



I. IDENTIFICATION DATA

Thesis title:	Design of Power Conditioning Circuit for Energy Harvester
Author's name:	Po-Wen Chen
Type of thesis :	master
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Microelectronics
Thesis reviewer:	Ing. Vladimír Janíček. Ph.D.
Reviewer's department:	Department of Microelectronics

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	challenging
<i>How demanding was the assigned project?</i>	
The aim of the thesis was to connect two worlds, MEMS and the design of integrated circuits. This placed high demands on the author in the form of understanding two types of simulators and their interconnection.	

Fulfilment of assignment	fulfilled
<i>How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.</i>	
The student managed to fulfill the assignment, although the proposed circuit for energy collection is basically only the basic type, the whole wiring can be considered fully functional due to the resulting simulations and the result of the work can be considered sufficient.	

Activity and independence when creating final thesis	A - excellent.
<i>Assess whether the student had a positive approach, whether the time limits were met, whether the conception was regularly consulted and whether the student was well prepared for the consultations. Assess the student's ability to work independently.</i>	
My student and I met regularly and corrected the progress of the work. The student was very active during the solution of the work and always fulfilled the assigned tasks until the next deadline. His interest in the subject is well evident from the scope of the initial analysis. A good proof of his own initiative is the fact that at the beginning of the solution of the work he had almost zero experience with both Coventor and Cadence simulators, on whose results the simulation of the work depends heavily. Personally, I regret to admit that this approach is already rare nowadays, and for me, as tutor, this was an ideal way to maintain oversight of the work so that it succeeds in the goal.	

Technical level	A - excellent.
<i>Is the thesis technically sound? How well did the student employ expertise in his/her field of study? Does the student explain clearly what he/she has done?</i>	
In the introductory chapters, the student took a strong research approach, drawing on many sources and comparing them with each other. Sometimes he jumps from one topic to another one or repeats the same thing, this can also be considered normal and essentially inevitable, given the above-average number and variety of sources cited. The student leads the reader very well from the introductory chapters on the principles of energy harvesting, through the description of the design of the MEMS generator structure itself and few versions of power management circuits to the test phase, where in the simulations it shows the achieved parameters. It would certainly be interesting to complete the whole design flow in the form of practical implementation, but this is time unrealistic. Although the name of the work evokes the necessary specialization in the circuit itself, the goal was to assemble a functional unit, from MEMS to the output energy storage device, which at the end succeeded.	

Formal level and language level, scope of thesis	A - excellent.
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THESIS SUPERVISOR'S REPORT

Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?

The thesis is written in English, It contains a negligible number of typos (e.g. 50Hz vs. 100 Hz). The scope of the work is sufficient.

Selection of sources, citation correctness

A - excellent.

Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?

The student offers a number of above-average 145 citation sources, from which he draws mainly in the first theoretical chapters.

Additional commentary and evaluation (optional)

Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.

Why did you choose a 100kHz generator frequency?

III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

The thesis is practically focused, it shows at present an innovative connection of the world of mems design for energy harvesting applications and the world of design of integrated circuits for processing obtained energy. The example demonstrates the complete design process from piezoelectric generator layout, through its optimization from the point of view of the required resonant frequency, design of accompanying electronics, rectifier, generator, circuit to maximize MPPT energy extraction to controlled DC-DC converter. The whole process is well commented on and gives the reader a good insight into the whole issue. Given the scope of the work, its timeliness and the results of the work, I recommend the defence.

The grade that I award for the thesis is **A - excellent**.

Date: **27.1.2021**

Signature: