



L4705/L4710

412-650

+ 413-030

L4705
L4785
L4710

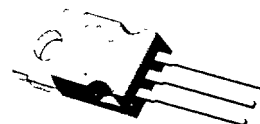
PRELIMINARY DATA

VERY LOW DROP VOLTAGE REGULATORS

- INPUT/OUTPUT DROP TYP. 0.6V
- 500mA OUTPUT CURRENT
- 80V LOAD DUMP PROTECTION
- -80V TRANSIENT PROTECTION
- REVERSE POLARITY PROTECTION
- OVERVOLTAGE PROTECTION
- OUTPUT CURRENT LIMITING
- THERMAL SHUTDOWN

L4700 series voltage regulators feature a very low voltage drop, an output current of 500mA and protection against load dump transients of $\pm 80V$. Available in 5V, 8.5V and 10V ($\pm 4\%$) versions, these regulators also include reverse polarity protection, overvoltage protection, output current limiting and a thermal shutdown circuit.

L4700 series regulators are specially designed for automotive and industrial applications where the electrical environment is very demanding and low voltage drop is required. For example, the L4705 can be used in 5V automotive applications, continuing to function even when the battery voltage falls to 6V, a common event during starting. Moreover, the L4705 is fully protected against the transients, overvoltages and polarity reversal encountered on the battery rail.



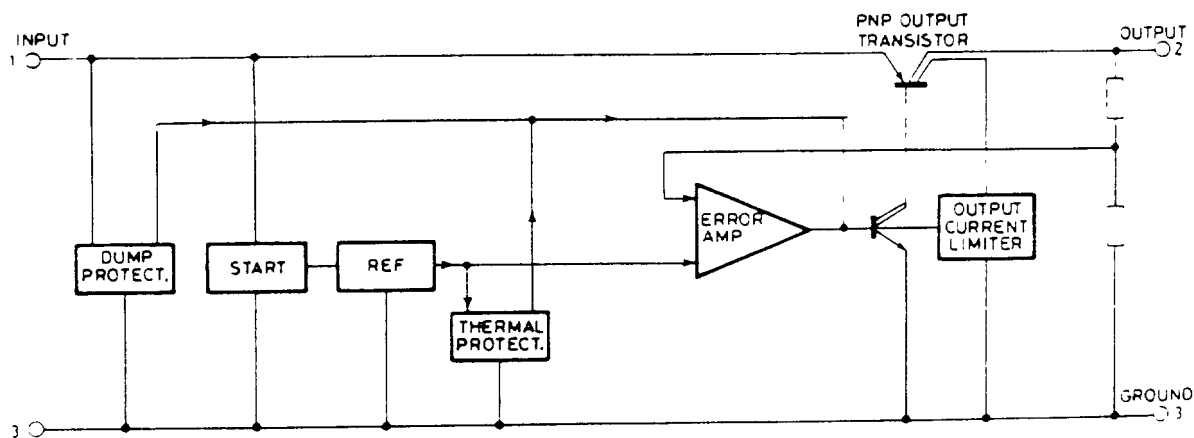
TO-220

ORDERING NUMBER: L4705CV (5V)
L4785CV (8.5V)
L4710CV (10V)

ABSOLUTE MAXIMUM RATINGS

| | | | |
|-----------|---|------------|----|
| V_i | Forward input voltage | 35 | V |
| V_r | Reverse input voltage | -18 | V |
| V_t | Positive transient peak voltage ($t = 300$ ms) | +80 | V |
| V_t | Negative transient peak voltage ($t = 100$ ms) | -80 | V |
| T_{op} | Operating junction temperature | -40 to 150 | °C |
| T_{stg} | Storage temperature | -55 to 150 | °C |

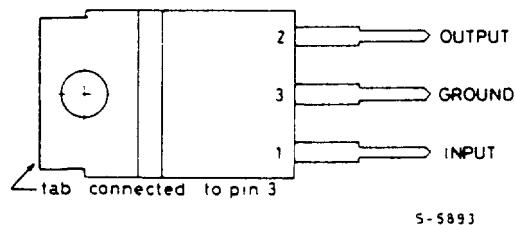
BLOCK DIAGRAM



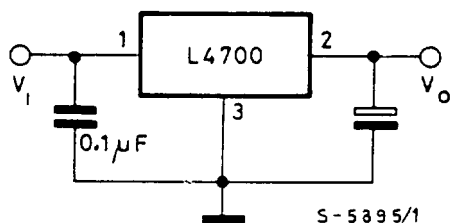
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L4705
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CONNECTION DIAGRAM (top view)



TEST AND APPLICATION CIRCUIT



The output capacitor is required for stability. Though the $47\mu\text{F}$ shown is the minimum recommended value, actual size and type may vary depending upon the application load and temperature range. Capacitor effective series resistance (ESR) also factors in the IC stability. Since ESR varies from one brand to the next, some bench work may be required to determine the minimum capacitor value to use in production. Worst-case is usually determined at the minimum ambient temperature and maximum load expected.

Output capacitors can be increased in size to any desired value above the minimum. One possible purpose of this would be to maintain the output voltages during brief conditions of negative input transients that might be characteristic of a particular system.

Capacitors must also be rated at all ambient temperature expected in the system. Many aluminum type electrolytics will freeze at temperatures less than -30°C , reducing their effective capacitance to zero. To maintain regulator stability down to -40°C , capacitors rated at that temperature (such as tantalums) must be used.

THERMAL DATA

| | | | | |
|-------------------------|----------------------------------|-----|---|--------------------|
| $R_{th \text{ J-case}}$ | Thermal resistance junction-case | max | 4 | $^\circ\text{C/W}$ |
|-------------------------|----------------------------------|-----|---|--------------------|

ELECTRICAL CHARACTERISTICS ($V_i = 14.4V$, $T_j = 25^\circ C$)

| Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--|---|------|------|------|-------------------------------|
| V_O Output voltage | $I_O = 5 \text{ mA to } 500 \text{ mA}$ | 4.80 | 5 | 5.20 | V |
| | | 8.16 | 8.5 | 8.84 | V |
| | | 9.6 | 10 | 10.4 | V |
| V_i Operating input voltage | (*) see note | | | 28 | V |
| $\Delta V_O/V_O$ Line regulation | $V_i = 11 \text{ to } 26V$ $I_O = 5 \text{ mA}$ | | 1 | | mV/V |
| $\Delta V_O/V_O$ Load regulation | $I_O = 5 \text{ to } 500 \text{ mA}$ | | 3 | | mV/V |
| $V_i - V_O$ Dropout voltage | $I_O = 500 \text{ mA}$ | | 0.6 | 0.9 | V |
| I_q Quiescent current | $I_O = 0 \text{ mA}$ | | 6 | | mA |
| | $I_O = 150 \text{ mA}$ | | 20 | 40 | mA |
| | $I_O = 500 \text{ mA}$ | | 130 | | mA |
| $\frac{\Delta V_O}{\Delta T \cdot V_O}$ Temperature output voltage drift | | | 0.1 | | $\frac{mV}{^\circ C \cdot V}$ |
| SVR Supply voltage rejection | $I_O = 350 \text{ mA}$ $f = 120 \text{ Hz}$ $C_O = 100 \mu F$ $V_i = V_O + 3V + 2V_{pp}$ | | 55 | | dB |
| I_{sc} Output short circuit current | | | 800 | | mA |

(*) For a DC input voltage $28V < V_i < 35V$ the device is not operating.

Fig. 1 - Dropout voltage vs. output current

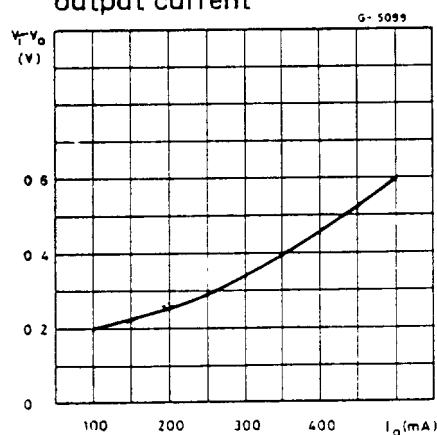


Fig. 2 - Quiescent current vs. output current

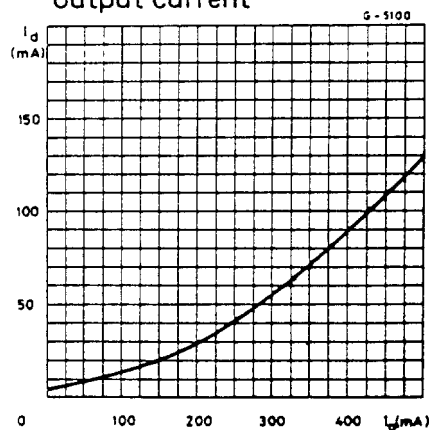
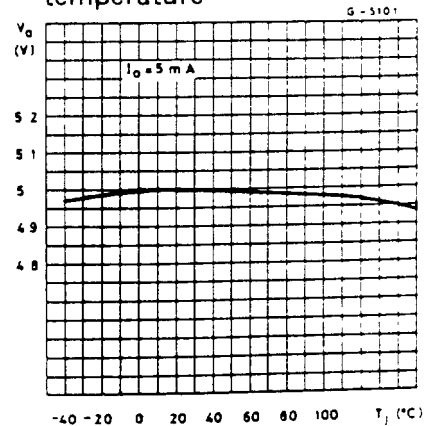


Fig. 3 - Output voltage vs. temperature



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