

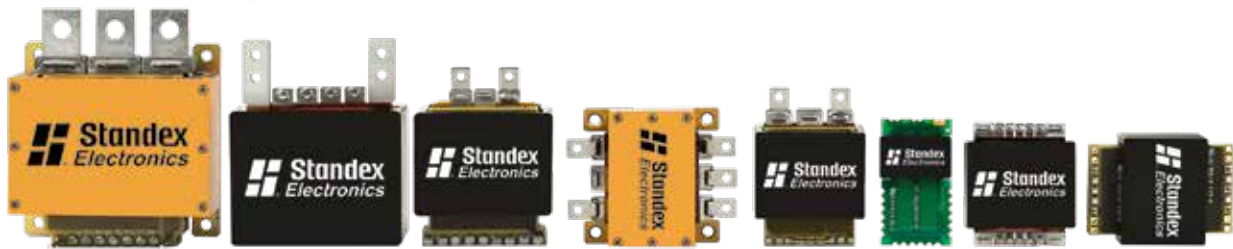
Thought Leadership
Planar Transformers

PARTNER | SOLVE | DELIVER®

The Advantages of Planar Transformers over Wire-Wound

Planar transformers are steadily replacing the need for traditional wire-wound transformers in many industries. Electric vehicles, solar inverters, wind power, aviation, healthcare, and industrial manufacturing are just some of the areas where this technology is gaining ground.

“The difference that planar transformers allow over traditional wire-wound transformers is the planar’s use of flat copper windings or lead frames,” explains Will Schellin, Engineer at Standex Electronics, “While the windings of wire-wound transformers are used with round wire, the planar’s windings are built by utilizing flat copper layers (PCBs) or plated flat copper windings (lead frames) to create a laminate-style winding construction. The result is a compact, high power density planar



transformer that is typically 30% of the volume and weight of a traditional wire-wound transformer.”

This size reduction eliminates many of the design constraints associated with wire-wound transformers, and the planar transformer’s other characteristics offer additional benefits. With a very low profile, excellent thermal characteristics, high repeatability, and low leakage inductance, planar transformers can easily meet the needs of modern applications.

However, the benefits of planar transformers can be best realized with customization. Thanks in part to the PCB and lead frame structure, planar transformers provide a great degree of design flexibility and can be modified to more exactly fit the parameters of specific applications.

“At Standex Electronics, we’ve had great success partnering with our customers to create custom solutions,” said Schellin. “The technology behind planar transformers really opens up a lot of possibilities for innovation,

and by working with designers, engineers, and manufacturers, we can take advantage of those opportunities to heighten efficiency, tighten control, or simply save space and money.”

Below are just three examples of how the unique properties of planar transformers can be utilized to provide a superior solution.

Industrial Applications: Precision Control for Arc Welding

Some of the most demanding applications for electronic components are in the industrial sector, where high temperatures, harsh environments, and heavy workloads can all contribute to stress and strain. The high performance and reliability of planar transformers makes them ideal for these applications.

“One of our industrial customers came to



Standex therefore recommended the SX41 Series planar transformer. This high-performing and reliable solution allowed for greater control of temperature, resistance, and heat dissipation. “Precision and control are always essential to a successful weld, no matter which method you employ,” said Schellin. “With the increased thermal performance and help of an aluminum heatsink the planar

us with a project involving arc welding,” said Schellin. “Arc welding is an incredibly demanding process that produces a lot of heat and involves virtually continuous arcing across the electrode and weld spot. The arc results in heat from the current and ultimately a large temperature rise in a small location if held continuously over the welded area.”

The customer had contacted Standex Electronics about a reliable planar transformer for their power supply for their arc welding process. They were looking to improve efficiency, but they also needed a solution that could handle the increased thermal demand of the transformer.

As mentioned above, the windings in planar transformers are flat rather than round, and as a result offer less AC winding resistance and thus reduce overall loss. The duty cycle of the power supply can limit the time the arc welder can operate the welder. Possible damage to the power supply may occur if the power supply is run over the rated continuous time for the specific unit.

transformer provided to our customer helped ensure greater control of the welding process and longer continuous weld times.”

Automotive: Looking Forward with Electric Vehicles

“The density advantages of planar transformers were really well demonstrated in one of our electric vehicle projects,” said Schellin. “An automotive manufacturer approached us about a custom solution that would maintain their current footprint, but allow for higher energy density.”

This project involved a reduction in height of 50% from a traditional wire-wound transformer. Because the design of planar transformers inherently saves space, Standex was able to modify the SX58 planar transformer to solve this problem.



"This was a partnership that centered on the application's requirements and the customer's specific needs," explained Schellin. "Planar transformers offer a great starting point for challenges like this, so our engineers were able to hit the ground running. We began by investigating the requirements and details around their operational and application needs."

"After that, it was time to test out the product," continued Schellin. "We tested and measured a variety of factors: the mechanical dimensions, insulation breakdown, resistance, inductance, capacitance, flux density and core loss."

As a result, Standex Electronics delivered a product that maintained the necessary footprint and delivered improved capacity without intruding on space. It also resulted in overall cost savings and provided a reduction in height by several millimeters from the original design.

Aerospace: Integrated Inductors for Aircraft

Cost and space are at a premium in the avia-

tion industry, where increasing fuel costs and a competitive market keep the emphasis on efficiency. Customized planar transformers can offer an excellent way to minimize cost and size for switched-mode power supplies (SMPS) and converters. Smaller volume planars can handle the electrical load as larger wire-wound transformers, and so they represent a smart choice for converting power and transformations effectively.

"For one aircraft project, we worked on an integrated inductor," said Schellin. "It was the first time our team had integrated an inductor into a planar transformer, and we were excited to produce an innovative, complete magnetic solution."

The solution entailed an additional winding on top of a planar transformer, which took the shape of a custom-tooled bobbin. The custom-tooled bobbin was designed and tooled within several weeks. Standex Electronics also made fixtures for the bobbins to help streamline the manufacturing process. Working closely with the mold maker on dimen-



sions and tolerances is important when using custom-tooled bobbins.



In addition, by utilizing the same core of the planar transformer in an area of space not used, they were able to maximize the capacity of the part and allow for an improved efficiency. This also eliminated the need for two cores, an obvious advantage with the limited space found in the aviation market.

Conclusion

As more and more industries begin to feel the push toward miniaturization, the planar transformer continues to emerge as a space-saving alternative to wire-wound transformers.

"Smaller, faster, cheaper – that's the name of today's engineering game, and planar transformers are a great way for you to get ahead," concluded Schellin. "This solution makes so much sense for today's applications, and when you combine planar transformers with excellent engineering, you can get a solution that not only saves you space, time, and costs, but suits your needs uniquely and specifically."



www.standexelectronics.com

Americas: +1.866.782.6339
info@standexelectronics.com

APAC: +86.21.37606000
salesasia@standexelectronics.com

EMEA: +49.7731.8399.0
salesemea@standexelectronics.com