

PhD in Electrical, Electronic and Communication Engineering

Research Title: Wide-bandgap power devices and applications

Funded by	Power Electronics Innovation Center (PEIC) Politecnico di Torino
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Context of the research activity	<p>Today's power electronics is based on the silicon technology. The driver for innovation are new devices using wide-bandgap semiconductors (SiC and GaN) instead of silicon. The WBG technology shows higher operating voltages, higher operating temperatures and higher operating frequencies with lower losses. However, the WBG devices impose with very high dv/dt effects with consequent effects on the electromagnetic compatibility. In addition, the market offers today many WBG devices but no suitable drivers are available. The research work will be carried out in a multidisciplinary environment inside the PEIC initiative (https://goo.gl/X0l6ZD).</p> <p>The activity will be focused on:</p> <ul style="list-style-type: none">- Parasitic extraction and modeling of a WBG transistors for EMC analysis- EMC Analysis of a power module based on WBG devices- Design of an innovative gate driver aimed to mitigate electromagnetic emissions
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Objectives	The main goal of the proposed PhD curriculum is the design and characterization of a test chip comprising a WBG gate driver for power converters employing WBG devices.
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Skills and competencies for	Hardware design and testing
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the development of the activity

Circuits simulator (Spectre, Eldo)
CAD tools (Matlab, Cadence Virtuoso, CST Microwave Studio)