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

GB/T 46973-2026

**Technical specification for high temperature superconducting
thin films for microwave passive devices**

微波无源器件用高温超导薄膜技术规范

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1. Structure and Drafting Rules of Standardization Documents". Drafting. 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 Chinese Academy of Sciences. This document is under the jurisdiction of the National Technical Committee on Standardization of Superconductivity (SAC/TC265). This document was drafted by: Tianjin Haixin Electronics Co., Ltd., Institute of Physics, Chinese Academy of Sciences, University of Electronic Science and Technology of China, and Songshan Lake Materials Laboratory. The laboratory, Nankai University, and the 16th Research Institute of China Electronics Technology Group Corporation. The main drafters of this document are: Ji Laiyun, Sun Yandong, Gao Zeyu, Wu Yun, Yang Jingting, Zeng Cheng, Tao Bowan, Ji Lu, and Xu Youping. Technical Specifications for High-Temperature Superconducting Thin Films for Microwave Passive Devices

1 Scope

GB/T 46973-2026 is the Chinese national standard covering the superconducting film from which microwave filters are made - the substrate and the film's critical temperature and current, the surface resistance at microwave frequencies that is the whole reason for using it, and the uniformity across the wafer. These filters sit at the front end of base stations and radio telescopes, where they reject interference no conventional filter can. First edition, under the Chinese Academy of Sciences. It was issued on 28 January 2026 and has been in force since 1 August 2026, as a first edition. The document is under the responsibility of the Chinese Academy of Sciences. This page is published from the official record of the 2026 edition; the clause text of a standard this recent is not yet in circulation, and the figures, limits and tables it contains are those of the document itself, delivered in full with the English translation.

This document specifies the technical requirements, packaging, marking, transportation, and storage of high-temperature superconducting thin films for microwave passive devices,

and describes the corresponding test procedures. Verification method. This document applies to high-temperature superconducting thin films used in microwave passive devices within the field of superconducting materials science.

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 14140 Method for testing the diameter of semiconductor wafers

GB/T 17711 Test method for DC resistance of yttrium barium copper oxide (123 phase) superconducting thin films at critical temperature T_c

GB/T 22586 Electronic Properties Measurement - Surface Resistance of Superconductors at Microwave Frequencies

GB/T 28786-2012 Vacuum Technology - Method for Measuring the Bond Strength of Vacuum Coated Layers - Adhesive Tape Method

GB/T 30857 Test method for thickness and thickness variation of sapphire substrates

GB/T 33826 Stylus profilometer method for measuring the thickness of nanofilms on glass substrates

GB/T 36969 Method for determining the thickness of nanofilms using atomic force microscopy in nanotechnology

GB/T 39843-2021 Measurement of Electronic Properties. Local Critical Current Density and Its Distribution in Large-Area Superconducting Films

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1 Thin-layer superconductors with an average thickness of less than 1 μm grown on a specific substrate material. Note

1.The substrate material is usually a single crystal material. Note

2.Superconducting thin films are usually prepared by physical vapor deposition, chemical vapor deposition or other processes.

3.2 critical temperature T_c The highest temperature at which a superconductor exhibits superconductivity is reached under zero current and zero magnetic field strength. [Source:

GB/T 2900.100-2017, 815-10-09]

3.3 Jc The current density across the entire cross-section of a conductor when the current through it is the critical current. [Source: GB/T 2900.100-2017, 815-12-03, with modifications]

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