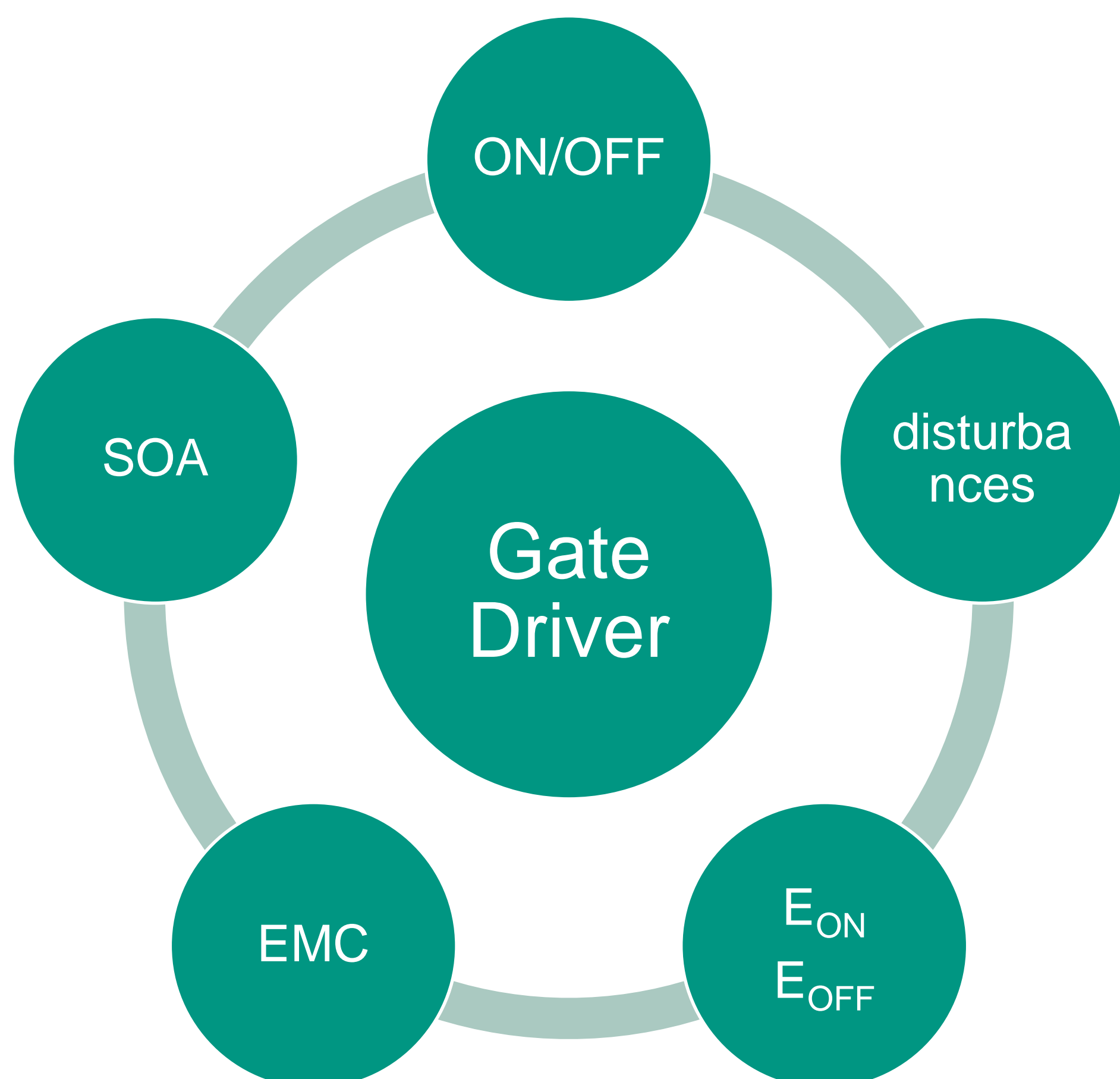


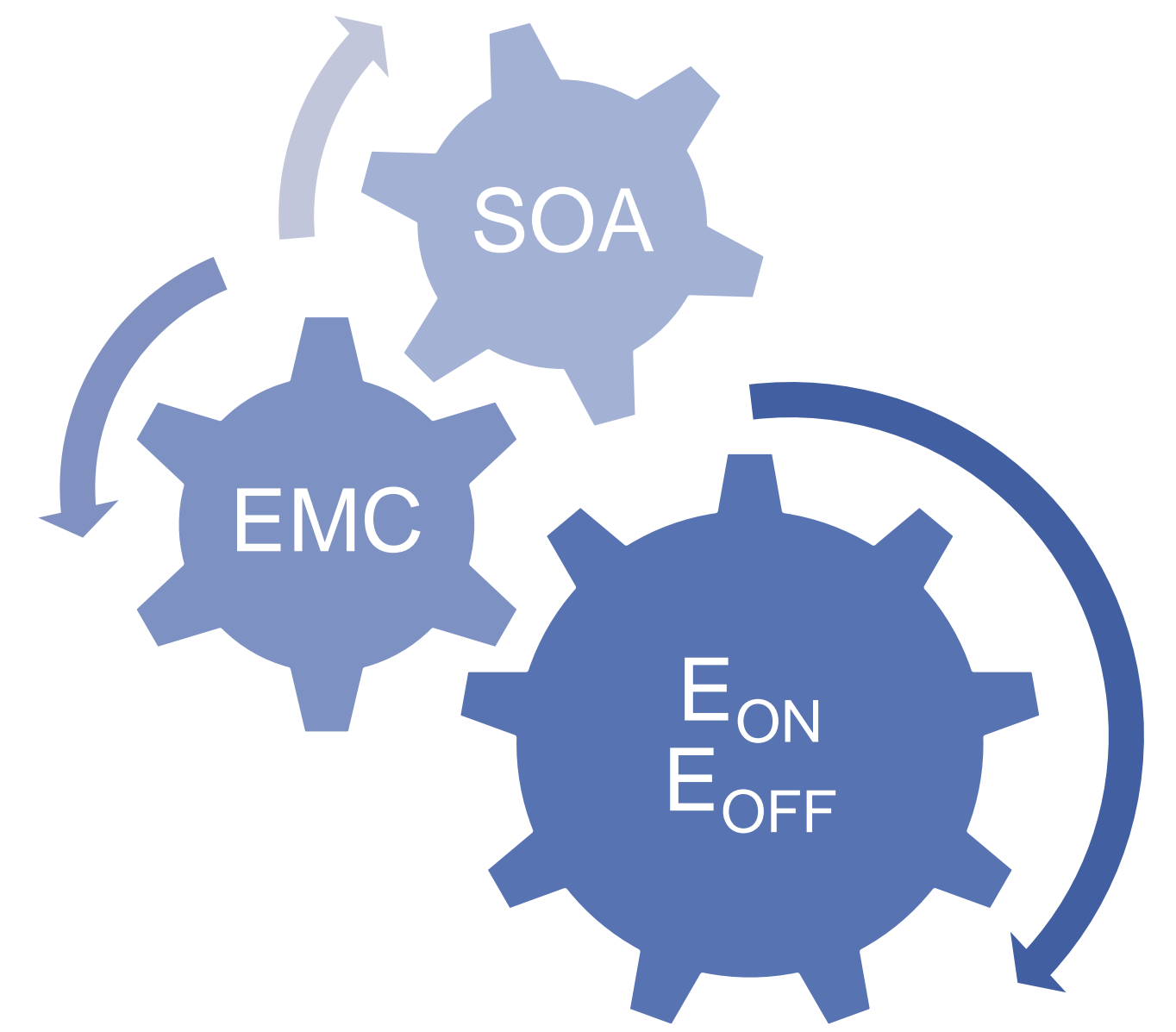
Adjustable gate control and intelligent protection of power semiconductors

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Tasks of an Gate-Driver



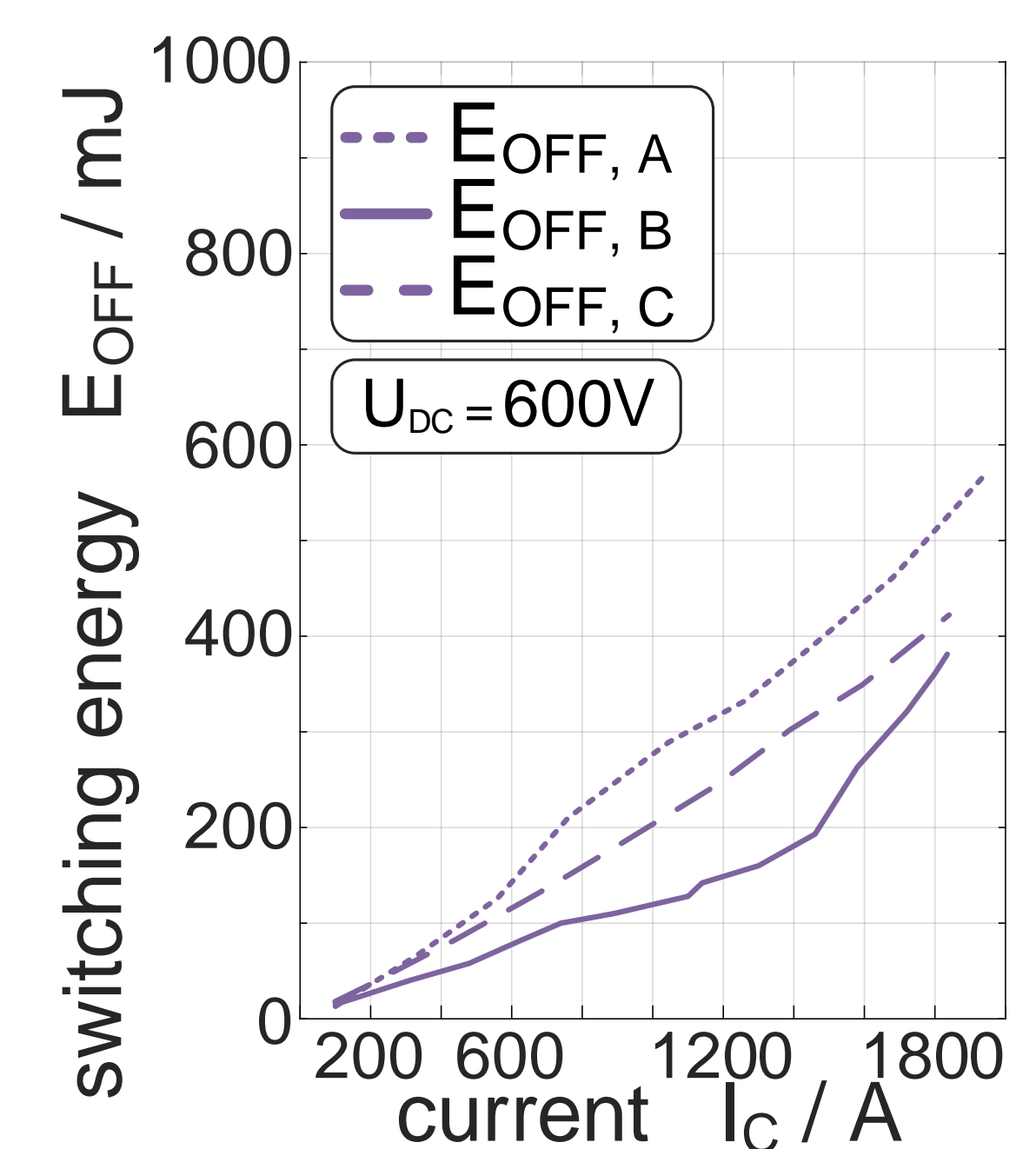
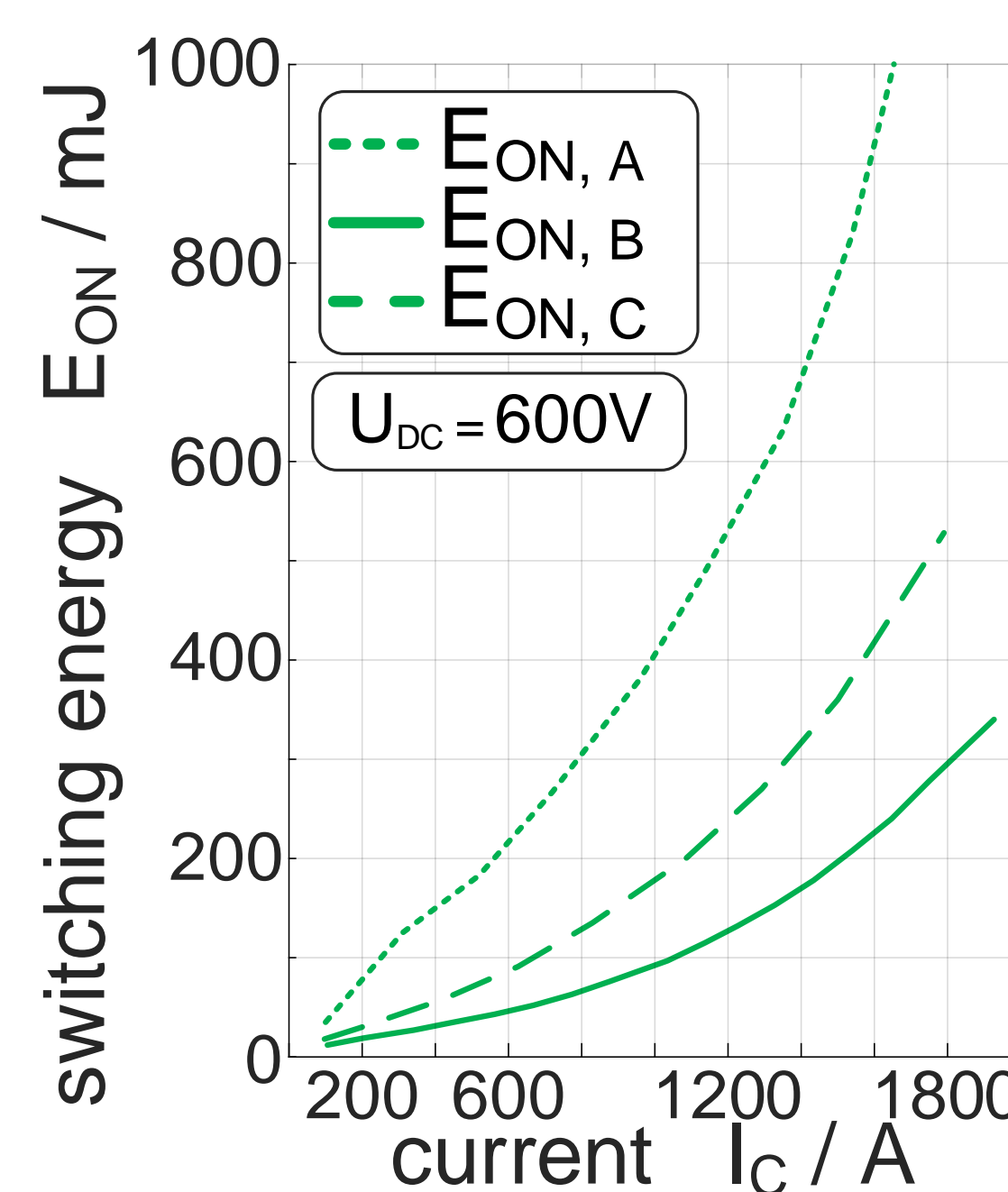
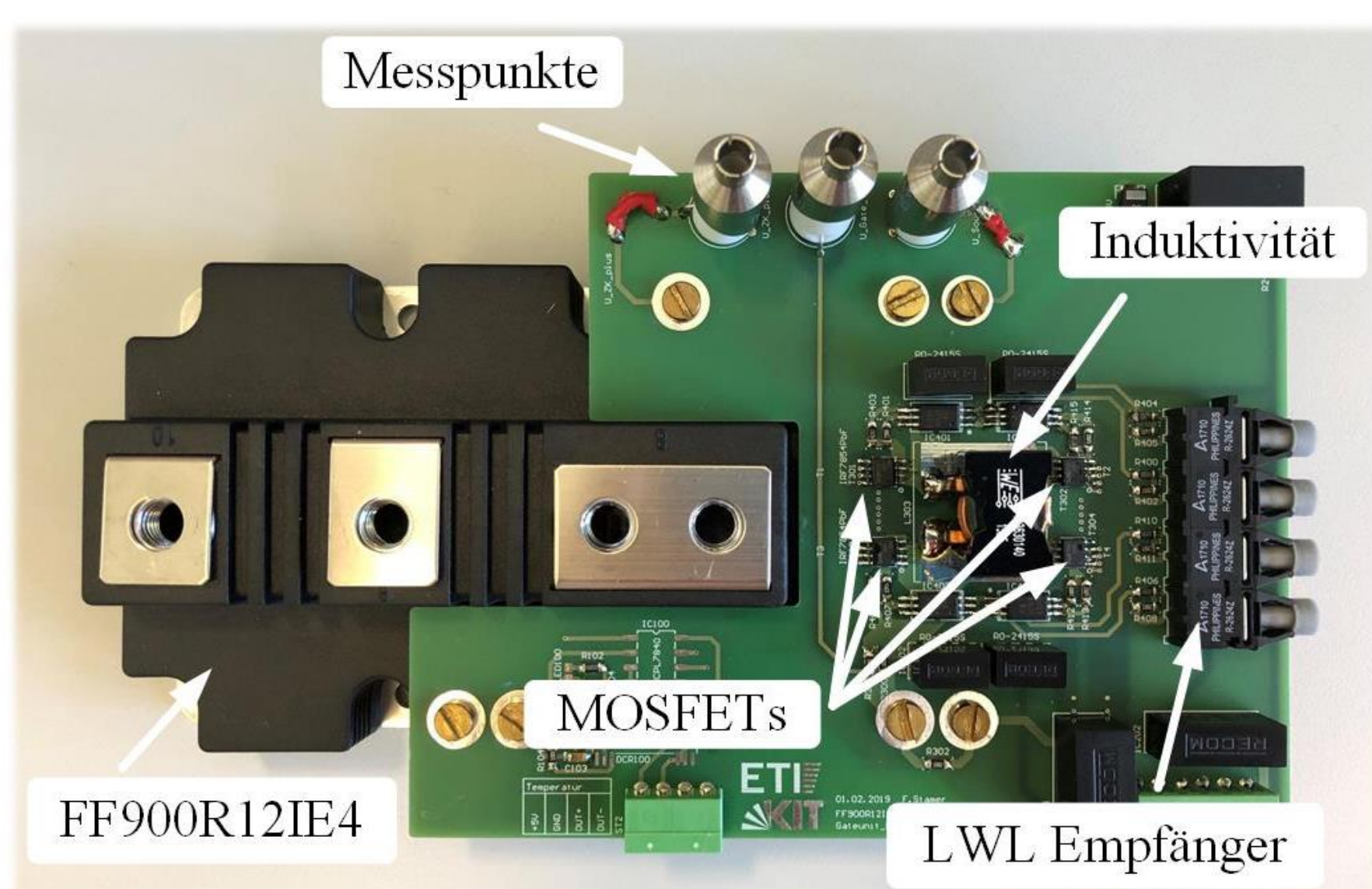
- Turning ON and OFF the IGBT
- Robust against disturbances
- Low switching energies
- Electromagnetic compatibility (EMC)
- No operation outside the SOA
 - Even with Overvoltage at DC-Link
 - Even with Low Junction temperature
 - Even with switched current greater then doubled rated current



➤ Changing one switching characteristic affects all others

Predictive and adaptive active Gate-Driver

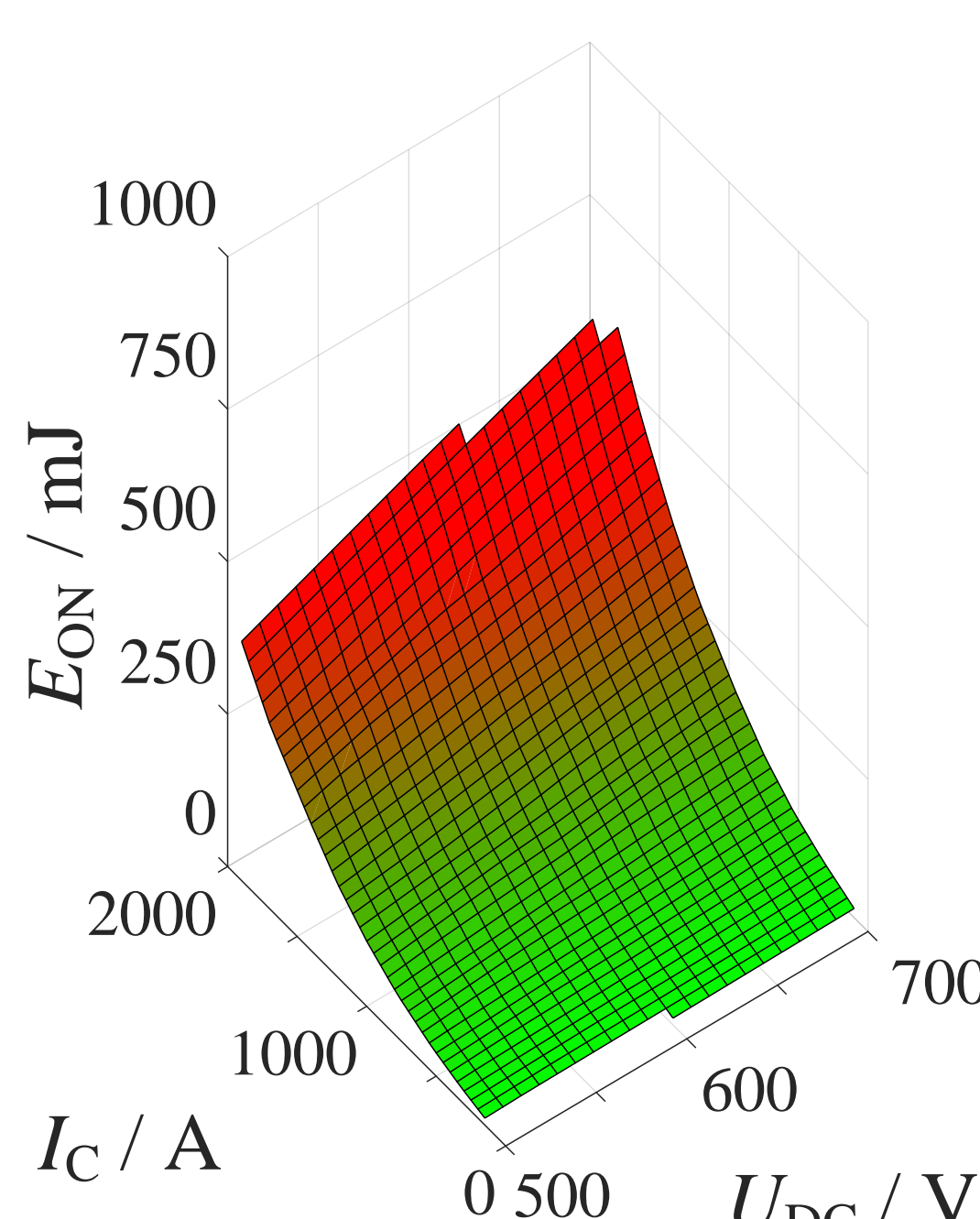
- Simplified circuit diagram with the main components:
 - MOSFET Full-Bridge T1-T4
 - Gate-inductance L1 instead of Gate-resistor
 - Bipolar power-supply
- Generation and control of a variable current
- Influence on switching characteristics



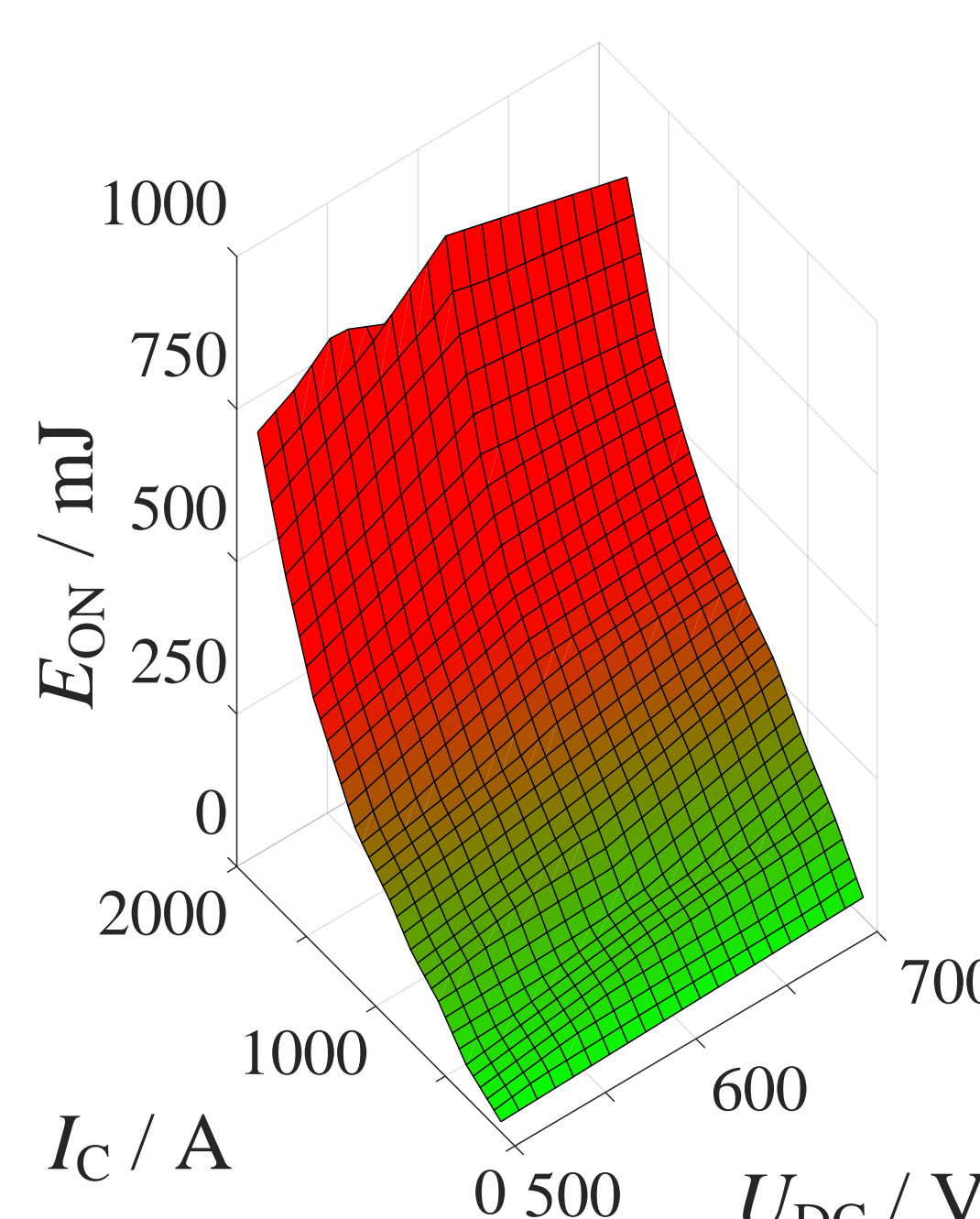
- Shift switching energy
- Independent variation of switching behavior for turn ON and OFF
- Variation of switching behavior
 - Overcurrent I_{RRM}
 - Overvoltage $V_{CE,max}$

Measurement Results for testing with an 1200V 900A IGBT

- Conventional resistive gate driver
- Fixed switching behavior for all operating points



- Adaptive Gate-Driver
- Turn On overcurrent set as low as possible
- Low switching speed



- Adaptive Gate-Driver
- Switching energies set as low as possible
- High switching speed

