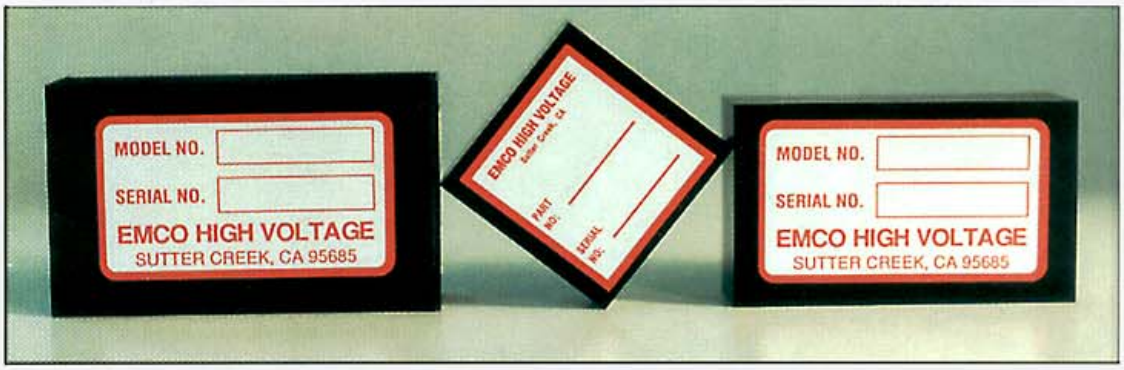
Standard high-voltage modules save time, space, and money

Building-block modules overcome common drawbacks of high-voltage parts



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Designers specifying high-voltage power supplies have historically had two choices: procure a custom supply from a supplier or build it themselves. Now, manufacturers have a third choice, one that allows them to build high-voltage power supplies without having to deal directly with many of the problems unique to high voltage.

Component-type high-voltage dc/dc converters have changed the way many manufacturers use high voltage in their products. These high-voltage dc/dc converters are small, pc-board-mounted encapsulated assemblies generating a high-voltage output that is fully controllable using standard low-voltage circuitry (see *diagram*).

Similar to a distributed-power approach, designers can now plug in miniature high-voltage modules right where the voltage is needed, eliminating the need for a bulky, chassis-mounted, custom high-voltage supply. Advancements in miniaturization of high voltage, coupled with a wide selection of pc-board-mounted high-voltage modules available off the shelf, have allowed many designers to take advantage of standard modules configured to their custom requirements.

Standard high-voltage dc/dc converters offer manufacturers the following benefits:

1. Reduced design cycles. Designers can plug in off-the-shelf high-voltage modules, eliminating the long lead time required to either qualify a custom high-voltage power supply or for designers to design the entire supply themselves. Changes in voltage or power levels are easily made at any time during development without incurring additional lead times for the change.

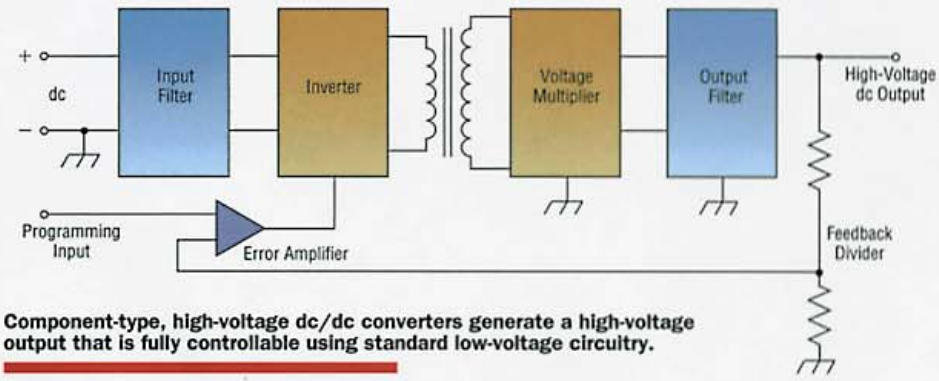
2. Reduced size and weight. Most high-voltage dc/dc converters now occupy less than 5 $in.^3$ and weigh less than 5 oz. Some are as small as 0.125 $in.^3$ and weigh under 5 g. For higher voltage and power requirements, some larger modules offer voltage levels over 30 kV and power levels over 30 W.

3. Reduced development and manufacturing costs. Pc-board-mounted modules require no chassis mounting and no hand wiring, thereby speeding up assembly and reducing the chance for error. Users also benefit from the economies of scale, since standard high-voltage modules are already being produced in volume and are priced accordingly. The use of standard products reduces the chance of a reliability problem because the high-voltage module design has, in most cases, already demonstrated its reliability over thousands of units and in many years of operation by other users.

4. Increased flexibility. Design modifications and custom variations can be generated rapidly with little redesign. Common packages and footprints among different products ease voltage or power changes.

These standard parts provide a viable alternative to custom supplies, whose time and cost to manufacture can be unattractive. With custom supplies, the original equipment manufacturer must invest time to generate the supply's electrical and mechanical specifications, then solicit quotes and select a vendor. NRE fees and tooling costs are often involved, and delivery of the first custom power supply can sometimes take from 6 to 12 weeks.

The designer's other route to a high-voltage supply—building one—presents challenges of reliable transformer design, high-voltage component selection, high-voltage board layout, encapsulation, and special assembly procedures. Typically, these issues require considerable time and effort before a reliable, producible power supply is developed. Reliability and manufacturability problems often appear late in the process, extending completion beyond schedule and delaying product release. EP



Component-type, high-voltage dc/dc converters generate a high-voltage output that is fully controllable using standard low-voltage circuitry.

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