

ICS 77.120.99

CCS H 65



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

GB/T 23595.1-2025

Replacing GB/T 23595.1-2009

**Test methods of rare earth phosphors for LED - Part 1:
Determination of spectrum**

LED用稀土荧光粉试验方法 第1部分：光谱的测定

Issued on: January 24, 2025

Implemented on: August 1, 2025

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

Foreword

Introduction

1 Scope

2 Normative references

3 Terms and definitions

3.1 Excitation spectrum

3.2 Emission spectrum emissionspectrum

3.3 lambdap

4 Principles of the method

Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is part 1 of GB/T 23595 Test methods for rare earth phosphors for LEDs. GB/T 23595 has been published for the following part.

- Part 1: Determination of spectrum;
- Part 2: Determination of relative brightness;
- Part 3: Determination of chromaticity coordinates;
- Part 4: Determination of high temperature and high humidity performance;
- Part 5: Determination of pH value;
- Part 6: Determination of electrical conductivity;
- Part 7: Determination of thermal quenching properties;
- Part 8: Determination of high voltage accelerated aging performance.

This document replaces GB/T 23595.1-2009 "Test methods for rare earth yellow phosphors for white light LED lamps Part 1: Spectral performance Compared with GB/T 23595.1-2009, in addition to structural adjustments and editorial changes, the main technical changes are as follows.

a) Changed the scope of application from "440nm~480nm" to "350nm~480nm" (see

Chapter 1, 2009 Edition) Chapter 1);

b) Added terms and definitions (see Chapter 3);

c) The principle of the method has been changed (see Chapter 4, Chapter 2 of the 2009 edition);

d) The accuracy of the fluorescence spectrophotometer has been changed (see 5.1, 3.1 of the 2009 edition);

e) The excitation spectrum measurement range has been changed (see 5.3, 3.3 of the 2009 edition);

f) Added sample requirements (see Chapter 6)

g) Added requirements for test environment (see Chapter 7);

h) The test steps have been changed (see Chapter 8, Chapter 4 of the 2009 edition);

i) The precision has been changed (see Chapter 10, Chapter 6 of the 2009 edition).

Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents.

This document was proposed and coordinated by the National Rare Earth Standardization Technical Committee (SAC/TC229).

This document was drafted by: YUYAN Rare Earth New Materials Co., Ltd., Jiangsu Borui Optoelectronics Co., Ltd., Jiangmen Keheng Industrial Co., Ltd.

Co., Ltd., Guangdong Academy of Sciences Resource Utilization and Rare Earth Development Institute, Tianjin Baotou Steel Rare Earth Research Institute Co., Ltd., High-tech Co., Ltd., Xiamen Rare Earth Materials Research Institute, and Baotou Rare Earth Research Institute.

The main drafters of this document are: Liu Ronghui, Liu Yuanhong, Chen Xiaoxia, Liang Chao, Huang Ruitian, Ni Haiyong, Tang Zongquan, Ding Jianhong, Wang Anli, Song Lijun, Liu Yayuan, Xie Shihui, Lin Fulin, Zhang Xia, Xu Huibing, Zhang Minghui, and Zhang Juan.

This document was first published in 2009 and this is the first revision.

Introduction

With the continuous development of semiconductor lighting and display technology, higher requirements are placed on the performance of phosphors.

The use of blue LED yellow phosphor has developed into the use of ultraviolet-blue LED blue-green/yellow/yellow-green/red phosphors, as well as blue LED green/red phosphors, including garnet structure aluminate yellow/yellow-green phosphors, nitride red phosphors, silicate LED rare earth phosphor products of mainstream systems such as salt green/yellow

phosphor, nitrogen oxide blue-green phosphor, etc. are becoming more and more diverse.

The comprehensive performance requirements of products are getting higher and higher, especially the new requirements for product reliability.

With the upgrading of local phosphor products and technologies, it is necessary to establish a unified evaluation method that conforms to the existing technology.

GB/T 23595 "Test methods for rare earth phosphors for LEDs" consists of 8 parts.

- Part 1: Determination of spectrum;
- Part 2: Determination of relative brightness;
- Part 3: Determination of chromaticity coordinates;
- Part 4: Determination of high temperature and high humidity performance;
- Part 5: Determination of pH value;
- Part 6: Determination of electrical conductivity;
- Part 7: Determination of thermal quenching properties;
- Part 8: Determination of high voltage accelerated aging performance.

In recent years, with the development of semiconductor lighting technology, the number of phosphor systems has gradually increased, and its application areas have continued to expand, including ordinary color rendering, high Market segments such as color rendering, full spectrum, high-power lighting and general color gamut display require higher precision in the excitation and emission spectra of phosphors.

In terms of spectrum testing instruments, the detection speed, measurement range, stability and measurement accuracy of phosphor samples have been significantly improved. The current national standard stipulates The test range, test accuracy and error cannot meet the actual application requirements. This document focuses on the expansion of the scope of application, test method The increase of light sources in the principle of the method and the upgrade of equipment accuracy have made the measurement steps and parameter requirements of the spectrum clearer.

The test method improves the accuracy and applicability of product testing, which is helpful for domestic and foreign LED rare earth phosphor manufacturers and related industries Production guidance and usage specifications.

Test methods for rare earth phosphors for LED Part 1: Determination of spectra

1 Scope

This document describes the method for determining the spectrum of rare earth phosphors for LEDs excited by ultraviolet to blue light with wavelengths from 350nm to 480nm.

This document is applicable to the determination of the spectrum of rare earth phosphors for LEDs excited by ultraviolet light to blue light with a wavelength of 350nm~480nm.

2 Normative references

GB/T 5838.1

GB/T 8170

3 Terms and definitions

The terms and definitions defined in GB/T 5838.1 and the following apply to this document.

3.1 Excitation spectrum

The intensity of a certain spectral line or spectral band of luminescence is distributed along with the wavelength or frequency of the excitation light.

[Source. GB/T 5838.1-2015, 2.59, modified]

3.2 Emission spectrum emissionspectrum

The distribution of the number of emitted photons or light (radiation) power by wavelength or frequency.

[Source. GB/T 5838.1-2015, 2.63, modified]

3.3 λ_{max}

The wavelength corresponding to the peak with the largest number of photons or light (radiation) power in the emission spectrum.

[Source. GB/T 24982-2020, 3.5, modified]

4 Principles of the method

Use a xenon lamp as the light source and split it with a monochromator, or use an LED monochromatic light source to excite the sample with light of a specific wavelength and then use a spectrum detector to Spectral scanning is performed to obtain the emission spectrum of the sample. Using a xenon lamp as the light source and a certain emission wavelength as the monitoring wavelength, different wavelengths of light are used for excitation.

The spectrum detector is used to detect and obtain the excitation spectrum of the sample.