

High Power Density 1700V1000A RC IGBT Module for Wind Energy Application

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Introduction

A new 1700V/1000A RC-IGBT module utilizing 8th RC-IGBT technology is introduced. By optimizing cell design and advanced lifetime control technique, the RC-IGBT achieves low power losses, robust SOA, and higher output current capability .

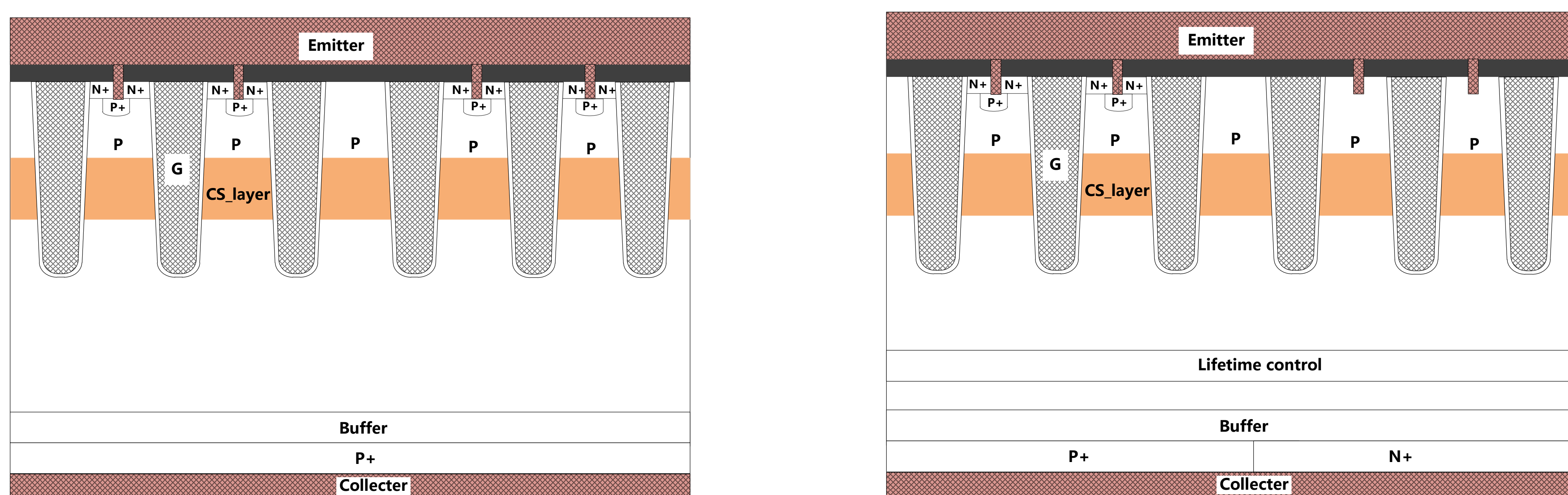


Fig. 1 (a) 7th STMOS IGBT Structure; (b) 8th RC-IGBT Structure

Electrical characteristics

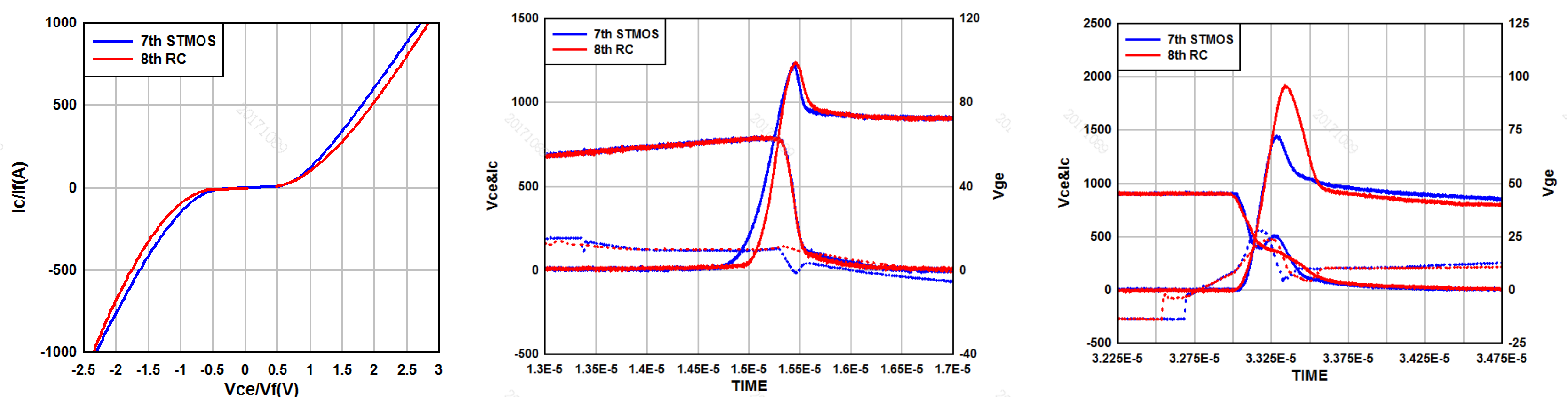


Fig. 2 (a) Static characteristic; (b) Turn-off waveform; (c) Turn-on waveform

- V_{ce} and V_f close to 7th STMOS
- Quicker turn-off speed , 26% lower E_{off} .
- Shorter current tail, larger peak current, similar E_{on} .

SOA Characteristics

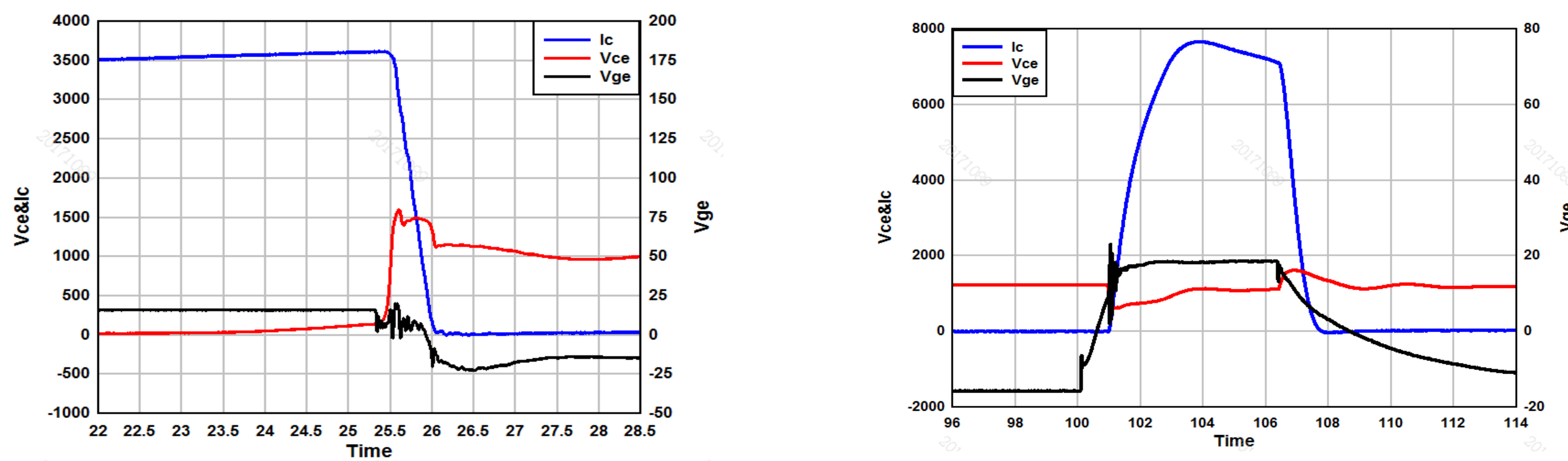


Fig. 3 SOA waveforms of RC-IGBT , left: RB 175°C; right: SC 25°C

- Turn off 3500A (3.5 times) at 1200V.
- Short-circuit at Vge 18V passed under ambient condition.

Thermal Characteristics

- Thermal capacitance increase 176%.
- Thermal resistance reduce 44%.

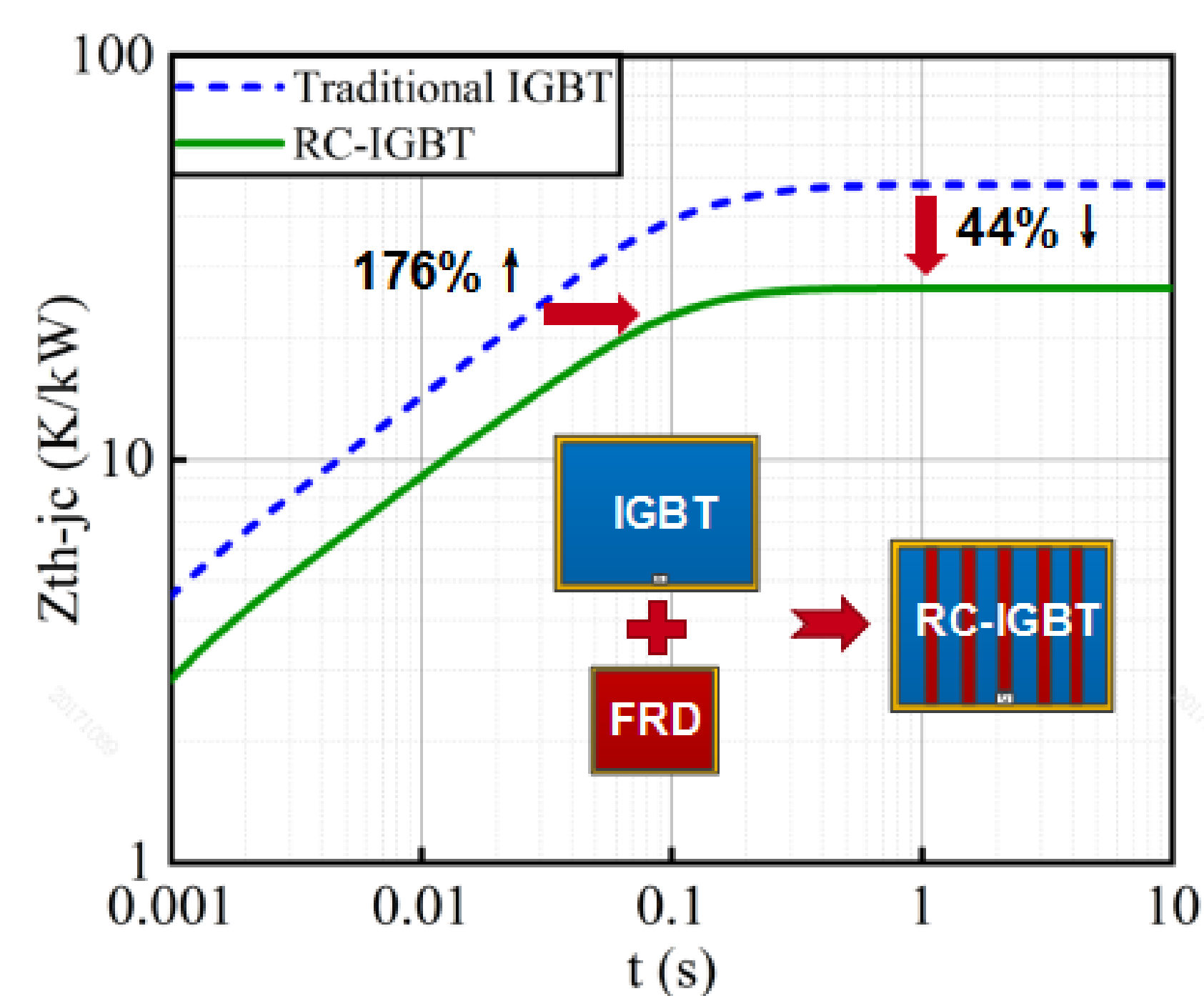


Fig. 4 Chip thermal impedance curve

Application benefits

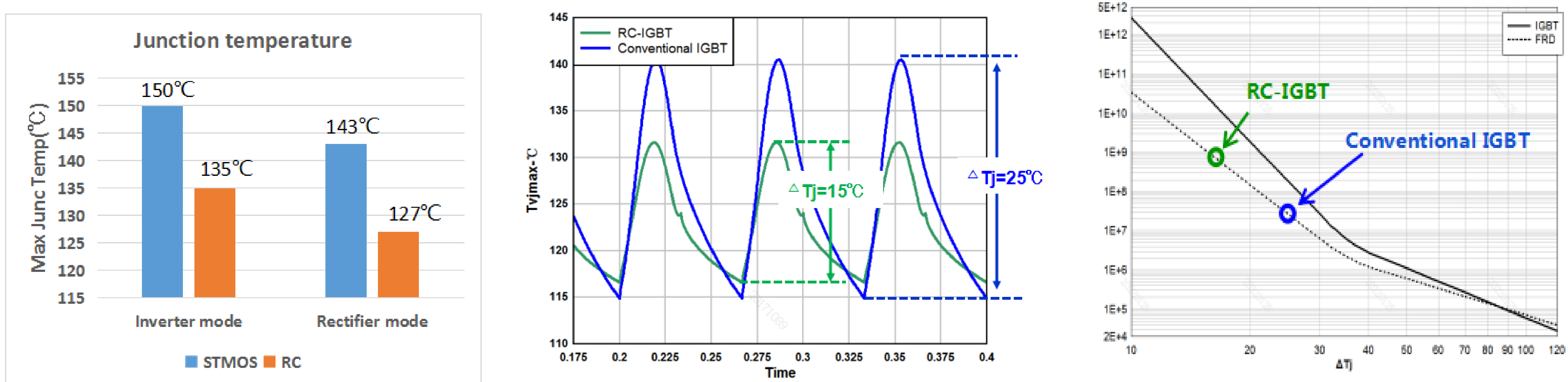


Fig. 5 (a) Junction temperature; (b) Junction temperature fluctuation; (c) ΔT_{vj} power cycle capability and temperature rise

- junction temperature reduced 15° C.
- Junction temperature fluctuations reduced 40%.
- power cycling capability enhanced, lifetime extended 46 fold.