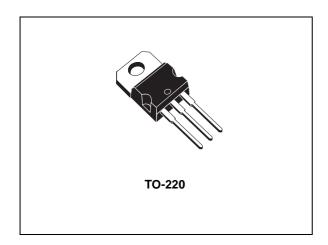


5 A low-drop positive voltage regulator adjustable

Datasheet - production data



LD1084 quiescent current flows into the load, so to increase the efficiency. A minimum capacitor of $10 \mu F$ 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 ± 1% at 25 °C and ± 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

Contents LD1084

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2	Pin configuration4
3	Maximum ratings
4	Schematic application6
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6	Typical performance characteristics
7	Package mechanical data
В	Revision history

LD1084 Diagram

1 Diagram

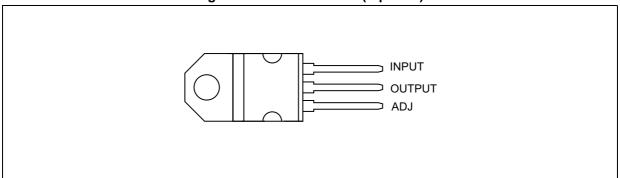
Vour

Figure 1. Schematic diagram

Pin configuration LD1084

2 Pin configuration

Figure 2. Pin connections (top view)



LD1084 Maximum ratings

3 Maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
VI	DC input voltage	30	V
I _O	Output current	Internally limited	mA
P _D	Power dissipation	Internally limited	mW
T _{STG}	T _{STG} Storage temperature range		°C
T _{OP}	Operating junction temperature range	-40 to +125	°C

Note:

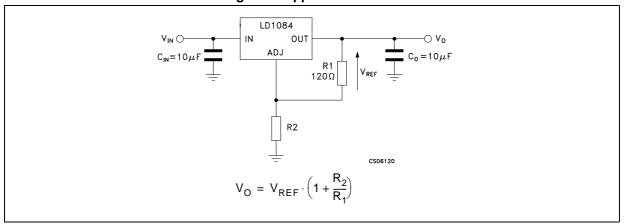
Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

Table 3. Thermal data

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

4 Schematic application

Figure 3. Application circuit



5 Electrical characteristics

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

Table 4. LD1084 electrical characteristics

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
V _{ref}	Reference voltage (1)	I _O = 10 mA T _J = 25 °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	Line regulation	$I_O = 10$ mA, $V_I = 2.85$ to 16.5V, $T_J = 25$ °C		0.015	0.2	%
		$I_O = 10 \text{ mA}, V_I = 2.85 \text{ to } 16.5 \text{ V}$		0.035	0.2	%
ΔVO	Load regulation	I _O = 10 mA to 5 A, T _J = 25 °C		0.1	0.3	%
Δνο	Load regulation	I _O = 0 to 5 A		0.2	0.4	%
V _d	Dropout voltage	I _O = 5 A		1.3	1.5	V
I _{O(min)}	Minimum load current	V _I = 30 V		3	10	mA
	Short-circuit current	V _I - V _O = 5 V	5.5	6.5		Α
I _{sc}		V _I - V _O = 25 V	0.5	0.7		Α
	Thermal regulation	T _A = 25 °C, 30 ms pulse		0.003	0.015	%/W
SVR	Supply voltage rejection	$f = 120 \text{ Hz}, C_O = 25 \mu\text{F},$ $C_{ADJ} = 25 \mu\text{F}, I_O = 5 \text{ A},$ $V_I = 6.25 \pm 3 \text{ V}$	60	72		dB
I _{ADJ}	Adjust pin current	V _I = 4.25 V, I _O = 10 mA		55	120	μΑ
Δl _{ADJ}	Adjust pin current change ⁽¹⁾	I _O = 10 mA to 5 A, V _I = 2.85 to 16.5 V		0.2	5	μА
eN	RMS output noise voltage (% of V _O)	T _A = 25 °C, f = 10 Hz to 10 kHz		0.003		%
S	Temperature stability			0.5		%
S	Long term stability	T _A = 125 °C, 1000 hrs		0.5		%

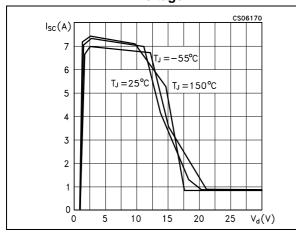
^{1.} See short-circuit current curve for available output current at fixed dropout.

6 Typical performance characteristics

Unless otherwise specified $T_J = 25$ °C, $C_I = 10 \mu F$ (tant.), $C_O = 22 \mu F$ (tant.)

Figure 4. Short-circuit current vs. dropout voltage

Figure 5. Line regulation vs. temperature



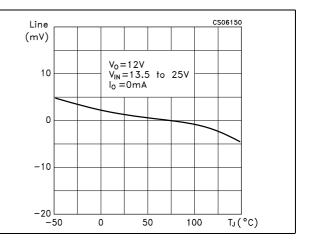
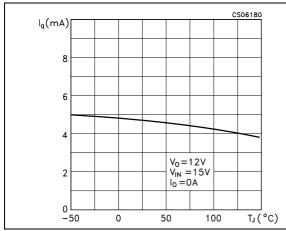


Figure 6. Quiescent current vs. temperature

Figure 7. Output voltage vs. temperature



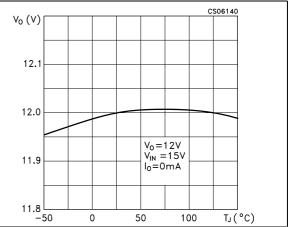
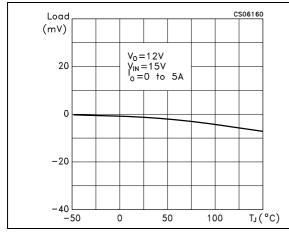
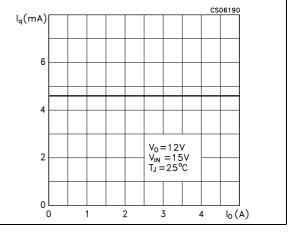


Figure 8. Load regulation vs. temperature

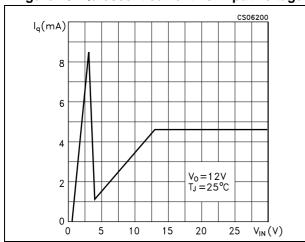
Figure 9. Quiescent current vs. output voltage





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Figure 10. Quiescent current vs. input voltage Figure 11. Dropout voltage vs. output current



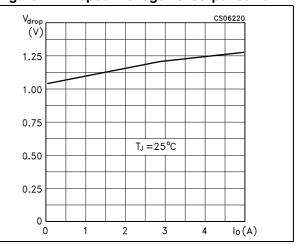
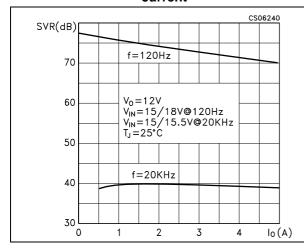


Figure 12. Supply voltage rejection vs. output current

Figure 13. Dropout voltage vs. temperature



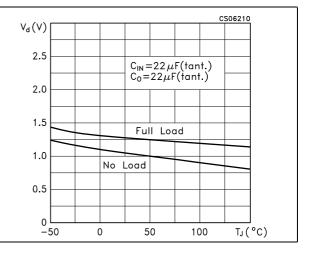
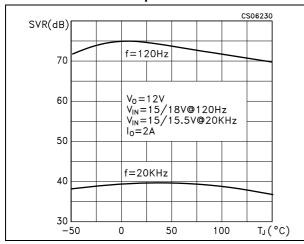
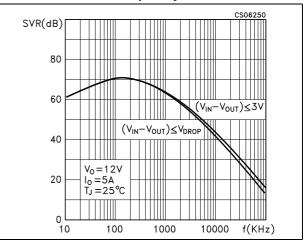


Figure 14. Supply voltage rejection vs. temperature

Figure 15. Supply voltage rejection vs. frequency





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Figure 16. Adjust pin current vs. output current Figure 17. Reference voltage vs. temperature

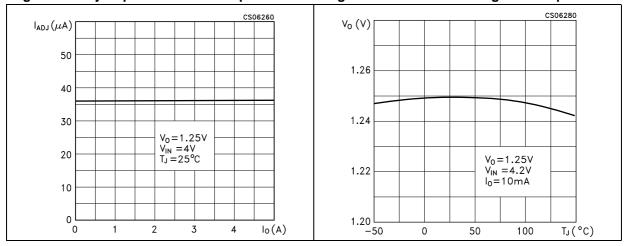


Figure 18. Load regulation vs. temperature

Figure 19. Adjust pin current vs. temperature

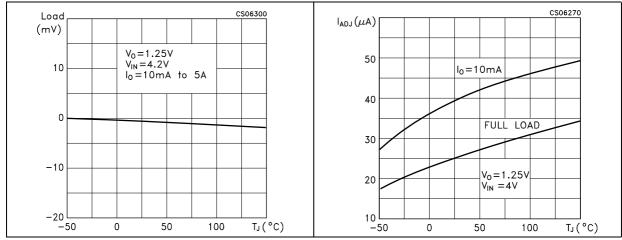
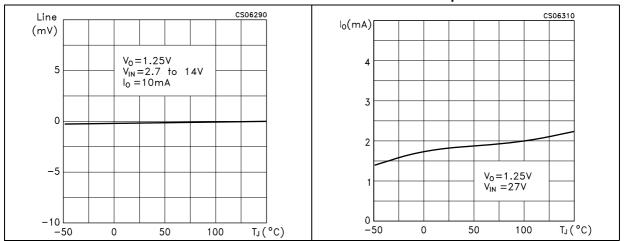


Figure 20. Line regulation vs. temperature

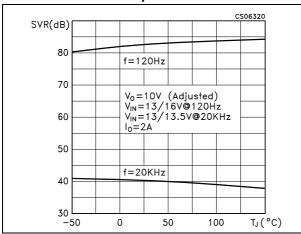
Figure 21. Minimum load current vs. temperature



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Figure 22. Supply voltage rejection vs. temperature

Figure 23. Supply voltage rejection vs. frequency



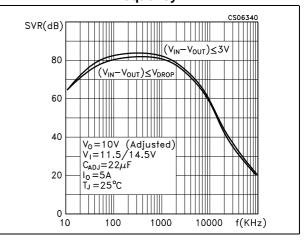
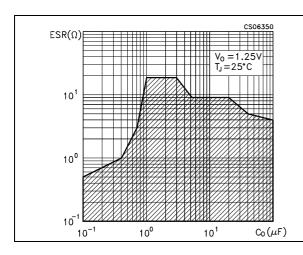


Figure 24. Stability

Figure 25. Supply voltage rejection vs. output current



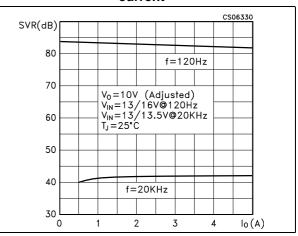
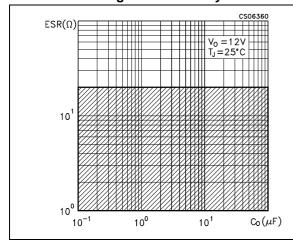
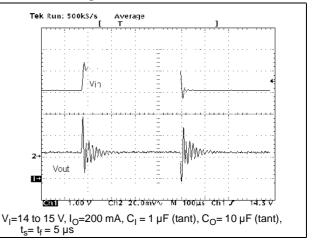


Figure 26. Stability

Figure 27. Line transient





Vin

Vout≐10V

Figure 28. Line transient

Tek Run: 500kS/s Average

Cin=1µF(tant) Cout=10µF(tant) No Cadj Tfall=Trise=5µs

Chi 1.00 V Ch2 20.0mV√ M 100µs Ch1 ✓ 12.5 V $V_{I}{=}12$ to 13 V, I_{O} = 200 mA, C_{I} = 1 μF (tant), $C_{O}{=}$ 10 μF (tant), No C_{ADJ} t_{s} = t_{f} = 5 μs

Figure 29. Load transient

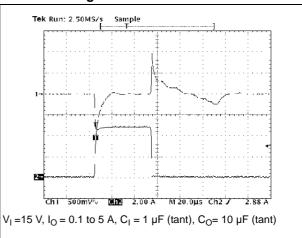


Figure 30. Load transient

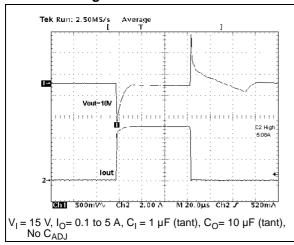


Figure 31. Line transient

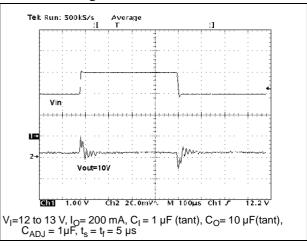
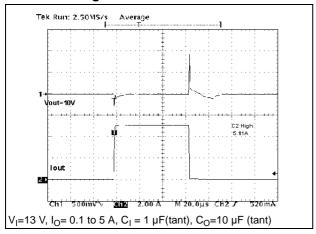


Figure 32. Load transient



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.	Тур.	Max.
А	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
С	0.48		0.70
D	15.25		15.75
E	10		10.40
е	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



øΡ Ξ Γ 2 J1 Gate Note 9-10 b1 (x3) С b (x3) e1 8174627_revD

Figure 33. TO-220 drawings

LD1084 Revision history

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: <i>Table 1 on page 1</i> . 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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