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Do you still remember what it was like have dial-up internet? If not, [here's an audio snippet that may jog your memory!](#) It was only a few years ago that you had to wait 10 minutes for someone to get off the phone before you could log in to your AOL Instant Messenger account, which probably took another five minutes with the typical 40-kbps transfer speeds. Now, even though we can download high-definition videos in seconds and have high-speed internet access in almost any developed area, we still want more data and faster bandwidth. And exciting innovations from data centers to semiconductors are delivering.

Increased bandwidth demands have made power density more important for electronic equipment like servers, routers and switches as circuit board space becomes more constrained. As a result, power integrated circuits (ICs) must pass more power (with a lower on-resistance [R_{ON}]) in a smaller footprint. Often this relationship between R_{ON} and footprint size is inversely related – optimizing one will worsen the other.

One subset of power ICs that has seen significant innovation in recent years is the [hot-swap controller](#). Historically, external metal-oxide semiconductor field-effect transistor (MOSFET) hot-swap controllers have been a very popular power-path protection solution. However, the footprint for such a solution can be quite large given the need for an external sense resistor and power MOSFET. As shown in [Figure 1](#), a hot-swap solution can take up a significant amount of board space.

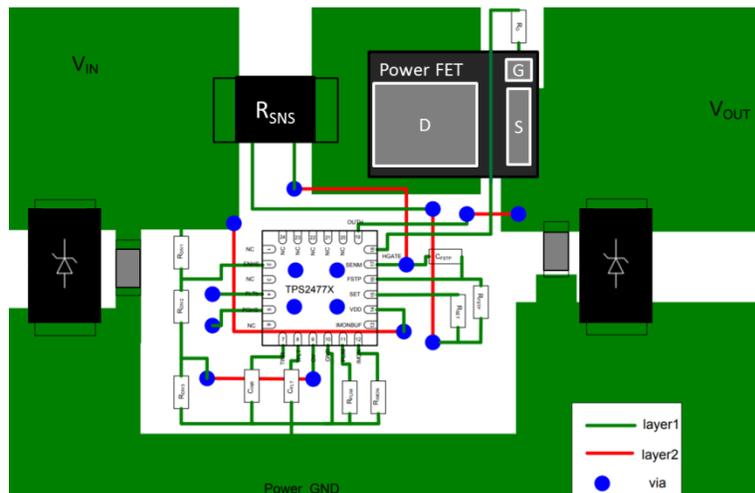


Figure 1. An External MOSFET Solution with the TPS2477x Hot-swap Controller

Decreasing the package size of these ICs will increase the R_{ON} , which will worsen the power performance. However, with TI's proprietary processes, it is possible to optimize both parameters and achieve superior power density in a very small footprint. [Figure 2](#) shows the TPS25982 – a new 24-V, 15-A eFuse that comes in a 4-mm-by-4-mm package.

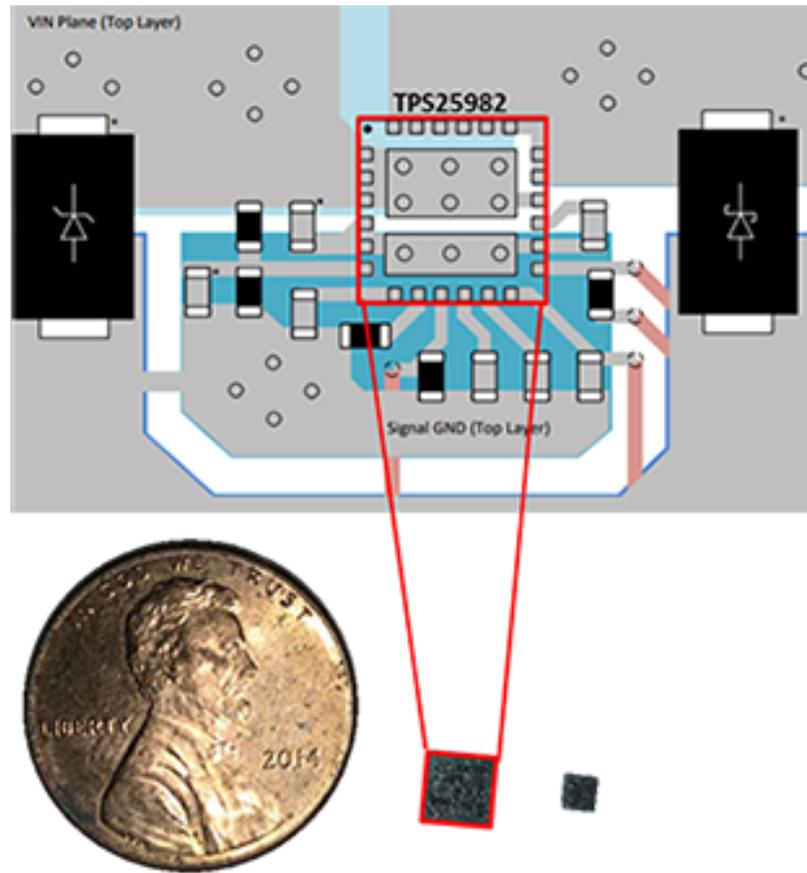


Figure 2. TPS25982 (Center) and TPS2595 (Right) Size Comparison

For even smaller footprint solutions, the TPS2595 eFuse comes in a 2mm x 2mm package and for higher voltages, the TPS1663 eFuse supports up to 60V, as shown below in [Table 1](#).

Table 1. Texas Instruments eFuse Options

Device	Voltage	Current	R _{ON}	Package
TPS25982	2.7 V-24 V	15 A	3 mΩ	4-mm-by-4-mm quad flat no-lead (QFN)
TPS2595	2.7 V-18 V	4 A	34 mΩ	2-mm-by-2mm QFN
TPS1663	4.5 V-60 V	6 A	31 mΩ	4-mm-by-4mm QFN

As overall power demands increase in the market, board space becomes more and more valuable. As a result, optimizing power efficient solutions in a small footprint will be something all power designers will have to consider.

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