

Negative Voltage Regulator Adjustable 3 Terminal

multicomp^{PRO}

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, on 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 -1.2V and -37V
- 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)

Rating	Symbol	Value	Unit
Input Output Voltage Differential	V _I V _O	40	Vdc
Power Dissipation T _A = +25°C	P _D	Internally Limited	W
Thermal Resistance, Junction to Ambient	θ _{JA}	65	°C/W
Thermal Resistance, Junction to Case	θ _{JC}	5	°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.

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DC Electrical Characteristics ($|V_i V_o| = 5.0\text{ V}$; $I_o = 0.5\text{ A}$ for T package; $T_J = T_{low}$ to T_{high} [Note 1]; I_{max} and P_{max} [Note 2].)

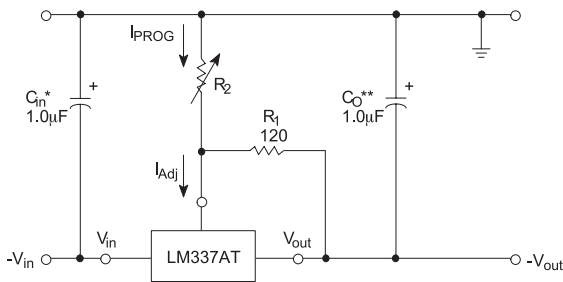
Characteristics	Figure	Symbol	Min	Typ	Max	Unit
Line Regulation (Note 3), $T_A = +25^\circ\text{C}$, $3\text{V} \leq V_i V_o \leq 40\text{V}$	1	Reg_{line}		0.01	0.04	%/V
Load Regulation (Note 3), $T_A = +25^\circ\text{C}$, $10\text{mA} \leq I_o \leq I_{max}$ $ V_o \leq 5\text{V}$ $ V_o \geq 5\text{V}$	2	Reg_{load}		15 0.3	50 1	mV % V_o
Thermal Regulation, $T_A = +25^\circ\text{C}$ (Note 5), 10 ms Pulse		Reg_{therm}		0.003	0.04	% V_o/W
Adjustment Pin Current	3	I_{Adj}		65	100	μA
Adjustment Pin Current Change, $2.5\text{V} \leq V_i V_o \leq 40\text{V}$, $10\text{mA} \leq I_o \leq I_{max}$, $P_D \leq P_{max}$, $T_A = +25^\circ\text{C}$	1.2	ΔI_{Adj}		2	5	
Reference Voltage, $T_A = +25^\circ\text{C}$, $3\text{V} \leq V_i V_o \leq 40\text{V}$, $10\text{mA} \leq I_o \leq I_{max}$, $P_D \leq P_{max}$, $T_J = T_{low}$ to T_{high}	3	V_{ref}	-1.213 -1.2	-1.250 -1.25	-1.287 -1.3	V
Line Regulation (Note 3), $3\text{V} \leq V_i V_o \leq 40\text{V}$	1	Reg_{line}		0.02	0.07	%/V
Load Regulation (Note 3), $10\text{mA} \leq I_o \leq I_{max}$ $ V_o \leq 5\text{V}$ $ V_o \geq 5\text{V}$	2	Reg_{load}		20 0.3	70 1.5	mV % V_o
Temperature Stability ($T_{low} \leq T_J \leq T_{high}$)	3	T_s		0.6	--	% V_o
Minimum Load Current to Maintain Regulation ($ V_i V_o 10\text{V}$) ($ V_i V_o 40\text{V}$)	3	I_{Lmin}		1.5 2.5	6 10	mA
Maximum Output Current $ V_i V_o \leq 15\text{V}$, $P_D \leq P_{max}$, T Package $ V_i V_o \leq 40\text{V}$, $P_D \leq P_{max}$, $T_J = +25^\circ\text{C}$, T Package	3	I_{max}		1.5 0.15	2.2 0.4	A
RMS Noise, % of V_o , $T_A = +25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 10\text{ kHz}$		N		0.003	--	% V_o
Ripple Rejection, $V_o = -10\text{V}$, $f = 120\text{ Hz}$ (Note 4) Without C_{Adj} $C_{Adj} = 10\ \mu\text{F}$	4	RR	-- 66	60 77	-- --	dB
Long Term Stability, $T_J = T_{high}$ (Note 6), $T_A = +25^\circ\text{C}$ for Endpoint Measurements	3	S		0.3	1	%/1k Hrs.
Thermal Resistance, Junction to Case, T Package		$R_{\theta JC}$		4	--	$^\circ\text{C/W}$

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.

- T_{low} to $T_{high} = 0^\circ$ to $+125^\circ\text{C}$, for LM337. T_{low} to $T_{high} = 40^\circ$ to $+125^\circ\text{C}$, for LM337B.
- $I_{max} = 1.5\text{ A}$, $P_{max} = 20\text{ W}$
- Load and line regulation are specified at constant junction temperature. Change in V_o because of heating effects is covered under the Thermal Regulation specification. Pulse testing with a low duty cycle is used.
- C_{Adj} , when used, is connected between the adjustment pin and ground.
- 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.
- Since Long Term Stability cannot be measured on each device before shipment, this specification is an engineering estimate of average

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*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.

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

Dimensions : Millimetres

Figure 1. Standard Application

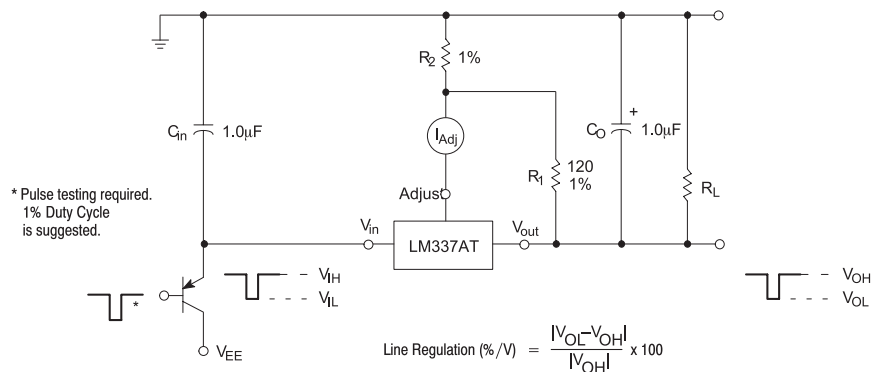
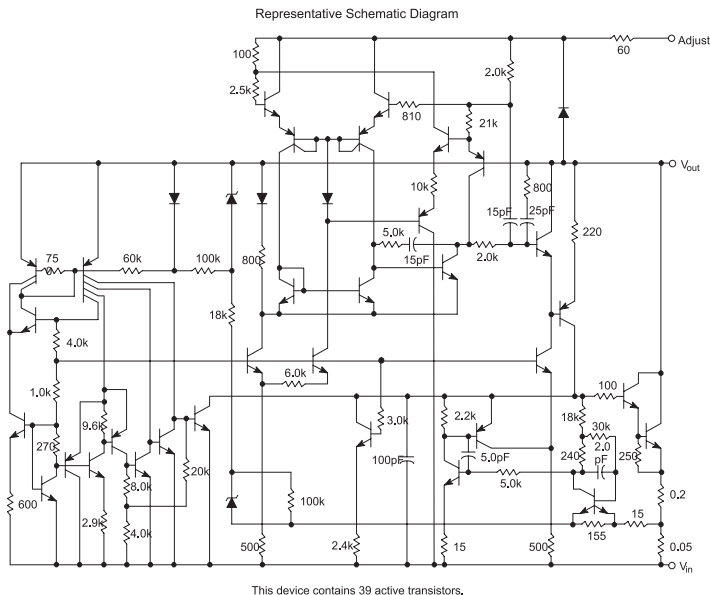


Figure 1. Line Regulation and ΔI_{Adj} /Line Test Circuit

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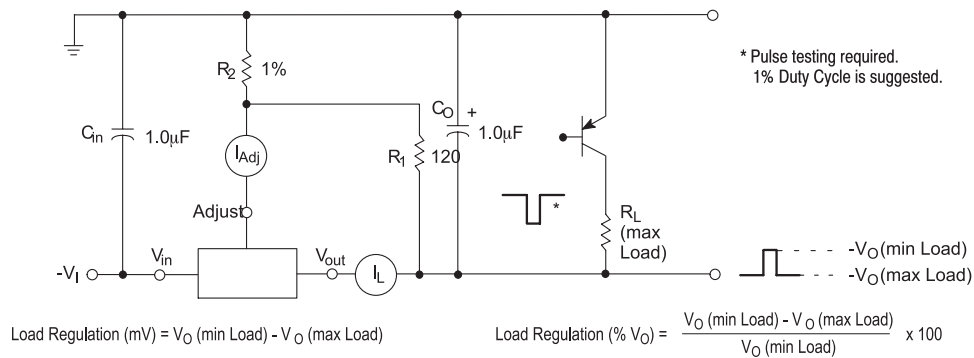


Figure 2. Load Regulation and ΔI_{Adj} /Load Test Circuit

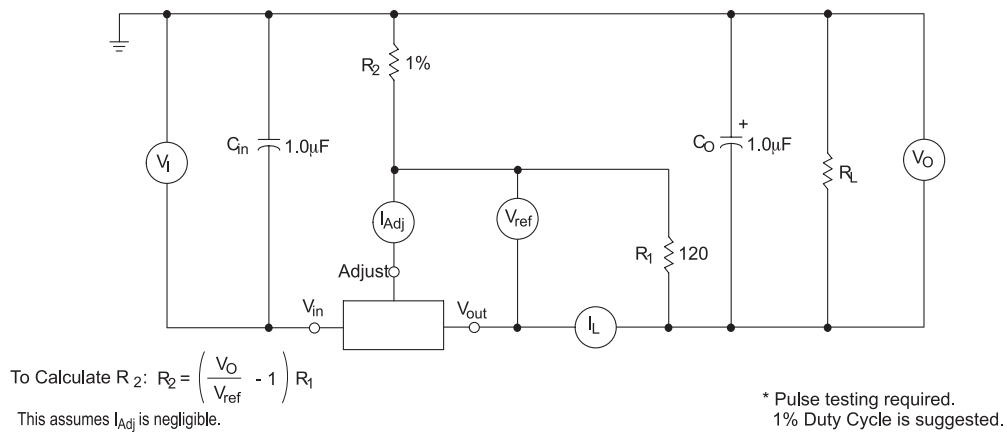


Figure 3. Standard Test Circuit

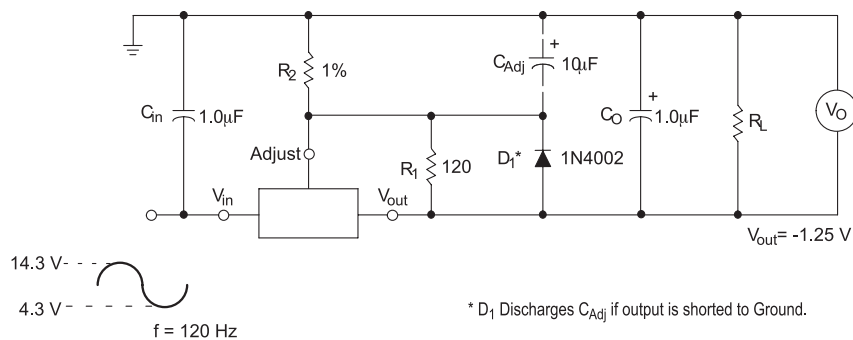


Figure 4. Ripple Rejection Test Circuit

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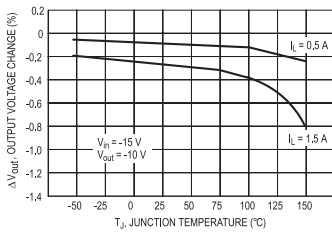


Figure 5. Load Regulation

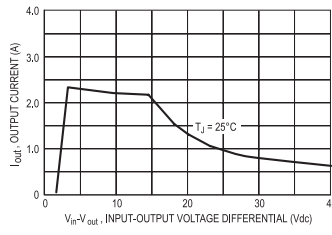


Figure 6. Current Limit

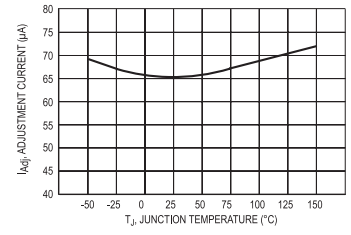


Figure 7. Adjustment Pin Current

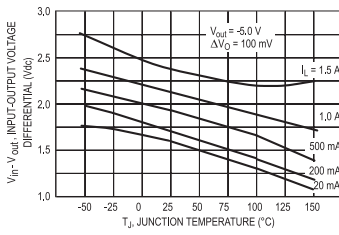


Figure 8. Dropout Voltage

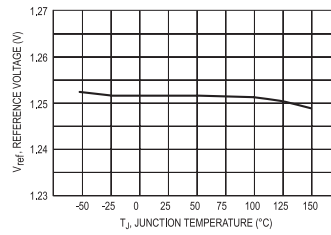


Figure 9. Temperature Stability

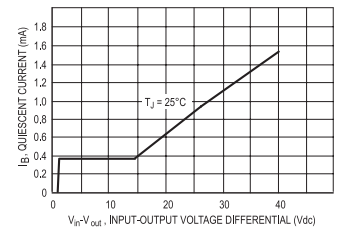


Figure 10. Minimum Operating Current

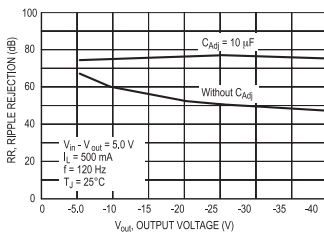


Figure 11. Ripple Rejection versus Output Voltage

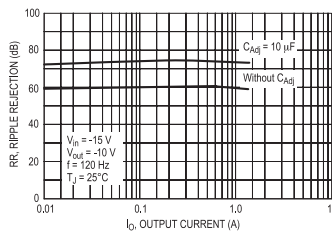


Figure 12. Ripple Rejection versus Output Current

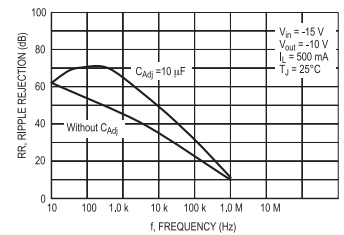


Figure 13. Ripple Rejection versus Frequency

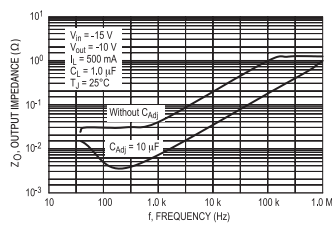


Figure 14. Output Impedance

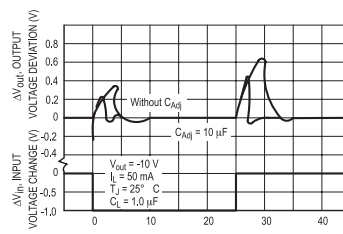


Figure 15. Line Transient Response

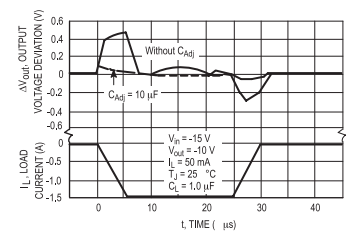


Figure 16. Load Transient Response

Part Number Table

Description	Part Number
Negative Voltage Regulator, -1.2V to -35V, 1.5A, TO-220	LM337AT

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