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# PRE-STANDARD

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

## 1 Scope

This PAS describes the measurement method of dielectric properties in the planer direction of dielectric plate at microwave frequency in order to develop new materials and to design microwave active and passive devices. This method is called a cavity resonator method.

This method has the following characteristics:

- the relative permittivity $\varepsilon'$ 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 $\varepsilon'$ and within 5 $\times 10^{-6}$ for tan $\delta$;
- fringing effect is corrected using correction charts calculated on the basis of rigorous analysis.

This method is applicable for measurements in the following conditions:

- frequency : 2 GHz < $f$ < 40 GHz;
- relative permittivity : 2 < $\varepsilon'$ < 100;
- loss tangent : $10^{-6}$ < tan $\delta$ < $10^{-2}$.