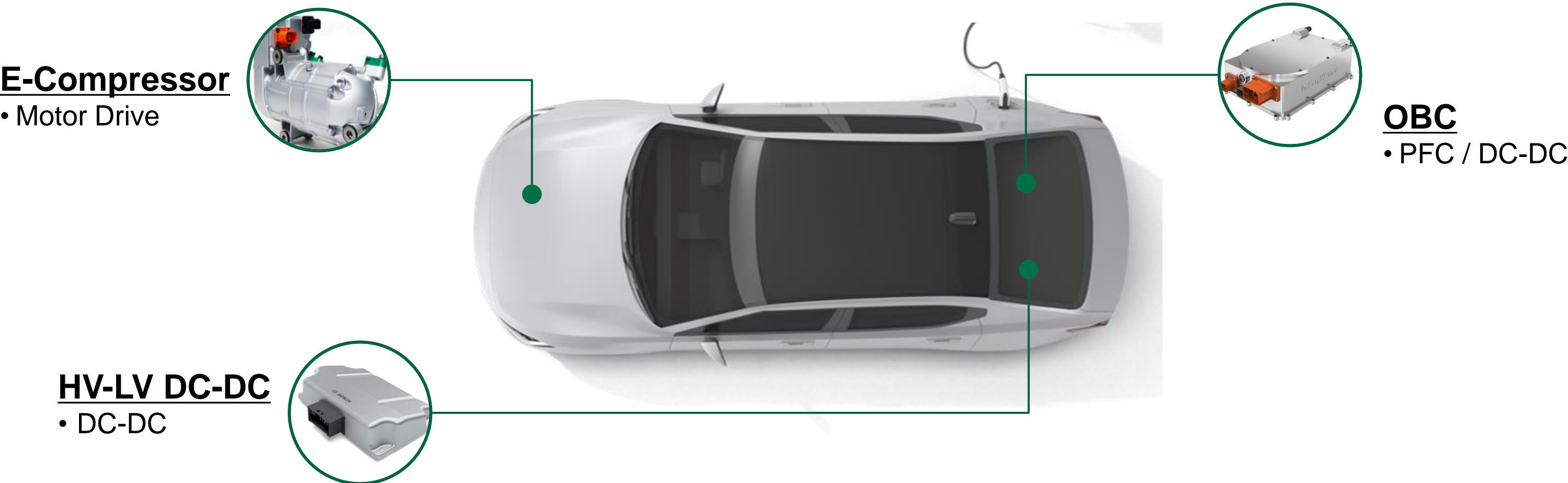


TSPAK, Innovative Top-Side Cooling Package

The TSPAK offers superior thermal performance, high efficiency, power density and reliability, making it ideal for a variety of automotive applications such as on-board chargers (OBCs), DCDC converters, and e-compressors. With an industry-standard footprint of 14mm x 18.58mm, the TSPAK packages provide superior thermal performance and Kelvin source configuration to minimizes gate noise and reduces turn-on losses by 60%, enabling higher-frequency operation and improved power density.

Target Applications



Key Features and Benefits of TSPAK

TSPAK LF version

- Top-side cooling package with an exposed drain at the surface, allowing direct heat dissipation to the heatsink.
- Offers superior thermal performance and supports high current capabilities.

TSPAK DBC version

- Integrates an isolated DBC ceramic pad on the surface, providing premium thermal performance and enhanced design flexibility.
- Features 3.6kV isolation voltage, extended creepage distance (5.23mm), and flexible mounting by directly connected to an external heatsink with thermal grease.

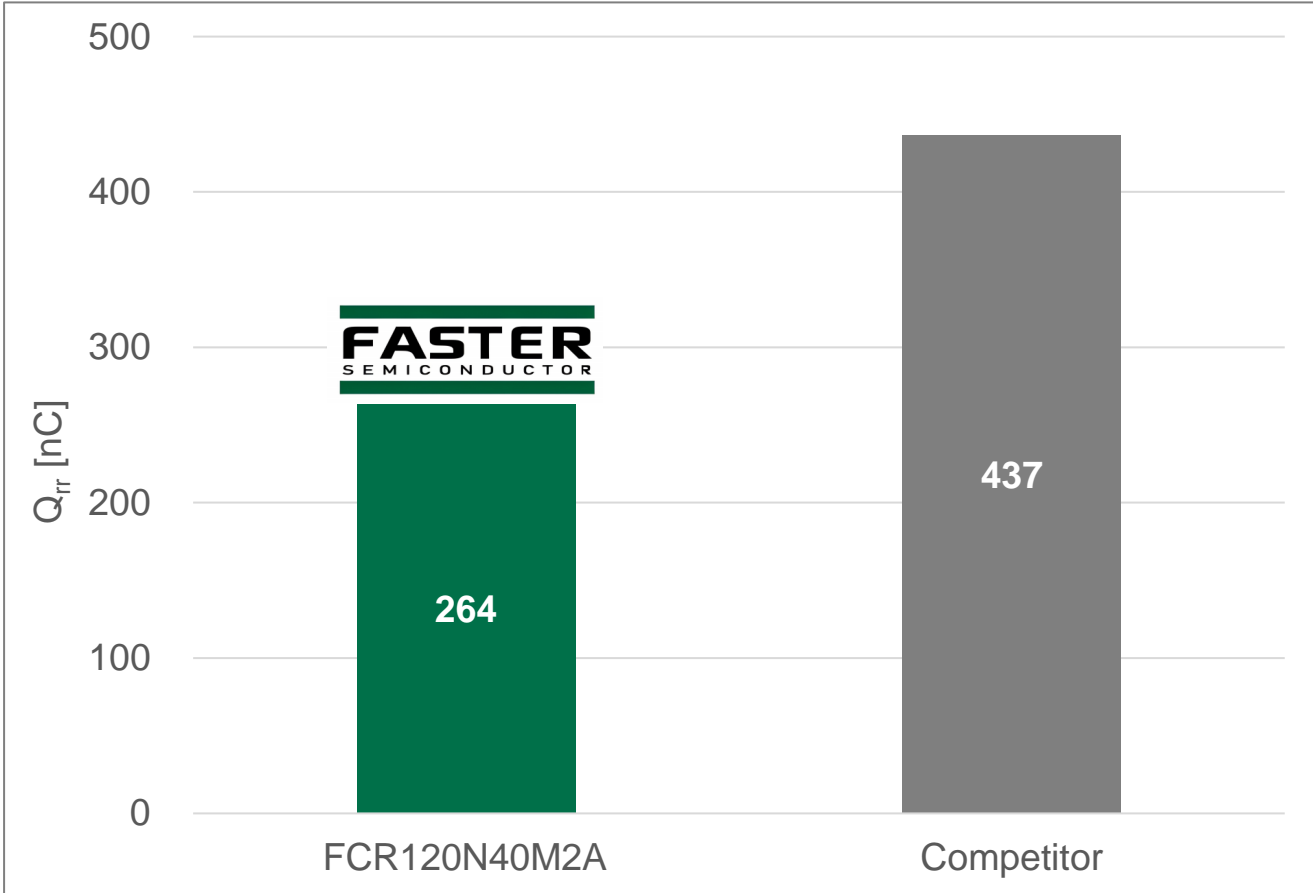
	Non-Isolated Design (LF version)	Isolated Design (DBC version)
Package		
Features	<ul style="list-style-type: none"> • Top-side cooling • High heat spread effect • Larger die size attachable than DBC version • Design flexibility : Better Thermal Performance <ul style="list-style-type: none"> • Comparable creepage distance (4.85mm) vs. Comp. • Industry standard package footprint (Pin-to-pin replacement) • Kelvin source Package • High temperature capability : $T_{j(max)} = 175^{\circ}\text{C}$ 	<ul style="list-style-type: none"> • Top-side cooling • Isolated substrate / High dielectric strength <ul style="list-style-type: none"> • Mounting flexibility with thermal grease • Design flexibility : Better Thermal Performance <ul style="list-style-type: none"> • Longer creepage distance (5.23mm) vs. Comp. • Industry standard package footprint (Pin-to-pin replacement) • Kelvin source Package • High temperature capability : $T_{j(max)} = 175^{\circ}\text{C}$
Benefits	<ul style="list-style-type: none"> • High current capability by thick wire bonding • High power density : Smaller FOM factor • Improved EMI and Easy to design • Better thermal performance • Lower switching losses 	<ul style="list-style-type: none"> • High current capability by thick wire bonding • Easy inverter replace during repair • Improved EMI and simplified design • High power density : Smaller FOM factor • Lower switching losses

Product Brief

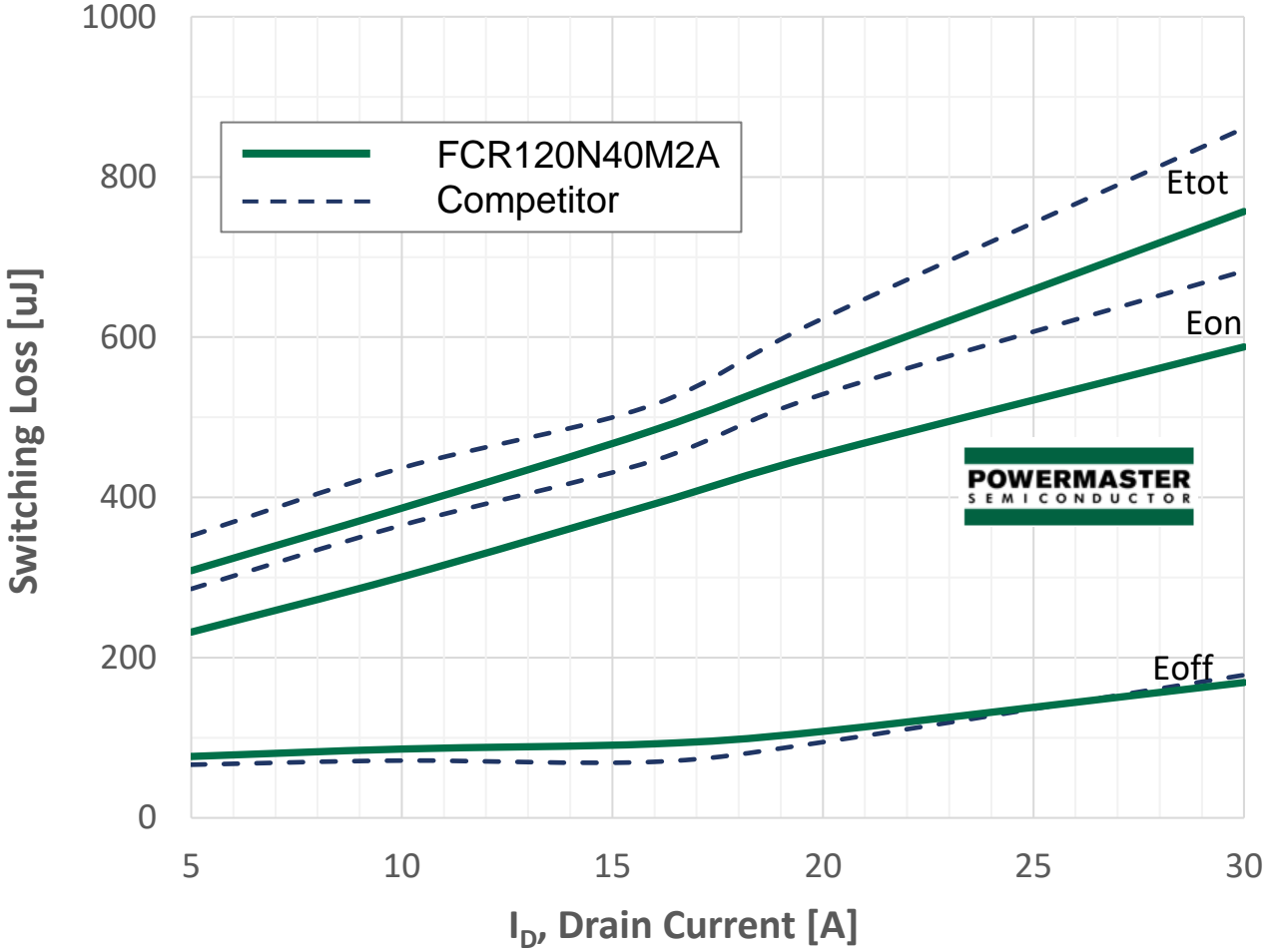
This innovative packaging leverages Power Master Semiconductor’s latest generation of 1200V eSiC MOSFET (Gen2), employing cutting-edge technology to decouple a trade-off between specific on-resistance (R_{sp}) and short-circuit withstand time (SCWT). Compared to the previous generation, the new 1200V eSiC MOSFETs deliver 20% reduction in $R_{DS(ON)}$ and a 15% improvement in SCWT, as well as a 45% reduction in switching losses

Performance Benchmark

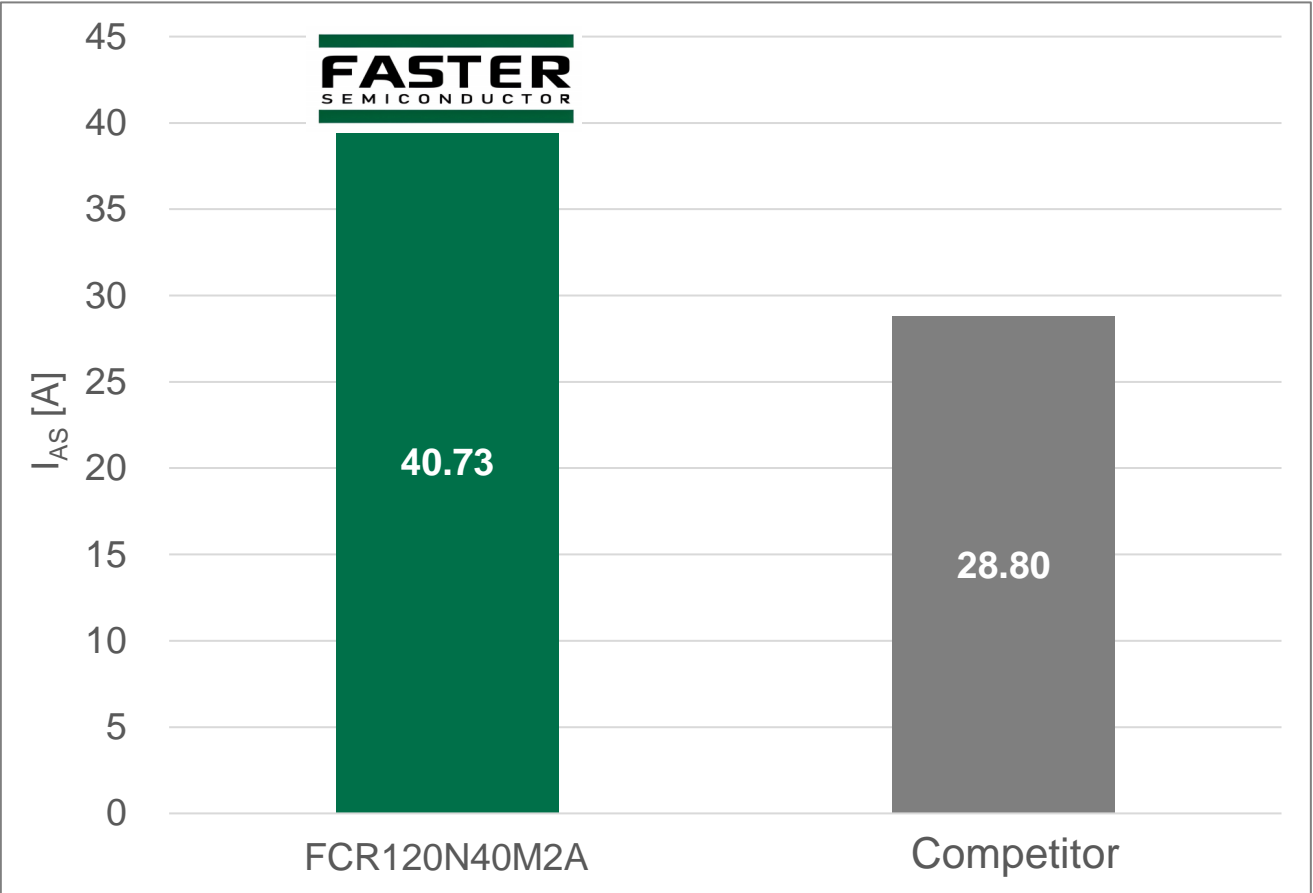
Body Diode Performance (Q_{rr})



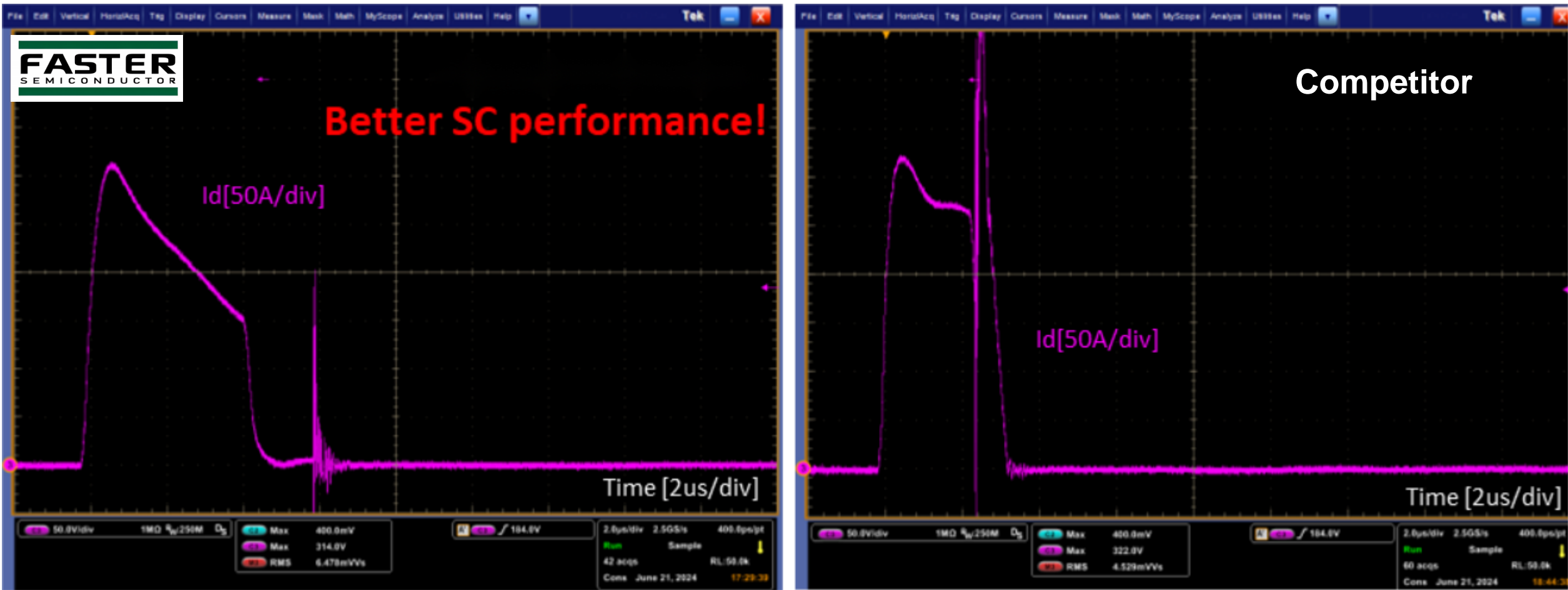
Switching Performance



UIS Ruggedness (Avalanche current)



Short Circuit Withstand Time (SCWT)



TSPAK - 1200V Gen2 eSiC MOSFET (Automotive Grade)



Package $R_{DS(ON)}_{typ}$	TSPAK-LF Version	TSPAK-DBC Version
21mΩ	FCRZ120N21M2A	FCR120N21M2A
40mΩ	FCRZ120N40M2A	FCR120N40M2A
60mΩ	FCRZ120N60M2A	FCR120N60M2A

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