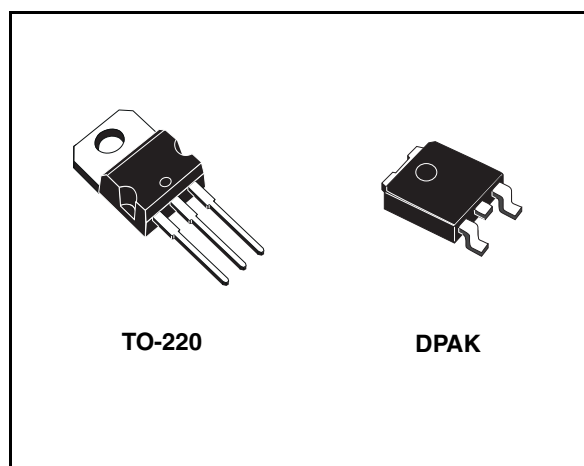


Very low drop 1A regulator**Feature summary**

- Low dropout voltage (450mV typ. at 1A)
- Very low quiescent current
- Thermal shutdown
- Short circuit protection
- Reverse polarity protection

Description

The L4941 is a three terminal 5V positive regulators available in TO-220 and DPAK packages, making it useful in a wide range of industrial and consumer applications. Thanks to its very low input/output voltage drop, these devices are particularly suitable for battery powered equipments, reducing consumption and



prolonging battery life. It employs internal current limiting, antisaturation circuit, thermal shut-down and safe area protection.

Order code

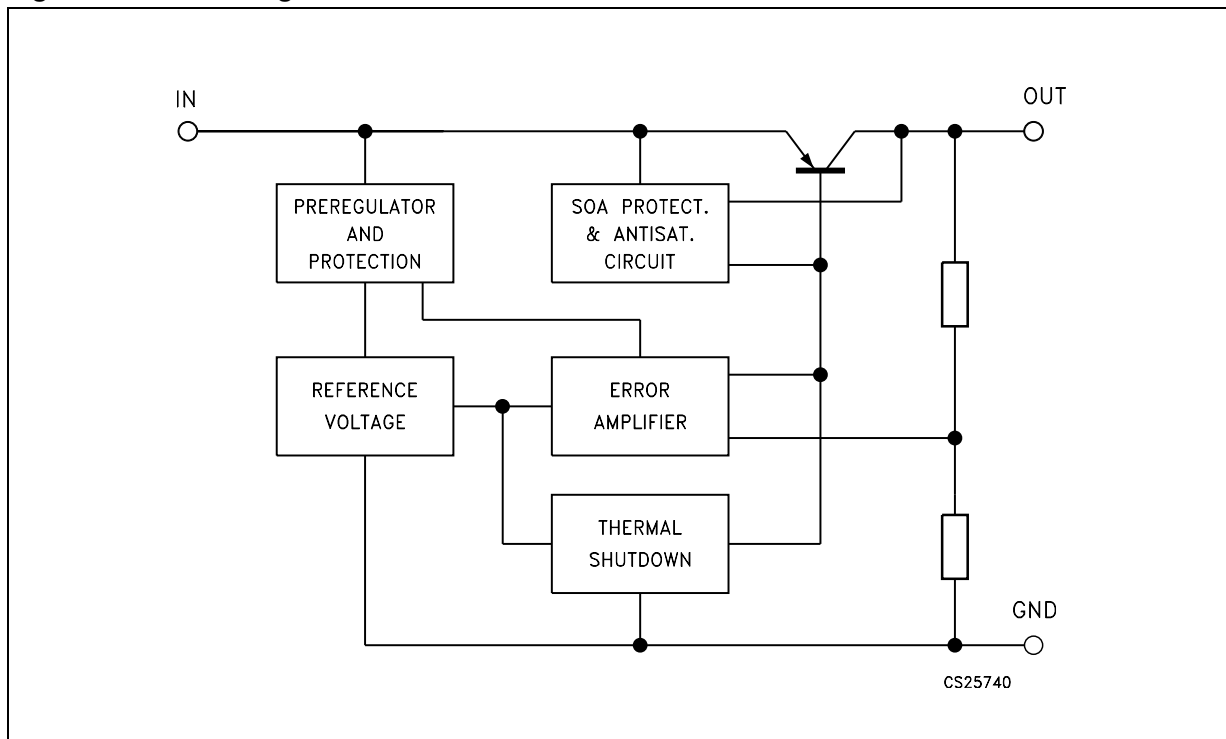
| Part number | Package |
|-------------|---------|
| L4941BV | TO-220 |
| L4941BDT-TR | DPAK |

Contents

| | | |
|---|----------------------------------|----|
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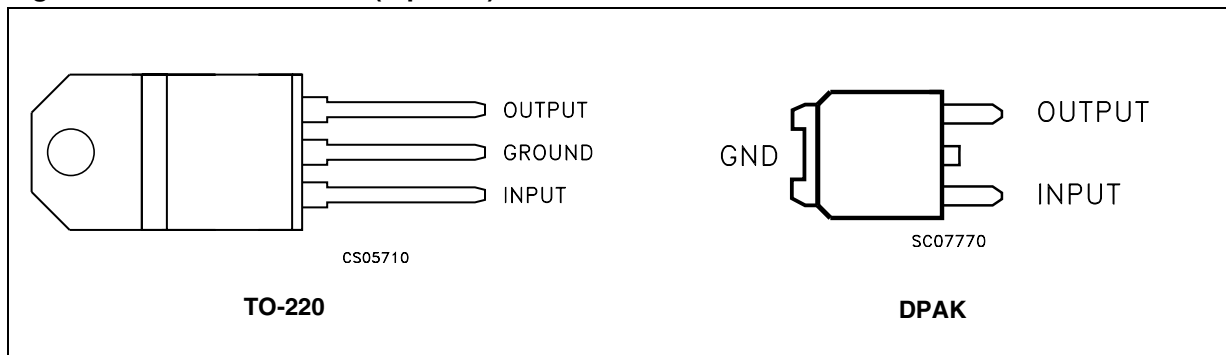
1 Block diagram

Figure 1. Block diagram



2 Pin configuration

Figure 2. Pin connections (top view)



3 Maximum ratings

Table 1. Absolute maximum ratings

| Symbol | Parameter | Value | Unit |
|-----------|---|--------------------|------|
| V_I | Forward input voltage | 30 | V |
| V_{IR} | Reverse input voltage ($R_O=100\Omega$) | -15 | V |
| I_O | Output current | Internally Limited | mA |
| P_D | Power dissipation | Internally Limited | mW |
| T_{stg} | Storage temperature range | -40 to +150 | °C |
| T_{op} | Operating junction temperature range | -40 to +150 | °C |

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

Table 2. Thermal Data

| Symbol | Parameter | TO-220 | DPAK | Unit |
|------------|-------------------------------------|--------|------|------|
| R_{thJC} | Thermal resistance junction-case | 3 | 8 | °C/W |
| R_{thJA} | Thermal resistance junction-ambient | 50 | 100 | °C/W |

4 Test circuits

Figure 3. DC Parameters

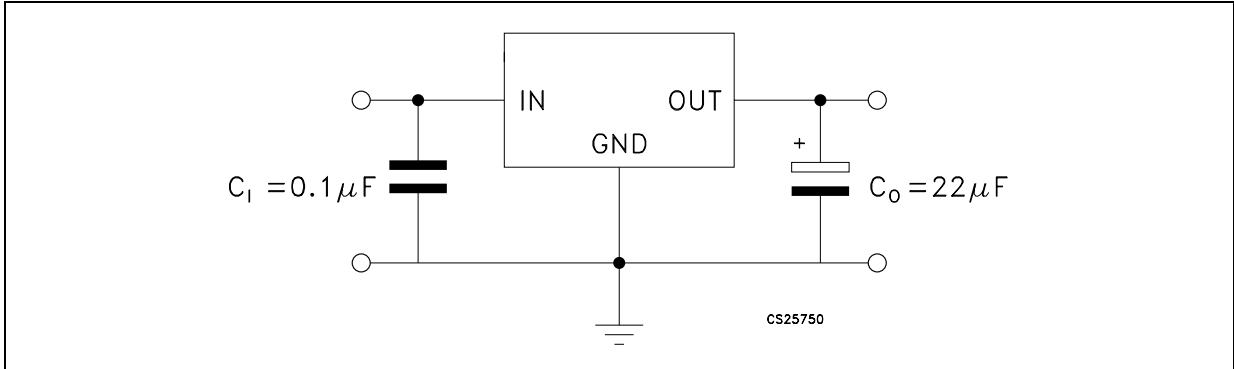


Figure 4. Load rejection

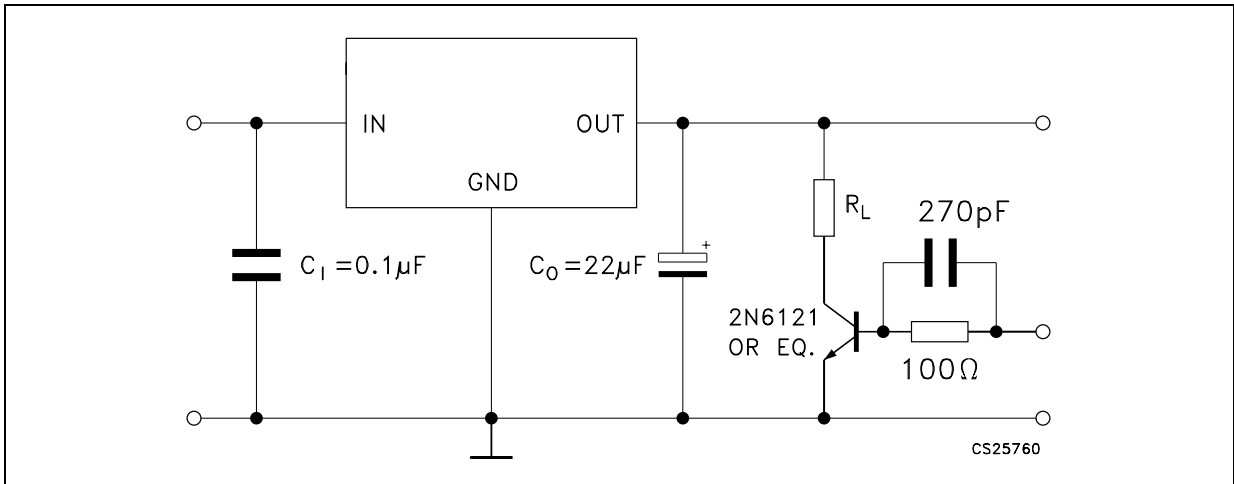
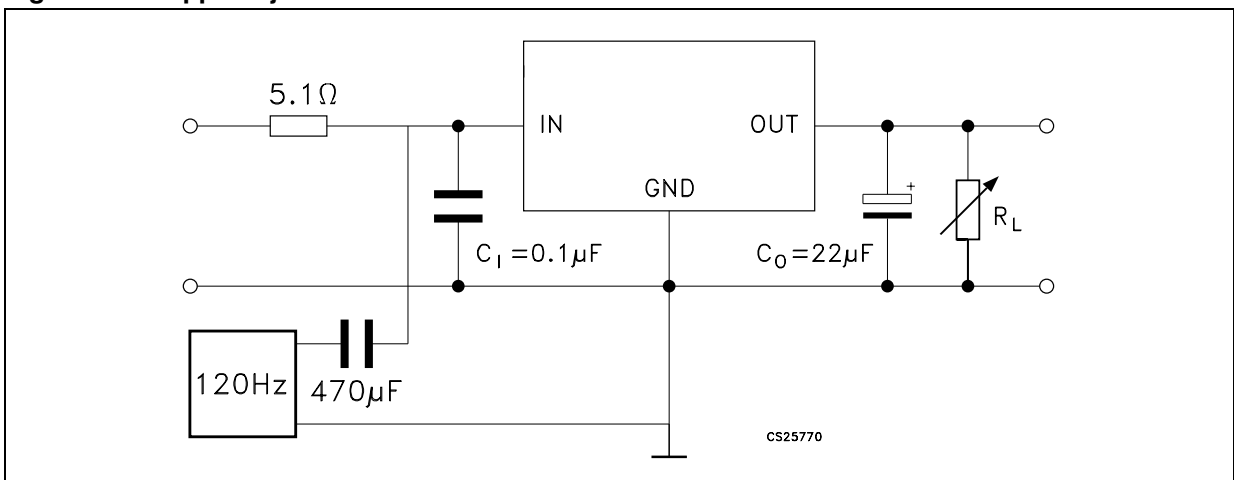


Figure 5. Ripple rejection



5 Electrical characteristics

Table 3. Electrical characteristics (refer to test circuit, $V_I=7V$, $C_1 = 0.1\mu F$, $C_O = 22\mu F$, $T_J = 25^\circ C$, unless otherwise specified.)

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|-----------------------|--------------------------|-------------------------------------|------|------|------|-------------|
| V_O | Output voltage | $I_O = 5mA$ to 1A, $V_I = 6$ to 14V | 4.8 | 5 | 5.2 | V |
| V_I | Input voltage | $I_O = 5$ mA | | | 16 | V |
| ΔV_O | Line regulation | $V_I = 6$ to 16V, $I_O = 5$ mA | | 5 | 20 | mV |
| ΔV_O | Load regulation | $I_O = 5mA$ to 1A | | 8 | 20 | mV |
| | | $I_O = 0.5A$ to 1A | | 5 | 15 | mV |
| I_q | Quiescent current | $I_O = 5$ mA, $V_I = 6V$ | | 4 | 8 | mA |
| | | $I_O = 1A$, $V_I = 6V$ | | 20 | 40 | mA |
| ΔI_q | Quiescent current change | $I_O = 5$ mA, $V_I = 6$ to 14V | | | 3 | mA |
| | | $I_O = 1A$, $V_I = 6$ to 14V | | | -10 | mA |
| V_d | Dropout voltage | $I_O = 0.5A$ | | 250 | 450 | mV |
| | | $I_O = 1A$ | | 450 | 700 | mV |
| $\Delta V_O/\Delta T$ | Output voltage drift | | | 0.6 | | mV/°C |
| SVR | Supply voltage rejection | $f = 120Hz$, $I_O = 1A$ | 58 | 68 | | dB |
| I_{sc} | Short circuit current | $V_I = 14V$ | | 1.6 | 2.0 | A |
| | | $V_I = 6V$ | | 1.8 | 2.2 | |
| Z_O | Output impedance | $f = 1KHz$, $I_O = 0.5A$ | | 30 | | mΩ |
| e_N | Output noise voltage | $B = 100Hz$ to 100KHz | | 30 | | $\mu V/V_O$ |

6 Typical application

Figure 6. Dropout voltage vs output current

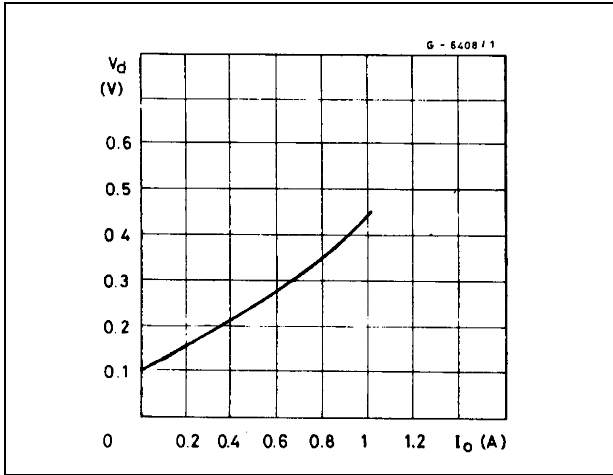


Figure 7. Dropout voltage vs temperature

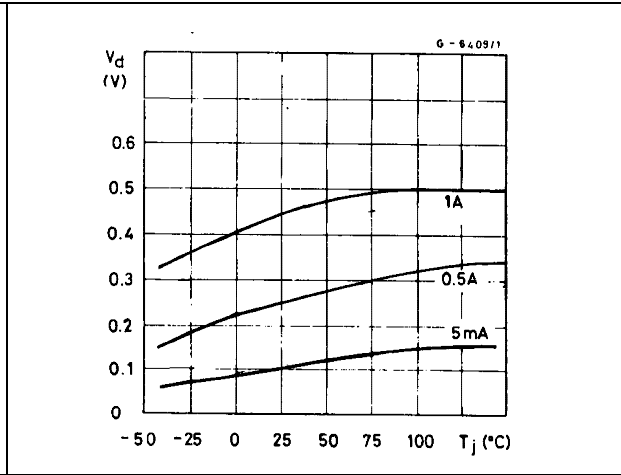


Figure 8. Output voltage vs temperature

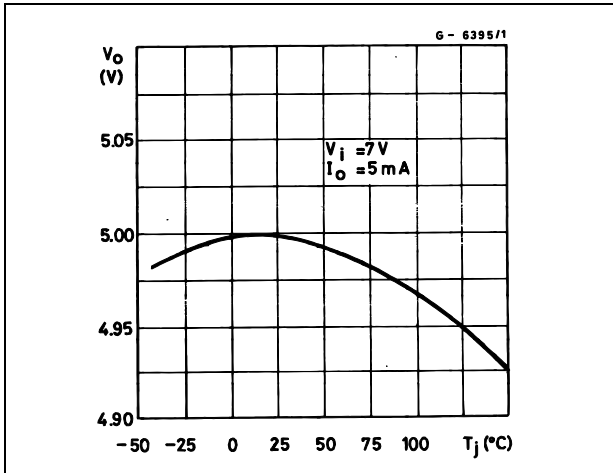


Figure 9. Quiescent current vs temperature

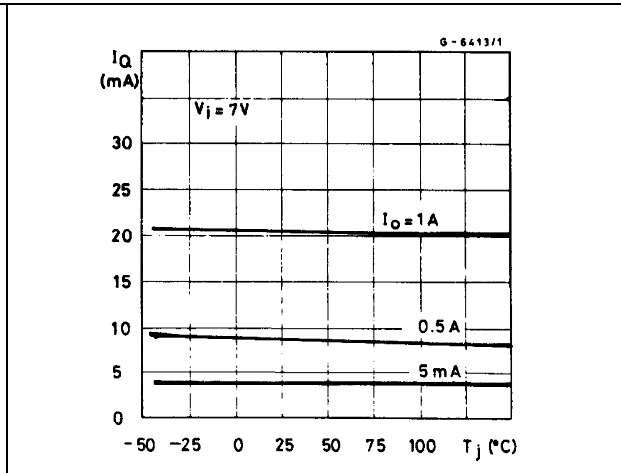


Figure 10. Quiescent current vs input voltage

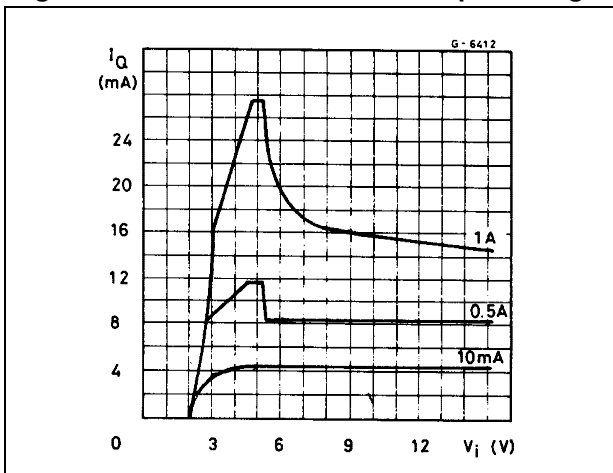


Figure 11. Quiescent current vs output current

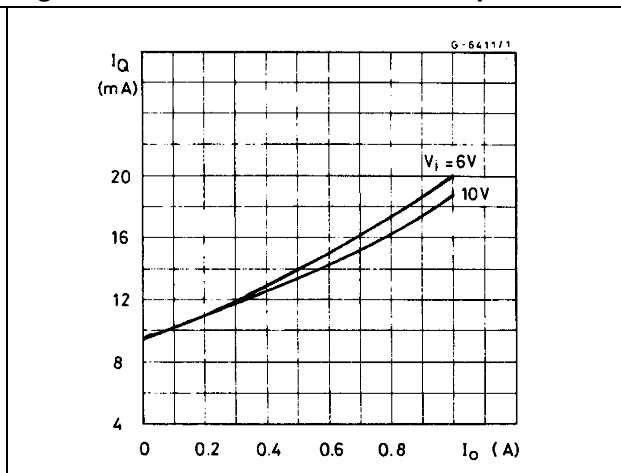


Figure 12. Short circuit current vs temperature Figure 13. Peak output current vs input/output differential voltage

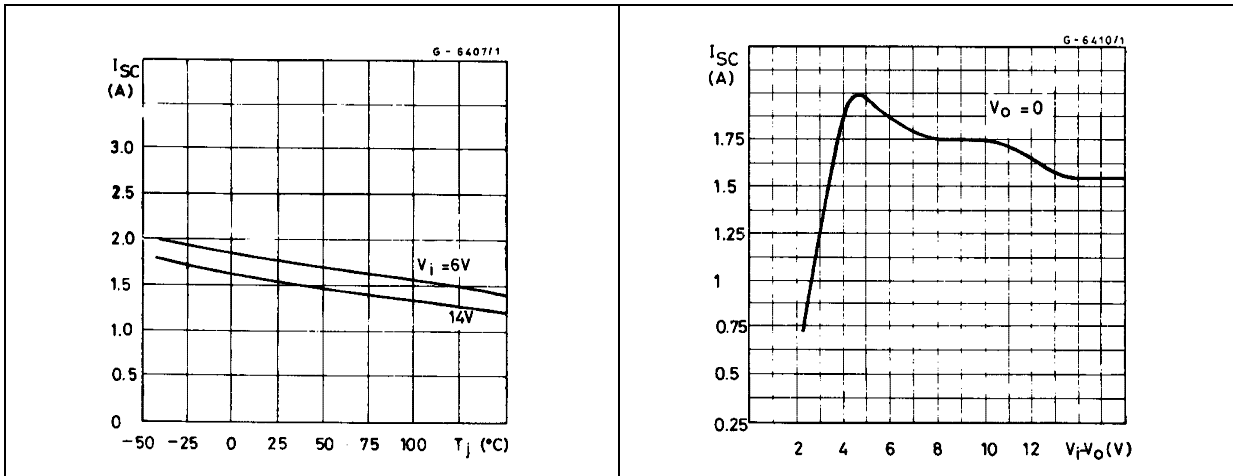


Figure 14. Low voltage behavior

Figure 15. Supply voltage rejection vs frequency

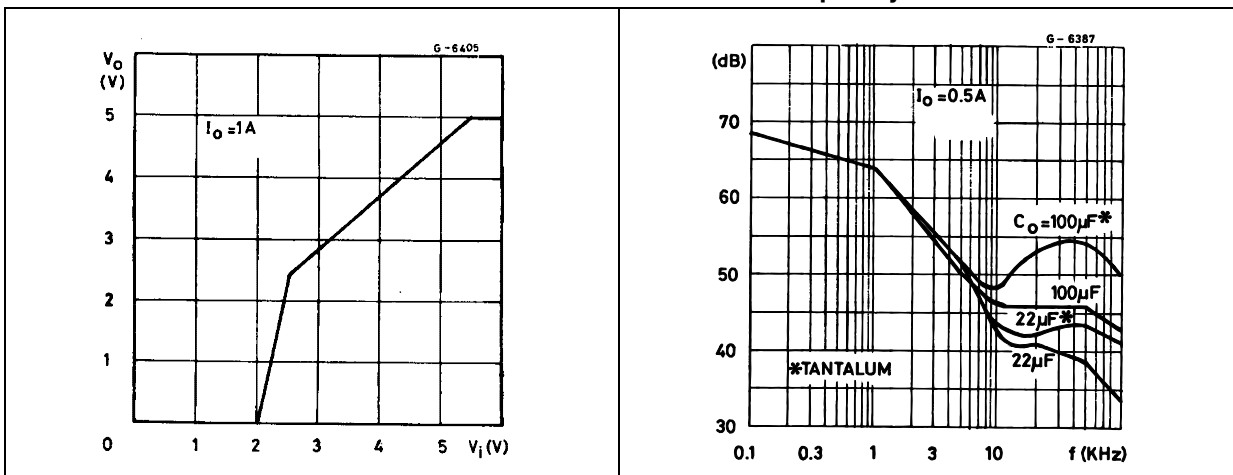


Figure 16. Supply voltage rejection vs output current

Figure 17. Load dump characteristics

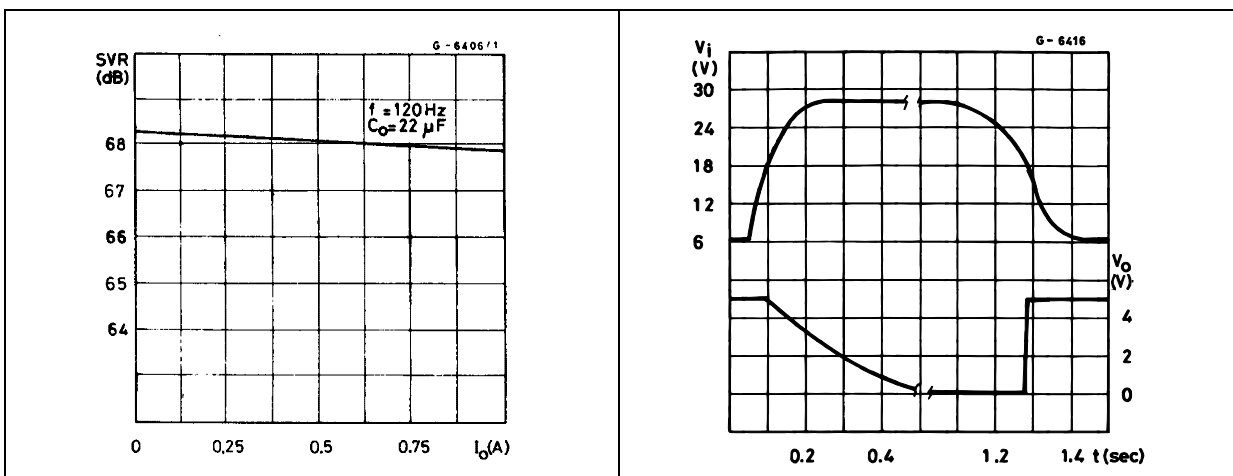


Figure 18. Line transient response

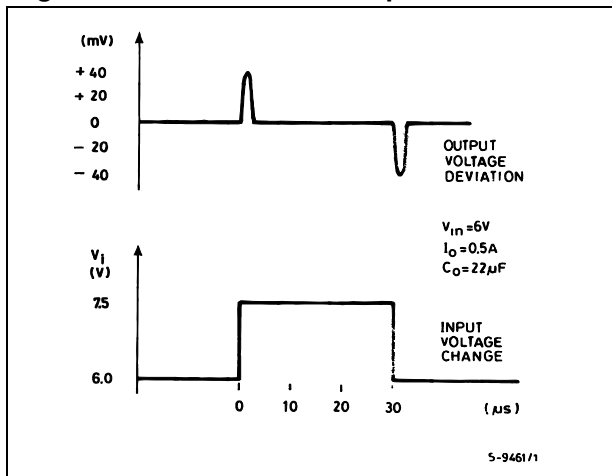


Figure 19. Total power dissipation

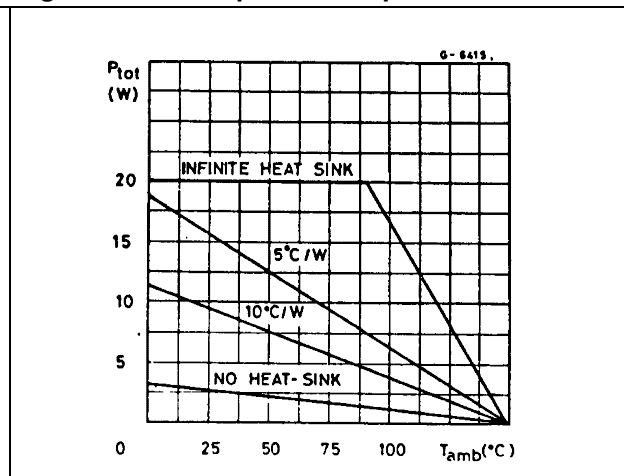
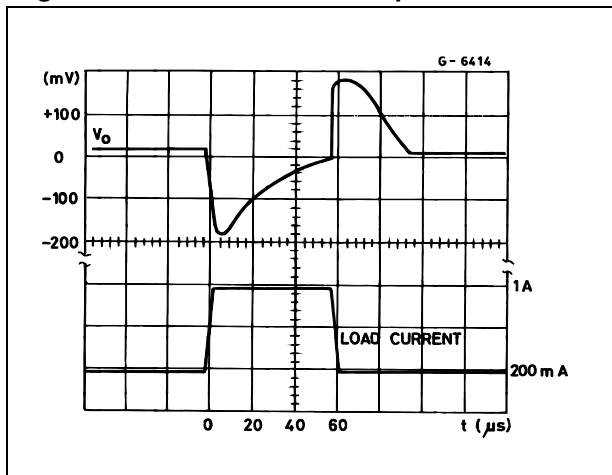


Figure 20. Load transient response



7 Schematic application

Figure 21. Distributed supply with On-card L4940 and L4941 low drop regulator

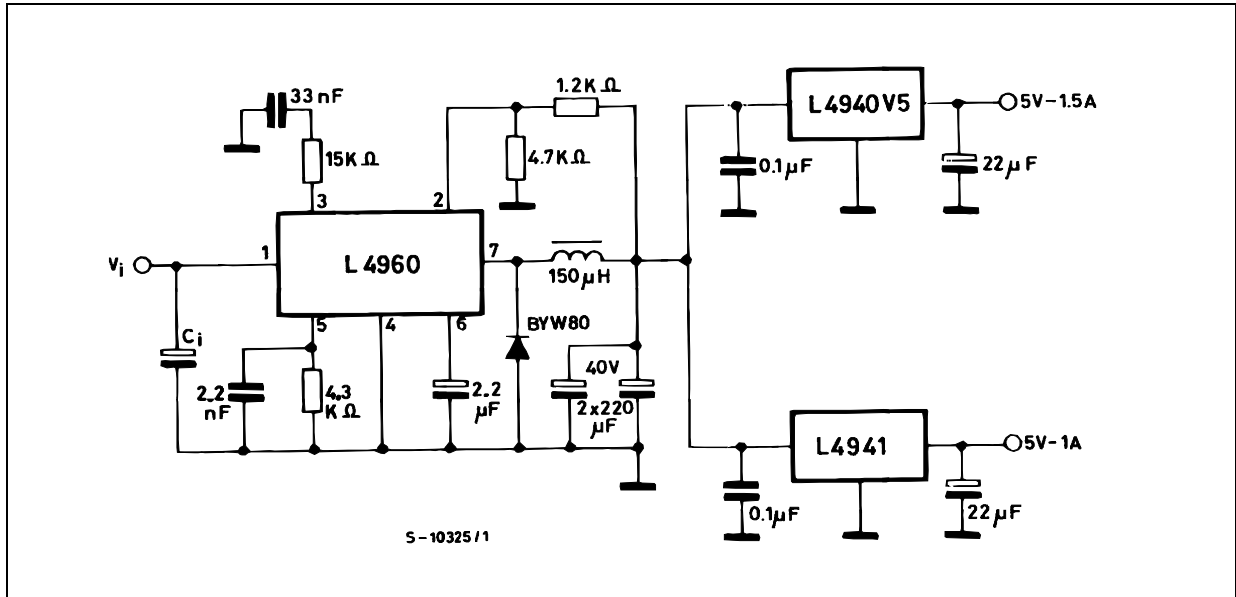
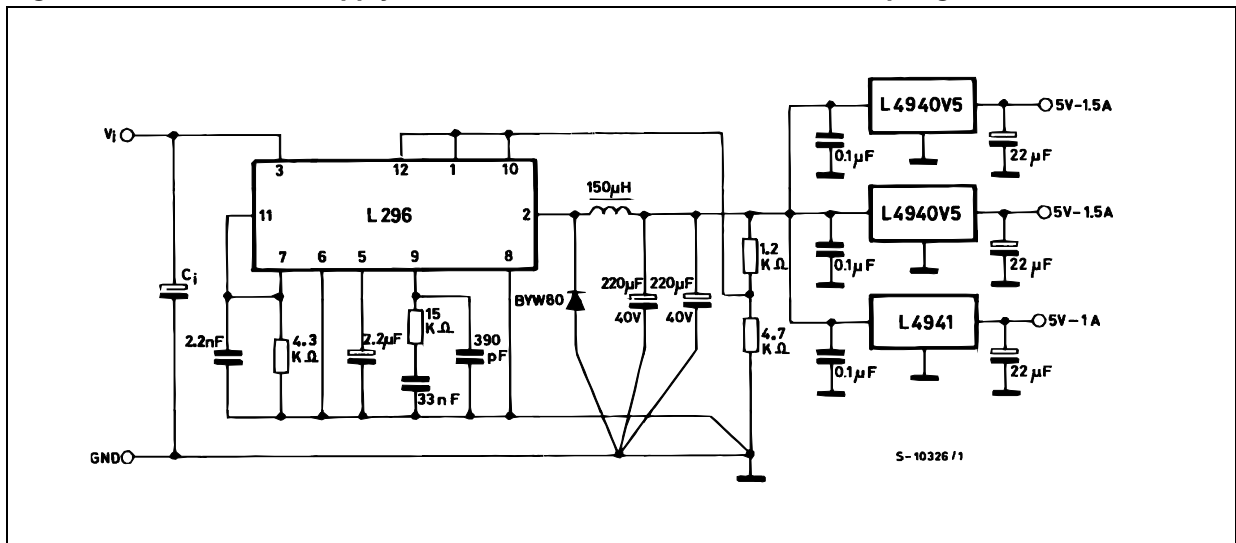


Figure 22. Distributed Supply with On-card L4940 and L4941 low drop regulator



ADVANTAGES OF THESE APPLICATION ARE:

On card regulation with short-circuit and thermal protection on each output.

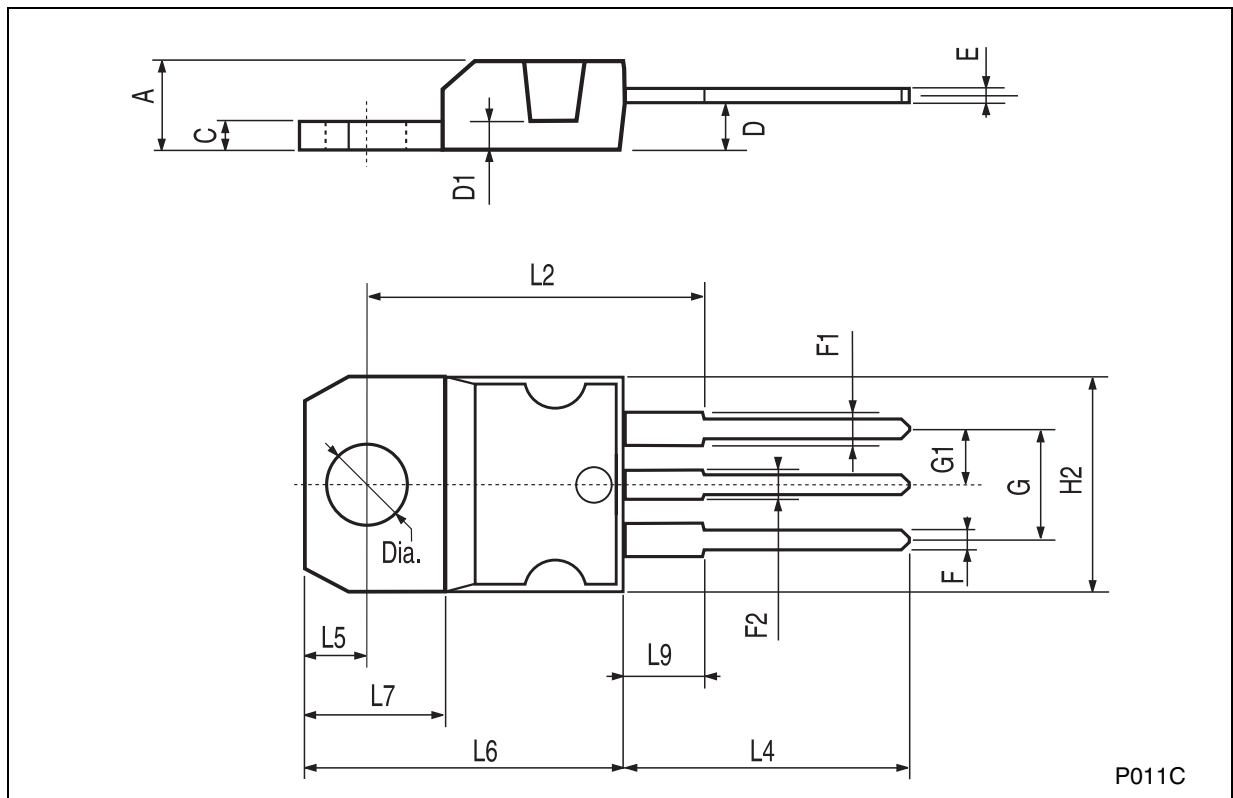
Vary high total system efficiency due to the switching preregulation and very low-drop postregulation.

8 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

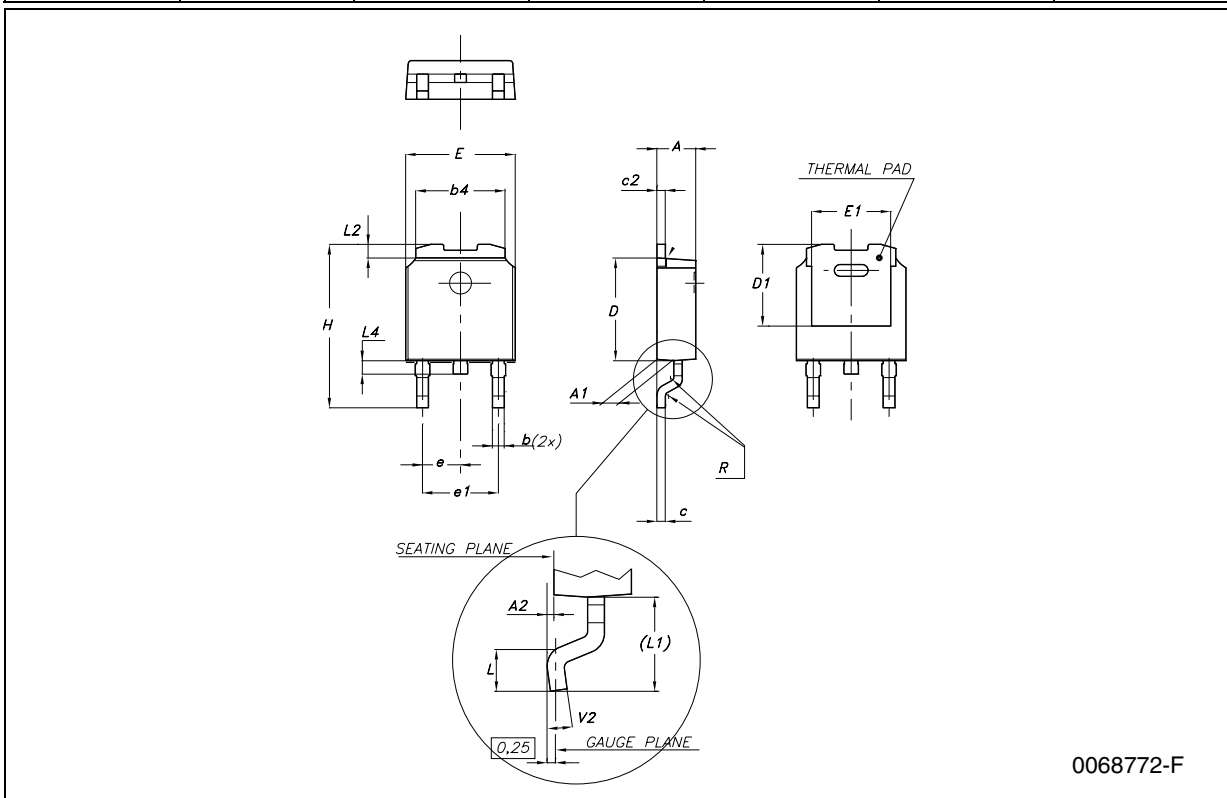
TO-220 MECHANICAL DATA

| 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 |



DPAK MECHANICAL DATA

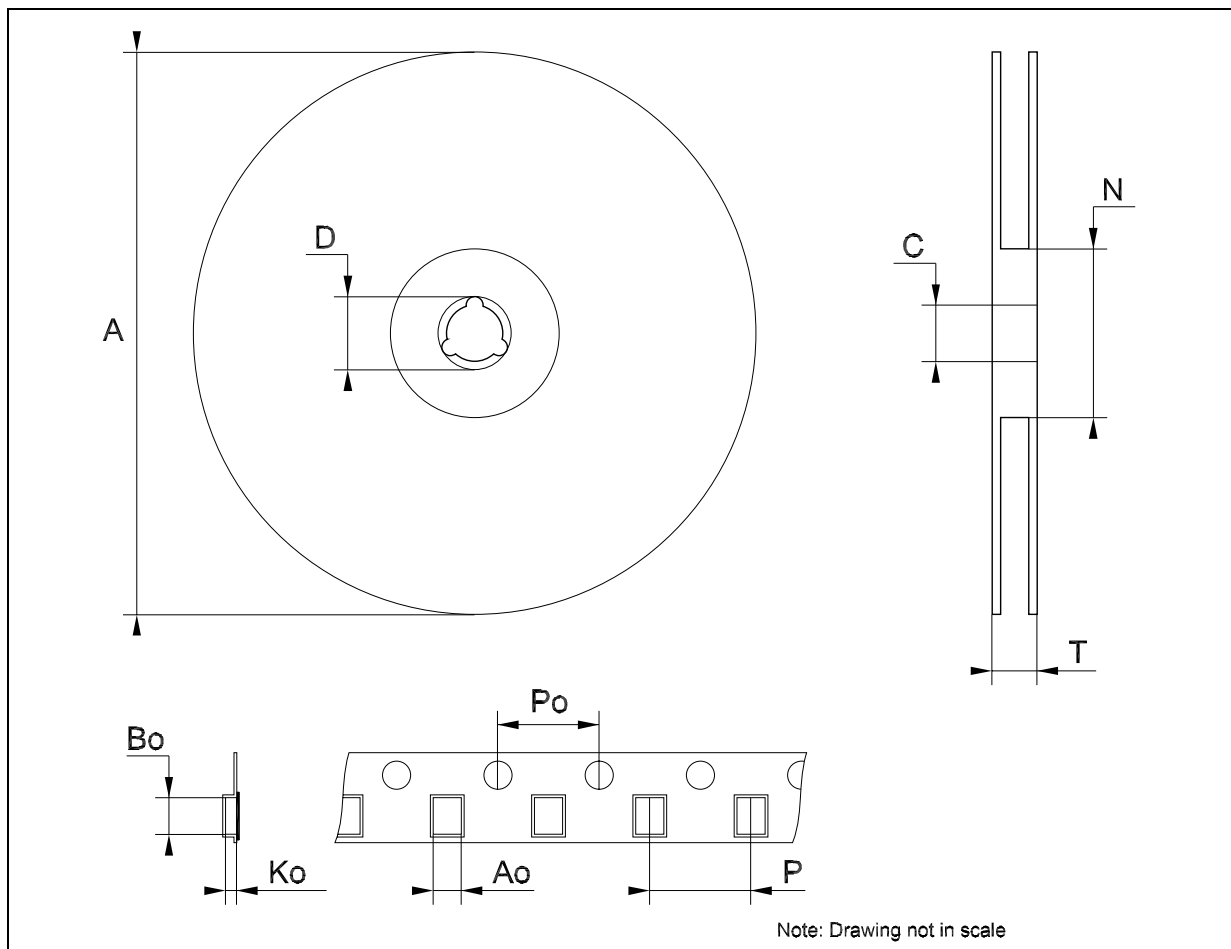
| DIM. | mm. | | | inch | | |
|------|------|------|------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 2.2 | | 2.4 | 0.086 | | 0.094 |
| A1 | 0.9 | | 1.1 | 0.035 | | 0.043 |
| A2 | 0.03 | | 0.23 | 0.001 | | 0.009 |
| B | 0.64 | | 0.9 | 0.025 | | 0.035 |
| b4 | 5.2 | | 5.4 | 0.204 | | 0.212 |
| C | 0.45 | | 0.6 | 0.017 | | 0.023 |
| C2 | 0.48 | | 0.6 | 0.019 | | 0.023 |
| D | 6 | | 6.2 | 0.236 | | 0.244 |
| D1 | | 5.1 | | | 0.200 | |
| E | 6.4 | | 6.6 | 0.252 | | 0.260 |
| E1 | | 4.7 | | | 0.185 | |
| e | | 2.28 | | | 0.090 | |
| e1 | 4.4 | | 4.6 | 0.173 | | 0.181 |
| H | 9.35 | | 10.1 | 0.368 | | 0.397 |
| L | 1 | | | 0.039 | | |
| (L1) | | 2.8 | | | 0.110 | |
| L2 | | 0.8 | | | 0.031 | |
| L4 | 0.6 | | 1 | 0.023 | | 0.039 |
| R | | 0.2 | | | 0.008 | |
| V2 | 0° | | 8° | 0° | | 8° |



0068772-F

Tape & Reel DPAK-PPAK MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|-------|-------|-------|-------|-------|--------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | | 330 | | | 12.992 |
| C | 12.8 | 13.0 | 13.2 | 0.504 | 0.512 | 0.519 |
| D | 20.2 | | | 0.795 | | |
| N | 60 | | | 2.362 | | |
| T | | | 22.4 | | | 0.882 |
| Ao | 6.80 | 6.90 | 7.00 | 0.268 | 0.272 | 0.276 |
| Bo | 10.40 | 10.50 | 10.60 | 0.409 | 0.413 | 0.417 |
| Ko | 2.55 | 2.65 | 2.75 | 0.100 | 0.104 | 0.105 |
| Po | 3.9 | 4.0 | 4.1 | 0.153 | 0.157 | 0.161 |
| P | 7.9 | 8.0 | 8.1 | 0.311 | 0.315 | 0.319 |



9 Revision history

Table 4. Revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 21-Jun-2004 | 4 | Document updating. |
| 15-Sep-2006 | 5 | Order Codes has been updated and new template. |

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