

## RF-30A – Stable Performance

RF-30A is an organic-ceramic laminate in Taconic's family of RF substrates. It is based on woven glass reinforcement. RF-30A is a result of Taconic'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 application.

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 broad-band 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 ½ ounce and 1 ounce RT copper shows a critical aspect whenever rework or repeated reflow process is required. Ultra low moisture absorption rate with stable loss tangent help minimized phase shift along the different temperature or humidity environments. Less dimensional movements also contribute to stable phase or impedance properties over broadband frequency range. Its low Z-CTE by optimized ceramic filler loading shows improved PTH reliability and multi-layer applicable characteristics. As results of the combination of above merits, circuits with RF-30A show more stable PIMD performance.

See "How to Order" on the back page for a complete product listing.

### Features and Benefits :

- Improved PIMD
- Improved PTH Quality
- Stable mechanical property
- Stable at high frequency
- Stable at high temperature
- Low moisture absorption
- Excellent peel strength
- Excellent price/performance ratio

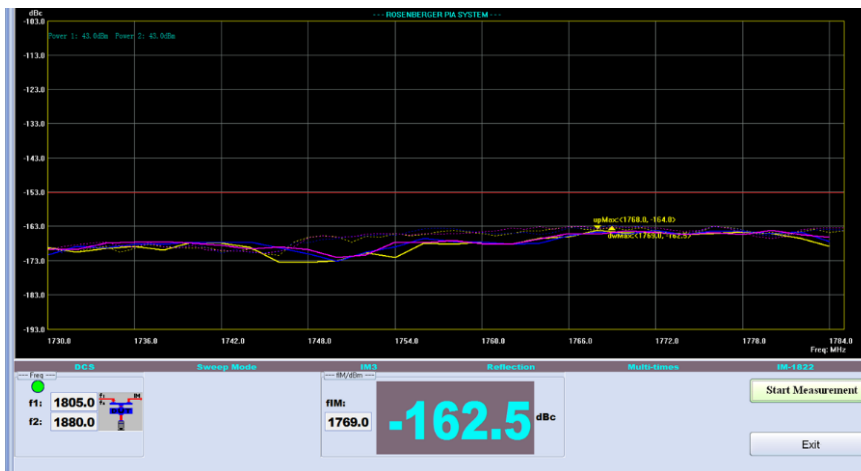
### Applications :

- Antenna and subcomponent
- RF passive components
- PA

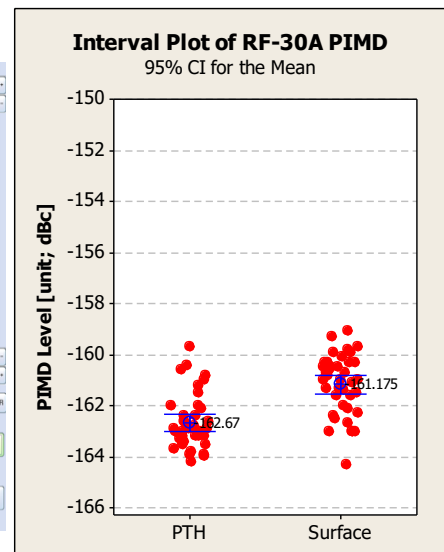
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- PIMD is Passive InterModulation Distortion in multi-frequency communication system. It is generally discussed that there are many factors to contribute on PIMD properties. Circuit design, power density distribution, connectors, cables, soldering, pcb processing, external circumstance and base material property are considered as its candidates. Among many factors, discontinuity on signal flow or improper signal cross-talking at complicate circuitry design is considered as major contribution. From time to time, laminates and pcbs are also discussed because the worst PIMD components can decide overall system PIMD levels. Generally PTFE based laminates with very low profile copper foil – whether reverse treatment foil or VLP copper – lead to best performance.
- In microstrip transmission line applications many additional factors can also contribute to its 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 with/without PTH coupons>



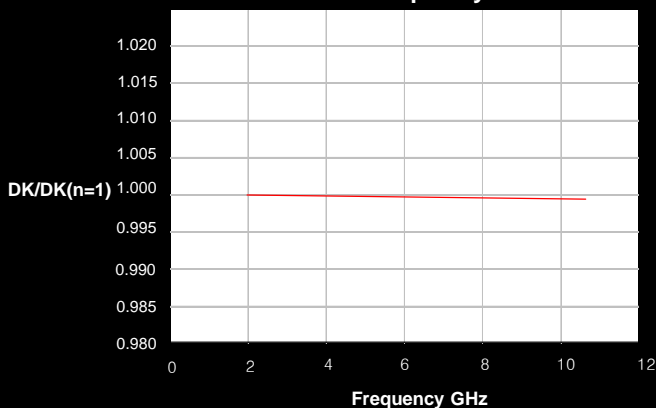
※ Condition; 20Watt(43dBm) source near 1800MHz, frequency sweep x5



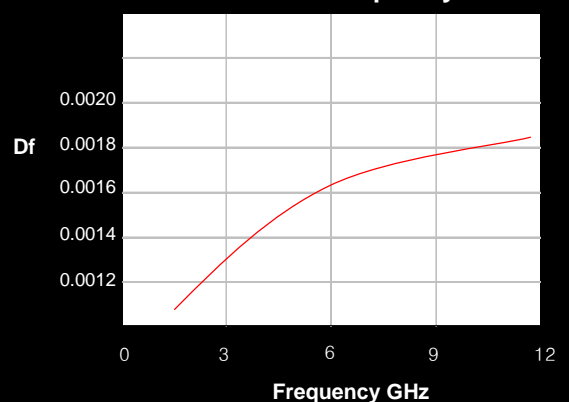
## RF-30A TYPICAL VALUES

| Property                      | Test Method                | Units             | Value                 | Units             | Value                 |
|-------------------------------|----------------------------|-------------------|-----------------------|-------------------|-----------------------|
| Dielectric Constant @ 1.9 GHz | IPC-TM 650 2.5.5.5.1 Mod   | -                 | 2.97±0.05             | -                 | 2.97±0.05             |
| Dissipation Factor @ 1.9 GHz  | IPC-TM 650 2.5.5.5.1 Mod   | -                 | 0.0013                | -                 | 0.0013                |
| Dissipation Factor @ 10 GHz   | IPC-TM 650 2.5.5.5.1 Mod   | -                 | 0.0020                | -                 | 0.0020                |
| Water absorption              | IPC-TM 650 2.6.2.1         | %                 | 0.05                  | %                 | 0.05                  |
| Peel Strength (1 oz. copper)  | IPC-TM 650 2.4.8           | Lbs./linear inch  | 12                    | N/mm              | 2.1                   |
| Volume Resistivity            | IPC-TM 650 2.5.17.1        | Mohm-cm           | 3.0 x 10 <sup>9</sup> | Mohm-cm           | 3.0 x 10 <sup>9</sup> |
| Surface Resistivity           | IPC-TM 650 2.5.17.1        | Mohm              | 2.0 x 10 <sup>8</sup> | Mohm              | 2.0 x 10 <sup>8</sup> |
| Flexural Strength Lengthwise  | IPC-TM 650 2.4.4           | psi               | 18,000                | N/mm <sup>2</sup> | 126.5                 |
| Flexural Strength Crosswise   | IPC-TM 650 2.4.4           | psi               | 17,000                | N/mm <sup>2</sup> | 119.5                 |
| Tensile Strength (MD)         | IPC-TM-650 2.4.18.3        | psi               | 19,000                | N/mm <sup>2</sup> | 133.6                 |
| Tensile Strength (TD)         | IPC-TM-650 2.4.19          | psi               | 15,000                | N/mm <sup>2</sup> | 105.5                 |
| Dimensional Stability (MD)    | IPC-TM-650 2.4.39 (Etch)   | % (30mil)         | 0.049                 | % (60mil)         | 0.025                 |
| Dimensional Stability (TD)    | IPC-TM-650 2.4.39 (Etch)   | % (30mil)         | 0.041                 | % (60mil)         | 0.026                 |
| Dimensional Stability (MD)    | IPC-TM-650 2.4.39 (Stress) | % (30mil)         | 0.049                 | % (60mil)         | 0.019                 |
| Dimensional Stability (TD)    | IPC-TM-650 2.4.39 (Stress) | % (30mil)         | 0.031                 | % (60mil)         | 0.011                 |
| Density                       | IPC-TM-650 2,3,5           | g/cm <sup>3</sup> | 2.16                  | g/cm <sup>3</sup> | 2.16                  |
| Specific Heat                 | IPC-TM-650 2.4.50          | J/g°C             | 0.95                  | J/g°C             | 0.95                  |
| Thermal Conductivity          | IPC-TM-650 2.4.50          | W/m/K             | 0.42                  | W/m/K             | 0.42                  |
| x-y CTE (50 ~ 150°C)          | IPC-TM 650 2.4.41          | ppm/°C            | 8-10                  | ppm/°C            | 8-10                  |
| z CTE (50 ~ 150°C)            | IPC-TM 650 2.4.41          | ppm/°C            | 60                    | ppm/°C            | 60                    |
| Flammability                  | Internal                   |                   | V-0                   |                   | V-0                   |

**DK Versus Frequency**



**Df Versus Frequency**



All reported values are typical and should not be used for specification purposes. In all instances, the user shall determine suitability in any given application.

# RF-30A – Stable Performance

| Designation | Dielectric Constant | Typical Thickness <sup>1</sup> |      | Typical Panel Size <sup>2</sup> |              |
|-------------|---------------------|--------------------------------|------|---------------------------------|--------------|
|             |                     | Inches                         | mm   |                                 |              |
| RF-30A      | 2.97 +/- 0.05       | 0.020"                         | 0.51 | 12"x18"                         | 305mmx457mm  |
|             |                     | 0.030"                         | 0.76 | 16"x18"                         | 406mmx457mm  |
|             |                     | 0.040"                         | 1.02 | 18"x24"                         | 457mmx610mm  |
|             |                     | 0.060"                         | 1.52 | 36"x48"                         | 914mmx1220mm |
|             |                     |                                |      |                                 |              |

<sup>1</sup> Standard RF-30A series can be manufactured in increments of 0.010" and minimum thickness is 0.0020". Please call for availability of additional thicknesses.

<sup>2</sup> Our Standard sheet size is 36"x48"(914mm X 1220mm). Please contact our customer service department for availability of other sizes.

| Available Copper Cladding |               |                  |        |                              |        |                                     |
|---------------------------|---------------|------------------|--------|------------------------------|--------|-------------------------------------|
| Designation               | Weight        | Copper Thickness |        | R <sub>ms</sub> Treated Side |        | Description                         |
| CVH (CH)                  | ½ oz./sq. ft. | ~ .0007"         | ~ 18µm | 19µin                        | 0.48µm | Very low profile / Electrodeposited |
| CV1 (C1)                  | 1 oz./sq. ft. | ~ .0014"         | ~ 35µm | 25µin                        | 0.64µm | Very low profile / Electrodeposited |
| CLH                       | ½ oz./sq. ft. | ~ .0007"         | ~ 18µm | 18µin                        | 0.46µm | Reverse Treated / Electrodeposited  |
| CL1                       | 1 oz./sq. ft. | ~ .0014"         | ~ 35µm | 16µin                        | 0.41µm | Reverse Treated / Electrodeposited  |
| C2                        | 2 oz./sq. ft. | ~ .0028"         | ~ 70µm | 27µin                        | 0.69µm | Electrodeposited                    |

**An example of a 30mil material with 1 oz. RTF Copper on both sides is part# :  
RF-30A-0300-CL1/CL1-18" x 24"(RF-30A-0300-CL1/CL1-457mm x 610mm)**



An ISO 9001:2008 Registered Company

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