LM337

DATASHEET

Specification Revision History:

Version	Date	Description
V1.0	2019/11	New
V1.1	2021/05	Modify Ordering Information
V1.2	2025/02	Modify Ordering Information
V1.3	2025/03	Add application precautions and overall typesetting.

General Description

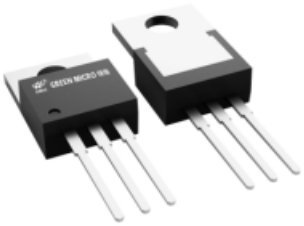
The LM337 are adjustable 3-terminal negative voltage regulators capable of supplying in excess of-1.5A over an output voltage range of-1.2V to-37V.These regulators are exceptionally easy to apply, requiring only 2 external resistors to set the output voltage and 1 output capacitor for frequency compensation.The circuit design has been optimized for excellent regulation and low thermal transients.

The LM337 serve a wide variety of applications including local on-card regulation,program mable-output voltage regulation or precision current regulation.The LM337 is ideal complemen ts to the LM337 adjustable positive regulators.

Features

- Output voltage adjustable from-1.2V to -37V
- 1.5A output current guaranteed
- Line regulation typically 0.01%/V
- Excellent thermal regulation,0.002%/W
- Excellent rejection of thermal transients
- Temperature-independent current limit
- Internal thermal overload protection

Simplified Outline

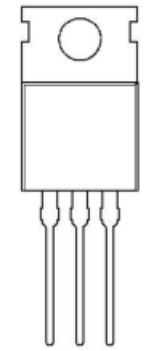


TO-220-3

Ordering Information

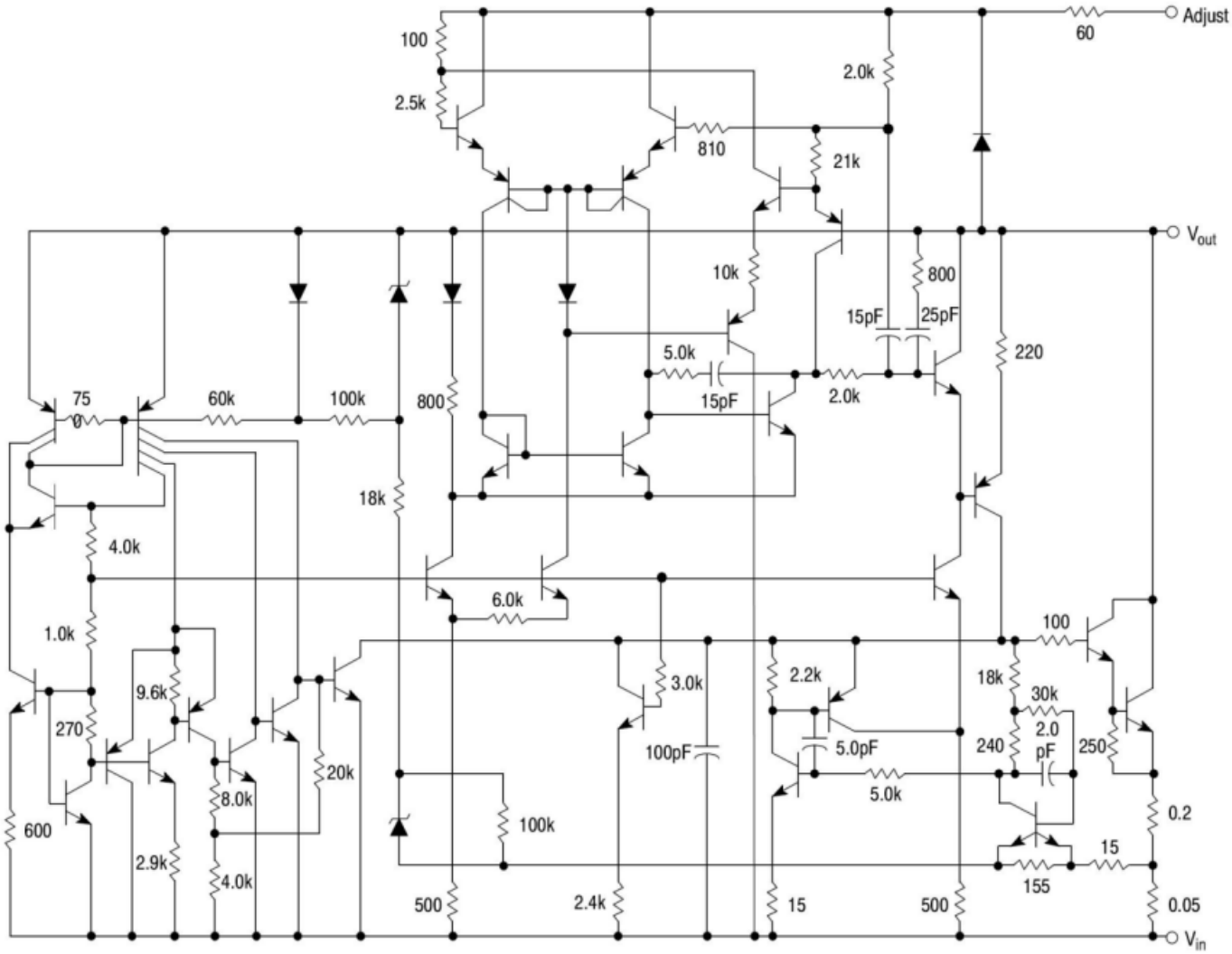
Product Model	Package Type	Marking	Packing	Packing Qty
LM337TBT	TO-220-3	LM337 S315	TUBE	1000PCS/BOX
LM337T	TO-220-3	LM337 G3A5	TUBE	1000PCS/BOX

Pin Configuration



LM337(TO-220-3)

Block Diagram



Absolute Maximum Ratings*1

Characteristic	Value	Unit
Power dissipation	Internally limited	
Input-output voltage differential	40	V
Operating junction temperature range	-20～+125	°C
Storage temperature	-65～+150	°C
Lead temperature(soldering,10 sec.)	300	°C
Plastic package(soldering,4 sec.)	260	°C
ESD rating	2k	Volts

Electrical Characteristics *1

Characteristics	Test conditions	Min	Typ	Max	Unit
Line regulation	T_J=25°C,3V≤|V_{IN}-V_{OUT}|≤40V *2 I_L=10mA		0.01	0.04	%/V
Load regulation	T_J=25°C,10mA≤V_{OUT}≤I_{MAX}		0.3	1.0	%
Thermal regulation	T_J=25°C,10ms pulse		0.003	0.04	%/W
Adjustment pin current			65	100	μA
Adjustment pin current charge	10mA≤I_L≤IMAX,T_A=25°C 3V≤ |V_{IN}-V_{OUT}|≤40V		2	5	μA
Reference voltage	T_J=25°C *3 3V≤|V_{IN}-V_{OUT}|≤40V *3 10mA≤I_{OUT}≤ IMAX,P≤P_{MAX}	-1.213 -1.200	-1.250 -1.250	-1.287 -1.300	V
Line regulation	3V≤|V_{IN}-V_{OUT}|≤40V *2		0.02	0.07	%/V
Load regulation	10mA≤I_{OUT}≤I_{MAX} *2		0.3	1.5	%
Temperature stability	T_{MIN}≤T_J≤T_{MAX}		0.6		%
Minimum load current	|V_{IN}-V_{OUT}|≤40V |V_{IN}-V_{OUT}|≤10V		2.5 1.5	10 6	mA
Current limit	|V_{IN}-V_{OUT}|≤15V |V_{IN}-V_{OUT}|=40V,T_J=25°C	1.5 0.15	2.2 0.4	3.7	A
RMS output noise,%of VoUT	T_J=25°C,10Hz≤f≤10kHz		0.003		%
Ripple rejection ratio	V_{OUT}|=-10V,f=120Hz CADJ=10μF	66	60 77		dB
Long-term stability	Tj=125°C,1000 Hours		0.3	1	%

Thermal resistance,junction to case	SOT223 TO220 TO252		2.3 12 4	3 15	°C/W
Thermal resistance,junction to ambient(no heat sink)	SOT223 TO220 TO252		35 140 50		C/W

*1:Unless otherwise specified,these specifications apply-20°C≤Tj≤+125°°C for the LM337;VIN-VOUT=5V;and IOUT=0.5A for the TO252,SOT223 and TO220 packages.Although power dissipation is internally limited,these specifications are applicable for power dissipations of 2W for the SOT223 (see Application Hints),and 20W for the TO252,and TO220.IMAX is 1.5A for the TO252,SOT223 and TO220 packages.

*2:Regulation is measured at constant junction temperature,using pulse testing with a low duty cycle. Changes in output voltage due to heating effects are covered under the specification for thermal regulation.Load regulation is measured on the output pin at a point 1/8"below the base of the TO252 packages.

*3:Selected devices with tightened tolerance re ference voltage available.

Application Summary

When a value for θ(H-A)is found using the equation shown,a heatsink must be selected that has a value that is less than or equal to this number.

Heatsinking SOT223 Package Parts

The SOT223 packages use a copper plane on the PCB and the PCB itself as a heatsink.To optimize the heat sinking ability of the plane and PCB,solder the tab of the package to the plane.

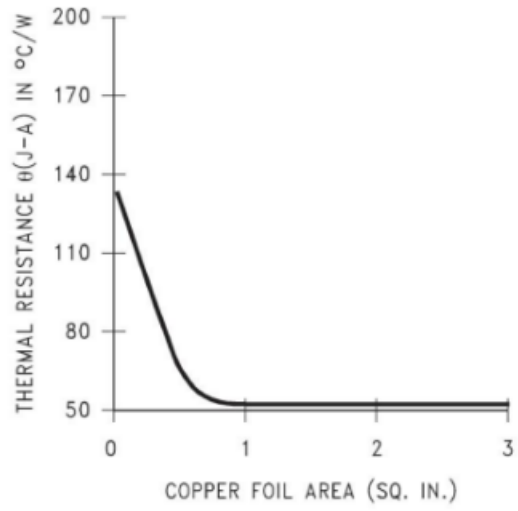


Fig. θ(J-A) vs Copper (2 ounce) Area for the SOT223 Package

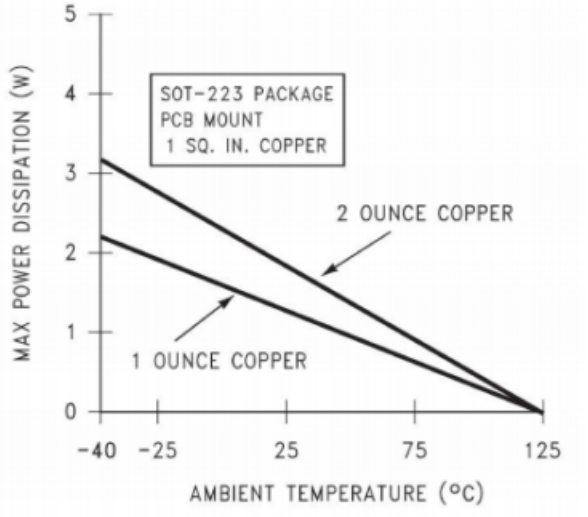
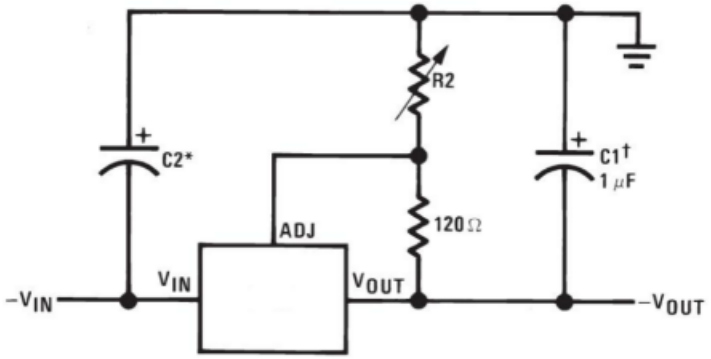


Fig. Maximum Power Dissipation vs. TAMB for the the SOT223 Package

Typical Application

Adjustable Negative Voltage Regulator



Full output current not available at high input-output voltages

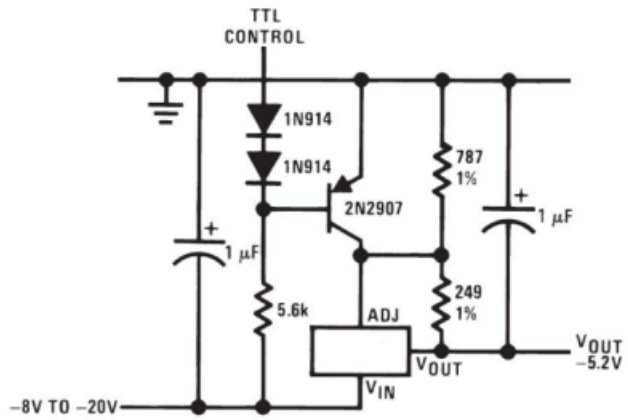
$$-V_{OUT} = -1.25V\left(1 + \frac{R2}{120}\right) + \left(-I_{ADJ} \times R2\right)$$

†C1 = 1 μF solid tantalum or 10 μF aluminum electrolytic required for stability

*C2 = 1 μF solid tantalum is required only if regulator is more than 4" from power-supply filter capacitor

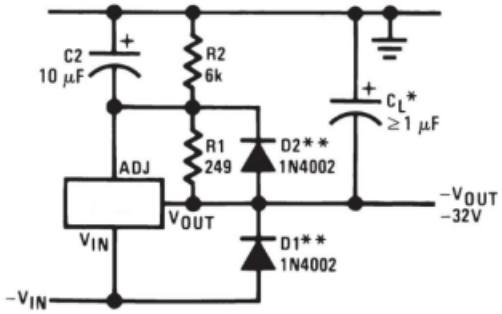
Output capacitors in the range of 1 μF to 1000 μF of aluminum or tantalum electrolytic are commonly used to provide improved output impedance and rejection of transients

–5.2V Regulator with Electronic Shutdown*



*Minimum output ≈ –1.3V when control input is low

Negative Regulator with Protection Diodes



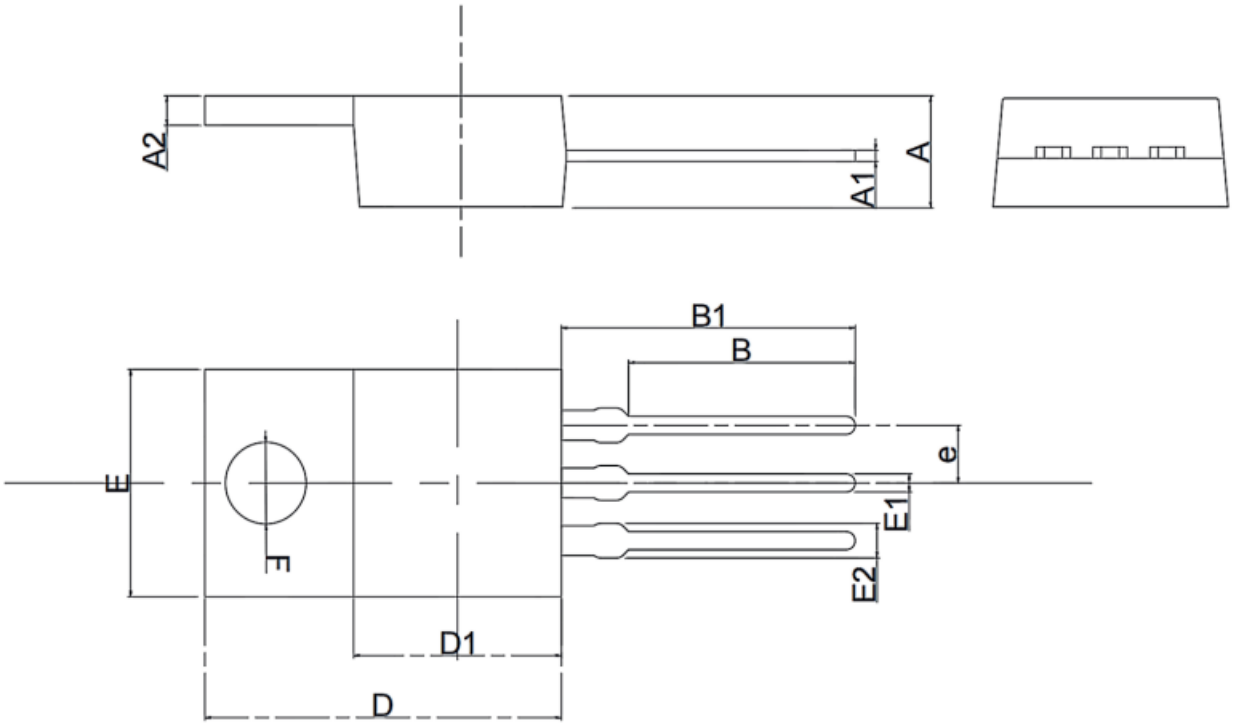
*When C_L is larger than 20 μF, D1 protects the LM137 in case the input supply is shorted

**When C2 is larger than 10 μF and $-V_{OUT}$ is larger than –25V, D2 protects the LM137 in case the output is shorted

Outline Dimensions

TO-220-3

Unit : mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.300	4.800	0.169	0.189
A1	0.340	0.600	0.013	0.023
A2	1.220	1.400	0.047	0.055
B	9.460	10.380	0.372	0.408
B1	12.880	13.760	0.507	0.541
D	14.410	15.900	0.567	0.626
D1	8.000	9.000	0.314	0.354
E	9.700	10.400	0.381	0.409
E1	0.700	0.900	0.027	0.036
E2	1.220	1.400	0.048	0.055
e	2.540 (BSC)		0.984 (BSC)	
F	Φ3.800	Φ3.900	Φ0.149	Φ0.153

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