

**MNLM185BY-2.5-X REV 1B1**

 Original Creation Date: 08/15/95  
 Last Update Date: 02/25/03  
 Last Major Revision Date: 10/16/02

**MICROPOWER VOLTAGE REFERENCE DIODE**
**General Description**

The LM185BY-2.5 is a micropower 2-terminal band-gap voltage regulator diode. Operating over a 20 uA to 20 mA current range, it features exceptionally low dynamic impedance and good temperature stability. On-chip trimming is used to provide tight voltage tolerance. Since the LM185BY-2.5 band-gap reference uses only transistors and resistors, low noise and good long term stability result.

Careful design of the LM185BY-2.5 has made the device exceptionally tolerant of capacitive loading, making it easy to use in almost any reference application. The wide dynamic operating range allows its use with widely varying supplies with excellent regulation.

The extremely low power drain of the LM185BY-2.5 makes it useful for micropower circuitry. This voltage reference can be used to make portable meters, regulators or general purpose analog circuitry with battery life approaching shelf life. Further, the wide operating current allows it to replace older references with a tighter tolerance part. For applications requiring 1.2V see LM185BY-1.2.

**Industry Part Number**

LM185BY

**NS Part Numbers**

 LM185BYH2.5-MLS  
 LM185BYH2.5-QV  
 LM185BYH2.5-SMD  
 LM185BYH2.5/883

**Prime Die**

LM185

**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**

- Operating current of 20uA to 20mA.
- 1 Ohm dynamic impedance (Typical).
- Low temperature coefficient
- Low voltage reference-2.5V

- CONTROLLING DOCUMENT:

LM185BYH2.5-SMD	5962-8759406XA
LM185BYH2.5-QV	5962-8759406VXA

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**MICROCIRCUIT DATA SHEET****MNLM185BY-2.5-X REV 1B1**Original Creation Date: 08/15/95  
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**Industry Part Number**

LM185BY

**NS Part Numbers**LM185BYH2.5-MLS  
LM185BYH2.5-QV  
LM185BYH2.5-SMD  
LM185BYH2.5/883**Prime Die**

LM185

**Controlling Document**

SEE FEATURES SECTION

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**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

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- 1 Ohm dynamic impedance (Typical).
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- CONTROLLING DOCUMENT:

LM185BYH2.5-SMD	5962-8759406XA
LM185BYH2.5-QV	5962-8759406VXA

**(Absolute Maximum Ratings)**

(Note 1)

Reverse Current	30mA
Forward Current	10mA
Operating Temperature Range	-55 C to +125 C
Maximum Junction Temperature	150 C
Storage Temperature	-55 C to +150 C
Lead Temperature (Soldering, 10 seconds)	300 C
Thermal Resistance	
ThetaJA	
H-Pkg (Still Air)	300 C/W
H-Pkg (500LF/Min Air flow)	139 C/W
ThetaJC	
H-Pkg	57 C/W
Package Weight (Typical)	
H-Pkg	TBD
ESD Tolerance (Note 2)	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: Human body model, 1.5k Ohms in series with 100pF

## Electrical Characteristics

### DC PARAMETERS:

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vref	Reverse Breakdown Voltage	Ir = 20uA			2.462	2.538	V	1
		Ir = 30uA			2.425	2.575	V	2, 3
		Ir = 1mA			2.462	2.538	V	1
					2.425	2.575	V	2, 3
		Ir = 20mA			2.462	2.538	V	1
				2.425	2.575	V	2, 3	
Delta Vref/ Delta Ir	Reverse Breakdown Voltage Change with Current	20uA ≤ Ir ≤ 1mA			-1.0	1.0	mV	1
		30uA ≤ Ir ≤ 1mA			-1.5	1.5	mV	2, 3
		1mA ≤ Ir ≤ 20mA			-10.0	10.0	mV	1
					-20.0	20.0	mV	2, 3
Vf	Forward Bias Voltage	If = 2mA			-1.0	-0.4	V	1
Tc	Temperature Coefficient		1			50	ppm/ C	2, 3

### DC PARAMETERS: DRIFT VALUES

(The following conditions apply to all the following parameters, unless otherwise specified.)

DC: "Delta Calculations to be performed after Burn-In and Group B-5, unless otherwise specified on IPI"

Vref(1)	Reverse Breakdown Voltage	Ir = 20uA			-10	10	mV	1
Vref(2)	Reverse Breakdown Voltage	Ir = 20mA			-10	10	mV	1

Note 1: The average temperature coefficient is defined as the maximum deviation of reference voltage at all measured temperatures between the operating Tmax and Tmin, divided by Tmax - Tmin. The measured temperatures are -55 C, -40 C, 0 C, 25 C, 70 C, 85 C and 125 C.

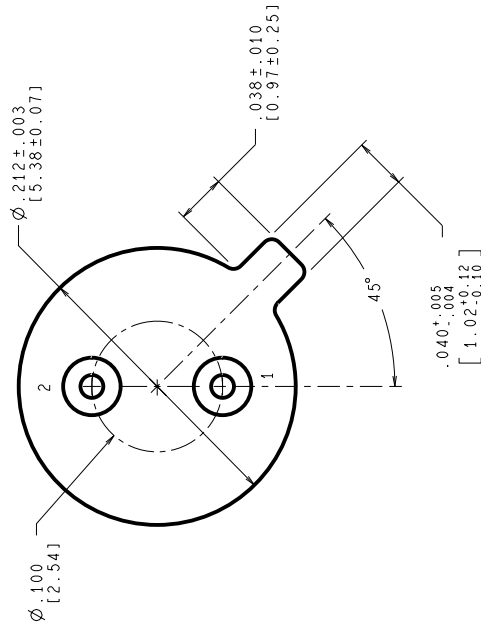
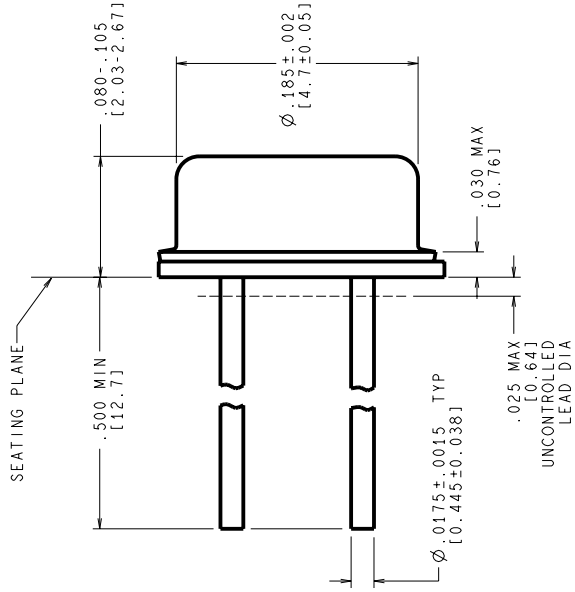
### Graphics and Diagrams

GRAPHICS#	DESCRIPTION
05886HRB2	METAL CAN (H), TO-39, 3LD, .200 DIA P.C. (B/I CKT)
H02ARE	METAL CAN, TO-46, 2LD, .100 DIA P.C. (P/P DWG)
P000364B	METAL CAN, TO-46, 2 LD, .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	10402	05/04/1994	TL/GY
E	UPDATE TITLE & MIL/AERO STAMP. CHANGE DWG SIZE FORMAT FROM B TO C.	12131	11/17/1998	MS/



CONTROLLING DIMENSION IS INCH  
VALUES IN ( ) ARE MILLIMETERS

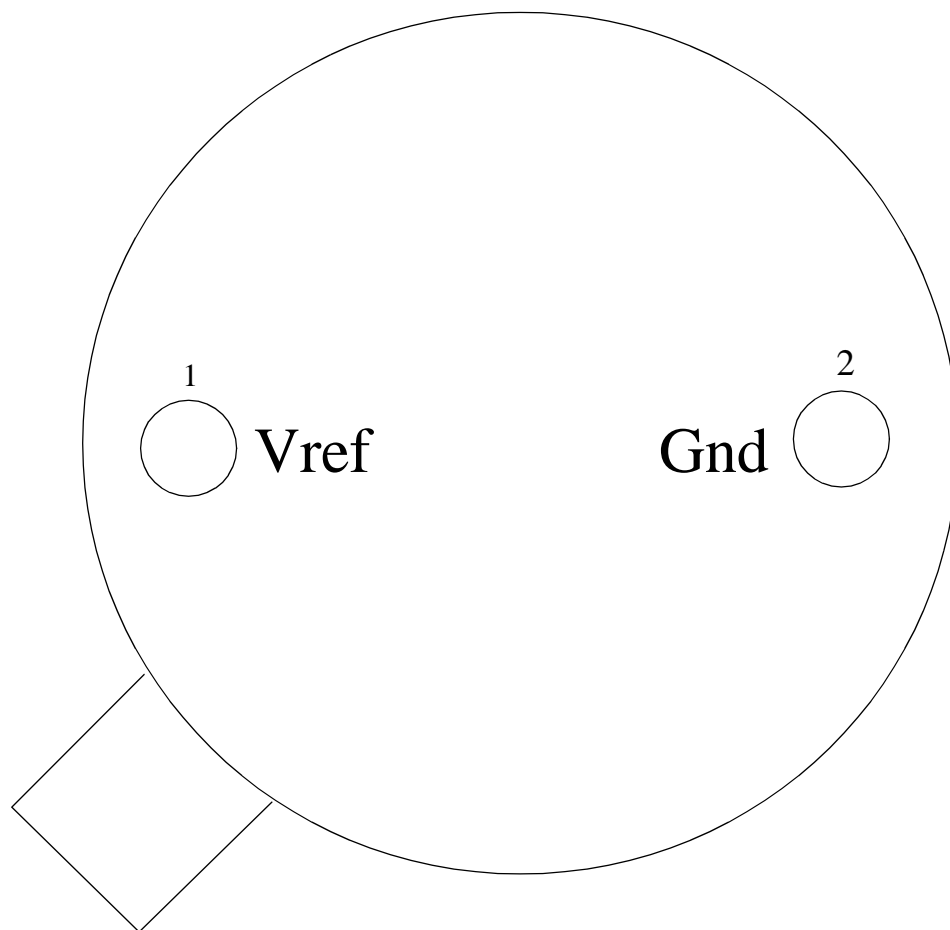
MIL-PRF-38535  
CONFIGURATION CONTROL

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	SCALE	SIZE	DRAWING NUMBER	REV
DRW'G: T. LEQUANG	05/04/1994	N/A	C	(SC)MKT-H02A	E
ENGR. CHK.					
National Semiconductor 2800 Semiconductor Dr., Santa Clara, CA 95052-8090					
METAL CAN TO-46, 2 LEAD, .100 DIA P.C.					
DO NOT SCALE DRAWING SHEET 1 of 1					





LM185H-2.5  
2 - LEAD TO-46  
CONNECTION DIAGRAM  
BOTTOM VIEW  
P000364B