

MNLM199A-X REV 0CL

 Original Creation Date: 08/15/95
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PRECISION VOLTAGE REFERENCE

General Description

The LM199 are precision, temperature-stabilized monolithic zeners offering temperature coefficients a factor of ten better than high quality reference zeners. Constructed on a single monolithic chip is a temperature stabilizer circuit and an active reference zener. The active circuitry reduces the dynamic impedance of the zener to about 0.5ohms and allows the zener to operate over 0.5 mA to 10 mA current range with essentially no change in voltage or temperature coefficient. Further, a new subsurface zener structure gives low noise and excellent long term stability compared to ordinary monolithic zeners. The package is supplied with a thermal shield to minimize heater power and improve temperature regulation.

The LM199 references are exceptionally easy to use and free of the problems that are often experienced with ordinary zeners. There is virtually no hysteresis in reference voltage with temperature cycling. Also, the LM199 is free of voltage shift due to stress on the leads. Finally, since the unit is temperature stabilized, warm up time is fast.

The LM199 can be used in almost any application in place of ordinary zeners with improved performance. Some ideal applications are analog to digital converters, calibration standards, precision voltage or current sources or precision power supplies. Further in many cases the LM199 can replace references in existing equipment with a minimum of wiring changes.

The LM199 series devices are packaged in a standard hermetic To-46 package inside a thermal shield. The LM199 is rated for operation from -55 C to +125 C.

Industry Part Number

LM199

NS Part Numbers

 LM199AH-SMD*
 LM199AH/883

Prime Die

LM199

Controlling Document

5962-8856101XA*

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

(Absolute Maximum Ratings)

Temperature Stabilizer Voltage	40V
Reverse Breakdown Current	20 mA
Forward Current	1 mA
Reference to Substrate Voltage (Note 1)	40V -0.1V
Operating Temperature Range	-55 C to +125 C
Storage Temperature Range	-55 C to +125 C
Soldering Information	
T0-92 package (10 sec.)	+260 C
T0-46 Package (10 Sec.)	+300 C
ESD Tolerance (Note 2)	3500V

Note 1: The substrate is electrically connected to the negative terminal of the temperature stabilizer. The voltage that can be applied to either terminal of the reference is 40 V more positive or 0.1V more than the substrate.

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
Vr	Reverse Breakdown Voltage	$0.5\text{mA} \leq I_r \leq 10\text{mA}$			6.8	7.1	V	1, 2, 3
Delta Vr	Reverse Breakdown Voltage Change with Current	$0.5\text{mA} \leq I_r \leq 10\text{mA}$				9.0	mV	1, 2, 3
Vnrms	Zener Rms Noise Voltage	$I_r = 1\text{mA}$, $V_h = 40\text{V}$, $10\text{Hz} < \text{Freq} < 10\text{KHz}$				20.0	uV	1
Ihpk	Peak Heater Current	$V_h = 40\text{V}$, 1 % Duty Cycle				200	mA	1
I1	Leakage Zener to Substrate	$V_h = 40\text{V}$				250	nA	1
Delta Vz/Delta T	Reverse Breakdown Temperature Coefficient	$I_r = 1\text{mA}$, $-55\text{C} \leq T_A \leq 85\text{C}$	3			0.5	ppm/C	1
		$I_r = 1\text{mA}$, $85\text{C} \leq T_A \leq 125\text{C}$	3			10.0	ppm/C	1
Zr	Reverse Dynamic Impedance	$I_r = 1\text{mA}$	1			1	Ohm	1
Ih	Stabilized Heater Current	$V_h = 30\text{V}$ (tested after 5 seconds of heater turn on time)				30	mA	1
		$V_h = 30\text{V}$ (Still air)	2			14	mA	2
			2			85	mA	3
Vnpk	Zener Peak Noise Voltage	$I_r = 1\text{mA}$, $V_h = 40\text{V}$, $10\text{Hz} < \text{Freq} < 10\text{KHz}$				80	uV	1
Vf	Forward Voltage	$I_r = 1\text{mA}$			-1.6		V	1

Note 1: Guaranteed by "Reverse Breakdown Voltage Change with Current".

Note 2: Guaranteed parameter, not tested.

Note 3: Tested on Auto Drift test oven.

Revision History

Rev	ECN #	Rel Date	Originator	Changes
0CL	M0004114	02/24/03	Rose Malone	Update MDS: MNLM199A-X, Rev. 0BL to MNLM199A-X, Rev. 0CL. Added ESD Level in Absolute Maximum Ratings Section.