National Semiconductor

MICROCIRCUIT DATA SHEET

MDLM137-K REV 0A0

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NEGATIVE ADJUSTABLE VOLTAGE REGULATOR

General Description

The LM137K 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 -37V. 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 LM137K features internal current limiting, thermal shutdown, and safe-area compensation, making it virtually blow-out proof against overloads.

The LM137K serves a wide variety of applications including local on-card regulation, programmable-output voltage regulation or precision current regulation. The LM137K is an ideal complement to the LM117K adjustable positive regulator.

Industry Part Number

LM137

NS Part Numbers

LM137K-SMD*

Prime Die

LM137

Controlling Document

7703403YA*

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (^{O}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 -37V.
- 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 is short circuit protected.

(Absolute Maximum Ratings)
(Note 1)

Power Dissipation (Note 2)	Internally Limited
Input-Output Voltage Differential	40V
Operating Ambient Temperature	-55 C to +125 C
Maximum Junction Temperature	150 C
Storage Temperature	-65 C to +150 C
Lead Temperature (Soldering, 10 seconds)	300 C
ESD Rating	2K Volts

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 Pdmax = (Tjmax - TA)/ThetaJA or the number given in the Absolute Maximum Ratings, whichever is lower.

Electrical Characteristics

DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: Il = 8mA

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
Rline	Line Regulation	3V ≤ Vdiff ≤ 40V			-9	9	mV	1
		3V ≤ Vdiff ≤ 40V			-23	23	mV	2, 3
Rload	Load Regulation	Vdiff = 5V, 8mA ≤ Il ≤ 1.5A			-25	25	mV	1, 2, 3
		Vdiff = 12V, 8mA ≤ Il ≤ 1.5A			-25	25	mV	1
		Vdiff = 40V, 8mA ≤ Il ≤ 200mA			-25	25	mV	1
		Vdiff = 40V, 8mA ≤ Il ≤ 100mA			-25	25	mV	2, 3
Vrth	Thermal Regulation	Vin = -14.6V, Il = 1.5A, Pd = 20W, t = 10mS			-5	5	mV	1
Iadj	Adjustment Pin Current	Vdiff = 3V				100	uA	1, 2, 3
		Vdiff = 40V				100	uA	1, 2, 3
Delta Iadj(line)	Adjustment Pin Current Change	3V ≤ Vdiff ≤ 40V			-5	5	uA	1, 2, 3
Delta Iadj(load)	Adjustment Pin Current Change	Vdiff = 5V, 8mA ≤ Il ≤ 1.5A			-5	5	uA	1, 2, 3
Ilmin	Minimum Load	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
Icl	Current Limit	Vdiff ≤ 5V			1.5	3.5	A	1, 2, 3
		Vdiff ≤ 40V			0.24	1.2	A	1

AC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: Il = 8mA

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

Note 1: Group "A" sample only, test at all temps.
Note 2: Bench test, refer to (SG)RPI-3-362.