

Postdoctoral Position (M/F)

Optimal Design of Power Converters Using PCB-Embedded Semiconductors

(12 months, reference DITFT056)

Context and project description

MITSUBISHI ELECTRIC is a key player in the field of power electronics, covering the entire value chain from semiconductor devices to complete systems such as HVDC converters. As a subsidiary of the Mitsubishi Electric Group, Mitsubishi Electric R&D Centre Europe (MERCE) hosts a research team specialized in Power Electronics, with a strong focus on heterogeneous integration technologies and high-efficiency, high-power-density converters. To further increase the Technology Readiness Level (TRL) and promote its integration techniques for both active and passive components, MERCE plans to develop dedicated DC/AC and DC/DC prototypes of highly-efficient and compact power converters.

Missions

We are hiring a postdoctoral researcher to carry out the following tasks:

- Experimentally define the maximum performance (Power vs. Frequency) of a half-bridge topology equipped with a PCB Embedded switching cell, under hard-switching and soft-switching (ZVS) conditions.
- Develop a Matlab-based design tool to identify Pareto fronts (Volume vs. Losses) for an interleaved multiphase converter (DC/DC and DC/AC). This tool will integrate pre-existing models related to: EMC filtering (common-mode and differential-mode), PCB based Planar filtering inductors, potentially coupled.
- Design a high-power-density DC/AC converter (power range: several tens of kW at 800 V) by selecting the most relevant solution identified on the Pareto front. This stage will include the selection of power and control devices, as well as the design of electronic boards (power, control, measurement), including PCB magnetics.
- Propose innovative solutions to improve mechanical integration and improve power density, especially for critical subsystems (e.g. active common-mode filtering to mitigate the size of a passive filter).
- Supervise the manufacturing of components by external partners and oversee the assembly of electronic boards.
- Perform experimental validation of the prototype to assess the targeted performance indicators.
- Write technical reports to ensure consistent project monitoring and documentation.

- A second research phase will extend the work towards isolated DC/DC converters for electric mobility and data center applications.

The results of the research activities will be eligible for publication in international conferences and peer-reviewed journals.

Candidate Profile

- PhD in Electrical Engineering, with a strong focus on Power Electronics design.
- Previous research experience in a public research laboratory or an industrial R&D environment.
- Strong background in Power Electronics, including DC/AC and DC/DC topologies, gate drivers, Magnetic component design and EMC filtering techniques.
- Proven experience with Wide Band Gap semiconductor devices and their experimental implementation (design, testing, validation).
- Proficiency in scientific computing tools (Matlab) and finite element analysis (e.g. FEMM 4.2).
- Experience in PCB layout tools such as Altium or KiCad is a plus.
- Hands-on experience in a laboratory environment, including power equipment (power supplies, electronic loads, control units), electrical measurements instruments (oscilloscopes and probes, impedance meters, power analyser), thermal measurement techniques (thermocouples, optical fibers, calorimetry).

Personal Skills

- High level of autonomy, strong organizational skills, and rigor.
- Motivation to work in a multicultural environment.
- Good interaction and adaptability skills.
- Strong analytical mindset and good communication abilities.
- Team spirit and proactive attitude.
- Fluent English (spoken and written).

Duration: 12 months, from May 2026 at the earliest (a 24-month extension is possible under the postdoctoral contract)

Contact : Magali BRANCHEREAU, HR Manager (jobs@fr.mercede.mee.com)

Please send your CV and cover letter (PDF format), quoting the reference DITFT056.