



# Q&A

## What are some key considerations when selecting high frequency board materials?



» **Art Aguayo, Sr. Market Development Manager, Rogers Corporation**

Determine the dielectric constant needed and the dielectric loss desired. There are many factors around these properties that are rarely captured in a data sheet or software property table, yet are very important in the selection of high frequency materials. Let's first look at dielectric constant, as important as the value of the material dielectric constant itself, the variation of this property needs to be taken into account. The variation can be in the nature of the material itself (frequency, temperature, moisture) or can be a product of manufacturing processes (within panel, panel to panel and lot to lot). In order to have a consistent product once it transfers

from product development to mass production, dielectric constant repeatability must be understood.

The second property to consider is the material's loss tangent (dielectric loss). Designers are often tasked to keep a certain loss budget under consideration. Conductor and dielectric losses need to be separated in order to reach a better estimate of needed loss tangent.



» **Jerry Posluszny, Mobile Mark, Inc.**

Since I work exclusively in the antenna field, my concerns may be different than, for instance, an RF power amp designer. Obviously, my first concern when evaluating a new PCB

material would be the dielectric constant and the loss of the materials. The dielectric constant effects the resonate lengths of antenna elements, so it is the primary concern. If I need to design an antenna to fit into a small enclosure, I would probably choose a high dielectric constant material. Typically the microwave materials I use have a dielectric constant of 2.2 to 4. The loss of the high frequency materials I use is approximately 0.002. This gives my antennas reasonably high efficiency.

The next concern when evaluating the board material are mechanical. How ridged is the board material? How stable is the material over the temperature range I'm designing for? How easy is it to fabricate? Can my partner P.C.B. fabrication houses process it?

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