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Cavity resonator method to measure the complex permittivity of low-loss dielectric plates

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CAVITY RESONATOR METHOD TO MEASURE THE COMPLEX PERMITTIVITY OF LOW-LOSS DIELECTRIC PLATES

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

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

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
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A bilingual version of this publication may be issued at a later date.

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CAVITY RESONATOR METHOD TO MEASURE THE COMPLEX PERMITTIVITY OF LOW-LOSS DIELECTRIC PLATES

1 Scope

The object of this International Standard is to describe a measurement method of dielectric properties in the planar direction of dielectric plate at microwave frequency. This method is called a cavity resonator method. It has been created in order to develop new materials and to design microwave active and passive devices for which standardization of measurement methods of material properties is more and more important.

This method has the following characteristics:

- the relative permittivity ε' and loss tangent $\tan\delta$ values of a dielectric plate sample can be measured accurately and non-destructively;
- temperature dependence of complex permittivity can be measured;
- the measurement accuracy is within 0,3 % for ε' and within 5×10^{-6} for $\tan\delta$;
- fringing effect is corrected using correction charts calculated on the basis of rigorous analysis.

This method is applicable for the measurements on the following condition:

– frequency : 2 GHz $<$ f $<$ 40 GHz;

– relative permittivity: 2 $<$ ε' $<$ 100;

– loss tangent : 10^{-6} $<$ $\tan\delta$ $<$ 10^{-2}.