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**NATIONAL STANDARD OF THE  
PEOPLE'S REPUBLIC OF CHINA**

**GB/T 7017-2025**

Replacing GB/T 7017-1986

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**Method of measurement of non-linearity in resistors**

电阻器非线性测量方法

**(English Translation)**

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## Foreword

This document is in accordance with GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting is scheduled.

This document replaces GB/T 7017-1986 "Methods for Nonlinear Measurement of Resistors". Compared with GB/T 7017-1986, the only changes are structural adjustments.

Aside from editorial changes, the main technical changes are as follows.

- a) Added normative reference to IEC 60068-1 (see Chapter 2, 5.1);
- b) The terms "electromotive force," "nonlinearity," and "third harmonic ratio" and their definitions have been added (see Chapter 3);

- c) Added content that should be specified in the relevant component specifications (see Chapter 5);
- d) A set of recommended test conditions for samples with rated power consumption of less than 100mW has been added (see Table 1).

This document adopts IEC 60440:2012 "Methods for measuring nonlinear resistance".

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the Ministry of Industry and Information Technology of the People's Republic of China.

This document is under the jurisdiction of the National Technical Committee on Standardization of Resistor and Capacitor Components for Electronic Equipment (SAC/TC165).

## 1 Scope

The nonlinear testing method described in this document is a method for evaluating the integrity of resistive components. It serves as an effective online screening method.

This method is applicable to detecting and eliminating potential early failures of passive components.

Typical factors causing nonlinearity in resistance include. uneven spots within the resistive film, thin film traces left in the spiral grooves, and connecting leads or terminals.

Unstable contact between the head and the resistive element, etc.

This document describes a measurement method and related test conditions for evaluating the magnitude of nonlinear distortion generated in resistance. If phase this method is used when detailed specifications are provided or an agreement is reached between the customer and the manufacturer.

## 2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

IEC 60068-1 Overview and Guidelines for Environmental Testing Note. GB/T 2421-2020 Overview and Guidelines for Environmental Testing (IEC 60068-1:2013, IDT)

### 3 Terms and Definitions

The following terms and definitions apply to this document.

electromotive force

The potential difference that generates current.

non-linearity

A voltage with harmonic frequency is generated under the action of a sinusoidal current, causing the impedance of the component to deviate from Ohm's law.

Third harmonic ratio A3 the ratio of the base voltage to the third harmonic electromotive force.

**Note 1:** The third harmonic ratio is expressed in decibels (dB).

**Note 2:** The third harmonic ratio was previously referred to as third harmonic attenuation. This historical convention is misleading because it incorrectly implies the attenuation from the testing equipment.

Harmonic frequencies are attenuated or filtered by the components used in the test. Therefore, it is advisable to avoid using misleading terminology.

#### 4.1 Measurement Principle

When a sinusoidal current flows through the component under test, if the component's impedance is non-linear, the voltage across the component will be distorted and contain harmonics. Measurement