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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 2414.2-2025

Replacing GB/T 2414.2-1998

Test methods for the properties of piezoelectric ceramics - Transverse length extension vibration mode for bar

电压陶瓷材料性能试验方法 长条横向长度伸缩振动模式

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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.

This document is Part 2 of GB/T 2414, "Test Methods for Properties of Piezoelectric Ceramic Materials". GB/T 2414 has the following parts published.

- Part 1: Radial Expansion and Contraction Vibration Modes of a Disc;

- Part 2: Long strip transverse length stretching vibration mode.

This document replaces GB/T 2414.2-1998 "Test Methods for Performance of Piezoelectric Ceramic Materials - Transverse Length Expansion Vibration Modes of Strips", and is consistent with...

Compared with GB/T 2414.2-1998, apart from structural adjustments and editorial changes, the main technical changes are as follows.

a) The uncertainty of the experiment was removed (see Chapter 6 of the 1998 edition);

b) The "transmission circuit method" test method has been removed (see 6.2.1 in the 1998 edition).

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 and is under the jurisdiction of the National Technical Committee on Standardization of Marine Ships (SAC/TC12).

This document was drafted by: Haiying Enterprise Group Co., Ltd. and Shanghai Institute of Ceramics, Chinese Academy of Sciences.

The main drafters of this document are: Jiang Xingbing, Zhang Hui, Yang Min, Meng Linyun,

and Liang Ruihong.

This document was first published in 1981, revised for the first time in 1998, and this is the second revision.

Introduction

Piezoelectric ceramics possess the characteristic of converting external forces into electrical energy; that is, they can convert extremely weak mechanical vibrations into electrical signals, and simultaneously convert electrical signals into electrical signals.

By replacing mechanical vibration with this property of piezoelectric ceramics, it has been widely applied in sonar systems, weather detection, and household appliances.

GB/T 2414 "Test Methods for Performance of Piezoelectric Ceramic Materials" is proposed to consist of two parts.

- Part 1: Radial Stretching Vibration Modes of Circular Piezoelectric Ceramics. The aim is to define the performance parameters of piezoelectric ceramics under radial stretching vibration modes. Numerical representation.

- Part 2: Transverse Length Expansion Vibration Modes. The aim is to define the properties of piezoelectric ceramics in transverse expansion vibration modes.

Energy parameter characterization.

Test methods for the properties of piezoelectric ceramic materials Long strip transverse length stretching vibration mode

1 Scope

This document describes the testing methods for the dielectric, piezoelectric, and elastic properties of transverse length stretching vibration modes of piezoelectric ceramic materials.

This document applies to the testing of transverse length extension vibration mode parameters of piezoelectric ceramic materials.

2 Normative references

GB/T 2413

GB/T 3389.1

3 Terms and Definitions

The terms and definitions defined in GB/T 3389.1 apply to this document.

4.1 Equivalent Circuit and Characteristic Frequency

The electromechanical characteristics of a piezoelectric ceramic oscillator that vibrates freely in a single mode near its resonant frequency can be represented by the equivalent circuit shown in Figure 1.

It is represented by a series branch consisting of a dynamic capacitor (C1), a dynamic inductor (L1), and a dynamic resistor (R1), connected in parallel with a parallel capacitor (C0).

Near the resonant frequency, these parameters can be considered independent of the frequency. Figure 1 Equivalent circuit Based on the equivalent circuit shown in Figure 1, the admittance of the piezoelectric ceramic oscillator can be expressed by formula (1). Y=jomegaC0 R1 j(omegaL1-1/omegaC1)= Y0 Y1(1) In the formula.

Y0 --- Admittance of the parallel branch, Y0=jomegaC0, unit is Siemens (S);

Y1 --- Admittance of the series branch, Y1= R1 j(omegaL1-1/omegaC1) The unit is Siemens (S);