睿龙科技

RHC350A

Thermal Conductivity Ceramic Filled PTFE/Woven Fiberglass Laminate for Microwave Printed Circuits Boards

RHC350A is a woven fiberglass reinforced, ceramic filled, PTFE-based composite. RHC350A is designed to provide enhanced heat-transfer through “Best-In-Class” thermal conductivity, while reducing dielectric loss and insertion loss. Lower losses result in higher Amplifier and Antenna Gains / Efficiencies.

The increased thermal conductivity of RHC350A provides higher power handling, reduces hot-spots and improves device reliability. This higher heat transfer within the substrate complements designs using coins, heat sinks or thermal via to provide designers additional design margin in managing heat. In designs with limited thermal management options, RHC350A significantly improves heat transfer where the primary thermal path is through the laminate. This results in reduced junction temperatures and extends the life of active components, which is critical for improving power amplifier reliability, extending MTBF and reducing warranty costs. In addition, lower operating temperatures and chip-matching thermal expansion characteristics provide better reliability for component attachment prone to solder fatigue, solder softening and joint failure.

RHC350A has excellent Dielectric Constant Stability across a wide temperature range. This helps Power Amplifier and Antenna designers maximize gain and minimize dead bandwidth lost to dielectric constant drift as operating temperature changes. Dielectric constant stability is also critical to phase and impedance sensitive devices such as network transformers utilized for impedance matching networks utilized in power amplifier circuitry or in Wilkinson Power Dividers.

RHC350A has low Z-Direction CTE which matches copper. This feature provides unsurpassed plated through hole reliability. RHC350A is a "soft substrate" that meets military standard requirements for vibration and shock resistance testing.

RHC350A enjoys a strong bond to copper, utilizing microwave grade low profile copper. Unlike ceramic hydrocarbons that need to utilize “toothy copper” to achieve acceptable bond, RHC350A utilizes relatively smooth copper. This results in even lower insertion loss due to skin effect losses of copper that are more obvious at higher RF and microwave frequencies.

Features:

- “Best in Class” Thermal Conductivity(0.8 W / m K)
- Dielectric Constant Stability across Wide Temperatures(- 9 pp m / ℃)
- Very Low Loss Tangent provides Higher Amplifier or Antenna Efficiency
- Priced Affordably for Commercial Application
- High Peel Strength for Reliable Copper Adhesion in thermally stressed applications
- Meet Military Standard for Shock and Impact Resistance Test

Benefits:

- Heat Dissipation and Management
- Improved Processing and Reliability
- Large Panel Sizes for Multiple Circuit Layout for lowered Processing Costs

Typical Applications:

- Power Amplifiers, Filters and Couplers
- Tower Mounted Amplifiers (TMA) and Tower Mounted Boosters (TMB)
- Thermally Cycled Antennas sensitive to dielectric drift
- Microwave Combiner and Power Dividers

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Typical Properties：

Property	Units	Value	Test Method
1. Electrical Properties			
Dielectric Constant			
@ 10 GHz	-	3.50	IPC TM-650 2.5.5.5
Dissipation Factor			
@ 10 GHz	-	0.0020	IPC TM-650 2.5.5.5
Temperature Coefficient of Dielectric			
TCεr @ 10 GHz (-40-150°C)	ppm/°C	-9	IPC TM-650 2.5.5.5
Volume Resistivity			
C96/35/90	MΩ-cm	7.4×10^{6}	IPC TM-650 2.5.17.1
E24/125	MΩ-cm	1.4×10^{8}	IPC TM-650 2.5.17.1
Surface Resistivity			
C96/35/90	MΩ	3.2×10^{7}	IPC TM-650 2.5.17.1
E24/125	MΩ	4.3×10^{8}	IPC TM-650 2.5.17.1
Electrical Strength	Volts/mil (kV/mm)	780（31）	IPC TM-650 2.5.6.2
Dielectric Breakdown	kV	40	IPC TM-650 2.5.6
Arc Resistance	sec	>240	IPC TM-650 2.5.1
2. Thermal Properties			
Decomposition Temperature (Td)			
Initial	° C	520	IPC TM-650 2.4.24.6
5%	° C	567	IPC TM-650 2.4.24.6
T260	min	>60	IPC TM-650 2.4.24.1
T288	min	>60	IPC TM-650 2.4.24.1
T300	min	>60	IPC TM-650 2.4.24.1
Thermal Expansion, CTE (x,y) 50-150° C	ppm/° C	7.7	IPC TM-650 2.4.41
Thermal Expansion, CTE (z) 50-150° C	ppm/° C	23	IPC TM-650 2.4.24
% z-axis Expansion (50-260ºC)	%	1.2	IPC TM-650 2.4.24
3. Physical Properties			
Water Absorption	%	0.05	IPC TM-650 2.6.2.1
Density, ambient 23° C	g/cm3	2.3	ASTM D792 Method A
Thermal Conductivity	W/mK	0.8	ASTM D5470
Specific Heat	J/gK	0.9	ASTM E1461
Flammability	Class	V0	UL-94
4. Mechanical Properties			
Peel Strength to Copper (1 oz/35 micron)			
After Thermal Stress	lb/in (N/mm)	9(1.58)	IPC TM-650 2.4.8
At Elevated Temperatures (150°)	lb/in (N/mm)	10(1.75)	IPC TM-650 2.4.8.2
After Process Solutions	lb/in (N/mm)	8(1.4)	IPC TM-650 2.4.8
Young’s Modulus	kpsi (MPa)	/	IPC TM-650 2.4.18.3
Flexural Strength (Machine/Cross)	kpsi (MPa)	14/10 (97/69)	IPC TM-650 2.4.4
Tensile Strength (Machine/Cross)	kpsi (MPa)	11/8 (76/55)	IPC TM-650 2.4.18.3
Compressive Modulus	kpsi (MPa)	/	ASTM D-3410
Poisson’s Ratio	-	/	ASTM D-3039

Results listed above are typical properties, they are not to be used as specification limits. The above information creates no expressed or implied warranties. The properties of Relong laminates may vary depending on the design and application.

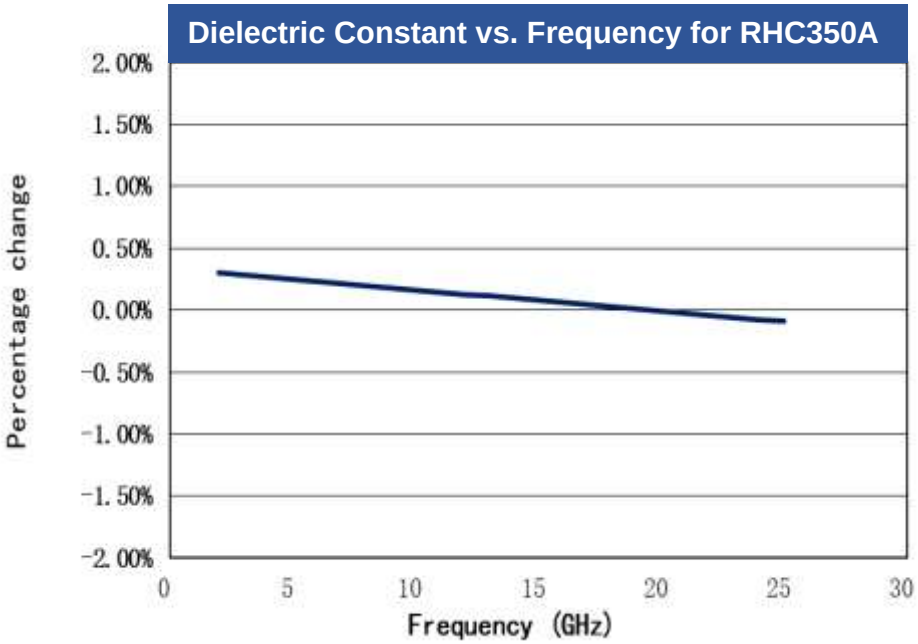

Figure 1
Demonstrates the Stability of Dielectric Constant across Frequency. This characteristic demonstrates the inherent robustness of RHC350A across Frequency, thus simplifying the final design process when working across EM spectrum. The stability of the Dielectric Constant of RHC350A over frequency ensures easy design transition and scalability of design.

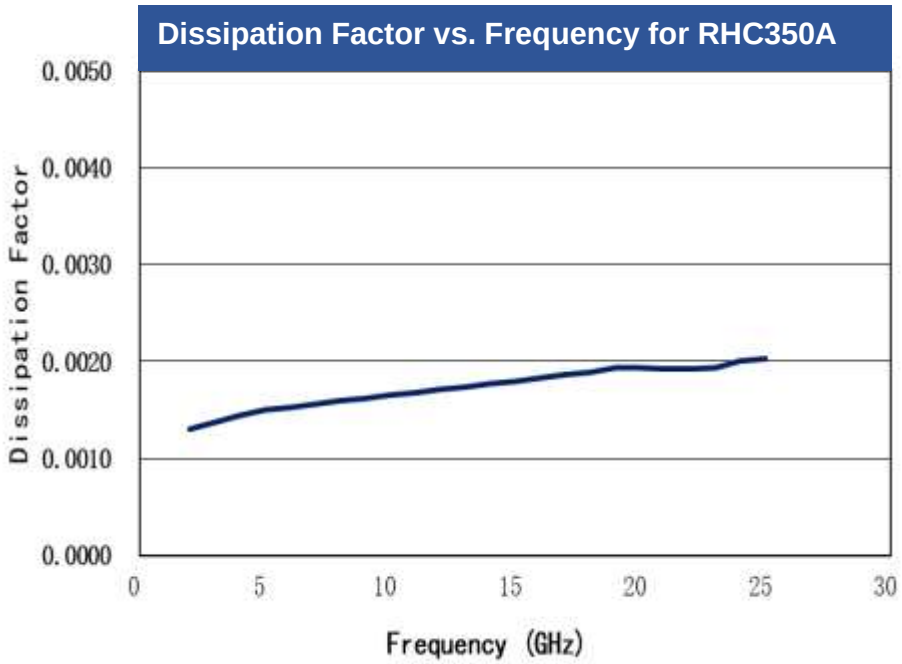

Figure 2
Demonstrates the Stability of Dissipation Factor across Frequency. This characteristic demonstrates the inherent robustness of RHC350A across Frequency, providing a stable platform for high frequency applications where signal integrity is critical to the overall performance of the application.

Material Availability:

RHC350A laminate is supplied with 1/2, 1 or 2 OZ electrodeposited or reverse treat copper on both sides. Other copper weights may be available. RHC350A is available bonded to heavy metal ground planes. Aluminum, brass or copper plates also provide an integral heat sink and mechanical support to the substrate.

When requesting samples of RHC350A product, please specify thickness, cladding, panel size, and any other special considerations. Available master sheet sizes is 54" x 48". Typical panel sizes include (but, are not limited to): 18" x 12"and 18" x 24".Contact Customer Service for other custom panel sizes.

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