



Point-One

Pole of innovative technology on nanoelectronics and embedded systems

MEMSLand

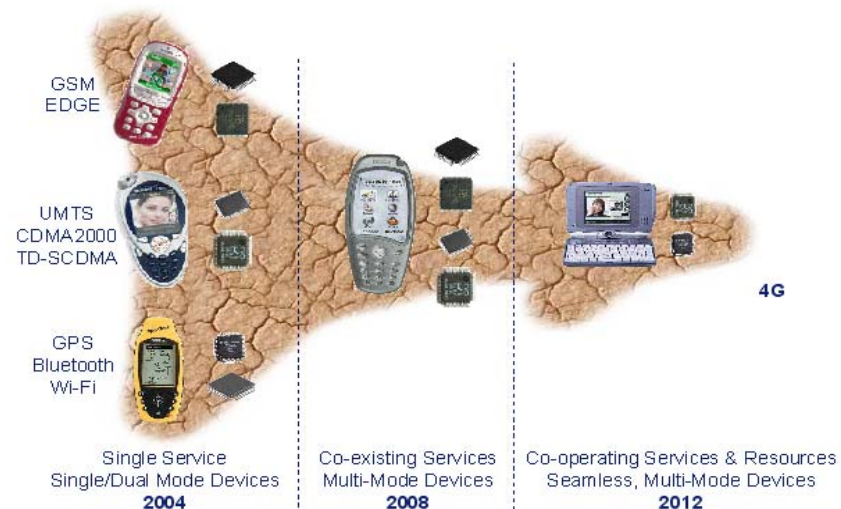
Cost Effective MEMS to Develop a Sustainable High Tech Business

RF-MEMS

Jiri Stulemeijer

Multiple bands & modes present a challenge for the mobile industry

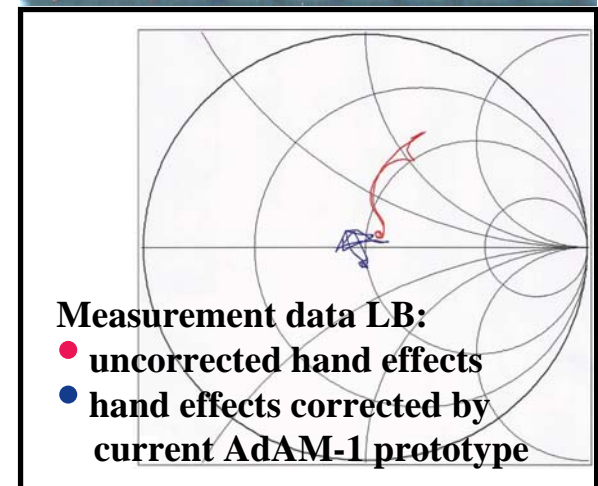
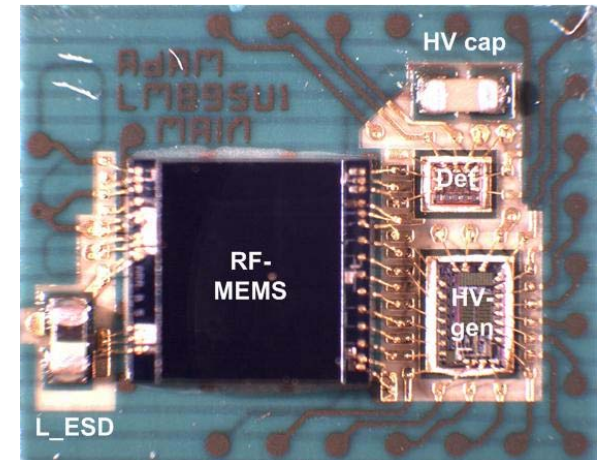
- Today's mobile terminals require increasing complexity in number of systems, bands and modes
- Consequently, subsystem components like Antenna's and PA/FEM's become more complex and specific
- Existing architectures do not provide a solution
- Re-configurable Front-Ends provide a solution and RF-MEMS is a key enabler



Adaptive antenna match

Benefits

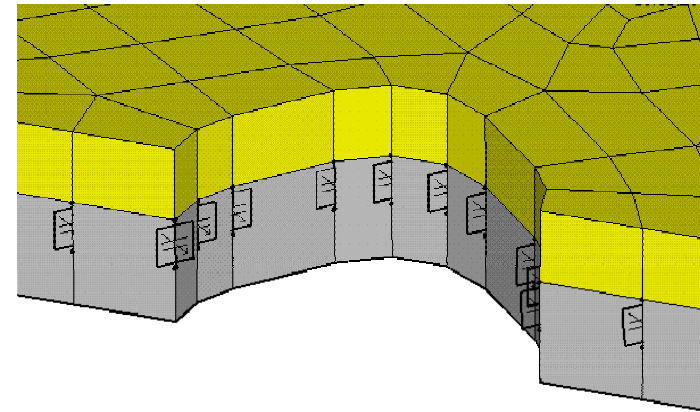
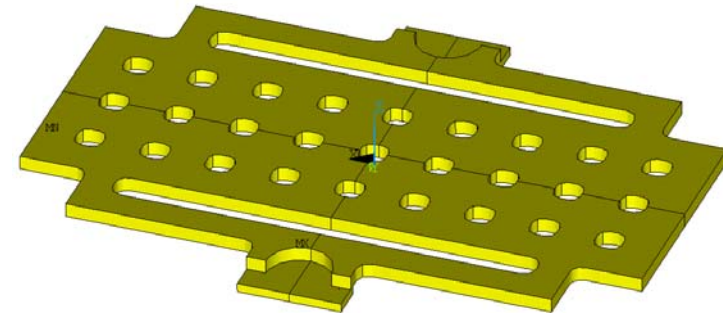
- A plug and play antenna module
 - frequency band configurable
 - automatic performance optimization
- ✓ increased average RF output power
- ✓ increased battery time
- ✓ lower VSWR, more system margin
- ✓ smaller antenna volumes
- ✓ re-use of antenna designs in platforms
- ✓ shorter antenna design-in times



RF-MEMS modeling/design activities WP2

Achievements:

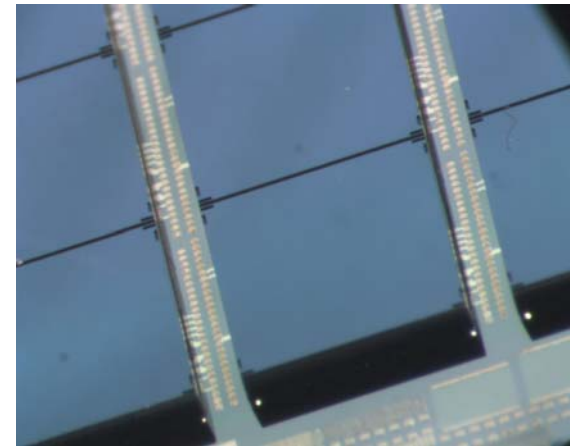
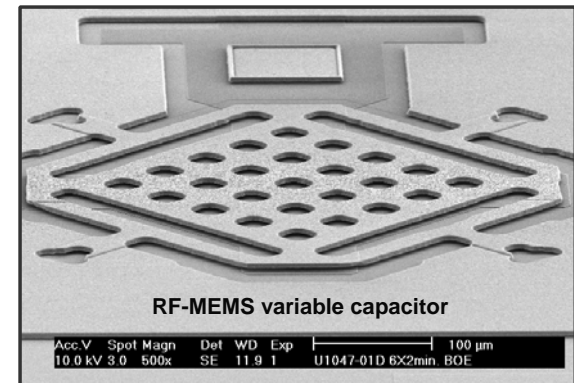
- Static and dynamic models, accurately predicting a single RF-MEMS device
- First design kit, predicting static and dynamic performance of the complete RF network
- Several mask sets designed, processed and characterized
- Significant number of publications



RF-MEMS processing activities WP3

Achievements

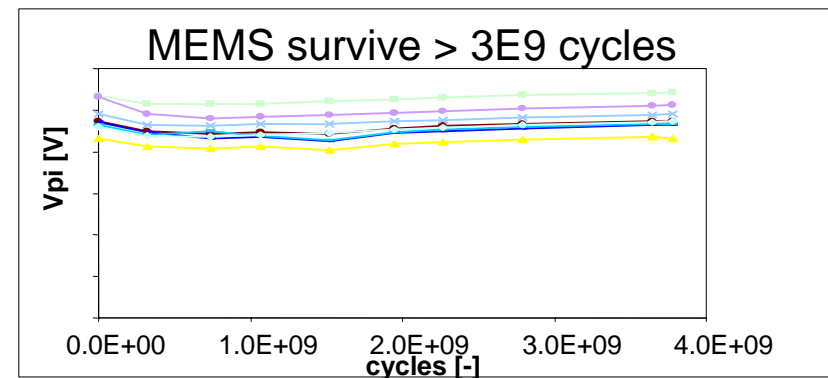
- wafer process optimizations w.r.t. yield and reliability
- Hermetic wafer level capping process established
- Processing several mask-sets



RF-MEMS reliability activities (WP4)

Achievements:

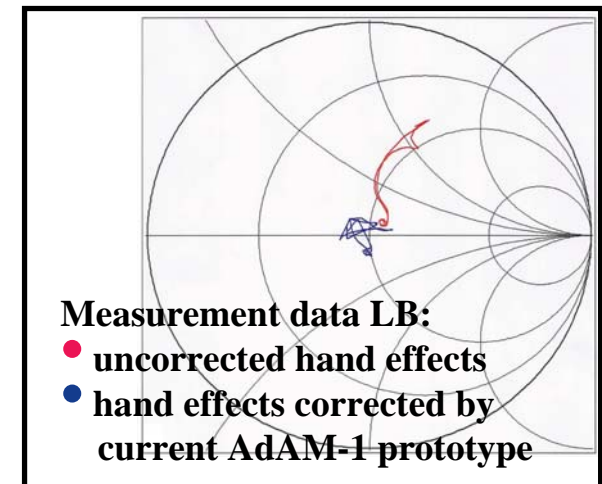
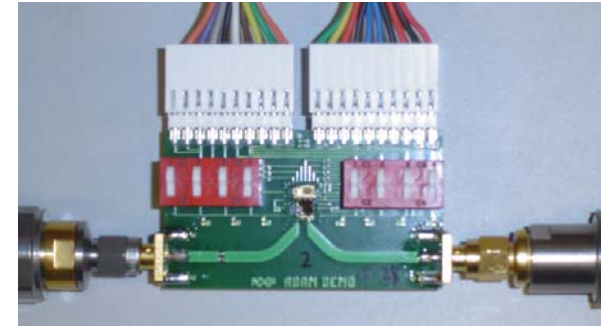
- Failure mechanisms investigated
- Accelerated life time testing & acceleration factors established
- Dielectric optimized for reliable electric operation
- Micro-structure of movable membrane is optimized for mechanical reliability
- Design rule established for reliable mechanical operation
- Reliability of hermetic package proven
- Several publications



RF-MEMS product prototyping (WP6)

- Generated prototypes:
 - Naked devices
 - Hermetic capped devices
 - Prototype of antenna tuner module with integrated RF-MEMS die

- Antenna tuner module demonstration in MEMSLand booth at Semicon 2007



Overall progress & planning

- BC2 RF-MEMS is fully on track, WP milestones were met on time or ahead of time
- No changes in the project or its planning are foreseen
- Cooperation with partners runs smoothly
- Overall manpower increased on EPCOS NL side to meet & beat planning