Epoxy Encapsulated Package Streamlines Assembly Of High-Rel DC-DC Converters In Customer's Applications

VPT, a HEICO company, has announced the availability of a fully encapsulated epoxy package option for its VPT series of high-reliability dc-dc converters, EMI filters and accessory products. The epoxy packaging allows for aqueous cleaning processes often required in higher-volume circuit board production applications. Additionally, the epoxy encapsulated devices have integral metalized EMI shielding and withstand harsh environments including shock, vibration and thermal cycling.

The VPT series is designed specifically for military vehicles, weapons, shipboard, avionics and many other high-reliability applications. The full line of dc-dc converters, EMI filters and accessory products are derived from proven military heritage designs for rugged duty in demanding environments. The series is tested to MIL-STD-810, MIL-STD-883, and JESD22. Additionally, the devices are designed with wide input voltage ranges per MIL-STD-704 and MIL-STD-1275.

According to Monty Pyle, vice president of sales and marketing at VPT, this new packaging option grew out of the customer's desire to streamline their manufacturing processes. Customers who were buying VPT's products in non-hermetic, metal packages had tried to put these products into high-volume assembly processes, rather than assemble them to the board manually (and clean them manually) after the automated assembly of the smaller, SMT components. However, when VPT's non-hermetic packages were integrated into the automated assembly, problems arose in the cleaning of the customer's pc boards.

During the industrial cleaning steps, the non-hermetic packages were getting contaminated. Although existing, mil-grade hermetic packaging would solve this problem, that option was too expensive for most customers using the non-hermetic products. And while the end applications for these products include military, high-rel avionics and ground equipment as well as some pseudo-industrial applications, most of the projects are built in COTS programs, which are cost sensitive.

As Pyle observes, customers wanted to know, "Can we take this six-sided non-hermetic, metal package and seal it up?"

Ultimately, VPT's answer was a fully sealed, epoxy encapsulated package that is produced in a multi-stage, multi-layer process.

"We're using a multi-stage process done in layers because some layers are in contact with components while some are in contact with the outside world. Yet all layers must be compatible in terms of thermal expansion coefficients," says Pyle who adds that the process must also ensure that there is no air anywhere in the epoxy. One of the layers contains metallization and is connected to chassis ground, which shields the part as effectively as the six-sided metal of the original package. Plus, he adds, "All layers are thermally conductive, so you can take heat out of the top or bottom," which is something you cannot do with even the more-expensive, military hermetic packages (see the figure.)

Surprisingly, the weight of the epoxy encapsulated package is about the same as the non-hermetic metal package—within 1 or 2 grams according to Pyle. Meanwhile, VPT is pricing its epoxy encapsulated products the same as its non-hermetic metal packaged products. As Pyle explains, "Even though it costs a little more to build, there is a savings in eliminating the metal package, so in the end, the cost is 'a wash.'"

Although power supply vendors have been offering potted power converters for years, VPT's epoxy encapsulated packaging is very different from those older products. Typically, vendors would take a five-sided plastic cover, fill it with epoxy and press the power converter assembly into the epoxy. These were typically low-cost, low-power products in which the potting material provided some protection of the electronics against humidity, moisture and dust. But these potted parts were not hermetic and subjecting them to industrial-type cleaning processes would cause the potting material to breakdown, says Pyle.

"The VPT series epoxy encapsulated package option is intended for water-wash assembly options such as high pressure sprays, wave solder and cleaning solvents," explains Pyle. "With the epoxy package, the devices can be utilized in a variety of chemical, solvent and salt environments without being damaged."

More information is available under the DC-DC Converters for Hi-Rel COTS Systems section of the VPT website.

Figure. VPT is now offering its VPT series dc-dc converters and related EMI filters and accessories in a new epoxy encapsulated package that allows these converters to be assembled onto the customer's pc boards in high-volume assembly processes and subjected to industrial cleaning steps. This option eliminates the need for manual assembly of these products, while still maintaining the same weight, EMI shielding and product pricing as the original products in the non-hermetic metal packages. Plus, since the epoxy is thermally conductive, heat can be removed from any side of the package.