

MDLM137HV-K REV 1A1

Original Creation Date: 07/12/95

Last Update Date: 04/16/99

Last Major Revision Date: 03/26/99

ADJUSTABLE 3-TERMINAL NEGATIVE VOLTAGE REGULATOR (HIGH VOLTAGE)

General Description

The LM137HVK is an adjustable 3-terminal negative voltage regulator capable of supplying in excess of -1.5A over an output voltage range of -1.2V to -47V. This regulator is exceptionally easy to apply, requiring only 2 external resistors to set the output voltage and 1 output capacitor for frequency compensation. The circuit design has been optimized for excellent regulation and low thermal transients. Further, the LM137HVK features internal current limiting, thermal shutdown and safe-area compensation, making it virtually blowout-proof against overloads.

The LM137HVK serves a wide variety of applications including local on-card regulation, programmable-output voltage regulation or precision current regulation. The LM137HVK is an ideal complement to the LM117HVK adjustable positive regulator.

Industry Part Number

LM137HV

NS Part Numbers

LM137HVK-QMLV
LM137HVK-SMD

Prime Die

LM137HV

Controlling Document

SEE FEATURES SECTION

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (°C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

Features

- Output voltage adjustable from -1.2V to -47V.
 - 1.5A output current guaranteed, -55 C to +150 C.
 - Line regulation typically 0.01%/V.
 - Load regulation typically 0.3%.
 - Excellent thermal regulation, 0.002%/W.
 - 77 dB ripple rejection.
 - Excellent rejection of thermal transients.
 - 50 ppm/ C temperature coefficient.
 - Temperature-independent current limit.
 - Internal thermal overload protection.
 - Standard 3-lead transistor package.
 - Output short circuit protected.
 - CONTROLLING DOCUMENT
- | | |
|----------------|-----------------|
| LM137HV-K-SMD | 5962-7703404YA |
| LM137HV-K-QMLV | 5962-7703404VYA |

(Absolute Maximum Ratings)

(Note 1)

Power Dissipation

(Note 2)

Internally Limited

Input-Output Voltage Differential

50V

Operating Ambient Temperature Range

-55 C to +125 C

Maximum Junction Temperature

(Note 2)

150 C

Storage Temperature Range

-65 C to +150 C

Lead Temperature

(Soldering, 10 seconds)

300 C

Thermal Resistance

ThetaJA

(Still Air)

(500LF/Min Air)

42 C/W

14 C/W

ThetaJC

3 C/W

Package Weight

(Typical)

12750mg

ESD Rating

(Note 3)

4000V

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics. The guaranteed specifications apply only for the test conditions listed. Some performance characteristics may degrade when the device is not operated under the listed test conditions.

Note 2: The maximum power dissipation must be derated at elevated temperatures and is dictated by Tjmax (maximum junction temperature), ThetaJA (package junction to ambient thermal resistance), and TA (ambient temperature). The maximum allowable power dissipation at any temperature is $P_{dmax} = (T_{jmax} - T_A) / \Theta_{JA}$ or the number given in the Absolute Maximum Ratings, whichever is lower.

Note 3: Human body model, 100pF discharged through 1.5K Ohms

Electrical Characteristics

DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: $I_L = 8\text{mA}$

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vref	Reference Voltage	Vdiff = 3V			-1.275	-1.225	V	1
					-1.3	-1.2	V	2, 3
		Vdiff = 50V			-1.275	-1.225	V	1
					-1.3	-1.2	V	2, 3
Rline	Line Regulation	$-50\text{V} \leq V_{\text{diff}} \leq -3\text{V}$			-10	10	mV	1
					-25	25	mV	2, 3
Rload	Load Regulation	$8\text{mA} \leq I_{\text{out}} \leq 110\text{mA}$, Vdiff = 50V			-25	25	mV	1
		$8\text{mA} \leq I_{\text{out}} \leq 1.5\text{A}$, Vdiff = 5V			-25	25	mV	1
					-25	45	mV	2, 3
Vrth	Thermal Regulation	Vin = -14.6V, $I_L = 1.5\text{A}$, Pd = 20 Watts, t = 10mS			-5	5	mV	1
Iadj	Adjustment Pin Current	Vdiff = 3V				100	uA	1, 2, 3
		Vdiff = 40V				100	uA	1, 2, 3
		Vdiff = 50V				100	uA	1, 2, 3
Delta Iadj(line)	Adjustment Pin Current Change	$-50\text{V} \leq V_{\text{diff}} \leq -3\text{V}$			-6	6	uA	1, 2, 3
Delta Iadj(load)	Adjustment Pin Current Change	Vdiff = 5V, $8\text{mA} \leq I_{\text{out}} \leq 1.5\text{A}$			-5	5	uA	1, 2, 3
Ilmin	Minimum Load Current	Vdiff = 3V, Vout = -1.4V (forced)				3	mA	1, 2, 3
		Vdiff = 10V, Vout = -1.4V (forced)				3	mA	1, 2, 3
		Vdiff = 40V, Vout = -1.4V (forced)				5	mA	1, 2, 3
		Vdiff = 50V, Vout = -1.4V (forced)				5	mA	1, 2, 3
Icl	Current Limit	Vdiff = 5V			1.5	3.5	A	1, 2, 3
		Vdiff = 50V			0.2	1	A	1

AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: $I_L = 8\text{mA}$

Rn	Ripple Rejection	f = 120Hz, Vout = Vref, Cadj = 10uF	1, 2		66		dB	4, 5, 6
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Electrical Characteristics

DC PARAMETERS: DRIFT VALUES

(The following conditions apply to all the following parameters, unless otherwise specified.)
 DC: "Delta calculations performed on JAN S and QMLV devices at group B, subgroup 5 only"

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Rline	Line Regulation	$-50V \leq V_{diff} \leq -3V$			-4.0	+4.0	mV	1
Vref	Reference Voltage	$V_{diff} = 3V$			-0.01	+0.01	V	1
		$V_{diff} = 50V$			-0.01	+0.01	V	1
Iadj	Adjustment Pin Current	$V_{diff} = 3V$			-10	+10	uA	1
		$V_{diff} = 40V$			-10	+10	uA	1
		$V_{diff} = 50V$			-10	+10	uA	1

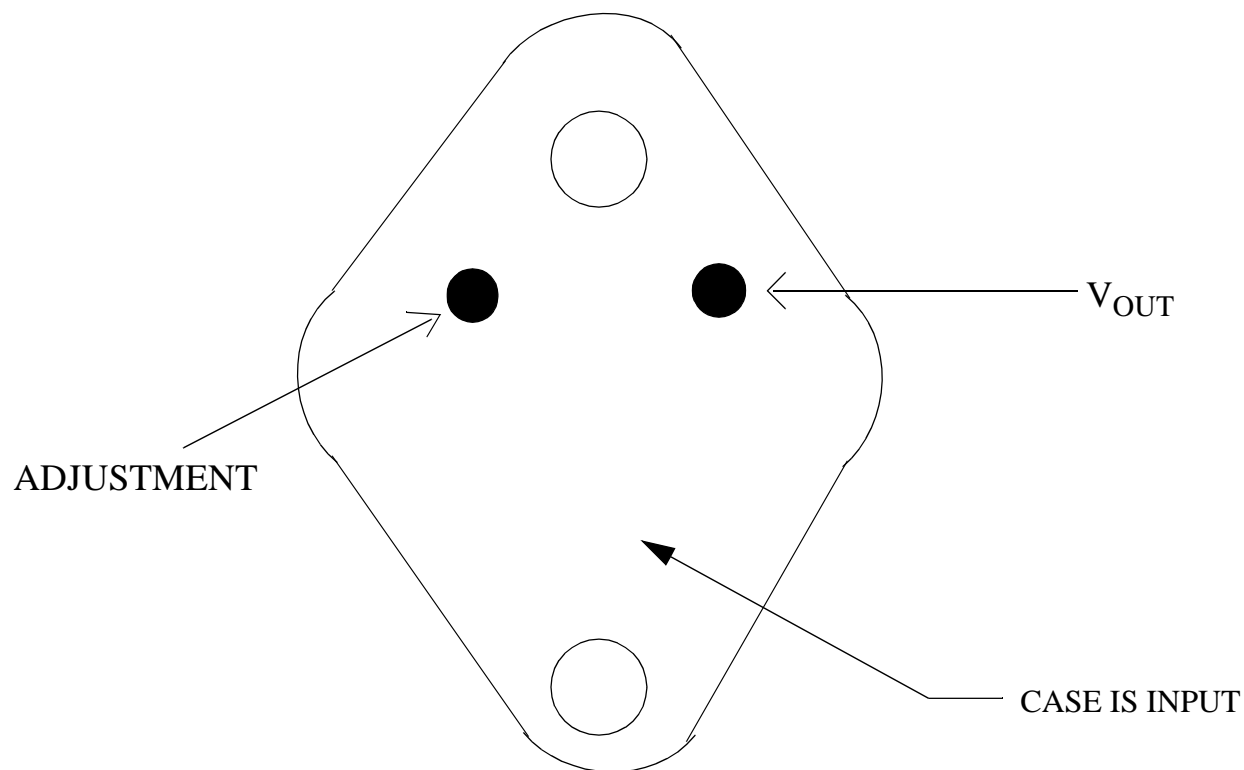
Note 1: Group "A" sample test only at +25 C, -55 C, +125 C.

Note 2: Bench test per (SG)RPI-3-362. Use TDN 70256657(NSSG).

Graphics and Diagrams

GRAPHICS#	DESCRIPTION
05191HRB4	METAL CAN (KA), TO-3, 2LD, LOW PROFILE (B/I CKT)
K02CRE	METAL CAN (KA), TO-3, 2LD, LOW PROFILE (P/P DWG)
P000200A	METAL CAN (KA), TO-3, 2 LD, LOW PROFILE (PINOUT)

See attached graphics following this page.



LM137K, LM137HVK
2 - LEAD TO3
CONNECTION DIAGRAM
BOTTOM VIEW
P000200A

Revision History

Rev	ECN #	Rel Date	Originator	Changes
1A1	M0003371	04/16/99	Rose Malone	Update MDS: MDLM137HV-K, Rev. 0A0 to MDLM137HV-K, Rev. 1A1. Added reference to QMLV device to Main Table, ESD limit and Thermal Resistance, Package weight to Absolute Maximum Section and Drift Table to Electrical section.