SiC MOSFET Comparison 2019

Discover and compare the state of the art: 22 SiC MOSFETs from Cree/ Wolfspeed, Rohm, STMicroelectronics, Littelfuse, and Infineon.

SiC devices are gaining the confidence of many customers and are penetrating various applications. This is confirmed by the promising market outlook for SiC devices, which will reach a compound annual growth rate (CAGR) of 31% for the period 2017-2023. The forecast for the value of the SiC power semiconductor market is about $1.5B by 2023.

Nevertheless, the technical panorama of SiC devices is still varying, and every manufacturer has its own solutions to die design and packaging integration. This leads to strong competition, which will accelerate technical innovation and lower prices. Moreover, SiC business models are still very different. In the future, we will see a restructuring of the supply chain driven by the main cost factors.

Manufacturers propose different approaches for gate structure and device design, focused on SiC’s intrinsic properties, or seeking to overcome issues linked to them.

SiC-based MOSFET devices still have some technical and commercial challenges to face, despite the value they add. For example both SiC wafer processing and supply constraints impact wafer price and make it the major cost-driver of a SiC device. Other challenges include wafer size transition from 4-inch to 6-inch and the complexity of some process steps, mainly epitaxy, which hinder SiC adoption on a large commercial scale.

In this report, System Plus Consulting presents an overview of the state of the art of SiC MOSFETs to highlight differences in design and manufacturing processes, and their impact on device size and production cost.

22 SiC MOSFETs of voltages varying from 650V to 1700V from Cree/Wolfspeed, Rohm, STMicroelectronics, Littelfuse, and Infineon have been analyzed. The report provides detailed optical and SEM pictures from the device’s packaging and structure at the microscopic level of transistor design, with a focus on the latter.

This report includes an estimated manufacturing cost of the MOSFET devices and analyzes their selling prices. It provides physical, technological and manufacturing cost comparisons between the analyzed MOSFETs. Moreover it shows a complete analysis of the actual SiC components’ market.

COMPLETE TEARDOWN WITH

• Detailed optical and SEM photos
• Precise measurements and identification
• SEM analysis of transistor structure
• Manufacturing process flow
• Supply chain evaluation
• In-depth economic analysis
• Manufacturing cost analysis
• Estimated sales price
• Comparison between Cree/ Wolfspeed, Rohm, STMicroelectronics, Littelfuse, and Infineon
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