

LM123-LM223-LM323

ABSOLUTE MAXIMUM RATINGS

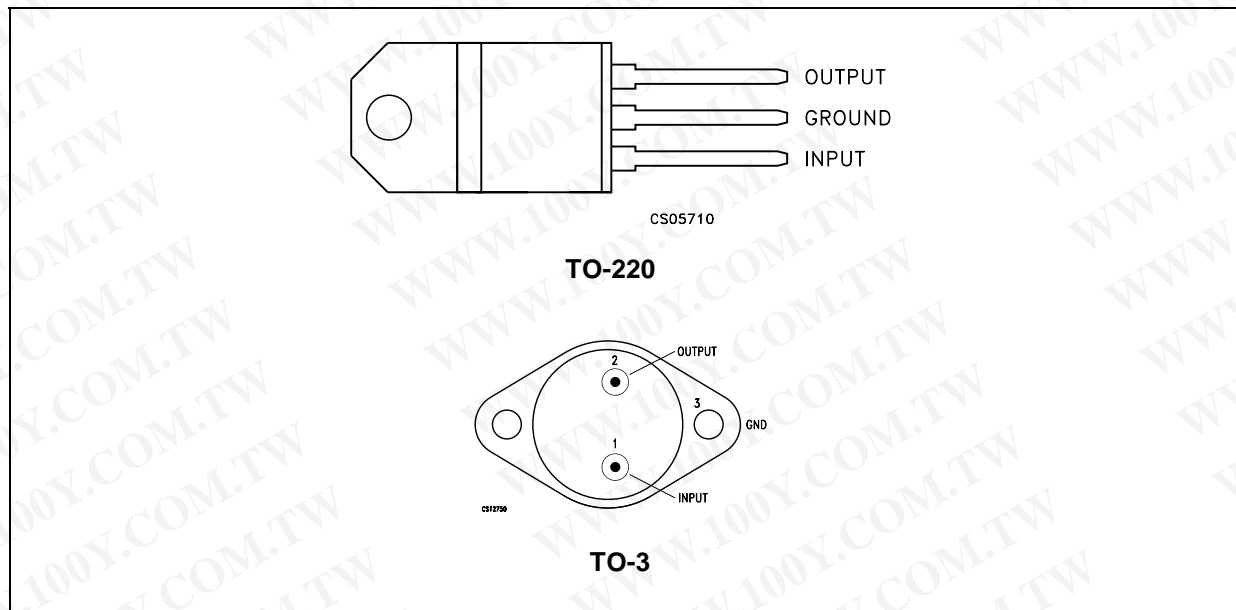
| Symbol | Parameter ² | Value | Unit |
|------------|--------------------------------------|--------------------|------------|
| V_I | Input Voltage | 20 | V |
| I_O | Output Current | Internally Limited | |
| P_{tot} | Power Dissipation | Internally Limited | |
| T_{stg} | Storage Temperature Range | -65 to 150 | °C |
| T_{oper} | Operating Junction Temperature Range | LM123 | -55 to 150 |
| | | 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 $\leq 5\%$.

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Figure 1 : Output Noise Voltage

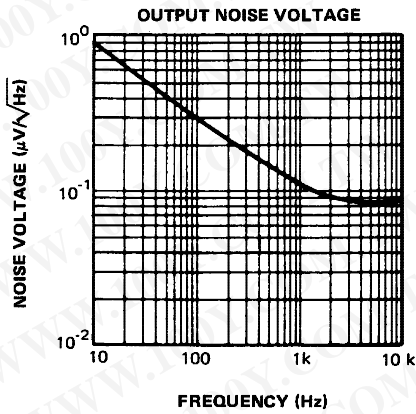


Figure 4 : Short Circuit Current

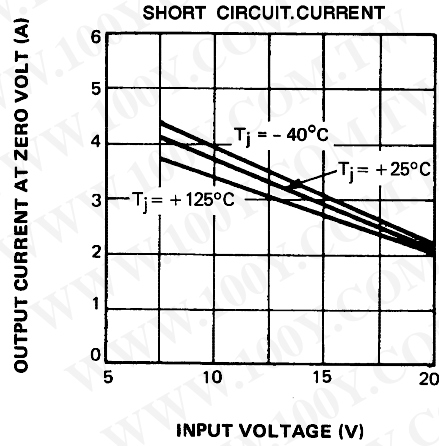


Figure 2 : Output Impedance

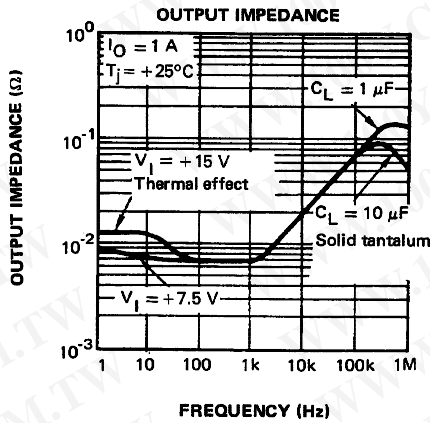


Figure 5 : Ripple Rejection

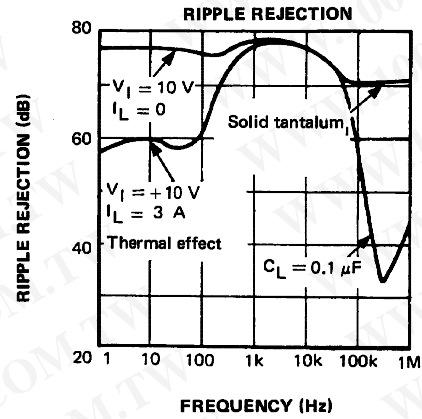


Figure 3 : Peak Available Output Current

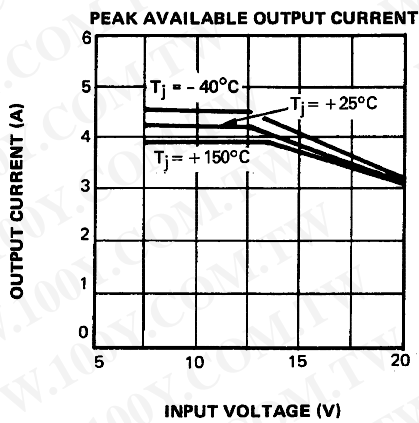
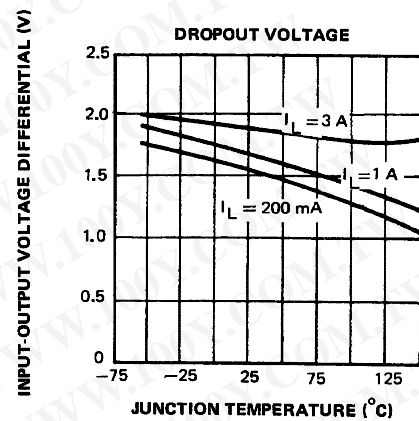


Figure 6 : Dropout Voltage



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Figure 7 : Line Transient Response

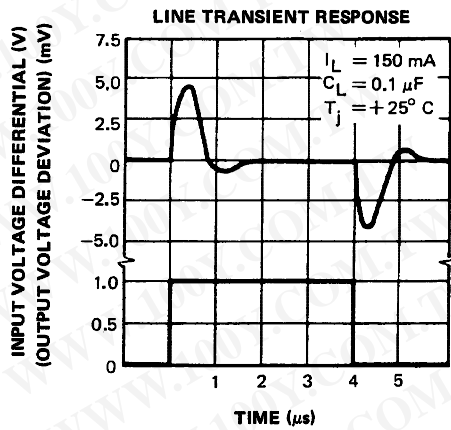


Figure 9 : Quiescent Current

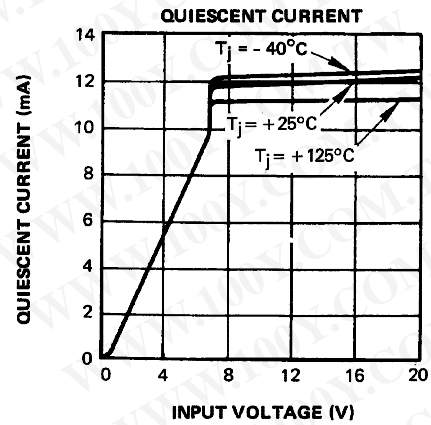


Figure 8 : Output Voltage

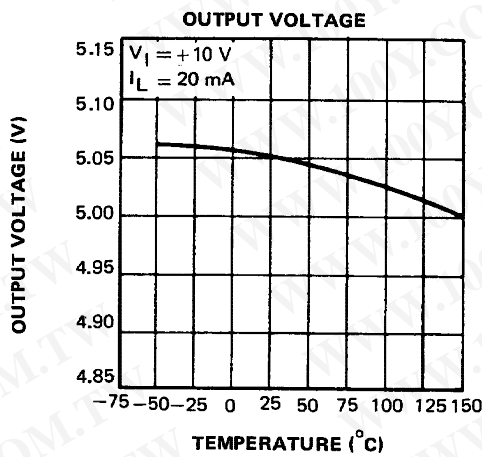
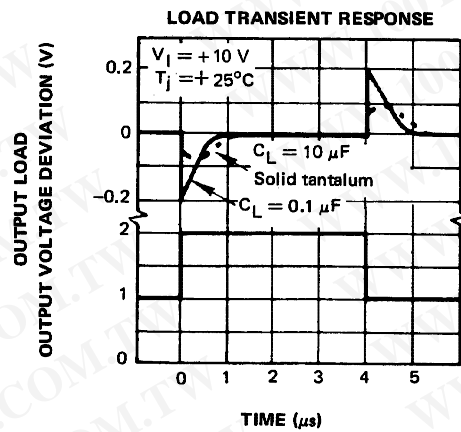
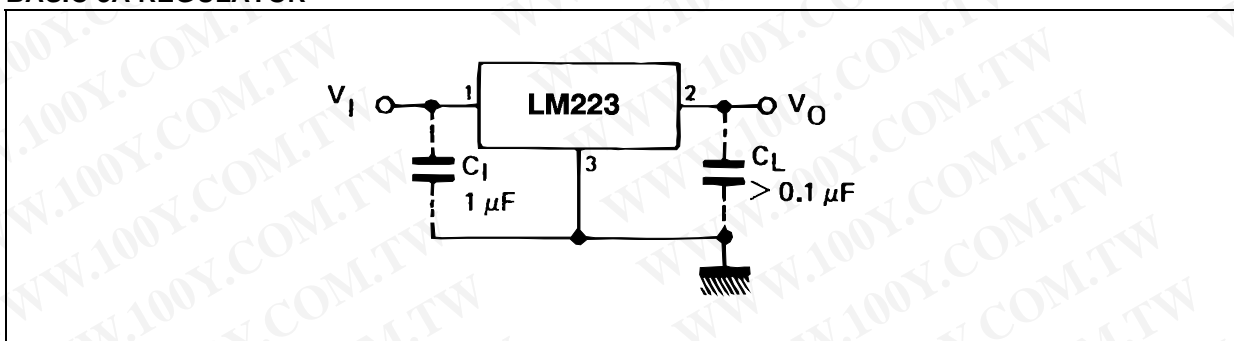


Figure 10 : Load Transient Response



TYPICAL APPLICATION

BASIC 3A REGULATOR

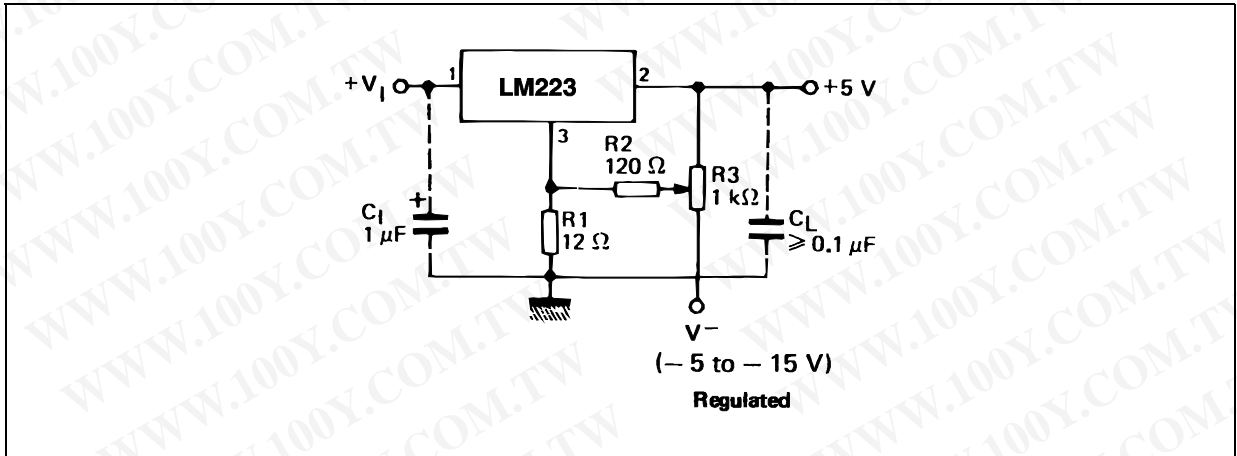


C_1 = Required if regulator is distant from filter capacitors.
 C_L = Regulator is stable with no load capacitor into resistive loads.

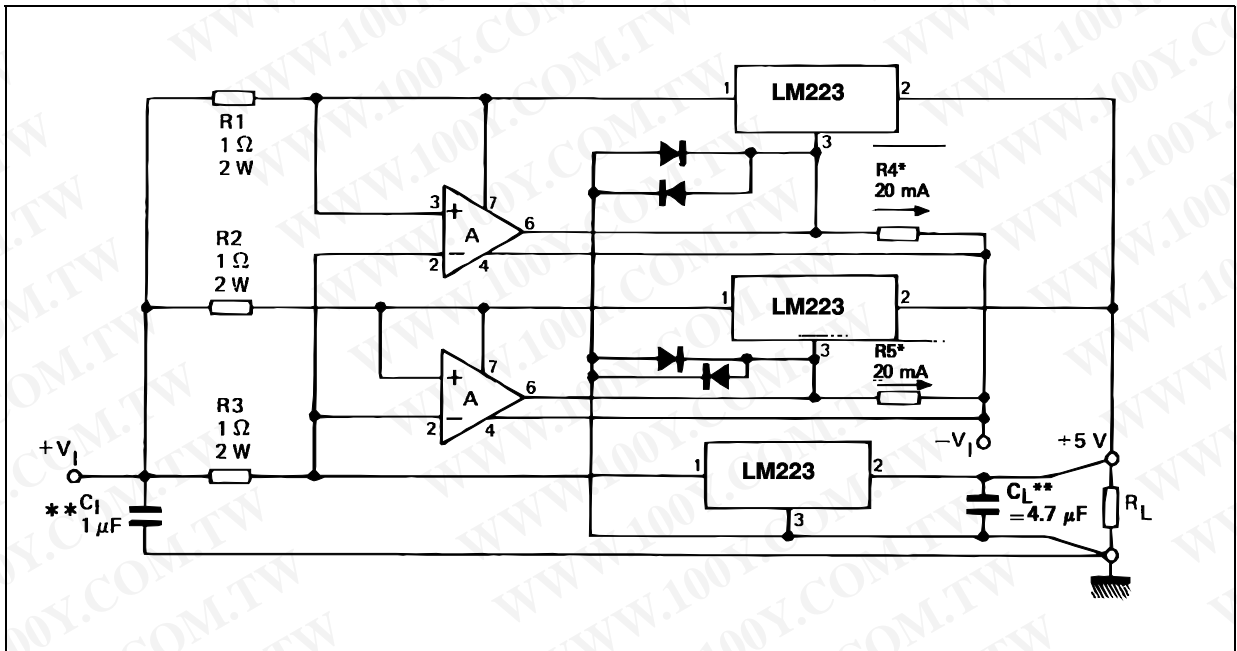
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LM123-LM223-LM323

TRIMMING OUTPUT TO 5V



10A REGULATOR WITH COMPLETE OVERLOAD PROTECTION



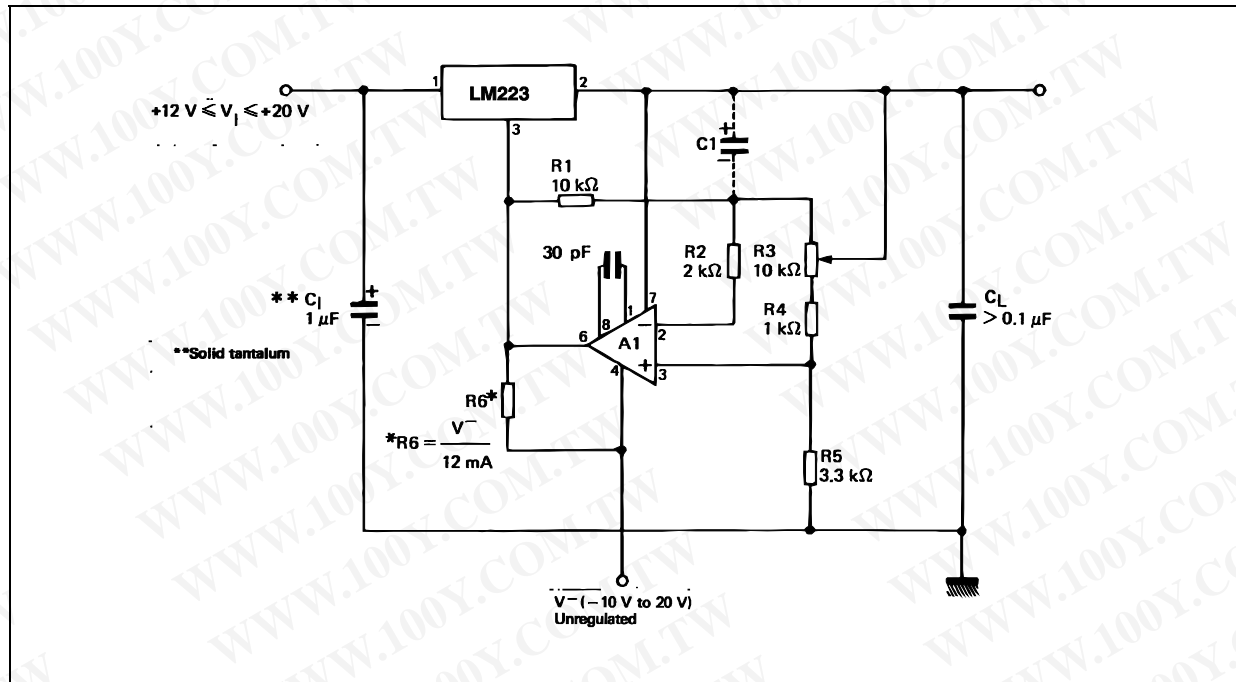
* Selected for 20 mA current from unregulated negative supply.

** Solid tantalum.

A = LM101A, LM201A, LM301A.

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ADJUSTABLE REGULATOR 0 - 10V/3A



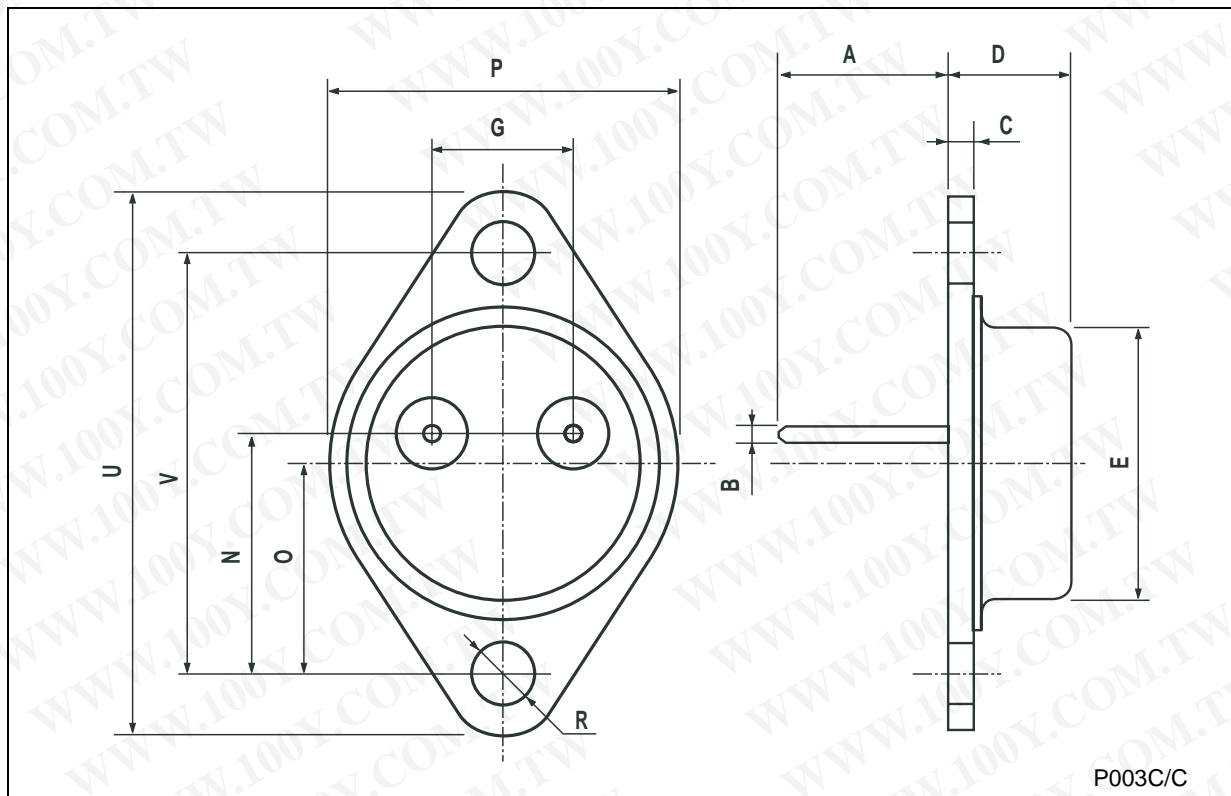
A1 = LM101A, LM201A, LM301A.

C1 = 2 μ F optional - improves ripple rejection, noise and transient response.

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TO-3 MECHANICAL DATA

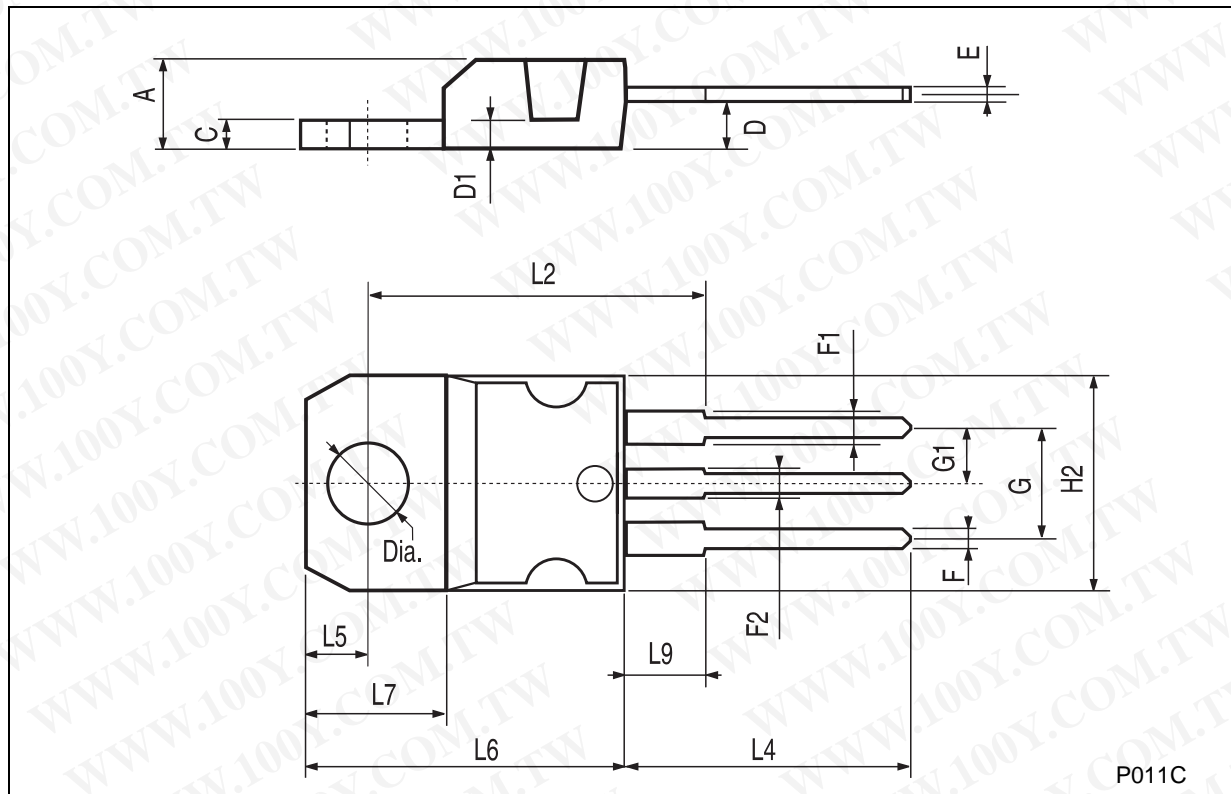
| DIM. | mm. | | | inch | | |
|------|------|-------|------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | 11.85 | | | 0.466 | |
| B | 0.96 | 1.05 | 1.10 | 0.037 | 0.041 | 0.043 |
| C | | | 1.70 | | | 0.066 |
| D | | | 8.7 | | | 0.342 |
| E | | | 20.0 | | | 0.787 |
| G | | 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 | |



P003C/C

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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