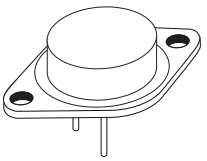
LM323

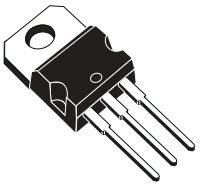
Three-terminal 3 A adjustable voltage regulators

Features

- Output current: 3 A
- Internal current and thermal limiting
- Typical output impedance: 0.01 W
- Minimum input voltage: 7.5 V
- Power dissipation: 30 W



TO-3



TO-220

Description

The LM323 are three-terminal positive voltage regulators with a preset 5 V output and a load driving capability of 3 A. New circuit design and processing techniques are used to provide the high output current without sacrificing the regulation characteristics of lower current devices.

The 3 A regulator is virtually blowout proof.

Current limiting, power limiting and thermal shut-down provide the same high level of reliability obtained with these techniques in the LM209, 1 A regulator. An overall worst case specification for the combined effects of input voltage, load current, ambient temperature, and power dissipation ensure that the LM323 will perform satisfactorily as a system element.

Table 1. Device summary

Order codes		Temperature range
TO-220	TO-3	
LM323T	LM323K	0°C to 125°C

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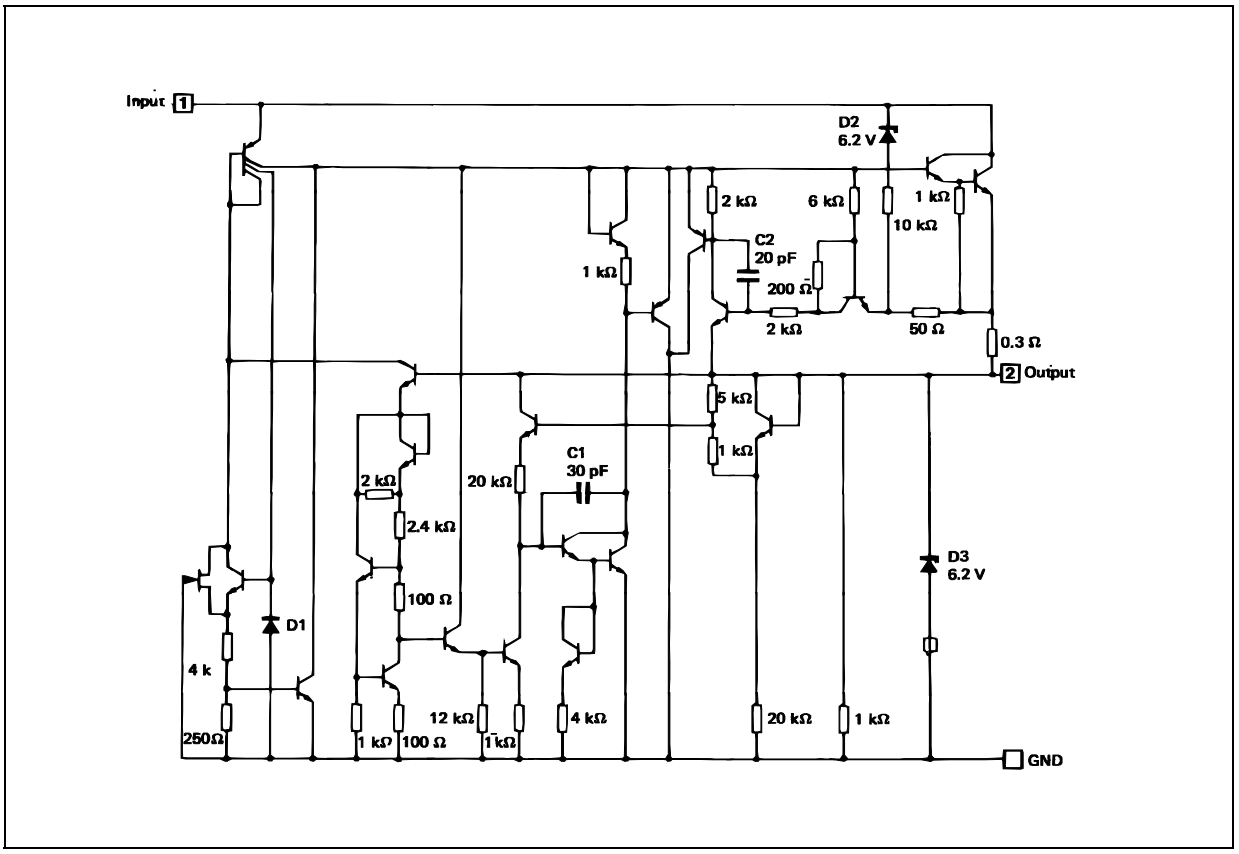
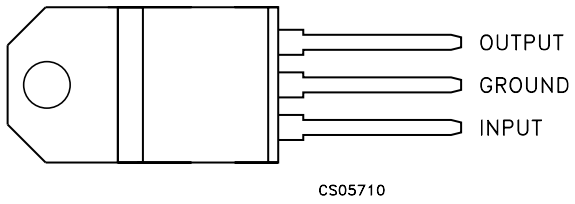
1 Diagram

Figure 1. Schematic diagram

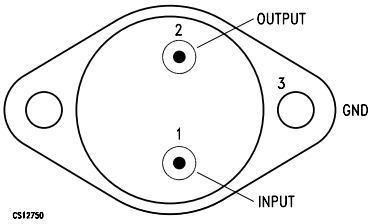


2 Pin configuration

Figure 2. Pin connections (tot view)



TO-220



TO-3

3 Maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_I	Input voltage	20	V
I_O	Output current	Internally limited	
P_D	Power dissipation	Internally limited	
T_{STG}	Storage temperature range	-65 to 150	°C
T_{OP}	Operating junction temperature range	0 to 125	°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 3. Thermal data

Symbol	Parameter	TO-220	TO-3	Unit
R_{thJC}	Thermal resistance junction-case	3	2	°C/W
R_{thJA}	Thermal resistance junction-ambient	50	35	°C/W

4 Electrical characteristics

Table 4. Electrical characteristics (T_J = 0 to 150 °C, unless otherwise specified [1])

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_O	Output voltage rang [2]	T_J = 25°C, V_I = 7.5 V, I_O = 0	4.8	5	5.2	V
V_O	Output voltage range [2]	$T_J = T_{min}$ to T_{max}, P ≤P_{max} V_I = 7.5 to 15 V, I_O = 0 to 3 A	4.75		5.25	V
K_{VI}	Line regulation [3]	V_I = 7.5 to 15 V, T_J = 25°C		5	25	mV
K_{VO}	Load regulation (Note 3)	I_O = 0 to 3 A, V_I = 7.5 V, T_J = 25°C		25	100	mV
I_{IB}	Quiescent current	V_I = 7.5 to 15 V, I_O = 0 to 3 A		12	20	mA
V_{NO}	Output noise voltage	T_J = 25°C, f = 10 Hz to 100 kHz		40		μV_{RMS}
I_{OS}	Short circuit current limit	V_I = 15 V, T_J = 25°C		3	4.5	A
		V_I = 7.5 V, T_J = 25°C		4	5	
K_{VH}	Long term stability				35	mV

1. Although power dissipation is internally limited, specifications apply only for P ≤30 W.
2. Selected devices with tightened tolerance output voltage available.
3. Load and line regulation are specified at constant junction temperature. Pulse testing is required with a pulse width ≤1 ms and duty cycle ≤5 %.

5 Typical characteristics

Figure 3. Output noise voltage

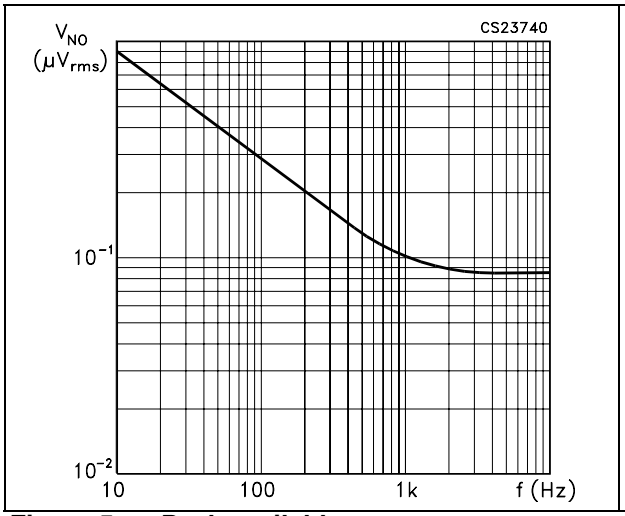


Figure 4. Output impedance

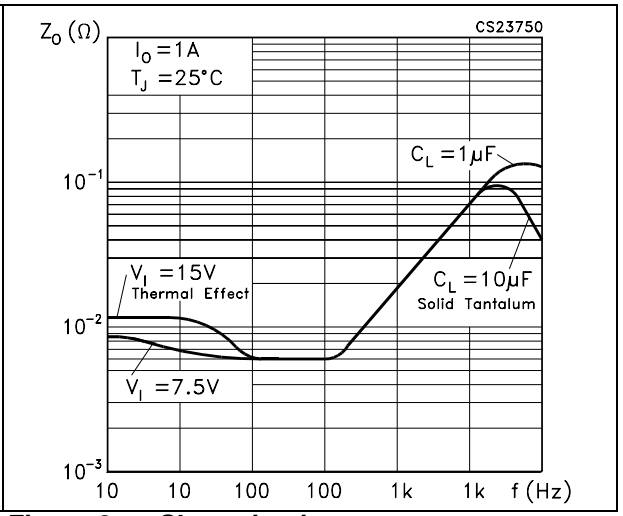


Figure 5. Peak available output current

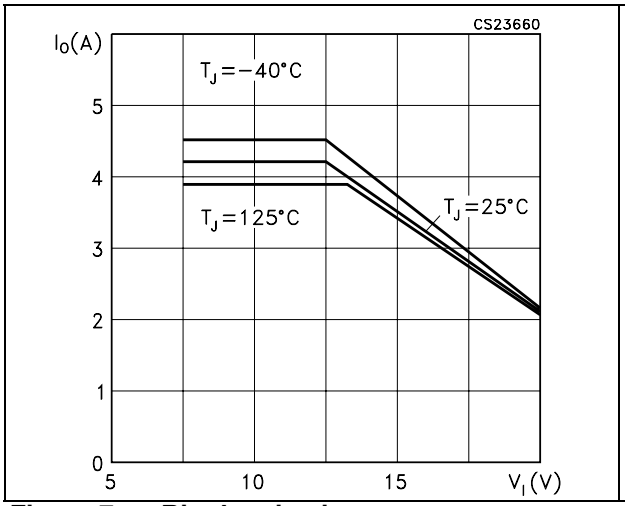


Figure 6. Short circuit current

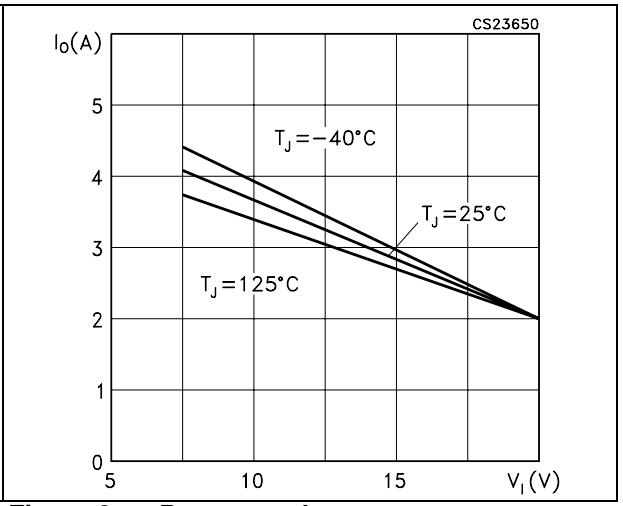


Figure 7. Ripple rejection

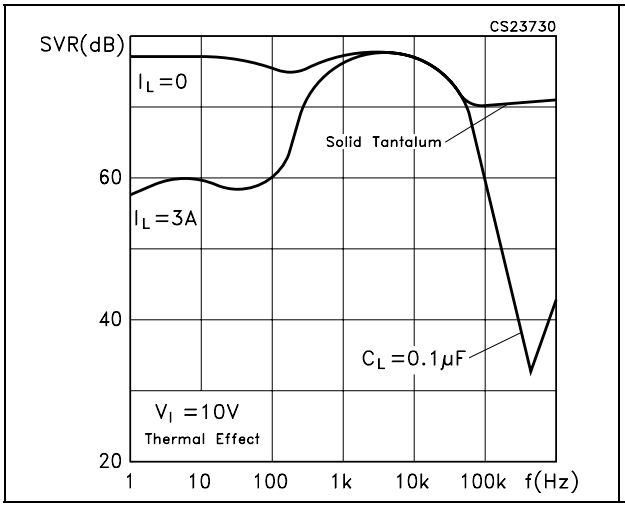


Figure 8. Dropout voltage

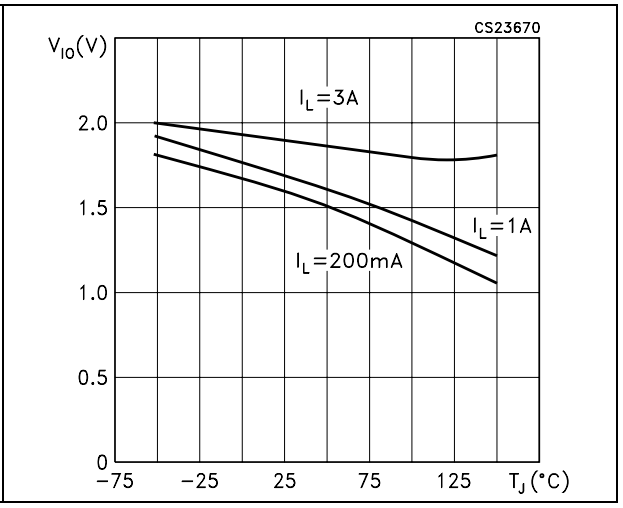


Figure 9. Line transient response

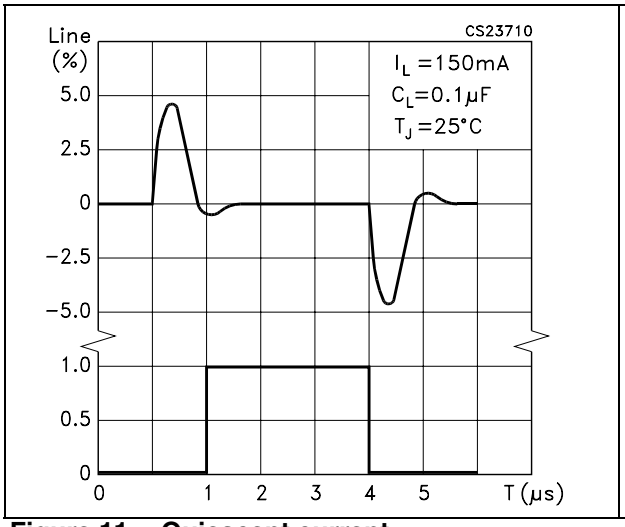


Figure 10. Output voltage

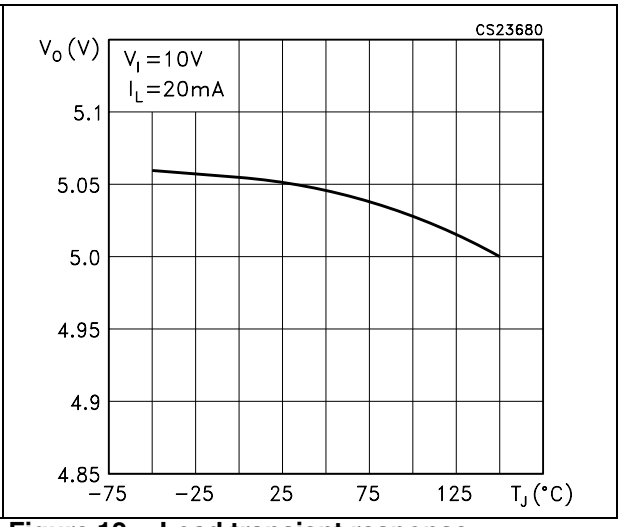


Figure 11. Quiescent current

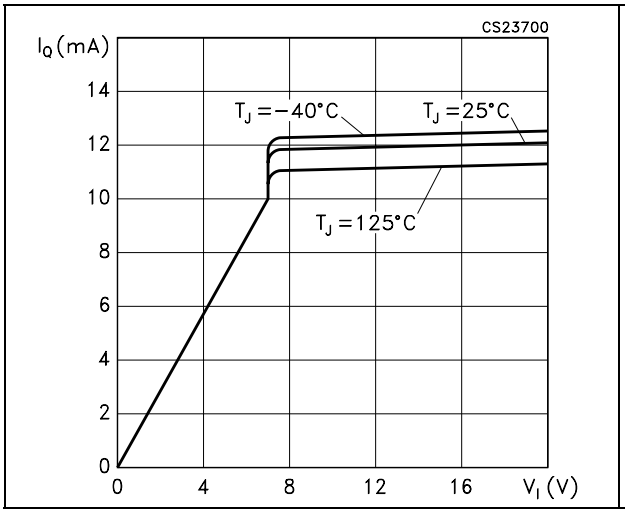
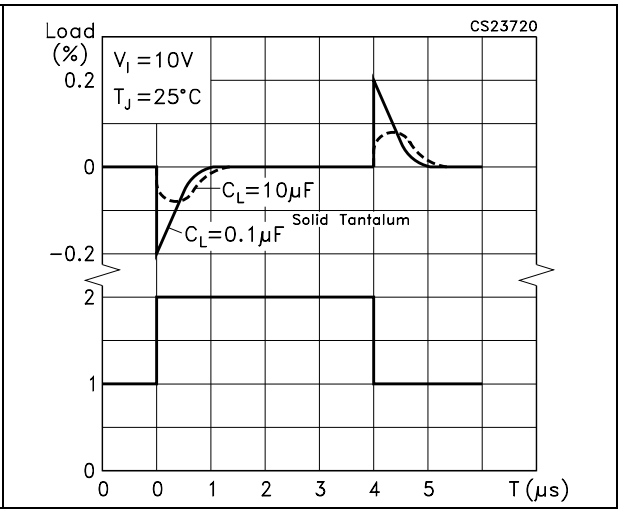
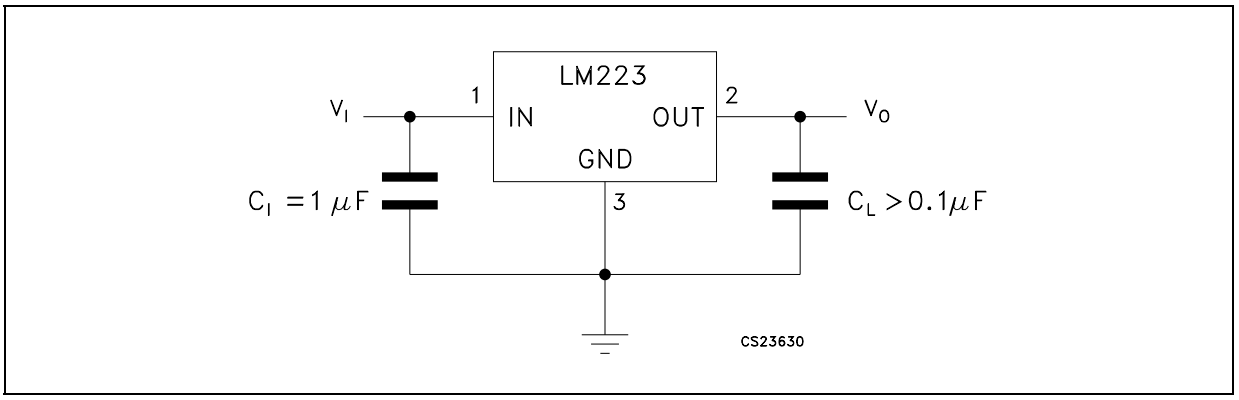


Figure 12. Load transient response



6 Typical application

Figure 13. Basic 3 A regulator



C_1 = Required if regulator is distant from filter capacitors.

C_L = Regulator is stable with no load capacitor into resistive loads.

Figure 14. Trimming output to 5 V

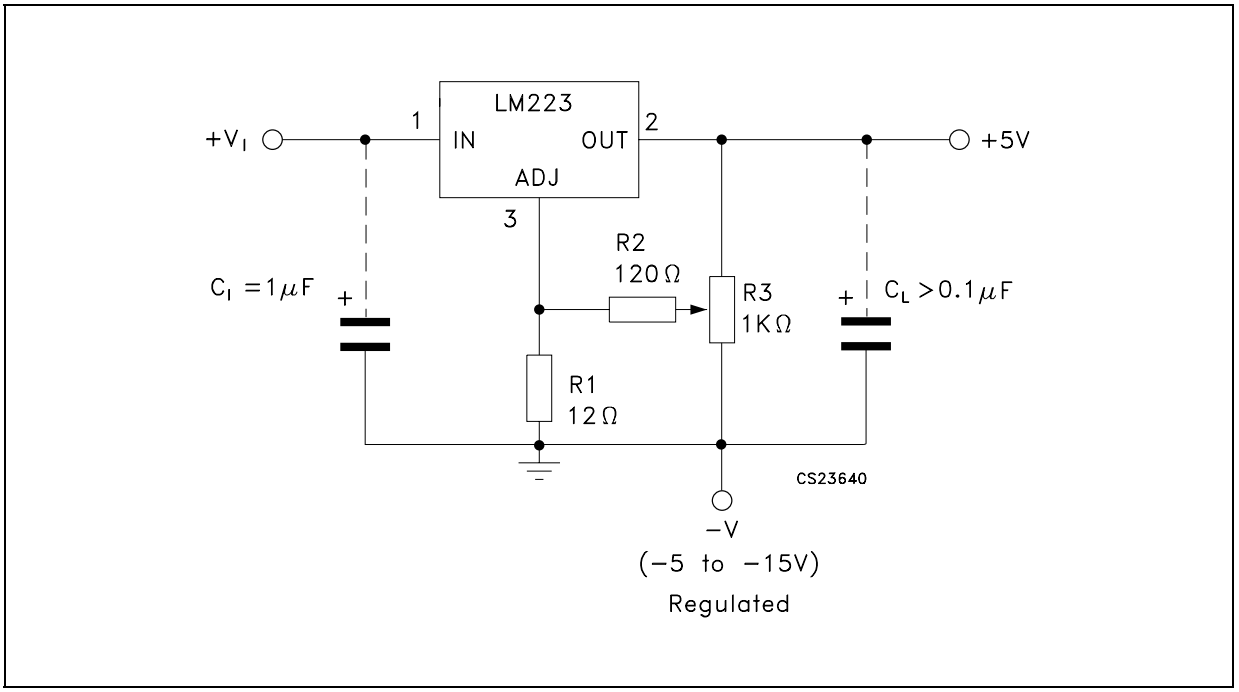
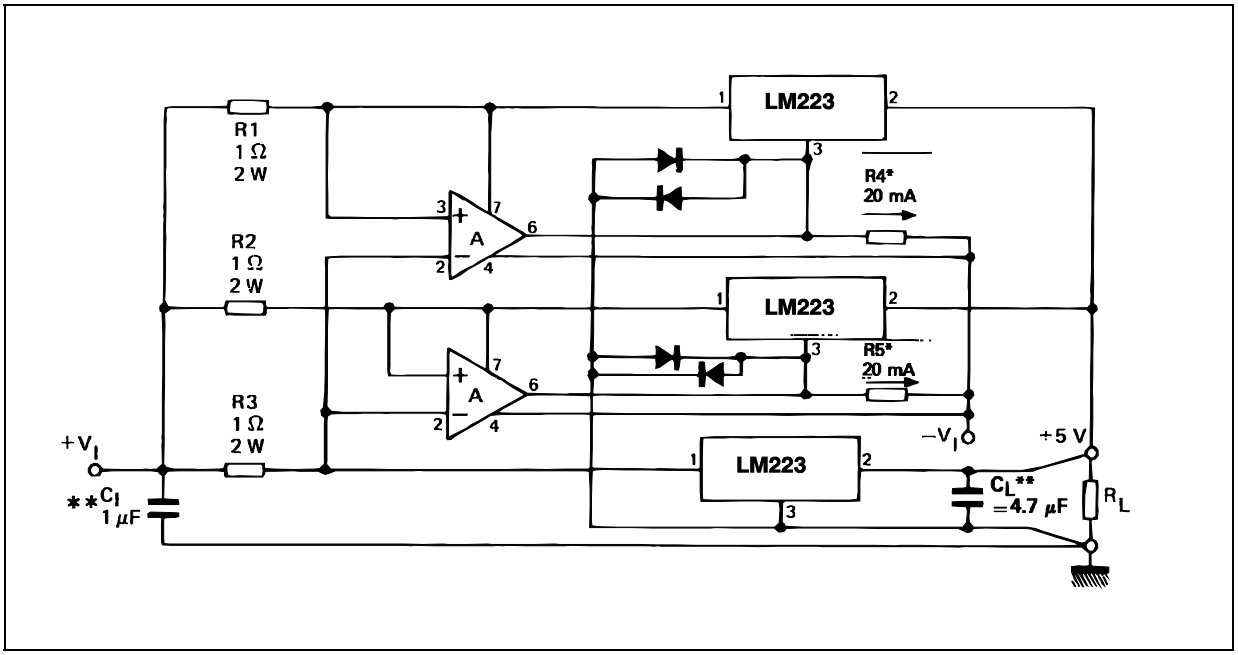


Figure 15. 10 A regulator with complete overload protection

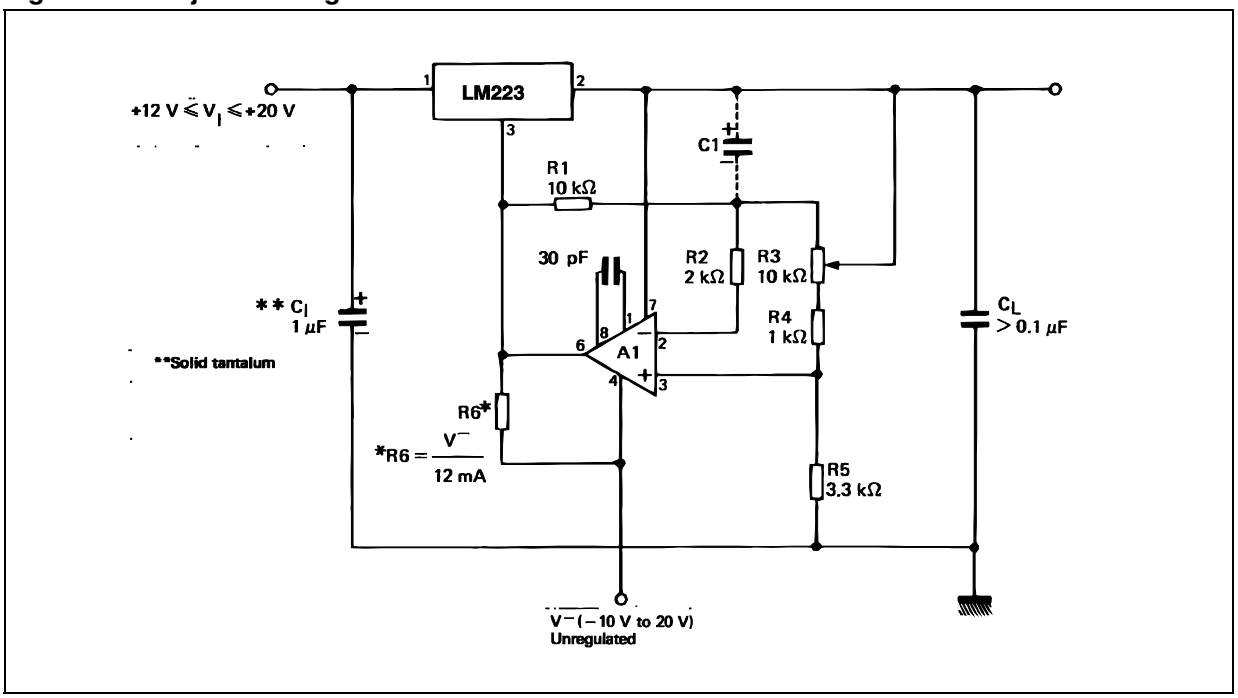


* Selected for 20 mA current from unregulated negative supply.

** Solid tantalum.

A = LM101A, LM201A, LM301A.

Figure 16. Adjustable regulator 0 - 10 V / 3 A



A1 = LM101A, LM201A, LM301A.

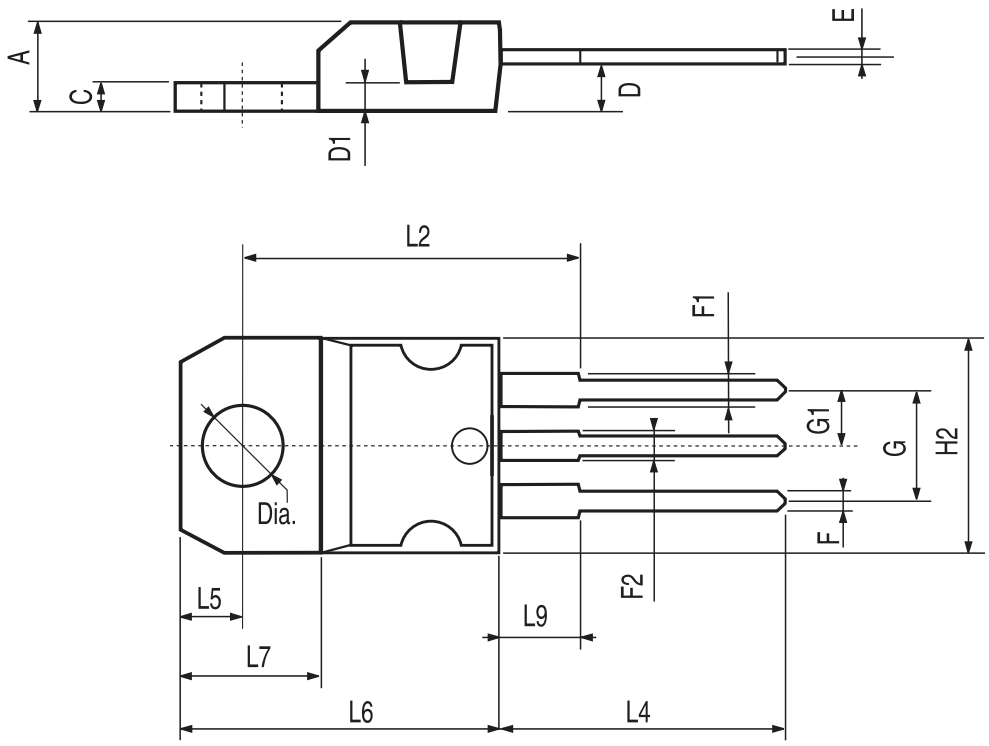
C_I = 2 µF optional - improves ripple rejection, noise and transient response.

7 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.

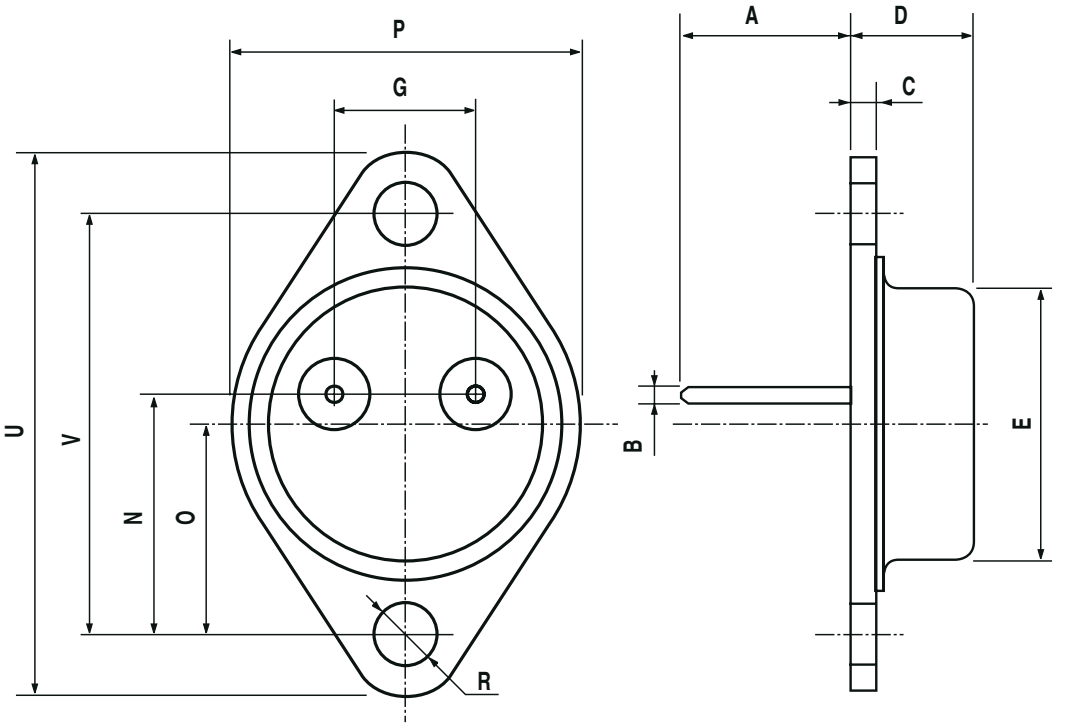
TO-220 mechanical data

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



TO-3 mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		11.85			0.466	
B	0.96	1.05	1.10	0.037	0.041	0.043
C			1.70			0.066
D			8.7			0.342
E			20.0			0.787
G		10.9			0.429	
N		16.9			0.665	
P			26.2			1.031
R	3.88		4.09	0.152		0.161
U			39.5			1.555
V		30.10			1.185	



P003C/C

8 Revision history

Table 5. Document revision history

Date	Revision	Changes
04-Nov-2005	3	Updated curves, no content change.
12-Feb-2008	4	Added: *Table 1 on page 1*.

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