

# MPD

## MICROWAVE PRODUCT DIGEST

RF TO LIGHT

### Editorial Statement of Purpose

*Microwave Product Digest* serves RF and microwave design engineers, research and development engineers, applications engineers and engineering managers. These professionals, working in facilities that serve both the commercial and government markets, are involved with the design, development, application, and use of systems and subsystems, devices, and techniques involving frequencies from RF to light.

#### Editor

Karen Hoppe  
editor@mpdigest.com

#### Senior Production Editor

Erin Perry  
eperry@mpdigest.com

#### Copy Editor

Sue Goldenberg

#### Circulation Manager

Kathie Boylan  
subscription@mpdigest.com

#### Director of Marketing

Rosalind Markhouse  
rmarkhouse@aol.com

#### Publishing Coordinator

Eileen Rocco  
errocco@aol.com

#### Publisher

Doug Markhouse  
douglasmeow@aol.com

#### Editorial Council

Thomas Couse, *ACC*  
Harvey Kaylie, *Mini-Circuits*  
Brian Modoff, *Deutsche Bank Securities*  
Robert Pinato, *Sirenza Microdevices*  
Rich Woodburn, *WJ Communications*

#### Publisher's Council

Robert Badami, *Herley-CTI*  
Eric Forstner, *Rodelco Electronics*  
Helle M. Kiiss, *MITEQ*  
Arthur Nixon, *Insulated Wire*  
William Reich, *NARDA*

#### Subscriptions

Subscribe online at  
[www.mpdigest.com](http://www.mpdigest.com)

or mail subscription card to:  
385 Sylvan Ave., Ste. 16  
Englewood Cliffs, NJ 07632

#### E-mail inquiries:

subscription@mpdigest.com

#### OCTAGON COMMUNICATIONS, INC.

**President** Douglas Markhouse  
**Secretary/Treasurer** Rosalind Markhouse  
**Controller** Eileen Rocco

#### GET MORE PRODUCT INFO

**TXT  
LINX  
CONNECTION**

[www.mpdigest.com/txtlinx](http://www.mpdigest.com/txtlinx)

### FROM THE EDITOR



**Karen Hoppe**  
Editor  
*Microwave  
Product Digest*

## Wideband High Power Amplifier Warranties— Why So Lame?

As we leaf through the pages of this month's trade magazines, it will no doubt be reinforced that each year brings significant advances in component performance or complexity and, in turn, this yields ever better performing sub systems. With each advance in component design has also come an ever-increasing improvement in reliability.

The creeping improvement in component reliability is obvious to those designing in the microwave power amplifier industry. It is not that long ago when it seemed that the RF power transistors available to designers lasted no longer than the cup of coffee you made, just before settling down to characterise the device, but that situation is very different today. RF power transistor, indeed all types of transistor, reliabilities have improved substantially over the decades, with device manufacturers increasing transistor lifetimes from hundreds of hours to millions of hours, through effective material research and improved manufacturing techniques.

Power supply reliability, often the Achilles heel of power amplifier designs has also improved as power supply designers develop new topologies and exploit new components fully. The wideband power amplifier industry consistently delivers, to its commercial markets, reliabilities up to 8 times greater than those predicted by MIL STD 217 and yet its warranties do not reflect this fact.

Why then, in general, do decades of improvement in component reliability not translate into meaningful warranty statements within the wideband power amplifier industry?

Why do headline grabbing three year warranties quickly morph into three year limited warranty plans and, under even closer inspection, become parts and labor cover for year one, parts only in years two and three, with a caveat that credit notes may be issued at a manufacturers discretion rather than completing a repair?

It is a fundamental MILMEGA philosophy that a warranty should be an outward expression of a company's integrity, confidence and commitment to quality. As one of the world's premier designers and manufacturers of high power solid state microwave amplifiers, we are committed to changing the experience of users of wideband power amplifiers in an industry where warranties seldom reflect the service life of a

product and response times to problems are measured in months.

Consider this scenario. You buy a quality car, of value \$40,000. You are impressed that it comes with a three year warranty, which you assume will cover you for all eventualities. The car breaks down, early in the first year, and you call the manufacturer to get it fixed. They say they will dispatch a tow truck but you will have to pay for collection of the vehicle – oh, and have your money ready when the driver turns up, it has to be pre-paid. You ask when they will get the vehicle back to you. They don't know. You state that your livelihood depends on it being available. They understand but they still do not know when they will get it back to you. You ask when they will at least have it assessed. They don't know because they are "kind of busy making new cars at the moment". They finally complete the assessment, several weeks later, but decide that, although under warranty, it is not economical to repair and instead they issue you with a credit note that can be part exchanged when you purchase a new car (from them)!

How many of you reading through that scenario expressed incredulity at the thought of having to pay to have your vehicle, still under warranty, towed to the repair facility? What is the difference between that and having to pay to return your \$40,000 amplifier purchase to the manufacturer for repair under warranty? How many of you would agree to this behavior in your personal lives yet accept this as a norm, for your business, from the power amplifier industry? As a supplier, do we really think that customers actually accept behaviour, which we ourselves would find unacceptable?

MILMEGA believes that a warranty is a commitment to a customer that you will ensure their peace of mind and the conditions of a warranty are a demonstration of your confidence in your product. MILMEGA will never ask a customer to pay for the transport costs, in any direction, of a failed warran-

## Headline

### IN MY OPINION



**Pat Moore,**  
Managing Director,  
*MILMEGA Ltd.*

ty amplifier and we believe that this should, and will, become the norm in this industry. We also believe that a factory turnaround time of 48 hours is a benchmark that others should strive for. We set it, we achieve it and it is a benefit of purchasing any MILMEGA standard product.

At a fixed \$100 million the merchant market for high power wideband solid state amplifiers may not be attractive to Far Eastern competition just yet, but as GaN matures as a technology, the TWTA replacement market will swell this market and open it to wider competition. Looking to the car industry for a comparison, it is likely that one of the battlegrounds of the future will be how amplifier manufacturers translate the reliability of their base components into tangible operational benefits for their customers.

The Asian car manufacturers Daewoo and Hyundai used this concept to take market share from established global players in Europe. On entering the automotive market they used the inherent reliability of their product to offer transparent warranty provision over 3 years, backed with superior customer Service. The strategy worked, they quickly established market share and existing players were forced to re-evaluate their offerings. There are lessons to be learnt here.

So given the advances in component reliability solutions, what, in the amplifier industry, restricts a company's ability to offer a comprehensive warranty and thus security to its customer base?

There are a number of reasons. The first may be that the company has chosen the wrong amplifier topology. When developing an amplifier topology a number of divergent requirements vie for attention. Electrical specifications, mechanical specifications, reliability and maintainability requirements are all tossed into the mix, in search of the most effective balance in what is known as the life cycle cost equation – i.e. the delicate balancing of both acquisition and maintenance costs. Too many companies focus on the first part of the equation and then expect customers to pick up a considerable bill for the second half of the equation (a bill that has hidden costs, such as facility down time, which can quickly escalate to thousands of dollars). Generally these companies measure progress by quantity, not quality.

The favoured amplifier topolo-

gy at MILMEGA is the Corporate Structure Amplifier. It derives its name from the hierarchy of levels employed in its construction, which, ignoring the combining elements, gives the block diagram of the amplifier an appearance not dissimilar to that of a company organisational chart rotated through 90 degrees.

From a reliability perspective, the multiple use of identical modules forces an inherent robustness into the amplifier system, as common assembly and test methods ensure repeatability of design throughout the manufacturing process.

Using this topology allows MILMEGA to offer, as standard, a 48 hour factory turnaround for amplifiers returned to the factory for warranty repair. MILMEGA is the only amplifier company offering this level of warranty protection, in a market where the industry response norm is measured in months.

Another possible reason for limiting the security given to Customers, via standard warranty provision, is that specifically implementing an aggressive design-for-reliability philosophy, such as that present at MILMEGA, requires a persistence and desire for quality that is absent in some company philosophies. The path to delivering reliability is a process that starts with the definition of the product and continues through manufacturing and use in the field. You need to consistently challenge all assumptions in an attempt to maximise product reliability. The benefits to Customers are then twofold:

1. The customer base owns a piece of capital equipment with a service life expectancy superior to any other

2. This equipment stays with the customer and it is not making unexpected visits back to the supplier's factory, where it represents a diversion to resources

At MILMEGA we always aim to exceed the standards of our competitors and the expectations of our customers. The continuing improvement in reliability of solid state devices and power supplies enables us to do that.

As this issue goes to press we are getting ready to announce the wideband power amplifier industry's first 5 year warranty with a promise of 48 hour factory turnaround, covering all labor, parts and shipment costs for the period, at no additional cost to our customer base.