## General Description

The SE78XX series are three terminal positive voltage regulators designed for a wide variety of applications including local, on-card regulation.

The SE78XX is complete with internal current limiting, thermal shutdown protection, and safe-area compensation which make them virtually immune from output overload. If adequate heat sinking is provided, these regulators can deliver output currents up to 1A.

The SE78XX are available in TO220 and TO252 packages.

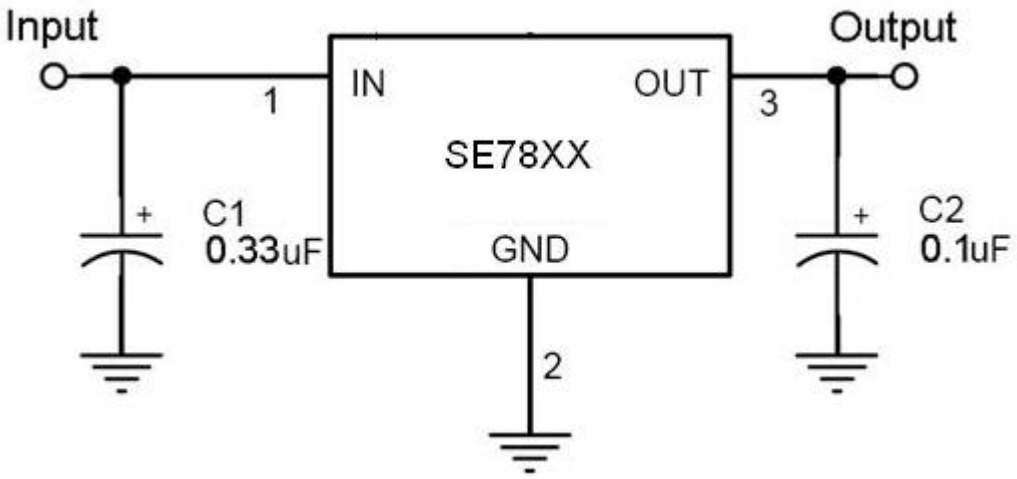
## Features

- Output Current up to 1A
- Fixed Output Voltages of 5V, 9Vand 12V
- Output Voltage Accuracy of ±4% over the Full Temperature Range
- Internal Short Circuit Current Limiting
- Internal Thermal Overload Protection
- Output Transistor Safe-area Protection
- Low Load Regulation
- Stable Performance in High Temperature

## Applications

- Intelligent Ammeter
- Power Management for Computer Mother Board
- LCD Monitor and LCD TV
- Post Regulators for Switching Supplies

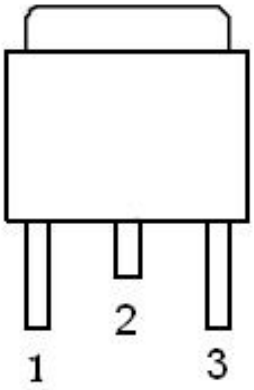
## Typical Application



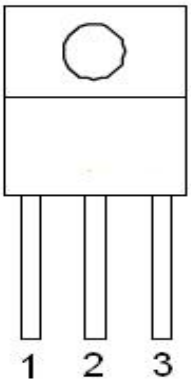


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## Pin Configuration




**TO252**
**1.IN 2.GND 3.OUT**

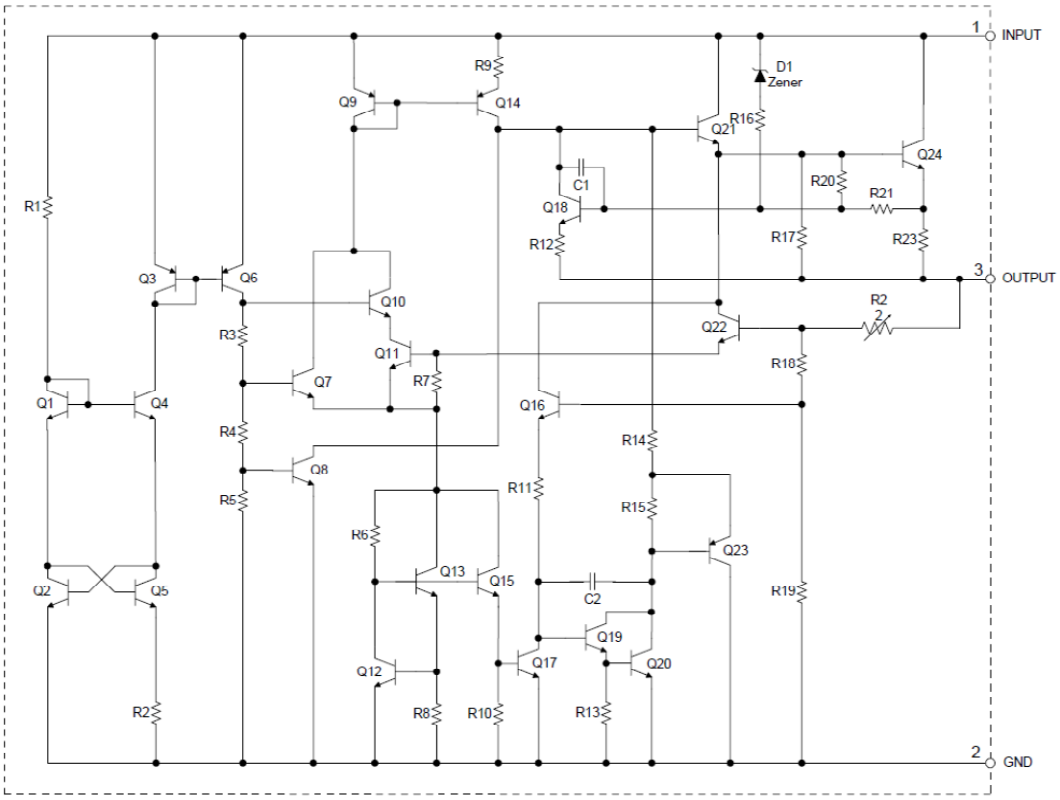



**TO220**
**1.IN 2.GND 3.OUT**

## Pin Description

| NO. | Pin Name | Pin Function Description |
|---|---|---|
| 1 | IN | Voltage Input |
| 2 | GND | Ground |
| 3 | OUT | Voltage Output |

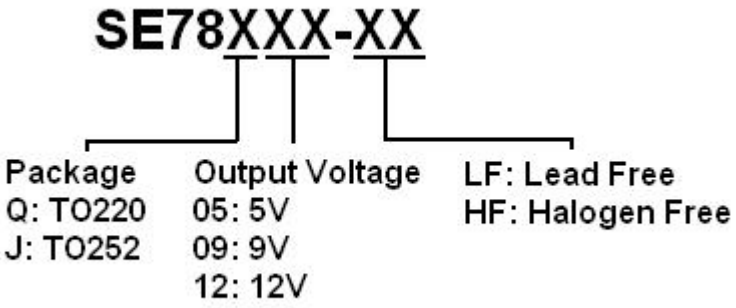
## Functional Block Diagram





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## Ordering Information




| Part Number | Marking Information | Package | Remarks |
|---|---|---|---|
| SE78QXX-LF | SE78XX<br>YYWW-LF | TO220 | XX means Output Voltage<br>YYWW means Production batch<br>LF means Lead Free |
| SE78JXX-LF | SE78XX<br>YYWW-LF | TO252 | |
| SE78QXX-HF | SE78XX<br>YYWW-HF | TO220 | XX means Output Voltage<br>YYWW means Production batch<br>HF means Halogen Free |
| SE78JXX-HF | SE78XX<br>YYWW-HF | TO252 | |

## Absolute Maximum Ratings

| Symbol | Parameter | | Maximum | Units |
|---|---|---|---|---|
| $V_{IN}$ | Input Voltage | | 36 | V |
| $T_{LEAD}$ | Lead Temperature (Soldering, 10sec) | | 260 | ℃ |
| $P_D$ | Power Dissipation | | Internal Limited | W |
| $T_J$ | Operating Junction Temperature | | 150 | ℃ |
| $T_{STG}$ | Storage Temperature Range | | -65~+150 | ℃ |
| $\theta_{JC}$ | Thermal Resistance -Junction to Case | TO220 | 5 | ℃/W |
| | | TO252 | 10 | |
| $\theta_{JA}$ | Thermal Resistance -Junction to Ambient | TO220 | 45 | ℃/W |
| | | TO252 | 55 | |

**Note:**Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

## Electrical Characteristics

### SE7805 Electrical Characteristics

（Vcc=10V ;Iout=1A ； Tj=25℃ unless otherwise specified）

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | $T_j$ =25°C | 4.9 | 5 | 5.1 | V |
| | | $I_{OUT}$=5mA to 1A, $V_{IN}$=7.5V to 20V,$P_D$≤15W | 4.8 | | 5.2 | |
| Line Regulation | $V_{RLINE}$ | $V_{IN}$=7.5V to 20V, $I_{OUT}$=500mA, $T_J$=25°C | | 25 | 50 | mV |
| Load Regulation | $V_{RLOAD}$ | $V_{IN}$=10V, $I_{OUT}$=5mA to 1A, $T_J$=25°C | | 20 | 50 | |
| Quiescent Current | Iq | $V_{IN}$=10V, $I_{OUT}$=0 | | 3.2 | 6 | mA |
| Quiescent Current Change | ΔIq | $V_{IN}$=8V to 25V, $I_{OUT}$=500mA, $T_J$=25°C | | 0.3 | 0.8 | mA |
| | | $I_{OUT}$=5mA to 1A, $T_J$=25°C | | 0.08 | 0.5 | mA |
| Ripple Rejection | PSRR | $V_{IN}$=8V to 18V, f=120Hz, $I_{OUT}$=500mA | | 70 | | dB |
| Dropout Voltage | $V_{DROP}$ | $\Delta V_{OUT}$=1%, $I_{OUT}$=1A, $T_J$=25°C | | 2 | | V |
| Output Noise Voltage | $N_{OUT}$ | f=10Hz to 100kHz, $T_A$=25°C | | 10 | | uV/Vo |
| Output Resistance | $R_{OUT}$ | f=1KHz | | 10 | | mΩ |
| Short Circuit Current | $I_{SC}$ | $V_{IN}$=35V, $T_A$=25°C | | 0.05 | | A |
| Peak Output Current | $I_{PK}$ | $V_{IN}$=10V, $T_J$=25°C | | 2.2 | | A |
| Temperature Coefficient of Output Voltage | $\Delta V_{OUT}/\Delta T$ | | | 0.4 | | mV/℃ |
| | $(\Delta V_{OUT}/V_{OUT})/\Delta T$ | | | 80 | | ppm/℃ |

**Note1**: Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature aspossible, and thermal effects must be taken into account separately.

**Note2**: This specification applies only for DC power dissipation permitted by absolute maximum ratings.

## Electrical Characteristics(Continue)

### SE7809 Electrical Characteristics

（Vcc=15V ;Iout=1A ； Tj=25℃ unless otherwise specified）

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | $T_j$ =25°C | 8.82 | 9 | 9.18 | V |
| | | $I_{OUT}$=5mA to 1A, $V_{IN}$=11.5V to 23V,$P_D$≤15W | 8.65 | | 9.35 | |
| Line Regulation | $V_{RLINE}$ | $V_{IN}$=11.5V to 23V, $I_{OUT}$=500mA, $T_J$=25°C | | 25 | 90 | mV |
| Load Regulation | $V_{RLOAD}$ | $V_{IN}$=14V, $I_{OUT}$=5mA to 1A, $T_J$=25°C | | 25 | 100 | |
| Quiescent Current | Iq | $V_{IN}$=15V, $I_{OUT}$=0 | | 3.2 | 6 | mA |
| Quiescent Current Change | ΔIq | $V_{IN}$=11.5V to 23V, $I_{OUT}$=500mA, $T_J$=25°C | | 0.3 | 0.8 | mA |
| | | $I_{OUT}$=5mA to 1A, $T_J$=25°C | | 0.08 | 0.5 | mA |
| Ripple Rejection | PSRR | $V_{IN}$=11.5V to 21.5V, f=120Hz, $I_{OUT}$=500mA | | 61 | | dB |
| Dropout Voltage | $V_{DROP}$ | $\Delta V_{OUT}$=1%, $I_{OUT}$=1A, $T_J$=25°C | | 2 | | V |
| Output Noise Voltage | $N_{OUT}$ | f=10Hz to 100kHz, $T_A$=25°C | | 10 | | uV/Vo |
| Output Resistance | $R_{OUT}$ | f=1KHz | | 10 | | mΩ |
| Short Circuit Current | $I_{SC}$ | $V_{IN}$=35V, $T_A$=25°C | | 0.2 | | A |
| Peak Output Current | $I_{PK}$ | $V_{IN}$=15V, $T_J$=25°C | | 2.2 | | A |
| Temperature Coefficient of Output Voltage | $\Delta V_{OUT}/\Delta T$ | | | 0.72 | | mV/℃ |
| | $(\Delta V_{OUT}/V_{OUT})/\Delta T$ | | | 80 | | ppm/℃ |

**Note1**:Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible, and thermal effects must be taken into account separately.

**Note2**: This specification applies only for DC power dissipation permitted by absolute maximum ratings.

## Electrical Characteristics(Continue)

### SE7812 Electrical Characteristics

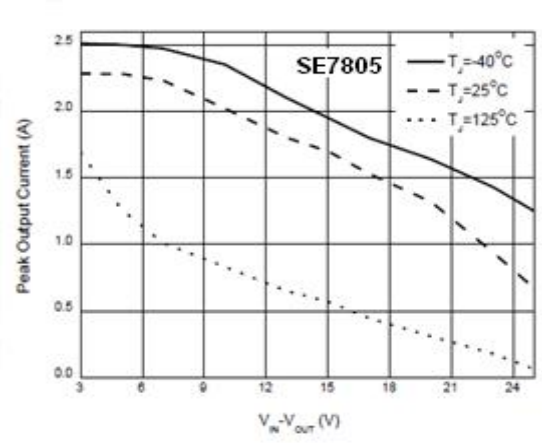
（Vcc=19V ;Iout=1A ； Tj=25℃ unless otherwise specified）

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | $T_j$ =25°C | 11.75 | 12 | 12.25 | V |
| | | $I_{OUT}$=5mA to 1A, $V_{IN}$=14.8V to 27V,$P_D$≤15W | 11.5 | | 12.5 | |
| Line Regulation | $V_{RLINE}$ | $V_{IN}$=14.8V to 27V, $I_{OUT}$=500mA, $T_J$=25°C | | 25 | 120 | mV |
| Load Regulation | $V_{RLOAD}$ | $V_{IN}$=19V, $I_{OUT}$=5mA to 1A, $T_J$=25°C | | 40 | 120 | |
| Quiescent Current | Iq | $V_{IN}$=19V, $I_{OUT}$=0 | | 3.4 | 6 | mA |
| Quiescent Current Change | ΔIq | $V_{IN}$=14.8V to 30V, $I_{OUT}$=500mA, $T_J$=25°C | | 0.3 | 0.8 | mA |
| | | $I_{OUT}$=5mA to 1A, $T_J$=25°C | | 0.08 | 0.5 | mA |
| Ripple Rejection | PSRR | $V_{IN}$=15V to 25V, f=120Hz, $I_{OUT}$=500mA | | 60 | | dB |
| Dropout Voltage | $V_{DROP}$ | $\Delta V_{OUT}$=1%, $I_{OUT}$=1A, $T_J$=25°C | | 2 | | V |
| Output Noise Voltage | $N_{OUT}$ | f=10Hz to 100kHz, $T_A$=25°C | | 10 | | uV/Vo |
| Output Resistance | $R_{OUT}$ | f=1KHz | | 11 | | mΩ |
| Short Circuit Current | $I_{SC}$ | $V_{IN}$=35V, $T_A$=25°C | | 0.2 | | A |
| Peak Output Current | $I_{PK}$ | $V_{IN}$=18V, $T_J$=25°C | | 2.2 | | A |
| Temperature Coefficient of Output Voltage | $\Delta V_{OUT}/\Delta T$ | | | 0.96 | | mV/℃ |
| | $(\Delta V_{OUT}/V_{OUT})/\Delta T$ | | | 80 | | ppm/℃ |

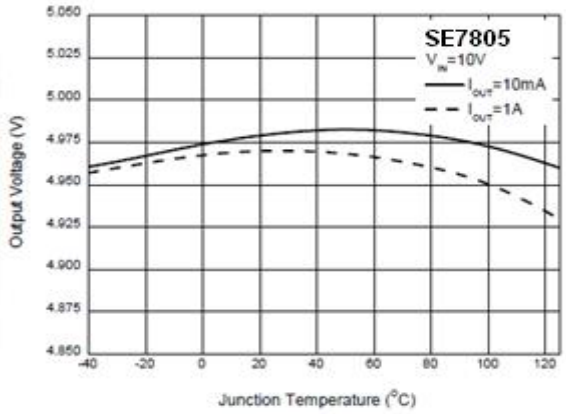
**Note1**:Pulse testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible, and thermal effects must be taken into account separately.

**Note2**: This specification applies only for DC power dissipation permitted by absolute maximum ratings

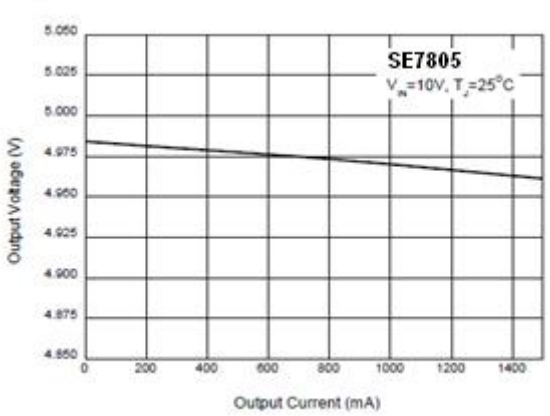
## Typical Performance Characteristics



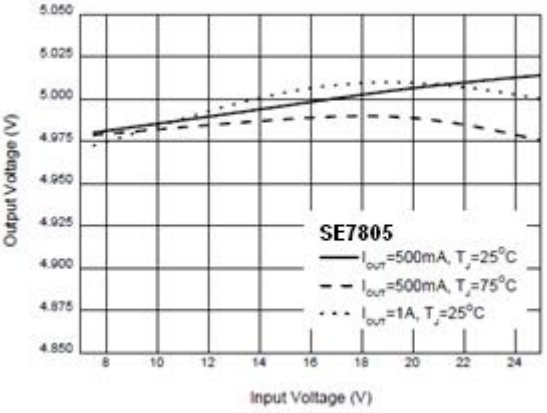

Peak Output Current vs Input/Output Differential Voltage



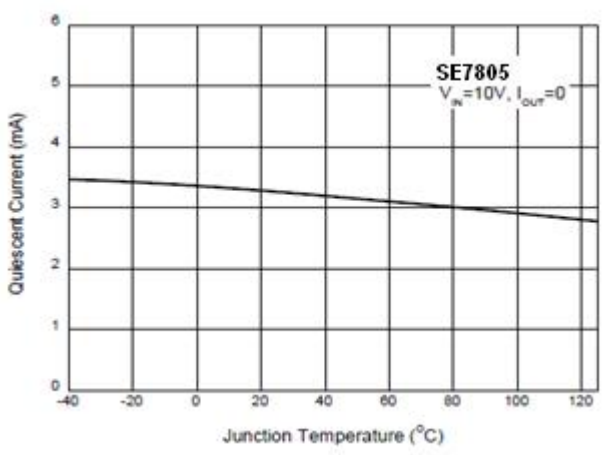

Output Voltage vs Junction Temperature



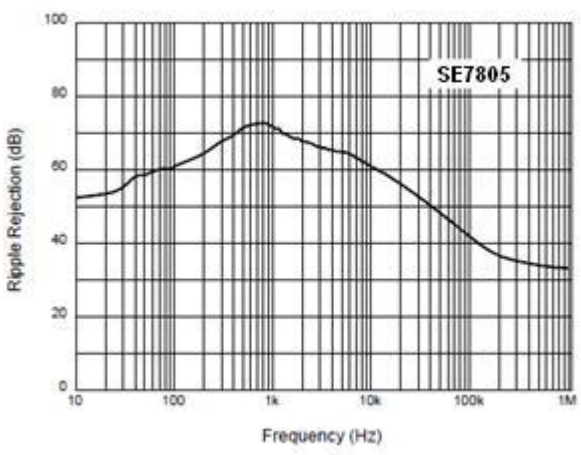

Output Voltage vs Output Current




Output Voltage vs Input Voltage



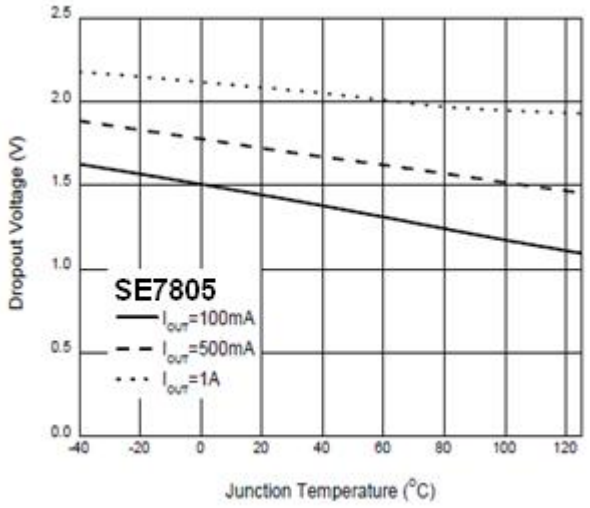

Quiescent Current vs Junction Temperature



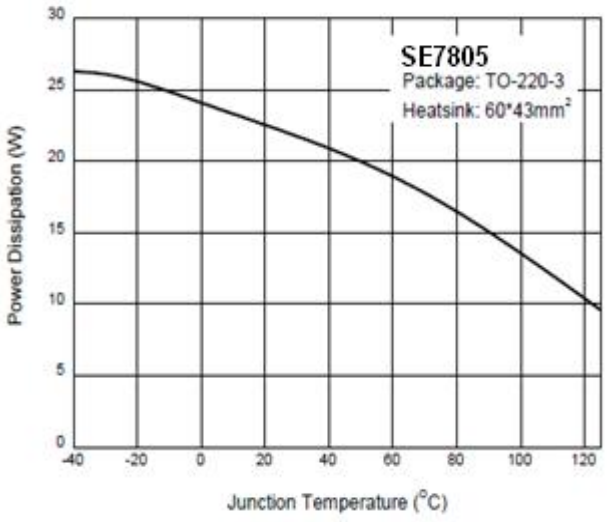

Ripple Rejection vs Frequency


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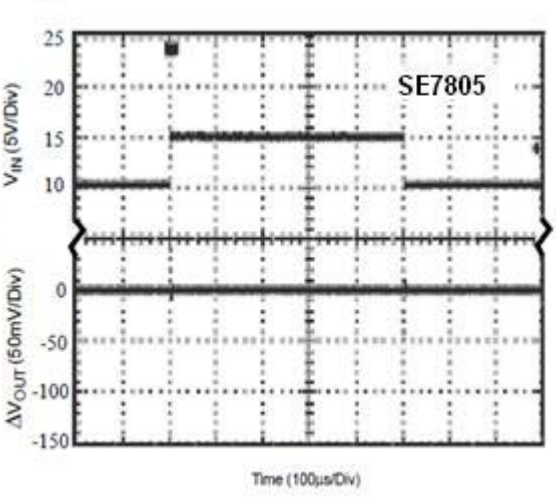
## Typical Performance Characteristics(Continue)



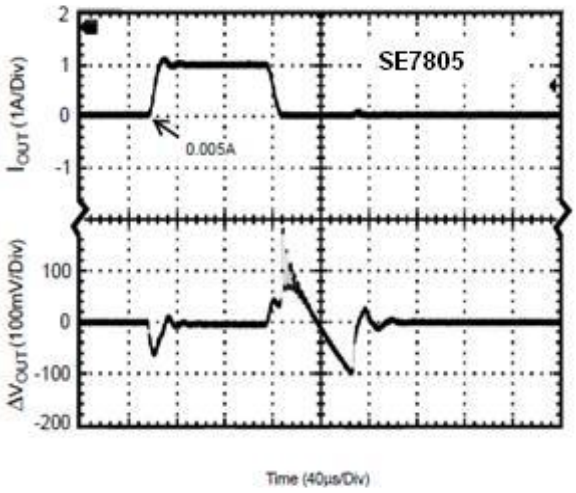

Dropout Voltage vs Junction Temperature




Power Dissipation vs Junction Temperature




Line Transient
(Conditions: $I_{OUT}$=500mA, $C_{OUT}$=0.1μF)

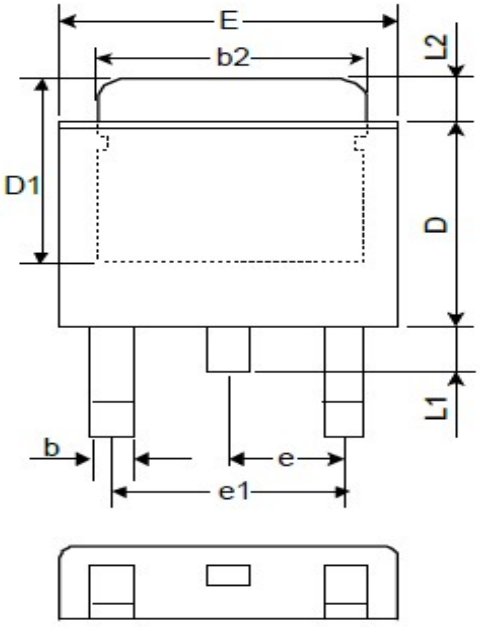


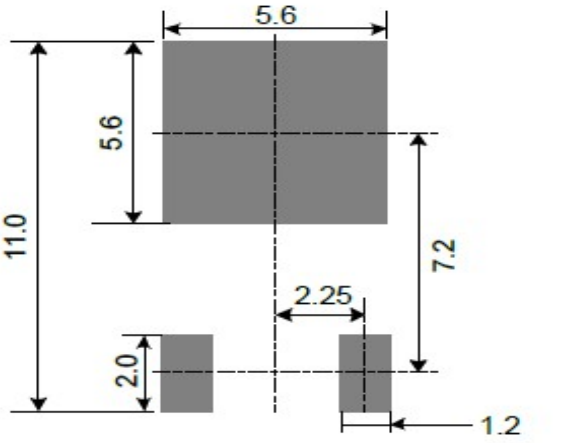

Load Transient
(Conditions: $C_{IN}$=0.33μF, $C_{OUT}$=0.1μF)


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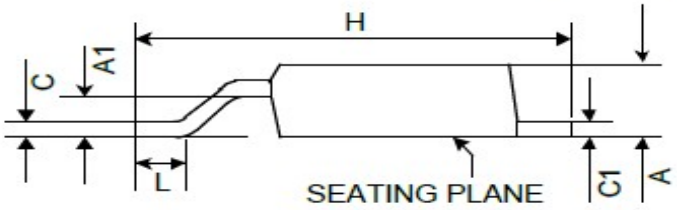
## Outline Drawing For SE78XX

### (1)TO252




Land Pattern Recommendation (Unit: mm)

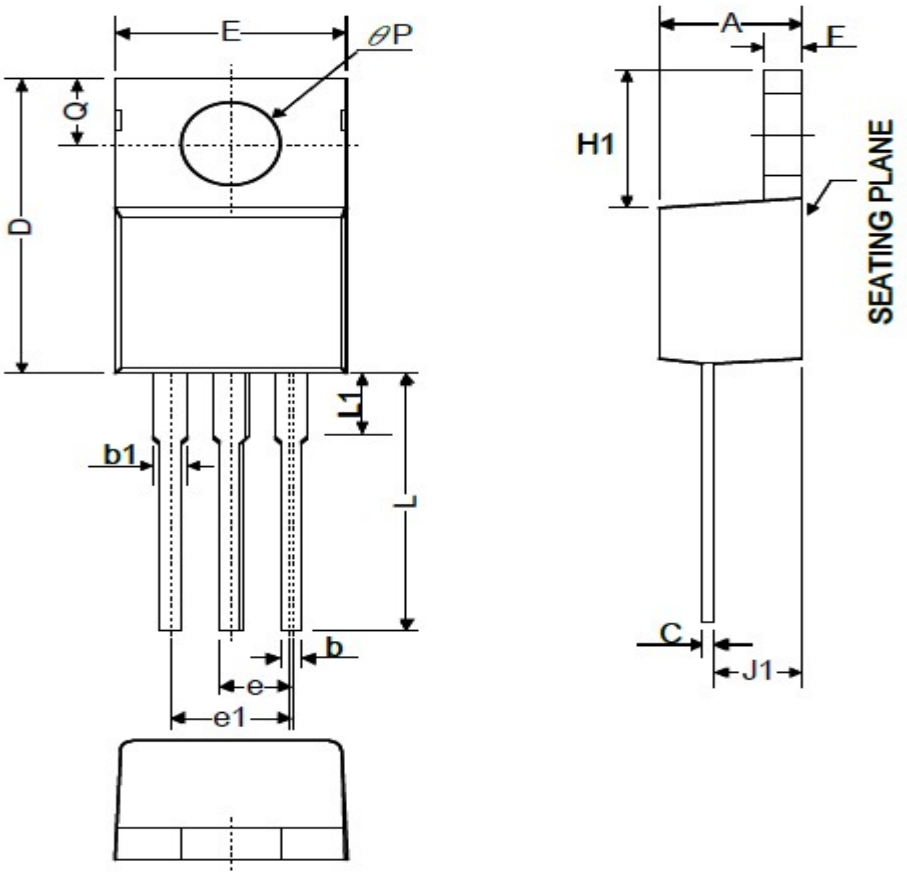



| Symbol | Dimensions in Millimeters | | | Dimensions in Inches | | |
|---|---|---|---|---|---|---|
| | Min. | Nom. | Max. | Min. | Nom. | Max. |
| A | 2.18 | 2.29 | 2.39 | 0.086 | 0.09 | 0.094 |
| A1 | - | - | 0.13 | - | - | 0.005 |
| b | 0.51 | 0.71 | 0.89 | 0.02 | 0.028 | 0.035 |
| b2 | 4.95 | 5.21 | 5.46 | 0.195 | 0.205 | 0.215 |
| C | 0.46 | 0.53 | 0.61 | 0.018 | 0.021 | 0.024 |
| C1 | 0.46 | 0.53 | 0.58 | 0.018 | 0.021 | 0.023 |
| D | 5.33 | 5.46 | 6.22 | 0.21 | 0.215 | 0.245 |
| D1 | 4.57 | - | - | 0.18 | - | - |
| E | 6.35 | 6.55 | 6.73 | 0.25 | 0.258 | 0.265 |
| e | | 2.29 BSC | | | 0.090 BSC. | |
| e1 | | 4.58 BSC | | | 0.180 BSC. | |
| H | 9.4 | 9.7 | 10.4 | 0.37 | 0.382 | 0.41 |
| L | 1.4 | 1.6 | 1.78 | 0.055 | 0.063 | 0.07 |
| L1 | - | - | 1.02 | - | - | 0.04 |
| L2 | 1.52 | 1.78 | 2.03 | 0.06 | 0.07 | 0.08 |

Mold flash shall not exceed 0.005inch per side
JEDEC outline: TO-252


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## (2)TO220




| Symbol | Dimensions in Millimeters | | | Dimensions in Inches | | |
|---|---|---|---|---|---|---|
| | Min. | Nom. | Max. | Min. | Nom. | Max. |
| A | 3.55 | 4.19 | 4.83 | 0.14 | 0.165 | 0.19 |
| b1 | 1.14 | 1.45 | 1.78 | 0.045 | 0.057 | 0.07 |
| b | 0.38 | 0.69 | 1.02 | 0.015 | 0.027 | 0.04 |
| C | 0.36 | 0.48 | 0.61 | 0.014 | 0.019 | 0.024 |
| D | 14.2 | 15.4 | 16.5 | 0.56 | 0.605 | 0.65 |
| E | 9.7 | 10.2 | 10.7 | 0.38 | 0.4 | 0.42 |
| e | | 2.54BSC | | | 0.1BSC | |
| e1 | | 5.08BSC | | | 0.2BSC | |
| F | 0.51 | 0.95 | 1.397 | 0.02 | 0.038 | 0.055 |
| H1 | 5.84 | 6.35 | 6.86 | 0.23 | 0.25 | 0.27 |
| J1 | 2.03 | 2.48 | 2.92 | 0.08 | 0.098 | 0.115 |
| L | 12.7 | 13.7 | 14.73 | 0.5 | 0.54 | 0.58 |
| L1 | | | 6.35 | | | 0.25 |
| θP | 3.53 | 3.81 | 4.09 | 0.139 | 0.15 | 0.161 |
| Q | 2.54 | 2.98 | 3.43 | 0.1 | 0.118 | 0.135 |

Mold flash shall not exceed 0.005inch per side
JEDEC outline: TO-220 AB


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