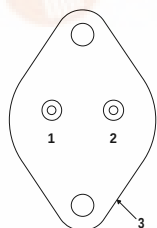
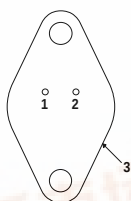


IP137 SERIES LM137 SERIES
 IP137A SERIES LM137A SERIES
 IP337 SERIES
 IP337A SERIES



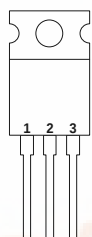
Pin 1 – ADJ.
 Pin 2 – V_{OUT}
 Case – V_{IN}

K Package – TO-3



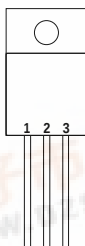
Pin 1 – ADJ.
 Pin 2 – V_{OUT}
 Case – V_{IN}

R Package – TO-66



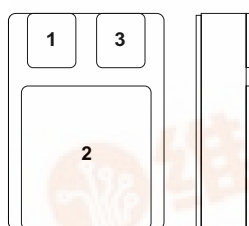
Pin 1 – ADJ.
 Pin 2 – V_{IN}
 Pin 3 – V_{OUT}
 Case – V_{IN}

T Package – TO-220

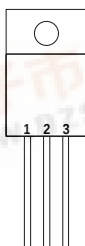


Pin 1 – ADJ.
 Pin 2 – V_{IN}
 Pin 3 – V_{OUT}
 Case – V_{IN}

G Package – TO-257



Pin 1 – ADJ.
 Pin 2 – V_{IN}
 Pin 3 – V_{OUT}

SG Package – SMD1
CERAMIC SURFACE
MOUNT

Pin 1 – ADJ.
 Pin 2 – V_{IN}
 Pin 3 – V_{OUT}

IG Package – TO-257
(Isolated)

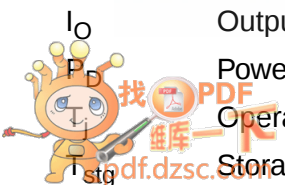
1.5 AMP NEGATIVE ADJUSTABLE VOLTAGE REGULATOR

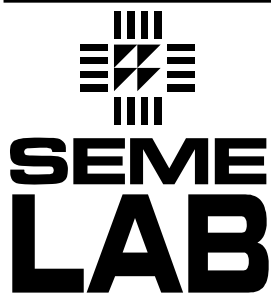
FEATURES

- OUTPUT VOLTAGE RANGE OF:
1.25 TO 40V FOR STANDARD VERSION
1.25 TO 50V FOR –HV VERSION
- 1% OUTPUT VOLTAGE TOLERANCE
- 0.3% LOAD REGULATION
- 0.01% / V LINE REGULATION
- COMPLETE SERIES OF PROTECTIONS:
 - CURRENT LIMITING
 - THERMAL SHUTDOWN
 - SOA CONTROL

ABSOLUTE MAXIMUM RATINGS ($T_{case} = 25^{\circ}\text{C}$ unless otherwise stated)

V_{I-O}	Input - Output Differential Voltage	– Standard	40V
		– HV Series	50V
I_O	Output Current		Internally limited
P_D	Power Dissipation		Internally limited
	Operating Junction Temperature Range		See Order Information Table
T_{stg}	Storage Temperature		-65 to 150°C





IP137 SERIES LM137 SERIES

IP137A SERIES LM137A SERIES

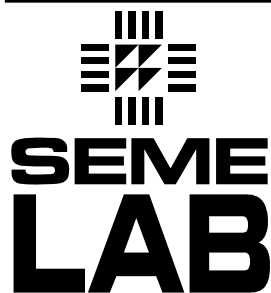
IP337 SERIES

IP337A SERIES

Parameter		Test Conditions		IP137A , IP137AHV LM137A , LM137AHV			IP137 , IP137HV LM137 , LM137HV			Units	
				Min.	Typ.	Max.	Min.	Typ.	Max.		
V _{REF}	Reference Voltage	I _{OUT} = 10mA		-1.238	-1.25	-1.262	-1.225	-1.25	-1.275	V	
		I _{OUT} = 10mA to I _{MAX} V _{IN} – V _{OUT} = 3V to V _{MAX} P ≤ P _{MAX} T _J = -55 to 150°C		-1.220	-1.25	-1.280	-1.200	-1.250	-1.300	V	
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	Line Regulation 1	V _{IN} – V _{OUT} = 3V to V _{MAX}			0.005	0.010		0.010	0.020	%V	
		T _J = -55 to 150°C			0.010	0.030		0.020	0.050		
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	Load Regulation 1	I _{OUT} = 10mA to I _{MAX}			5	25		15	25	mV	
					0.1	0.5		0.3	0.5	%	
		I _{OUT} = 10mA to I _{MAX}			10	50		20	50	mV	
		T _J = -55 to 150°C			0.2	1		0.3	1	%	
Thermal Regulation		t _p = 10ms T _A = 25°C			0.002	0.020		0.002	0.02	%/W	
Ripple Rejection		V _{OUT} = -10V		60	66		60		dB		
		f = 120Hz		70	80		66	77	dB		
I _{ADJ}	Adjust Pin Current	T _J = -55 to 150°C			65	100		65	100	μA	
ΔI _{ADJ}	Adjust Pin Current Change	T _J = -55 to 150°C	I _{OUT} = 10mA to I _{MAX}		0.2	2		0.5	5	μA	
			V _{IN} – V _{OUT} = 3V to 40V		1.0	5		2	5		
			V _{IN} – V _{OUT} = 3V to 50V (HV SERIES)		2.0	6		3	6		
I _{MIN}	Minimum Load Current	T _J = -55 to 150°C			2.5	5		2.5	5	mA	
					1.2	3		1.2	3		
I _{CL}	Current Limit	T _J = -55 to 150°C			1.5	2.2	3.2	1.5	2.2	3.2	A
				0.24	0.4	1	0.24	0.4			
				0.2	0.4	0.8	0.2	0.4	0.8		
$\frac{\Delta V_{OUT}}{\Delta TEMP}$	Temperature Stability	T _J = -55 to 150°C			0.6	1.5		0.6		%	
$\frac{\Delta V_{OUT}}{\Delta TIME}$	Long Term Stability	T _A = +125°C t = 1000 Hrs			0.3	1		0.3	1	%	
e _n	RMS Output Noise (% of V _{OUT})	f = 10 Hz to 10 kHz T _A = 25°C			0.003			0.003		%	
R _{θJC}	Thermal Resistance Junction to Case	K Package			2.3	3		2.3	3	°C/W	
		R Package			5	7		5	7		
		G Package			3	5		3	5		

1) Regulation is measured at constant junction temperature, using pulse testing at a low duty cycle. Changes in output voltage due to heating effects are covered under thermal regulation specifications. Load regulation is measured at a point 1/8" from the bottom of the package for the TO-3 and TO-66 packages, at the junction of the wide and narrow portion of the output lead for the SMD1 package, and 1/8" below the base of the package on the output pin of the TO-257 package.

2) Test Conditions unless otherwise stated: V_{IN} – V_{OUT} = 5V , I_{OUT} = 0.5A , P_{MAX} = 20W , I_{MAX} = 1.5A
V_{MAX} = 40V for standard series , 50V for HV series.



IP137 SERIES LM137 SERIES

IP137A SERIES LM137A SERIES

IP337 SERIES

IP337A SERIES

Parameter	Test Conditions	IP337AHV			IP337HV LM337HV			Units
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{REF} Reference Voltage	$I_{OUT} = 10\text{mA}$	-1.238	-1.25	-1.262	-1.213	-1.25	-1.287	V
	$I_{OUT} = 10\text{mA to } I_{MAX}$ $V_{IN} - V_{OUT} = 3\text{V to } V_{MAX}$ $P \leq P_{MAX}$ $T_J = 0 \text{ to } 125^\circ\text{C}$	-1.220	-1.25	-1.280	-1.200	-1.250	-1.300	V
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$ Line Regulation 1	$V_{IN} - V_{OUT} = 3\text{V to } V_{MAX}$		0.005	0.010		0.010	0.040	% / V
	$T_J = 0 \text{ to } 125^\circ\text{C}$		0.010	0.030		0.020	0.070	
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$ Load Regulation 1	$I_{OUT} = 10\text{mA to } I_{MAX}$	$V_{OUT} \leq 5\text{V}$		5	25	15	50	mV
		$V_{OUT} \geq 5\text{V}$		0.1	0.5	0.3	1	%
	$I_{OUT} = 10\text{mA to } I_{MAX}$ $T_J = 0 \text{ to } 125^\circ\text{C}$	$V_{OUT} \leq 5\text{V}$		10	50	20	70	mV
		$V_{OUT} \geq 5\text{V}$		0.2	1	0.3	1.5	%
Thermal Regulation	$t_p = 10\text{ms}$ $T_A = 25^\circ\text{C}$		0.002	0.020		0.003	0.04	% / W
Ripple Rejection	$V_{OUT} = 10\text{V}$ $f = 120\text{Hz}$	$C_{ADJ} = 0$		60	66	60		dB
		$C_{ADJ} = 10\mu\text{F}$ $T_J = 0 \text{ to } 125^\circ\text{C}$		70	80	66	77	dB
I_{ADJ} Adjust Pin Current	$T_J = 0 \text{ to } 125^\circ\text{C}$		65	100		65	100	μA
ΔI_{ADJ} Adjust Pin Current Change	$T_J = 0$ to 125°C	$I_{OUT} = 10\text{mA to } I_{MAX}$		0.2	2	0.5	5	μA
		$V_{IN} - V_{OUT} = 3\text{V to } 40\text{V}$		1.0	5	2	5	
		$V_{IN} - V_{OUT} = 3\text{V to } 50\text{V}$ (HV SERIES)		2.0	6	3	6	
I_{MIN} Minimum Load Current	$T_J = 0 \text{ to } 125^\circ\text{C}$	$V_{IN} - V_{OUT} \leq 40\text{V}$		2.5	5	2.5	10	mA
		$V_{IN} - V_{OUT} \leq 10\text{V}$		1.2	3	1	6	
I_{CL} Current Limit	$T_J = 0 \text{ to } 125^\circ\text{C}$	$V_{IN} - V_{OUT} \leq 15\text{V}$		1.5	2.2	3.5	3.5	A
		$V_{IN} - V_{OUT} = 40\text{V}$		0.24	0.4	1	0.15	
		$V_{IN} - V_{OUT} = 50\text{V}$ (HV SERIES)		0.2	0.4	0.8	0.1	
$\frac{\Delta V_{OUT}}{\Delta \text{TEMP}}$ Temperature Stability	$T_J = 0 \text{ to } 125^\circ\text{C}$		0.6	1.5		0.6		%
$\frac{\Delta V_{OUT}}{\Delta \text{TIME}}$ Long Term Stability	$t = 1000 \text{ Hrs}$		0.3	1		0.3	1	%
e_n RMS Output Noise (% of V_{OUT})	$f = 10 \text{ Hz to } 10 \text{ kHz}$ $T_A = 25^\circ\text{C}$		0.003			0.003		%
$R_{\theta JC}$ Thermal Resistance Junction to Case	K Package		2.3	3		2.3	3	$^\circ\text{C/W}$
	T Package		4	5		4		

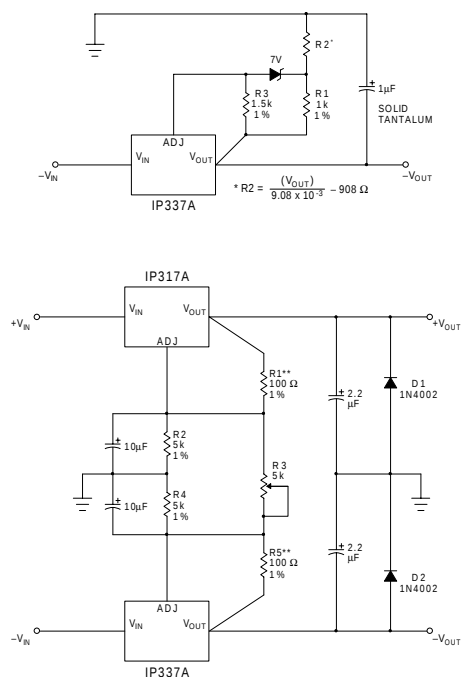
1) Regulation is measured at constant junction temperature, using pulse testing at a low duty cycle. Changes in output voltage due to heating effects are covered under thermal regulation specifications. Load regulation is measured at a point $\frac{1}{8}$ " from the bottom of the package for the TO-3 and TO-66 packages, at the junction of the wide and narrow portion of the output lead for the SMD1 package, and $\frac{1}{8}$ " below the base of the package on the output pin of the TO-257 package.

2) Test Conditions unless otherwise stated: $V_{IN} - V_{OUT} = 5\text{V}$, $I_{OUT} = 0.5\text{A}$, $P_{MAX} = 20\text{W}$, $I_{MAX} = 1.5\text{A}$
 $V_{MAX} = 40\text{V}$ for standard series, 50V for HV series.

APPLICATIONS INFORMATION

High Stability Regulator

The output stability, load regulation, line regulation, thermal regulation, temperature drift, long term drift, and noise, can be improved by a factor of 6.6 over the standard regulator configuration. This assumes a zener has 20PPM/°C maximum drift and about 10 times lower noise than the regulator.

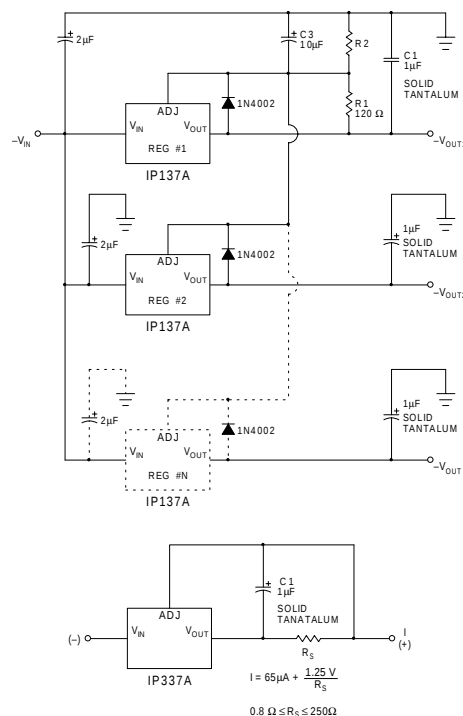


* Solid Tantalum
** R1 or R5 may be trimmed slightly to improve tracking.

Multiple Tracking Regulators

In the application shown below, regulator #2 to "N" will track regulator #1 to within ±24mV initially, and to ±60mV over all load, line, and temperature conditions.

If any regulator output is shorted to ground, all other outputs will drop to -2V. Load regulation of regulators 2 to "N" will be improved by $V_{OUT} / 1.25V$ compared to a standard regulator, so regulator #1 should be the one which has the lowest load current.



Dual Tracking Supply

Current Regulator

Order Information

Part Number	K-Pack (TO-3)	R-Pack (TO-66)	IG-Pack G-Pack (TO-257)	T-Pack (TO-220)	SG-Pack SMD1	Temp. Range
LM137	✓	✓	✓		✓	-55 to +150°C
LM137HV	✓	✓	✓		✓	"
LM137A	✓	✓	✓		✓	"
LM137AHV	✓	✓	✓		✓	"
IP137	✓	✓	✓		✓	-55 to +150°C
IP137HV	✓	✓	✓		✓	"
IP137A	✓	✓	✓		✓	"
IP137AHV	✓	✓	✓		✓	"
LM337	✓			✓		0 to 125°C
LM337HV	✓			✓		0 to 125°C
IP337	✓			✓		0 to 125°C
IP337HV	✓			✓		"
IP337A	✓			✓		0 to 125°C
IP337AHV	✓			✓		"