

**MNLM136-2.5-X REV 0A0**

 Original Creation Date: 07/10/95  
 Last Update Date: 12/13/99  
 Last Major Revision Date: 12/03/99

## 2.5V REFERENCE DIODE

### General Description

The LM136-2.5 integrated circuit is a precision 2.5V shunt regulator diode. This monolithic IC voltage reference operates as a low-temperature-coefficient 2.5V zener with 0.2 Ohms dynamic impedance. A third terminal on the LM136-2.5 allows the reference voltage and temperature coefficient to be trimmed easily.

The LM136-2.5 is useful as a precision 2.5V low voltage reference for digital voltmeters, power supplies or op amp circuitry. The 2.5V makes it convenient to obtain a stable reference from 5V logic supplies. Further, since the LM136-2.5 operates as a shunt regulator, it can be used as either a positive or negative voltage reference.

### Industry Part Number

LM136

### NS Part Numbers

LM136H-2.5/883

### Prime Die

LM136

### 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**

- Low temperature coefficient
- Wide operating current of 400uA to 10mA
- 0.2 Ohms dynamic impedance
- $\pm 1\%$  initial tolerance available
- Guaranteed temperature stability
- Easily trimmed for minimum temperature drift
- Fast turn-on
- Three lead transistor package

**(Absolute Maximum Ratings)**

(Note 1)

Reverse Current	15mA
Forward Current	10mA
Storage Temperature	-60 C to +150 C
Operating Ambient Temperature (Note 2)	-55 C to +125 C
Maximum Junction Temperature (Note 2)	150 C
Lead Temperature (Soldering, 10 Seconds)	300 C
Thermal Resistance ThetaJA (Still Air Flow) (500LF/Min Air Flow)	354 C/W 77 C/W
ThetaJC	46 C/W
Package Weight (Typical)	TBD
ESD Rating (Note 3)	1000V

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  $T_{jmax}$  (maximum junction temperature),  $\theta_{JA}$  (package junction to ambient thermal resistance), and  $T_A$  (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, 1.5K Ohms in series with 100pF.

## Electrical Characteristics

### DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)  
DC:  $I_z = 1\text{mA}$

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Iadj	Adjust Current	Vadj = 0.7V			-125	+125	uA	1, 2, 3
Delta Vz	Delta Zener Voltage	$0.4\text{mA} \leq I_z \leq 10\text{ mA}$				6	mV	1
						10	mV	2, 3
Vz	Zener Voltage	Vadj = Open			2.44	2.54	V	1
					2.42	2.56	V	2, 3
		Vadj = 0.7V			2.39	2.49	V	1
					2.29	2.49	V	2, 3
		Vadj = 1.9V			2.49	2.69	V	1, 2, 3
Zrd	Reverse Dyn. Imp.		1			1	Ohm	1, 2, 3
Vstab	Temp Stability	Vz = Adjusted to 2.490V	2			18	mV	2, 3

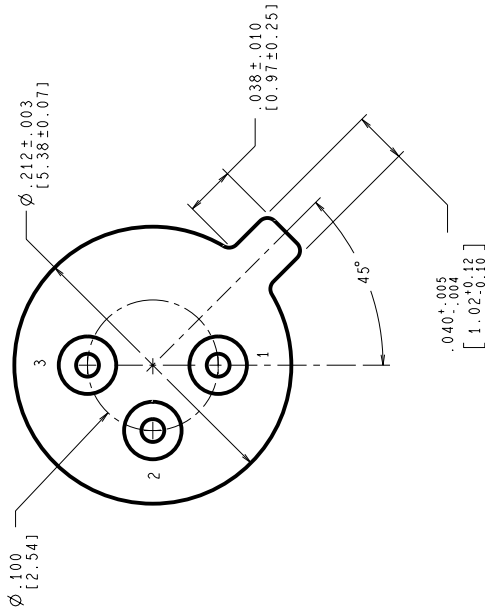
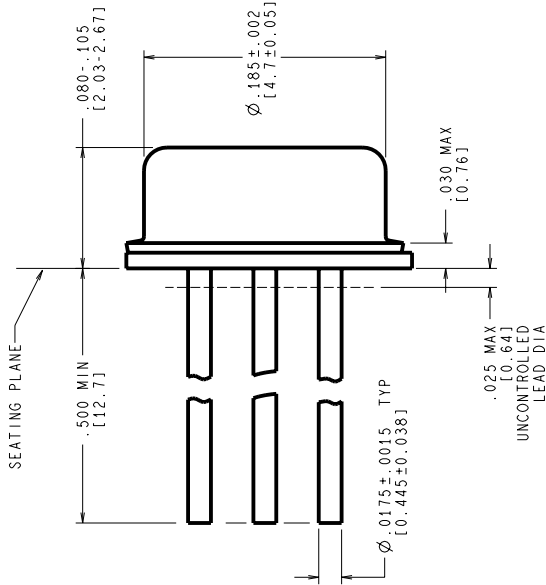
Note 1: Parameter tested go-no-go only.  
Note 2: Tested on Auto Drift Oven.

## Graphics and Diagrams

GRAPHICS#	DESCRIPTION
09988HRB4	METAL CAN, TO-46, 3LD, .100 DIA P.C. (B/I CKT)
H03HRE	METAL CAN, TO-46, 3LD, .100 DIA P.C. (P/P DWG)
P000372A	METAL CAN, TO-46, 3LD, .100 DIA P.C. (PINOUT)

See attached graphics following this page.

REVISIONS				
LTR	DESCRIPTION	E.C.N.	DATE	BY/APP'D
D	REVISE & REDRAW PER NEW STANDARD	10404	05/19/94	TL/GY
E	UPDATE MIL/AERO STAMPS	11000	06/19/95	MS/



CONTROLLING DIMENSION IS INCH  
VALUES IN [ ] ARE MILLIMETERS

MIL-I-38535  
CONFIGURATION CONTROL

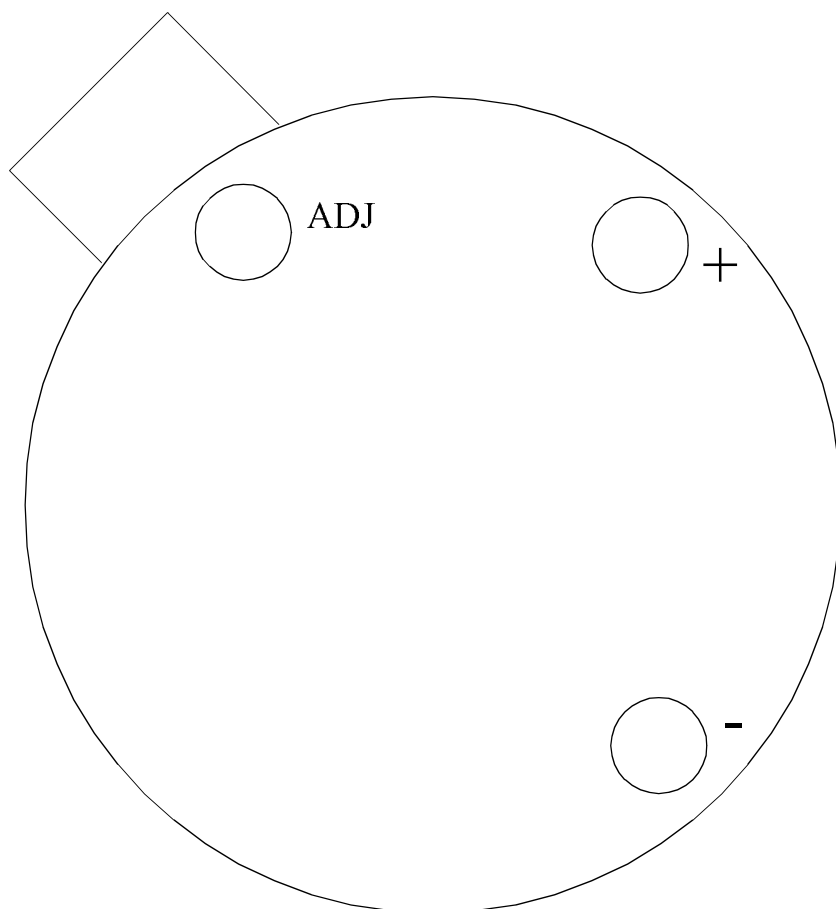
NOTES: UNLESS OTHERWISE SPECIFIED

- LEADS TO BE LOCATED WITHIN .007 IN/ 0.18 mm OF THEIR TRUE POSITIONS RELATIVE TO A MAXIMUM WIDTH TAB.
- STANDARD METAL CAN TYPE: SOLID BASE.
- APPLIES TO MIL-AERO AND LINEAR PRODUCTS.
- REFERENCE JEDEC REGISTRATION TO-46, JEDEC PUBLICATION No. 95.

APPROVALS	DATE	BY
DESIGN	05/19/94	T. LEONARD
ESTD. CHK.		
ENGR. CHK.		
PROJECTION		
SCALE	N/A	C
SIZE	C	MKT-H03H
REV		E
DO NOT SCALE DRAWING		
SHEET 1 of 1		

**National Semiconductor**  
2000 Semiconductor dr., Santa Clara, CA 95052-8000

METAL CAN,  
TO-46, 3 LEAD,  
.100 DIA P.C.



LM136AH, LM136H  
3 - LEAD TO-46  
CONNECTION DIAGRAM  
BOTTOM VIEW  
P000372A



National Semiconductor™  
MIL/AEROSPACE OPERATIONS  
2900 SEMICONDUCTOR DRIVE  
SANTA CLARA, CA 95050

**Revision History**

<b>Rev</b>	<b>ECN #</b>	<b>Rel Date</b>	<b>Originator</b>	<b>Changes</b>
0A0	M0003609	12/13/99	Rose Malone	Change/Archive MNLM136-2.5-X, Rev. 0BL. Full MDS Release MNLM136-2.5-X, Rev. 0A0.