

### 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

#### 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 shutdown 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	Temperature range	
TO-220	то-з	remperature range
LM323T	LM323K	0°C to 125°C

February 2008

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## 1 Diagram





## 2 Pin configuration







# 3 Maximum ratings

#### Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
VI	Input voltage	20	V
۱ <sub>0</sub>	Output current	Internally limited	
PD	Power dissipation	Internally limited	
T <sub>STG</sub>	Storage temperature range	-65 to 150	°C
T <sub>OP</sub>	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

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Symbol	Parameter	TO-220	TO-3	Unit
R <sub>thJC</sub>	Thermal resistance junction-case	3	2	°C/W
R <sub>thJA</sub>	Thermal resistance junction-ambient	50	35	°C/W

### 4 Electrical characteristics

Symbol	Parameter	Test conditions		Тур.	Max.	Unit
Vo	Output voltage rang <sup>(2)</sup>	$T_J = 25^{\circ}C, V_I = 7.5 V, I_O = 0$	4.8	5	5.2	V
V <sub>O</sub>	Output voltage range <sup>(2)</sup>	$    T_J = T_{min} \text{ to } T_{max}, P \leq P_{max} $ $    V_I = 7.5 \text{ to } 15 \text{ V}, I_O = 0 \text{ to } 3 \text{ A} $			5.25	V
K <sub>VI</sub>	Line regulation <sup>(3)</sup>	$V_{I} = 7.5$ to 15 V, $T_{J} = 25^{\circ}C$		5	25	mV
K <sub>VO</sub>	Load regulation (Note 3)	$I_{O} = 0$ to 3 A, $V_{I} = 7.5$ V, $T_{J} = 25^{\circ}C$		25	100	mV
I <sub>IB</sub>	Quiescent current	$V_{I} = 7.5$ to 15 V, $I_{O} = 0$ to 3 A		12	20	mA
V <sub>NO</sub>	Output noise voltage	$T_{J} = 25^{\circ}C$ , f = 10 Hz to 100 kHz		40		$\mu V_{RMS}$
los Short circuit current limit		$V_{I} = 15 \text{ V}, \text{ T}_{J} = 25^{\circ}\text{C}$		3	4.5	А
I <sub>OS</sub> Short circ		$V_{I} = 7.5 \text{ V}, \text{ T}_{J} = 25^{\circ}\text{C}$		4	5	A
K <sub>VH</sub>	Long term stability				35	mV

Table 4.	Electrical characteristics	$(T_J = 0 \text{ to } 150 \text{ °C}, \text{ unless otherwise specified } (1)$	)
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1. Although power dissipation is internally limited, specifications apply only for P  $\leq$ 30 W.

2. Selected devices with tightened tolerance output voltage available.

 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 9. Line 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.





 $\mathsf{A1}=\mathsf{LM101A},\,\mathsf{LM201A},\,\mathsf{LM301A}.$ 

 $C_I$  = 2  $\mu F$  optional - improves ripple rejection, noise and transient response.



### 7 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK<sup>®</sup> 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.



Dim.		mm.			inch.	
Dini.	Min.	Тур.	Max.	Min.	Тур.	Max.
А	4.40		4.60	0.173		0.181
С	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-220 mechanical data

Dim.		mm.			inch.	
Dini.	Min.	Тур.	Max.	Min.	Тур.	Max.
А		11.85			0.466	
В	0.96	1.05	1.10	0.037	0.041	0.043
С			1.70			0.066
D			8.7			0.342
E			20.0			0.787
G		10.9			0.429	
Ν		16.9			0.665	
Р			26.2			1.031
R	3.88		4.09	0.152		0.161
U			39.5			1.555
V		30.10			1.185	



#### TO-3 mechanical data

## 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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