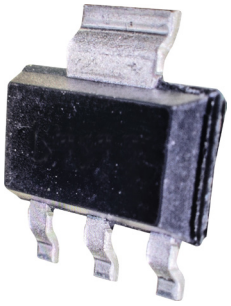
Negative Voltage Regulator
Adjustable 3 Terminal



RoHS Compliant

Description

This is an adjustable 3 terminal negative voltage regulator capable of supplying in excess of 1.5 A over an output voltage range of 1.2 V to 37 V. This voltage regulator is exceptionally easy to use and requires only two external resistors to set the output voltage. Further, it employs internal current limiting, thermal shutdown and safe area compensation, making it essentially blow out proof.

This serves a wide variety of applications including local, o n card regulation. This device can also be used to make a programmable output regulator, or by connecting a fixed resistor between the adjustment and output, this can be used as a precision current regulator.

Features

- Output Current in Excess of 1.5 A
- Output Adjustable between 1.2 V and 37 V
- Internal Thermal Overload Protection
- Internal Short Circuit Current Limiting Constant with Temperature
- Output Transistor Safe Area Compensation
- Floating Operation for High Voltage Applications
- Eliminates Stocking many Fixed Voltages

Maximum Ratings (TA = +25°C, unless otherwise noted)

Parameter	Symbol	Value	Unit
Input Output Voltage Differential	V_I V_O	40	Vdc
Power Dissipation T_A = +25°C Thermal Resistance, Junction to Ambient Thermal Resistance, Junction to Case	P_D θ_{JA} θ_{JC}	Internally Limited 65 5	W °C/W °C/W
Operating Junction Temperature Range	T_J	-40 to +125	°C
Storage Temperature Range	T_{stg}	-65 to +150	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

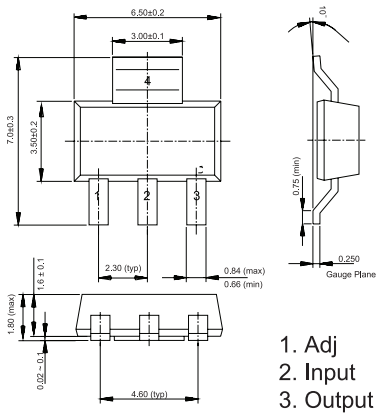
DC Electrical Characteristics ($|V_I\ V_O|$ = 5.0 V; Io = 0.5 A for T package; TJ = T_{low} to T_{high} [Note 1]; I_{max} and P_{max} [Note 2].)

Parameter Name	Figure	Symbol	Min	Typ	Max	Unit
Line Regulation (Note 3), T_A = +25°C, 3 V≤$\|V_I\ V_O\|$≤40V	1	Reg_{line}	--	0.01	0.04	%/V
Load Regulation (Note 3), T_A = +25°C, 10mA Io I_{max} $\|V_O\|$≤5V $\|V_O\|$≥5V	2	Reg_{load}	--	15 0.3	50 1	mV % Vo
Thermal Regulation, T_A = +25°C (Note 5), 10 ms Pulse		Reg_{therm}	--	0.003	0.04	% Vo/W
Adjustment Pin Current	3	I_{Adj}	--	65	100	µA
Adjustment Pin Current Change, 2.5V≤$\|V_I\ V_O\|$≤40 V, 10mA≤I_L≤I_{max}, P_D P_{max}, T_A = +25°C	1.2	ΔI_{Adj}	--	2	5	µA
Reference Voltage, T_A = +25°C, 3V≤$\|V_I\ V_O\|$≤40V, 10mA≤Io≤I_{max}, P_D P_{max}, T_J = T_{low} to T_{high}	3	V_{ref}	-1.213 -1.2	-1.250 -1.25	-1.287 -1.3	V
Line Regulation (Note 3), 3V≤$\|V_I\ V_O\|$≤40V	1	Reg_{line}	--	0.02	0.07	%/V
Load Regulation (Note 3), 10mA≤Io≤Imax $\|V_O\|$≤5V $\|V_O\|$≥5V	2	Reg_{load}	--	20 0.3	70 1.5	mV % Vo
Temperature Stability (T_{low}≤T_J≤T_{high})	3	Ts	--	0.6	--	% Vo
Minimum Load Current to Maintain Regulation ($\|V_I\ V_O\|$ 10V) ($\|V_I\ V_O\|$ 40V)	3	I_{Lmin}	--	1.5 2.5	6 10	mA
Maximum Output Current $\|V_I\ V_O\|$≤15V, P_D≤P_{max}, T Package $\|V_I\ V_O\|$≤40V, PD≤Pmax, T_J = +25°C, T Package	3	I_{max}	--	1.5 0.15	2.2 0.4	A
RMS Noise, % of Vo, T_A = +25°C, 10 Hz≤f≤10 kHz		N	--	0.003	--	% Vo
Ripple Rejection, Vo = -10V, f = 120 Hz (Note 4) Without C_{Adj} C_{Adj} = 10 µF	4	RR	-- 6	60 77	-- --	dB
Long Term Stability, T_J = T_{high} (Note 6), T_A = +25°C for Endpoint Measurements	3	S	--	0.3	1	%/1k Hrs.
Thermal Resistance, Junction to Case, T Package		$R_{\theta JC}$	--	4	--	°C/W

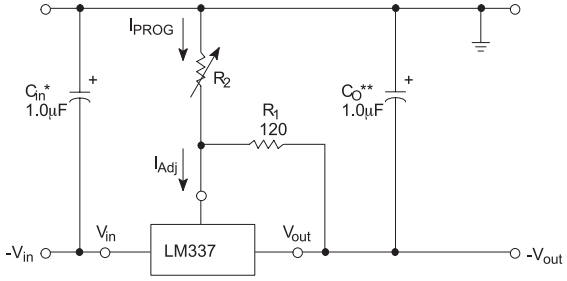
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. T_{low} to T_{high} = 0° to +125°C, for LM337. T_{low} to T_{high} = 40° to +125°C, for LM337B.
2. I_{max} = 1.5 A, P_{max} = 20 W
3. Load and line regulation are specified at constant junction temperature. Change in Vo because of heating effects is covered under the Thermal Regulation specification. Pulse testing with a low duty cycle is used.
4. C_{Adj}, when used, is connected between the adjustment pin and ground.
5. Power dissipation within an IC voltage regulator produces a temperature gradient on the die, affecting individual IC components on the die. These effects can be minimized by proper integrated circuit design and layout techniques. Thermal Regulation is the effect of these temperature gradients on the output voltage and is expressed in percentage of output change per watt of power change in a specified time.
6. Since Long Term Stability cannot be measured on each device before shipment, this specification is an engineering estimate of average

Diagram



1. Adj
2. Input
3. Output



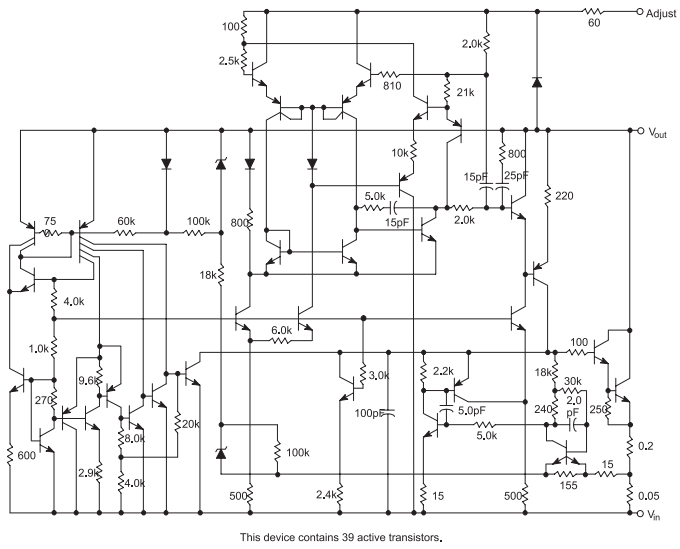
*C_{in} is required if regulator is located more than 4 inches from power supply filter. A 1.0µF solid tantalum or 10µF aluminum electrolytic is recommended.

**C_O is necessary for stability. A 1.0 µF solid tantalum or 10 µF aluminum electrolytic is recommended.

$$V_{out} = -1.25\,V\left(1 + \frac{R_2}{R_1}\right)$$

Figure 1. Standard Application

Representative Schematic Diagram



This device contains 39 active transistors.

Dimensions : Millimetres

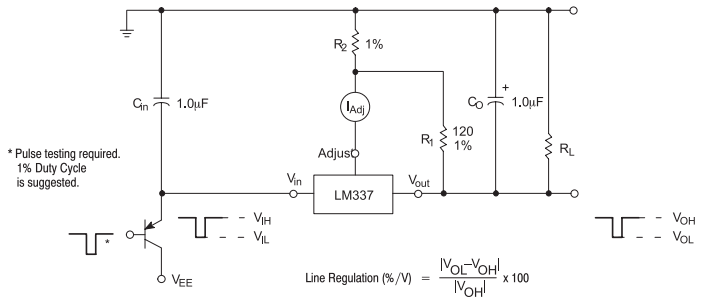


Figure 1. Line Regulation and ΔI_{Adj}/Line Test Circuit

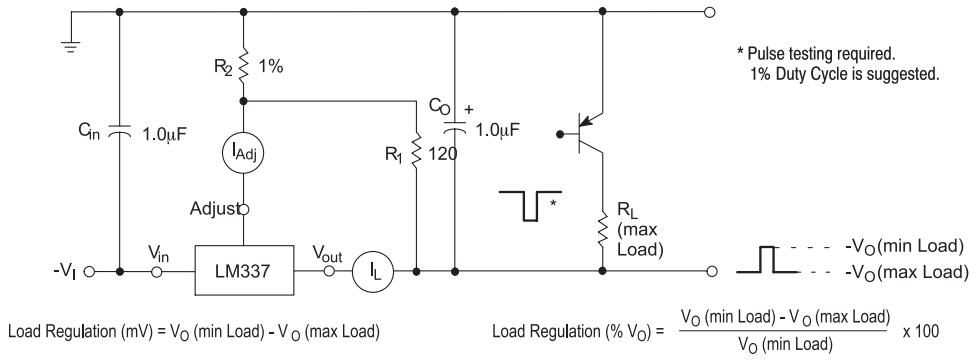


Figure 2. Load Regulation and ΔI_{Adj}/Load Test Circuit

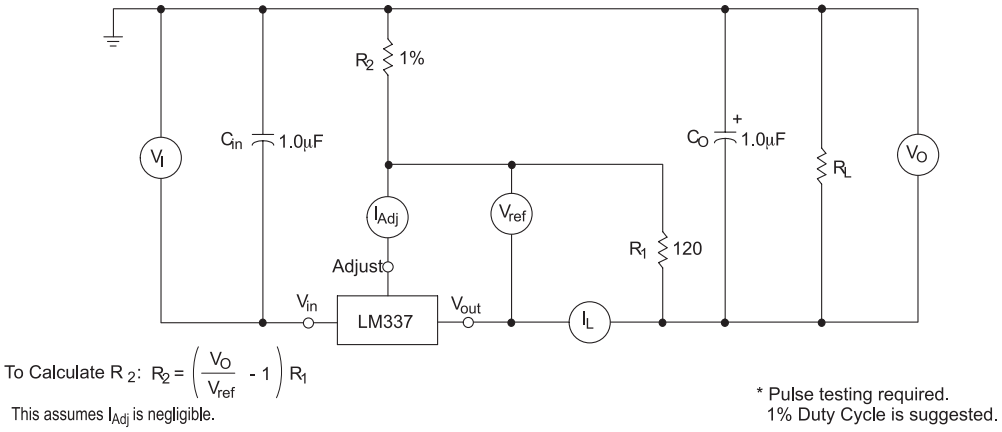


Figure 3. Standard Test Circuit

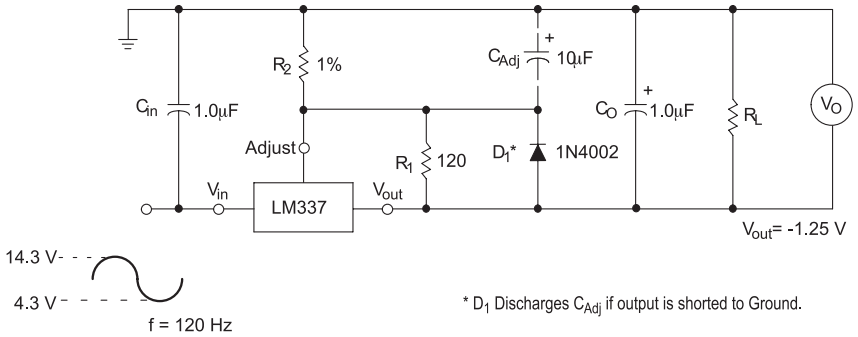


Figure 4. Ripple Rejection Test Circuit

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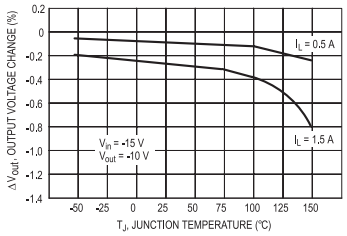

Figure 5. Load Regulation

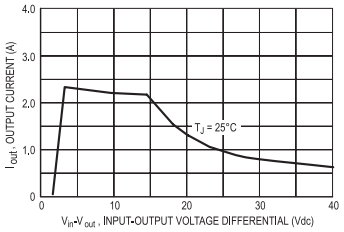

Figure 6. Current Limit

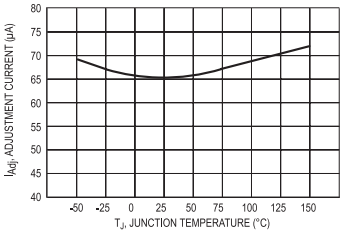

Figure 7. Adjustment Pin Current

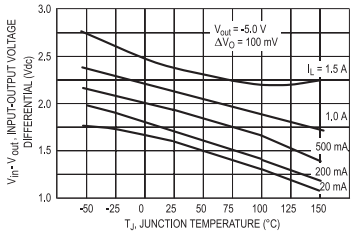

Figure 8. Dropout Voltage

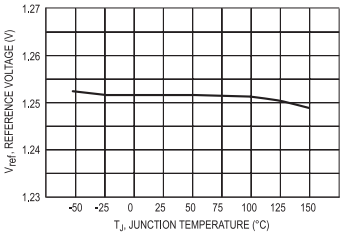

Figure 9. Temperature Stability

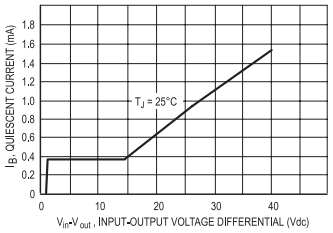

Figure 10. Minimum Operating Current

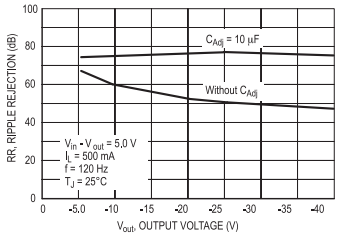

Figure 11. Ripple Rejection versus Output Voltage

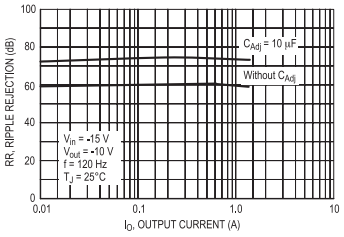

Figure 12. Ripple Rejection versus Output Current

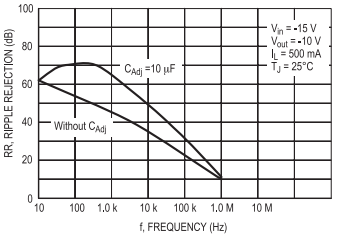

Figure 13. Ripple Rejection versus Frequency

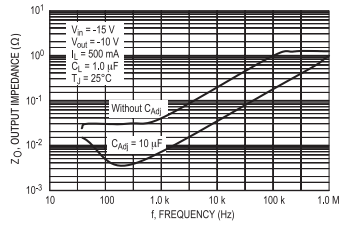

Figure 14. Output Impedance

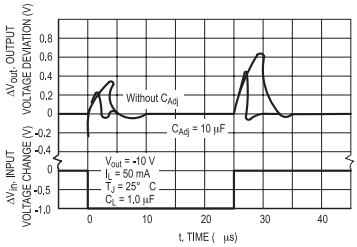

Figure 15. Line Transient Response

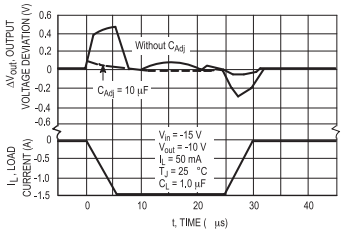

Figure 16. Load Transient Response

Part Number Table

Description	Part Number
Negative Voltage Regulator, 1.2V to 37V, 1.5A, SO-223	LM337