

**MDLM137HV-H REV 1A1**

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## ADJUSTABLE, 3-TERMINAL NEGATIVE VOLTAGE REGULATOR (HIGH VOLTAGE)

### General Description

The LM137HVH is an adjustable 3-terminal negative voltage regulator capable of supplying in excess of -0.5A 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 LM137HVH features internal current limiting, thermal shutdown and safe-area compensation, making it virtually blowout-proof against overloads.

The LM137HVH serves a wide variety of applications including local on-card regulation, programmable-output voltage regulation or precision current regulation. The LM137HVH is an ideal complement to the LM117HVH adjustable positive regulator.

### Industry Part Number

LM137HV

### NS Part Numbers

 LM137HVH-QMLV  
 LM137HVH-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.
- 0.5A 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
  - LM137HVH-SMD        5962-7703404XA
  - LM137HVH-QMLV     5962-7703404VXA

**(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 Flow)

174 C/W

64 C/W

ThetaJC

15 C/W

Package Weight

(Typical)

955mg

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 = 40V			-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	Vdiff = 50V, $8\text{mA} \leq I_{\text{out}} \leq 100\text{mA}$			-25	25	mV	1
		Vdiff = 5V, $8\text{mA} \leq I_{\text{out}} \leq 500\text{mA}$			-31	31	mV	1
					-50	50	mV	2, 3
Vrth	Thermal Regulation	Vin = -16.5V, $I_L = 330\text{mA}$ , Pd = 5 Watts, t = 10mS			-2.0	2.0	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(load)	Adjustment Pin Current Change	Vdiff = 5V, $8\text{mA} \leq I_{\text{out}} \leq 200\text{mA}$			-5	5	uA	1, 2, 3
Delta Iadj(line)	Adjustment Pin Current Change	$I_L = 8\text{mA}$ , $-50\text{V} \leq V_{\text{diff}} \leq -3\text{V}$			-6	6	uA	1, 2, 3
I <sub>L</sub> min	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
I <sub>CL</sub>	Current Limit	Vdiff = 5V			0.5	1.8	A	1, 2, 3
		Vdiff = 50V			0.1	0.65	A	1

## Electrical Characteristics

### AC PARAMETERS

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

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Rn	Ripple Rejection	$f = 120\text{Hz}$ , $V_{out} = V_{ref}$ , $C_{adj} = 10\mu\text{F}$	1, 2		66		dB	4, 5, 6

### 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"

Rline	Line Regulation	$-50\text{V} \leq V_{diff} \leq -3\text{V}$			-4.0	+4.0	mV	1
Vref	Reference Voltage	$V_{diff} = 3.0\text{V}$			-0.01	+0.01	V	1
		$V_{diff} = 40\text{V}$			-0.01	+0.01	V	1
		$V_{diff} = 50\text{V}$			-0.01	+0.01	V	1
Iadj	Adjustment Pin Current	$V_{diff} = 3.0\text{V}$			-10	+10	uA	1
		$V_{diff} = 40\text{V}$			-10	+10	uA	1
		$V_{diff} = 50\text{V}$			-10	+10	uA	1

Note 1: Group "A" sample only, test at all temperature.

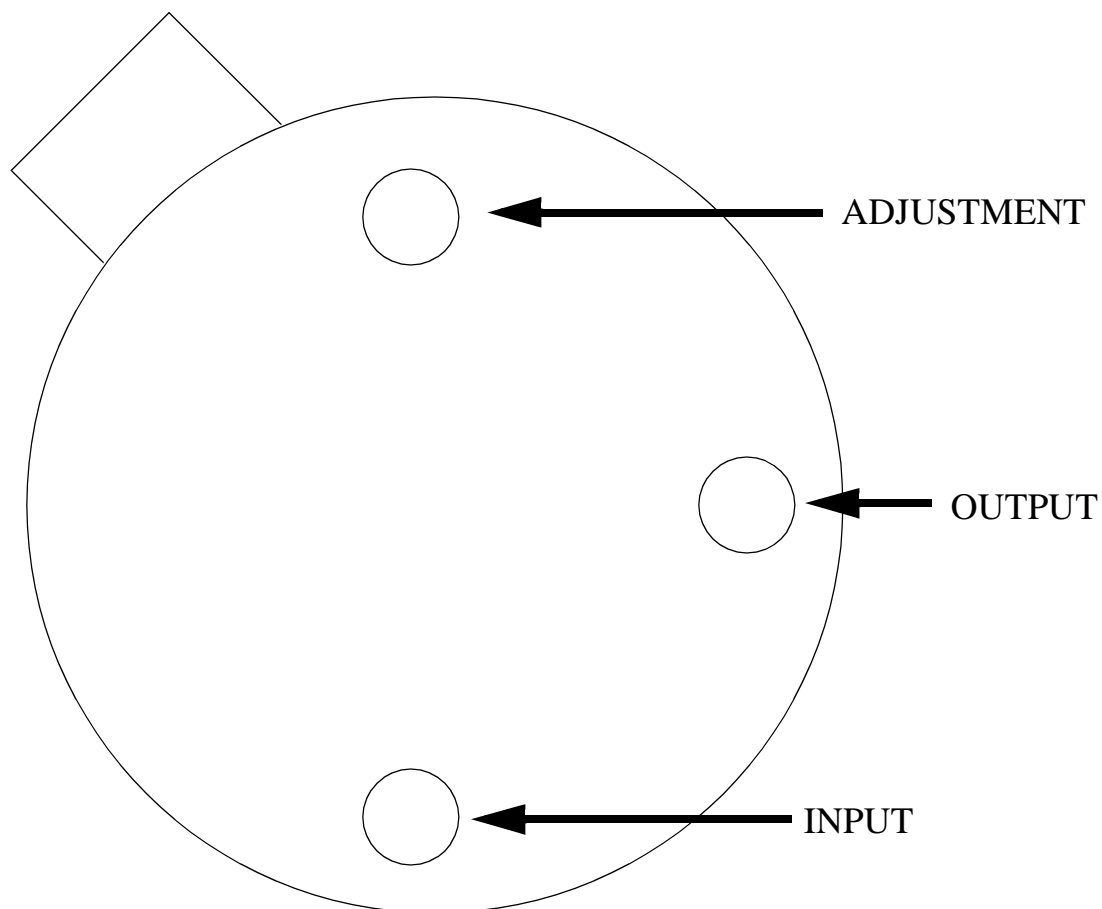
Note 2: Bench test per RPI-3-362. Use TDN 70256657(NSSG).

## Graphics and Diagrams

GRAPHICS#	DESCRIPTION
05192HRB2	METAL CAN (H), TO-39, 3LD, .200 DIA P.C. (P/P DWG)
H03ARD	METAL CAN (H), TO-39, 3LD, .200 DIA P.C. (P/P DWG)
P000199A	METAL CAN (H), TO-39, 3 LEAD (PINOUT)

See attached graphics following this page.





LM137H, LM137HVH  
3 - LEAD TO-39  
CONNECTION DIAGRAM  
BOTTOM VIEW  
P000199A

**Revision History**

Rev	ECN #	Rel Date	Originator	Changes
1A1	M0003375	04/16/99	Rose Malone	Update MDS: MDLM137HV-H, Rev. 0A0 to MDLM137HV-H, 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.