

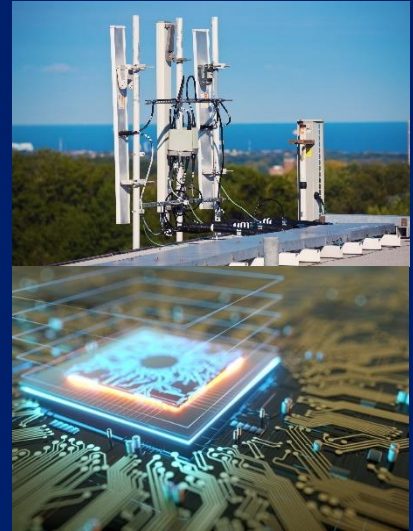
## Stable Performance Laminate

### Benefits

- Excellent PIM Values in PCBs (measured at lower than -160 dBc\*)
- Improved PTH Quality
- Stable Mechanical Properties
- Stable at High Frequencies
- Stable at High Temperatures
- Low Moisture Absorption
- Excellent Peel Strength
- Excellent Price/Performance Ratio

### Applications

- Antenna and Subcomponent
- RF Passive Components
- PA



RF-30A is an organic-ceramic laminate in AGC's family of RF substrates. It is based on woven glass reinforcement. RF30A is a result of AGC's expertise in both ceramic filler and PTFE coating technology. RF-30A is the best choice for low cost, high volume commercial microwave and radio frequency applications.

RF-30A exhibits more stable electrical and mechanical properties than designers need. This low loss dielectric substrate with low profile copper foil leads to stable electrical properties with better PIMD levels and lower insertion loss over broadband frequency range. More stable mechanical properties with lower CTE values, better dimensional stability, and harder rigidity can make RF components less affected by other factors.

RF-30A's excellent peel strength for 1/2 ounce and 1 ounce RT copper is a critical aspect when rework or repeated reflow process is required. An ultra low moisture absorption rate with stable loss tangent helps minimize phase shift along the different temperature or humidity environments. Less dimensional movement also contributes to stable phase or impedance properties over broadband frequency range.

RF-30A has been optimized with ceramic to have a low Z axis CTE for improved PTH reliability and ease of fabrication of multilayer circuits. These properties also contribute to more stable PIMD performance.

\*Measurement using manufactured PCB coupon with 20 watts per channel @ 800 and 1800 MHz.

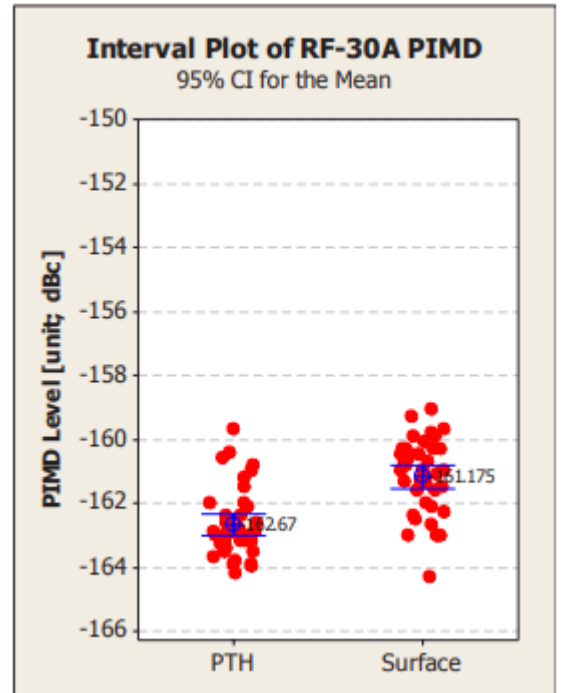
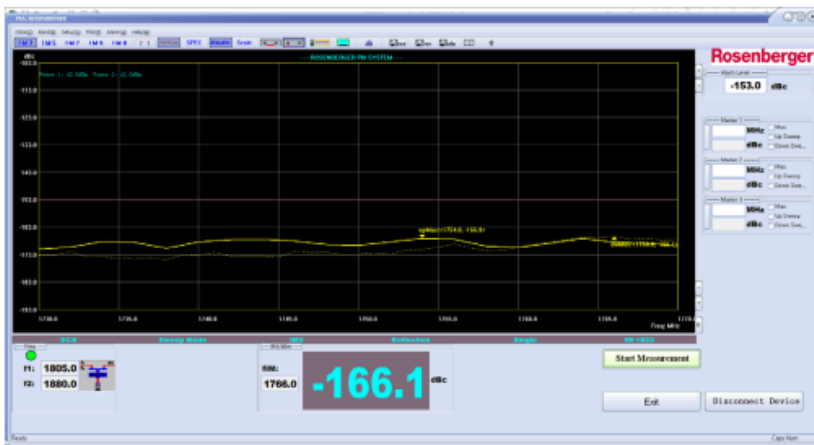
PIMD is Passive Intermodulation Distortion in multi-frequency communication systems. In general, there are many factors that contribute to PIMD properties: circuit design, power density distribution, connectors, cables, soldering, PCB processing, base material properties, and the best and worst PIM performing components. Other factors include: impedance discontinuities or improper signal cross-talk in complex circuitry design. Generally PTFE based laminates with very low profile copper foil – whether reverse treatment foil or very low profile/no profile copper – lead to the best performance.

In microstrip transmission line applications many additional factors can also contribute to PIM levels.

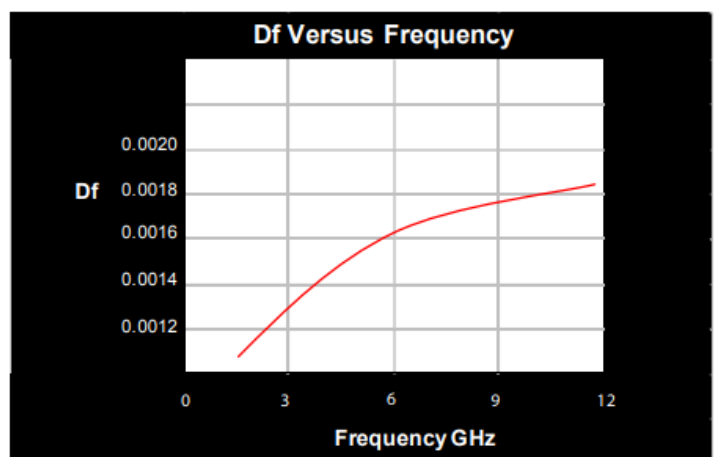
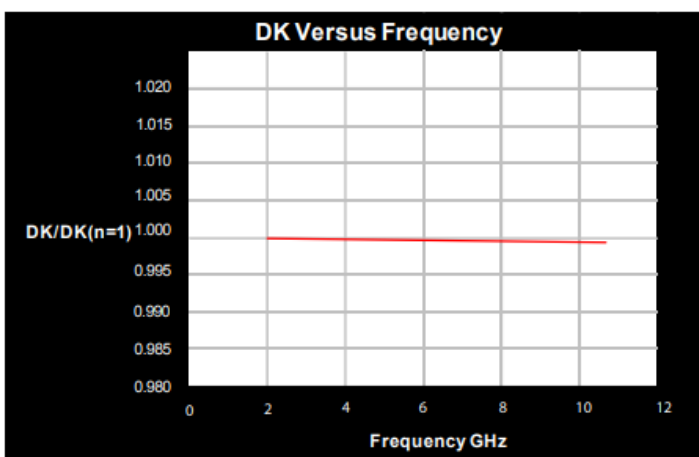
RF-30A exhibits very stable PIM performance and is less affected by other factors, as shown in examples of microstrip transmission PIM results with and without PTH.

RF-30A exceeds PIM requirements in PCBs of -153 dBc (measured between 880 and 960 MHz, between 1710 and 1880 MHz and between 1920 and 2170 MHz at 20 W power) with CL1/CL1 cladding when processed with today's state-of-the-art processes and process parameters.

Example of PIMD results on RF-30A-0600-CL1/CL1



Condition; 20Watt(43dBm) source near 1800MHz, frequency sweep  
Test coupons ; 50 Ohm microstripline with about 20 inch signal length



Properties	Conditions	Typical Value	Unit	Test Method
<b>Electrical Properties</b>				
Dielectric Constant	@ 1.9 GHz	2.97 ± 0.05		IPC-TM 650 2.5.5.5.1 mod
Dissipation Factor	@ 1.9 GHz	0.0013		IPC-TM 650 2.5.5.5.1 mod
	@ 10 GHz	0.0020		IPC-TM 650 2.5.5.5.1 mod
Volume Resistivity		3.0 x 10 <sup>9</sup>	Mohm-cm	IPC-650 2.5.17.1
Surface Resistivity		2.0 x 10 <sup>8</sup>	Mohms	IPC-650 2.5.17.1
<b>Thermal Properties</b>				
Thermal Conductivity		0.42	W/M*K	IPC-650 2.4.50
CTE (50-150°C)	X	8	ppm/°C	IPC-650 2.4.41
	Y	11		
	Z	60		
<b>Mechanical Properties</b>				
Specific Heat		0.95	J/gK	IPC-650 2.4.50
Density	Specific Gravity	2.16	g/cm <sup>3</sup>	IPC-TM-650 2.3.5
Flexural Strength	MD	126.5 (18,000)	N/mm <sup>2</sup> (psi)	IPC-650 2.4.18.3
	CD	119.5 (17,000)	N/mm <sup>2</sup> (psi)	IPC-650 2.4.19
Tensile Strength	MD	133.6 (19,000)	N/mm <sup>2</sup> (psi)	IPC-TM-650 2.4.18.3
	CD	105.5 (15,000)	N/mm <sup>2</sup> (psi)	IPC-650 2.4.19
Dimensional Stability	MD	0.049	% (30 mil)	IPC-650 2.4.39 (After Etch)
		0.025	% (60 mil)	
	CD	0.041	% (30 mil)	
		0.026	% (60 mil)	
	MD	0.049	% (30 mil)	IPC-650 2.4.39 (After Stress)
		0.019	% (60 mil)	
	CD	0.031	% (30 mil)	
		0.011	% (60 mil)	
<b>Chemical / Physical Properties</b>				
Flammability Rating			V-0	Internal

**Typical Thicknesses<sup>1</sup>**

Inches	mm
0.020	0.51
0.030	0.76
0.040	1.02
0.060	1.52

**Available Sheet Sizes<sup>2</sup>**

Inches	mm
12 x 18	305 x 457
16 x 18	406 x 457
18 x 24	457 x 610
36 x 48	914 x 1,220

\* All test data provided are typical values and not intended to be specification values. For review of critical specification tolerances, please contact a company representative directly.

\* RF-30A can be manufactured in increments of 0.010" (0.250mm).

\* Standard panel size is 18" x 24" (457 mm x 610 mm).

\* Please contact AGC for availability of additional thicknesses, other sizes & any other type of cladding.

