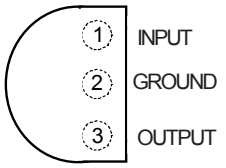
# 100 mA POSITIVE VOLTAGE REGULATORS

- **Wide range of Fixed Output Voltages**
- **Output Current up to 100 mA**
- **No External Components Required**
- **Internal Thermal Overload Protection**
- **Internal Short Circuit Current-Limiting**
- **Available in TO-92, SOT-89 and SOP-8 packages**

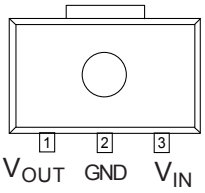
The GM78L00 series of positive voltage regulators are low-cost devices providing a simple solution for a wide variety of applications requiring a regulated supply of up to 100mA.
These virtually indestructible positive voltage regulators are protected by thermal shutdown and internal current-limiting. Most applications require no external components.
The GM78L00's are very versatile. Use them as fixed voltage regulators in a wide range of applications, including local on-card regulation for elimination of noise and distribution problems associated with single-point regulation. They can also be used with power pass elements to make high current voltage regulators.
The GM78L00's offer impressive performance advantages over old-fashioned zener diode-resistor combinations, providing lower output impedance and reduced quiescent current, along with lower noise.

## PIN CONFIGURATIONS

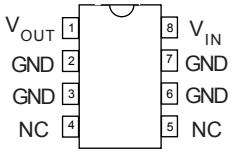
TO-92 (TOP VIEW)



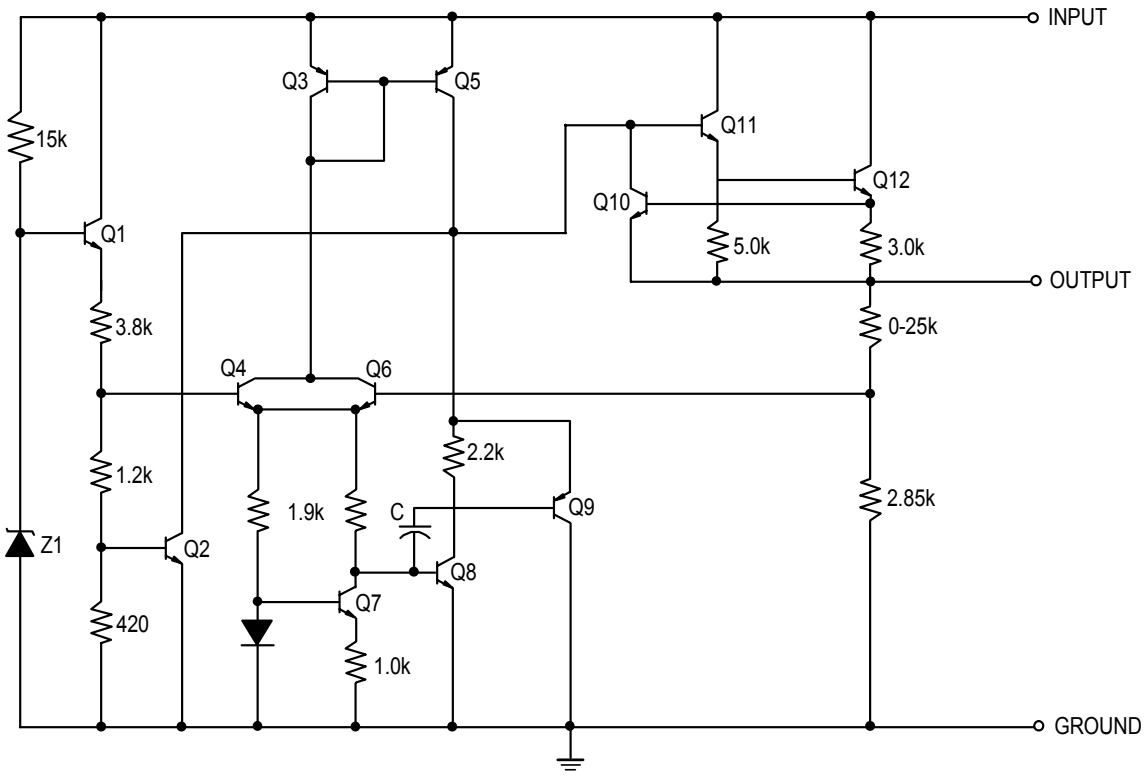

SOT-89 (Top View)




SOP-8 (TOP VIEW)




## REPRESENTATIVE BLOCK DIAGRAM



## ■ ELECTRICAL CHARACTERISTICS GM78L05

$T_A$ = 0°C to 125° C, $V_I$=10V, $I_O$=40mA, $C_I$=0.33µF, unless otherwise specified (Note 1)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | $T_J$=25°C | 4.8 | 5.0 | 5.2 | V |
| Line Regulation | $V_{R\ LINE}$ | $T_J$=25°C, 7V ≤ $V_I$≤ 20V | | 32 | 150 | mV |
| | | $T_J$=25°C, 8V ≤ $V_I$≤ 20V | | 26 | 100 | |
| Load Regulation | $V_{R\ LOAD}$ | $T_J$=25°C, 1mA ≤ $I_O$≤ 100mA | | 11 | 60 | mV |
| | | $T_J$=25°C, 1mA ≤ $I_O$≤ 40mA | | 5 | 30 | |
| Output Voltage (Note 2) | $V_O$ | 7V ≤ $V_I$≤ 20V, 1mA ≤ $I_O$≤ 40mA | 4.75 | 5 | 5.25 | V |
| | | 7V ≤ $V_I$≤ $V_{MAX}$, 1mA ≤ $I_O$≤ 70mA | 4.75 | 5 | 5.25 | |
| Quiscent Current | $I_Q$ | $T_J$=25°C | | 3.8 | 6.0 | mA |
| Quiscent Current Change | $\Delta I_Q$ | (with Line) 8V ≤ $V_I$≤ 20V | | | 1.5 | mA |
| | | (with Load) 1mA ≤ $I_O$≤ 40mA | | | 0.1 | |
| Noise | $N_O$ | $T_A$=25°C, 10Hz ≤ f≤ 100kHz | | 42 | | µV |
| Ripple Rejection | $\Delta V_I / \Delta V_O$ | $T_J$=25°C, f=120kHz, 8V ≤ $V_I$≤ 18V | 41 | 49 | | dB |
| Dropout Voltage | $V_{DO}$ | $T_J$=25°C | | 1.7 | | V |

**Note 1**: The maximum steady state usable output current and input voltage are very dependent on the heat sinking and/or lead length of the package. The data above represent pulse test conditions with junction temperatures as indicated at the initiation of tests.
**Note 2**: Power Dissipation ≤ 0.75W.

## ■ ELECTRICAL CHARACTERISTICS GM78L06

$T_A$ = 0°C to 125° C, $V_I$=11V, $I_O$=40mA, $C_I$=0.33µF, $C_O$=0.1µF, unless otherwise specified (Note 1)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | $T_J$=25°C | 5.75 | 6.0 | 6.25 | V |
| Line Regulation | $V_{R\ LINE}$ | $T_J$=25°C, 8.0V ≤ $V_I$≤ 20V | | 35 | 175 | mV |
| | | $T_J$=25°C, 9.0V ≤ $V_I$≤ 20V | | 29 | 125 | |
| Load Regulation | $V_{R\ LOAD}$ | $T_J$=25°C, 1mA ≤ $I_O$≤ 100mA | | 16 | 80 | mV |
| | | $T_J$=25°C, 1mA ≤ $I_O$≤ 40mA | | 9 | 40 | |
| Output Voltage (Note 2) | $V_O$ | 8V ≤ $V_I$≤ 20V, 1mA ≤ $I_O$≤ 40mA | 5.7 | 6 | 6.3 | V |
| | | 8V ≤ $V_I$≤ $V_{MAX}$, 1mA ≤ $I_O$≤ 70mA | 5.7 | 6 | 6.3 | |
| Quiscent Current | $I_Q$ | $T_J$=25°C | | 3.9 | 6.0 | mA |
| Quiscent Current Change | $\Delta I_Q$ | (with Line) 9V ≤ $V_I$≤ 20V | | | 1.5 | mA |
| | | (with Load) 1mA ≤ $I_O$≤ 40mA | | | 0.1 | |
| Noise | $N_O$ | $T_A$=25°C, 10Hz ≤ f≤ 100kHz | | 46 | | µV |
| Ripple Rejection | $\Delta V_I / \Delta V_O$ | $T_J$=25°C, f=120kHz, 9V ≤ $V_I$≤ 19V | 40 | 48 | | dB |
| Dropout Voltage | $V_{DO}$ | $T_J$=25°C | | 1.7 | | V |

**Note 1**: The maximum steady state usable output current and input voltage are very dependent on the heat sinking and/or lead length of the package. The data above represent pulse test conditions with junction temperatures as indicated at the initiation of tests.
**Note 2**: Power Dissipation ≤ 0.75W.

## ■ ELECTRICAL CHARACTERISTICS GM78L08

$T_A$ = 0°C to 125° C, $V_I$=14V, $I_O$=40mA, $C_I$=0.33µF, $C_O$=0.1µF, unless otherwise specified (Note 1)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | $T_J$=25°C | 7.7 | 8.0 | 8.3 | V |
| Line Regulation | $V_{R\ LINE}$ | $T_J$=25°C, 11V ≤ $V_I$≤ 23V | | 42 | 175 | mV |
| | | $T_J$=25°C, 12V ≤ $V_I$≤ 23V | | 36 | 125 | |
| Load Regulation | $V_{R\ LOAD}$ | $T_J$=25°C, 1mA ≤ $I_O$≤ 100mA | | 18 | 80 | mV |
| | | $T_J$=25°C, 1mA ≤ $I_O$≤ 40mA | | 10 | 40 | |
| Output Voltage (Note 2) | $V_O$ | 11V ≤ $V_I$≤ 23V, 1mA ≤ $I_O$≤ 40mA | 7.6 | 8 | 8.4 | V |
| | | 11V ≤ $V_I$≤ $V_{MAX}$, 1mA ≤ $I_O$≤ 70mA | 7.6 | 8 | 8.4 | |
| Quiscent Current | $I_Q$ | $T_J$=25°C | | 4 | 6 | mA |
| Quiscent Current Change | $\Delta I_Q$ | (with Line) 12V ≤ $V_I$≤ 23V | | | 1.5 | mA |
| | | (with Load) 1mA ≤ $I_O$≤ 40mA | | | 0.1 | |
| Noise | $N_O$ | $T_A$=25°C, 10Hz ≤ f≤ 100kHz | | 54 | | µV |
| Ripple Rejection | $\Delta V_I$ /$\Delta V_O$ | $T_J$=25°C, f=120kHz, 12V ≤ $V_I$≤ 22V | 37 | 46 | | dB |
| Dropout Voltage | $V_{DO}$ | $T_J$=25°C | | 1.7 | | V |

**Note 1**: The maximum steady state usable output current and input voltage are very dependent on the heat sinking and/or lead length of the package. The data above represent pulse test conditions with junction temperatures as indicated at the initiation of tests.
**Note 2**: Power Dissipation ≤ 0.75W.

## ■ ELECTRICAL CHARACTERISTICS GM78L09

$T_A$ = 0°C to 125° C, $V_I$=16V, $I_O$=40mA, $C_I$=0.33µF, $C_O$=0.1µF, unless otherwise specified (Note 1)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | $T_J$=25°C | 8.6 | 9.0 | 9.4 | V |
| Line Regulation | $V_{R\ LINE}$ | $T_J$=25°C, 12V ≤ $V_I$≤ 24V | | 45 | 175 | mV |
| | | $T_J$=25°C, 13V ≤ $V_I$≤ 24V | | 40 | 125 | |
| Load Regulation | $V_{R\ LOAD}$ | $T_J$=25°C, 1mA ≤ $I_O$≤ 100mA | | 19 | 90 | mV |
| | | $T_J$=25°C, 1mA ≤ $I_O$≤ 40mA | | 11 | 40 | |
| Output Voltage (Note 2) | $V_O$ | 12V ≤ $V_I$≤ 24V, 1mA ≤ $I_O$≤ 40mA | 8.55 | 9.0 | 9.45 | V |
| | | 12V ≤ $V_I$≤ $V_{MAX}$, 1mA ≤ $I_O$≤ 70mA | 8.55 | 9.0 | 9.45 | |
| Quiscent Current | $I_Q$ | $T_J$=25°C | | 4.1 | 6.0 | mA |
| Quiscent Current Change | $\Delta I_Q$ | (with Line) 13V ≤ $V_I$≤ 24V | | | 1.5 | mA |
| | | (with Load) 1mA ≤ $I_O$≤ 40mA | | | 0.1 | |
| Noise | $N_O$ | $T_A$=25°C, 10Hz ≤ f≤ 100kHz | | 58 | | µV |
| Ripple Rejection | $\Delta V_I$ /$\Delta V_O$ | $T_J$=25°C, f=120kHz, 15V ≤ $V_I$≤ 25V | 38 | 45 | | dB |
| Dropout Voltage | $V_{DO}$ | $T_J$=25°C | | 1.7 | | V |

**Note 1**: The maximum steady state usable output current and input voltage are very dependent on the heat sinking and/or lead length of the package. The data above represent pulse test conditions with junction temperatures as indicated at the initiation of tests.
**Note 2**: Power Dissipation ≤ 0.75W.

## ■ ELECTRICAL CHARACTERISTICS GM78L10

$T_A$ = 0°C to 125° C, $V_I$=17V, $I_O$=40mA, $C_I$=0.33µF, $C_O$=0.1µF, unless otherwise specified (Note 1)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | $T_J$=25°C | 9.6 | 10 | 10.4 | V |
| Line Regulation | $V_{R\ LINE}$ | $T_J$=25°C, 13V ≤ $V_I$≤ 24V | | 51 | 175 | mV |
| | | $T_J$=25°C, 14V ≤ $V_I$≤ 24V | | 42 | 125 | |
| Load Regulation | $V_{R\ LOAD}$ | $T_J$=25°C, 1mA ≤ $I_O$≤ 100mA | | 22 | 100 | mV |
| | | $T_J$=25°C, 1mA ≤ $I_O$≤ 40mA | | 13 | 50 | |
| Output Voltage (Note 2) | $V_O$ | 13V ≤ $V_I$≤ 24V, 1mA ≤ $I_O$≤ 40mA | 9.5 | 10 | 10.5 | V |
| | | 13V ≤ $V_I$≤ $V_{MAX}$, 1mA ≤ $I_O$≤ 70mA | 9.5 | 10 | 10.5 | |
| Quiscent Current | $I_Q$ | $T_J$=25°C | | 4.3 | 6.5 | mA |
| Quiscent Current Change | $\Delta I_Q$ | (with Line) 14V ≤ $V_I$≤ 24V | | | 1.5 | mA |
| | | (with Load) 1mA ≤ $I_O$≤ 40mA | | | 0.1 | |
| Noise | $N_O$ | $T_A$=25°C, 10Hz ≤ f≤ 100kHz | | 62 | | µV |
| Ripple Rejection | $\Delta V_I / \Delta V_O$ | $T_J$=25°C, f=120kHz, 16V ≤ $V_I$≤ 27V | 37 | 44 | | dB |
| Dropout Voltage | $V_{DO}$ | $T_J$=25°C | | 1.7 | | V |

**Note 1**: The maximum steady state usable output current and input voltage are very dependent on the heat sinking and/or lead length of the package. The data above represent pulse test conditions with junction temperatures as indicated at the initiation of tests.
**Note 2**: Power Dissipation ≤ 0.75W.

## ■ ELECTRICAL CHARACTERISTICS GM78L12

$T_A$ = 0°C to 125° C, $V_I$=19V, $I_O$=40mA, $C_I$=0.33µF, $C_O$=0.1µF, unless otherwise specified (Note 1)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | $T_J$=25°C | 11.5 | 12.0 | 12.5 | V |
| Line Regulation | $V_{R\ LINE}$ | $T_J$=25°C, 14.5V ≤ $V_I$≤ 27V | | 55 | 250 | mV |
| | | $T_J$=25°C, 16V ≤ $V_I$≤ 27V | | 49 | 200 | |
| Load Regulation | $V_{R\ LOAD}$ | $T_J$=25°C, 1mA ≤ $I_O$≤ 100mA | | 22 | 100 | mV |
| | | $T_J$=25°C, 1mA ≤ $I_O$≤ 40mA | | 13 | 50 | |
| Output Voltage (Note 2) | $V_O$ | 14.5V ≤ $V_I$≤ 27V, 1mA ≤ $I_O$≤ 40mA | 11.4 | 12 | 12.6 | V |
| | | 14.5V ≤ $V_I$≤ $V_{MAX}$, 1mA ≤ $I_O$≤ 70mA | 11.4 | 12 | 12.6 | |
| Quiscent Current | $I_Q$ | $T_J$=25°C | | 4.3 | 6.5 | mA |
| Quiscent Current Change | $\Delta I_Q$ | (with Line) 16V ≤ $V_I$≤ 27V | | | 1.5 | mA |
| | | (with Load) 1mA ≤ $I_O$≤ 40mA | | | 0.1 | |
| Noise | $N_O$ | $T_A$=25°C, 10Hz ≤ f≤ 100kHz | | 70 | | µV |
| Ripple Rejection | $\Delta V_I / \Delta V_O$ | $T_J$=25°C, f=120kHz, 15V ≤ $V_I$≤ 25V | 37 | 42 | | dB |
| Dropout Voltage | $V_{DO}$ | $T_J$=25°C | | 1.7 | | V |

**Note 1**: The maximum steady state usable output current and input voltage are very dependent on the heat sinking and/or lead length of the package. The data above represent pulse test conditions with junction temperatures as indicated at the initiation of tests.
**Note 2**: Power Dissipation ≤ 0.75W.

## ■ ELECTRICAL CHARACTERISTICS GM78L15

$T_A$ = 0°C to 125° C, $V_I$=23V, $I_O$=40mA, $C_I$=0.33µF, $C_O$=0.1µF, unless otherwise specified (Note 1)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | $T_J$=25°C | 14.4 | 15.0 | 15.6 | V |
| Line Regulation | $V_{R\ LINE}$ | $T_J$=25°C, 17.5V ≤ $V_I$≤ 30V | | 65 | 300 | mV |
| | | $T_J$=25°C, 20V ≤ $V_I$≤ 30V | | 58 | 250 | |
| Load Regulation | $V_{R\ LOAD}$ | $T_J$=25°C, 1mA ≤ $I_O$≤ 100mA | | 25 | 150 | mV |
| | | $T_J$=25°C, 1mA ≤ $I_O$≤ 40mA | | 15 | 75 | |
| Output Voltage (Note 2) | $V_O$ | 17.5V ≤ $V_I$≤ 30V, 1mA ≤ $I_O$≤ 40mA | 14.25 | 15 | 15.75 | V |
| | | 17.5V ≤ $V_I$≤ $V_{MAX}$, 1mA ≤ $I_O$≤ 70mA | 14.25 | 15 | 15.75 | |
| Quiscent Current | $I_Q$ | $T_J$=25°C | | 4.7 | 6.5 | mA |
| Quiscent Current Change | $\Delta I_Q$ | (with Line) 20V ≤ $V_I$≤ 30V | | | 1.5 | mA |
| | | (with Load) 1mA ≤ $I_O$≤ 40mA | | | 0.1 | |
| Noise | $N_O$ | $T_A$=25°C, 10Hz ≤ f≤ 100kHz | | 82 | | µV |
| Ripple Rejection | $\Delta V_I / \Delta V_O$ | $T_J$=25°C, f=120kHz,18.5V ≤ $V_I$≤ 28.5V | 34 | 39 | | dB |
| Dropout Voltage | $V_{DO}$ | $T_J$=25°C | | 1.7 | | V |

**Note 1**: The maximum steady state usable output current and input voltage are very dependent on the heat sinking and/or lead length of the package. The data above represent pulse test conditions with junction temperatures as indicated at the initiation of tests.
**Note 2**: Power Dissipation ≤ 0.75W.

## ■ ELECTRICAL CHARACTERISTICS GM78L18

$T_A$ = 0°C to 125° C, $V_I$=26V, $I_O$=40mA, $C_I$=0.33µF, $C_O$=0.1µF, unless otherwise specified (Note 1)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | $T_J$=25°C | 17.3 | 18.0 | 18.7 | V |
| Line Regulation | $V_{R\ LINE}$ | $T_J$=25°C, 20.5V ≤ $V_I$≤ 33V | | 70 | 360 | mV |
| | | $T_J$=25°C, 22V ≤ $V_I$≤ 33V | | 64 | 300 | |
| Load Regulation | $V_{R\ LOAD}$ | $T_J$=25°C, 1mA ≤ $I_O$≤ 100mA | | 27 | 180 | mV |
| | | $T_J$=25°C, 1mA ≤ $I_O$≤ 40mA | | 19 | 90 | |
| Output Voltage (Note 2) | $V_O$ | 20.5V ≤ $V_I$≤ 30V, 1mA ≤ $I_O$≤ 40mA | 17.1 | 18 | 18.9 | V |
| | | 20.5V ≤ $V_I$≤ $V_{MAX}$, 1mA ≤ $I_O$≤ 70mA | 17.1 | 18 | 18.9 | |
| Quiscent Current | $I_Q$ | $T_J$=25°C | | 4.7 | 6.5 | mA |
| Quiscent Current Change | $\Delta I_Q$ | (with Line) 22V ≤ $V_I$≤ 33V | | | 1.5 | mA |
| | | (with Load) 1mA ≤ $I_O$≤ 40mA | | | 0.1 | |
| Noise | $N_O$ | $T_A$=25°C, 10Hz ≤ f≤ 100kHz | | 89 | | µV |
| Ripple Rejection | $\Delta V_I / \Delta V_O$ | $T_J$=25°C, f=120kHz,,21.5V ≤ $V_I$≤ 31.5V | 32 | 36 | | dB |
| Dropout Voltage | $V_{DO}$ | $T_J$=25°C | | 1.7 | | V |

**Note 1**: The maximum steady state usable output current and input voltage are very dependent on the heat sinking and/or lead length of the package. The data above represent pulse test conditions with junction temperatures as indicated at the initiation of tests.
**Note 2**: Power Dissipation ≤ 0.75W.

## ■ ELECTRICAL CHARACTERISTICS GM78L24

$T_A$ = 0°C to 125° C, $V_I$=32V, $I_O$=40mA, $C_I$=0.33µF, $C_O$=0.1µF, unless otherwise specified (Note 1)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | $T_J$=25°C | 23 | 24 | 25 | V |
| Line Regulation | $V_{R\ LINE}$ | $T_J$=25°C, 26.5V ≤ $V_I$≤ 39V | | 95 | 480 | mV |
| | | $T_J$=25°C, 29V ≤ $V_I$≤ 39V | | 78 | 400 | |
| Load Regulation | $V_{R\ LOAD}$ | $T_J$=25°C, 1mA ≤ $I_O$≤ 100mA | | 41 | 240 | mV |
| | | $T_J$=25°C, 1mA ≤ $I_O$≤ 40mA | | 28 | 120 | |
| Output Voltage (Note 2) | $V_O$ | 26.5V ≤ $V_I$≤ 39V, 1mA ≤ $I_O$≤ 40mA | 22.8 | 24 | 25.2 | V |
| | | 26.5V ≤ $V_I$≤ $V_{MAX}$, 1mA ≤ $I_O$≤ 70mA | 22.8 | 24 | 25.2 | |
| Quiscent Current | $I_Q$ | $T_J$=25°C | | 4.8 | 6.5 | mA |
| Quiscent Current Change | $\Delta I_Q$ | (with Line) 22V ≤ $V_I$≤ 33V | | | 1.5 | mA |
| | | (with Load) 1mA ≤ $I_O$≤ 40mA | | | 0.1 | |
| Noise | $N_O$ | $T_A$=25°C, 10Hz ≤ f≤ 100kHz | | 97 | | µV |
| Ripple Rejection | $\Delta V_I / \Delta V_O$ | $T_J$=25°C, f=120kHz,,27.5V ≤ $V_I$≤ 37.5V | 30 | 33 | | dB |
| Dropout Voltage | $V_{DO}$ | $T_J$=25°C | | 1.7 | | V |

**Note 1**: The maximum steady state usable output current and input voltage are very dependent on the heat sinking and/or lead length of the package. The data above represent pulse test conditions with junction temperatures as indicated at the initiation of tests.
**Note 2**: Power Dissipation ≤ 0.75W.

## ■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | VALUE | UNITS |
|---|---|---|---|
| Input Voltage (5.0 to 15V) | $V_I$ | 35 | V |
| Power Dissipation | $P_D$ | internally limited | W |
| Operating Junction Temperature Range | $T_J$ | 0 to +125 | °C |
| Storage Temperature Range | $T_{stg}$ | -65 to +150 | °C |
| Lead Temperature (soldering 10sec.) | $T_L$ | 265 | °C |

## ■ APPLICATION INFORMATION

### Design Considerations

The GM78L series regulators have thermal overload protection from excessive power, internal short-circuit protection which limits each circuit's maximum current, and output transistor safe-area protection for reducing the output current as the voltage across each pass transistor is increased.

Although the internal power dissipation is limited, the junction temperature must be kept below the maximum specified temperature (125°C) in order to meet data sheet specifications.

### Thermal Considerations

The TO-92 molded package is capable of unusually high power dissipation due to the lead frame design. However, its thermal capabilities are generally overlooked because of a lack of understanding of the thermal paths from the semiconductor junction to ambient temperature.

While thermal resistance is normally specified for the device mounted 1 cm above an infinite heat sink, very little has been mentioned of the options available to improve on the conservatively rated thermal capability. An explanation of the thermal paths of the TO-92 will allow the designer to determine the thermal stress he is applying in any given application.

### The TO-92 Package

The TO-92 package thermal paths are complex. In addition to the path through the molding compound to ambient temperature, there is another path through the leads, in parallel with the case path, to ambient temperature, as shown in Figure 1.

The total thermal resistance in this model is then:

$$\theta_{JA} = \frac{(\theta_{JA} + \theta_{CA})(\theta_{JL} + \theta_{LA})}{\theta_{JA} + \theta_{CA} + \theta_{JL} + \theta_{LA}}$$

Where:

$\theta_{JC}$ = thermal resistance of the case between the regulator die and a point on the case directly above the die location.

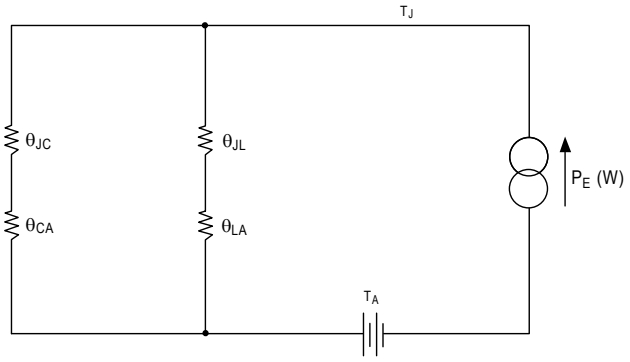
$\theta_{CA}$ = thermal resistance between the case and air at ambient temperature.

$\theta_{JL}$ = thermal resistance from regulator die through the input lead to a point $^1/_{16}$ inch below the regulator case.

$\theta_{LA}$ = total thermal resistance of the input/output ground leads to ambient temperature.

$\theta_{JA}$ = junction to ambient thermal resistance.

**FIGURE 1. TO-92 Thermal Equivalent Circuit**




## ■ ORDERING INFORMATION

| | OUTPUT VOLTAGE | PACKAGE | | |
|---|---|---|---|---|
| | | TO-92 | SOT-89 | SOP 8 |
| GM78L00 | 5V | GM78L05-T92 | GM78L05-ST89 | GM78L05-S8 |
| | 6V | GM78L06-T92 | GM78L06-ST89 | GM78L06-S8 |
| | 8V | GM78L08-T92 | GM78L08-ST89 | GM78L08-S8 |
| | 9V | GM78L09-T92 | GM78L09-ST89 | GM78L09-S8 |
| | 10V | GM78L10-T92 | GM78L10-ST89 | GM78L10-S8 |
| | 12V | GM78L12-T92 | GM78L12-ST89 | GM78L12-S8 |
| | 15V | GM78L15-T92 | GM78L15-ST89 | GM78L15-S8 |
| | 18V | GM78L18-T92 | GM78L18-ST89 | GM78L18-S8 |
| | 24V | GM78L24-T92 | GM78L24-ST89 | GM78L24-S8 |