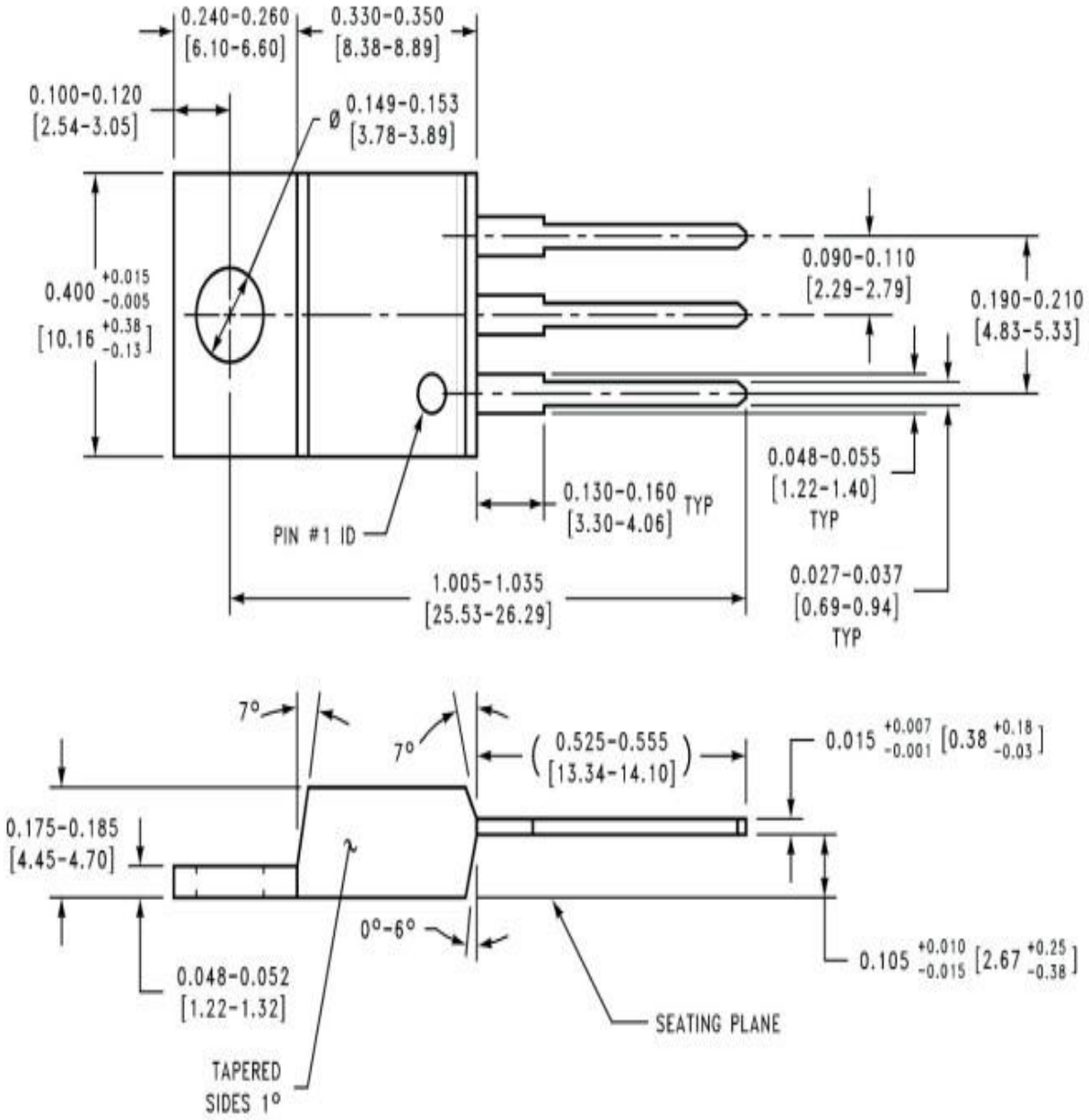


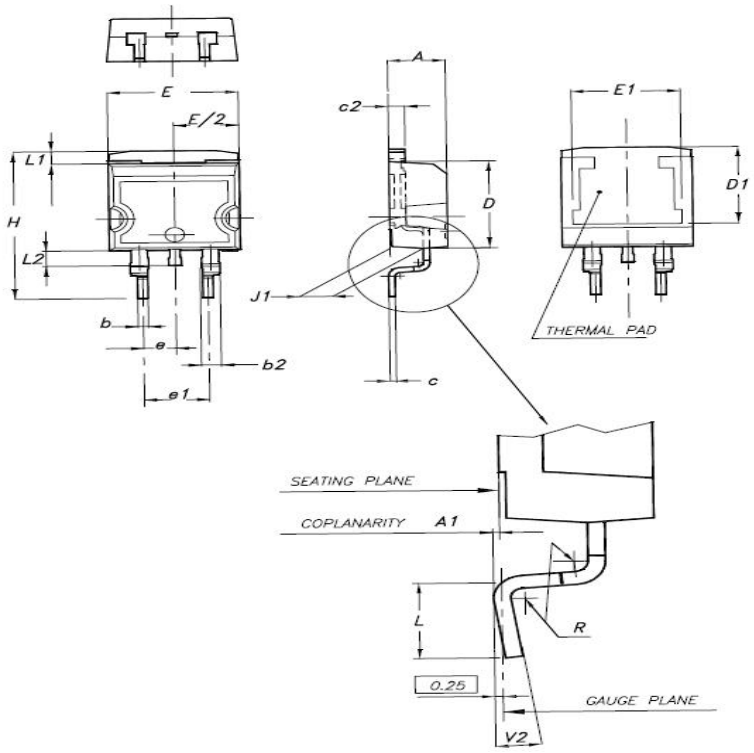

Figure9：Quiescent current vs Input voltage



## Package Information（TO220）



## Package Information（TO263-2）




| Symbol | Dimensions In Millimeters | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| A | 4.40 | - | 4.60 |
| A1 | 0.03 | - | 0.23 |
| b | 0.70 | - | 0.93 |
| b2 | 1.14 | - | 1.70 |
| c | 0.45 | - | 0.60 |
| c2 | 1.23 | - | 1.36 |
| D | 8.95 | - | 9.35 |
| D1 | 7.50 | - | - |
| E | 10 | - | 10.40 |
| E1 | 8.50 | - | - |
| e | - | 2.54 | - |
| e1 | 4.88 | - | 5.28 |
| H | 15 | - | 15.85 |
| J1 | 2.49 | - | 2.69 |
| L | 2.29 | - | 2.79 |
| L1 | 1.27 | - | 1.40 |
| L2 | 1.30 | - | 1.75 |
| R | - | 0.4 | - |
| V2 | 0° | - | 8° |

## Special Instructions

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

## Version Change Description

| | | |
|---|---|---|
| Version：V1.2 | Author：Yangyang | Time：2021.3.10 |
| Modify the record： | | |
| 1. Re-typesetting the manual and checking some data | | |
| Version：V1.3 | Author：Yang | Time：2025.6.9 |
| Modify the record： | | |
| 1. Updating and modifying the TO263-2 package | | |

# Statement

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