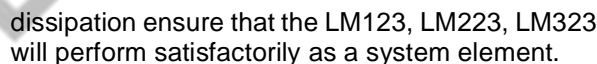




- OUTPUT CURRENT: 3A
- INTERNAL CURRENT AND THERMAL LIMITING
- TYPICAL OUTPUT IMPEDANCE: 0.01Ω
- MINIMUM INPUT VOLTAGE: 7.5V
- POWER DISSIPATION: 30W

The LM123, LM223, LM323 are three-terminal positive voltage regulators with a preset 5V output and a load driving capability of 3A. New circuit design and processing techniques are used to provide the high output current without sacrificing the regulation characteristics of lower current devices.

Current limiting, power limiting and thermal shut-down provide the same high level of reliability obtained with these techniques in the LM209, 1A regulator. An overall worst case specification for the combined effects of input voltage, load current, ambient temperature, and power

[illegible]

ABSOLUTE MAXIMUM RATINGS

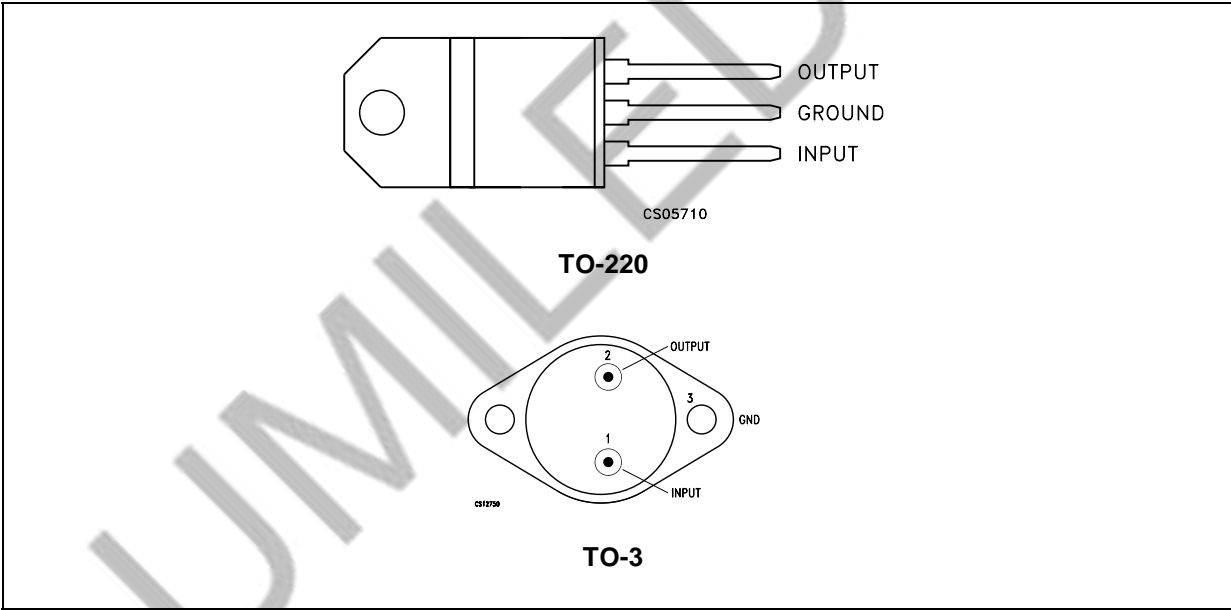
| Symbol | Parameter ² | | Value | Unit |
|-------------------|--------------------------------------|-------|--------------------|------|
| V _I | Input Voltage | | 20 | V |
| I _O | Output Current | | Internally Limited | |
| P _{tot} | Power Dissipation | | Internally Limited | |
| T _{stg} | Storage Temperature Range | | -65 to 150 | °C |
| T _{oper} | Operating Junction Temperature Range | LM123 | -55 to 150 | °C |
| | | LM223 | -25 to 125 | |
| | | LM323 | 0 to 125 | |

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

THERMAL DATA

| Symbol | Parameter | TO-220 | TO-3 | Unit |
|-----------------------|---|--------|------|------|
| R _{thj-case} | Thermal Resistance Junction-case Max | 3 | 2 | °C/W |
| R _{thj-amb} | Thermal Resistance Junction-ambient Max | 50 | 35 | °C/W |

CONNECTION DIAGRAM (top view)



ORDERING CODES

| TYPE | TO-220 | TO-3 | TEMPERATURE RANGE |
|-------|--------|--------|-------------------|
| LM123 | LM123K | | -55°C to 150°C |
| LM223 | LM223K | | -25°C to 150°C |
| LM323 | LM323K | LM323T | 0°C to 125°C |

ELECTRICAL CHARACTERISTICS OF LM123/LM223 ($T_J = -55$ to 150°C for LM123, $T_J = -25$ to 150°C for LM223 unless otherwise specified).

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|----------|-------------------------------|--|------|------|------|----------------------------|
| V_O | Output Voltage Range (Note 2) | $T_a = 25^\circ\text{C}$, $V_I = 7.5\text{ V}$, $I_O = 0$ | 4.7 | 5 | 5.3 | V |
| V_O | Output Voltage Range (Note 2) | $T_J = T_{\min}$ to T_{\max} $P \leq P_{\max}$ $V_I = 7.5$ to 15 V $I_O = 0$ to 3 A | 4.6 | | 5.4 | V |
| K_{VI} | Line Regulation (Note 3) | $V_I = 7.5$ to 15 V $T_J = 25^\circ\text{C}$ | | 5 | 25 | mV |
| K_{VO} | Load Regulation (Note 3) | $I_O = 0$ to 3 A $V_I = 7.5\text{ V}$ $T_J = 25^\circ\text{C}$ | | 25 | 100 | mV |
| I_{IB} | Quiescent Current | $V_I = 7.5$ to 15 V $I_O = 0$ to 3 A | | 12 | 20 | mA |
| V_{NO} | Output Noise Voltage | $T_a = 25^\circ\text{C}$ $f = 10\text{ Hz}$ to 100 KHz | | 40 | | μV_{rms} |
| I_{OS} | Short Circuit Current Limit | $V_I = 15\text{ V}$ $T_J = 25^\circ\text{C}$ | | 3 | 4.5 | A |
| | | $V_I = 7.5\text{ V}$ $T_J = 25^\circ\text{C}$ | | 4 | 5 | |
| K_{VH} | Long Term Stability | | | | 35 | mV |

Notes: 1. Although power dissipation is internally limited, specifications apply only for $P \leq 30\text{W}$.
 2. Selected devices with tightened tolerance output voltage available.
 3. Load and line regulation are specified at constant junction temperature. Pulse testing is required with a pulse width $\leq 1\text{ms}$ and duty cycle $\leq 5\%$.

ELECTRICAL CHARACTERISTICS OF LM323 ($T_J = 0$ to 150°C , unless otherwise specified).

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|----------|-------------------------------|--|------|------|------|----------------------------|
| V_O | Output Voltage Range (Note 2) | $T_a = 25^\circ\text{C}$, $V_I = 7.5\text{ V}$, $I_O = 0$ | 4.8 | 5 | 5.2 | V |
| V_O | Output Voltage Range (Note 2) | $T_J = T_{\min}$ to T_{\max} $P \leq P_{\max}$ $V_I = 7.5$ to 15 V $I_O = 0$ to 3 A | 4.75 | | 5.25 | V |
| K_{VI} | Line Regulation (Note 3) | $V_I = 7.5$ to 15 V $T_J = 25^\circ\text{C}$ | | 5 | 25 | mV |
| K_{VO} | Load Regulation (Note 3) | $I_O = 0$ to 3 A $V_I = 7.5\text{ V}$ $T_J = 25^\circ\text{C}$ | | 25 | 100 | mV |
| I_{IB} | Quiescent Current | $V_I = 7.5$ to 15 V $I_O = 0$ to 3 A | | 12 | 20 | mA |
| V_{NO} | Output Noise Voltage | $T_a = 25^\circ\text{C}$ $f = 10\text{ Hz}$ to 100 KHz | | 40 | | μV_{rms} |
| I_{OS} | Short Circuit Current Limit | $V_I = 15\text{ V}$ $T_J = 25^\circ\text{C}$ | | 3 | 4.5 | A |
| | | $V_I = 7.5\text{ V}$ $T_J = 25^\circ\text{C}$ | | 4 | 5 | |
| K_{VH} | Long Term Stability | | | | 35 | mV |

Notes: 1. Although power dissipation is internally limited, specifications apply only for $P \leq 30\text{W}$.
 2. Selected devices with tightened tolerance output voltage available.
 3. Load and line regulation are specified at constant junction temperature. Pulse testing is required with a pulse width $\leq 1\text{ms}$ and duty cycle $\leq 5\%$.

Figure 1 : Output Noise Voltage

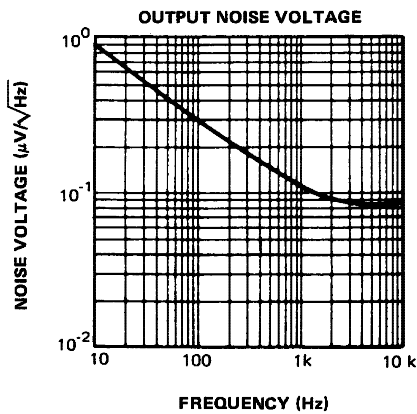


Figure 4 : Short Circuit Current

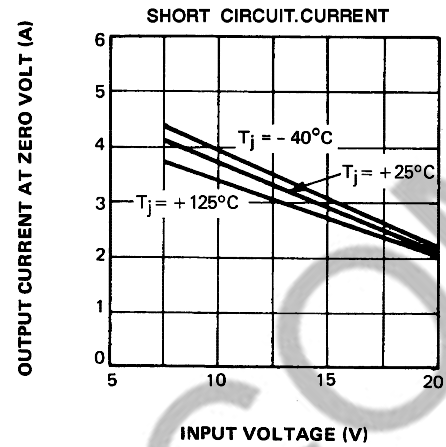


Figure 2 : Output Impedance

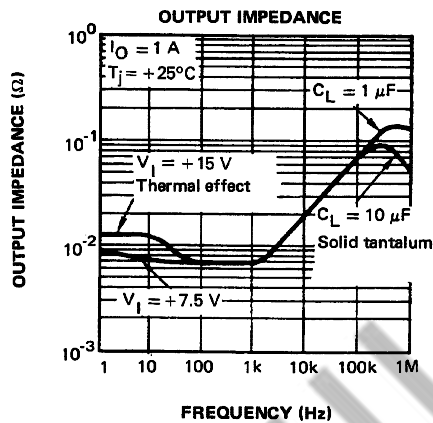


Figure 5 : Ripple Rejection

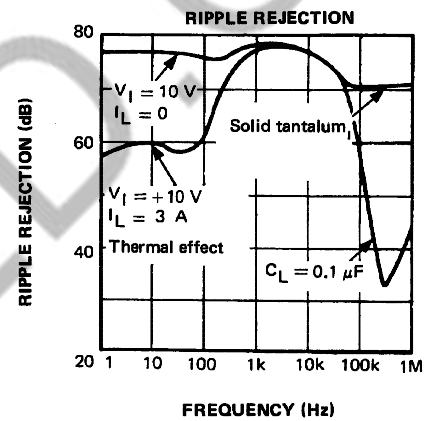


Figure 3 : Peak Available Output Current

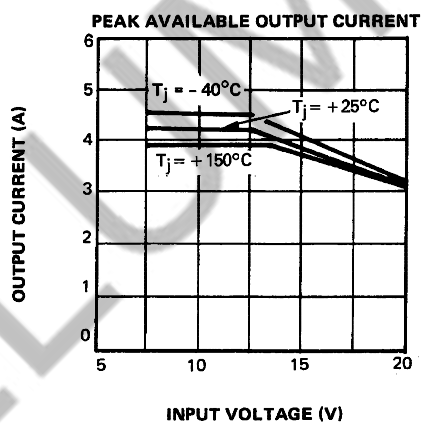


Figure 6 : Dropout Voltage

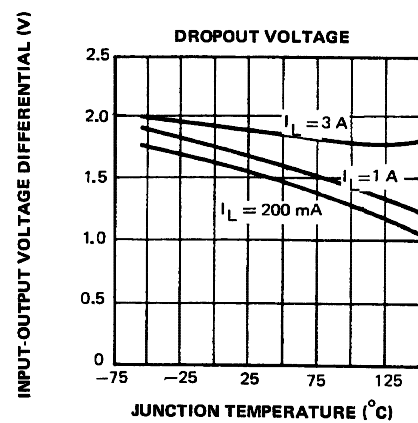


Figure 7 : Line Transient Response

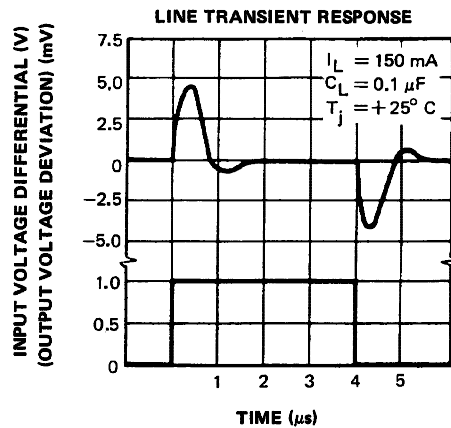


Figure 9 : Quiescent Current

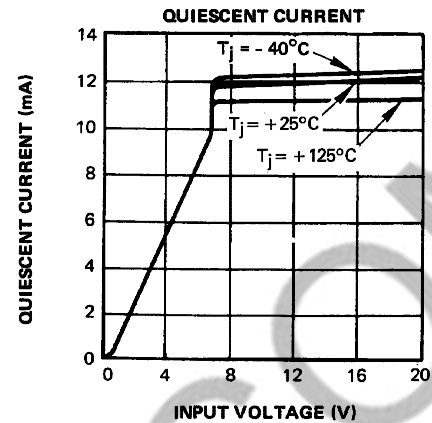


Figure 8 : Output Voltage

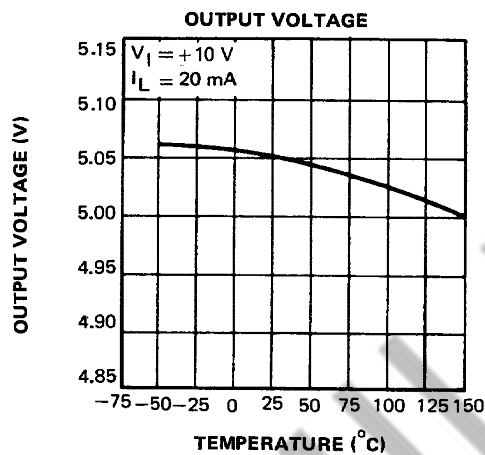
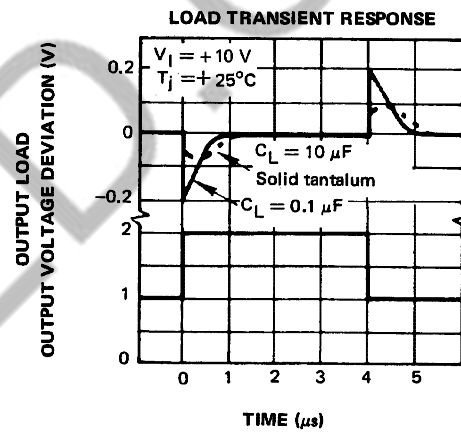
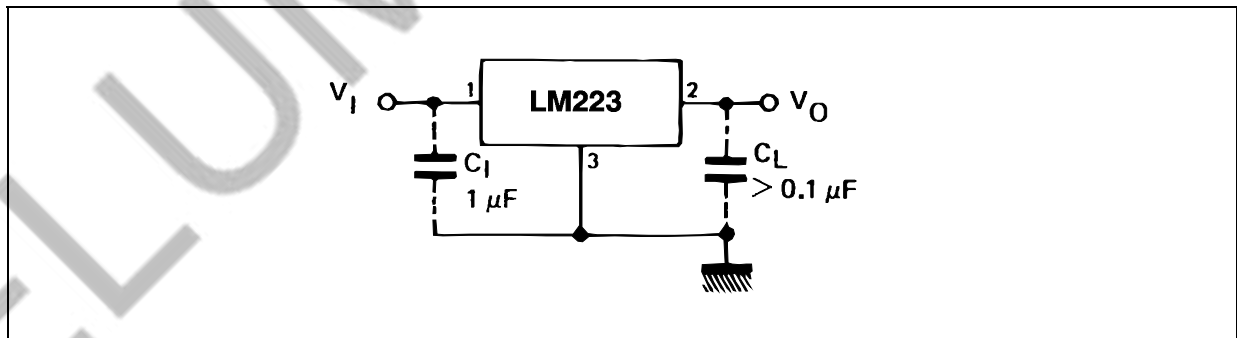


Figure 10 : Load Transient Response



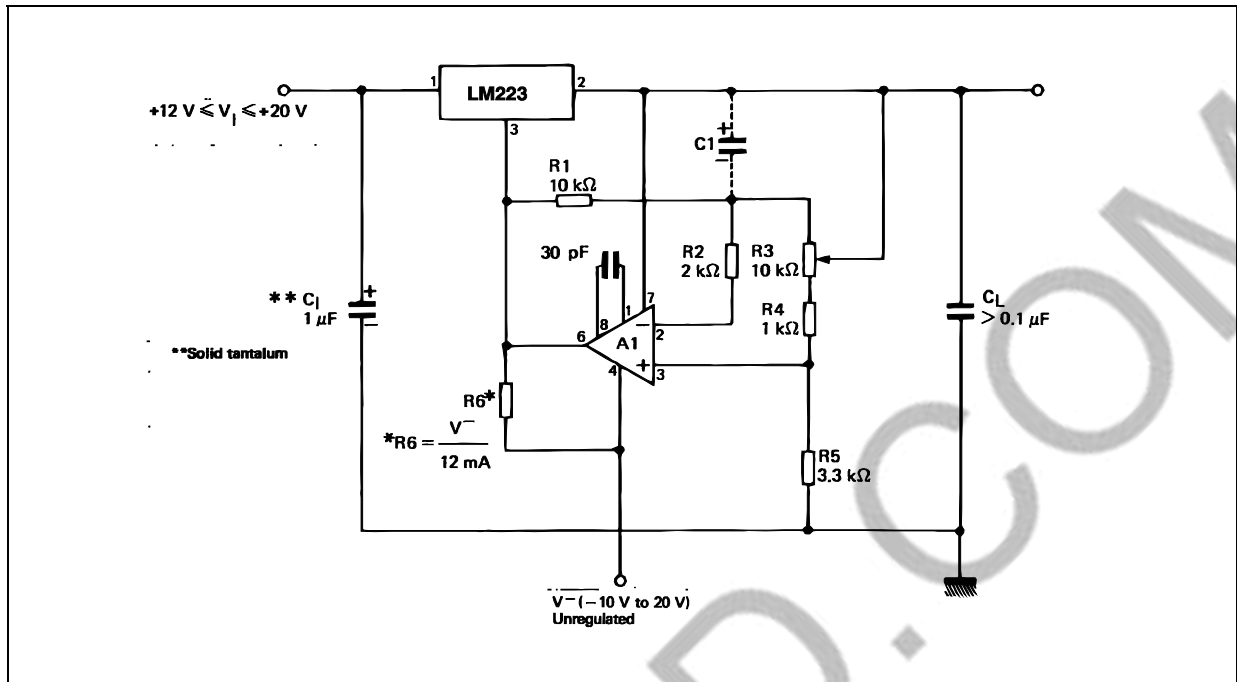
TYPICAL APPLICATION

BASIC 3A REGULATOR



C_I = Required if regulator is distant from filter capacitors.
 C_L = Regulator is stable with no load capacitor into resistive loads.

ADJUSTABLE REGULATOR 0 - 10V/3A

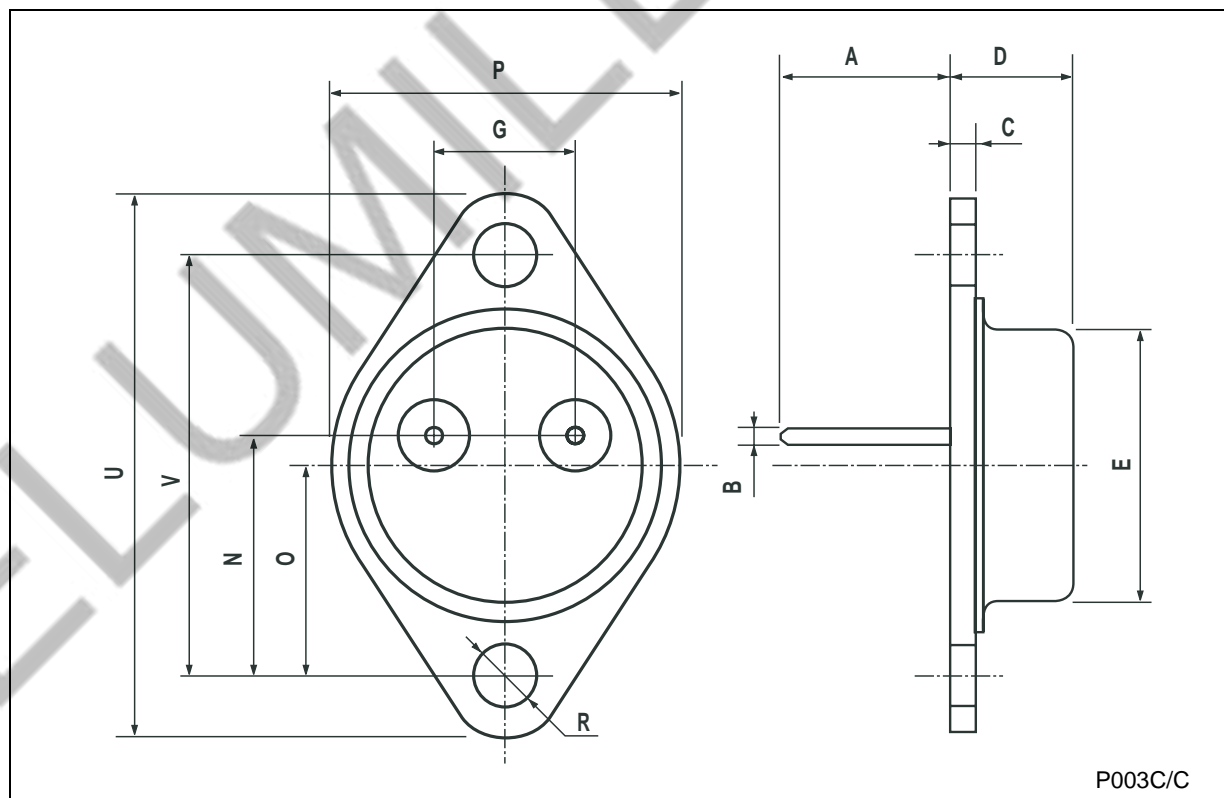


A1 = LM101A, LM201A, LM301A.

$C_I = 2 \mu F$ optional - improves ripple rejection, noise and transient response.

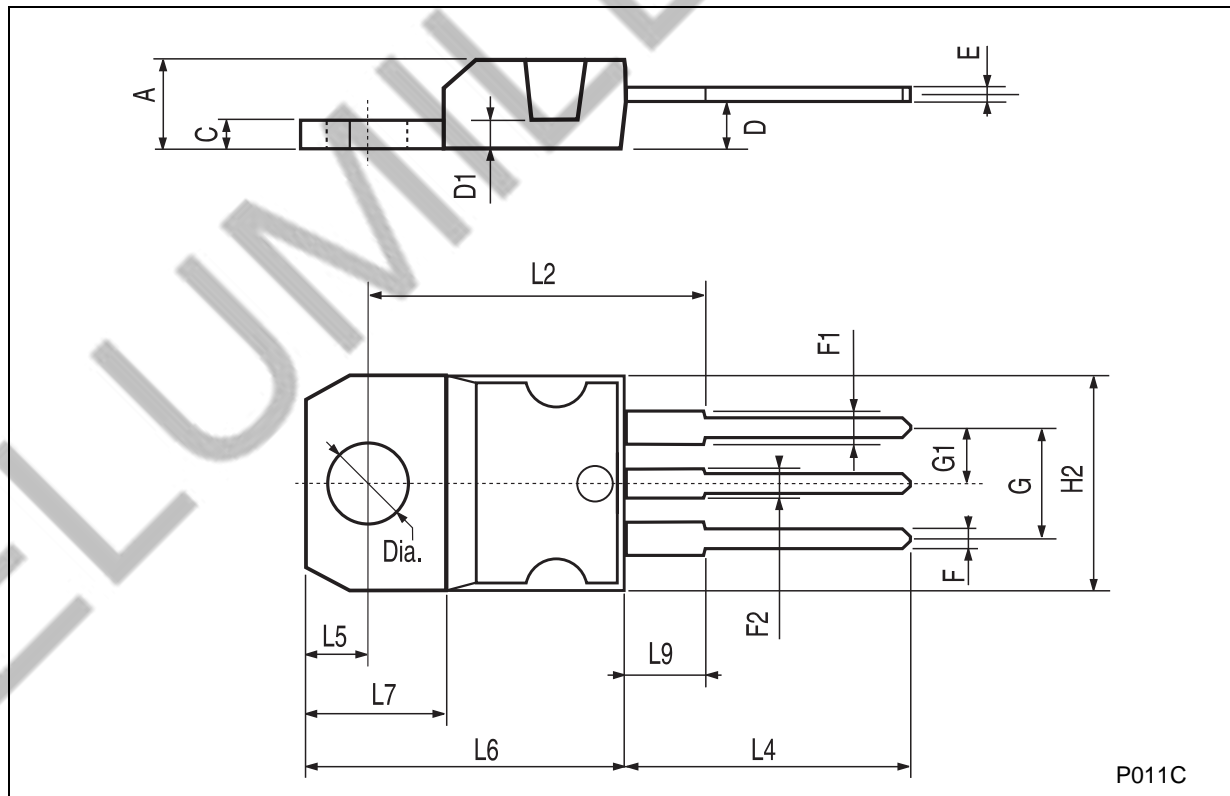
TO-3 MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------|-------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | 11.85 | | | 0.466 | |
| B | 0.96 | 1.05 | 1.10 | 0.037 | 0.041 | 0.043 |
| C | | | 1.70 | | | 0.066 |
| D | | | 8.7 | | | 0.342 |
| E | | | 20.0 | | | 0.787 |
| G | | 10.9 | | | 0.429 | |
| N | | 16.9 | | | 0.665 | |
| P | | | 26.2 | | | 1.031 |
| R | 3.88 | | 4.09 | 0.152 | | 0.161 |
| U | | | 39.5 | | | 1.555 |
| V | | 30.10 | | | 1.185 | |



TO-220 MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|-------|------|-------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 4.40 | | 4.60 | 0.173 | | 0.181 |
| C | 1.23 | | 1.32 | 0.048 | | 0.051 |
| D | 2.40 | | 2.72 | 0.094 | | 0.107 |
| D1 | | 1.27 | | | 0.050 | |
| E | 0.49 | | 0.70 | 0.019 | | 0.027 |
| F | 0.61 | | 0.88 | 0.024 | | 0.034 |
| F1 | 1.14 | | 1.70 | 0.044 | | 0.067 |
| F2 | 1.14 | | 1.70 | 0.044 | | 0.067 |
| G | 4.95 | | 5.15 | 0.194 | | 0.203 |
| G1 | 2.4 | | 2.7 | 0.094 | | 0.106 |
| H2 | 10.0 | | 10.40 | 0.393 | | 0.409 |
| L2 | | 16.4 | | | 0.645 | |
| L4 | 13.0 | | 14.0 | 0.511 | | 0.551 |
| L5 | 2.65 | | 2.95 | 0.104 | | 0.116 |
| L6 | 15.25 | | 15.75 | 0.600 | | 0.620 |
| L7 | 6.2 | | 6.6 | 0.244 | | 0.260 |
| L9 | 3.5 | | 3.93 | 0.137 | | 0.154 |
| DIA. | 3.75 | | 3.85 | 0.147 | | 0.151 |



P011C

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