



# SLOVENSKI STANDARD SIST EN IEC 63185:2021

01-marec-2021

---

## Merjenje kompleksne permitivnosti dielektričnih substratov z uravnoteženo metodo krožnega diskovnega resonatorja (IEC 63185:2020)

Measurement of the complex permittivity for low-loss dielectric substrates balanced-type circular disk resonator method (IEC 63185:2020)

Messung der komplexen Dielektrizitätskonstante für verlustarme dielektrische Substrate nach dem symmetrischen Kreisscheibenresonatorverfahren (IEC 63185:2020)

Méthode au résonateur à disque circulaire de type symétrique pour mesurer la permittivité complexe des substrats diélectriques à faible perte (IEC 63185:2020)

<https://standards.iteh.ai/catalog/standards/sist/c4831502-6218-4f11-bbb7-801971317caf/sist-en-iec-63185-2021>

Ta slovenski standard je istoveten z: **EN IEC 63185:2021**

---

### ICS:

33.120.30      Radiofrekvenčni konektorji      RF connectors  
(RF)

**SIST EN IEC 63185:2021**

**en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN IEC 63185:2021](#)

<https://standards.iteh.ai/catalog/standards/sist/c4831502-6218-4f11-bbb7-891971317caf/sist-en-iec-63185-2021>

EUROPEAN STANDARD

EN IEC 63185

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2021

ICS 33.120.30

English Version

Measurement of the complex permittivity for low-loss dielectric substrates balanced-type circular disk resonator method  
(IEC 63185:2020)

Méthode au résonateur à disque circulaire de type symétrique pour mesurer la permittivité complexe des substrats diélectriques à faible perte  
(IEC 63185:2020)

Messung der komplexen Dielektrizitätskonstante für verlustarme dielektrische Substrate nach dem symmetrischen Kreisscheibenresonatorverfahren  
(IEC 63185:2020)

This European Standard was approved by CENELEC on 12 January 2021. CEN and CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN and CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN and CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

<https://standards.iteh.ai/catalog/standards/sist/c4831502-6218-4f11-bbb7->

CEN and CENELEC members are the national standards bodies and national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom



European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

**EN IEC 63185:2021 (E)****European foreword**

The text of document 46F/523/FDIS, future edition 1 of IEC 63185, prepared by SC 46F "RF and microwave passive components" of IEC/TC 46 "Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 63185:2021.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-10-12
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024-01-12

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

**Endorsement notice**

The text of the International Standard IEC 63185:2020 was approved by CENELEC as a European Standard without any modification.

(standards.iteh.ai)

SIST EN IEC 63185:2021

<https://standards.iteh.ai/catalog/standards/sist/c4831502-6218-4f11-bbb7-891971317caf/sist-en-iec-63185-2021>

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61338-1-3	1999	Waveguide type dielectric resonators - Part 1-3: General information and test conditions - Measurement method of complex relative permittivity for dielectric resonator materials at microwave frequency	EN 61338-1-3	2000
IEC 62810	2015	Cylindrical cavity method to measure the complex permittivity of low-loss dielectric rods	EN 62810	2015

<https://standards.iteh.ai/catalog/standards/sist/c4831502-6218-4f11-bbb7-891971317caf/sist-en-iec-63185-2021>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN IEC 63185:2021](#)

<https://standards.iteh.ai/catalog/standards/sist/c4831502-6218-4f11-bbb7-891971317caf/sist-en-iec-63185-2021>



IEC 63185

Edition 1.0 2020-12

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Measurement of the complex permittivity for low-loss dielectric substrates  
balanced-type circular disk resonator method**

**Méthode au résonateur à disque circulaire de type symétrique pour mesurer la  
permittivité complexe des substrats diélectriques à faible perte**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 33.120.30

ISBN 978-2-8322-9133-7

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references .....	5
3 Terms and definitions .....	5
4 Measurement parameters .....	6
5 Theory and calculation equations .....	6
6 Measurement system.....	8
7 Measurement procedure .....	9
7.1 Preparation of measurement apparatus.....	9
7.2 Adjustment of measurement conditions .....	9
7.3 Calibration of a vector network analyzer .....	9
7.4 Measurement of complex permittivity of test sample .....	10
7.5 Periodic checkup of metal in resonator.....	10
Annex A (informative) Example of measurement results and associated uncertainties for complex permittivity .....	11
Bibliography.....	13
Figure 1 – Structure of a circular disk resonator .....	7
Figure 2 – Relations between resonant frequency and relative permittivity.....	8
Figure 3 – Schematic diagram of a vector network analyzer measurement system.....	9
Figure 4 – Frequency response of $ S_{21} $ of balanced-type circular disk resonator .....	10
Table A.1 – Parameters of the cavity and the sheet sample .....	11
Table A.2 – The resonant frequencies and unloaded Q-factors .....	11
Table A.3 – Measurement results of complex permittivity .....	12

**ITh STANDARD PREVIEW**  
 (standards.iteh.ai)  
 https://standards.iteh.ai/catalog/standards/sist/c4831502-6218-4f11-bbb7-891971317caf/sist-en-iec-63185-2021



## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MEASUREMENT OF THE COMPLEX PERMITTIVITY  
FOR LOW-LOSS DIELECTRIC SUBSTRATES  
BALANCED-TYPE CIRCULAR DISK RESONATOR METHOD**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 63185 has been prepared by subcommittee 46F: RF and microwave passive components, of IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
46F/523/FDIS	46F/531/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

## **iTeh STANDARD PREVIEW (standards.iteh.ai)**

[SIST EN IEC 63185:2021](#)

<https://standards.iteh.ai/catalog/standards/sist/c4831502-6218-4f11-bbb7-891971317caf/sist-en-iec-63185-2021>