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LD1084V

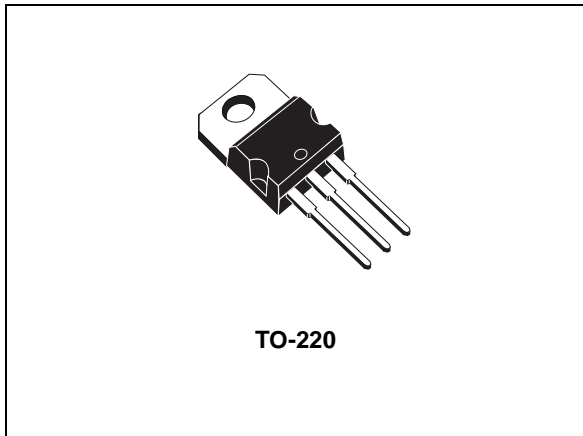
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深圳创唯电子有限公司

<http://www.rohm-chip.com>

5 A low-drop positive voltage regulator adjustable

Datasheet - production data



LD1084 quiescent current flows into the load, so to increase the efficiency. A minimum capacitor of 10 μ F is needed for stability.

The device is supplied in TO-220. The on-chip trimming allows the regulator to reach a very tight output voltage tolerance, within $\pm 1\%$ at 25 °C.

Table 1. Device summary

Order code	Output voltage
LD1084V	adjustable

Features

- Typical dropout 1.3 V (at 5 A)
- Three-terminal adjustable output voltage
- Guaranteed output current up to 5 A
- Output tolerance $\pm 1\%$ at 25 °C and $\pm 2\%$ in full temperature range
- Internal power and thermal limit
- Wide operating temperature range -40 °C to 125 °C
- Package available: TO-220
- Pinout compatibility with standard adjustable VREG

Description

The LD1084 is a low-drop voltage regulator providing up to 5 A of output current. Dropout is guaranteed at a maximum of 1.5 V at the maximum output current, decreasing at lower loads. The LD1084 is pin-to-pin compatible with the older 3-terminal adjustable regulators, but it has better performances in terms of drop and output tolerance.

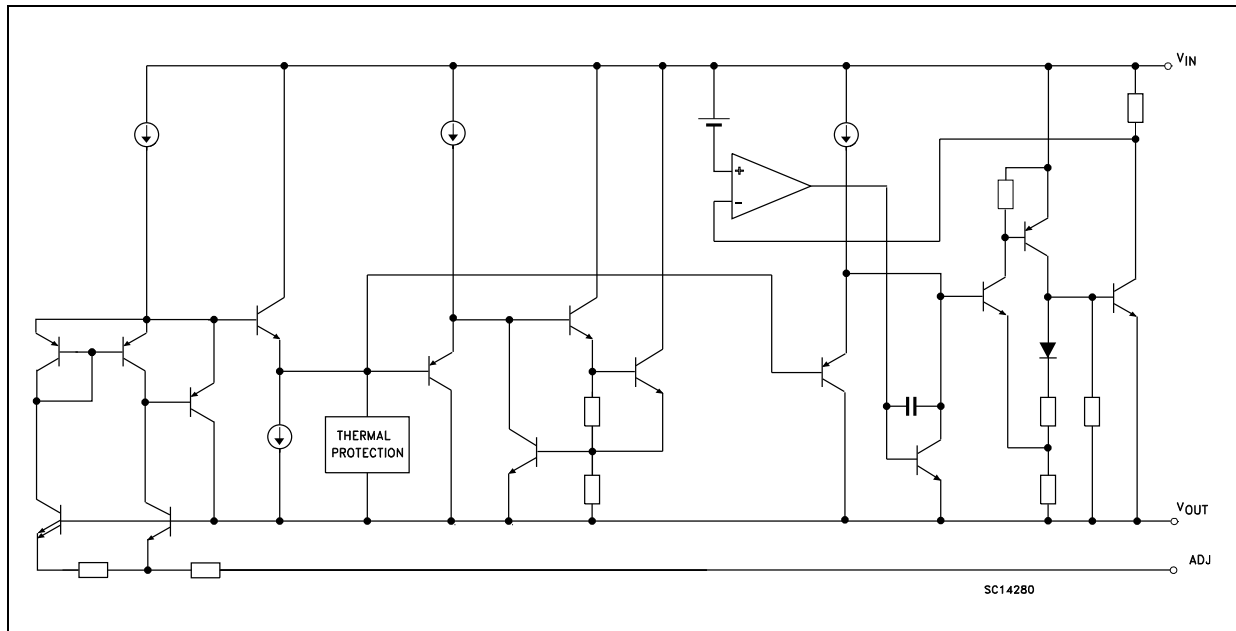
Unlike PNP regulators, where a part of the output current is wasted as quiescent current, the

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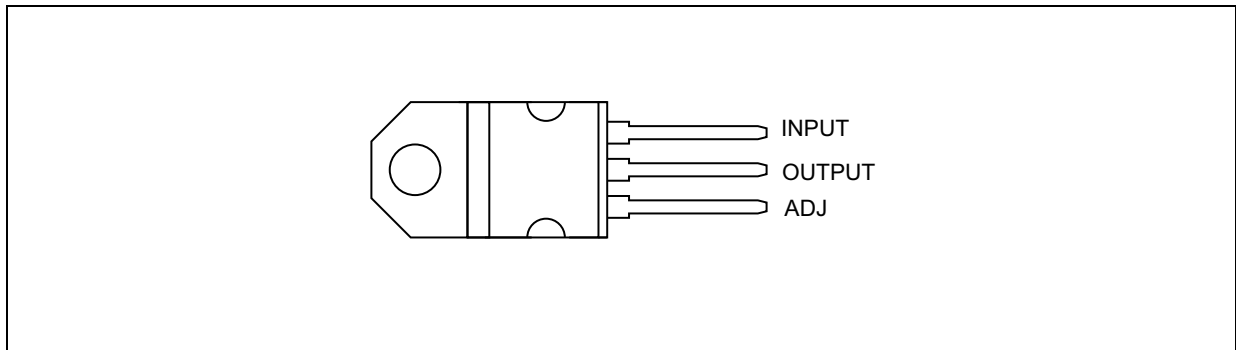
1 Diagram

Figure 1. Schematic diagram



2 Pin configuration

Figure 2. Pin connections (top view)



3 Maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_I	DC input voltage	30	V
I_O	Output current	Internally limited	mA
P_D	Power dissipation	Internally limited	mW
T_{STG}	Storage temperature range	-55 to +150	°C
T_{OP}	Operating junction temperature range	-40 to +125	°C

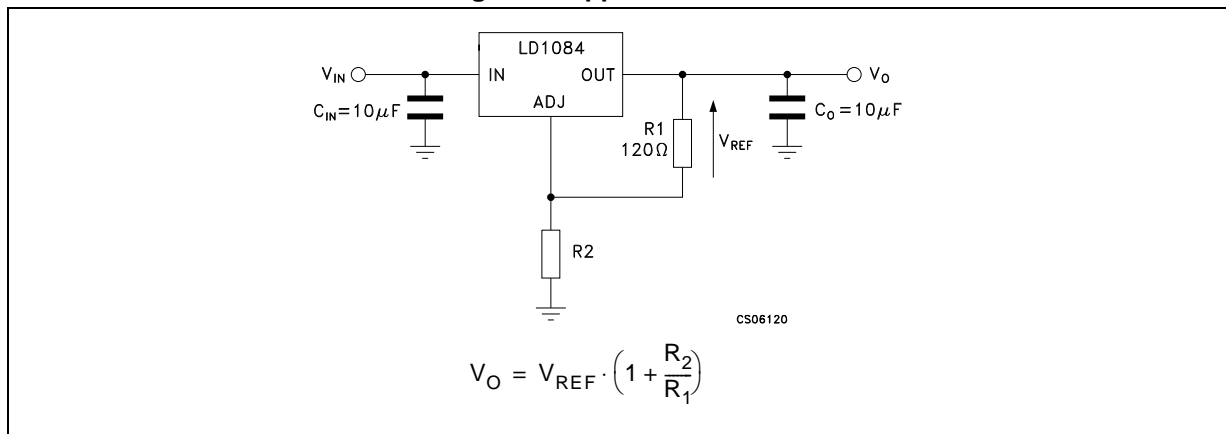
Note: Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

Table 3. Thermal data

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

4 Schematic application

Figure 3. Application circuit



5 Electrical characteristics

$V_I = 4.25\text{ V}$, $C_I = C_O = 10\ \mu\text{F}$, $T_A = -40\text{ to }125\text{ }^\circ\text{C}$, unless otherwise specified.

Table 4. LD1084 electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{ref}	Reference voltage ⁽¹⁾	$I_O = 10\text{ mA}$, $T_J = 25\text{ }^\circ\text{C}$	1.237	1.25	1.263	V
		$I_O = 10\text{ mA to }3\text{ A}$, $V_I = 2.85\text{ to }30\text{ V}$	1.225	1.25	1.275	V
ΔV_O	Line regulation	$I_O = 10\text{ mA}$, $V_I = 2.85\text{ to }16.5\text{ V}$, $T_J = 25\text{ }^\circ\text{C}$		0.015	0.2	%
		$I_O = 10\text{ mA}$, $V_I = 2.85\text{ to }16.5\text{ V}$		0.035	0.2	%
ΔV_O	Load regulation	$I_O = 10\text{ mA to }5\text{ A}$, $T_J = 25\text{ }^\circ\text{C}$		0.1	0.3	%
		$I_O = 0\text{ to }5\text{ A}$		0.2	0.4	%
V_d	Dropout voltage	$I_O = 5\text{ A}$		1.3	1.5	V
$I_{O(\text{min})}$	Minimum load current	$V_I = 30\text{ V}$		3	10	mA
I_{sc}	Short-circuit current	$V_I - V_O = 5\text{ V}$	5.5	6.5		A
		$V_I - V_O = 25\text{ V}$	0.5	0.7		A
	Thermal regulation	$T_A = 25\text{ }^\circ\text{C}$, 30 ms pulse		0.003	0.015	%/W
SVR	Supply voltage rejection	$f = 120\text{ Hz}$, $C_O = 25\ \mu\text{F}$, $C_{\text{ADJ}} = 25\ \mu\text{F}$, $I_O = 5\text{ A}$, $V_I = 6.25 \pm 3\text{ V}$	60	72		dB
I_{ADJ}	Adjust pin current	$V_I = 4.25\text{ V}$, $I_O = 10\text{ mA}$		55	120	μA
ΔI_{ADJ}	Adjust pin current change ⁽¹⁾	$I_O = 10\text{ mA to }5\text{ A}$, $V_I = 2.85\text{ to }16.5\text{ V}$		0.2	5	μA
eN	RMS output noise voltage (% of V_O)	$T_A = 25\text{ }^\circ\text{C}$, $f = 10\text{ Hz to }10\text{ kHz}$		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	$T_A = 125\text{ }^\circ\text{C}$, 1000 hrs		0.5		%

1. See short-circuit current curve for available output current at fixed dropout.

6 Typical performance characteristics

Unless otherwise specified $T_J = 25\text{ }^\circ\text{C}$, $C_I = 10\text{ }\mu\text{F}$ (tant.), $C_O = 22\text{ }\mu\text{F}$ (tant.)

Figure 4. Short-circuit current vs. dropout voltage

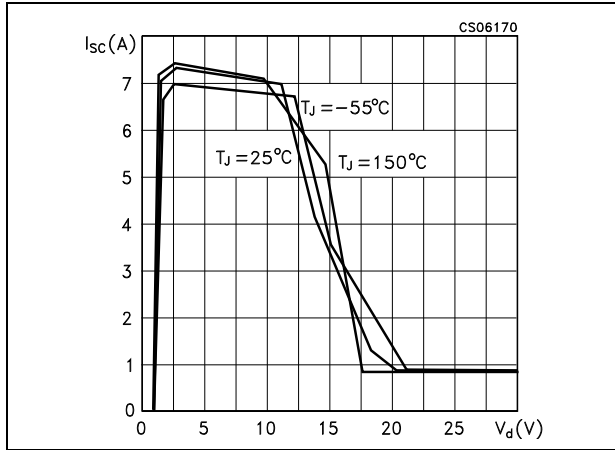


Figure 5. Line regulation vs. temperature

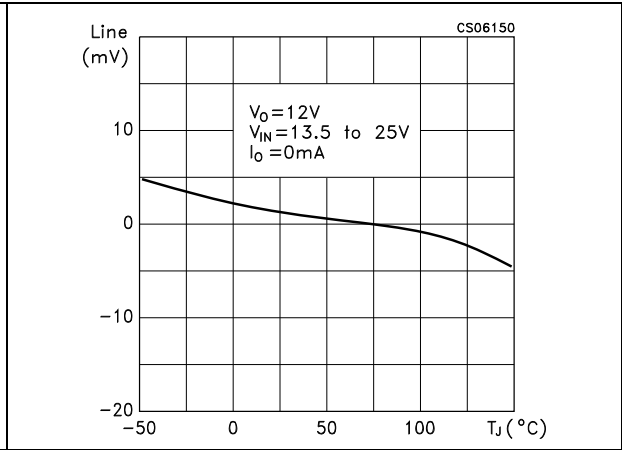


Figure 6. Quiescent current vs. temperature

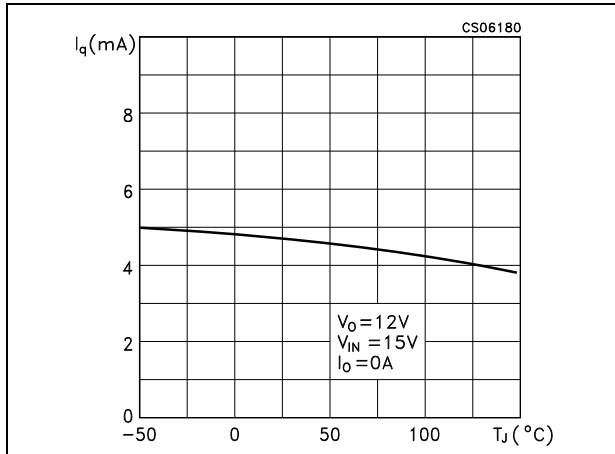


Figure 7. Output voltage vs. temperature

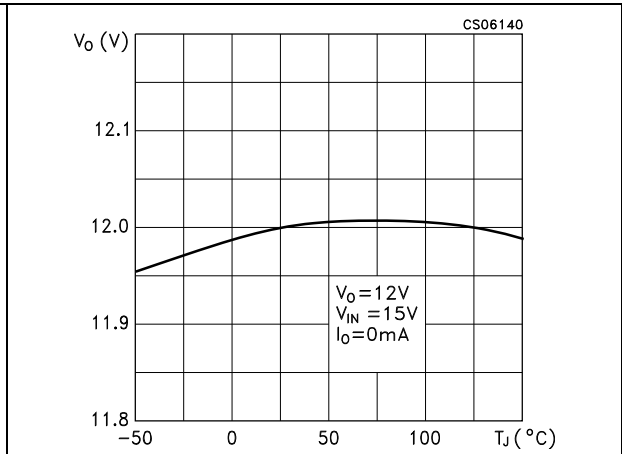


Figure 8. Load regulation vs. temperature

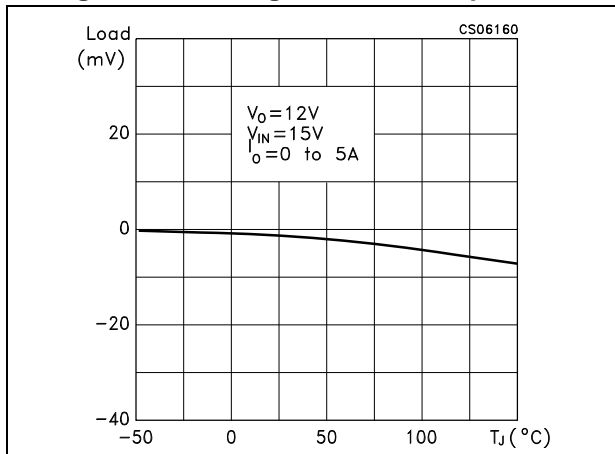


Figure 9. Quiescent current vs. output voltage

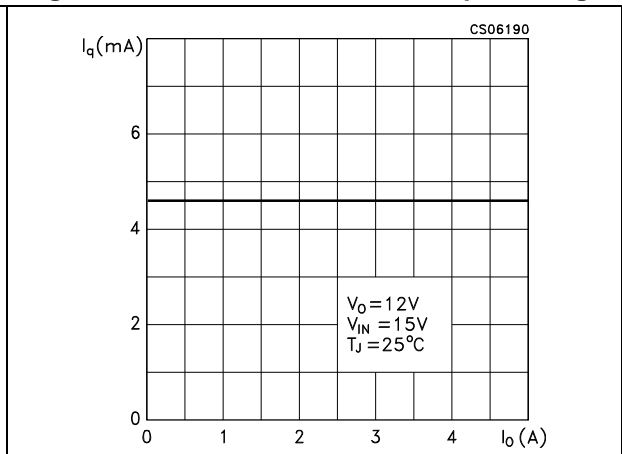


Figure 10. Quiescent current vs. input voltage

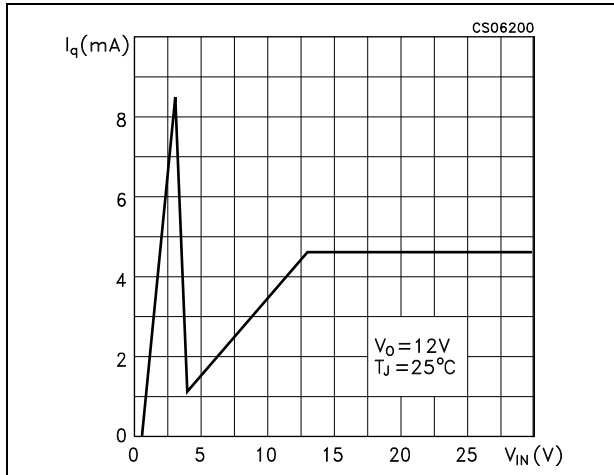


Figure 11. Dropout voltage vs. output current

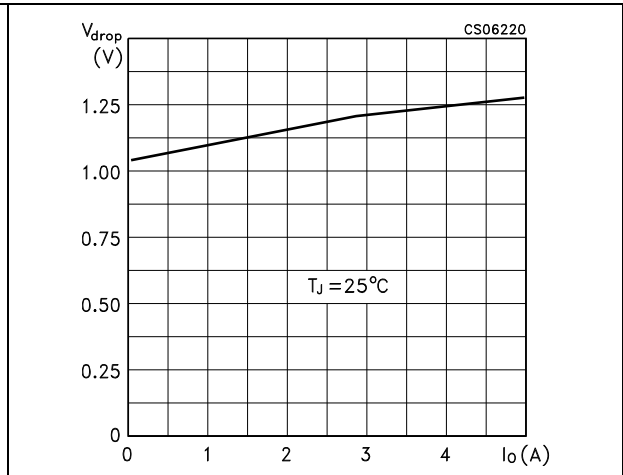


Figure 12. Supply voltage rejection vs. output current

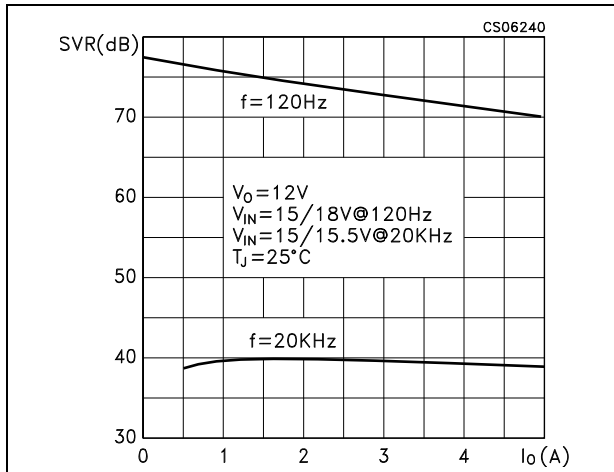


Figure 13. Dropout voltage vs. temperature

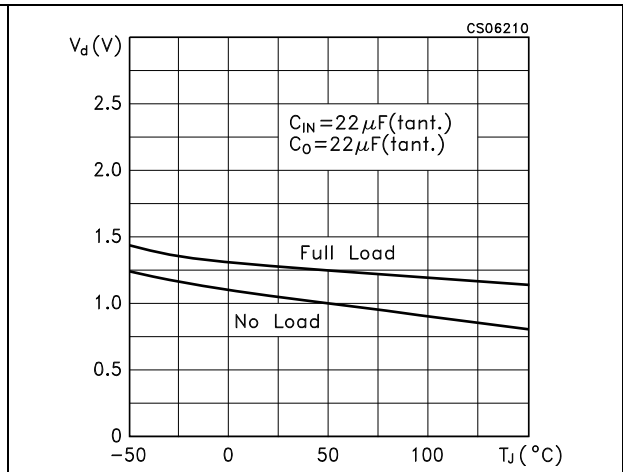


Figure 14. Supply voltage rejection vs. temperature

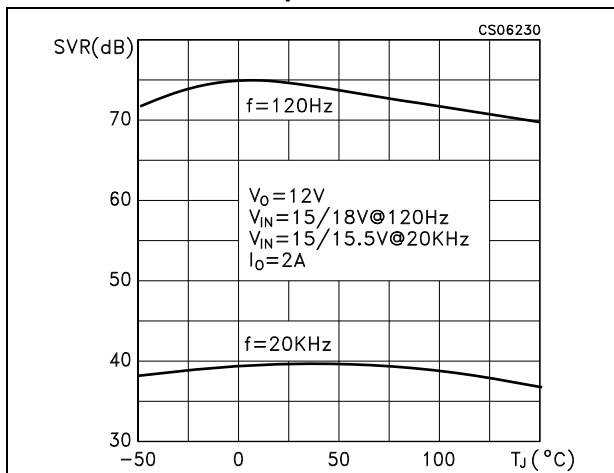


Figure 15. Supply voltage rejection vs. frequency

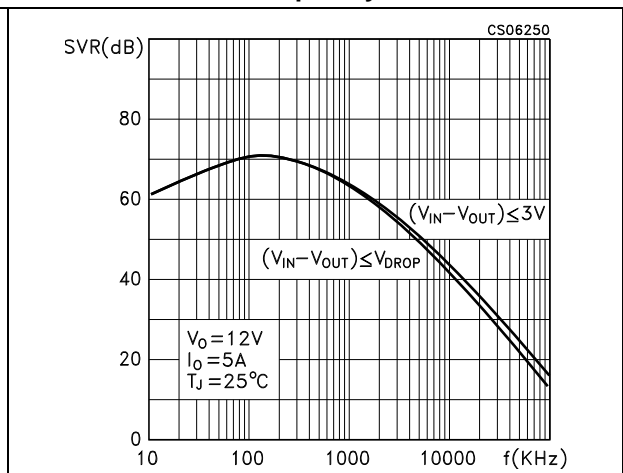


Figure 16. Adjust pin current vs. output current

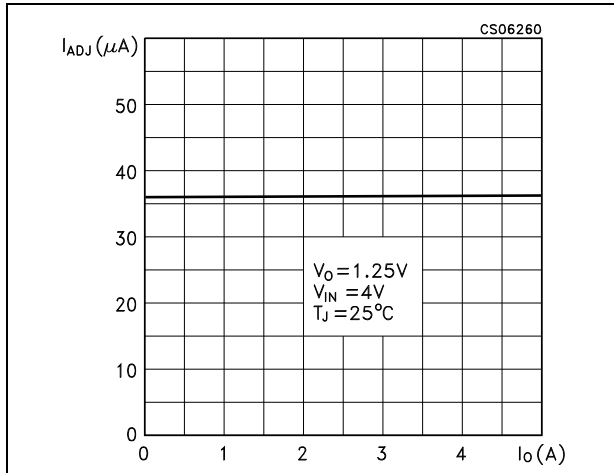


Figure 17. Reference voltage vs. temperature

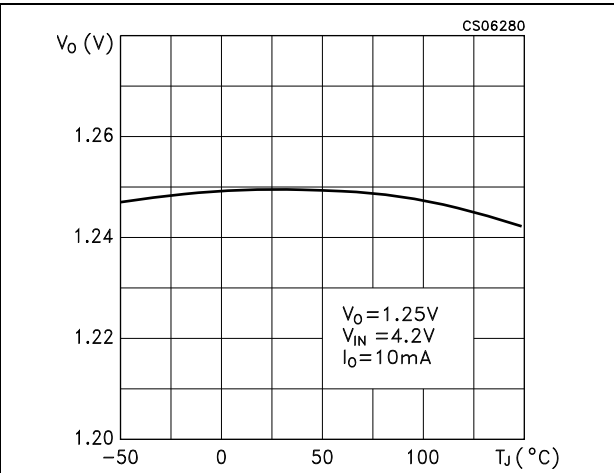


Figure 18. Load regulation vs. temperature

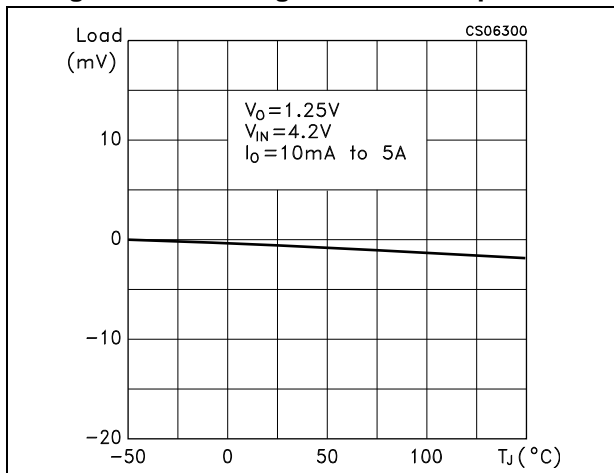


Figure 19. Adjust pin current vs. temperature

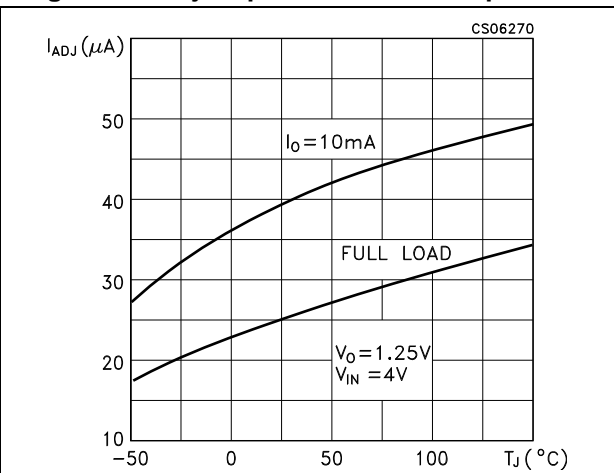


Figure 20. Line regulation vs. temperature

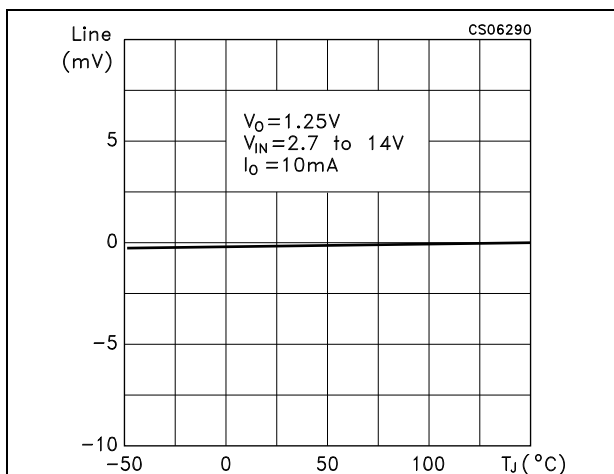


Figure 21. Minimum load current vs. temperature

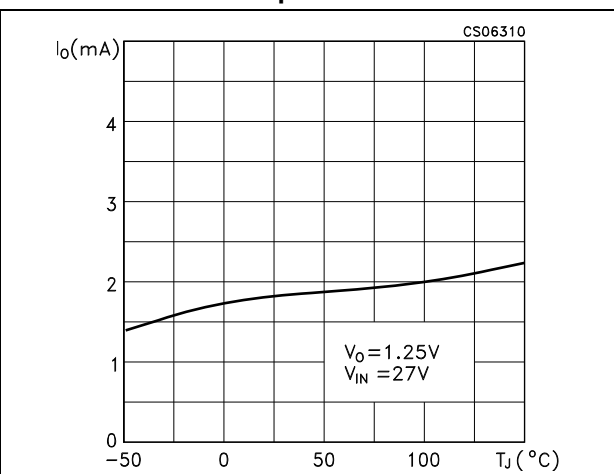


Figure 22. Supply voltage rejection vs. temperature

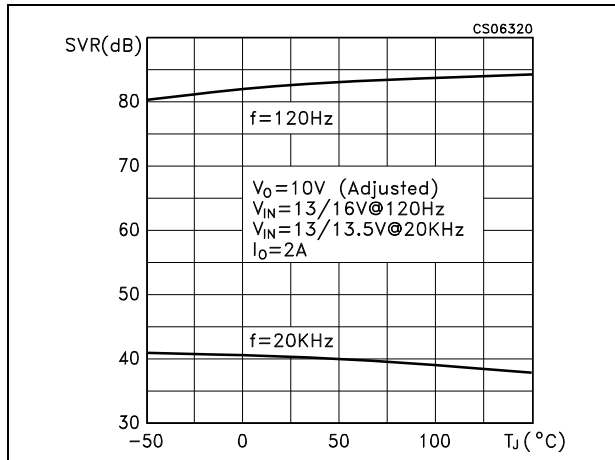


Figure 24. Stability

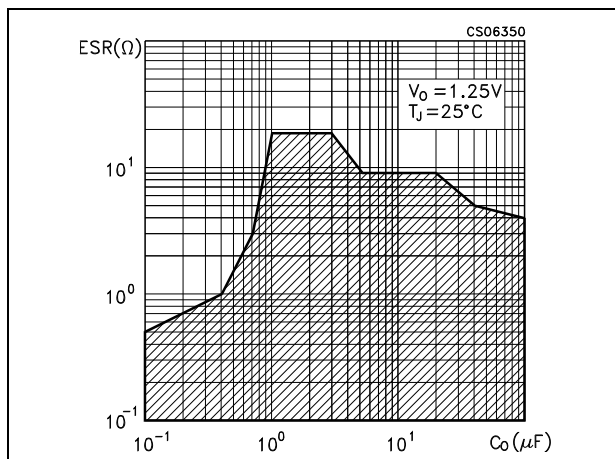


Figure 26. Stability

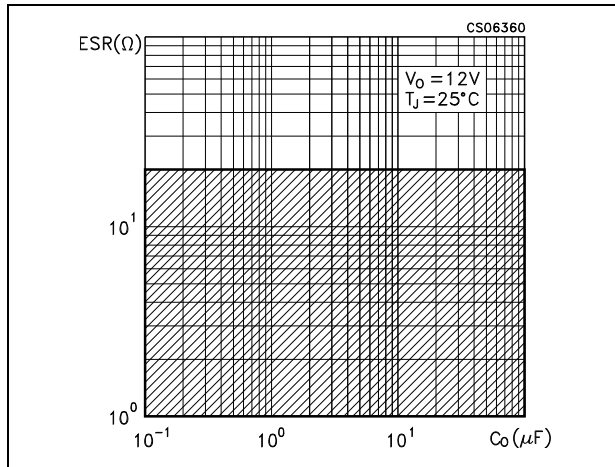


Figure 23. Supply voltage rejection vs. frequency

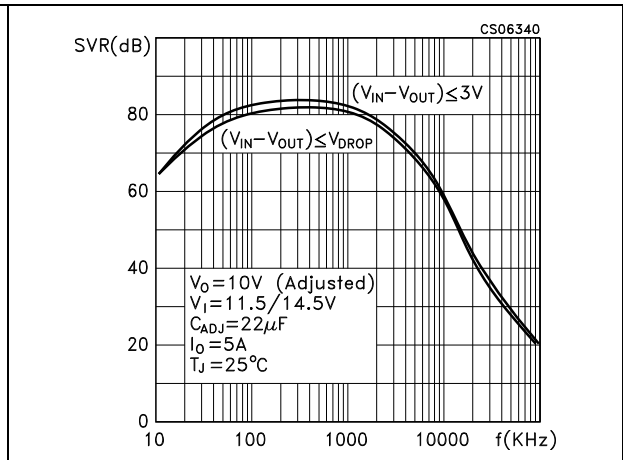


Figure 25. Supply voltage rejection vs. output current

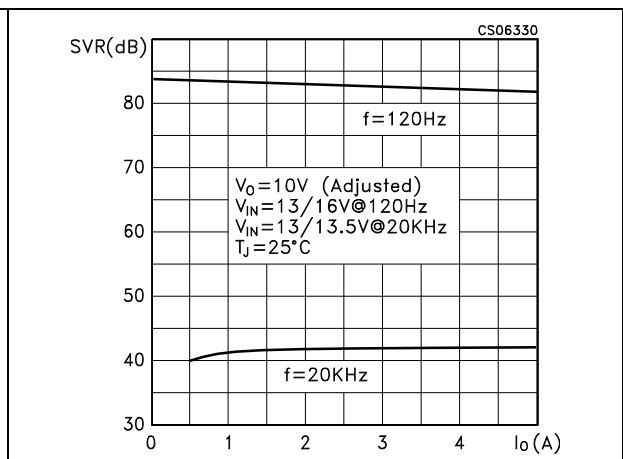


Figure 27. Line transient

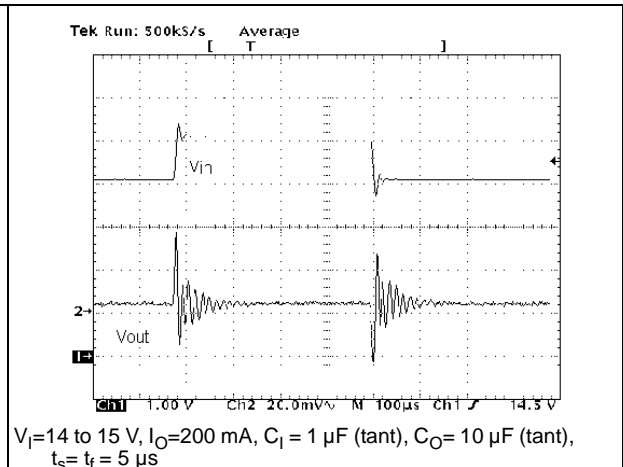


Figure 28. Line transient

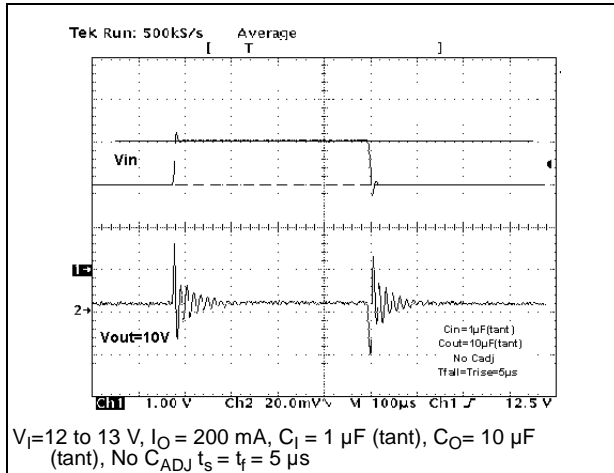


Figure 29. Load transient

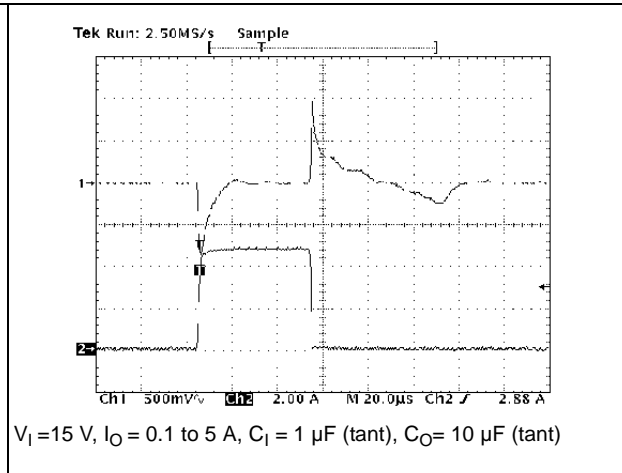


Figure 30. Load transient

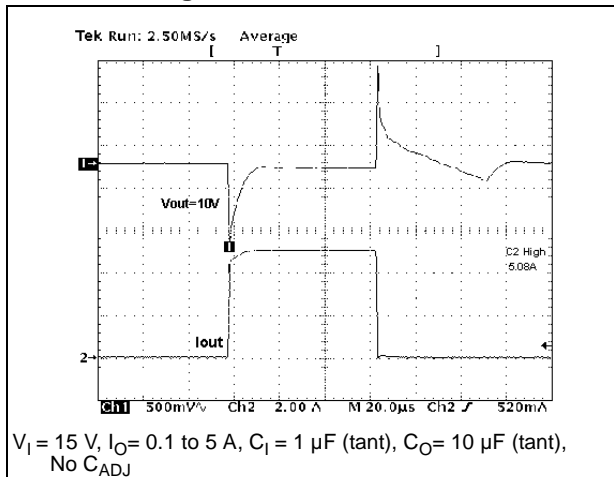


Figure 31. Line transient

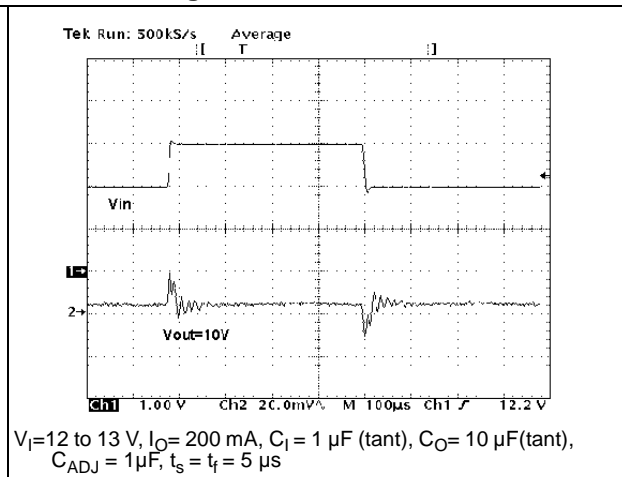
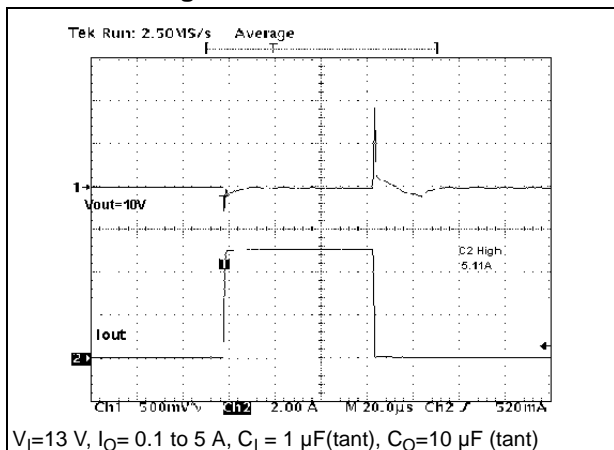


Figure 32. Load transient



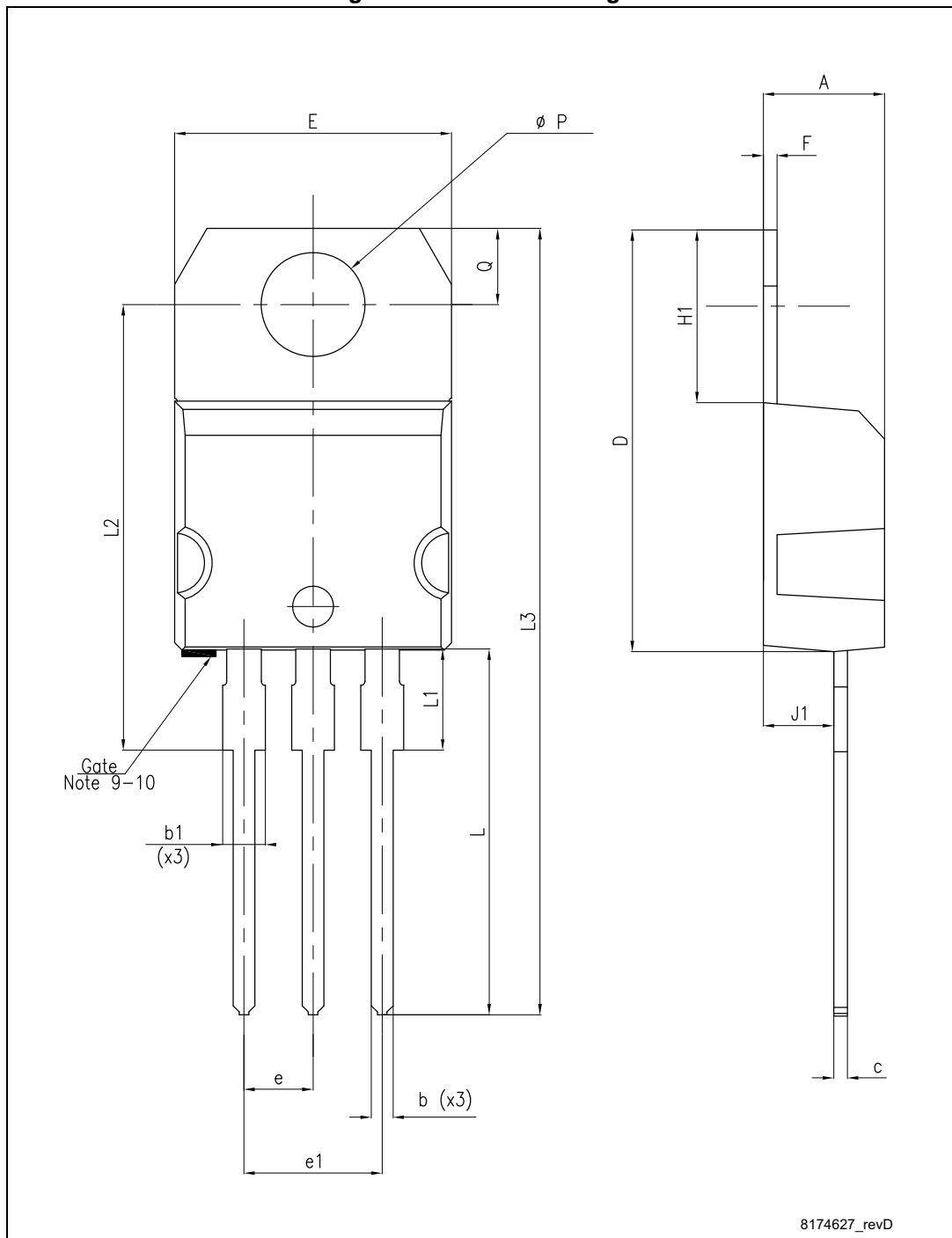
7 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 5. TO-220 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
c	0.48		0.70
D	15.25		15.75
E	10		10.40
e	2.40		2.70
e1	4.95		5.15
F	0.51		0.60
H1	6.20		6.60
J1	2.40		2.72
L	13		14
L1	3.50		3.93
L20		16.40	
L30		28.90	
ØP	3.75		3.85
Q	2.65		2.95

Figure 33. TO-220 drawings



8174627_revD

8 Revision history

Table 6. Document revision history

Date	Revision	Changes
07-Oct-2004	3	Mistake order codes - Table 1.
08-Feb-2005	4	Mistake U.M. Load Regulation - V ==> mV.
16-Jun-2005	5	Order codes updated.
04-Apr-2007	6	Order code updated.
07-Jun-2007	7	Order codes updated.
08-Apr-2008	8	Modified: Table 1 on page 1 . Removed: packages D ² PAK, D ² PAK/A and mechanical data.
29-Jul-2009	9	Modified: Table 1 on page 1 .
04-Sep-2013	10	RPN LD1084XX changed to LD1084. Updated the Description in cover page, Section 7: Package mechanical data , Figure 2: Pin connections (top view) and Figure 3: Application circuit . Minor text changes.

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