

MNLM135-X REV 0B0

Original Creation Date: 07/10/95

Last Update Date: 02/24/03

Last Major Revision Date: 07/10/95

PRECISION TEMPERATURE SENSOR

General Description

The LM135 is a precision, easily-calibrated, integrated circuit temperature sensor. Operating as a 2-terminal zener, the LM135 has a breakdown voltage directly proportional to absolute temperature at + 10mV/K. With less than 1 Ohm dynamic impedance the device operates over a current range of 400uA to 5 mA with virtually no change in performance. When calibrated at 25C the LM135 has typically less than 1 C error over a 100C temperature range. Unlike other sensors the LM135 has a linear output. The low impedance and linear output make interfacing to readout or control circuitry especially easy.

This device is tested only at room temperature.

Industry Part Number

LM135

NS Part Numbers

LM135H-MIL

LM135H-MLS

Prime Die

LM135

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

- Directly calibrated in degrees Kelvin.
- 1 degree C initial accuracy available.
- Operated from 400 uA to 5mA.
- Less than 1 Ohm dynamic impedance.
- Easily calibrated.
- Wide operating temperature range.

(Absolute Maximum Ratings)

(Note 1)

Reverse Current	15mA
Forward Current	10 mA
Storage Temperature T0-46 Package	-60 C to +180 C
Maximum Junction Temperature	150 C
Specified Operating Temperature Range (Note 2)	-55 C to +125 C
Thermal Resistance	
ThetaJA (Still Air)	279 C/W
(500LF/Min Air flow)	117 C/W
ThetaJC	46 C/W
Lead Temperature (Soldering, 10 seconds)	300 C
ESD Tolerance (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 specification and test condition, 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: Continuous operation at these temperatures for 10,000 hours may decrease life expectancy of the device.

Note 3: 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
V _z	Zener Voltage	V _{adjust} = open, I _z = 0.4mA			2.85	3.15	V	1
		V _{adjust} = 1.5V, I _z = 1mA			2.50	3.50	V	1
		V _{adjust} = 0.2V, I _z = 1mA			2.30	3.00	V	1
		V _{adjust} = 2.8V, I _z = 1mA			3.10	4.00	V	1
		V _{adjust} = open, I _z = 1mA, 18 °C < T _C < 36 °C			2.88	3.12	V	1
	Delta R.V.Z.	Change in settling time; 800mS to 100mS V _{adjust} =open, I _z = 0.4mA			-3.0	3.0	mV	1
	Relative Zener Voltage	V _{adjust} =open, I _z =1mA	1		-28.0	28.0	mV	1
		V _{adjust} =open, I _z =0.707mA			-27.0	27.0	mV	1
I _{adj}	Adjust Current	V _{adjust} = 1.5V, I _z =1mA			-150	150	uA	1
		V _{adjust} = 0.2V, I _z =1mA			-150	150	uA	1
		V _{adjust} = 2.8V, I _z =1mA			-150	150	uA	1
Delta Z	Delta Zener Voltage	Change in Load Current; 0.4mA to 5mA V _{adjust} = open			-9.8	9.8	mV	1
V _f	Forward Voltage	I _z = -10 mA			-1.40	-0.50	V	1

Note 1: Difference between a known device and a measured device. One degree change in centigrade = one degree change in Kelvin. 10mV = approx. 1C.

Revision History

Rev	ECN #	Rel Date	Originator	Changes
0B0	M0004115	02/24/03	Rose Malone	Update MDS: MNLM135-X, Rev. 0A0 to MNLM135-X, Rev. 0B0. Added ESD Level in Absolute Maximum Ratings Section.