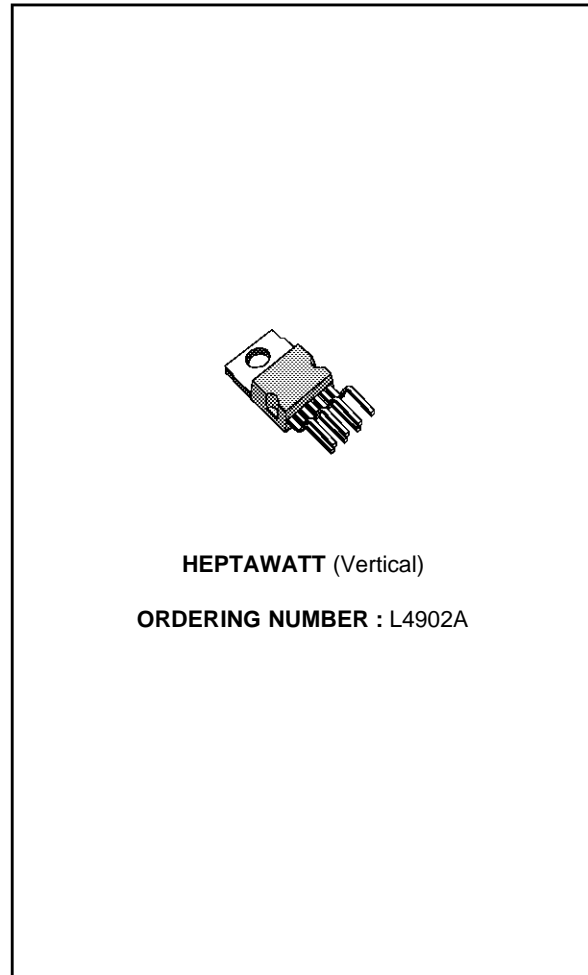


DUAL 5V REGULATOR WITH RESET AND DISABLE

PRELIMINARY DATA

- DOUBLE BATTERY OPERATING
- OUTPUT CURRENTS : $I_{O1} = 300 \text{ mA}$
 $I_{O2} = 300 \text{ mA}$
- FIXED PRECISION OUTPUT VOLTAGE
 $5 \text{ V} \pm 2 \%$
- RESET FUNCTION CONTROLLED BY INPUT VOLTAGE AND OUTPUT 1 VOLTAGE
- RESET FUNCTION EXTERNALLY PROGRAMMABLE TIMING
- RESET OUTPUT LEVEL RELATED TO OUTPUT 2
- OUTPUT 2 INTERNALLY SWITCHED WITH ACTIVE DISCHARGING
- OUTPUT 2 DISABLE LOGICAL INPUT
- LOW LEAKAGE CURRENT, LESS THAN $1 \mu\text{A}$ AT OUTPUT 1
- RESET OUTPUT NORMALLY HIGH
- INPUT OVERVOLTAGE PROTECTION UP TO 60V
- OUTPUT TRANSISTORS SOA PROTECTION
- SHORT CIRCUIT AND THERMAL OVERLOAD PROTECTION

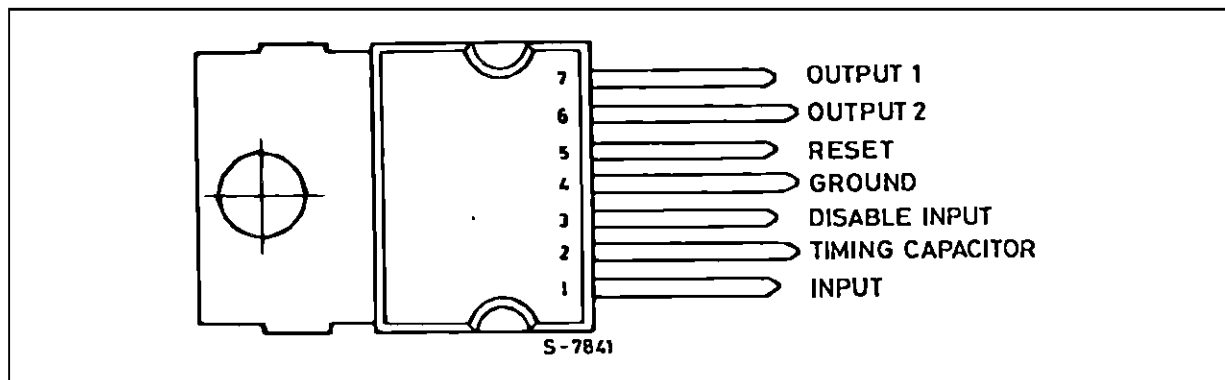


DESCRIPTION

The L4902A is a monolithic low drop dual 5V regulator designed mainly for supplying microprocessor systems.

Reset and data save functions and remote switch on/off control can be realized.

PIN CONNECTION

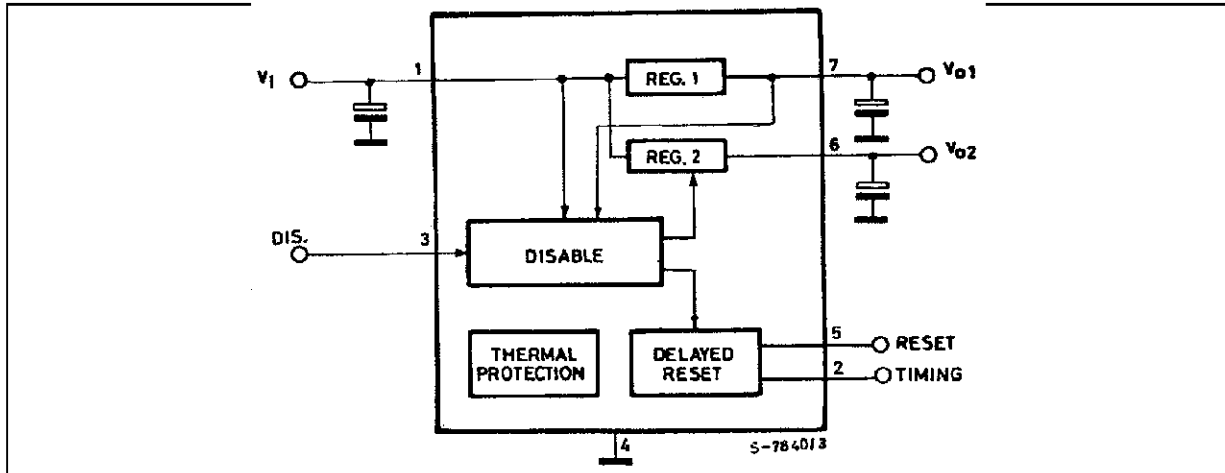


L4902A

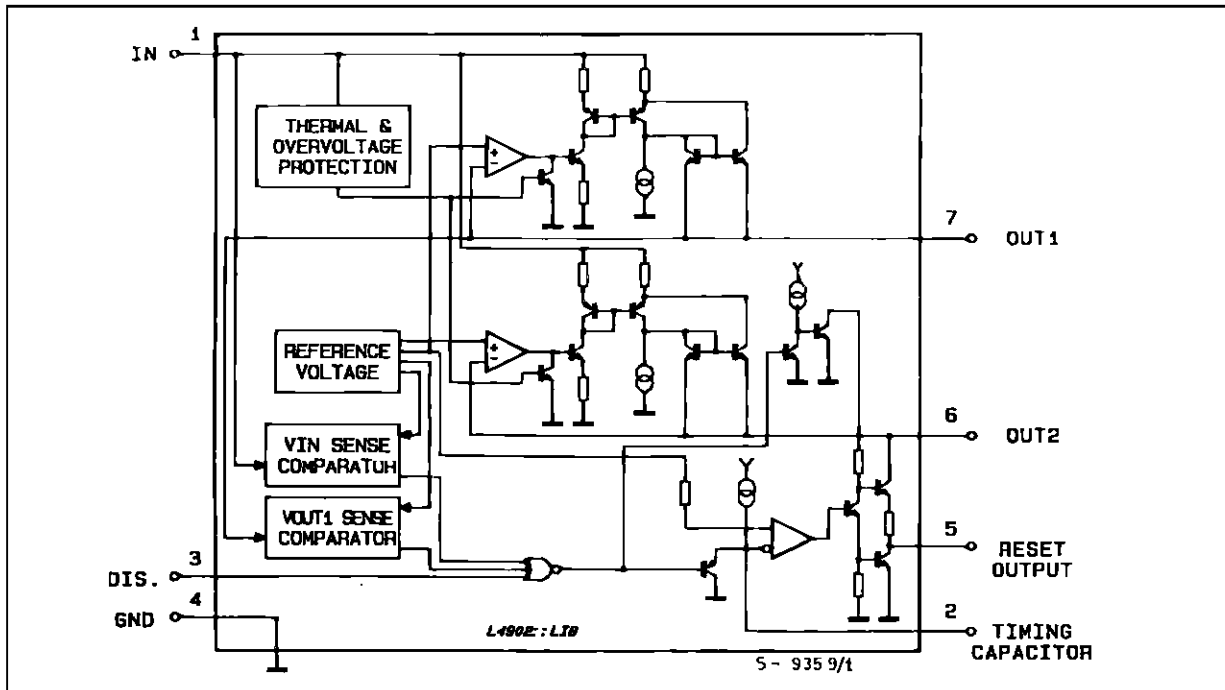
PIN FUNCTIONS

| N° | Name | Function |
|----|------------------|---|
| 1 | Input 1 | Regulators Common Input |
| 2 | Timing Capacitor | If Reg. 2 is switched-ON the delay capacitor is charged with a 5µA constant current. When Reg. 2 is switched-OFF the delay capacitor is discharged. |
| 3 | Disable Input | A high level (> V _{DT}) disable output Reg. 2. |
| 4 | GND | Common Ground |
| 5 | Reset Output | When pin 2 reaches 5V the reset output is switched high. Therefore $t_{RD} = C_t \left(\frac{5V}{10\mu A} \right)$; $t_{RD} \text{ (ms)} = C_t \text{ (nF)}$ |
| 6 | Output 2 | 5V – 300mA Regulator Output. Enabled if V _o 1 > V _{RT} . DISABLE INPUT < V _{DT} and V _{IN} > V _{IT} . If Reg. 2 is switched-OFF the C ₀₂ capacitor is discharged. |
| 7 | Output 1 | 5V – 300mA. Low leakage (in switch-OFF condition) output |

BLOCK DIAGRAM



SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|----------------|---|--------------------|--------|
| V_{IN} | DC Input Voltage Transient Input Overvoltage ($t = 40\text{ms}$) | 28 60 | V V |
| I_o | Output Current | Internally Limited | |
| T_{stg}, T_j | Storage and Junction Temperature | - 40 to 150 | °C |

THERMAL DATA

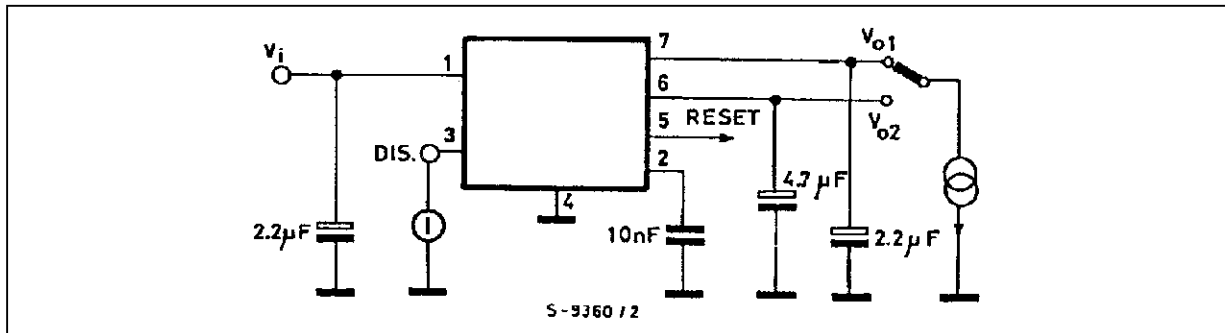
| Symbol | Parameter | Value | Unit |
|-------------------------|----------------------------------|-------|------|
| $R_{th\ j\text{-case}}$ | Thermal Resistance Junction-case | Max 4 | °C/W |

ELECTRICAL CHARACTERISTICS ($V_{IN} = 14.4\text{V}$, $T_{amb} = 25^\circ\text{C}$ unless otherwise specified))

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|----------------------------------|------------------------------------|---|-----------------|-------------------|-------------------|--------------------------------|
| V_i | DC Operating Input Voltage | | | | 24 | V |
| V_{O1} | Output Voltage 1 | R Load $1\text{k}\Omega$ | 4.95 | 5.05 | 5.15 | V |
| $V_{O2\ H}$ | Output Voltage 2 HIGH | R Load $1\text{k}\Omega$ | $V_{O1} - 0.1$ | 5 | V_{O1} | V |
| $V_{O2\ L}$ | Output Voltage 2 LOW | $I_{O2} = -5\text{mA}$ | | 0.1 | | V |
| I_{O1} | Output Current 1 max. | $\Delta V_{O1} = -100\text{mV}$ | 300 | | | mA |
| I_{LO1} | Leakage Output 1 Current | $V_{IN} = 0, V_{O1} \leq 3\text{V}$ | | | 1 | μA |
| I_{O2} | Output Current 2 max. | $\Delta V_{O2} = -100\text{mV}$ | 300 | | | mA |
| V_{iO1} | Output 1 Dropout Voltage (*) | $I_{O1} = 10\text{mA}$ $I_{O1} = 100\text{mA}$ $I_{O1} = 300\text{mA}$ | | 0.7 0.8 1.1 | 0.8 1 1.4 | V V V |
| V_{IT} | Input Threshold Voltage | | $V_{O1} + 1.2$ | 6.4 | $V_{O1} + 1.7$ | V |
| V_{iTH} | Input Threshold Voltage Hyst. | | | 250 | | mV |
| ΔV_{O1} | Line Regulation 1 | $7\text{V} < V_{IN} < 24\text{V}, I_{O1} = 5\text{mA}$ | | 5 | 50 | mV |
| ΔV_{O2} | Line Regulation 2 | $7\text{V} < V_{IN} < 24\text{V}, I_{O2} = 5\text{mA}$ | | 5 | 50 | mV |
| ΔV_{O1} | Load Regulation 1 | $5\text{mA} < I_{O1} < 300\text{mA}$ | | 40 | 80 | mV |
| ΔV_{O2} | Load Regulation 2 | $5\text{mA} < I_{O2} < 300\text{mA}$ | | 50 | 80 | mV |
| I_Q | Quiescent Current | $I_{O1} = I_{O2} \leq 5\text{mA}$ $0 < V_{IN} < 13\text{V}$ $7\text{V} < V_{IN} < 13\text{V}, V_{O2}\ \text{LOW}$ $7\text{V} < V_{IN} < 13\text{V}, V_{O2}\ \text{HIGH}$ | | 4.5 2.7 1.6 | 6.5 4.5 3.5 | mA |
| V_{RT} | Reset Threshold Voltage | | $V_{O2} - 0.15$ | 4.9 | $V_{O2} - 0.05$ | V |
| V_{RTH} | Reset Threshold Hysteresis | | 30 | 50 | 80 | mV |
| V_{RH} | Reset Output Voltage HIGH | $I_R = 500\mu\text{A}$ | $V_{O2} - 1$ | 4.12 | V_{O2} | V |
| V_{RL} | Reset Output Voltage LOW | $I_R = -1\text{mA}$ | | 0.25 | 0.4 | V |
| t_{RD} | Reset Pulse Delay | $C_1 = 10\text{nF}$ | 3 | 5 | 11 | ms |
| t_d | Timing Capacitor Discharge Time | $C_1 = 10\text{nF}$ | | | 20 | μs |
| V_{DT} | V_{O2} Disable Threshold Voltage | | | 1.25 | 2.4 | V |
| I_D | V_{O2} Disable Input Current | $V_D \leq 0.4\text{V}$ $V_D \geq 2.4\text{V}$ | | - 150 - 30 | | μA μA |
| $\frac{\Delta V_{O1}}{\Delta T}$ | Thermal Drift | $-20^\circ\text{C} \leq T_{amb} \leq 125^\circ\text{C}$ | | 0.3 -0.8 | | mV/°C |
| $\frac{\Delta V_{O2}}{\Delta T}$ | Thermal Drift | $-20^\circ\text{C} \leq T_{amb} \leq 125^\circ\text{C}$ | | 0.3 -0.8 | | mV/°C |
| SVR1 | Supply Voltage Rejection | $f = 100\text{Hz}, V_R = 0.5\text{V}$ $I_o = 100\text{mA}$ | 50 | 84 | | dB |
| SVR2 | Supply Voltage Rejection | | 50 | 80 | | dB |
| T_{JSD} | Thermal Shut Down | | | 150 | | °C |

* The dropout voltage is defined as the difference between the input and the output voltage when the output voltage is lowered of 25 mV under constant output current condition.

TEST CIRCUIT



APPLICATION INFORMATION

In power supplies for μP systems it is necessary to provide power continuously to avoid loss of information in memories and in time of day clocks, or to save data when the primary supply is removed. The L4902A makes it very easy to supply such equipments ; it provides two voltage regulators (both 5V high precision) with common inputs plus a reset output for the data save function and a Reg. 2 disable input.

programmable time T_{RD} (timing capacitor).

V_{o2} and V_R are switched together at low level when one of the following conditions occurs :

- a high level (V_{DT}) is applied on pin 3 ;
- an input overvoltage ;
- an overload on the output 1 ($V_{o1} > V_{RT}$) ;
- a switch off ($V_{IN} < V_{IT} - V_{ITH}$) ;

and they start again as before when the condition is removed.

An overload on output 2 does not switch Reg. 2, and does not influence Reg. 1.

The V_{o1} output features :

- 5V internal reference without voltage divider between the output and the error comparator
- very low drop series regulator element utilizing current mirrors

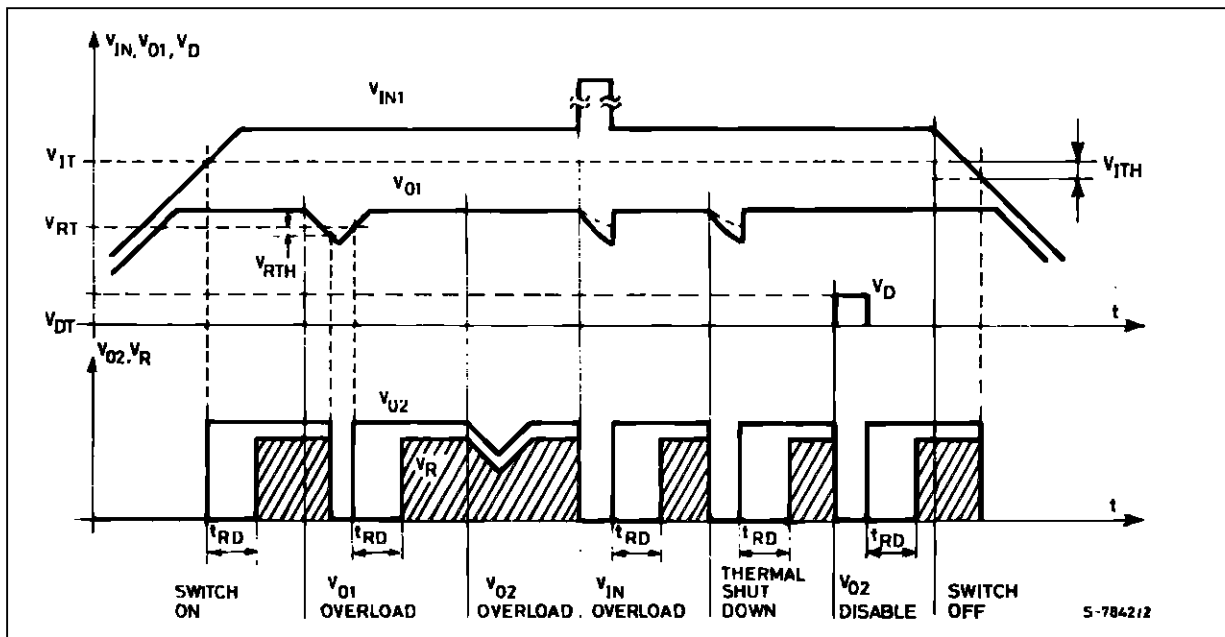
permit high output impedance and then very low leakage current even in power down condition.

CIRCUIT OPERATION (see Figure 1)

After switch on Reg. 1 saturates until V_{o1} rises to the nominal value.

When the input reaches V_{IT} and the output 1 is higher than V_{RT} the output 2 (V_{o2}) switches on and the reset output (V_R) also goes high after a pro-

Figure 1



This output may therefore be used to supply circuits continuously, such as volatile RAMs, allowing the use of a back-up battery.

The V_{O2} output can supply other non essential 5 V circuits which may be powered down when the system is inactive, or that must be powered down to prevent uncorrect operation for supply voltages below the minimum value.

The reset output can be used as a "POWER DOWN INTERRUPT", permitting RAM access only in correct power conditions, or as a "BACK-UP ENABLE" to transfer data into in a NV SHADOW MEMORY

when the supply is interrupted.

The disable function can be used for remote on/off control of circuits connected to the V_{O2} output.

APPLICATION SUGGESTIONS

Figure 2 illustrate how the L4902A's disable input may be used in a CMOS μ Computer application. The V_{O1} regulator (low consumption) supply permanently a CMOS time of day clock and a CMOS μ computer chip with volatile memory. V_{O2} output, supplying non-essential circuits, is turned OFF under control of a μ P unit.

Figure 2

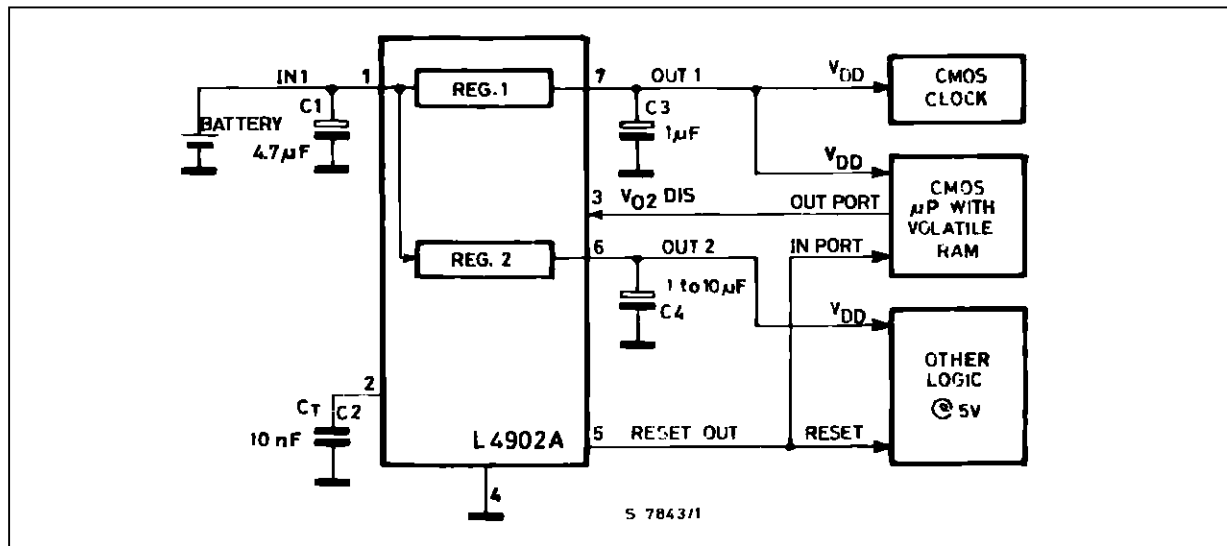
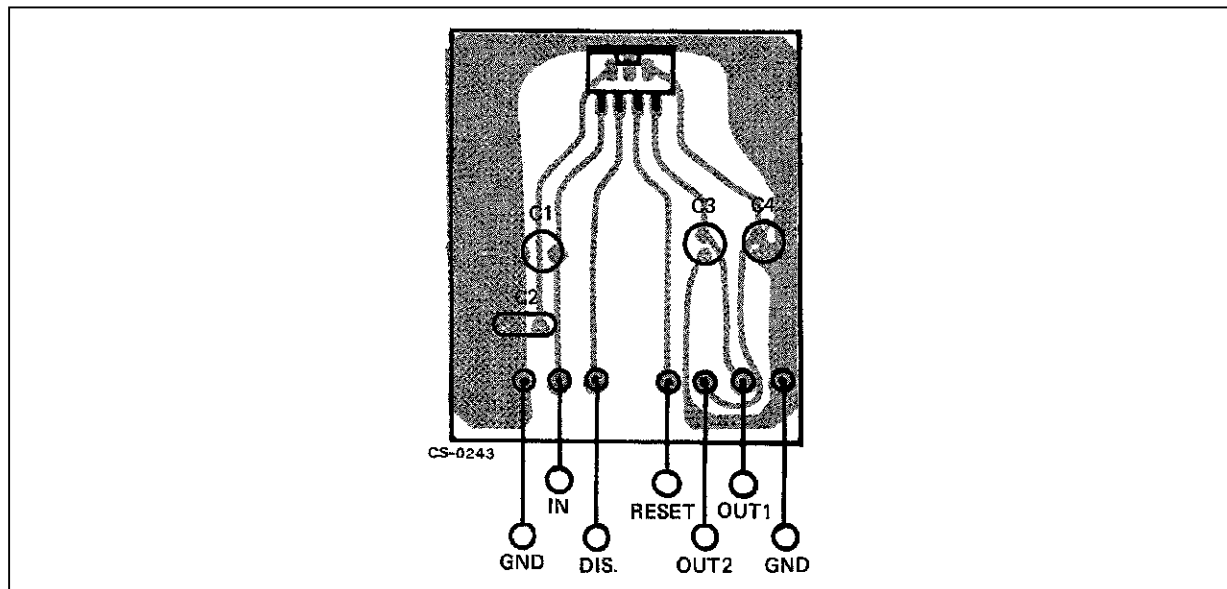


Figure 3 : P.C. Board Component Layout of Figure 2



L4902A

Configurations of this type are used in products where the OFF switch is part of a keyboard scanned by a micro which operates continuously even in the OFF state.

Another application for the L4902A is supplying a shadow-ram microcomputer chip (SGS M38SH72 for example) where a fast NV memory is backed up on chip by a EEPROM when a low level on the reset output occurs.

By adding two CMOS-SCHMIDT-TRIGGER and few external components, also a watch dog func-

tion may be realized (see Figure 5). During normal operation the microsystem supplies a periodical pulse waveform ; if an anomalous condition occurs (in the program or in the system), the pulses will be absent and the disable input will be activated after a settling time determined by R1 C1. In this condition all the circuitry connected to V_{O2} will be disabled, the system will be restarted with a new reset front.

The disable of V_{O2} prevent spurious operation during microprocessor malfunctioning.

Figure 4

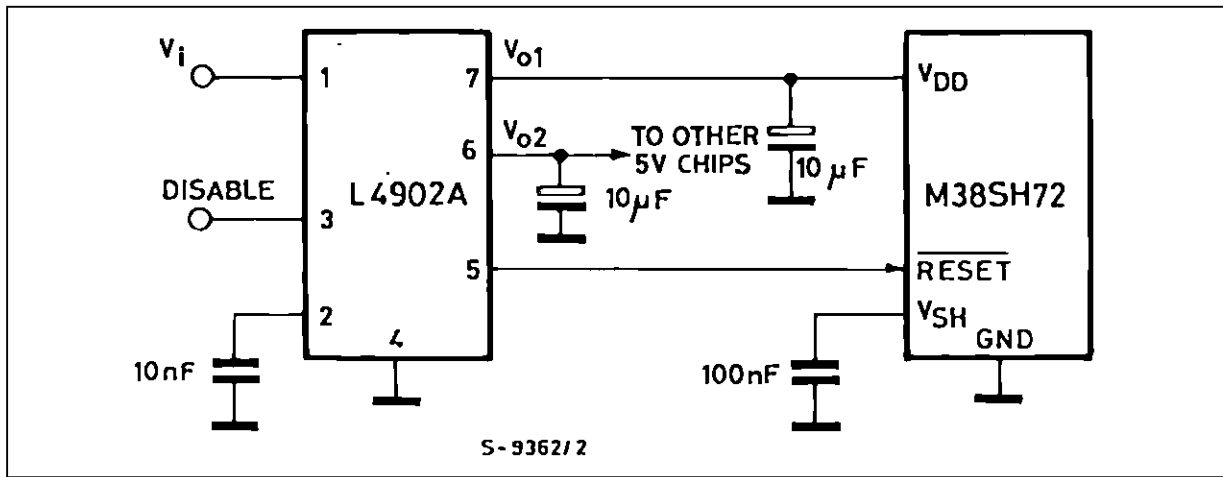


Figure 5

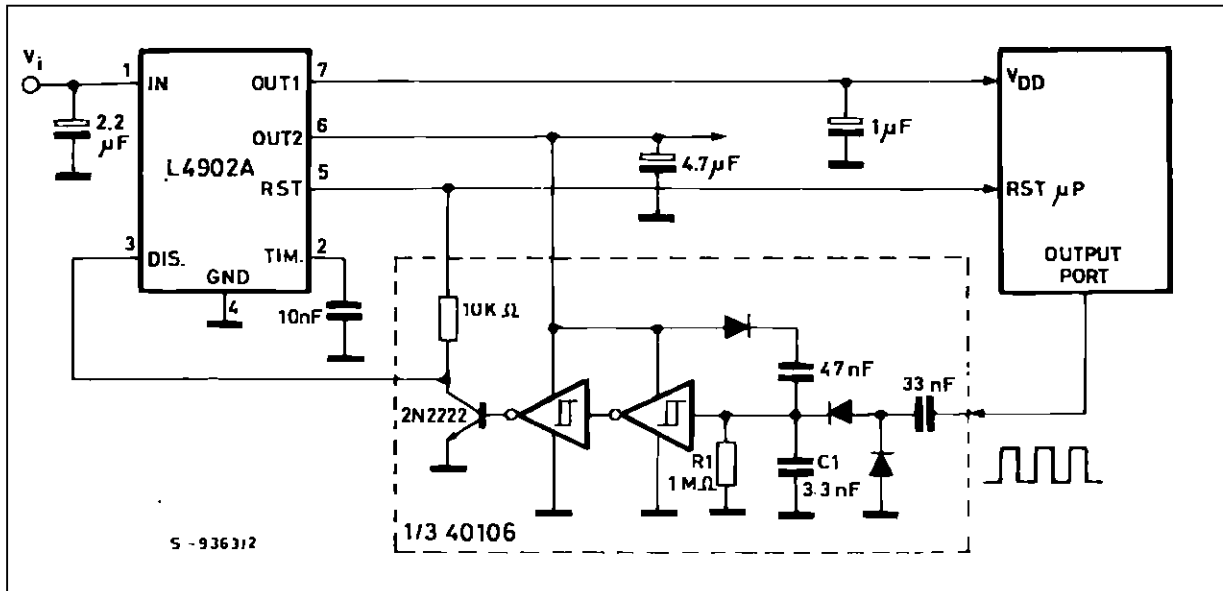


Figure 6 : Quiescent Current versus Output Current

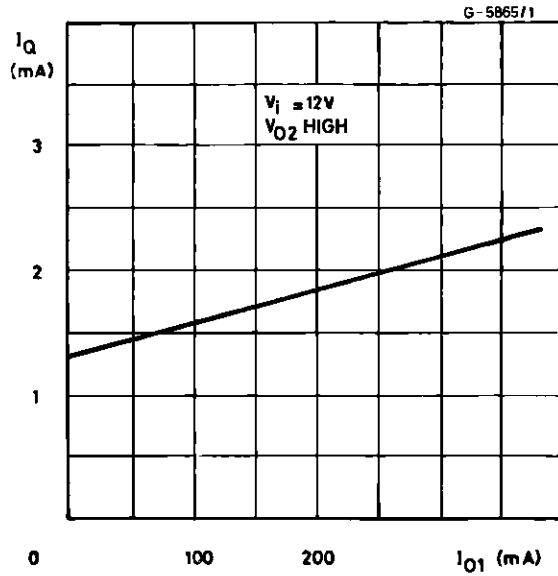


Figure 7 : Quiescent Current versus Input Voltage

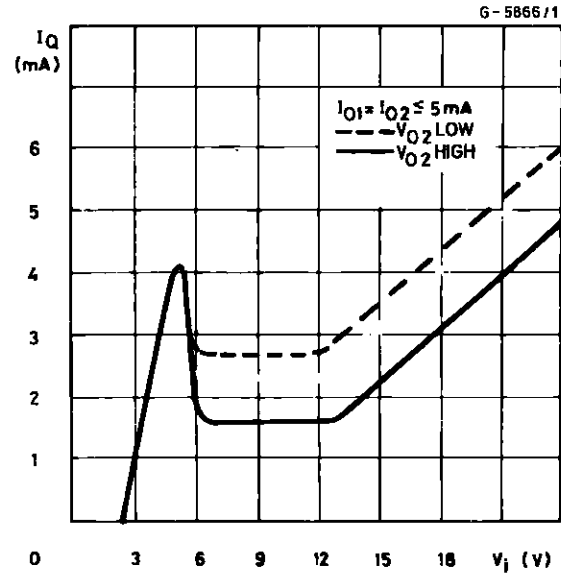
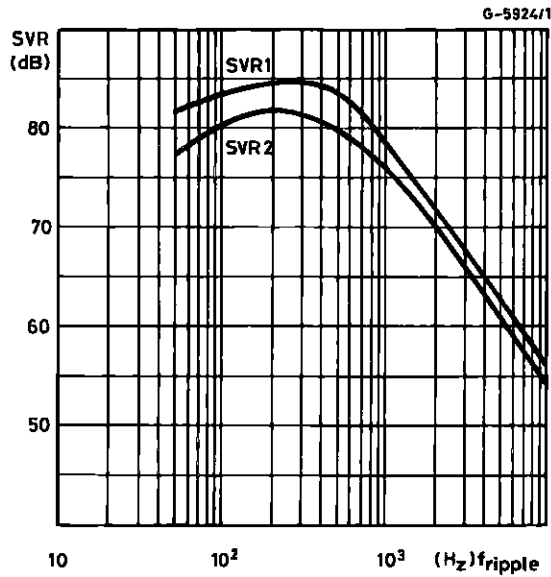
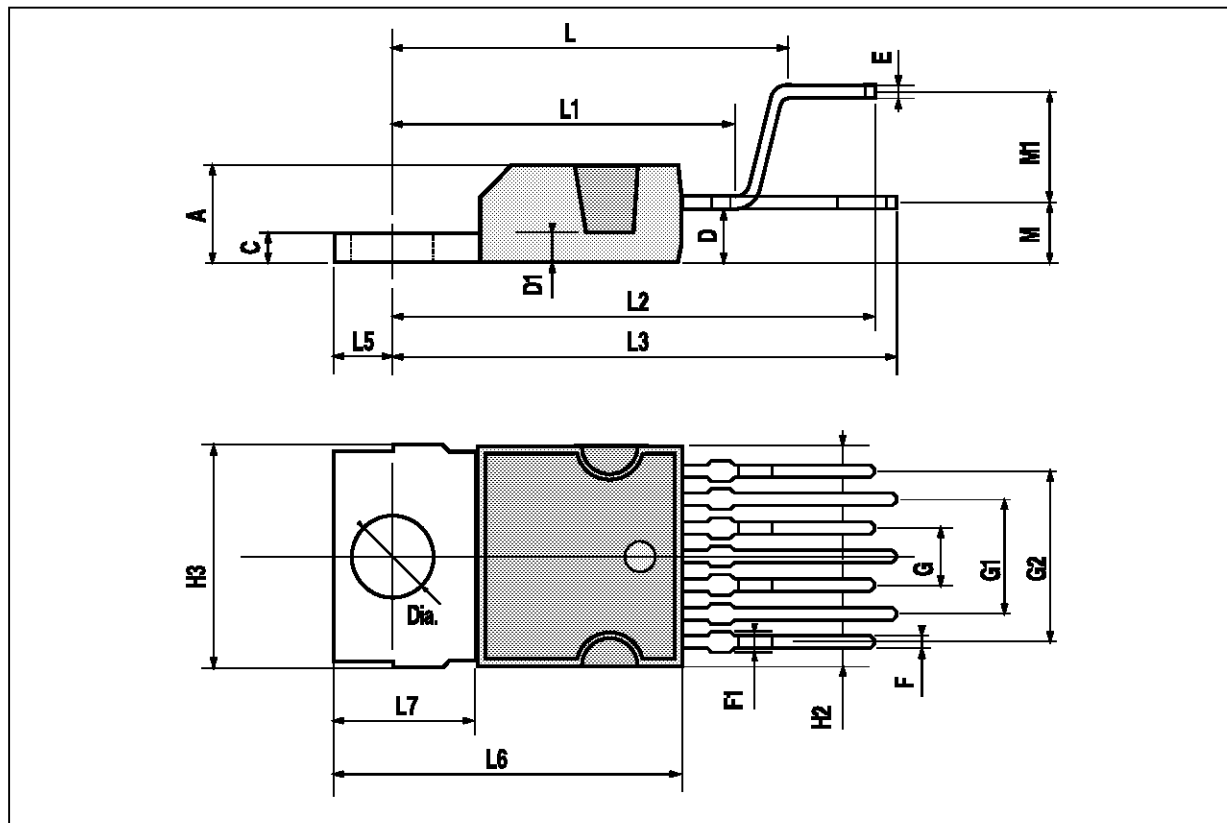


Figure 8 : Supply Voltage Rejection Regulators 1 and 2 versus Input Ripple Frequency



HEPTAVATT PACKAGE MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|-------|-------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 4.8 | | | 0.189 |
| C | | | 1.37 | | | 0.054 |
| D | 2.4 | | 2.8 | 0.094 | | 0.110 |
| D1 | 1.2 | | 1.35 | 0.047 | | 0.053 |
| E | 0.35 | | 0.55 | 0.014 | | 0.022 |
| F | 0.6 | | 0.8 | 0.024 | | 0.031 |
| F1 | | | 0.9 | | | 0.035 |
| G | 2.41 | 2.54 | 2.67 | 0.095 | 0.100 | 0.105 |
| G1 | 4.91 | 5.08 | 5.21 | 0.193 | 0.200 | 0.205 |
| G2 | 7.49 | 7.62 | 7.8 | 0.295 | 0.300 | 0.307 |
| H2 | | | 10.4 | | | 0.409 |
| H3 | 10.05 | | 10.4 | 0.396 | | 0.409 |
| L | | 16.97 | | | 0.668 | |
| L1 | | 14.92 | | | 0.587 | |
| L2 | | 21.54 | | | 0.848 | |
| L3 | | 22.62 | | | 0.891 | |
| L5 | 2.6 | | 3 | 0.102 | | 0.118 |
| L6 | 15.1 | | 15.8 | 0.594 | | 0.622 |
| L7 | 6 | | 6.6 | 0.236 | | 0.260 |
| M | | 2.8 | | | 0.110 | |
| M1 | | 5.08 | | | 0.200 | |
| Dia | 3.65 | | 3.85 | 0.144 | | 0.152 |



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