Amplifier metal carrier information needed

I find your publication very helpful and a great resource. I have a question on where I might find a web site for information on a comparison of metal back machined carriers for amplifier packages and other heat dissipating applications. I am looking for information on copper-tungsten and magnesium materials, as well as Carpenter 49 [*a nickel-iron alloy —editor*].

Any suggestions would be helpful.

Tom Kramer
BEM CNC

An expert offers help

Copper tungsten (Cu/W) is growing in popularity for heat sink applications, because it combines thermal performance close to that of pure copper, but with a much lower coefficient of expansion. It does have some special requirements for classic metalworking operations like rolling, stamping and machining. You are wise to seek more information!

Companies involved with these materials include the following:

Zentrix Technologies (a Brush Engineered Materials Company) — www.zentrix.com

Polese Company (a SEMX Company) — Web site: www.semx.com

Sumitomo Special Metals (Japan) — English Web site: www.ssmc.co.jp/english/index_e.html; their US office is *Sumitomo Special Metals America* — Web site: www.sumitomosma.com

Shwarzkopf Technologies — www.stcmetals.com

These web sites provide some technical information and, of course, e-mail and telephone numbers you can use to get more detailed information.

There is also a lot work going on in layered metals that offer a different set of performance options. Copper-molybdenum-copper is one, which might be used in a 40 mil thick sandwich with approximately 13 mils in each metal layer. I believe most of the companies listed above are involved with this process.

Another technique is a combination of two or more layers using pure Cu on Cu/W. An example is a 60 mil thick flange with 15 mils of pure copper as a "heat spreader" next to the semiconductor die or hybrid substrate and 45 mils of Cu/W to provide the mechanical stability. This technique is limited to fairly thin copper layers, to avoid the stesses between layers with different coefficients of thermal expansion.

Carpenter 49 is not a familiar alloy in the high frequency engineering realm. Being a magnetic material, perhaps it is more common for DC and powerline frequency applications. Sumitomo is involved in magnetic materials, as well as TDK and a number of other companies that are not on the above list.

Lee Max
Consultant
San Jose, CA

What EM modeling tool should I use?

I am a new engineer with the job of modeling simple whip antennas at HF and VHF and their interaction with the nearby environment (e.g. mounted on a tank, Humvee or personnel carrier). I have NEC-4 available, but before starting up the learning curve, I'd like to know if it's really the right software tool.

(name withheld by request)

The Editorial Director replies

Yes, NEC-4 is the typical choice for this type of work. In fact, the type of application you are working on is one of the primary reasons for its development.

There are many resources available for NEC users, starting with the NEC-list, an e-mail discussion group. You can find out more and request a subscription to the list at:

http://www.gweep.ca/mailman/listinfo.cgi/nec-list

The group can guide you in the selection of a commercial interface to NEC. There are several products available that make it easy to "start up the learning curve" by providing a flexible and intuitive user interface for entering data. Also, there are many standard NEC files for military aircraft, naval vessels and land vehicles. List members will certainly be able to help you locate those that fit your work.

Gary Breed
Editorial Director

How do I submit a question to the "Ask the Experts" column?

The best way to submit questions is by e-mail to: *editor@highfrequencyelectronics.com*. We will locate the right person among our many volunteer experts to provide the answer you need.

All questions will receive a reply. We will pick the most interesting questions and answers for publication in our print and online editions.

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