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**Title: Realization of Integrated Power Conversion Systems through Universal Smart Power Modules**

**Abstract**

With the advent of SiC and GaN devices, power converters, including grid-connected inverters, have made remarkable advancements in performance. On the other hand, design technologies have become increasingly complicated, requiring significant design time and human resources to accommodate diverse specifications. As the number of skilled designers continues to decline, modularization emerges as a promising approach to meet such demands. While power electronics systems have traditionally been discussed in terms of combinations of four basic discrete parts, switches, diodes, inductors (L), and capacitors (C), they are now approaching a stage similar to integrated circuits (ICs) in electronic circuits.

In response to these demands, this presentation introduces the concept of the Universal Smart Power Module (USPM). The USPM is a power electronics module that integrates not only the main circuit and protection functions but also the controller. Users can construct a power conversion system by combining multiple USPMs according to their specific requirements. Since all the complexities of implementation, such as noise mitigation and thermal management, are encapsulated within the USPM, anyone can easily build a power electronics system. This talk will present the USPM concept along with the key enabling technologies required for its realization.