Electronic Design

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The Challenge of Power-Supply Design

Sponsored by Digi-Key and RECOM: The make vs. buy decision when it comes to power supplies becomes more onerous due to demands designers must meet. However, some of the latest supplies to arrive make that choice easier.

When do you get around to designing the power supply for your new product? Before, after, or during product development? Whatever your approach, you probably need an ac-dc supply, perhaps with some dc-dc converters, to provide some of the multiple dc voltages needed in a sophisticated design.

It used to be so easy. All it took was a step-down transformer, a rectifier, and a big filter capacitor followed up with an IC linear regulator. This is no longer possible as power-supply requirements have become tougher over the years. Today's power supplies must be super-efficient, generate minimal EMI, meet stringent regulations, and affordable.

While designing your own power supply is still possible, in many instances there are significant benefits to acquiring one or more commercial supplies. For example, RECOM has a complete line of power supplies that can take care of most demands. Here's an update on this age-old make vs. buy decision and a new source to consider for your power-supply needs.

Shown is RECOM's RACM60-K open-frame 60-W ac-dc power supply.

AC-DC Converters

While the output voltage, current handling, and power output capability are still the main specifications of any new power supply, today multiple additional conditions must usually be met. You probably already know these requirements, but here's a summary to illustrate the importance of a good supply:

- Can the supply operate from the ac mains anywhere in the world?
- Will the supply operate reliably in an extreme temperature environment?
- Is the supply packaged to fit the available space in the product?
- Is there any isolation requirement in the design?
- Will the supply meet my efficiency expectations?
- Can the supply meet the EMC requirements?
- Is there a cooling problem with the new product?
- Will the supply pass the 2MOPP (means of patient protection) certification, allowing for use in a medical product?

Now ask yourself, can I or any of my colleagues design a supply that complies with all of the conditions stated, within time and cost constraints? If not, you're covered. Simply choose an available commercial supply.

RECOM addresses those conditions with its line of power supplies. The RACM60-K series of supplies, for example, are 60-W supplies are available with outputs of 5, 12, 15, 24, 36 and 48 V *(see figure)*. These open-frame supplies can be had in 2- × 3-in. or 2- × 4-in PCB sizes. They're also available in PCB mountable modules.

In addition, the supplies offer specs like 4-kV$_{AC}$/1 minimum reinforced isolation, a temperature range of –40 to +55°C, and an efficiency of 90%. Cooling is by natural air convection for totally silent operation. No-load power consumption is a low 100 mW. And a Class B EMC filter is built in. Both the open-frame supplies and modules meet 2MOPP certifications for

medical use.

You don't have to design your own supply when these ready-made products can usually drop right into your design with minimal effort, saving both development time and money.

Switching Regulators

Switching regulators have all but replaced the original popular linear regulators. With high efficiency of up to 97% and no need for a heatsink, what's not to like?

Those are the key features of the RECOM R-78 series of switching regulators, which are designed as pin-compatible replacements of the original LM78 linear regulators. The R-78 regulators are non-isolated and ideal for point-of-load (POL) use. The basic dimensions are 11.6 × 10.4 × 8.5 mm, but a SIP3 package with a TO-220 footprint is available.

Output voltages for the R-78 regulators range from 1.8 to 9 V in standard values. Continuous output current is 1 A max. Other highlights include EN-55022 emissions certification and an FCC Class B filter. Remember, efficiency is excellent, so no heatsink is required.

RECOM offers other products like dc-dc converters and LED drivers. Its REM5E dc-dc converters are 5-W modules housed in a 24-pin DIP or SMD package. These medical-grade modules are available with single or dual outputs in standard voltage values and meet all necessary certifications, including UL, CB, IEC, EN and ANSI/AAMI 60601. Efficiencies are in the 75 to 85% range.