1700 V EconoDUAL™ 3 modules with TRENCHSTOP™ IGBT7

Aleksei Gurvich
Senior Manager Product Definition & Application Engineering LMP
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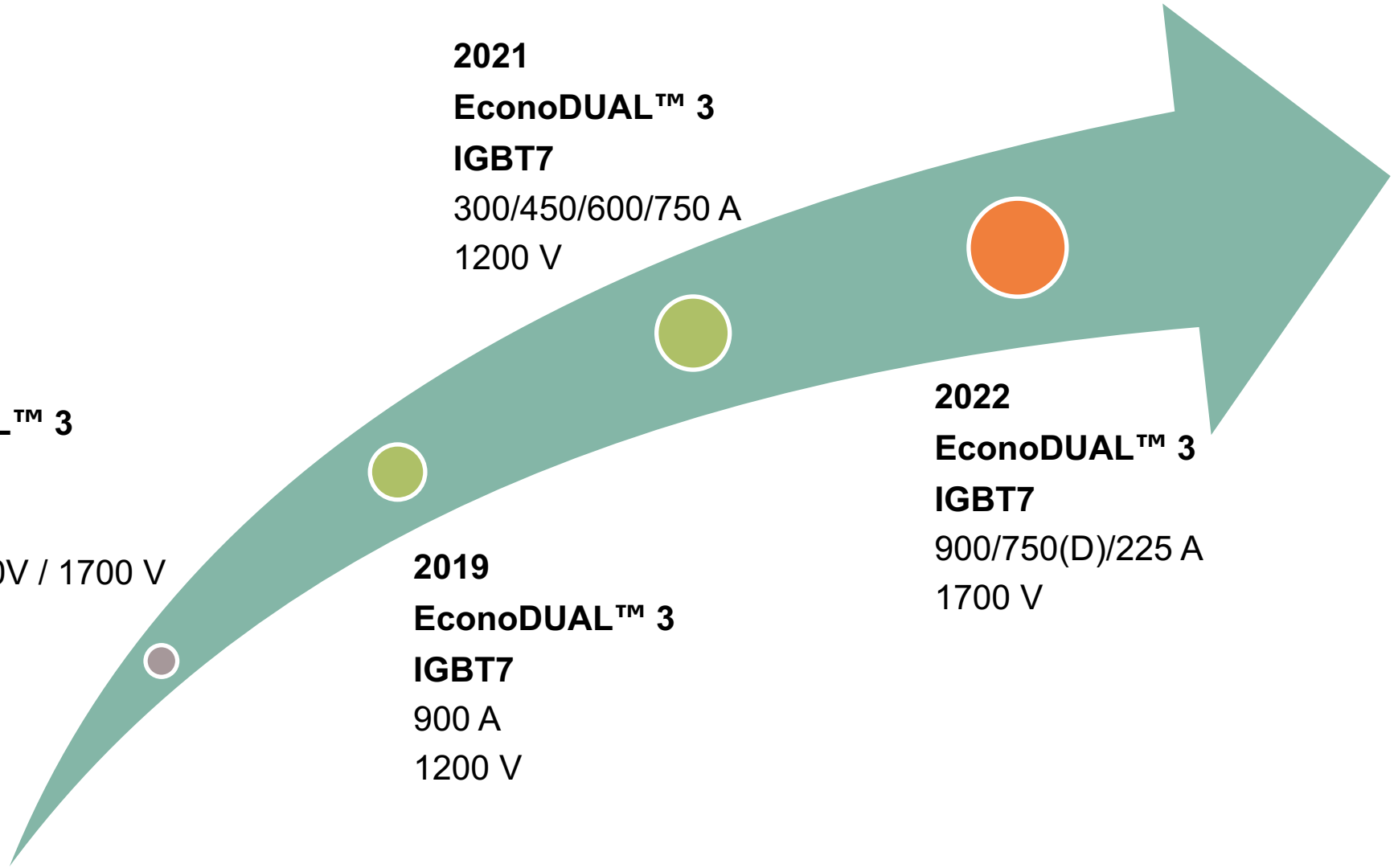
EconoDUAL™ 3 addresses a broad range of applications including Wind, Drives, Solar and CAV

Highlights

- Versatile and popular package
- Broad product portfolio with proven IGBT4 and IGBT7 technology
- Available with TIM and PressFIT
- Customized products

EconoDUAL™ 3 portfolio is further growing – current extension to 900 A now also available in 1700 V voltage class



EconoDUAL™ 3 with TRENCHSTOP™ IGBT7

Key Features

- 900 A 1700 V best-in-class EconoDUAL™ 3
- 750 A 1700 V EconoDUAL™ 3 with enlarged diode as best fit for Wind and SVG applications
- TRENCHSTOP™ IGBT7 technology
- Improved EconoDUAL™ 3 housing
- Lower conduction and switching losses
- Higher inverter output current for the same frame size
- Reduced system costs by avoiding paralleling of the modules

Typical Applications

Target Product Portfolio	
IC [A]	1700 V
900	**FF900R17ME7_B11***
750	FF750R17ME7_B11 **FF750R17ME7D_B11****
600	FF600R17ME7_B11
450	FF450R17ME7_B11
300	FF300R17ME7_B11
225	**FF225R17ME7_B11***

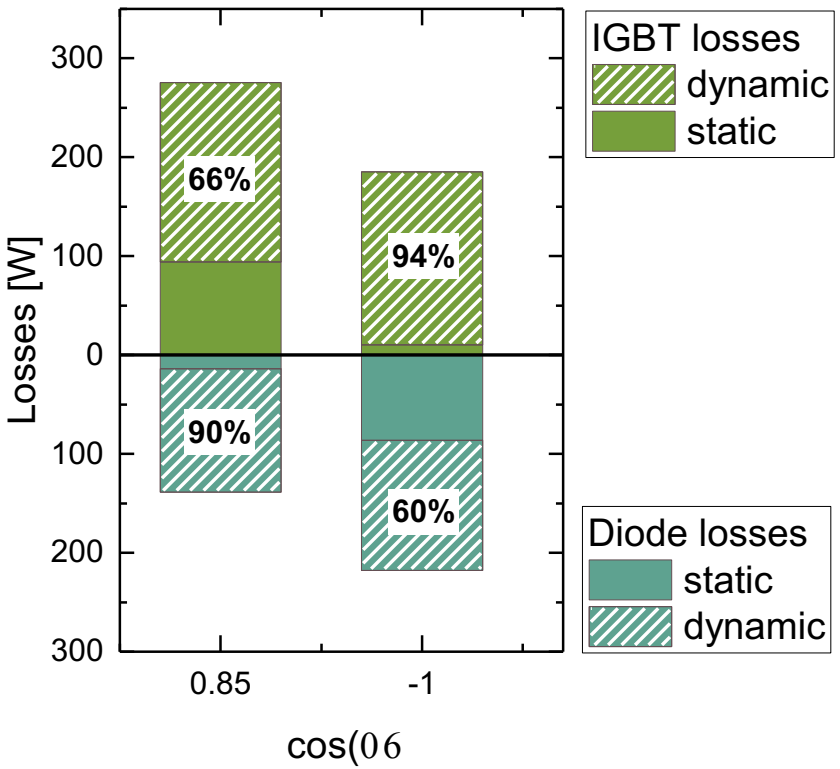
* already available

** with enlarged diode

optionally available with TIM

IGBT 7

Typical application conditions for 1700 V IGBT modules
Dynamic losses are dominating

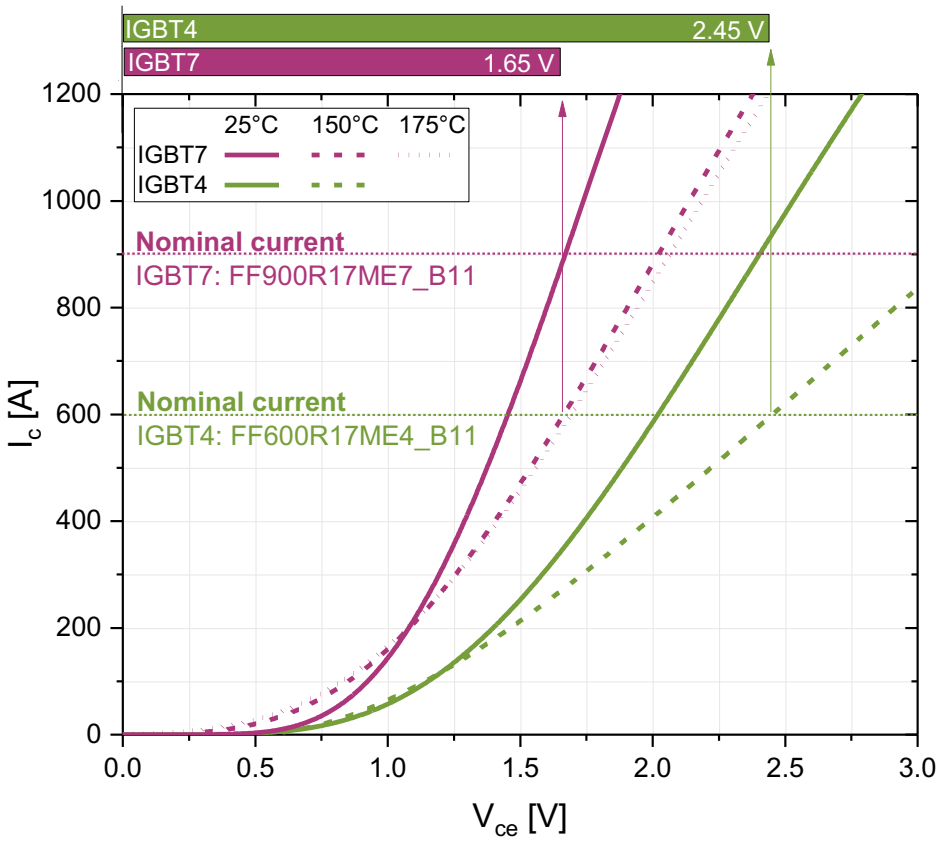


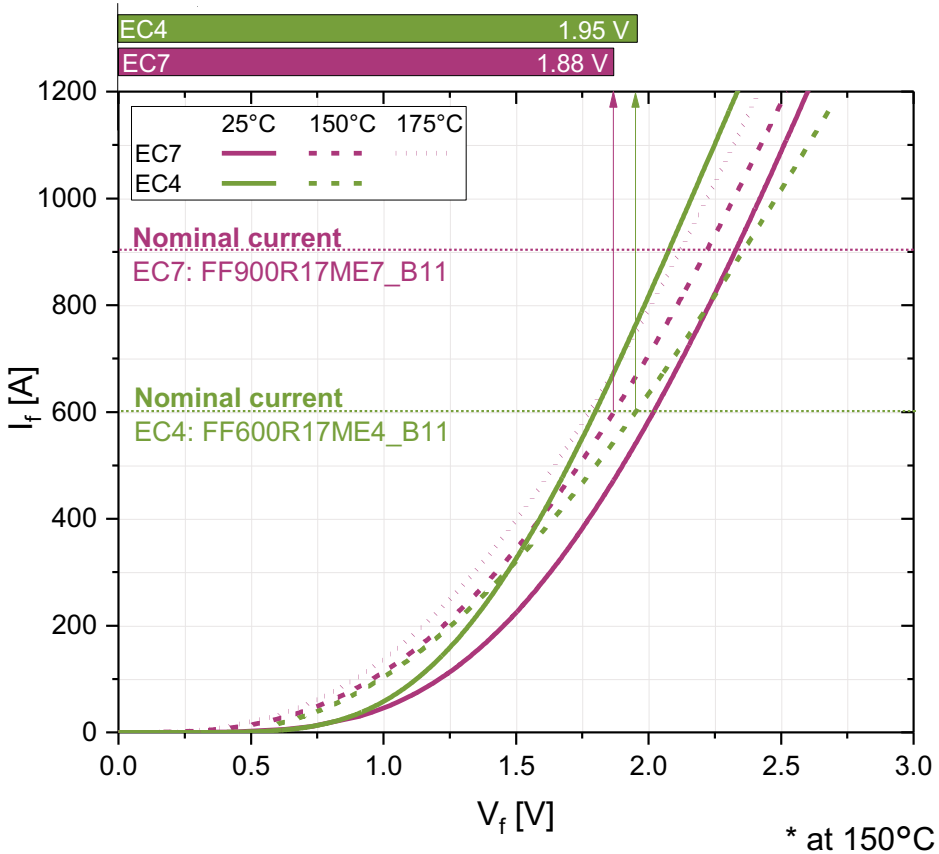
Power losses ratio for the FF600R17ME4_B11 under the following conditions:

- f_{sw} = 2.5 kHz
- I_{rms} = 175 A
- cos(φ) = 0.85 / -1
- m = 1
- f_{out} = 50 Hz
- V_{dc} = 1150 V
- forced air cooling

- Dynamic losses have a major share at both cos(φ) = 0.85 and cos(φ) = -1
- To optimize the electrical performance it is crucial to reduce switching losses
- Well-balanced switching and static parameters of the IGBT and the diode should not be neglected

Static losses comparison
Significantly reduced IGBT static loss compared to former generation



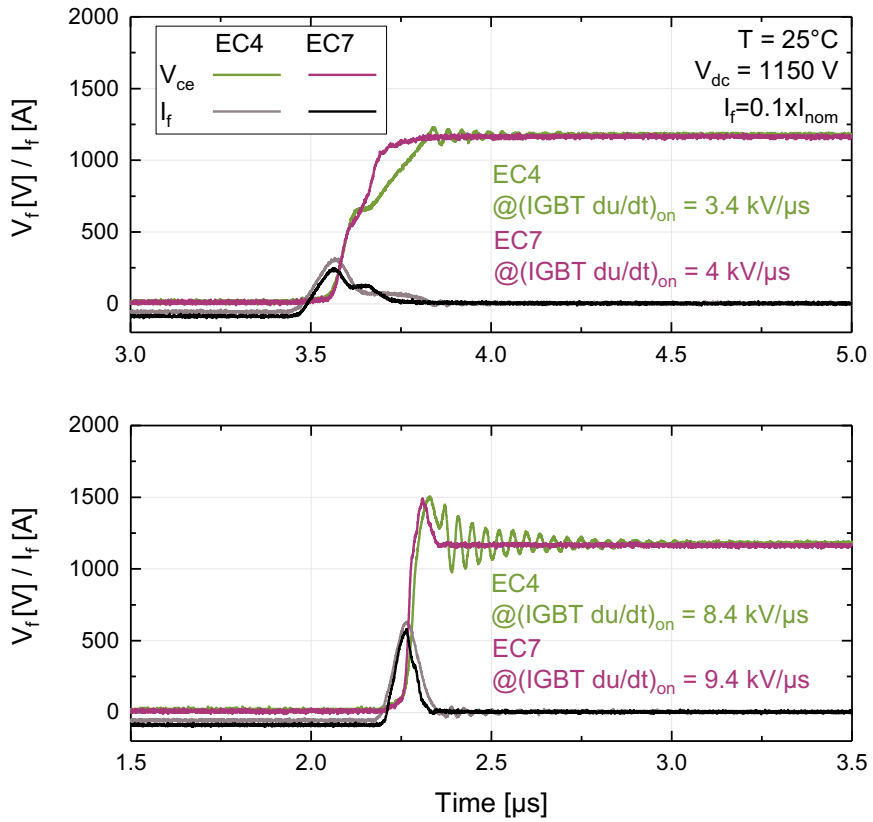


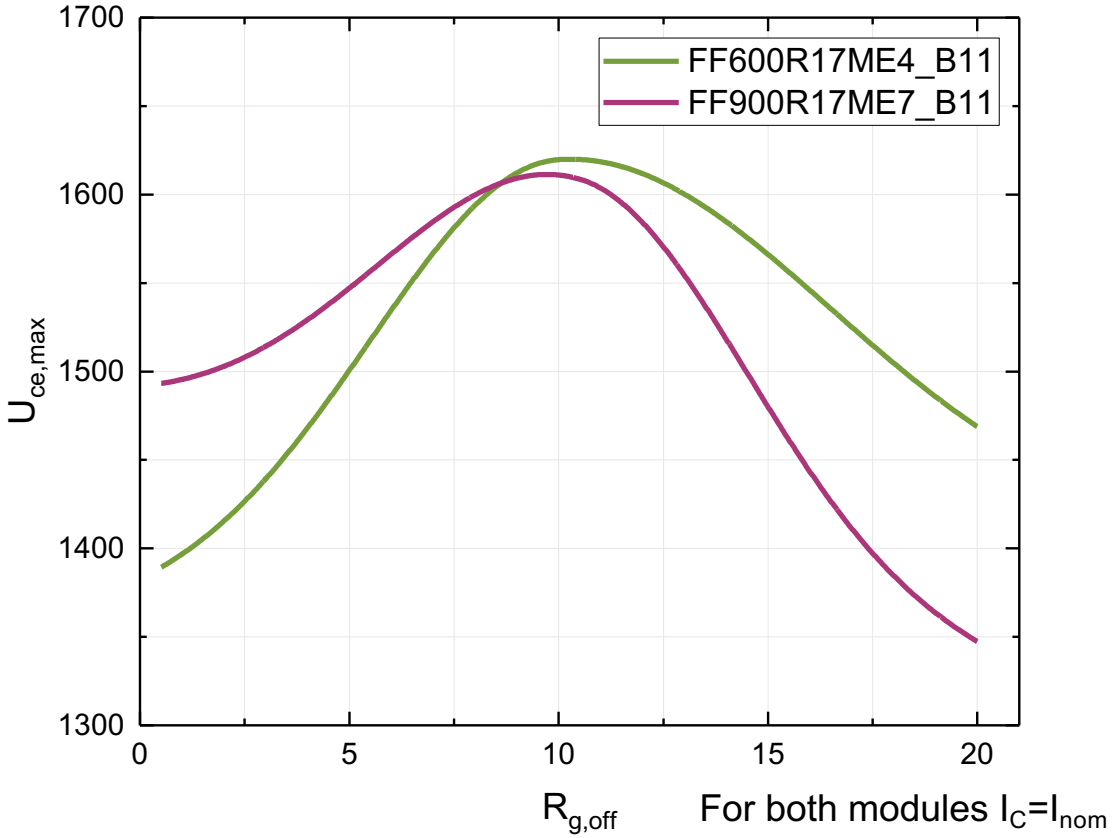
* at 150°C and 600 A

FF900R17ME7_B11 with TRENCHSTOP™ IGBT7 1700 V shows:

- **33%** lower IGBT static losses*
- **4%** lower diode static losses*

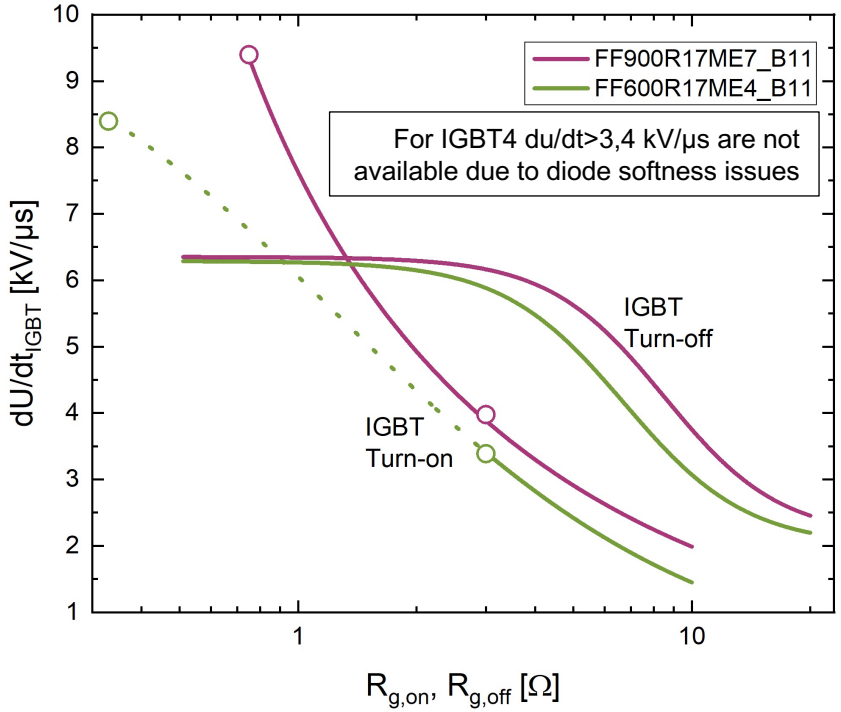
Diode softness and IGBT overvoltage at turn-off
Safe and smooth switching over a wide operating range

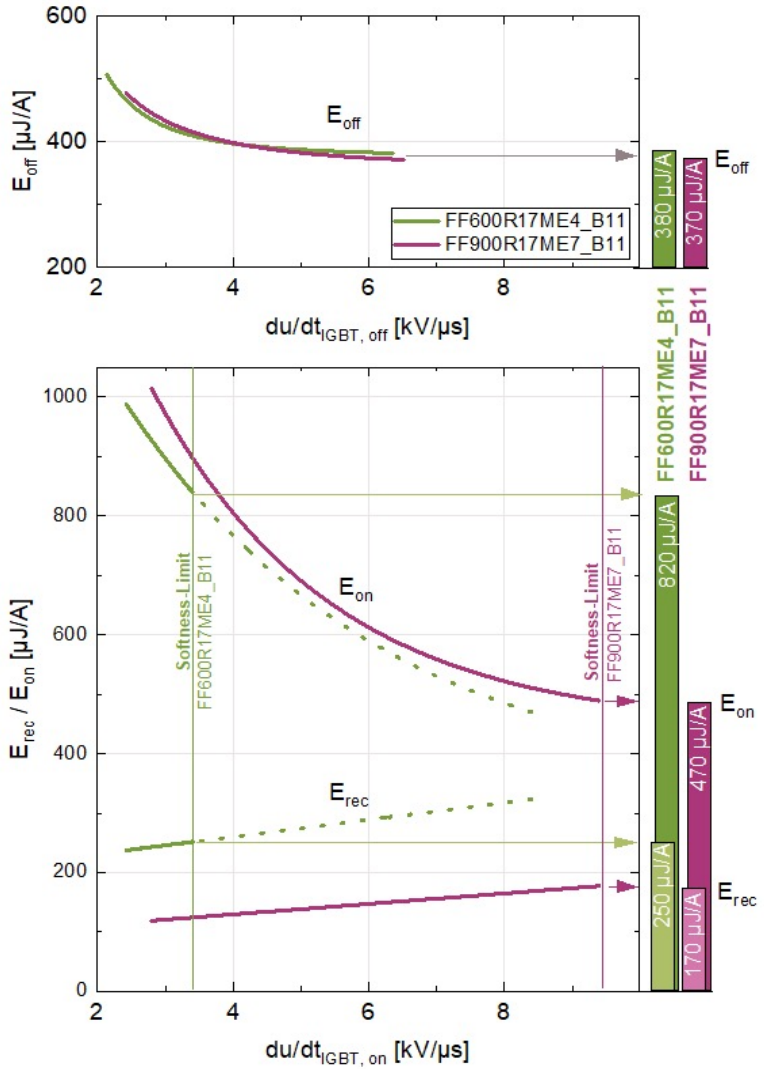




- Improved softness of EC7 diode allows clean switching even at high du/dt
- IGBT7 is able to turn-off **50%** higher current with the same $U_{ce,max}$ level

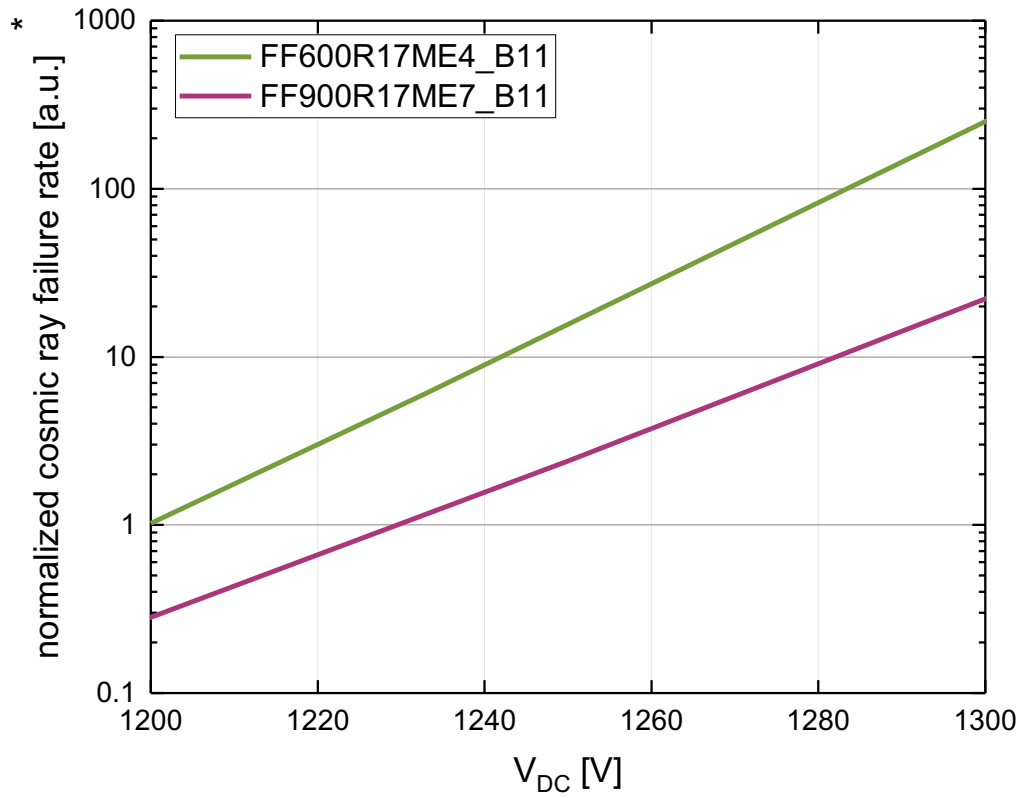
du/dt controllability and dynamic losses
Improved switching losses for both IGBT and diode





- Wider du/dt range leads to more than **40%** lower turn-on losses IGBT7 vs IGBT4
- The new EC7 diode shows **50%** Erec reduction when switching at the same du/dt

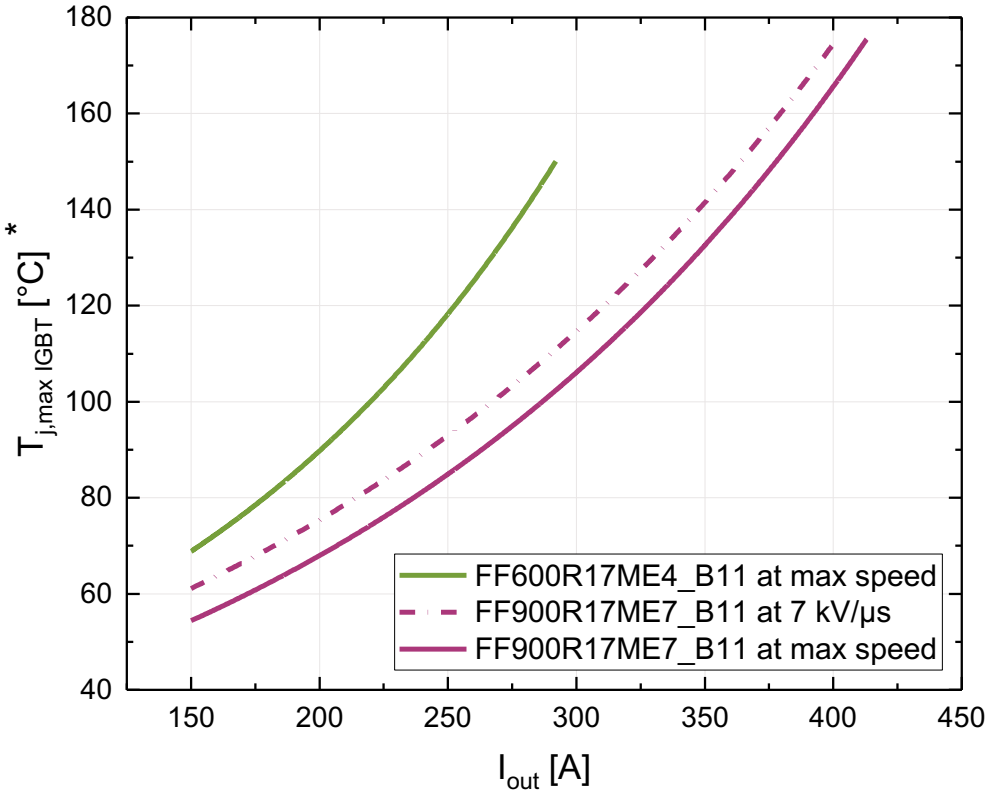
Cosmic ray induced FIT rate
Up to one order of magnitude CR FIT improvement



* at 25°C

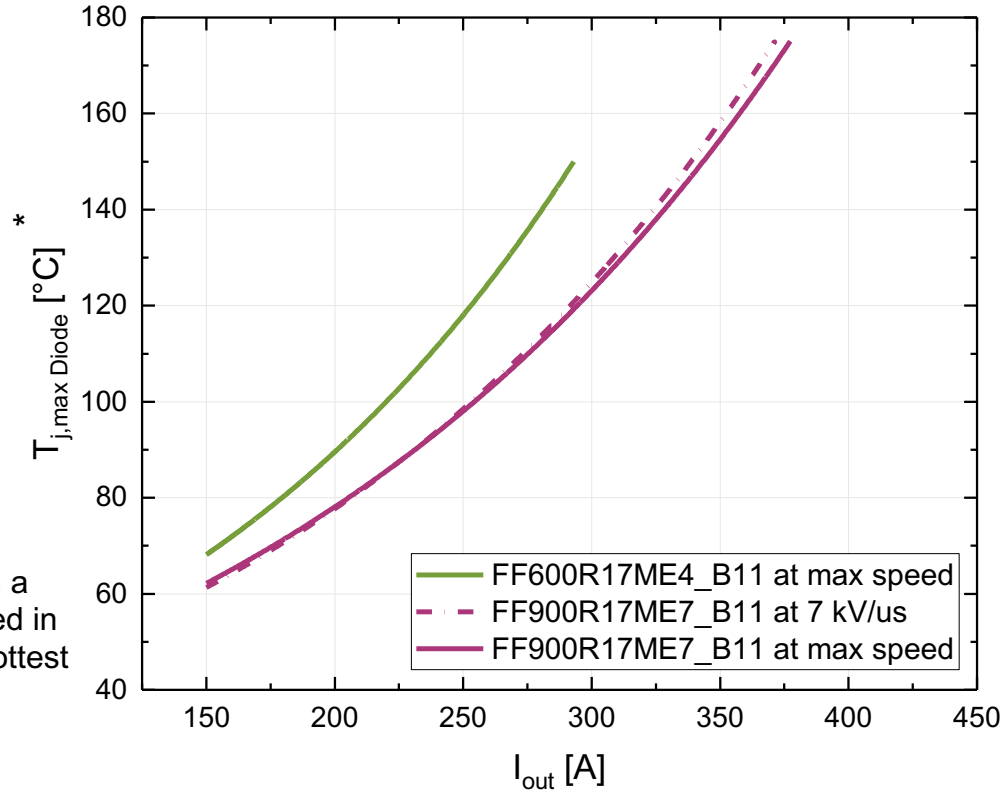
› **Factor of 3** CR FIT improvement at 1200 V
› **One order of magnitude** reduced CR FIT at 1300 V

Application test results: drives and AFE
Higher current densities with IGBT7



cos(φ)= **0.85**, V_{dc} = 1150 V, f_{sw} = 2.5 kHz, f_{out} = 50 Hz

* measured with a thermocouple glued in the center of the hottest chip

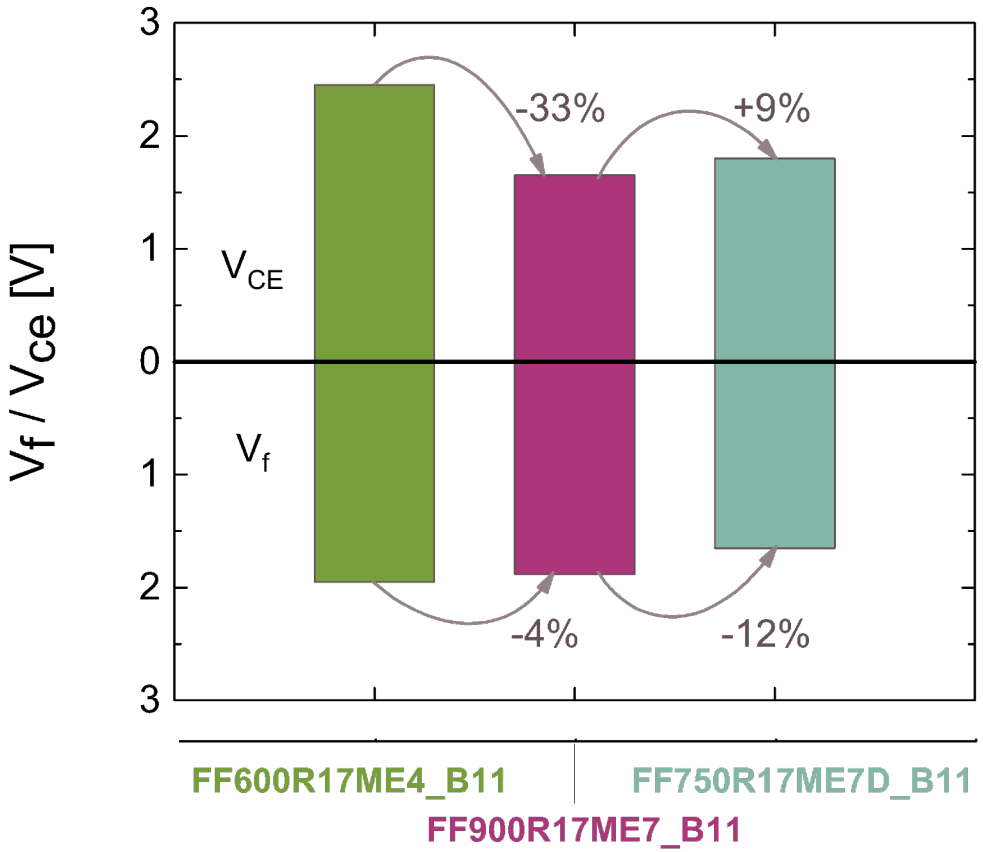


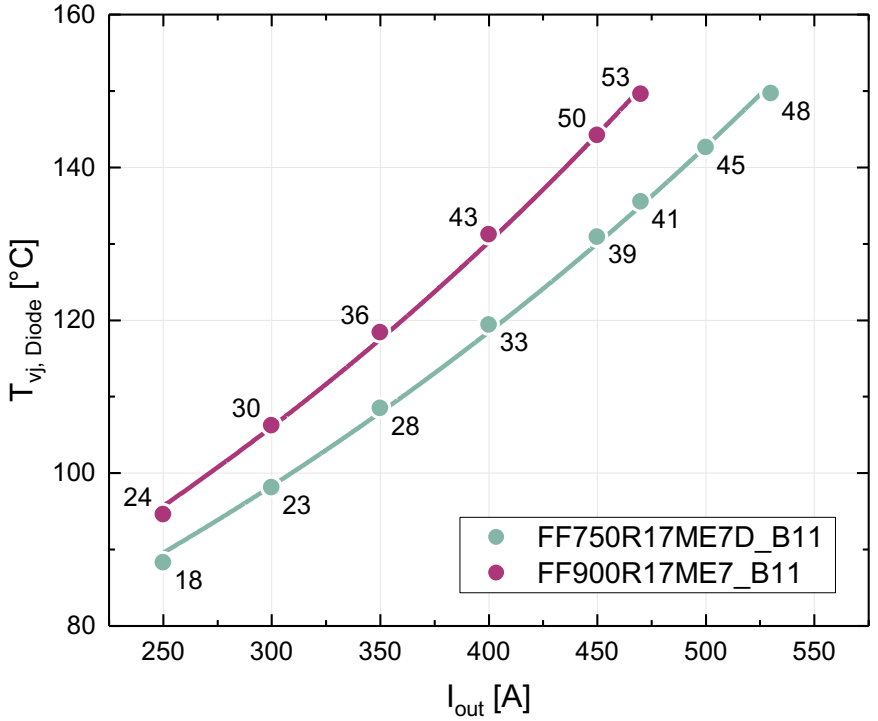
cos(φ)= **-1**, V_{dc} = 1150 V, f_{sw} = 2.5 kHz, f_{out} = 50 Hz

FF900R17ME7_B11 with TRENCHSTOP™ IGBT7 1700 V shows:

- **up to 41%** higher output current at cos (φ) = 0,85
- **up to 30%** higher output current at cos(φ) = -1

FF750R17ME7D_B11 with enlarged diode: performance gain in V_F-demanding applications



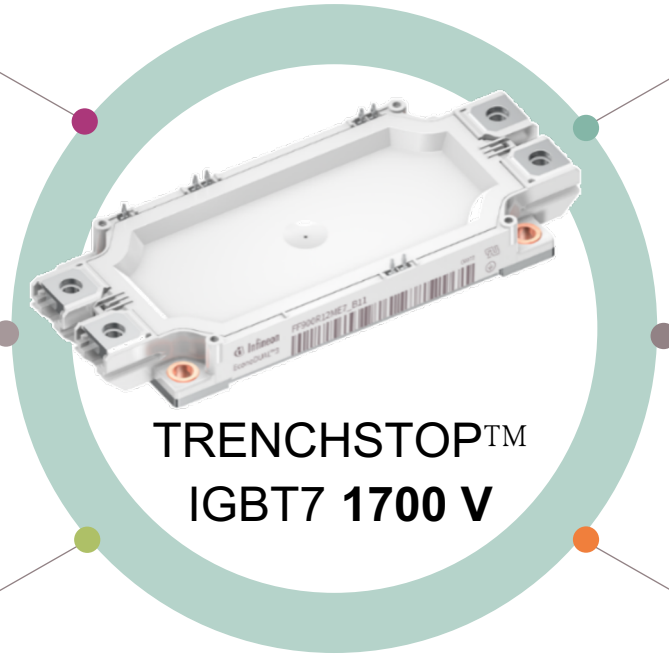


V_{dc} = 1850 V, f_{sw} = 1.5 kHz, f_{out} = 7 Hz, cos(φ) = -0.75, ANPC,
the values of $\Delta T_{vjDIODE}$ are given as data labels.
Based on datasheet values.

- **12%** lower V_F and **16%** lower $R_{thJC,DIODE}$ compared to the FF900R17ME7_B11 translate into:
- **13%** higher output current in rotor-side converter with DFIG
- **4,6 times** higher quantity of turn-on/off cycles at same I_{out} = 470 A

TRENCHSTOP™ IGBT7 1700 V in EconoDUAL™ 3 at a glance

1. Lower conduction and switching losses
2. Enhanced controllability of du/dt and diode softness
3. Overload capability at Tvj,op=175°C



4. FF750R17ME7D_B11 with reduced VF and diode R_{th}
5. Improved cosmic ray robustness
6. Higher power densities in a wide variety of applications

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