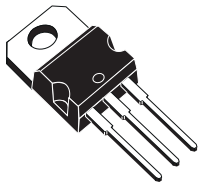
L4941

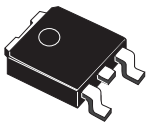
Very low drop 1A regulator

Feature summary

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



TO-220



DPAK

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.

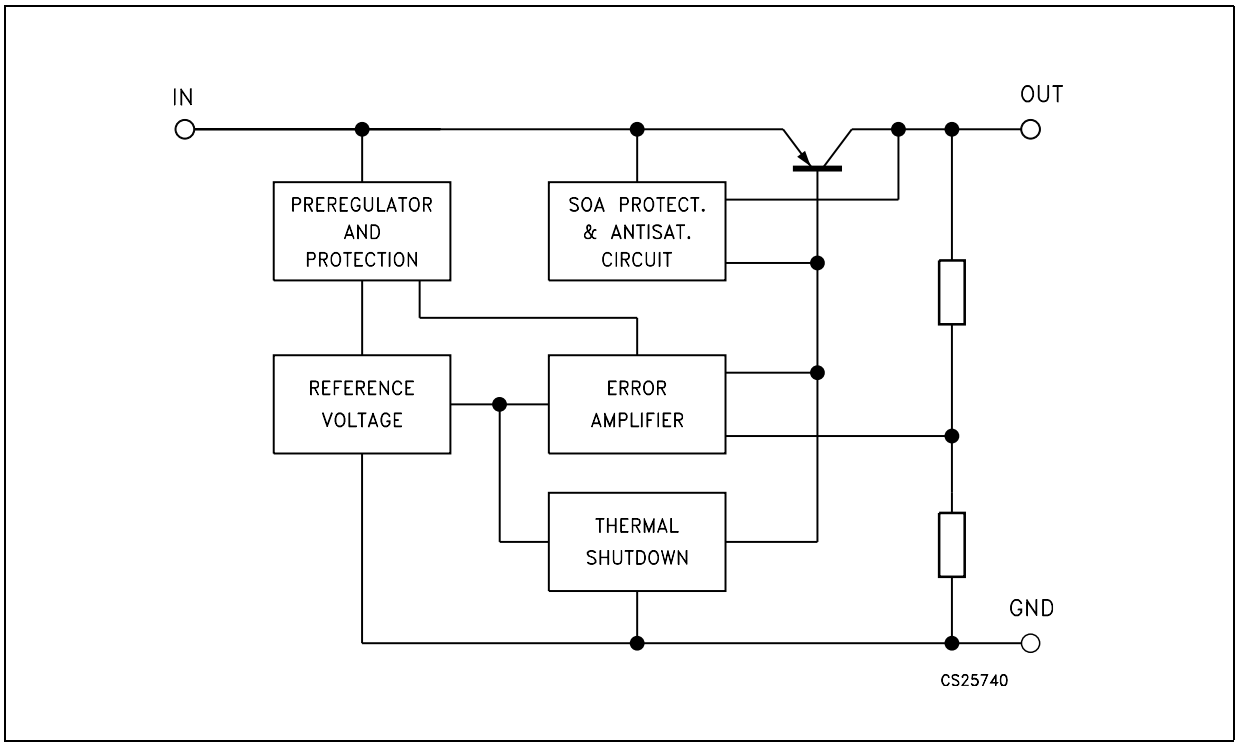
Order code

Part number	Package
L4941BV	TO-220
L4941BDT-TR	DPAK

Contents

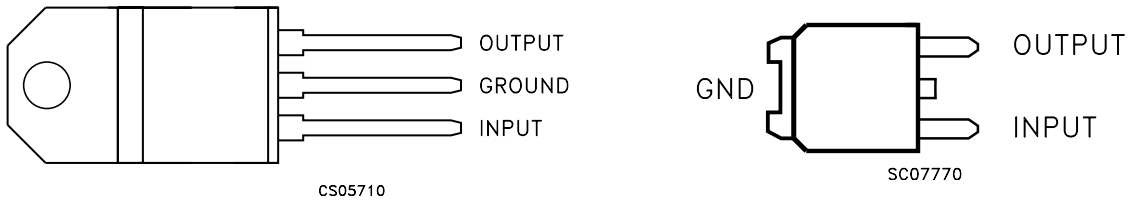
1 Block diagram

Figure 1. Block diagram



2 Pin configuration

Figure 2. Pin connections (top view)



TO-220 DPAK

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=100Ω)	-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

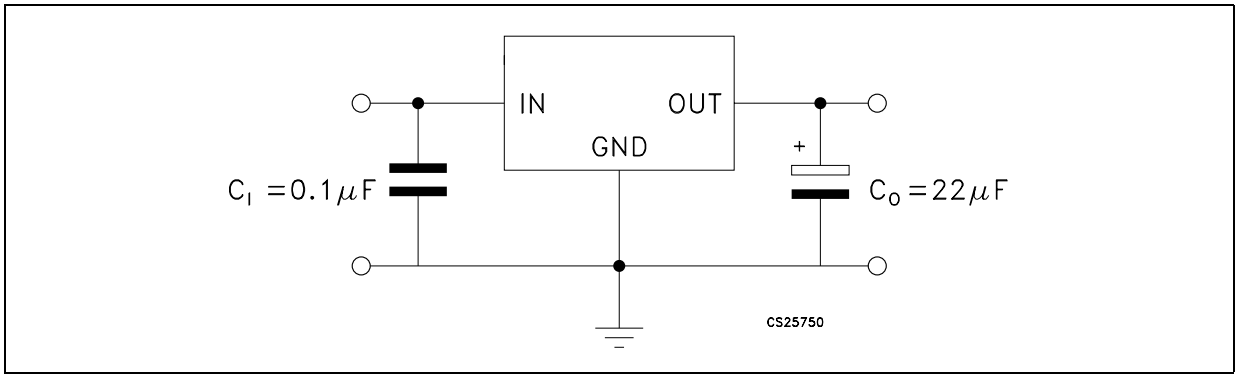


Figure 4. Load rejection

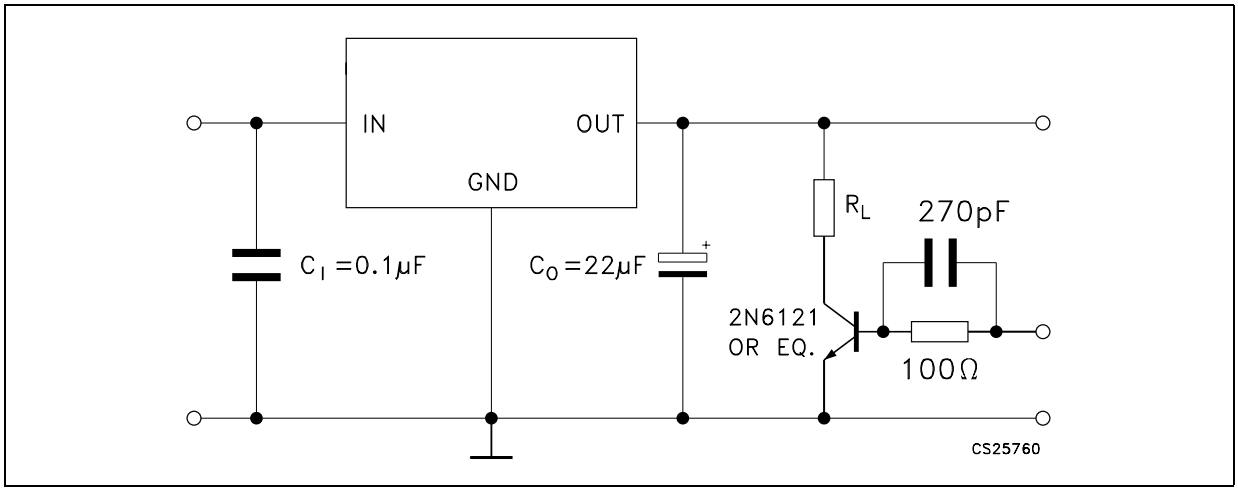
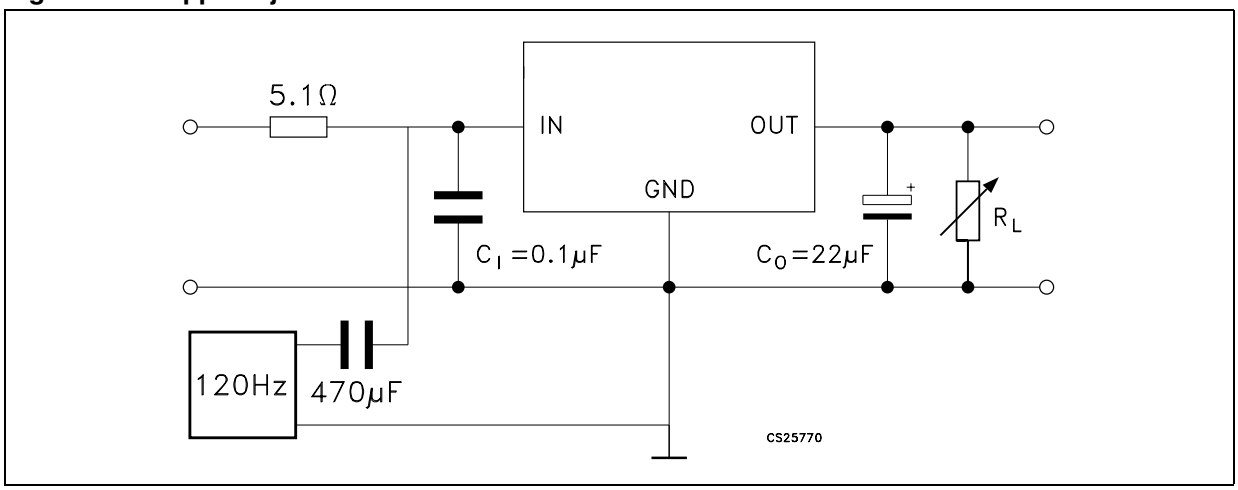


Figure 5. Ripple rejection



5 Electrical characteristics

Table 3. Electrical characteristics (refer to test circuit, V_I=7V, C_I = 0.1µF, C_O = 22µF, T_J = 25°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		µV/V_O

6 Typical application

Figure 6. Dropout voltage vs output current

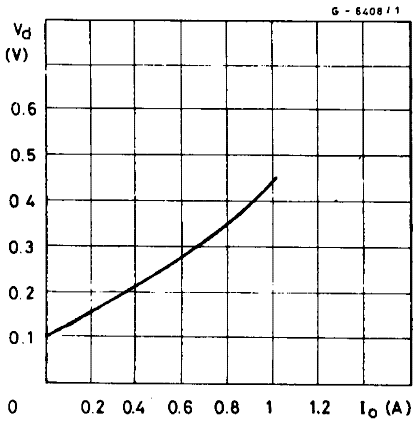


Figure 7. Dropout voltage vs temperature

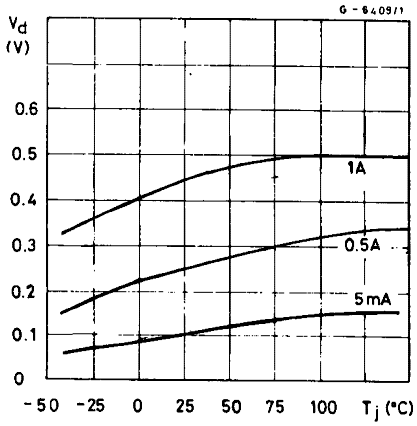


Figure 8. Output voltage vs temperature

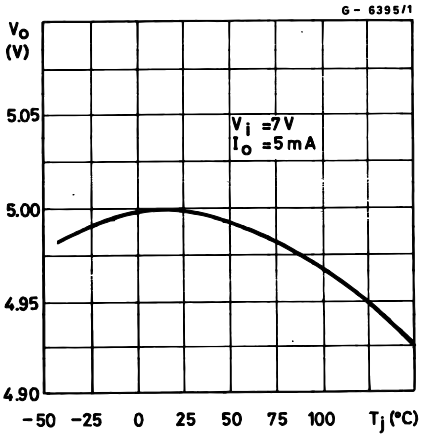


Figure 9. Quiescent current vs temperature

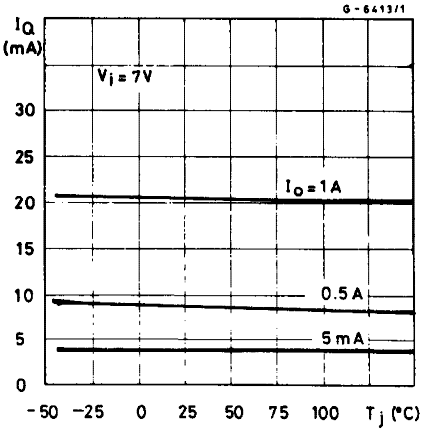


Figure 10. Quiescent current vs input voltage

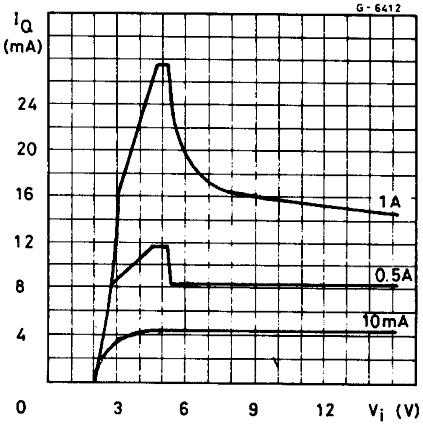


Figure 11. Quiescent current vs output current

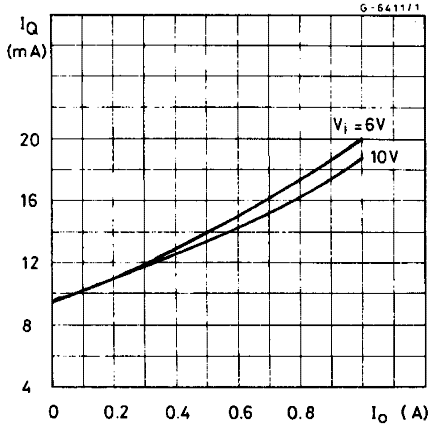


Figure 12. Short circuit current vs temperature

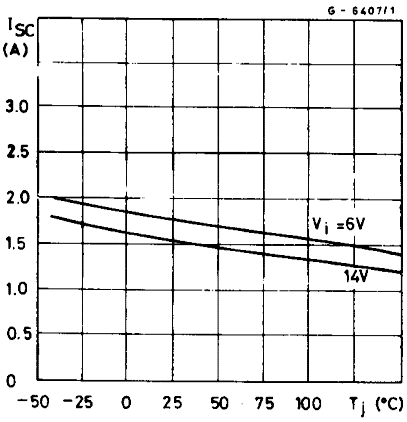


Figure 13. Peak output current vs input/output differential voltage

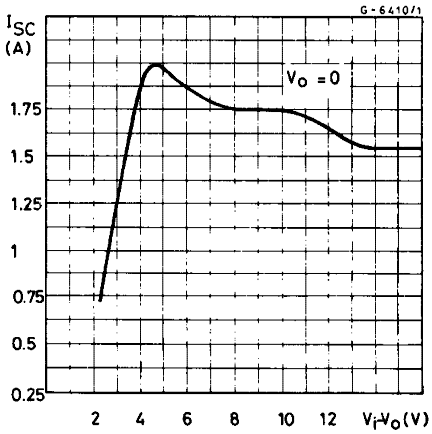


Figure 14. Low voltage behavior

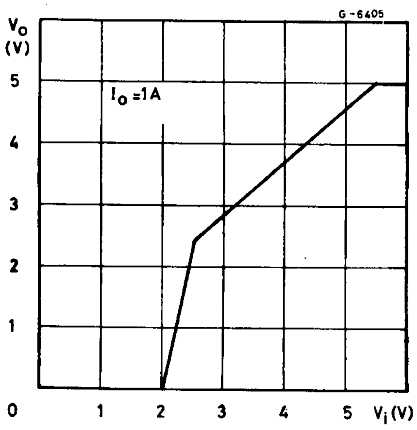


Figure 15. Supply voltage rejection vs frequency

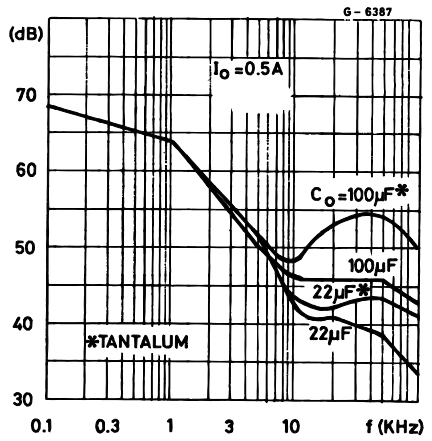


Figure 16. Supply voltage rejection vs output current

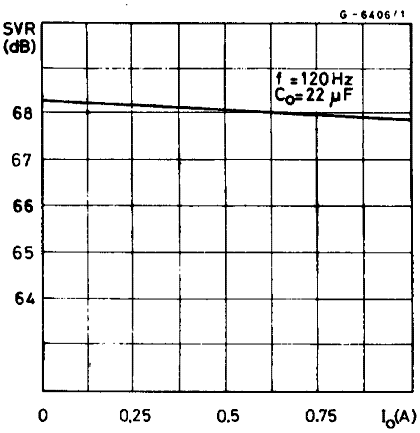


Figure 17. Load dump characteristics

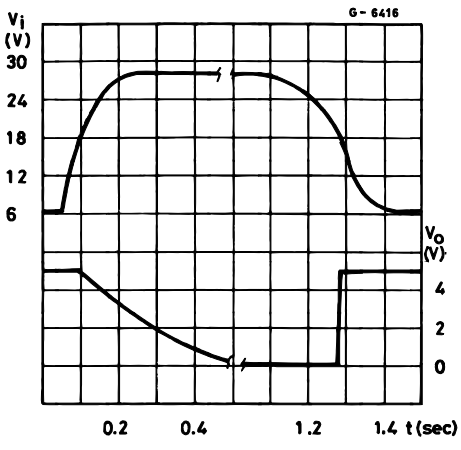


Figure 18. Line transient response

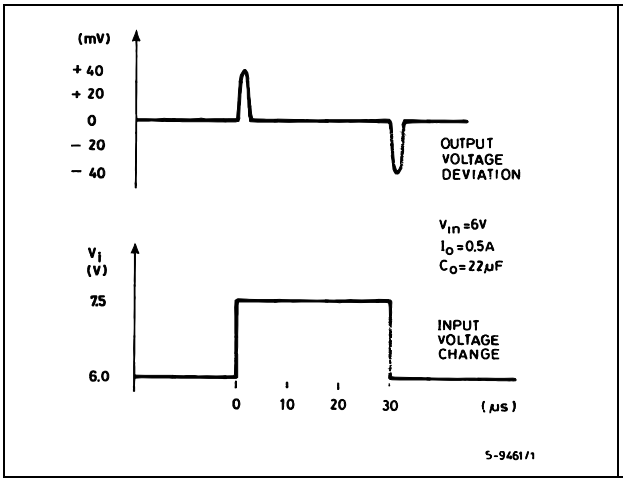


Figure 19. Total power dissipation

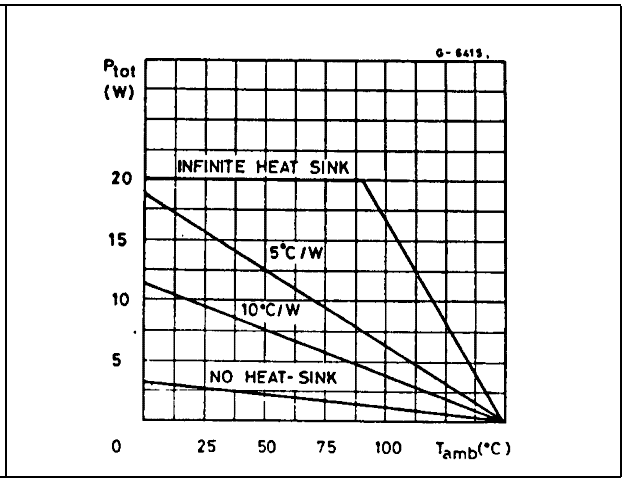
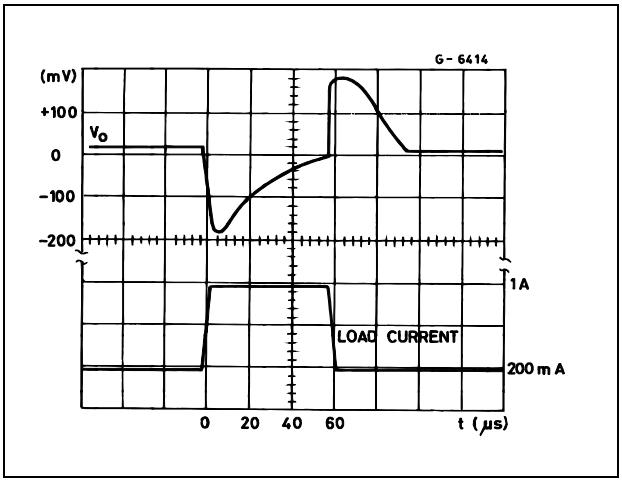


Figure 20. Load transient response



7 Schematic application

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

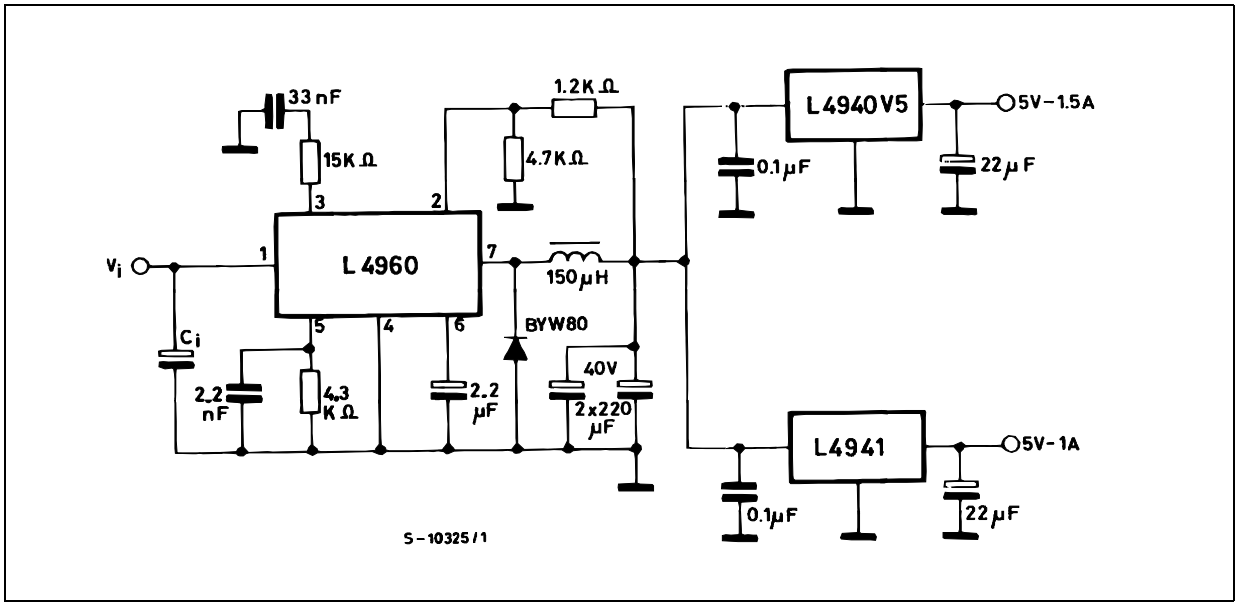
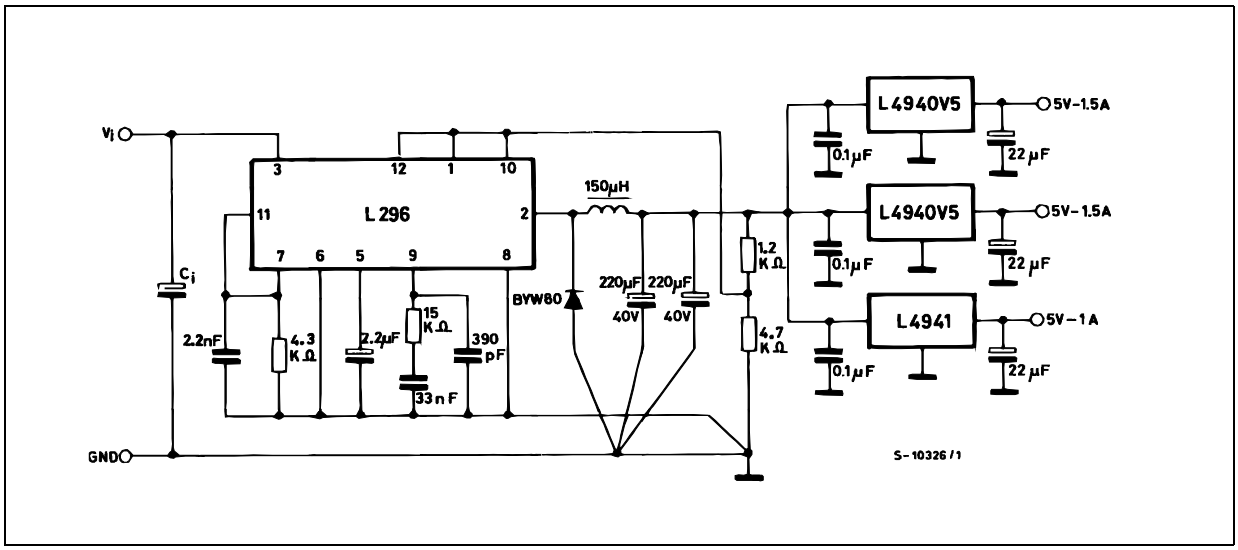


Figure 22. Distributed Supply with On-card L4940 and L4941 low drop regulator



ADVANTAGES OF THESE APPLICATION ARE:

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

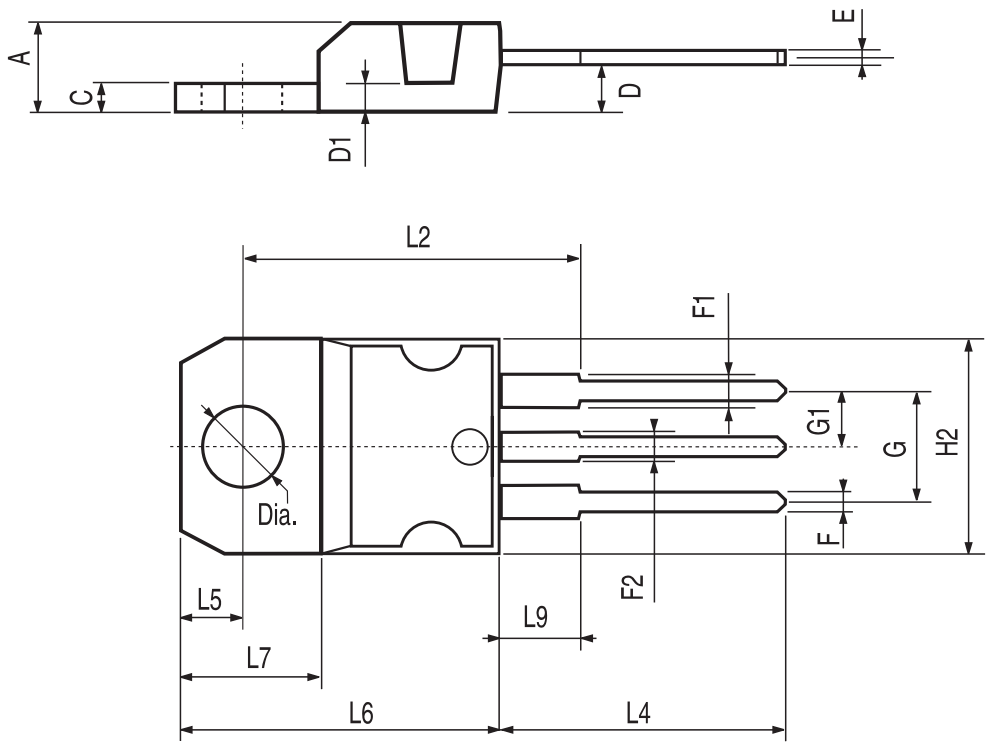
Vary high total system efficiency due to the switching preregulation and very low-drop postregulation.

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.

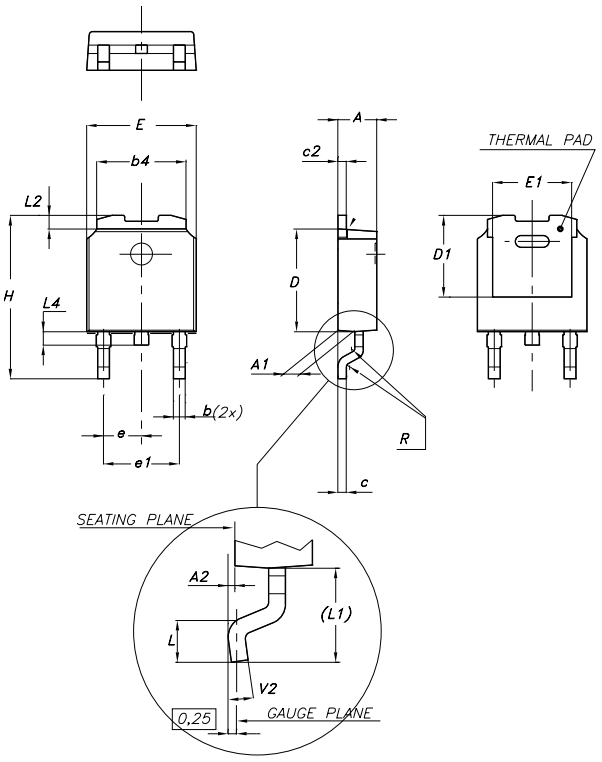
TO-220 MECHANICAL DATA

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

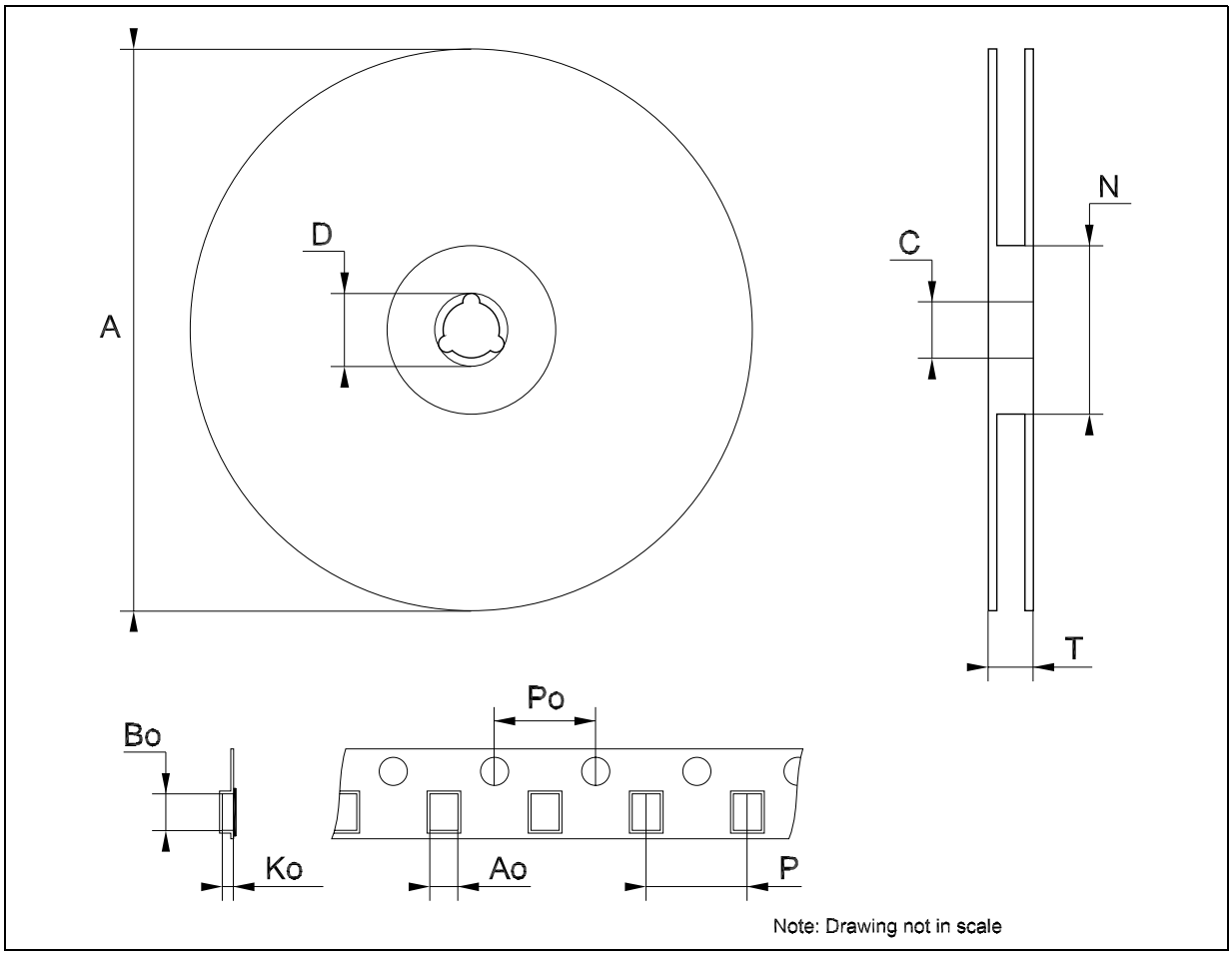
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.9	0.025		0.035
b4	5.2		5.4	0.204		0.212
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
D1		5.1			0.200	
E	6.4		6.6	0.252		0.260
E1		4.7			0.185	
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	0.2.76
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



Note: Drawing not in scale

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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