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Measurement of the conductivity for metal thin films at microwave and millimeter-wave frequencies - Balanced-type circular disk resonator method

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FOREWORD

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IEC 63616 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. It is an International Standard.

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

Draft	Report on voting
46F/722/FDIS	46F/734/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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– reconfirmed,
– withdrawn, or
– revised.

1 Scope

This document relates to a conductivity measurement method of thin metal films at microwave and millimeter-wave frequencies. This method has been developed to evaluate the conductivity of a metal foil used for adhering to a substrate or the interfacial conductivity of a metal layer formed on a dielectric substrate. It uses higher-order modes of a balanced-type circular disk resonator and provides broadband conductivity measurements by using a single resonator.

In comparison with the conventional method described in IEC 61788-7 [1][1], this method has the following characteristics:

– the value of the conductivity σ of a metal foil can be measured accurately and non-destructively;
– the value of the interfacial conductivity σ of a metal layer on a dielectric substrate can be measured accurately and non-destructively;
– this method presents broadband measurements by using higher-order modes by one resonator;
– this method is applicable for the measurements under the following conditions:
  - frequency: 10 GHz $\leq f \leq$ 170 GHz;
  - conductivity: 10^5 S/m $\leq \sigma \leq$ 10^8 S/m.

2 Normative references

There are no normative references in this document.

[1] Numbers in square brackets refer to the Bibliography.