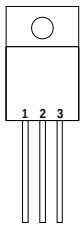
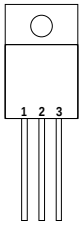
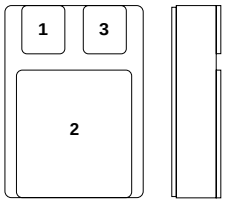
IP137 SERIES LM137 SERIES
IP137A SERIES LM137A SERIES
IP337 SERIES
IP337A SERIES



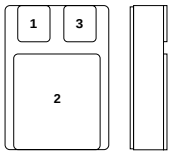
Pin 1 – ADJ.
Pin 2 – V_{IN}
Pin 3 – V_{OUT}
Case – V_{IN}
G Package – (TO–257AA)



Pin 1 – ADJ.
Pin 2 – V_{IN}
Pin 3 – V_{OUT}
IG Package – (TO–257AA)
(Isolated)



Pin 1 – ADJ.
Pin 2 – V_{IN}
Pin 3 – V_{OUT}
SMD1 (TO276AB)
CERAMIC SURFACE MOUNT

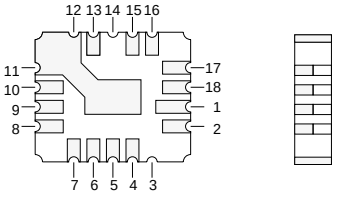


Pin 1 – ADJ.
Pin 2 – V_{OUT}
Pin 3 – V_{IN}
SMD05 (TO-276AA)
CERAMIC SURFACE MOUNT

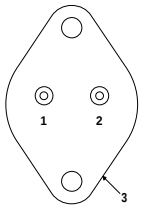
1.5 AMP NEGATIVE ADJUSTABLE VOLTAGE REGULATOR

FEATURES

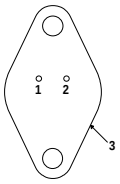
- **OUTPUT VOLTAGE RANGE OF:**
  1.25 TO 40V FOR STANDARD VERSION
  1.25 TO 50V FOR –HV VERSION
- **1% OUTPUT VOLTAGE TOLERANCE**
- **0.3% LOAD REGULATION**
- **0.01% / V LINE REGULATION**
- **COMPLETE SERIES OF PROTECTIONS:**
  - **CURRENT LIMITING**
  - **THERMAL SHUTDOWN**
  - **SOA CONTROL**



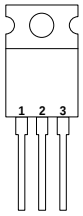
Pins 4,5 – ADJ.
Pins 6,7,8,9,10,11,12,13 – V_{OUT}
Pins 15,16,17,18,1,2 – V_{IN}
LCC4
CERAMIC SURFACE MOUNT



Pin 1 – ADJ.
Pin 2 – V_{OUT}
Case – V_{IN}
K Package – TO–3 (TO-204AA)



Pin 1 – ADJ.
Pin 2 – V_{OUT}
Case – V_{IN}
R Package – TO–66
(TO-213AA)



Pin 1 – ADJ.
Pin 2 – V_{IN}
Pin 3 – V_{OUT}
Case – V_{IN}
T Package – TO–220

ABSOLUTE MAXIMUM RATINGS (T_{case} = 25°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
T_j	Operating Junction Temperature Range		See Order Information Table
T_{stg}	Storage Temperature		-65 to 150°C

Semelab plc. Telephone +44(0)1455 556565. Fax +44(0)1455 552612.
E-mail: sales@semelab.co.uk Website: http://www.semelab.co.uk

Document Number 2831
Issue 2

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} $P \le P_{MAX}$ 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}	$V_{OUT} \le 5V$		5	25		15	25	mV
			$V_{OUT} \ge 5V$		0.1	0.5		0.3	0.5	%
		I_{OUT} = 10mA to I_{MAX} T_J = -55 to 150°C	$V_{OUT} \le 5V$		10	50		20	50	mV
			$V_{OUT} \ge 5V$		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 f = 120Hz	C_{ADJ} = 0	60	66			60		dB
			C_{ADJ} = 10µF T_J = -55 to 150°C	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	$V_{IN} - V_{OUT} \le 40V$		2.5	5		2.5	5	mA
			$V_{IN} - V_{OUT} \le 10V$		1.2	3		1.2	3	
I_{CL}	Current Limit	T_J = -55 to 150°C	$V_{IN} - V_{OUT} \le 15V$	1.5	2.2	3.2	1.5	2.2	3.2	A
			$V_{IN} - V_{OUT}$ = 40V	0.24	0.4	1	0.24	0.4		
			$V_{IN} - V_{OUT}$ = 50V **(HV SERIES)**	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		%
$R_{\theta JC}$	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	
		LCC4 Package				13			13	

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 SMD packages, 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.

Semelab plc. Telephone +44(0)1455 556565. Fax +44(0)1455 552612.
E-mail: sales@semelab.co.uk Website: http://www.semelab.co.uk

Document Number 2831
Issue 2

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

Parameter		Test Conditions		IP337A IP337AHV			IP337, IP337HV LM337 , LM337HV			Units
				Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{REF}	Reference Voltage	I_{OUT} = 10mA		-1.238	-1.25	-1.262	-1.213	-1.25	-1.287	V
		I_{OUT} = 10mA to I_{MAX} $V_{IN} - V_{OUT}$ = 3V to V_{MAX} $P \le P_{MAX}$ T_J = 0 to 125°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	0.040	%/V
			T_J = 0 to 125°C		0.010	0.030		0.020	0.070	
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	Load Regulation [1]	I_{OUT} = 10mA to I_{MAX}	$V_{OUT} \le 5V$		5	25		15	50	mV
			$V_{OUT} \ge 5V$		0.1	0.5		0.3	1	%
		I_{OUT} = 10mA to I_{MAX} T_J = 0 to 125°C	$V_{OUT} \le 5V$		10	50		20	70	mV
			$V_{OUT} \ge 5V$		0.2	1		0.3	1.5	%
	Thermal Regulation	t_p = 10ms	T_A = 25°C		0.002	0.020		0.003	0.04	%/W
	Ripple Rejection	V_{OUT} = 10V f = 120Hz	C_{ADJ} = 0	60	66			60		dB
			C_{ADJ} = 10µF T_J = 0 to 125°C	70	80		66	77		dB
I_{ADJ}	Adjust Pin Current	T_J = 0 to 125°C			65	100		65	100	µA
ΔI_{ADJ}	Adjust Pin Current Change	T_J = 0 to 125°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 = 0 to 125°C	$V_{IN} - V_{OUT} \le 40V$		2.5	5		2.5	10	mA
			$V_{IN} - V_{OUT} \le 10V$		1.2	3		1	6	
I_{CL}	Current Limit	T_J = 0 to 125°C	$V_{IN} - V_{OUT} \le 15V$	1.5	2.2	3.5	1.5	2.2	3.5	A
			$V_{IN} - V_{OUT}$ = 40V	0.24	0.4	1	0.15	0.4		
			$V_{IN} - V_{OUT}$ = 50V **(HV SERIES)**	0.2	0.4	0.8	0.1	0.4	0.8	
$\frac{\Delta V_{OUT}}{\Delta TEMP}$	Temperature Stability	T_J = 0 to 125°C			0.6	1.5		0.6		%
$\frac{\Delta V_{OUT}}{\Delta TIME}$	Long Term Stability	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		%
$R_{\theta JC}$	Thermal Resistance Junction to Case	K Package			2.3	3		2.3	3	°C/W
		T Package			4	5		4		
		LCC4 Package				13			13	

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 SMD packages, 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.

Semelab plc. Telephone +44(0)1455 556565. Fax +44(0)1455 552612.
E-mail: sales@semelab.co.uk Website: http://www.semelab.co.uk

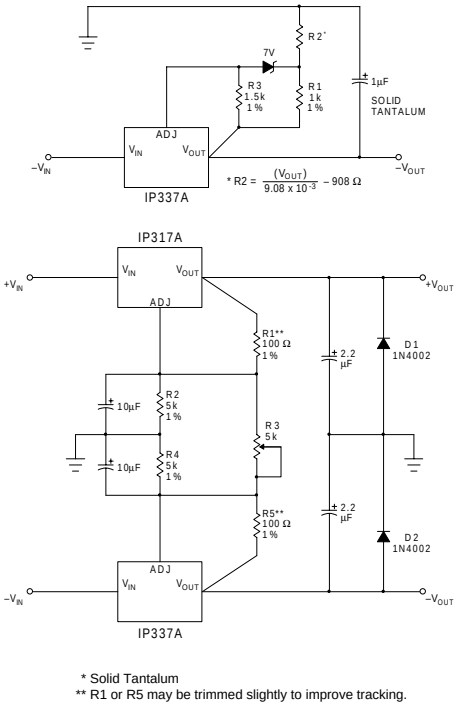
Document Number 2831
Issue 2

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



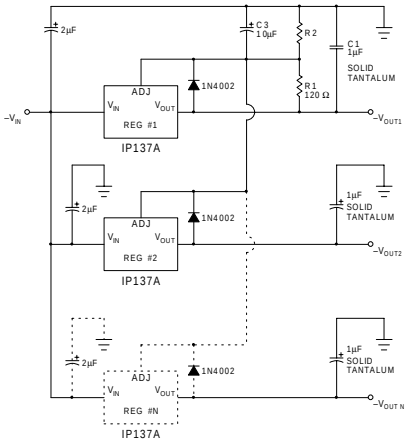
* Solid Tantalum
** R1 or R5 may be trimmed slightly to improve tracking.

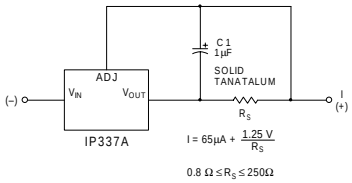
Dual Tracking Supply

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.





Current Regulator

Order Information

Part Number	IG–Pack G–Pack (TO257)	SMD1	SMD05	LCC4	K–Pack (TO3)	R–Pack (TO66)	T–Pack (TO220)	Temp. Range
LM137	✓	✓	✓	✓	✓	✓		-55 to +150°C
LM137HV	✓	✓	✓	✓	✓	✓		”
LM137A	✓	✓	✓	✓	✓	✓		”
LM137AHV	✓	✓	✓	✓	✓	✓		”
IP137	✓	✓	✓	✓	✓	✓		“
IP137HV	✓	✓	✓	✓	✓	✓		”
IP137A	✓	✓	✓	✓	✓	✓		”
IP137AHV	✓	✓	✓	✓	✓	✓		”
LM337					✓		✓	0 to 125°C
LM337HV					✓		✓	”
IP337					✓		✓	”
IP337HV					✓		✓	”
IP337A					✓		✓	”
IP337AHV					✓		✓	”

Semelab plc. Telephone +44(0)1455 556565. Fax +44(0)1455 552612.
E-mail: sales@semelab.co.uk Website: http://www.semelab.co.uk

Document Number 2831
Issue 2