

3M Advanced Materials Division

Dielectric Properties

3D Printed PTFE

Background

The outstanding electrical insulating properties of PTFE are due to the symmetrical, non-polar structure of this polymer. PTFE test samples, 3D printed using 3M's proprietary printing process, were tested for dielectric constant and dielectric loss. The results of these tests at 1 KHz, 1 MHz, and 9.5 GHz show that the 3D printed PTFE maintains the favorable dielectric properties of traditionally processed PTFE.

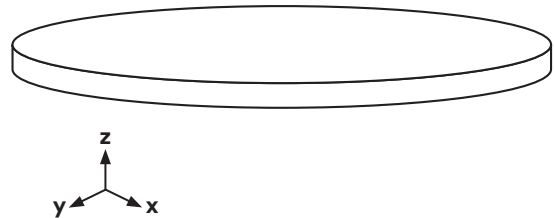
Test Methods

Measurements at 1 KHz and 1 MHz were made according to ASTM D150.

Measurements at 9.5 GHz were made using a Split Post Dielectric Resonator method.^{1,2}

Sample Description

3D printed PTFE disk horizontally printed in the x-y plane, machined to 1 mm thickness.



1 kHz		1 MHz		9.5 GHz	
Dielectric Constant (eps)	Dielectric Loss (tan δ)	Dielectric Constant (eps)	Dielectric Loss (tan δ)	Dielectric Constant (eps)	Dielectric Loss (tan δ)
2.1	0.0001	2.1	<0.0002	2.1	0.0003

Average values. Not for specification.

References

1. *Dielectric and Conductor-Loss Characterization and Measurements on Electronic Packaging Materials*. Baker-Jarvis J., Janezic M., Riddle B., Holloway C., Paulter N., and Blendell J. NIST Technical Note 1520, 2001.
2. *Dielectric and Magnetic Properties of Printed Wiring Boards and Other Substrate Material*. Baker-Jarvis J., Riddle B., and Janezic M. NIST Technical Note 1512, 1999.

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