# TS79M00 series

## 3-Terminal Medium Current Negative Voltage Regulator

TO-220


TO-252


Pin assignment:
1. Ground
2. Input
3. Output

(Heatsink surface connected to Pin 2)

**Voltage Range - 5V to - 24V**
**Output Current up to 0.5A**

## General Description

The TS79M00 Series negative voltage regulators are identical to the popular TS7900 Series devices, except that they are specified for only half the output current. Like the TS7900 devices, the TS79M00 Series 3-Terminal regulators are intended for local, on-card voltage regulation.

Internal current limiting, thermal shutdown circuitry and safe-area compensation for the internal pass transistor combine to make these devices remarkably rugged under most operating conditions. Maximum output current with adequate heatsink is 500mA

This series is offered in 3-pin TO-220, TO-252 package.

## Features

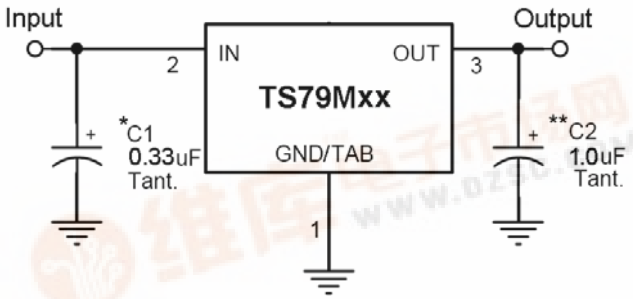
- ✧ Output current up to 0.5A
- ✧ No external components required
- ✧ Internal thermal overload protection
- ✧ Internal short-circuit current limiting
- ✧ Output transistor safe-area compensation
- ✧ Output voltage offered in 4% tolerance

## Ordering Information

| Part No. | Operating Temp. | Package |
|---|---|---|
| TS79MxxCZ | -20 ~ +125°C | TO-220 |
| TS79MxxCP | | TO-252 |

Note: Where xx denotes voltage option.

## Standard Application




A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0V above the output voltage even during the low point on the Input ripple voltage.

XX = these two digits of the type number indicate voltage.

* = Cin is required if regulator is located an appreciable distance from power supply filter.

** = Co is not needed for stability; however, it does improve transient response.

## Absolute Maximum Rating

| | | | | |
|---|---|---|---|---|
| Input Voltage | | Vin * | - 35 | V |
| Input Voltage | | Vin ** | - 40 | V |
| Power Dissipation | TO-220 | Without heatsink | 2 | W |
| | TO-220 | Pt *** | 15 | |
| | TO-252 | Without heatsink | 1 | |
| Operating Junction Temperature Range | | $T_J$ | -20 ~ +125 | °C |
| Storage Temperature Range | | $T_{STG}$ | -65 ~ +150 | °C |

Note : * TS79M05 to TS79M18
** TS79M24
*** Follow the derating curve

## TS79M05 Electrical Characteristics

(Vin= -10V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

| Parameter | Symbol | Test Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| Output voltage | Vout | Tj=25 °C | | - 4.80 | - 5 | - 5.20 | V |
| | | -7.5V≤Vin≤ -20V, 5mA≤Iout≤350mA, PD≤5W | | - 4.75 | - 5 | - 5.25 | |
| Line Regulation | REGline | Tj=25 °C | -7.5V≤Vin≤ -25V, Io=200mA | -- | 3 | 50 | mV |
| Load Regulation | REGload | Tj=25 °C | 5mA≤Iout≤500mA | -- | 20 | 100 | |
| | | | 5mA≤Iout≤200mA | -- | 10 | 50 | |
| Quiescent Current | Iq | Iout=0, Tj=25 °C | | -- | 4 | 8 | mA |
| Quiescent Current Change | ΔIq | -7.5V≤Vin≤ -25V | | -- | -- | 0.5 | |
| | | 5mA≤Iout≤350mA | | -- | -- | 0.5 | |
| Output Noise Voltage | Vn | 10Hz≤f≤100KHz, Tj=25 °C | | -- | 40 | -- | uV |
| Ripple Rejection Ratio | RR | f=120Hz, -8V≤Vin≤ -18V | | 54 | 66 | -- | dB |
| Voltage Drop | Vdrop | Iout=350mA, Tj=25 °C | | -- | 2 | -- | V |
| Peak Output Current | Io peak | Tj=25 °C | | -- | 0.7 | -- | A |
| Temperature Coefficient of Output Voltage | ΔVout/ ΔTj | Iout=5mA, 0 °C≤Tj≤125 °C | | -- | -0.2 | -- | mV/ °C |

## TS79M06 Electrical Characteristics

(Vin= -11V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

| Parameter | Symbol | Test Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | Vout | Tj=25 °C | | - 5.75 | - 6 | - 6.25 | V |
| | | -8.5V≤Vin≤ -21V, 5mA≤Iout≤350mA, PD≤5W | | - 6.3 | - 6 | - 6.3 | |
| Line Regulation | REGline | Tj=25 °C | -8.5V≤Vin≤ -25V, Io=200mA | -- | 3 | 50 | mV |
| Load Regulation | REGload | Tj=25 °C | 5mA≤Iout≤500A | -- | 20 | 120 | |
| | | | 5mA≤Iout≤200mA | -- | 10 | 60 | |
| Quiescent Current | Iq | Iout=0, Tj=25 °C | | -- | 4 | 8 | mA |
| Quiescent Current Change | ΔIq | -8.5V≤Vin≤ -25V | | -- | -- | 0.5 | |
| | | 5mA≤Iout≤350mA | | -- | -- | 0.5 | |
| Output Noise Voltage | Vn | 10Hz≤f≤100KHz, Tj=25 °C | | -- | 40 | -- | uV |
| Ripple Rejection Ratio | RR | f=120Hz, -9V≤Vin≤ -19V | | 54 | 66 | -- | dB |
| Voltage Drop | Vdrop | Iout=350mA, Tj=25 °C | | -- | 2 | -- | V |
| Peak Output Current | Io peak | Tj=25 °C | | -- | 0.7 | -- | A |
| Temperature Coefficient of Output Voltage | ΔVout/ ΔTj | Iout=5mA, 0 °C≤Tj≤125 °C | | -- | -0.2 | -- | mV/ °C |

- 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.
- This specification applies only for DC power dissipation permitted by absolute maximum ratings.

## TS79M08 Electrical Characteristics

(Vin= -14V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

| Parameter | Symbol | Test Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | Vout | Tj=25 °C | | - 7.69 | - 8 | - 8.32 | V |
| | | -10.5V≤Vin≤ -23V, 5mA≤Iout≤350mA, PD≤5W | | - 7.61 | - 8 | - 8.40 | |
| Line Regulation | REGline | Tj=25 °C | -10.5V≤Vin≤ -25V, Io=200mA | -- | 6 | 50 | mV |
| Load Regulation | REGload | Tj=25 °C | 5mA≤Iout≤500mA | -- | 25 | 160 | |
| | | | 5mA≤Iout≤200mA | -- | 10 | 80 | |
| Quiescent Current | Iq | Iout=0, Tj=25 °C | | -- | 4 | 8 | mA |
| Quiescent Current Change | ΔIq | -10.5V≤Vin≤ -25V | | -- | -- | 0.5 | |
| | | 5mA≤Iout≤350mA | | -- | -- | 0.5 | |
| Output Noise Voltage | Vn | 10Hz≤f≤100KHz, Tj=25 °C | | -- | 60 | -- | uV |
| Ripple Rejection Ratio | RR | f=120Hz, -11V≤Vin≤ -21V | | 54 | 63 | -- | dB |
| Voltage Drop | Vdrop | Iout=350mA, Tj=25 °C | | -- | 2 | -- | V |
| Peak Output Current | Io peak | Tj=25 °C | | -- | 0.7 | -- | A |
| Temperature Coefficient of Output Voltage | ΔVout/ ΔTj | Iout=5mA, 0 °C≤Tj≤125 °C | | -- | -0.4 | -- | mV/ °C |

## TS79M09 Electrical Characteristics

(Vin= -15V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

| Parameter | Symbol | Test Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | Vout | Tj=25 °C | | - 8.65 | - 9 | - 9.36 | V |
| | | -11.5V≤Vin≤ -23V, 5mA≤Iout≤350mA, PD≤5W | | - 8.57 | - 9 | - 9.45 | |
| Line Regulation | REGline | Tj=25 °C | -11.5V≤Vin≤ -26V Io=200mA | -- | 6 | 50 | mV |
| Load Regulation | REGload | Tj=25 °C | 5mA≤Iout≤500mA | -- | 25 | 180 | |
| | | | 5mA≤Iout≤200mA | -- | 10 | 90 | |
| Quiescent Current | Iq | Iout=0, Tj=25 °C | | -- | 4 | 8 | mA |
| Quiescent Current Change | ΔIq | -11.5V≤Vin≤ -26V | | -- | -- | 0.5 | |
| | | 5mA≤Iout≤350mA | | -- | -- | 0.5 | |
| Output Noise Voltage | Vn | 10Hz≤f≤100KHz, Tj=25 °C | | -- | 60 | -- | uV |
| Ripple Rejection Ratio | RR | f=120Hz, -12V≤Vin≤ -22V | | 54 | 63 | -- | dB |
| Voltage Drop | Vdrop | Iout=350mA, Tj=25 °C | | -- | 2 | -- | V |
| Peak Output Current | Io peak | Tj=25 °C | | -- | 0.7 | -- | A |
| Temperature Coefficient of Output Voltage | ΔVout/ ΔTj | Iout=5mA, 0 °C≤Tj≤125 °C | | -- | -0.4 | -- | mV/ °C |

- 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.
- This specification applies only for DC power dissipation permitted by absolute maximum ratings.

## TS79M12 Electrical Characteristics

(Vin= -19V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

| Parameter | Symbol | Test Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | Vout | Tj=25 °C | | - 11.53 | - 12 | - 12.48 | V |
| | | -14.5V≤Vin≤ -27V, 5mA≤Iout≤350mA, PD ≤5W | | - 11.42 | - 12 | - 12.60 | |
| Line Regulation | REGline | Tj=25 °C | -14.5V≤Vin≤ -30V, Io=200mA | -- | 8 | 50 | mV |
| Load Regulation | REGload | Tj=25 °C | 5mA≤Iout≤500mA | -- | 25 | 240 | |
| | | | 0mA≤Iout≤200mA | -- | 10 | 120 | |
| Quiescent Current | Iq | Tj=25 °C, Iout=0 | | -- | 4 | 8 | mA |
| Quiescent Current Change | ΔIq | -14.5V≤Vin≤ -30V | | -- | -- | 0.5 | |
| | | 5mA≤Iout≤200mA | | -- | -- | 0.5 | |
| Output Noise Voltage | Vn | 10Hz≤f≤100KHz, Tj=25 °C | | -- | 70 | -- | uV |
| Ripple Rejection Ratio | RR | f=120Hz, -15V≤Vin≤ -25V | | 54 | 60 | -- | dB |
| Voltage Drop | Vdrop | Iout=350mA, Tj=25 °C | | -- | 2 | -- | V |
| Peak Output Current | Io peak | Tj=25 °C | | -- | 0.7 | -- | A |
| Temperature Coefficient of Output Voltage | ΔVout/ ΔTj | Iout=5mA, 0 °C≤Tj≤125 °C | | -- | -0.8 | -- | mV/ °C |

## TS79M15 Electrical Characteristics

(Vin= -23V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

| Parameter | | Test Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | Vout | Tj=25 °C | | - 14.42 | - 15 | - 15.60 | V |
| | | -17.5V≤Vin≤ -30V, 5mA≤Iout≤350mA, PD ≤5W | | - 14.28 | - 15 | - 15.75 | |
| Line Regulation | REGline | Tj=25 °C | -17.5V≤Vin≤ -30V, Io=200mA | -- | 8 | 50 | mV |
| Load Regulation | REGload | Tj=25 °C | 5mA≤Iout≤500mA | -- | 25 | 300 | |
| | | | 5mA≤Iout≤200mA | -- | 10 | 150 | |
| Quiescent Current | Iq | Tj=25 °C, Iout=0 | | -- | 5 | 8 | mA |
| Quiescent Current Change | ΔIq | -17.5V≤Vin≤ -30V | | -- | -- | 0.5 | |
| | | 5mA≤Iout≤350mA | | -- | -- | 0.5 | |
| Output Noise Voltage | Vn | 10Hz≤f≤100KHz, Tj=25 °C | | -- | 90 | -- | uV |
| Ripple Rejection Ratio | RR | f=120Hz, -18V≤Vin≤ -28V | | 54 | 60 | -- | dB |
| Voltage Drop | Vdrop | Iout=350mA, Tj=25 °C | | -- | 2 | -- | V |
| Peak Output Current | Io peak | Tj=25 °C | | -- | 0.7 | -- | A |
| Temperature Coefficient of Output Voltage | ΔVout/ ΔTj | Iout=5mA, 0 °C≤Tj≤125 °C | | -- | -1.0 | -- | mV/ °C |

- 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.
- This specification applies only for DC power dissipation permitted by absolute maximum ratings.

## TS79M18 Electrical Characteristics

(Vin= -27V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

| Parameter | Symbol | Test Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | Vout | Tj=25 °C | | - 17.30 | - 18 | - 18.72 | V |
| | | -21V≤Vin≤ -33V, 5mA≤Iout≤350mA, PD ≤5W | | - 17.14 | - 18 | - 18.90 | |
| Line Regulation | REGline | Tj=25 °C | -21V≤Vin≤ -33V, Io=200mA | -- | 8 | 50 | mV |
| Load Regulation | REGload | Tj=25 °C | 5mA≤Iout≤500mA | -- | 25 | 360 | |
| | | | 5mA≤Iout≤200mA | -- | 10 | 180 | |
| Quiescent Current | Iq | Tj=25 °C, Iout=0 | | -- | 5 | 8 | mA |
| Quiescent Current Change | ΔIq | -21V≤Vin≤ -33V | | -- | -- | 0.5 | |
| | | 5mA≤Iout≤350nA | | -- | -- | 0.5 | |
| Output Noise Voltage | Vn | 10Hz≤f≤100KHz, Tj=25 °C | | -- | 110 | -- | uV |
| Ripple Rejection Ratio | RR | f=120Hz, -21V≤Vin≤ -31V | | 54 | 60 | -- | dB |
| Voltage Drop | Vdrop | Iout=350mA, Tj=25 °C | | -- | 2 | -- | V |
| Peak Output Current | Io peak | Tj=25 °C | | -- | 0.7 | -- | A |
| Temperature Coefficient of Output Voltage | ΔVout/ ΔTj | Iout=5mA, 0 °C≤Tj≤125 °C | | -- | -1.0 | -- | mV/ °C |

## TS79M24 Electrical Characteristics

(Vin=- 33V, Iout=350mA, 0 °C≤Tj≤125 °C, Cin=0.33uF, Cout=0.1uF; unless otherwise specified.)

| Parameter | Symbol | Test Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| Output Voltage | Vout | Tj=25 °C | | - 23.07 | - 24 | - 24.96 | V |
| | | -27V≤Vin≤ -38V, 5mA≤Iout≤350mA, PD ≤5W | | - 22.85 | - 24 | - 25.20 | |
| Line Regulation | REGline | Tj=25 °C | -27V≤Vin≤ -38V, Io=200mA | -- | 10 | 50 | mV |
| Load Regulation | REGload | Tj=25 °C | 5mA≤Iout≤500mA | -- | 30 | 480 | |
| | | | 5mA≤Iout≤200mA | -- | 10 | 240 | |
| Quiescent Current | Iq | Iout=0, Tj=25 °C | | -- | 5 | 9 | mA |
| Quiescent Current Change | ΔIq | -27V≤Vin≤ -38V | | -- | -- | 0.5 | |
| | | 5mA≤Iout≤350mA | | -- | -- | 0.5 | |
| Output Noise Voltage | Vn | 10Hz≤f≤100KHz, Tj=25 °C | | -- | 170 | -- | uV |
| Ripple Rejection Ratio | RR | f=120Hz, -27V≤Vin≤ -37V | | 50 | 60 | -- | dB |
| Voltage Drop | Vdrop | Iout=350mA, Tj=25 °C | | -- | 2 | -- | V |
| Peak Output Current | Io peak | Tj=25 °C | | -- | 0.7 | -- | A |
| Temperature Coefficient of Output Voltage | ΔVout/ ΔTj | Iout=5mA, 0 °C≤Tj≤125 °C | | -- | -1.0 | -- | mV/ °C |

- 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.
- This specification applies only for DC power dissipation permitted by absolute maximum ratings.

## Electrical Characteristics Curve

**FIGURE 1 - Worst Case Power Dissipation v.s. Ambient Temperature**

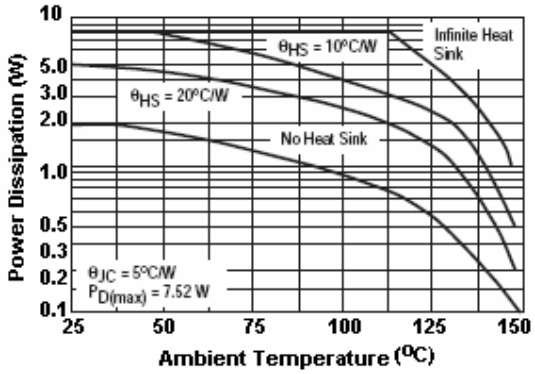



**FIGURE 2 - Peak Output Current v.s. Dropout Voltage**

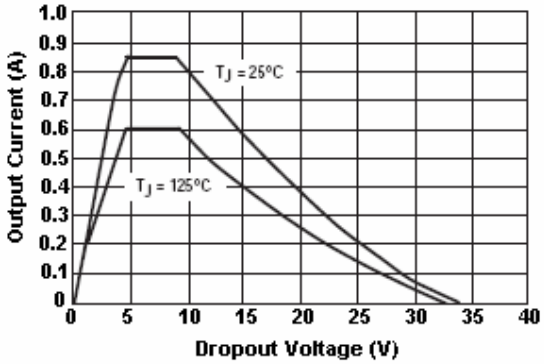



**FIGURE 3 – Quiescent Current v.s. Input Voltage**

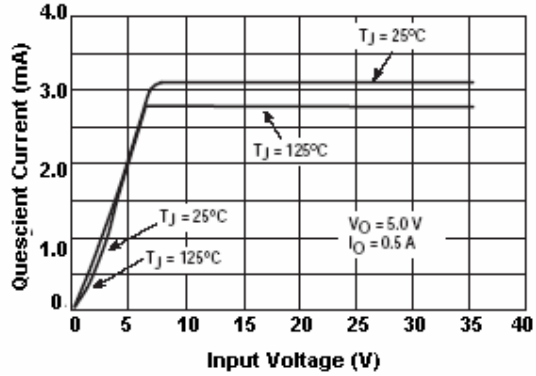



**FIGURE 4 –Dropout Voltage v.s. Junction Temperature**

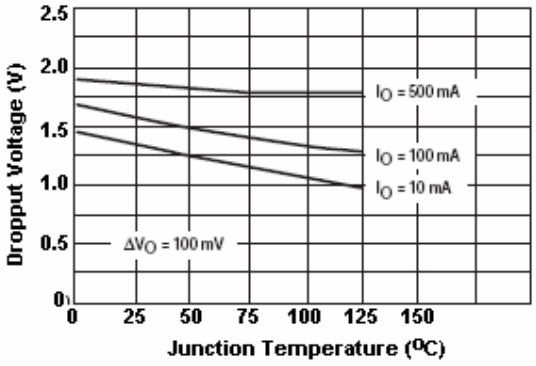



**FIGURE 5 – Quiescent Current v.s. Output Current**

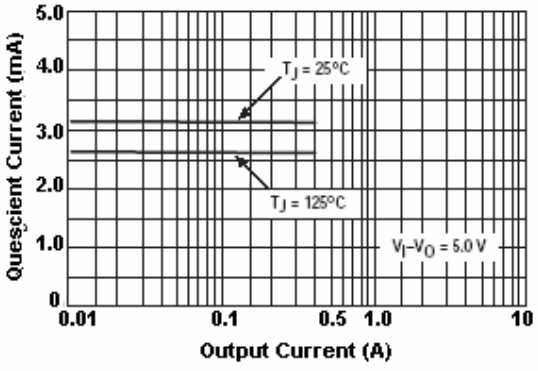
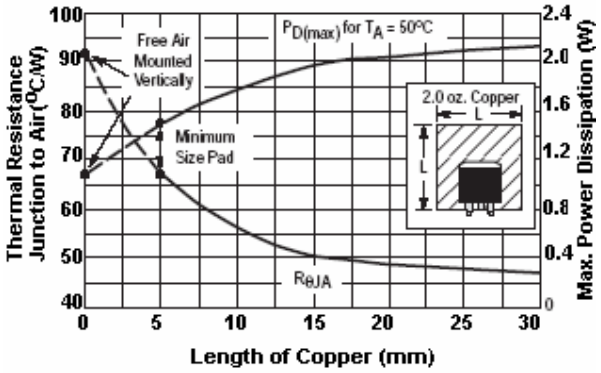



**FIGURE 6 – TO-252 Thermal Resistance and Pd(max) v.s. P.C.B Copper Length**



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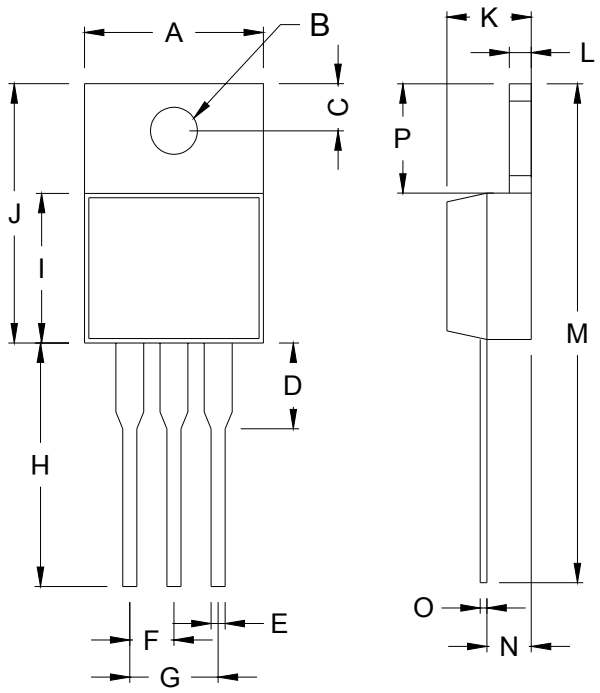
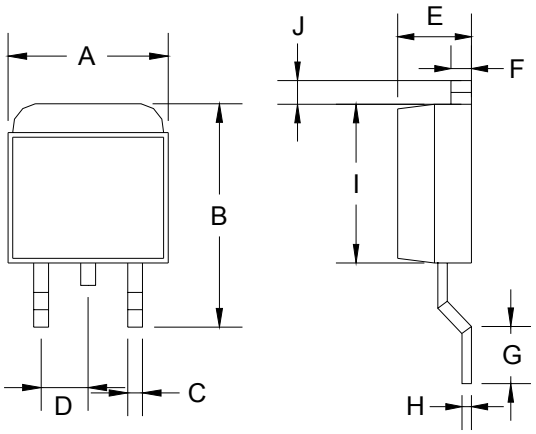
## TO-220 Mechanical Drawing




| TO-220 DIMENSION | | | | |
|---|---|---|---|---|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 10.000 | 10.500 | 0.394 | 0.413 |
| B | 3.240 | 4.440 | 0.128 | 0.175 |
| C | 2.440 | 2.940 | 0.096 | 0.116 |
| D | - | 6.350 | - | 0.250 |
| E | 0.381 | 1.106 | 0.015 | 0.040 |
| F | 2.345 | 2.715 | 0.092 | 0.058 |
| G | 4.690 | 5.430 | 0.092 | 0.107 |
| H | 12.700 | 14.732 | 0.500 | 0.581 |
| I | 8.382 | 9.017 | 0.330 | 0.355 |
| J | 14.224 | 16.510 | 0.560 | 0.650 |
| K | 3.556 | 4.826 | 0.140 | 0.190 |
| L | 0.508 | 1.397 | 0.020 | 0.055 |
| M | 27.700 | 29.620 | 1.060 | 1.230 |
| N | 2.032 | 2.921 | 0.080 | 0.115 |
| O | 0.255 | 0.610 | 0.010 | 0.024 |
| P | 5.842 | 6.858 | 0.230 | 0.270 |

## TO-252 Mechanical Drawing




| TO-252 DIMENSION | | | | |
|---|---|---|---|---|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 6.570 | 6.840 | 0.259 | 0.269 |
| B | 9.250 | 10.400 | 0.364 | 0.409 |
| C | 0.550 | 0.700 | 0.022 | 0.028 |
| D | 2.560 | 2.670 | 0.101 | 0.105 |
| E | 2.300 | 2.390 | 0.090 | 0.094 |
| F | 0.490 | 0.570 | 0.019 | 0.022 |
| G | 1.460 | 1.580 | 0.057 | 0.062 |
| H | 0.520 | 0.570 | 0.020 | 0.022 |
| I | 5.340 | 5.550 | 0.210 | 0.219 |
| J | 1.460 | 1.640 | 0.057 | 0.065 |