

**Waveguide type dielectric resonators –
Part 2: Guide to the use of waveguide
type dielectric resonators**

Withdrawn

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Waveguide Type Dielectric Resonators
Part2: Guide to the use of waveguide type dielectric
resonators

導波管型誘電体共振器
第2部：導波管型誘電体共振器の使用法

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WAVEGUIDE TYPE DIELECTRIC RESONATORS –**Part 2: Guide to the use of waveguide type dielectric resonators****FOREWORD**

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IEC-PAS 61338 was submitted by the Japanese Institute of Electronics, Information and Communication Engineers and has been processed by IEC technical committee 49: Piezoelectric and dielectric devices for frequency control and selection.

The text of this PAS is based on the following document:

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FOREWORD

The role of the microwave communication systems is becoming greater and greater in the recent information age. The dielectric resonator is growing in importance as a key element for microwave components such as the filters for hand-held phones and the oscillators for broadcasting satellite TVs. This comes from the fact that the dielectric resonator has a capability to reduce the size of microwave components drastically.

For the understanding and wider use of dielectric resonator, it is indispensable to standardize its items such as the terms and definitions, test conditions, measurement methods of materials constants, and guide to the use.

International Electrotechnical Commission located in Geneva is actively working for the international standardization in the electrotechnical field. Among many Technical Committees (TCs) in IEC, TC 49 is working on the Piezoelectric and Dielectric Devices for Frequency Control and Selection. TC 49 has ten Working Groups (WGs), and the Working Group 10 (WG10) is working for the preparation and deliberation of the IEC standard on the surface acoustic wave and dielectric devices.

The Japanese National Committee for IEC/TC 49/WG 10 proposed and drafted the following three documents, which has been already published as a series of the IEC Standards on waveguide type dielectric resonators.

IEC 61338-1-1 : Waveguide type dielectric resonators, Part 1: General information and test conditions, Section 1: General information.

IEC 61338-1-2 : Waveguide type dielectric resonators, Part 1-2: General information and test conditions - Test condition.

IEC 61338-1-3 : Waveguide type dielectric resonators, Part 1-3: Measurement method of complex relative permittivity for dielectric resonator materials at microwave frequency.

This document should be issued as IEC 61338-2: Waveguide type dielectric resonators, Part 2: Guide to the use of waveguide type dielectric resonators. When the Japanese National Committee for IEC/TC 49 proposed a new work item proposal for this document as the fourth proposal to complete the set of standards on waveguide type dielectric resonators, this proposal, however, was not approved, because only two countries; Germany and Japan, nominated experts to participate this project. According to the IEC rule for the New Work Item Proposal, it is required to start a new project that more than four P-member countries should nominate the name of experts and this proposal failed. But, the Japanese National Committee for IEC/TC 49 decided to continue the work to draft this standard, even if it was not approved, because we believed that this should be a very fundamental, useful and mandatory document in the field of dielectric resonators, and asked the Dielectric Device Group in the Working Group on surface acoustic wave devices and dielectric devices (WG 10). Now, this document has been completed and is published as a standard of the Institute of Electronics, Information and Communication Engineers.

This standard is a fruit of collecting wisdom in the field of advanced technology in Japan and it is open for public as a standard of the Institute of Electronics, Information and Communication Engineers. And it is expected that this standard will contribute to the development of technology in this fast growing field. And this standard will be submitted to the IEC in the track of IEC PAS (Publicly Available Specification) for international circulation.

Finally, I would like to express my sincere appreciation to Professor Yoshio Kobayashi, Chairman, Professor Takao Chiba, Co-chairman, Dr. Hiroshi Tamura, Secretary, and all members of the Dielectric Device Group in the Working Group on surface acoustic wave devices and dielectric devices (WG 10) of the Japanese National Committee for IEC/TC 49, for their efforts to develop this standard

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Waveguide Type Dielectric Resonators

Part 2: Guide to the use of waveguide type dielectric resonators

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1. Introduction

This chapter gives practical guidance on the use of waveguide type dielectric resonators that are used in telecommunications and radar systems. Refer to preceding chapters for general information, standard values, and test conditions.

The features of these dielectric resonators are small size without degradation of quality factor, low mass, high reliability and high stability against temperature and ageing. The dielectric resonators are suitable for applications to miniaturized oscillators and filters with high performance.

This standard has been compiled in response to a generally expressed desire on the part of both users and manufacturers for a guide to the use of dielectric resonators, so that the resonators may be used to their best advantage. For this purpose, general and fundamental characteristics have been explained in this guide.

2. Scope

The scope of this guide is limited to the waveguide type dielectric resonators that are used for oscillator and filter applications. These types of resonators are now widely used in oscillators for direct broadcasting or communication satellite systems, oscillators for radio links, voltage controlled oscillators for mobile communication systems and so on. In addition, these dielectric resonators are also used as an essential component of miniaturized filters for the same kind of applications.

It is not the aim of this guide either to explain theory or to attempt to cover all the eventualities that may arise in practical circumstances. This guide draws attention to some of the more fundamental questions, which should be considered by the user before he places an order for dielectric resonators for a new application. Such a procedure will be the user's insurance against unsatisfactory performance.

Standard specifications, such as those in the IEC standard of which this guide forms a part, and national specifications or detail specifications issued by manufacturers, will define the available combinations of resonance frequency, quality factor, temperature coefficient of resonance frequency, etc. These specifications are compiled to include a wide range of dielectric resonators with standardized performances. It cannot be over-emphasized that the user should, wherever possible, select his dielectric resonators from these specifications, when available, even if it may lead to making small modifications to his circuit to enable standard resonators to be used. This applies particularly to the selection of the nominal frequency.