Appendix C: Temperature Sensor LM 35

Introduction

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full -55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a -55° to +150°C temperature range, while the LM35C is rated for a -40° to +110°C range (-10° with improved accuracy). The LM35 series is available packaged in hermetic TO-46 transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D is also available in an 8-lead surface mount small outline package and a plastic TO-220 package.

Features

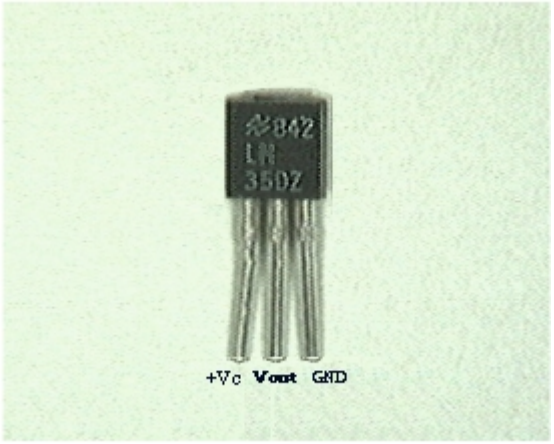
- Calibrated directly in ° Celsius (Centigrade).
- Linear + 10.0 mV/°C scale factor.
- 0.5°C accuracy guarantee able (at +25°C).
- Rated for full -55° to +150°C range.
- Suitable for remote applications.
- Low cost due to wafer-level trimming.
- Operates from 4 to 30 volts.
- Less than 60 µA current drain.

- Low self-heating, 0.08°C in still air.
- Non-linearity only ±¼°C typical.
- Low impedance output, 0.1 Ohm for 1 mA load.

Use of LM35s to Measure Temperature

Temperature can be measured more accurately than a using a thermistor. The sensor circuitry is sealed and not subject to oxidation, etc.

The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified see figure below.



LM35