

ELECTRICAL, ELECTRONICS AND COMMUNICATIONS ENGINEERING

MUR DM 117/STMicroelectronics - Design and implementation of a low-quiescent current (IQ) voltage regulator in CMOS integrated technology

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] STMICROELECTRONICS S.R.L. [P.iva/CF:00951900968] Politecnico di TORINO [P.iva/CF:00518460019]
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Context of the research activity	<p>Aim of this project is to work on the design of a voltage regulators with very-low quiescent current (IQ), that is the current absorbed when no energy, or a negligible energy is provided to the output.</p> <p>The design shall investigate all component of a voltage regulator, including the references generator and the feedback circuit, and will take into account all innovative solutions recently proposed in the literature.</p> <p>Progetto finanziato nell'ambito del PNRR – DM 117/2023 - CUP E14D23002000004</p>
Objectives	<p>One of the main pillars of the green digital transition is the development of low-energy systems, a key-enabling technology for extending lifetime of electronic systems relying on battery, and enabling autonomous circuits running on any sort of energy-harvesting approach.</p> <p>Aim of this project is to investigate the energy required by a power supply system, in particular its quiescent current (IQ), that is the current absorbed when no energy, or a negligible energy, is required at its output (i.e., when the driven circuit is in deep energy saving mode). Since the power supply circuit is the only part of the system that cannot be turned off, in many conditions (such as, when the system in a deep-energy saving mode), the energy due to the IQ may be the dominant one.</p> <p>The design and the implementation of low IQ dc/dc power supply circuit to be used in the aforementioned environment will be investigated. The design shall investigate all component of a voltage regulator, including the references generator and the feedback circuit, and will take into account all</p>

innovative solutions recently proposed in the literature that will be compatible with the commercial technology used. The overall quiescent current at light load conditions shall range between tens of nanoamps to a hundred of nanoamps.
The project is in collaboration with STMicroelectronics s.r.l., that will provide the CMOS technology for designed the circuit.

Skills and competencies for the development of the activity

The candidate must be familiar (possibly already experienced) with the design methodology of analog electronics as well as integrated circuit design and testing.
A good knowledge of related CAD is fundamental prerequisite (mainly Cadence/Synopsis systems).
Competences in signal processing analysis, in particular with the propagation of noise in a circuit, is required.
Acquaintance with digital programmable devices such as DSPs, microcontrollers and/or FPGAs, and with numeric computation platform (Matlab, Mathematica) is also required.