

ISSUE: [July 2024](#)

## ***Silicon And SiC MOSFETs Support High Efficiency In Data Centers***

[onsemi's](#) latest generation T10 PowerTrench family and EliteSiC 650-V MOSFETs create a solution that is said to offer unparalleled efficiency and high thermal performance in a smaller footprint for data center applications. This improved performance is meant to support the growing power demands of data centers under the processing requirements of AI workloads.

Compared to a typical search engine request, an AI-supported engine request requires more than 10x the power, leading to data center power needs expected to reach an estimated 1,000 TWh globally in less than two years according to the IEA report, Electricity 2024. To process one AI-supported request, energy is converted four times from the grid to the processor, which can result in an energy loss of approximately 12%.

Using the T10 PowerTrench family and EliteSiC 650-V solution, data centers are able to reduce power losses that occur by an estimated 1%, according to the vendor. If implemented in data centers globally, the solution could reduce energy consumption by 10 TWh annually or the equivalent of the energy required to fully power nearly one million homes per year (Based on annual household power consumption from U.S. Energy Information Administration.)

The EliteSiC 650-V MOSFET offers superior switching performance and lower device capacitances. Compared to the previous generation, these new generation SiC MOSFETs have halved the gate charge and reduced both the energy stored in output capacitance ( $E_{oss}$ ) and the output charge ( $Q_{oss}$ ) by 44%.

With no tail current during turn-off and superior performance at high temperatures, they can also significantly reduce switching losses compared to superjunction MOSFETs. This allows customers to downsize system components while increasing the operating frequency, resulting in an overall reduction in system costs.

Separately, the T10 PowerTrench family is engineered to handle high currents, crucial for dc-dc power conversion stages, and offers increased power density and superior thermal performance in a compact footprint. This is achieved through a shield gate trench design, which boasts an ultra-low gate charge and an  $R_{DS(ON)}$  of less than 1 m $\Omega$ .

Additionally, the soft-recovery body diode and lower  $Q_{RR}$  effectively minimizes ringing, overshoots, and electrical noise to ensure optimal performance, reliability, and robustness under stress. The T10 PowerTrench family also meets the stringent standards required for automotive applications.

The combined solution also meets the stringent Open Rack V3 (ORV3) base specification required by hyperscale operators to support the next generation of high-power processors.

For more information, see the [T10 PowerTrench Family](#) and [EliteSiC 650-V MOSFETs](#) pages.