



Call for Letters - Special Section on

Highly Robust Power Electronics in the Era of DC Grid

Scheduled Publication Time: September 2025

Brief description

DC grids, including high voltage direct current (HVDC), mid voltage direct current (MVDC) and low voltage direct current (LVDC), can not only control both active and reactive power independently and quickly, but can also simplify the integration of renewable energy, data centers and energy storage systems. DC grids also possess the advantages of lower cost, higher power conversion efficiency and greater power quality.

As cutting-edge technology for renewable energy, data centers and energy storage systems, dc grids help address the clean energy supply and electricity scarcity issues in the renewable energy and AI booming era, and achieve the decarbonization goal by 2030, which has been of a widespread concern in recent years.

Unlike traditional transformer-based ac grids that use electromagnetic principles, dc grids rely on power electronic technology to realize voltage and power conversion, which would inevitably require a substantial amount of power electronic devices, such as ac/dc converters, dc/dc transformers and dc circuit breakers, in the future dc grid. In this context, highly robust power electronic components and converters are expected to play a significant role in the construction of dc grids, as well as providing active support and grid-forming ability services to the traditional ac grid.

Objective

The theme of this special issue emerges from the perspective of "a new generation of power-electronic devices, leading a new generation of equipment, pioneering a new generation of systems", focusing on advanced power electronic technology in the era of highly robust dc grids to facilitate and empower the future large-scale renewable-energy applications in power grids. This issue aims to provide a platform to disseminate novel findings and technological innovations in the field of power electronics, covering the area of relevant power electronic systems, converters and components.

Subtopics

Prospective authors are invited to submit original contributions and application-oriented papers on related topics of interest including, but not limited to, the following:

- > Novel power-electronic devices and packaging with high continuous or short-term overload ability for dc grids.
- Emerging topologies for power electronic converters including AC/DC, DC/DC, and AC/AC converters with short-term overcapacity providing tenacious support for dc grids.
- Advanced control technology of dc converters with active-support and grid-forming ability.
- > New design, implementation, and application of highly robust power electronics equipment in dc grids.
- New architecture, operation, and fault processes of power-electronic-based dc transmission and distribution systems with a high proportion of renewable energy.

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Proposed timeline

- October 1, 2024 Open to Manuscript Submissions
- April 1, 2025 Manuscript Submissions Deadline
- June 30, 2025 Final Decision Notification
- July 15, 2025 Manuscripts Forwarded to IEEE for Publication
- August 1, 2025 Manuscripts Published Online as Early Access
- September 15, 2025 Special Section Published in an IEEE TPEL Issue