



September 2014

# KA337 / LM337

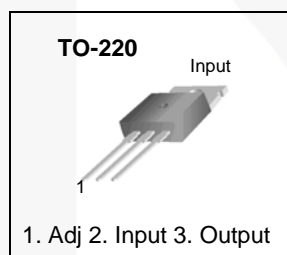
## 3-Terminal 1.5 A Negative Adjustable Regulator

### Features

- Output-Current in Excess of 1.5 A
- Output-Adjustable Between -1.25 V and -37 V
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limiting
- Output-Transistor Safe Area Compensation
- Floating Operation for High-Voltage Applications
- Standard 3-Pin TO-220 Package

### Description

The KA337 / LM337 are 3-terminal negative adjustable regulators. They supply in excess of 1.5 A over an output voltage range of -1.25 V to -37 V. These regulators require only two external resistors to set the output voltage and employ current limiting, thermal overload protection, and safe area compensation.



### Ordering Information

Product Number	Package	Packing Method	Operating Temperature
KA337TU	TO-220 (Dual Gauge)	Rail	0°C to +125°C
LM337T	TO-220 (Single Gauge)		

### Block Diagram

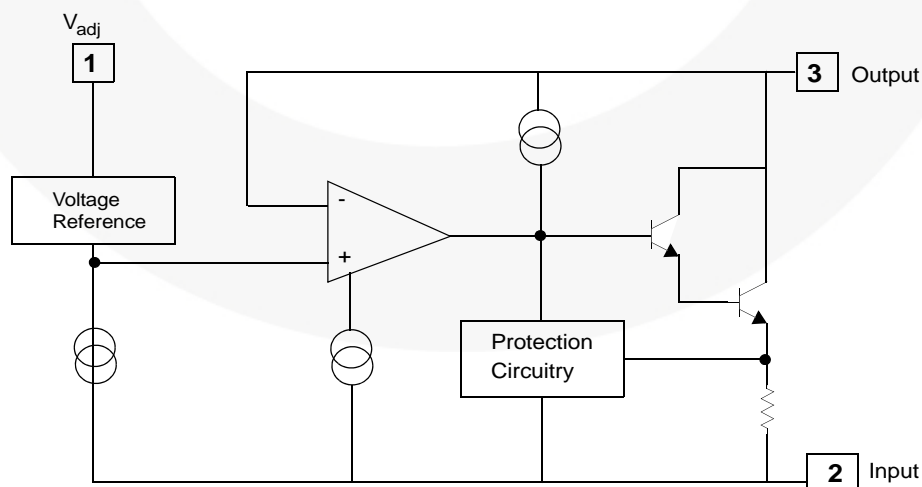


Figure 1. Block Diagram

## Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Value	Unit
$ V_I - V_O $	Input-Output Voltage Differential	40	V
$P_D$	Power Dissipation	Internally Limited	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	4	$^\circ\text{C}/\text{W}$
$T_{OPR}$	Operating Temperature Range	0 to +125	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-65 to +125	$^\circ\text{C}$

## Electrical Characteristics

$V_I - V_O = 5\text{ V}$ ,  $I_O = 40\text{ mA}$ ,  $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$ ,  $P_{D\text{MAX}} = 20\text{ W}$ ; unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{line}$	Line Regulation <sup>(1)</sup>	$T_A = +25^\circ\text{C}$ , $3\text{ V} \leq  V_I - V_O  \leq 40\text{ V}$		0.01	0.04	% / V
		$3\text{ V} \leq  V_I - V_O  \leq 40\text{ V}$		0.02	0.07	
$R_{load}$	Load Regulation <sup>(1)</sup>	$T_A = +25^\circ\text{C}$ , $10\text{ mA} \leq I_O \leq 0.5\text{ A}$		15	50	mV
		$10\text{ mA} \leq I_O \leq 1.5\text{ A}$		15	150	
$I_{ADJ}$	Adjustable Pin Current			50	100	$\mu\text{A}$
$\Delta I_{ADJ}$	Adjustable Pin Current Change	$T_A = +25^\circ\text{C}$ , $10\text{ mA} \leq I_O \leq 1.5\text{ A}$ , $3\text{ V} \leq  V_I - V_O  \leq 40\text{ V}$		2	5	$\mu\text{A}$
$V_{REF}$	Reference Voltage	$T_A = +25^\circ\text{C}$	-1.213	-1.250	-1.287	V
		$3\text{ V} \leq  V_I - V_O  \leq 40\text{ V}$ , $10\text{ mA} \leq I_O \leq 1.5\text{ A}$	-1.200	-1.250	-1.300	
$ST_T$	Temperature Stability	$0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$		0.6		%
$I_{L(MIN)}$	Minimum Load Current to Maintain Regulation	$3\text{ V} \leq  V_I - V_O  \leq 40\text{ V}$		2.5	10.0	mA
		$3\text{ V} \leq  V_I - V_O  \leq 10\text{ V}$		1.5	6.0	
$e_N$	RMS Noise, % of $V_{OUT}$	$T_A = +25^\circ\text{C}$ , $10\text{ Hz} \leq f \leq 10\text{ kHz}$		0.003		%
RR	Ripple Rejection Ratio	$V_O = -10\text{ V}$ , $f = 120\text{ Hz}$		60		dB
		$C_{ADJ} = 10\text{ }\mu\text{F}^{(2)}$	66	77		
ST	Long-Term Stability	$T_J = 125^\circ\text{C}$ , 1000 Hours		0.3	1.0	%

### Notes:

- Load and line regulation are specified at constant junction temperature. Change in  $V_O$  due to heating effects must be taken into account separately. Pulse testing with low duty is used.
- $C_{ADJ}$ , when used, is connected between the adjustment pin and ground.

## Typical Performance Characteristics

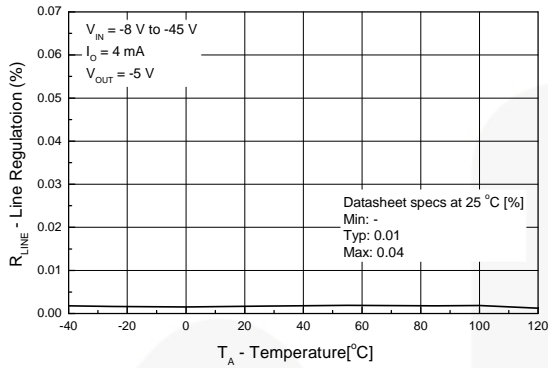


Figure 2. Line Regulation vs. Temperature

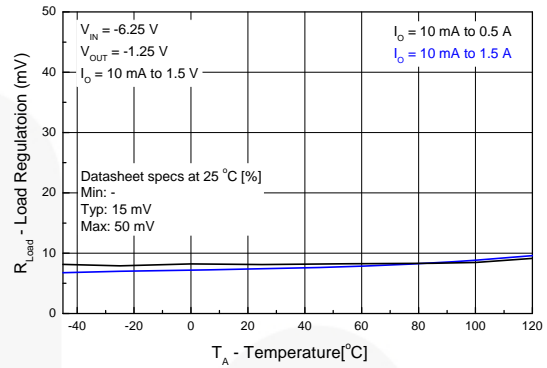


Figure 3. Load Regulations vs. Temperature

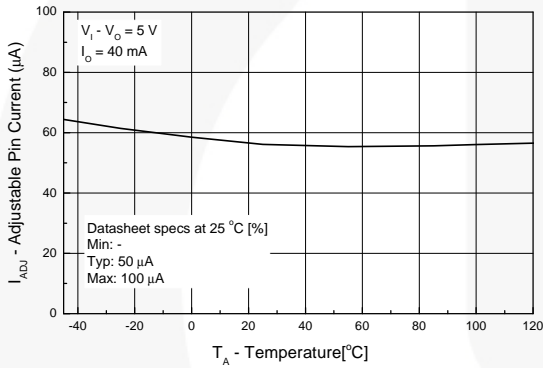


Figure 4. Adjustable Pin Current vs. Temperature

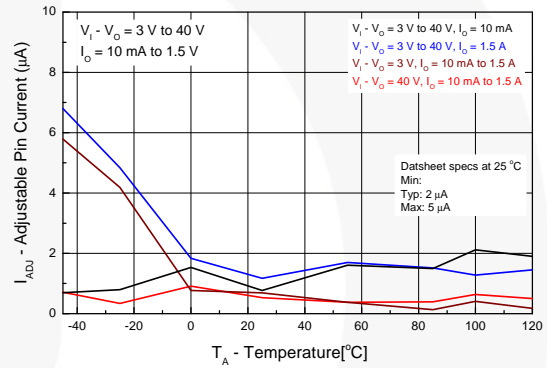


Figure 5. Adjustable Pin Current Change vs. Temperature

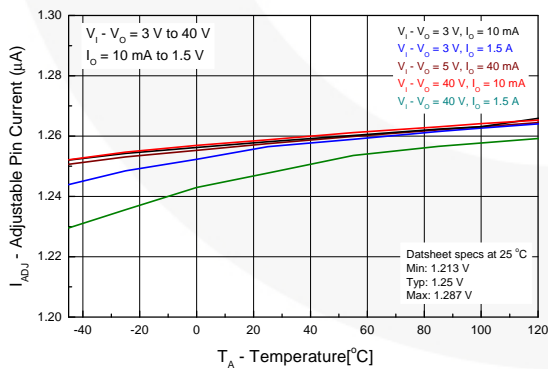


Figure 6. Reference Voltage vs. Temperature

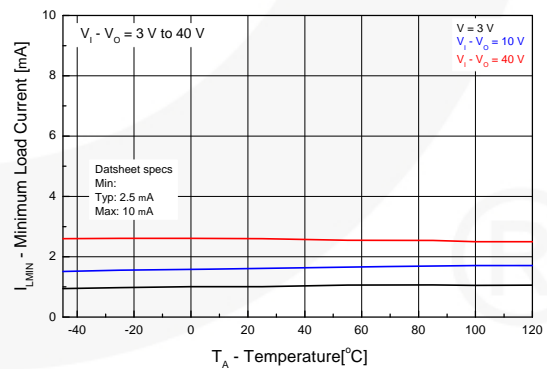


Figure 7. Minimum Load Current vs. Temperature

## Typical Performance Characteristics

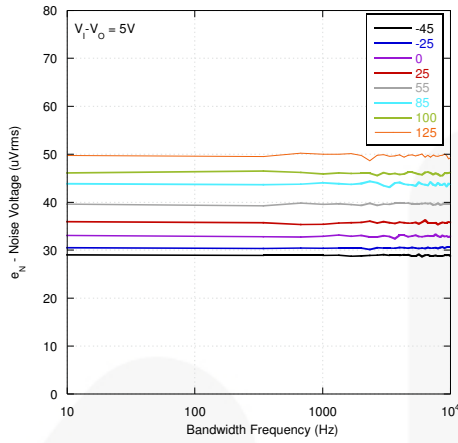


Figure 8. Noise Voltage vs. Temperature

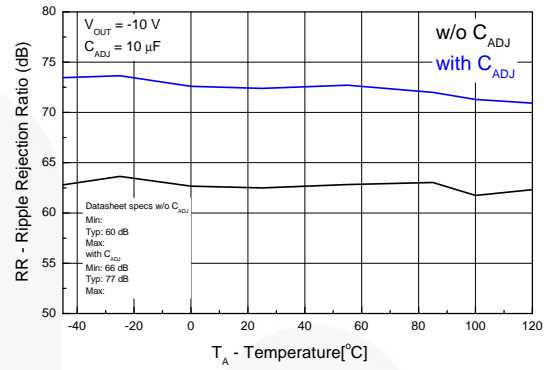


Figure 9. Ripple Rejection vs. Temperature

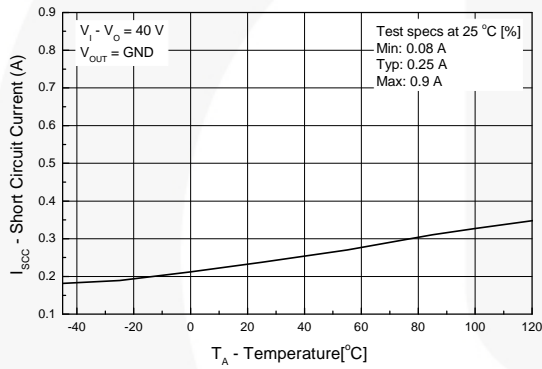


Figure 10. Short-Circuit Currents vs. Temperature

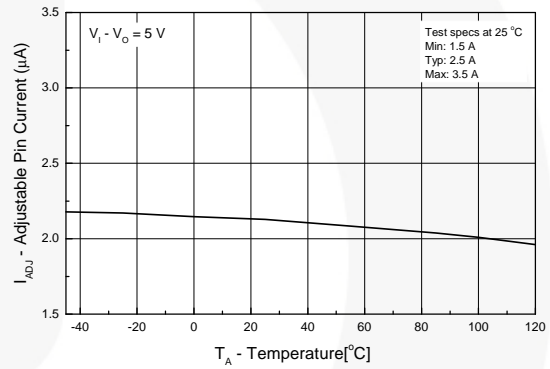


Figure 11. Peak Current vs. Temperature

## Typical Application

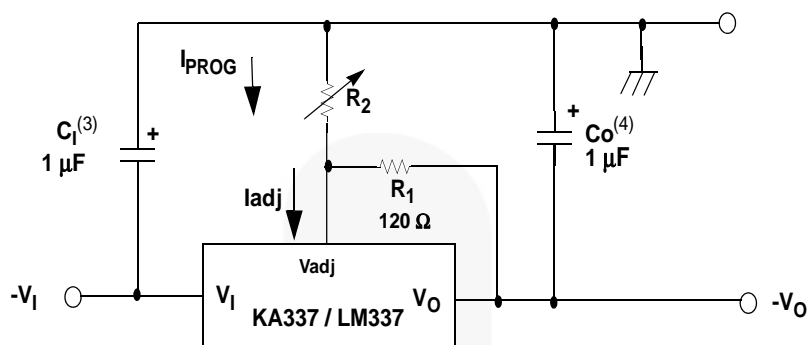
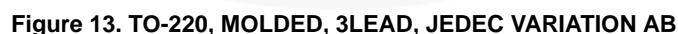


Figure 12. Typical Application

### Notes:

3.  $C_I$  is required if regulator is located more than 4 inches from power supply filter.  
1.0  $\mu\text{F}$  solid tantalum or 10  $\mu\text{F}$  aluminum electrolytic is recommended.
4.  $C_O$  is necessary for stability. 1.0  $\mu\text{F}$  solid tantalum or 10  $\mu\text{F}$  aluminum electrolytic is recommended.  
 $V_O = -1.25 \text{ V} (1 + R_2 / R_1)$ .





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