

**PhD Title** *Study and development of new ESD devices for RF sensitive pins and applications*

**Key words** ESD, RF, Overshoot, CDM, SPACE, AUTOMOTIVE

CIFRE supervision		2019
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<b>Organization :</b> IDNA/ESD team	<b>Duration of presence at ST in % :</b> 80%	
<b>Number of currently PhD supervision :</b> 0	<b>CEA involved and if yes duration of presence in % at CEA :</b> N	

**Thesis Proposal**

During the last few years, STMicroelectronics has addressed specific RF applications and caught new customers (SPACEX, CNES, ZUMA (28fdsoi), Automotive Radar...). But to ensure high level of products reliability during mass production, specific ESD protections need to be embedded with a minimum of high speed signaling losses.

Today, our customers challenge our ESD/LU solution to be less disturbing with a better HBM/CDM robustness. They ask to reduce by half the capacitance with the same ESD performances, reduce the overshoot during CDM, protect balun, bipolar or GO1/SG devices... which is a limit of the knowledge in ST.

Indeed, some limitations appear already in several products for Zuma or SpaceX with weak pins below ESD expectation target (2A instead of 5A for CDM). The objective of this thesis is to develop new ESD solutions dedicated to RF applications. These devices should achieve very low signal losses (below 50fF capacitance) with a high ESD robustness (2kV HBM and 5A CDM) without CDM overshoot.

**Thesis short Description (pitch elevator) (why?)**

For all RF Customers who need High Yield during mass prod the PhD address all RF pins in RF products for having a robust ESD solution without disturbing their RF signaling. Differentiating from ESD protection with 100fF parasitic capacitances in more robust bulk technologies the thesis project aims to protect against 2kV HBM/ 5A CDM a single GO1/SG MOS with only 50fF in RF design in C28fdSOI.

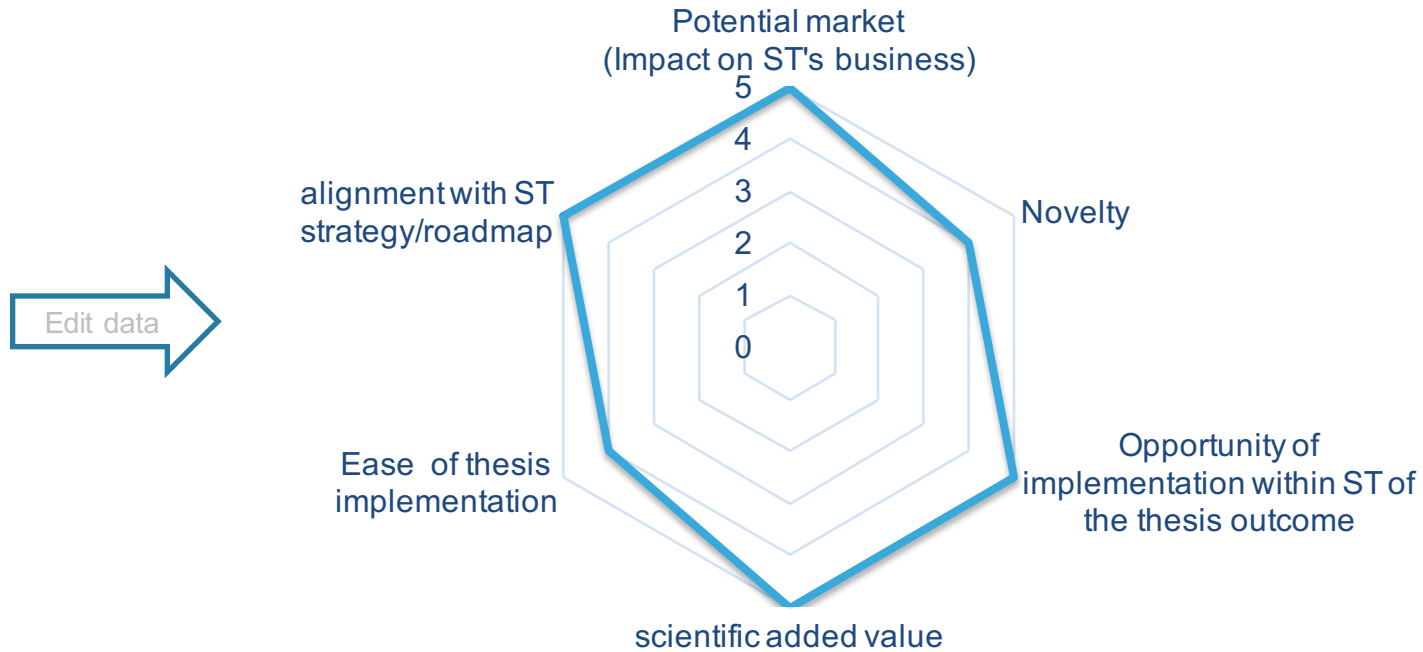
**Laboratory name: RF IC/ Grenoble**

RF IC laboratory has a specific department dedicated to RF circuit performances. In this way, they will firstly support the study thanks a good knowledge of capacitance hidden of ESD protection and RF measurement. But the added value will be in the forecast of the calibration and the quality losses of RF application due to the new ESD solutions.

Domain	Industrial engineering	Photonics Analog/RF	imager	CMOS eNVM	Emerging	Generic (process charact/model ...)
<b>Incremental (extension)</b>		Yes				
<b>Disruptive (pathfinding)</b>		Yes				



# Self-assessment



Criteria	Comment
Potential market (Impact on ST's business)	Low reliability on all RF, Automotive products (already happens for zuma/SpaceX)
Novelty	Yes in ST / Yes on SOI
Opportunity of implementation within ST of the thesis outcome	The need is already here, so as soon as it is mature
Scientific added value	New devices/strategy development
Ease of thesis implementation	Yes in all next RF products
Alignment with ST strategy/roadmap	Dedicated solution for RF/Automotive in C28fdSOI (10-80GHz)