

ICS 31.040.01
CCS L 13



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

GB/T 7016-2025

Replacing GB/T 7016-1986

**Method of measurement of current noise generated in fixed
resistors**

固定电阻器电流噪声测量方法

(English Translation)

Issued on: December 2, 2025

Implemented on: July 1, 2026

Issued by: State Administration for Market Regulation

Table of Contents

Preface
1 Scope
2 Normative References
3 Terms and Definitions
4 Measurement Method
4.1 Noise Basics
4.1.1 Noise
4.1.2 Thermal noise
4.1.3 Current noise
4.2 Measurement Principles
4.3 Measurement System
4.3.1 Recommended Measurement System
4.3.2 Optional Measurement Systems
4.4 Measurement System Requirements
4.4.1 Input Circuit
4.4.2 Isolation resistor value R_M
4.4.3 DC Voltage Source
4.4.4 DC Voltmeter
4.4.5 Calibrate the resistor value R_{Cal}
4.4.6 Calibration Source
4.4.7 Verification of Calibration Voltage
4.4.8 AC Bandpass Amplifier
4.4.9 Alternating Current Meter
4.4.10 Test Fixture
4.5 Determination of the Measurement System
4.5.1 Performance checks are performed using instrument measurements and thermal noise analysis. (9)
4.5.2 Performance checks through repeated measurements
5 Measurement Procedure
5.1 Environmental Conditions
5.2 Sample Preparation
5.3 Program

- 5.3.1 General Rule
- 5.3.2 Calibration
- 5.3.3 Measurement of System Noise Figure S
- 5.3.4 Measurement of Total Noise Figure T
- 5.4 Protective Measures
- 6 Evaluation of Measurement Results
 - 6.1 System Noise Correction
 - 6.2 Determination of Current Noise Index A1
 - 6.3 Determination of Current Noise Voltage Ratio (CNRU)
 - 6.4 Accuracy
 - 6.5 Requirement
- 7 Detailed specifications should include the following content.
- Appendix A (Informative) Letters, Symbols, and Abbreviations
 - A.1 Letter Symbols
 - A.2 Abbreviation

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 7016-1986 "Method for Measuring Current Noise in Fixed Resistors". Compared with GB/T 7016-1986, it differs in the following aspects.

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

---Added terms "current noise", "current noise index", "precise current noise index", "current noise voltage ratio", "noise", and "thermal noise".

The term "noise" and its definition were removed, along with the terms "noise voltage," "thermal noise voltage," "current noise voltage," and "current noise index." Definition (see Chapter 3, Chapter 3 of the 1986 edition);

---The configuration conditions for the isolation resistor value R_M under recommended operating conditions have been changed (see Table 2, Table 1 in the 1986 edition);

---A set of recommended operating conditions for test samples with rated power consumption less than 100mW has been added (see Table 2, Table 1 in the 1986 edition);

---The error in the system noise correction factor for $f(TS)$ has been corrected (see Table 3, Table 2 in the 1986 edition);

---Added recommendations for relevant detailed specifications (see Chapter 7).

This document adopts IEC 60195:2016 "Method for measuring current noise in fixed resistors".

The following minimal editorial changes have been made to this document.

---Specific clauses are cited in the text; Chapter 2, normative references, should be changed to date references.

---The terms "flicker noise" and "scattering noise" in Chapter 3 were not used in the entire text and have been deleted;

---Informative Appendix X has been removed.

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 measurement methods and related test conditions described in this document are applicable to evaluating the current noise level in various types of fixed resistors. The purpose is...

Select resistors that are noise-sensitive in electronic circuits and provide comparable measurement results.

Current noise reflects the granular structure of the resistive material and serves as a marker for identifying defects in resistors with the same film layer and structure. These defects are key characteristics of the component.

The root cause of abnormal aging under the influence of temperature and time.

The methods described in this document are not general specification requirements; therefore, if specified in relevant detailed specifications, or by the customer and manufacturer, they should be interpreted accordingly.

If an agreement is reached between the parties, then this method applies.

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.

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.

current noise

The combination of all random fluctuations in the current within a resistor.

Note: Current noise is not caused by thermal oscillation of charge carriers (thermal noise), but depends on the applied DC current.

Current noise index

The effective value of open-circuit current noise voltage at tenth harmonics [in microvolts (μV)] and the DC voltage applied in the test [in volts] the logarithmic exponent of the ratio of (V).

Note 1: Current noise is expressed in decibels (dB). The ratio of microvolts (μV) to volts (V), without considering unit differences, results in a value smaller than the precise current noise index $A'1$.

120dB, this index is derived from a previous revision of the method.

Note 2: For letter symbols and abbreviations in this document, see Appendix A.

Using the same units of measurement, the effective value of open-circuit current noise voltage at tenth harmonics [in volts (V)] is compared with the DC applied in the experiment.

The logarithmic exponent of the ratio of voltages [in volts (V)].

Note: The accurate current noise index is expressed in decibels (dB), and the value is derived mathematically from the relevant parameters.