

The background is a solid blue color with a pattern of faint, light blue geometric shapes, including rectangles and triangles, some of which are overlapping. There are also several small, light blue arrows pointing upwards and to the right, scattered across the background.

# Millimeter Wave Microsystem Application Potential

MIMOMEMS Strategic Workshop, Sinaia, Oct. 2009

Tauno Vähä-Heikkilä

RF Program Manager

Team Leader on Adaptive Radios



Business from technology

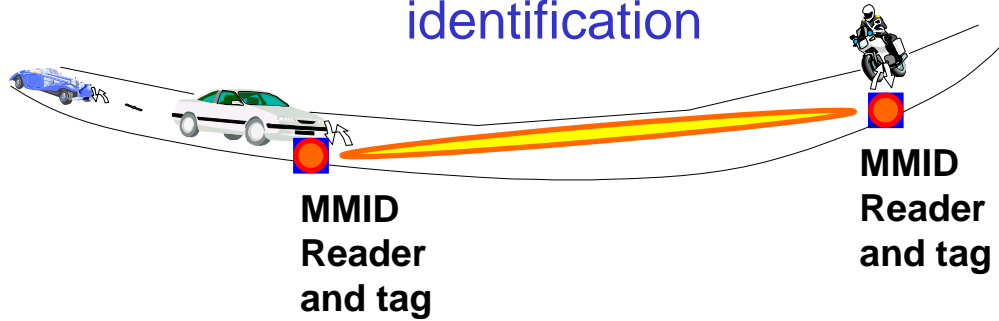
## Introduction

- Millimeter wave (30-300 GHz) and terahertz (300 GHz -) frequencies with new application and technological solutions offer interesting area for joint projects
- This presentation is divided into four parts:
  - Millimeter wave identification - MMID
  - Millimeter wave test and measurement
  - MEMS-4-MMIC technology

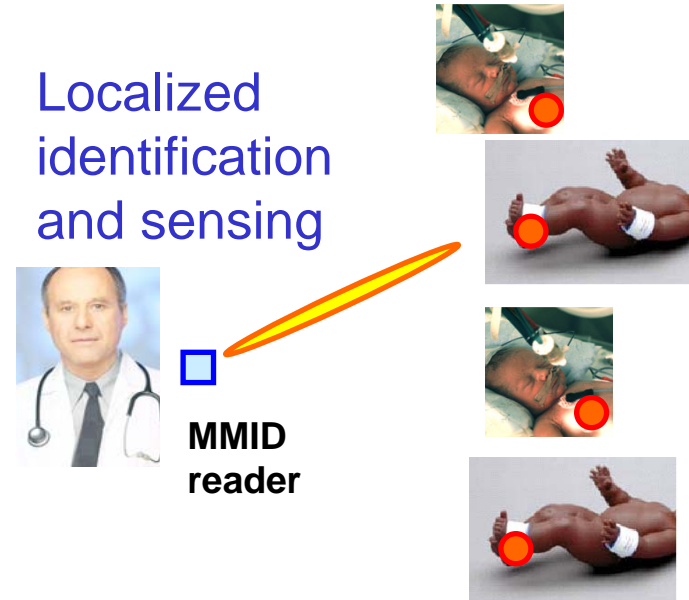
## Millimeter Wave Identification - MMID

# Millimeter Wave Identification (MMID) Vision

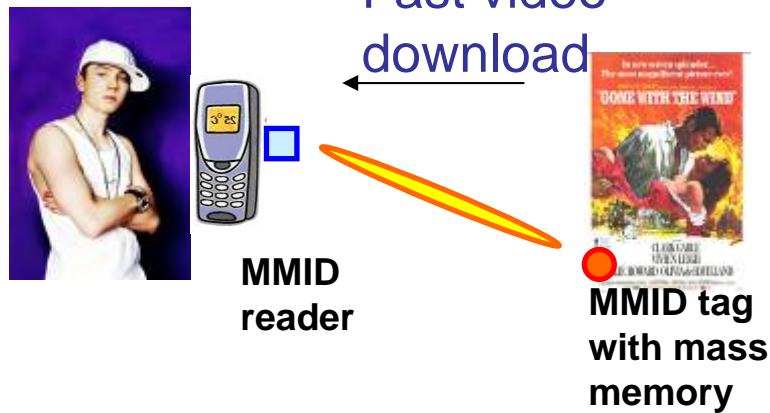
Radar compatible identification



Localized identification and sensing

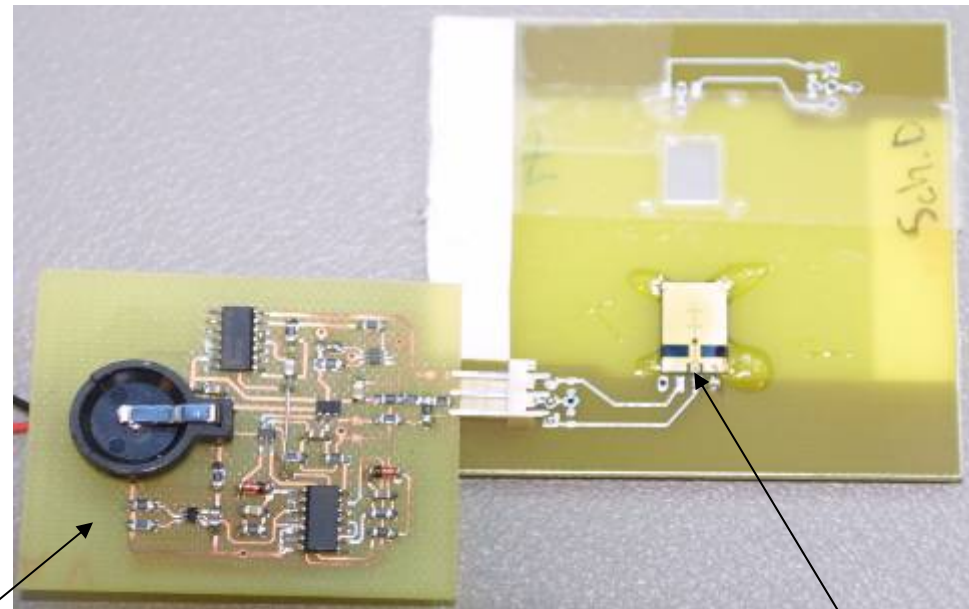
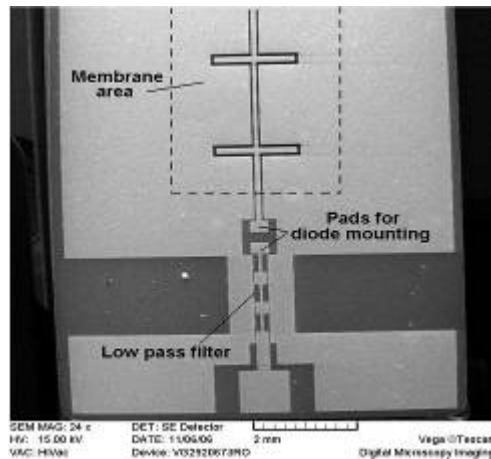
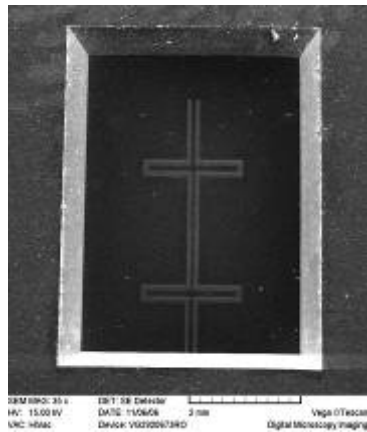


Fast video download



# 77 GHz MMID Tags

- Hybrid integrated micromachined tag at 77 GHz
- Double folded slot antenna on a membrane with a flip chipped schottky diode

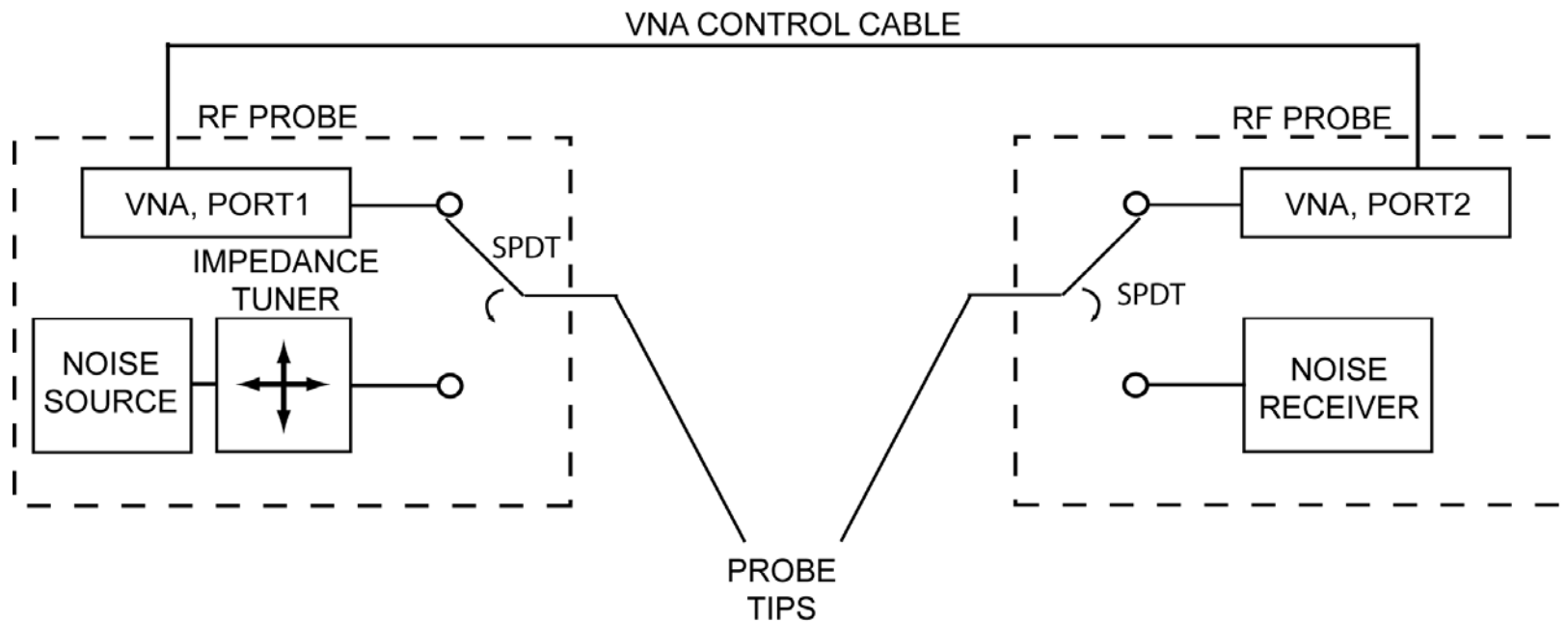


- Baseband electronics at 900 MHz

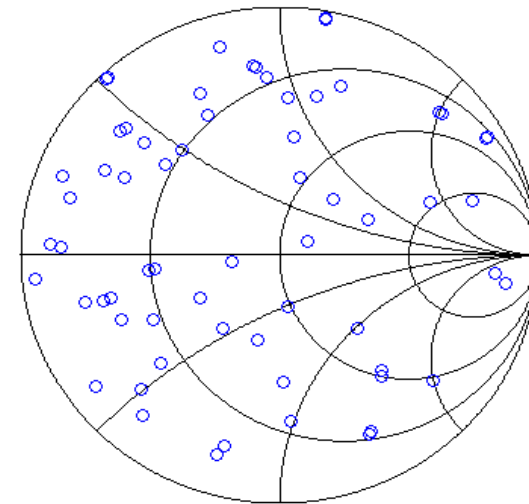
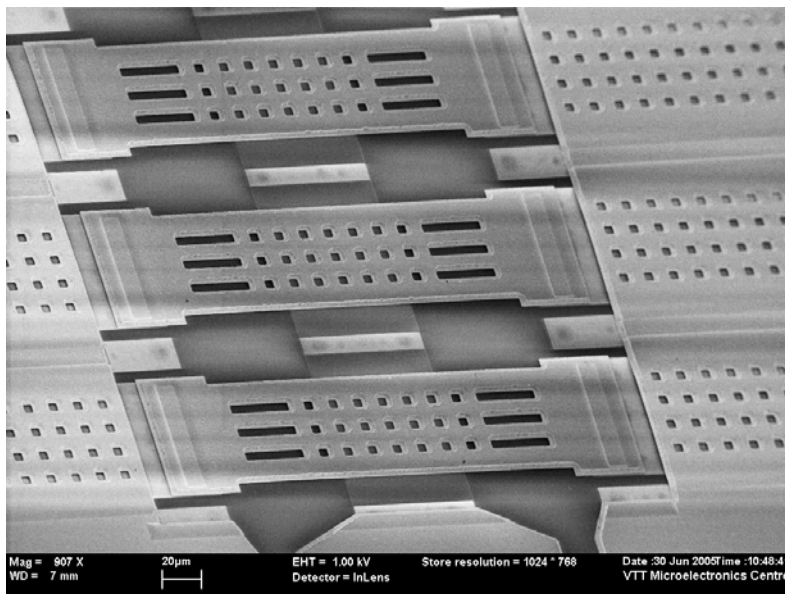
- Tag: MM-wave diode + antenna

# Millimeter Wave Test and Measurement Applications

# Millimeter Wave Test and Measurement Applications: Vision for Millimeter Wave Probes with all Electronics Inside



# RF MEMS Impedance Tuners for Transistor and Amplifier Characterization



**Measured impedance coverage at 60 GHz**

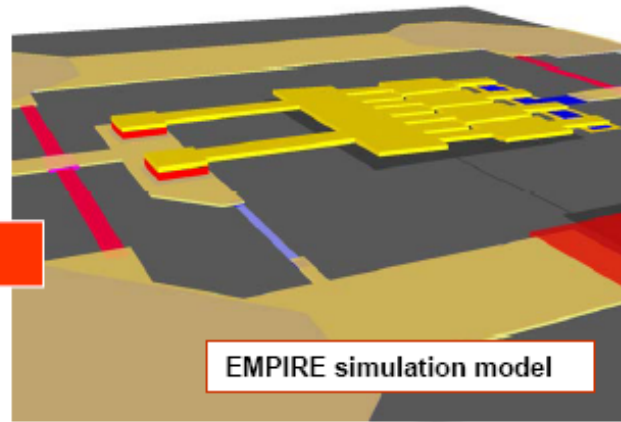
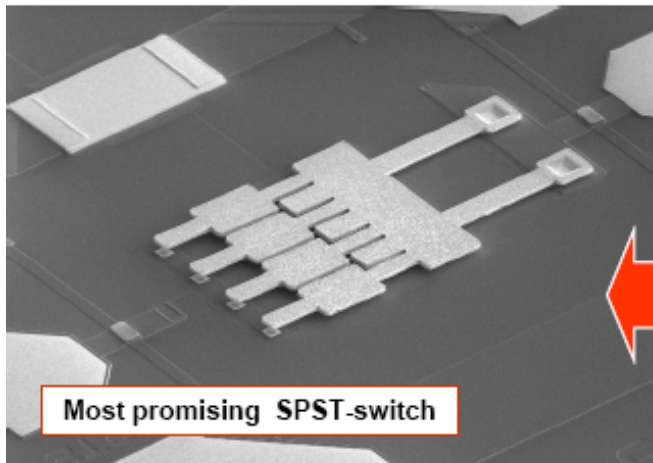
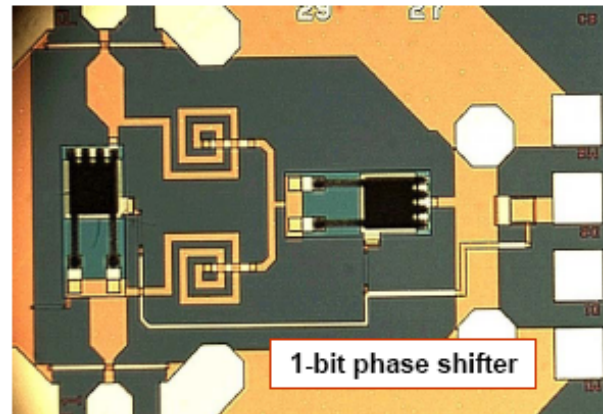
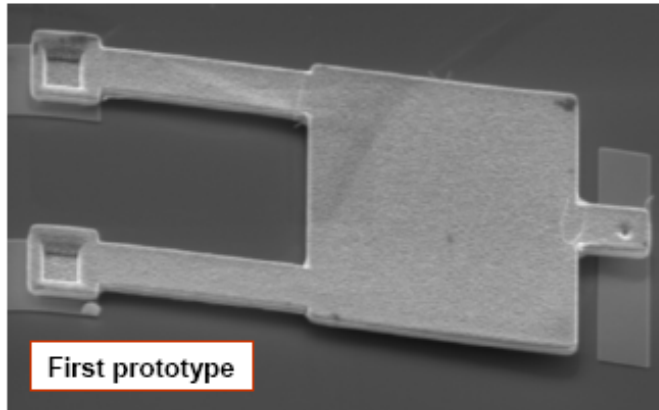


# Millimeter wave imaging for automotive applications

# Monolithic integration of RF MEMS and MMICs MEMS-4-MMIC FP7 Project

# Monolithic integration of RF MEMS and MMICs

## MEMS-4-MMIC FP7 Project



CNRS  
CENTRE NATIONAL  
DE LA RECHERCHE  
SCIENTIFIQUE

SAAB

OMMIC  
Innovating with III-V's

FOI

VTT

IMST

MEMS 4 MMIC

## Conclusions

- Many applications are foreseen for millimeter wave microsystems
- Killer application still needs be found
- Technology development to commercially level needed



# VTT creates business from technology

