

## FEATURES

- 50V Operation
- *Guaranteed* 1% Initial Voltage Tolerance
- *Guaranteed* 0.01%/V Line Regulation
- *Guaranteed* 0.5% Load Regulation
- *Guaranteed* 0.02%/W Thermal Regulation
- 100% Burn-in in Thermal Limit

## APPLICATIONS

- Adjustable Power Supplies
- System Power Supplies
- Precision Voltage/Current Regulators
- On-Card Regulators

## DESCRIPTION

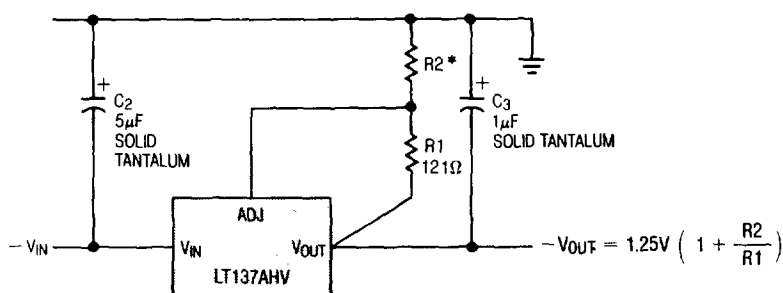
The LT137AHV/LM137HV negative high voltage adjustable regulators will deliver up to 1.5 Amps output current over an output voltage range of  $-1.2V$  to  $-47V$ . Linear Technology has made significant improvements in these regulators compared to previous devices, such as better line and load regulation, and a maximum output voltage error of 1% for the LT137AHV and LT337AHV.

Every effort has been made to make these devices easy to use and difficult to damage. Internal current and power limiting coupled with true thermal limiting prevents device damage due to overloads or shorts, even if the regulator is not fastened to a heat sink.

Maximum reliability is attained with Linear Technology's advanced processing techniques combined with a 100% burn-in in the thermal limit mode. This assures that all device protection circuits are working and eliminates field failures experienced with other regulators that receive only standard electrical testing. For performance curves and applications circuits see the LT137A series data sheet.

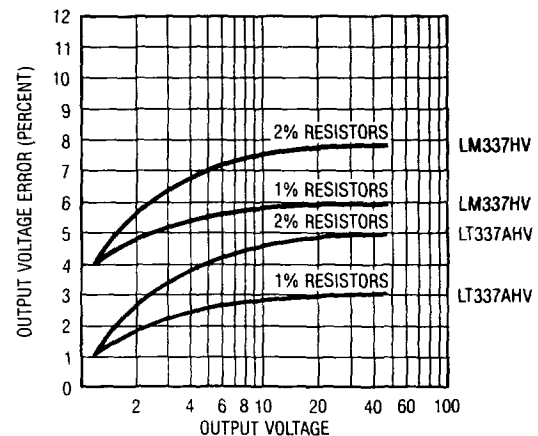
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Negative Regulator



$$* R2 = R1 \left( \frac{|V_{OUT}|}{1.25V} - 1 \right)$$

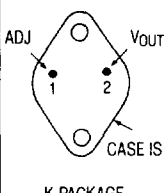
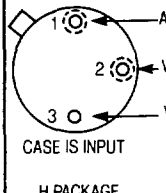
Worst Case Output Voltage  
 Error @  $T_J = 25^\circ C$



## ABSOLUTE MAXIMUM RATINGS

Power Dissipation . . . . .	Internally Limited
Input to Output Voltage Differential . . . . .	50V
Operating Junction Temperature Range	
LT137AHV/LM137HV . . . . .	-55°C to 150°C
LT337AHV/LM337HV . . . . .	0°C to 125°C
Storage Temperature Range	
LT137AHV/LM137HV . . . . .	-65°C to 150°C
LT337AHV/LM337HV . . . . .	-65°C to 150°C
Lead Temperature (Soldering, 10 sec.) . . . . .	300°C

## PACKAGE/ORDER INFORMATION

BOTTOM VIEW  K PACKAGE	ORDER PART NO. LT137AHVK LT337AHVK LM137HVK LM337HVK	BOTTOM VIEW  H PACKAGE	ORDER PART NO. LT137AHVH LT337AHVH LM137HVH LM337HVH
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## PRECONDITIONING

100% THERMAL LIMIT BURN-IN

## ELECTRICAL CHARACTERISTICS (See Note 1)

SYMBOL	PARAMETER	CONDITIONS	LT137AHV			LM137HV			UNITS	
			MIN	TYP	MAX	MIN	TYP	MAX		
$V_{REF}$	Reference Voltage	$ V_{IN} - V_{OUT}  = 5V, I_{OUT} = 10mA, T_j = 25^\circ C$	-1.238	-1.250	-1.262	-1.225	-1.250	-1.275	V	
		$3V \leq  V_{IN} - V_{OUT}  \leq 50V, 10mA \leq I_{OUT} \leq I_{MAX}, P \leq P_{MAX}$	-1.220	-1.250	-1.280	-1.200	-1.250	-1.300	V	
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	Load Regulation	$10mA \leq I_{OUT} \leq I_{MAX}, (See\ Note\ 2), T_j = 25^\circ C,  V_{OUT}  \leq 5V$		5	25		15	25	mV	
		$T_j = 25^\circ C,  V_{OUT}  \geq 5V$		0.1	0.5		0.3	0.5	%	
		$ V_{OUT}  \leq 5V$	●	10	50		20	50	mV	
		$ V_{OUT}  \geq 5V$	●	0.2	1.0		0.3	1.0	%	
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	Line Regulation	$3V \leq  V_{IN} - V_{OUT}  \leq 50V (See\ Note\ 2), T_j = 25^\circ C$		0.005	0.01		0.01	0.02	%/V	
			●	0.01	0.03		0.02	0.05	%/V	
	Ripple Rejection	$V_{OUT} = -10V, f = 120Hz, C_{ADJ} = 0, C_{ADJ} = 10\mu F$	●	70	80	66	60	77	dB	
	Thermal Regulation	$T_j = 25^\circ C, T = 2ms\ to\ 12ms$		0.002	0.02		0.002	0.02	%/W	
$I_{ADJ}$	Adjust Pin Current		●	65	100		65	100	$\mu A$	
$\Delta I_{ADJ}$	Adjust Pin Current Change	$10mA \leq I_{OUT} \leq I_{MAX}, 2.5V \leq  V_{IN} - V_{OUT}  \leq 50V$	●	0.2	2		0.5	5	$\mu A$	
			●	2	6		3	6	$\mu A$	
	Minimum Load Current	$ V_{IN} - V_{OUT}  \leq 50V,  V_{IN} - V_{OUT}  \leq 10V$	●	2.5	5.0		2.5	5.0	mA	
$I_{SC}$	Current Limit	$ V_{IN} - V_{OUT}  \leq 13V$	●	1.5	2.2	3.2	1.5	2.2	3.2	A
		K Package	●	0.5	0.8	1.6	0.5	0.8	1.6	A
		$ V_{IN} - V_{OUT}  = 50V$		0.2	0.4	0.8	0.2	0.4	0.8	A
		K Package		0.1	0.17	0.5	0.1	0.17	0.5	A
		H Package							A	
$\frac{\Delta V_{OUT}}{\Delta Temp}$	Temperature Stability of Output Voltage (Note 3)	$T_{MIN} \leq T \leq T_{MAX}$	●	0.6	1.5		0.6		%	
$\frac{\Delta V_{OUT}}{\Delta Time}$	Long Term Stability	$T_A = 125^\circ C, 1000\ Hours$		0.3	1.0		0.3	1.0	%	
$e_n$	RMS Output Noise (% of $V_{OUT}$ )	$T_A = 25^\circ C, 10Hz \leq f \leq 10kHz$		0.003			0.003		%	
$\theta_{JC}$	Thermal Resistance Junction to Case	H Package		12	15		12	15	$^\circ C/W$	
		K Package		2.3	3.0		2.3	3.0	$^\circ C/W$	

**ELECTRICAL CHARACTERISTICS** (See Note 1)

SYMBOL	PARAMETER	CONDITIONS	LT337AHV			LM337HV			UNITS	
			MIN	TYP	MAX	MIN	TYP	MAX		
V <sub>REF</sub>	Reference Voltage	$ V_{IN} - V_{OUT}  = 5V, I_{OUT} = 10mA, T_j = 25^\circ C$	-1.238	-1.250	-1.262	-1.213	-1.250	-1.287	V	
		$3V \leq  V_{IN} - V_{OUT}  \leq 50V, 10mA \leq I_{OUT} \leq I_{MAX}, P \leq P_{MAX}$	-1.220	-1.250	-1.280	-1.200	-1.250	-1.300	V	
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	Load Regulation	$10mA \leq I_{OUT} \leq I_{MAX}$ (See Note 2) $T_j = 25^\circ C,  V_{OUT}  \leq 5V$		5	25		15	50	mV	
		$T_j = 25^\circ C,  V_{OUT}  \geq 5V$		0.1	0.5		0.3	1.0	%	
		$ V_{OUT}  \leq 5V$	●	10	50		20	70	mV	
		$ V_{OUT}  \geq 5V$	●	0.2	1.0		0.3	1.5	%	
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	Line Regulation	$3V \leq  V_{IN} - V_{OUT}  \leq 50V$ (See Note 2) $T_j = 25^\circ C$		0.005	0.01		0.01	0.04	%/V	
			●	0.01	0.03		0.02	0.07	%/V	
	Ripple Rejection	$V_{OUT} = -10V, f = 120Hz, C_{ADJ} = 0, C_{ADJ} = 10\mu F$	●	70	80	66	60	77	dB dB	
	Thermal Regulation	$T_j = 25^\circ C, T = 2ms \text{ to } 12ms$		0.002	0.04		0.003	0.04	%/W	
I <sub>ADJ</sub>	Adjust Pin Current		●	65	100		65	100	$\mu A$	
$\Delta I_{ADJ}$	Adjust Pin Current Change	$10mA \leq I_{OUT} \leq I_{MAX}, 2.5V \leq  V_{IN} - V_{OUT}  \leq 50V$	●	0.2	2		2	5	$\mu A$	
			●	2	6		3	6	$\mu A$	
	Minimum Load Current	$ V_{IN} - V_{OUT}  \leq 40V,  V_{IN} - V_{OUT}  \leq 10V$	●	2.5	5		2.5	10	mA	
I <sub>SC</sub>	Current Limit	$ V_{IN} - V_{OUT}  \leq 13V$ K Package	●	1.5	2.2	3.5	1.5	2.2	3.5	A
		H Package	●	0.5	0.8	1.8	0.5	0.8	1.8	A
		$ V_{IN} - V_{OUT}  = 50V$ K Package		0.1	0.4	0.8	0.1	0.4	0.8	A
		H Package		0.05	0.17	0.5	0.05	0.17	0.5	A
$\frac{\Delta V_{OUT}}{\Delta Temp}$	Temperature Stability of Output Voltage (Note 3)		●	0.6	1.5		0.6		%	
$\frac{\Delta V_{OUT}}{\Delta Time}$	Long Term Stability	$T_A = 125^\circ C, 1000 \text{ Hours}$		0.3	1.0		0.3	1.0	%	
e <sub>n</sub>	RMS Output Noise (% of V <sub>OUT</sub> )	$T_A = 25^\circ C, 10Hz \leq f \leq 10kHz$		0.003			0.003		%	
$\theta_{JC}$	Thermal Resistance Junction to Case	H Package		12	15		12	15	$^\circ C/W$	
		K Package		2.3	3.0		2.3	3.0	$^\circ C/W$	

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The ● denotes the specifications which apply over the full operating temperature range.

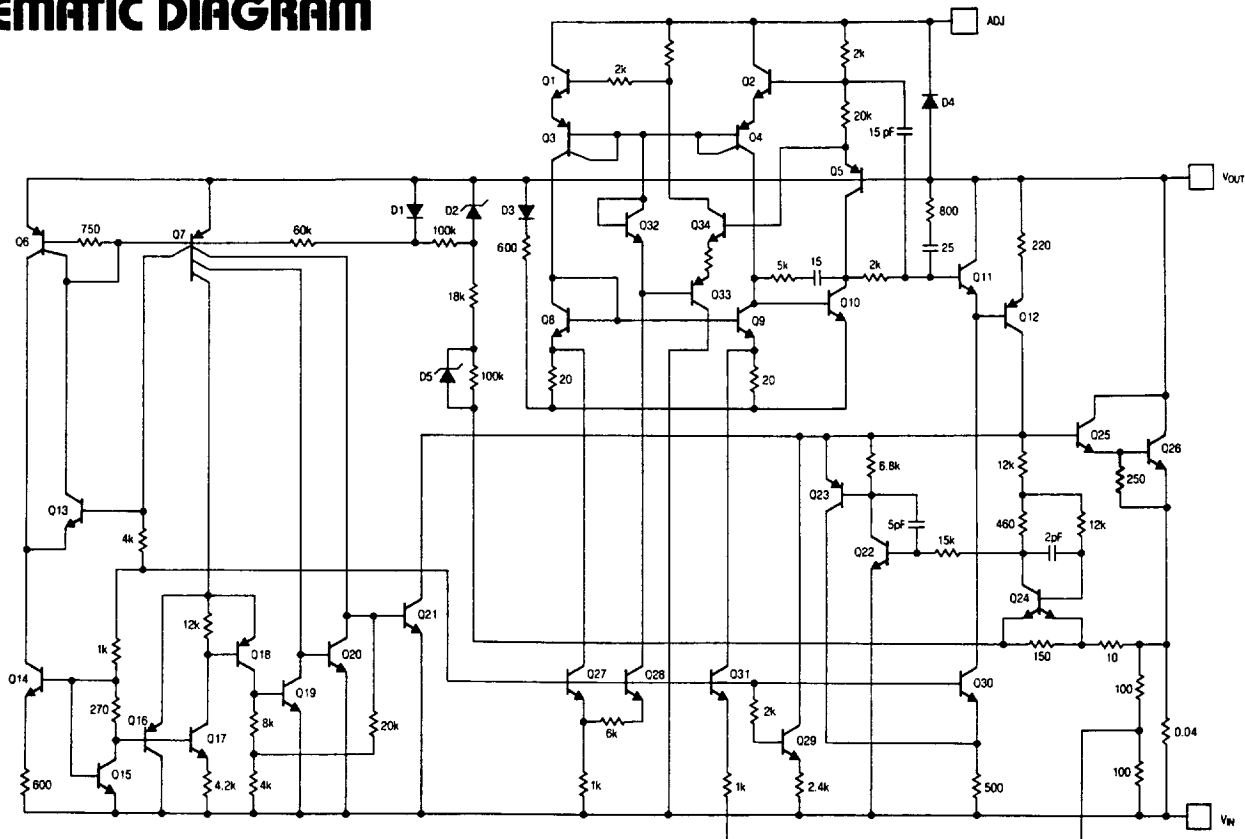
The shaded electrical specifications indicate those parameters which have been improved or guaranteed test limits provided for the first time.

**Note 1:** Unless otherwise indicated, these specifications apply:  $|V_{IN} - V_{OUT}| = 5V$ ; and  $I_{OUT} = 0.1A$  for the H package,  $I_{OUT} = 0.5A$  for the K package. Power dissipation is internally limited. However, these specifications apply for power dissipation up to 2W for the H package and 20W for the K package.  $I_{MAX} = 1.5A$  for the K package, and 0.2A for the H package.

**Note 2:** Testing is done using a pulsed low duty cycle technique. See thermal regulation specifications for output changes due to heating effects. Load regulation is measured on the output pin at a point 1/8 inch below the base of the K and H package.

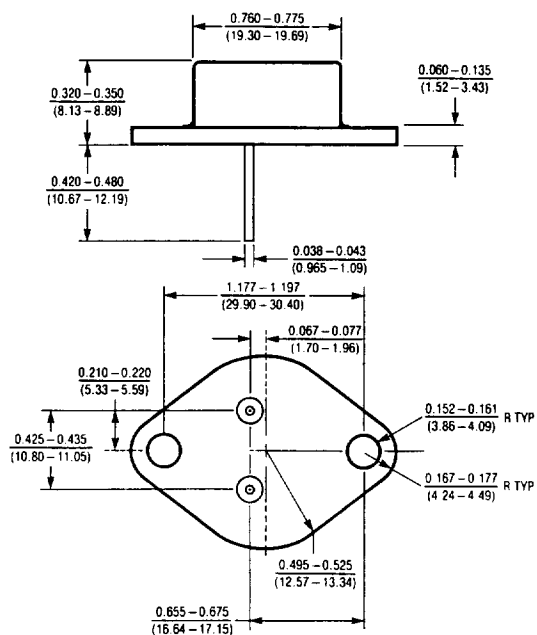
**Note 3:** Guaranteed on the LT137AHV and LT337AHV, but not 100% tested in production.

# SCHEMATIC DIAGRAM



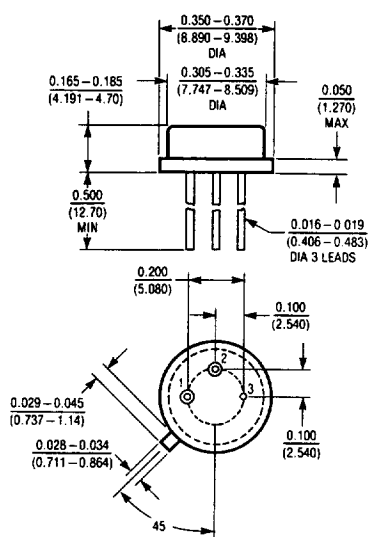
# PACKAGE DESCRIPTION

**K Package TO-3 STEEL Metal Can**



	T <sub>JMAX</sub>	θ <sub>JC</sub>
137AHV 137HV	150°C	3°C/W
337AHV 337HV	125°C	3°C/W

**H Package 3-Lead Metal Can**



	T <sub>JMAX</sub>	θ <sub>JC</sub>
137AHV 137HV	150°C	15°C/W
337AHV 337HV	125°C	15°C/W