

Specific Market Challenges and Trends Require Tailored Solutions

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“Customer applications are much the same. It’s enough to offer standard topologies in a sound and robust standard housing.” This is a commonly held sentiment in the market for power modules. And in many cases, it holds true. However, there is also an unwritten law stating that markets constantly evolve. Demands change. Engineers turn up novel and innovative solutions. With competition, the need to cut costs, and new legislation exerting relentless pressure, change is constant. And this change gives rise to trends.

Companies that provide power modules are compelled to recognize these trends and develop strategies to satisfy constantly changing requirements. Only those providers that succeed in rising to this challenge will be in the position to deliver solutions that are optimized for customers’ applications. This goes for both standard products and custom solutions.

Two powerful trends are shaping today’s motion control market. For one, customers are eager to reduce system costs. For the other, they put a premium on an unimpeachable supply chain. The latter is easily achieved on the drawing board or on a presentation slide. Second-source suppliers would seem to be the way to go. However, it turns out that such a strategy is not so easily implemented in the real world. Although compatible power module products are indeed available, rarely are two such products absolutely identical. Providers do offer similar types of housings with base plates in the medium 10-to-100-kW performance range, but their dies are quite different. Fully compatible modules featuring MiniSKiiP[®] technology are, however, available in the lower-to-medium power range.

Customers in the motion control market strive to minimize the costs of their applications, for instance, by applying pressure to suppliers' prices in the hope that they will steadily erode. If that ploy fails, the only real fix is an innovative concept. This is why power modules have been engineered to drive down the customer's assembly costs. Applications now benefit from modules with spring pressure contacts and Press-fit pins for solder-less assembly. Modules that ship with thermal interface material pre-applied took the market by storm. Highly integrated solutions, equipped with the full complement of control circuitry alongside the bare power chips, provide optimum solutions for certain niche applications. Finally, choosing the right chip manufacturer for the given application can certainly contribute to cost-cutting efforts and ensure a greater variety of features and options. MiniSKiiP[®] is an excellent example of such concepts put into practice using a standard technology.

Developments in the market for solar photovoltaic inverters are on a somewhat different trajectory. Cost reductions, of course, also figure prominently. Providers are streamlining, slimming down, and scaling down the power ratings of first-generation products. The idea here is to use less semiconductor surface area, thereby cutting costs. Efforts are also underway to optimize components. On the other hand, solar cells are a mandatory component that complete PV systems. This is why efforts to eke out those final few percentage points in energy efficiency from photovoltaic systems are well worth the engineering labors. A more efficient system needs less cell surface area, which enables manufacturers to slash costs. Remarkably innovative solutions can be realized with new materials and dies such as silicon carbide SiC technology. Consequently, they are making major inroads into customer applications. Now that 600V SiC Schottky diodes, followed by a second wave of 1200V diodes, have been launched with such success, the market is eagerly anticipating the release of mature active switches in various guises such as J-FETs and SiC-based MOSFETs. The drive to boost energy efficiency shows no signs of slowing. Seeking to make the most of infrastructural synergies, many engineers are

eschewing low-power devices in favor of systems that are able to generate far more electrical energy. This has prompted customers to demand power module housings that are robust enough and equipped with the terminals necessary to handle all this electrical power. However, they also want the highly efficient performance they have come to expect from low-power housings. Vincotech, a market leader in the field, has come up with some amazing solutions that limit parasitic inductivities to values far lower than 10 nH. Products geared for three-level systems make the implementation of neutral point clamped (NPC) converters an exercise in convenience. Reactive power compensation is easily introduced to comply with new regulations in countries around the world.

Legislation is also compelling manufacturers to make their uninterruptible power supplies more efficient. This demand certainly makes sense in view of the enormous amount of energy dissipated worldwide by the relatively inefficient UPS units that power sundry devices. Power module solutions engineered for the photovoltaic market are also being used to this end. Some have been modified with different chip technology. For example, in some cases a fast IGBT, sited at the same topological position as an efficient MOSFET in a photovoltaic system, can get the job done in a UPS. Three-level systems are currently in the works; novel topologies are available in great numbers; the significance of discrete solutions is waning.

We believe that we have listened to our customers well. We believe that change is constant in our markets. We believe that our customers are facing great challenges. And we believe that we can help and are well prepared to do so.