

# SemiPowerEx SiC Power Modules

Adopting UnitedSiC devices to deliver a stable, cost-effective power module system

## OVERVIEW

Using UnitedSiC FETs, SemiPowerEx increased switching frequency, without sacrificing stability, while reducing cost.

## SOLUTIONS

UF3SC065007  
(650V, 7m $\Omega$ )  
UF3SC120009  
(1200V, 9m $\Omega$ )  
UF3SC120016  
(1200V, 16m $\Omega$ )

## BENEFITS

- Made system smaller, more efficient with better stable operation at higher frequencies.

►To learn more, go to:  
<https://unitedsic.com/group/uf3c-sc-sic-fets/>



Based in Korea, SemiPowerEx is a technical innovator in the design and manufacture of semiconductor power modules based on Si, IGBT and wide bandgap SiC and GaN solutions. SemiPowerEx uses High Thermal Conductivity AlN substrates for their modules, enabling their customers to reduce the cost of their heat sinks by improving thermal efficiency and reducing overall system size.

To maintain the highest-performance SiC power modules, SemiPowerEx needed to explore advanced methods to ensure optimum performance from SiC FET devices including improved signal management related to di/dt and dv/dt slope control and gate noise control – with target performance benchmarks exceeding that of Si MOSFETs/IGBTs modules.



**D.K. Jang**  
Chief Executive Officer  
SemiPowerEx

“We developed SiC power modules optimized for power conversion systems using UnitedSiC FET because they have an excellent advantage on high gate-source threshold voltage, low RDS(ON), and high transconductance performance. Also, we appreciated UnitedSiC engineering team’s excellent technical support as they provided performance test support for our power module samples in their lab and advised us on the optimum value of RC snubber, making it helpful for us to make a high-performance SiC power module”.

## SOLUTIONS

SemiPowerEx upgraded the existing modules with UnitedSiC stack cascode FETs, the UF3SC065007, UF3SC120016 and UF3SC120009, along with a UnitedSiC recommended RC snubber circuitry added for stable signal operation (Snubber is internal for bolt terminal modules).

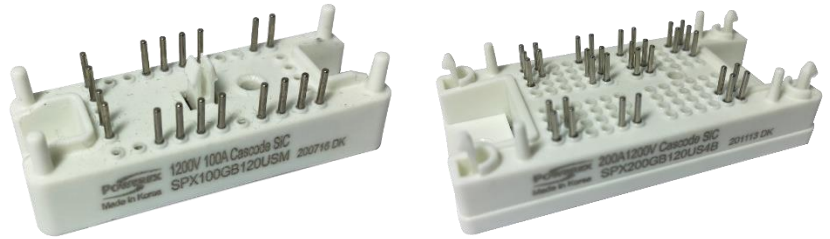


Figure 1. SemiPowerEx SiC FET power modules

## BENEFITS

After applying the recommend RC snubber-based control methods in conjunction with UnitedSiC SiC FETs, SemiPowerEx was able to create a smaller, more efficient, and stable operation – even at high frequencies.

### Smaller System Size & Lower Cost

SemiPowerEx estimate their end customers can reduce system size by ~20% and cost by ~10% using UnitedSiC FETs and RC snubber circuitry.

### Improved Efficiency, Increased Switching Speeds

When using the 1200V, 9mohm SiC FET, switching frequency was increased up to 3X in comparison to IGBTs. With 650V SiC FET, switching frequency can be increased by 2X compared to an Si FET circuit, and 3X compared to IGBT.