

# CUMING MICROWAVE

Technical Bulletin 210-1

RoHS  
Compliant

## C-STOCK AK AND AK-500 LOW LOSS PLASTIC STOCK WITH ADJUSTED DIELECTRIC CONSTANT

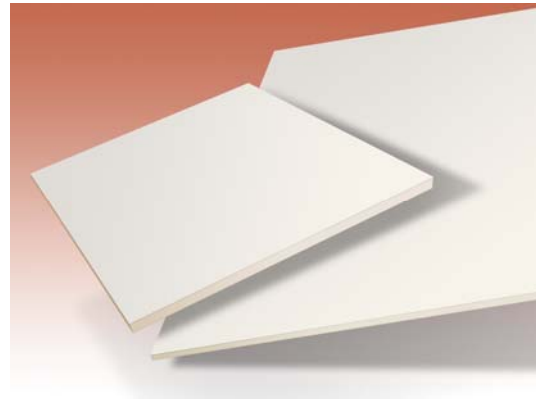
C-STOCK AK is a series of plastic stock materials with an adjusted dielectric constant and low loss tangent, intended for a variety of RF and microwave applications. The available dielectric constants range from 3 to 25.

C-STOCK AK is a ceramic filled cross-linked plastic and, unlike sintered ceramics, is readily machined with carbide tools. It has many applications as a dielectric spacer or circuit substrate, tapered permittivity transition, radome, RF lens, or other uses where a machined part of a specific dielectric constant is needed.

C-STOCK AK-500 is a similar product, having essentially the same electrical and mechanical properties as C-STOCK AK, except that it is made from a high temperature plastic which allows continuous use to 200°C (390°F), and short term exposure to 260°C (500°F).

### DIELECTRIC CONSTANT

C-STOCK AK and AK-500 are available in standard dielectric constants of 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, and 20. Other custom dielectric constants between these values and as high as 25 are also possible. The material is homogeneous and isotropic to within +/- 5% at all points within the material (+/- 10% for dielectric constant values above 15). Cuming Microwave can also quote the material to tighter tolerances on the dielectric constant when required.



### TYPICAL PROPERTIES

Color: White  
Loss Tangent: <0.002  
Dielectric Strength, kV/mm: >8 (>200 V/mil)  
Volume Resistivity, ohm-cm: >10<sup>12</sup>  
Specific Gravity: 2.2 – 2.5, depending on grade  
Thermal Expansion per °C: 36 x 10<sup>-6</sup>  
Thermal Conductivity: .001 cal-cm/sec-cm<sup>2</sup>-°C  
3.0 BTU-in/hr-ft<sup>2</sup>-°F  
Service Temperature (AK): -55 to +110 °C  
(-65 to +230 °F)  
short term exposure to 180 °C  
(AK-500): -55 to +200 °C  
(-65 to +390°F)  
short term exposure to 260°C.

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## MACHINING AND USE

C-STOCK AK and AK-500 are ceramic filled plastics, and can be machined using carbide or diamond tools. Relatively slow speeds should be used.

C-STOCK AK can be difficult to bond to other materials with adhesives. In most applications, mechanical attachment is used. C-STOCK AK can be bonded to itself using a silicone adhesive. It can also be bonded to other materials if those materials have first been primed with a silicone adhesive primer. Pre-preg film adhesives can be used to adhere a copper film to the material for circuit applications. Epoxy or cyanate ester adhesives can be used for bonding AK-500. Consult a sales engineer for more information.

## AVAILABILITY

All grades of C-STOCK AK and AK-500 are available in standard sheet sizes 12 in x 12 in (305 x 305 mm), in thicknesses of 1/4in, 3/8in, 1/2in, 1in, 2in, and 3in (6.4, 9.5, 12.7, 25.4, 50.8, and 76.2 mm). Unless tolerances are specified, the sheets are normally supplied "as cast", with skins and approx. 0.05 to 0.10 inches over the nominal thickness, and in a size larger than 12 inches.

All grades are also available in 12 in (305 mm) rods in standard diameters of .375 in, .50 in, and 1.00 in (9.5, 12.7, and 25.4 mm), as well as in other custom diameters. Rods are also supplied "as cast" unless machined dimensions are specified.

Cuming Microwave can also supply sheets precision ground to a specified thickness, and can machine parts to customer drawings. Custom shaped castings are also possible. Contact a Cuming Microwave sales engineer for more details.

Specify the material as C-STOCK AK (or AK-500) K=nn, a x b x c, where nn is the dielectric constant, and a, b, c are the dimensions, for example:

C-STOCK AK K=10.0, 12 x 12 x 0.5 inch, or  
C-STOCK AK-500 K=5.0, 12in by 1.0in  
diameter

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The information in this technical bulletin, although believed to be accurate, is not to be taken as a warranty for which Cuming Microwave assumes legal responsibility nor as permission or recommendation to practice any patented invention without license. It is offered for verification by the customer, who must make the final judgment of suitability for any application.

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