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High Frequency... What Does it Mean, Anyway?

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Gary Breed
Editorial Director



This is the time of year when we begin planning our editorial coverage for next year. We take a fresh look at the industries we serve and do our best to identify trends in engineering techniques and technologies. We decide what application areas we should cover, which areas of engineering fundamentals to provide tutorial articles, and what types of products are worthy of featured coverage. We allow for plenty of articles on a wide range of other topics, too. After all, we can't make perfect predictions, and there are just too many areas where interesting work is happening.

Our choices are based on the way we define our mission. That mission is based on the set of engineering principles we call *high frequency*. These principles are the knowledge base of the engineers we serve and include the following:

- Frequency-dependent effects
- Transmission line principles
- Electromagnetics

These three things differentiate design at high frequencies from design at DC. At high frequencies *all* components and circuits exhibit these behaviors; there are no simple, ideal components. Although the magnitudes of each effect will vary with frequency and physical size, they are all present.

(Before too long, we may need to add a fourth principle to the list—atomic structure. Active and passive component development certainly involves this overlap with physics and materials science. And as work increases in the high mm-wave and THz region, those circuits and devices will rely heavily on this area of knowledge.)

We do not define our mission by frequency range (e.g., RF or microwave), or by specific application areas (e.g., wireless). We see our job as serving the engineers who have the specialized knowledge embodied in the above three principles. As years pass, those principles will be used to create products for new and different applications. For example, many years ago when I began playing with early microcomputers, no one would have guessed that we would have multi-GHz clock speeds and near-GHz bus speeds in our low cost personal computers!

Our broad definition of high frequency allows us to provide needed information to engineers working in high speed digital design, as well as advanced wireline systems, RF heating and sputtering, medical devices, and many other things that are not considered traditional communications-based RF and microwave applications.

For 2012, we will be searching for good articles on all active product development areas. Naturally, wireless devices are a huge part of the current engineering effort, both at the handheld level and with the more complex and higher performance design of base stations. I hope to find some good articles on design and deployment issues with tower-top electronics packages.

RFID is another active area, as are medical devices for treatment, sensors and telemetry. A huge number of short range wireless sensing and telemetry systems are in the works. Development of military communications, remote sensing and countermeasures has not slowed, and is always of interest, since most of those technologies will find valuable uses in future commercial and consumer devices.

Work that supports our readers' design effort is very important, too. Computer simulation and analysis, test instrumentation, foundry services and continuing education are a few of the areas we watch closely.

An essential part of an engineer's job is specifying the right components, instruments and EDA tools, so we also look to publish product application notes from companies who make these things. Even if a reader does not use that specific product, a good app note always provides useful insight into the development of the product and the reasoning behind the various performance features.

Finally, we provide coverage at all technical levels, from basic tuto-

rials to advanced theory. Regardless of today's hot topics, we will always devote a generous amount of space to the fundamentals. I have been surprised at the popularity of our short tutorial articles—it seems that engineers who are expert in one area want to know what's happening in other design realms.

We'll continue to provide business news, as well, including our listing of "Meetings & Events," and a selection of recent happenings in our "In the News" section.

And I'll keep writing my Editorial column—hopefully my comments will give you some ideas to think about until the next issue arrives!