

JEDEC STANDARD

Measurement of Temperature Coefficient of Voltage Regulator Diodes

JESD5

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JEDEC SOLID STATE TECHNOLOGY ASSOCIATION



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JEDEC STANDARD No. 5

MEASUREMENT OF TEMPERATURE COEFFICIENT
OF
VOLTAGE REGULATOR DIODES

Formerly JEDEC Suggested Standard No. 5-A

Prepared by JEDEC JC-22.4 Committee on Signal and Regulator Diodes

FOREWORD

The material contained herein was developed by the EIA/JC-22.4 Committee on Signal and Regulator Diodes of the Joint Electron Device Engineering Council. It has been approved for publication by the JEDEC Solid State Products Engineering Council as a JEDEC Standard.

This document is issued in the form of a JEDEC Standard so that it may be applied immediately to new devices.

MEASUREMENT OF TEMPERATURE COEFFICIENT OF VOLTAGE-REGULATOR DIODES

PURPOSE

This standard is designed to define voltage-temperature characteristic measurement techniques and method of calculation. Although many methods could be defined, this method provides a desired uniformity and lends itself to production testing.

GENERAL

- I. Temperature coefficient and voltage variation with temperature are parameters describing the voltage-temperature characteristics of regulator and reference diodes as referenced below:
 - A. The linear voltage regulator temperature coefficient is properly stated in terms of $\%/^{\circ}\text{C}$ or millivolts $/^{\circ}\text{C}$.
 - B. The nonlinear voltage reference diode voltage variation with temperature is described by a maximum allowable voltage variation in millivolts with a specified temperature change.

TEST METHOD

- I. V_Z
 - A. V_Z is measured at I_Z . Tolerance of this current(s) is understood to be $I_Z \pm 1\%$ unless otherwise defined. In the event a range of I_Z is required, the tolerance of V_Z is specified such that all devices fall within this tolerance at the test current extremes. Temperature tolerance shall be $\pm 1^{\circ}\text{C}$ unless otherwise defined.

- B. The device will be measured at $T_1, T_2, T_3 \dots T_n$, where T_1 is the lowest temperature, and T_n is the highest temperature.

PROCEDURE

- I. The device is subjected to $T_1, T_2, T_3, \dots T_n$ and the corresponding voltages $V_1, V_2, V_3 \dots V_n$ are obtained at thermal equilibrium.*

- A. When a current range is specified, the following is applicable: Each voltage shall be measured at the extremes of the specified current range and the expression under calculation must be maximized.

- B. Calculation

$$\Delta V_{Z(\text{temp})} = V_{hi} - V_{lo}$$

where V_{hi} = highest voltage reading at any temperature

$$T_1, T_2, T_3, \dots T_n *$$

V_{lo} = lowest voltage reading at any temperature

$$T_1, T_2, T_3, \dots T_n *$$

$\Delta V_{Z(\text{temp})}$ shall be determined separately at each current extreme for current range devices.

The highest magnitude value temperature coefficient of regulator voltage for regulator diodes may be expressed in terms of $\%/^{\circ}\text{C}$ by the calculation

$$\alpha_{VZ} = \frac{100 \Delta V_{Z(\text{temp})}}{V_Z (T_n - T_1)} \quad (V_Z \text{ at } 25^{\circ}\text{C})$$

Temperature coefficient expression in terms of $\%/^{\circ}\text{C}$ or millivolts $/^{\circ}\text{C}$ is not recommended for reference diodes due to nonlinearity of the voltage variation. A voltage change over the defined temperature range is the preferred expression.

- * A condition of thermal equilibrium may be considered to have been achieved if halving the time between the application of power and the taking of the reading causes no error in the indicated result within the required accuracy of measurement. For these purposes very long pulses or step functions may be considered as steady-state dc.



Standard Improvement Form

JEDEC JESD5

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1. I recommend changes to the following:

☐ Requirement, paragraph number _____

☐ Test method number _____ Paragraph number _____

The referenced paragraph number has proven to be:

☐ Unclear ☐ Too Rigid ☐ In Error

☐ Other _____

2. Recommendations for correction:

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