

## **New DC-DC Converter Interconnect System Offers Surface Mount Capability**

### **Designers/Assemblers Gain Vast Range of SMT-Qualified Converters**

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Surface mount technology (SMT) has demonstrated that it can substantially improve manufacturing throughput, reduce costs, and increase packaging density. Achievement of these benefits, however, usually requires that all of the components to be mounted are: (1) packaged for easy dispensing, (2) delivered to the PCB by pick and place equipment, and (3) capable of undergoing reflow soldering.

The road to ubiquitous adoption of SMT — especially when DC-DC converters are involved — has been blocked primarily by the inability of pick and place equipment to handle the size and weight of most converters. Nevertheless, a growing number of converter manufacturers are reducing the size and weight of their DC-DC converters — by increasing power densities, improving packaging, and achieving higher efficiencies (eliminating the need for potting or heat sinks) — and creating more candidates for surface mount capability.

In spite of the advances, however, the obstacles thwarting widespread SMT adoption (again, when converters are involved) are substantial. The total number of SMT-qualified converters (and suppliers) remains small, and products are limited to the lower end of the power spectrum.

Now, a new interconnect system is available that combines the inherent flexibility of component power designs with the manufacturing efficiency of surface mount assembly. Although the new surface mounting system is designed exclusively for use with Vicor's 2nd Generation DC-DC converters and accessory modules, it should be emphasized that this system vastly expands the number and range of available SMT-qualified converters (see Figure 1). These products are available for all three standard DC-DC converter and accessory module sizes — Maxi, Mini, and Micro (full, half and quarter bricks). In addition, for the first time, circuit board designers and assemblers will have the ability to surface mount high-density DC-DC converters with current ratings up to 100 Amps.

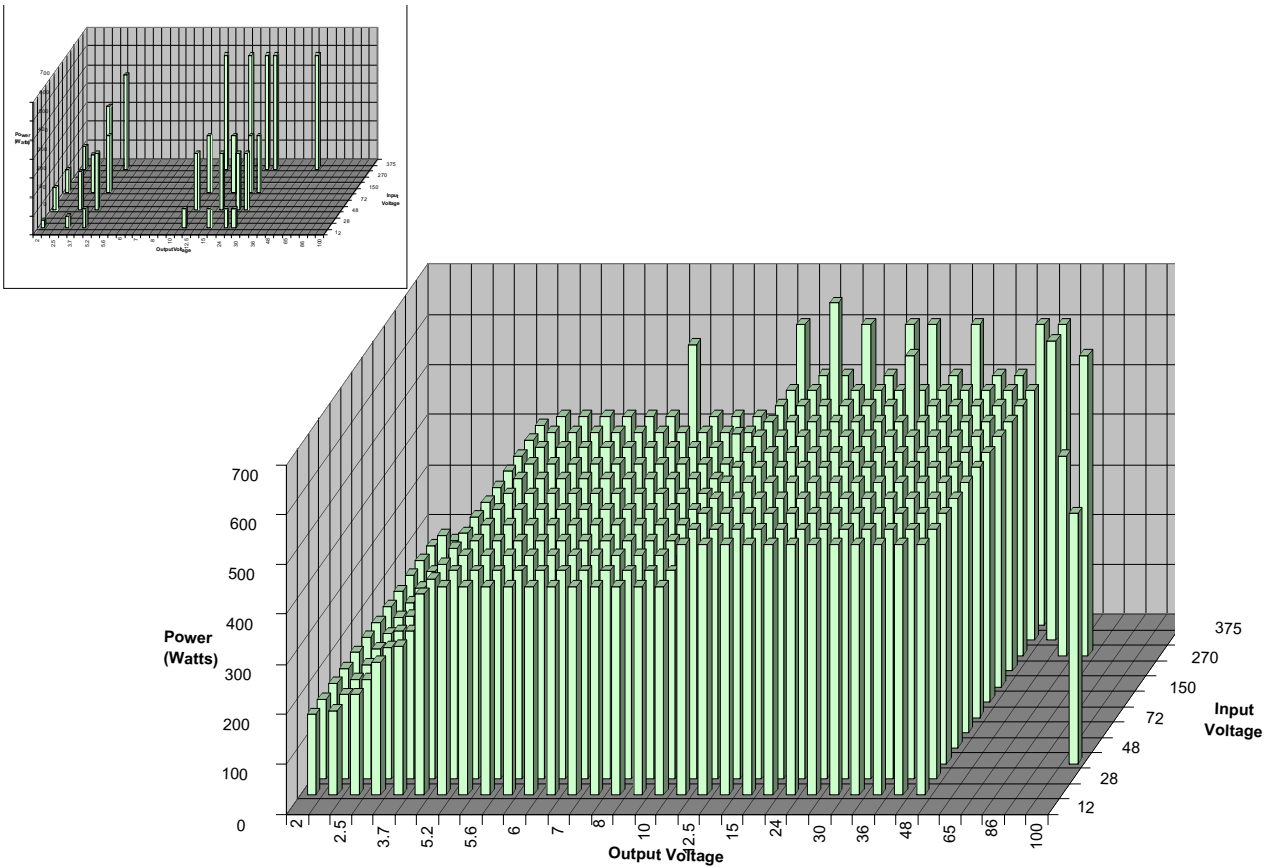


Figure 1. SMT-qualified Vicor modules can be ordered with any input voltage from 4.5 to 450V, any output voltage from 1 to 100V, and any power level up to 600W. Inset: In contrast, the total input/output/ power map of a major supplier of DC-DC converters (that also offers some SMT-qualified converters) is shown.

In brief, here's how it works: a pair of header sockets — one for the input and one for the output — is soldered on to the PCB using a standard reflow process (see Figure 2). Then the DC-DC converter is simply inserted into the header sockets. No additional soldering operation is necessary.

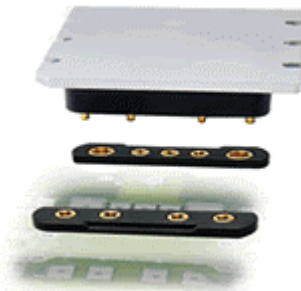


Figure 2. The interconnect system consists of a pair of header sockets soldered on to the PCB using a standard reflow process. The input header is in the foreground. The converter (top) is simply inserted later.

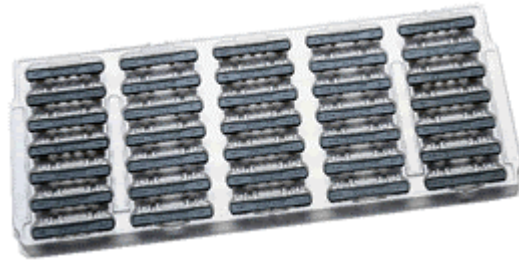
Since the converter modules themselves are not reflow soldered, they are subjected to neither the heat of the solder process nor the trauma of the cleaning process. The additional capability of providing a simple means of removing or upgrading a module in the field is unprecedented.

The new surface mount system, called SurfMate, utilizes a pair of surface mount headers which contain the sockets to accept the input and output pins of the converter module (see Figure 3) and ensure the precise alignment of sockets and pins. The plastic carrier that holds the SurfMate caps is actually part of the socket; it holds the positioning of the caps in the exact centerline orientation. Positioning keys hold it in place during reflow soldering. Ridges are used to hold the cap up just high enough — approximately 0.003" — for solder reflow and provides ample surface area to accommodate operation at high currents. The mounting system is compatible with any thickness PC board, and it does not increase the module height above the board.



*Figure 3. A SurfMate is a header that surface mounts to the PCB to provide a socket interface for a module. Top: sockets for module pins; bottom; surface mount pads.*

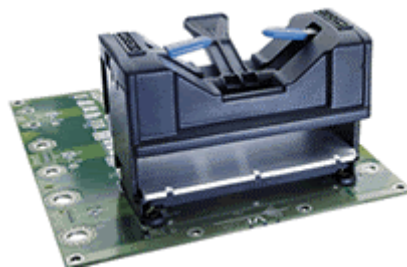
The interconnect sockets are available packaged in standard recyclable JEDEC-style trays (see Figure 4) for use with automated pick and place equipment and are compatible with standard reflow solder operations. After reflow, the modules are simply inserted into the sockets. Any secondary soldering operation used for through-hole sockets or pins can now be entirely eliminated — reducing manufacturing time and eliminating dual processes. The system reduces assembly costs and improves overall manufacturing efficiencies.



*Figure 4. SurfMate interconnect sockets are available packaged in standard recyclable JEDEC-style trays for use with automated pick and place equipment*

A complete set of design and assembly recommendations is available for PCB designers and manufacturing engineers including, for example, accurate pad layouts in CAD format on the web ready to be cut and pasted on the board layout. The plastic strip that holds the header together doesn't add to the module height above the board because the module pins are recessed.

With the ability to easily upgrade boards and facilitate repairs, SurfMate also provides a means of safely inserting and removing modules. Extraction tools (see Figure 5), which are similar to an IC extraction tool, are available for each converter size



*Figure 5. One of the available extraction tools that permit safe removal of a module from the interconnect sockets.*