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Benefits of EDT3 750V Technology in Automotive Inverter Applications

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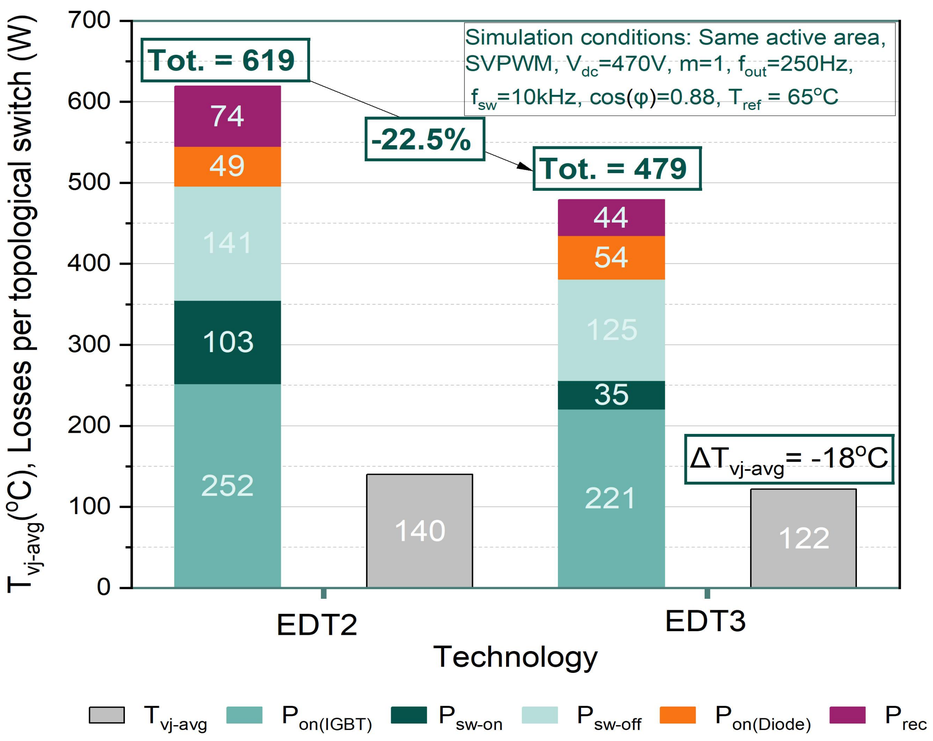
Introduction

Infineon’s new EDT3 750V technology was designed to increase the maximum output current without increasing the light load losses relative to EDT2. These improvements result in increased efficiency for several drive cycles, including WLTP, CLTC, Artemis Urban and Artemis Highway. The mentioned benefits yield significant chip-shrink potential which ultimately offer an option for system level cost improvements.

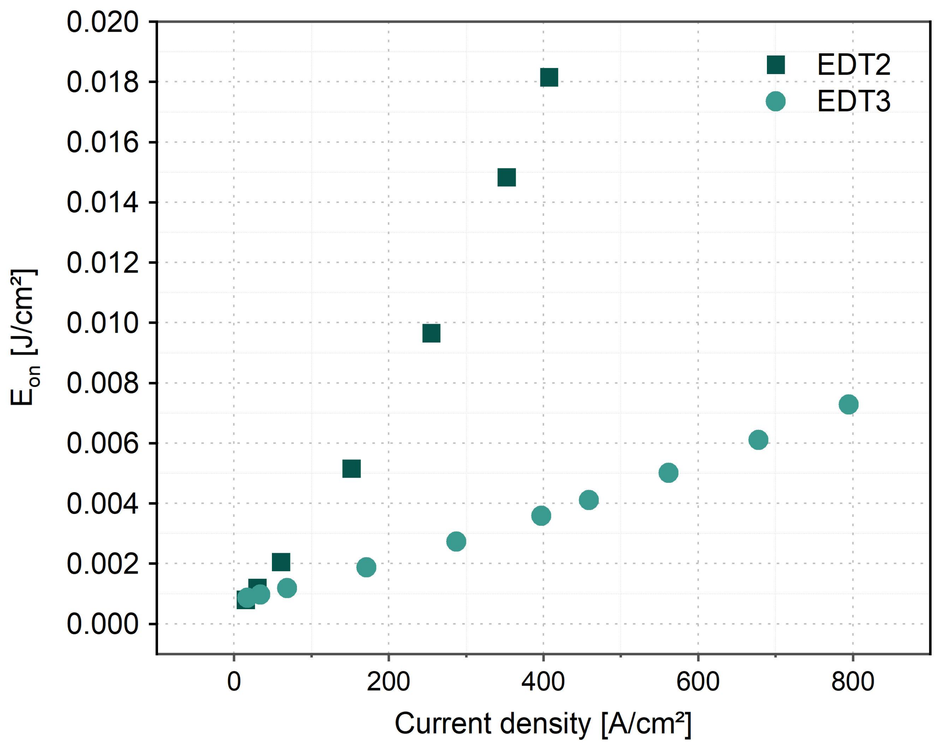
Benefit of EDT3 750V

Infineon’s EDT3 750V technology can offer an increase of approximately **25 %** in maximum output current from the same chip size when compared to EDT2, with the improvements:

- Reduction of the IGBT saturation voltage (VCE,sat)
- Faster switching due to improved IGBT and diode design
- Increase of the maximum junction temperature to 185°C



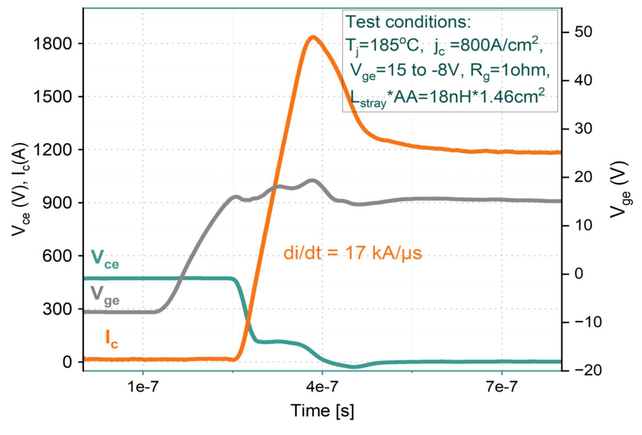
EDT3 750V shows a decrease of total losses by 22.5 % compared to EDT2 for the same chip size.



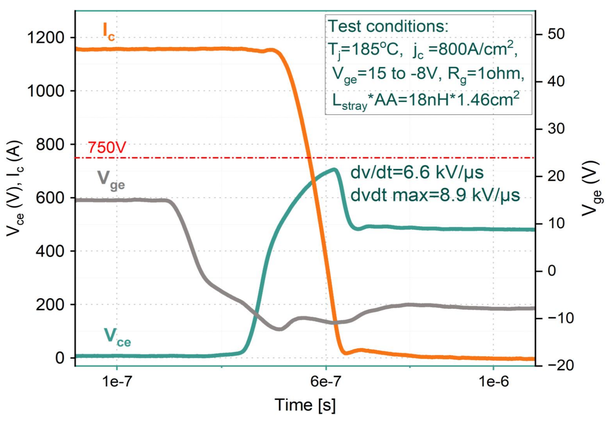
Significant reduction of approximately 66 % of the IGBT turn-on losses (Eon) can be seen compared to EDT2.

EDT3 750V Robustness and Qualification

- Fast switching without exceeding 750V
- RBSOA and diode SOA verified by repetitive switching test
- Short-circuit robust for 3 µs (at 175°C) and 2.5 µs (at 185°C)
- Qualified for operation at up to 185°C in several reference packages
  - ➢ 2000h HTRB, HTGB, HV-H3TRB



IGBT turn-on curve at high current and high voltage at 185°C



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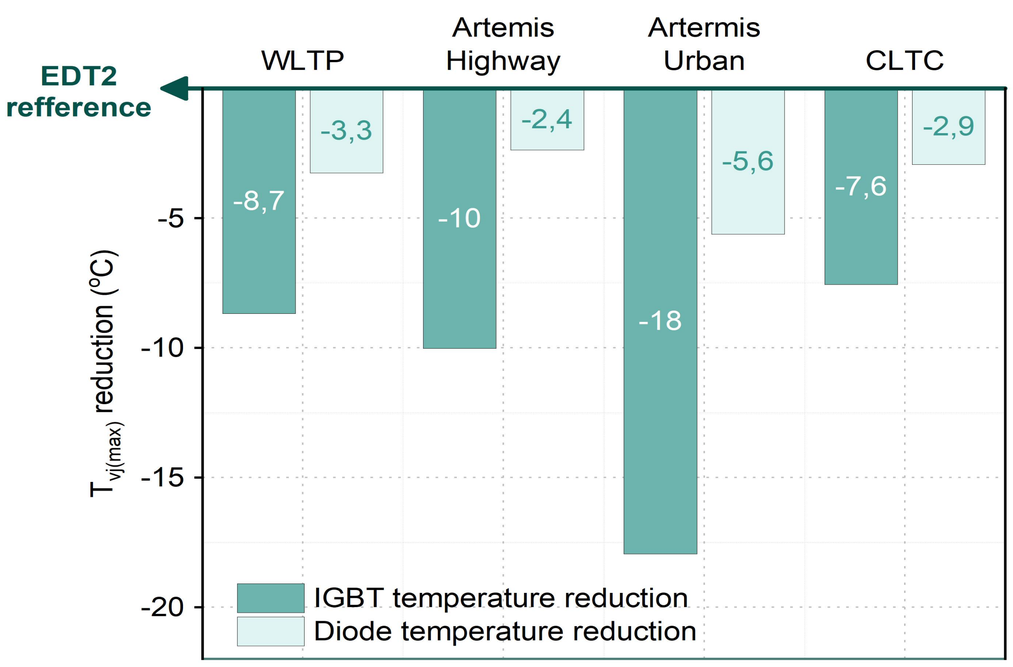
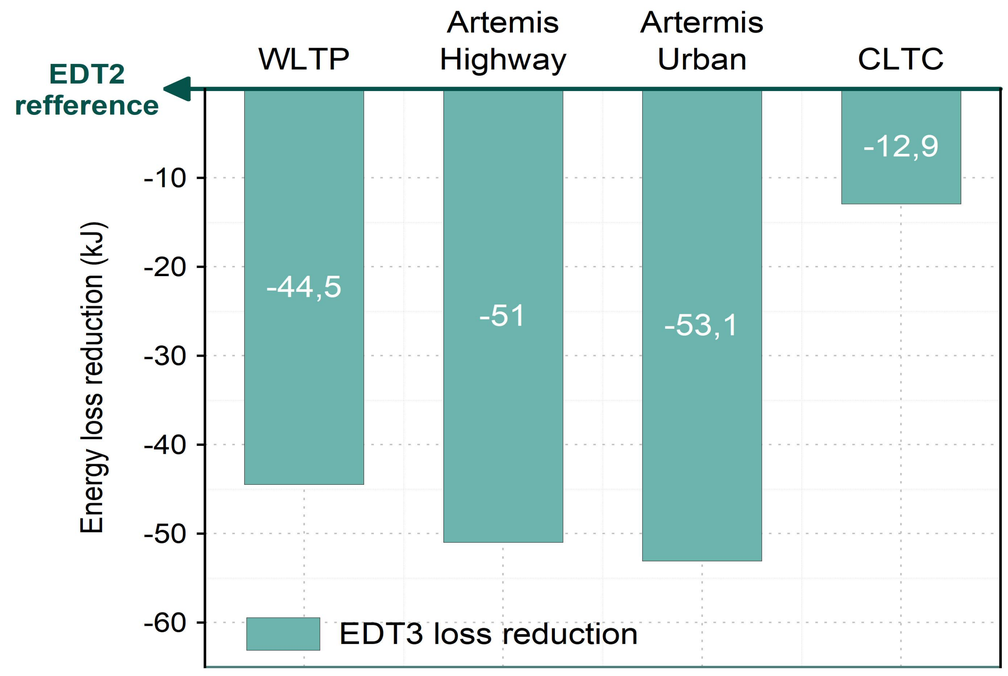
Driving Profile Comparison

The driving cycle simulation shows lower average temperature of both IGBT and diode and reduced energy loss with EDT3 in comparison with EDT2 for all driving profiles.



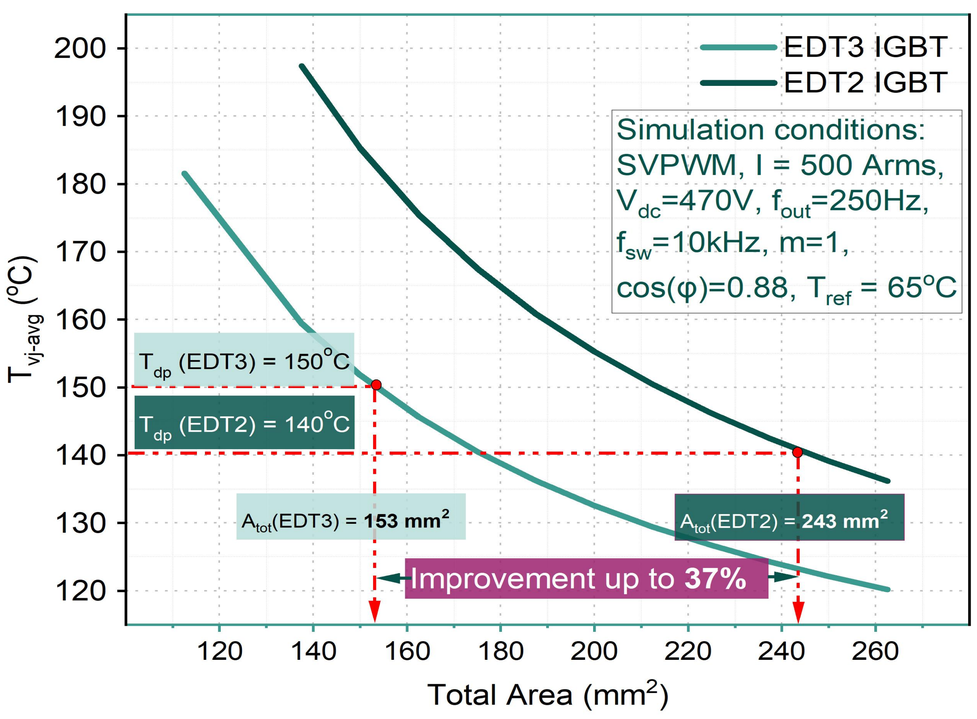
Temperature reduction of EDT3 IGBT and diode relative to EDT2 (same active area)



Energy saving achieved with EDT3 relative to EDT2 (same active area)

Chip Size Estimation

The required chip size of EDT3 and EDT2 IGBT is compared via simulation for a certain load operation condition and with the same thermal characteristic of power module. EDT3 offers up to **37 %** IGBT shrink potential compared to EDT2.



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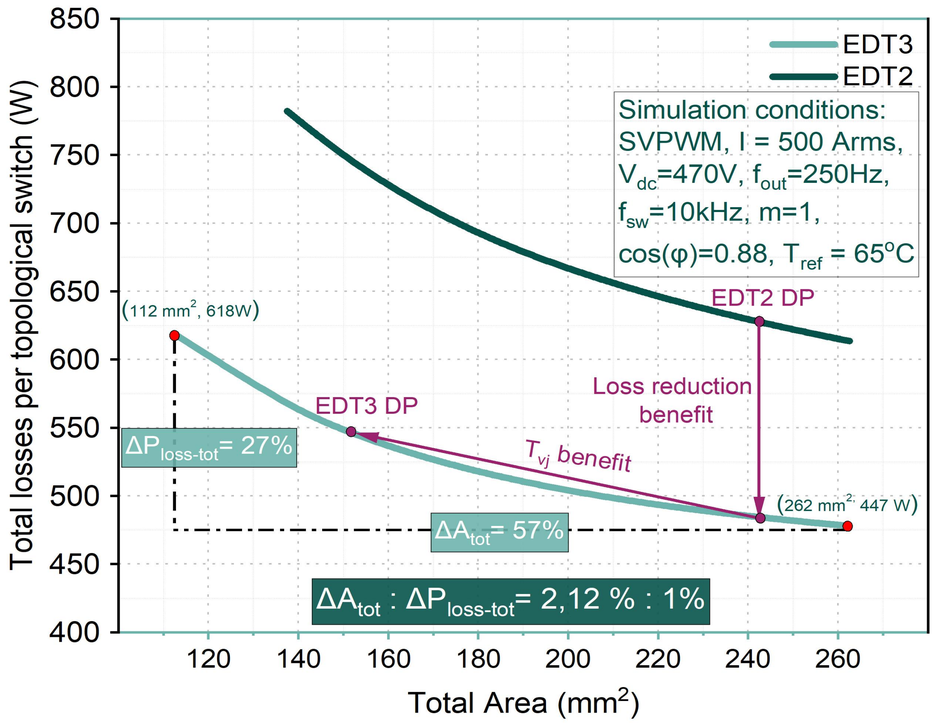

The chip shrink of EDT3 benefits from the combination of total power loss reduction and increase max. junction temperature