

Prototyping of Quasi MMIC Radios

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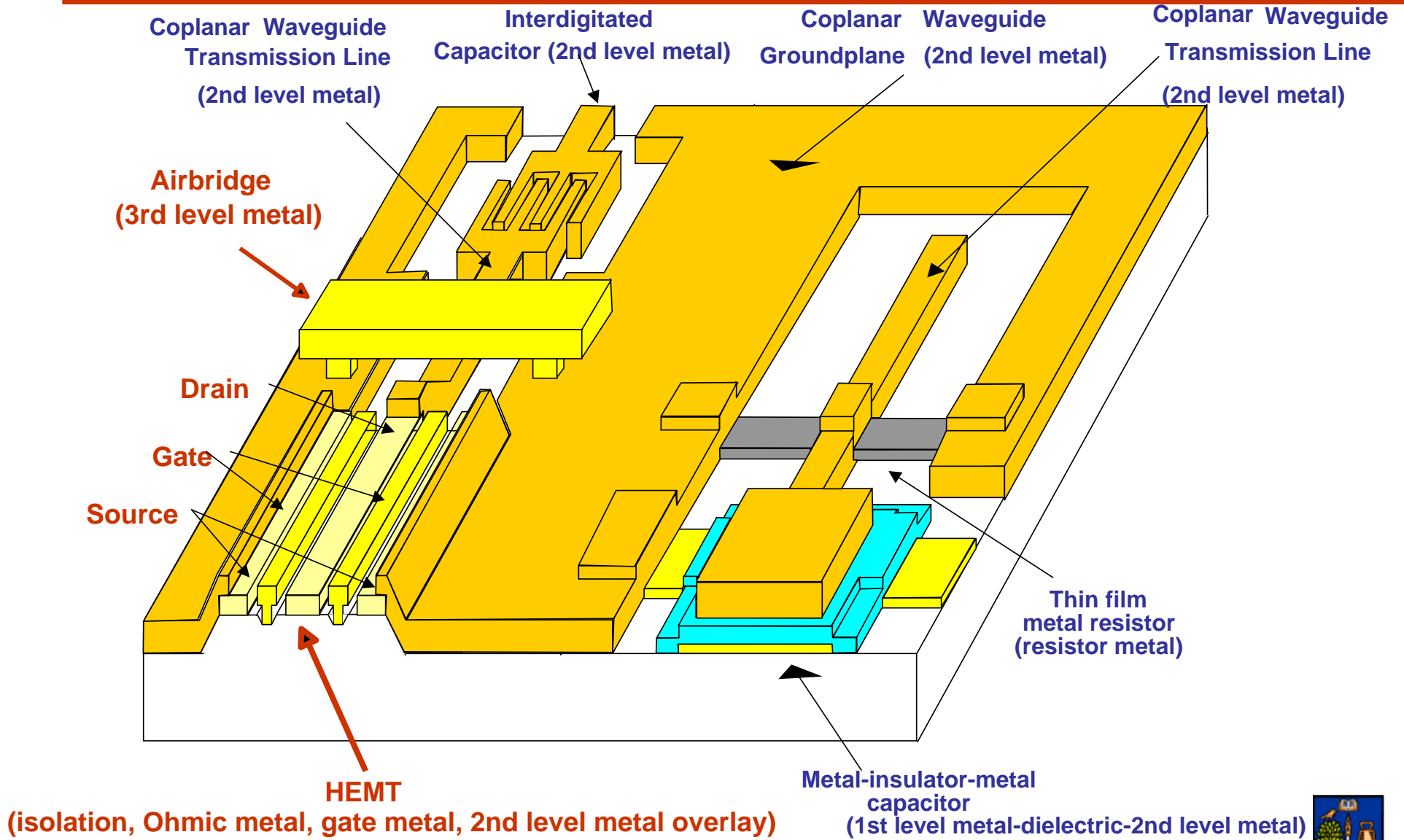


Presentation Outline

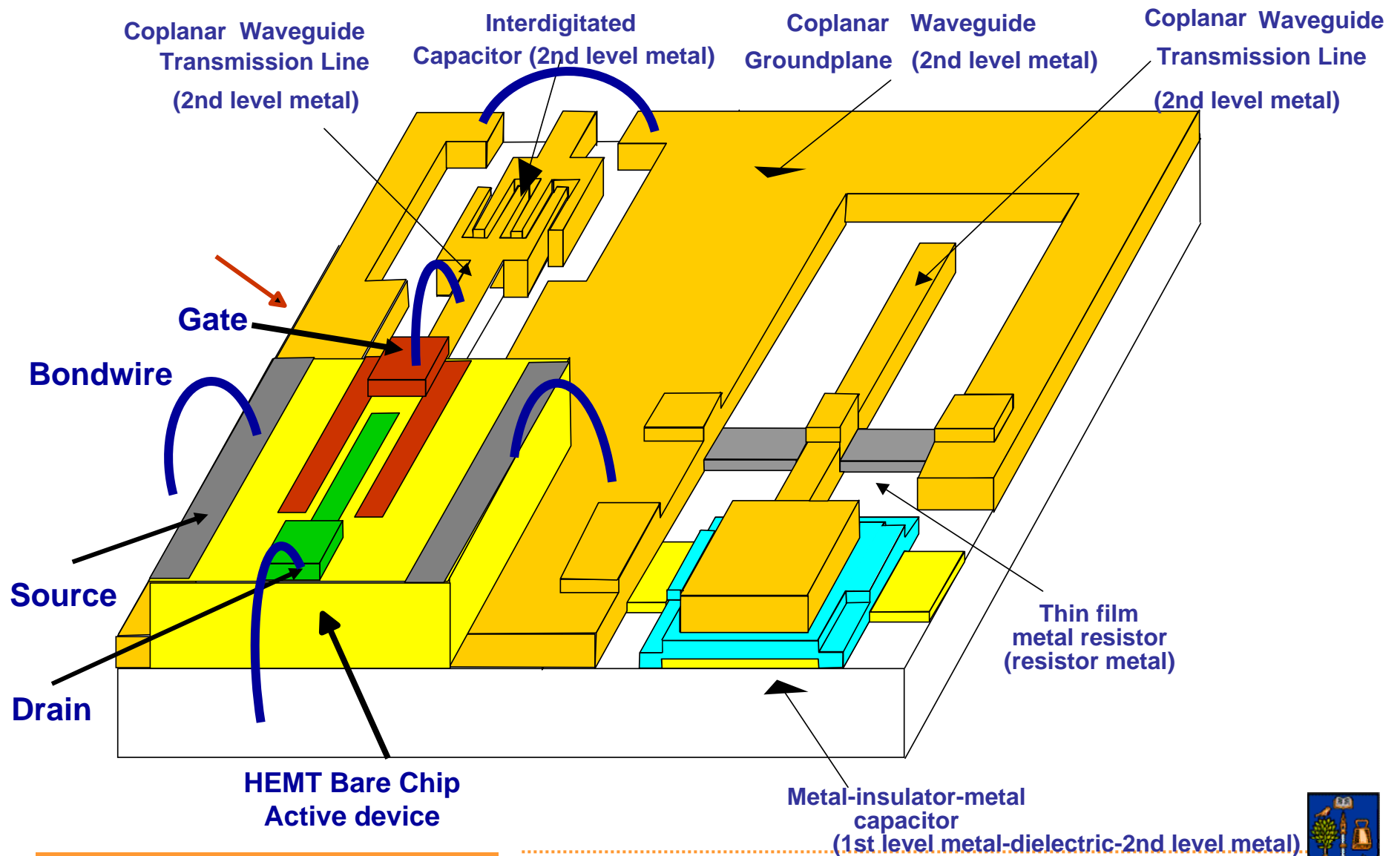
- Introduction
- Steps involved
- Comparison with MMICs full process
- Evaluations and validations
- Conclusions



Coplanar Waveguide MMIC Schematic

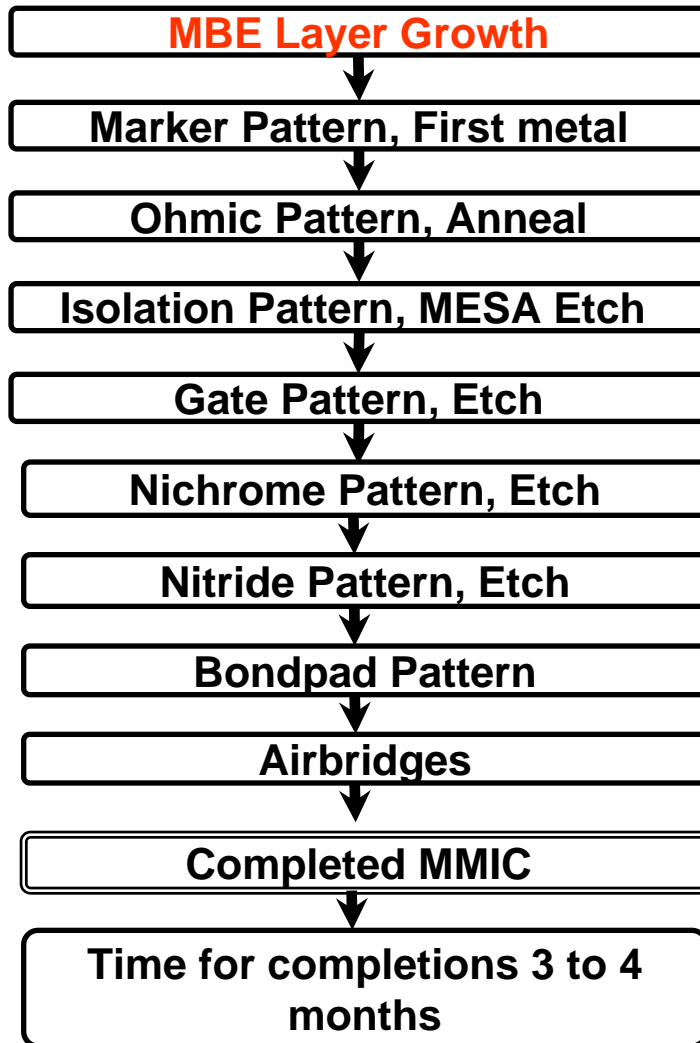


Coplanar Waveguide Quasi MMIC Schematic

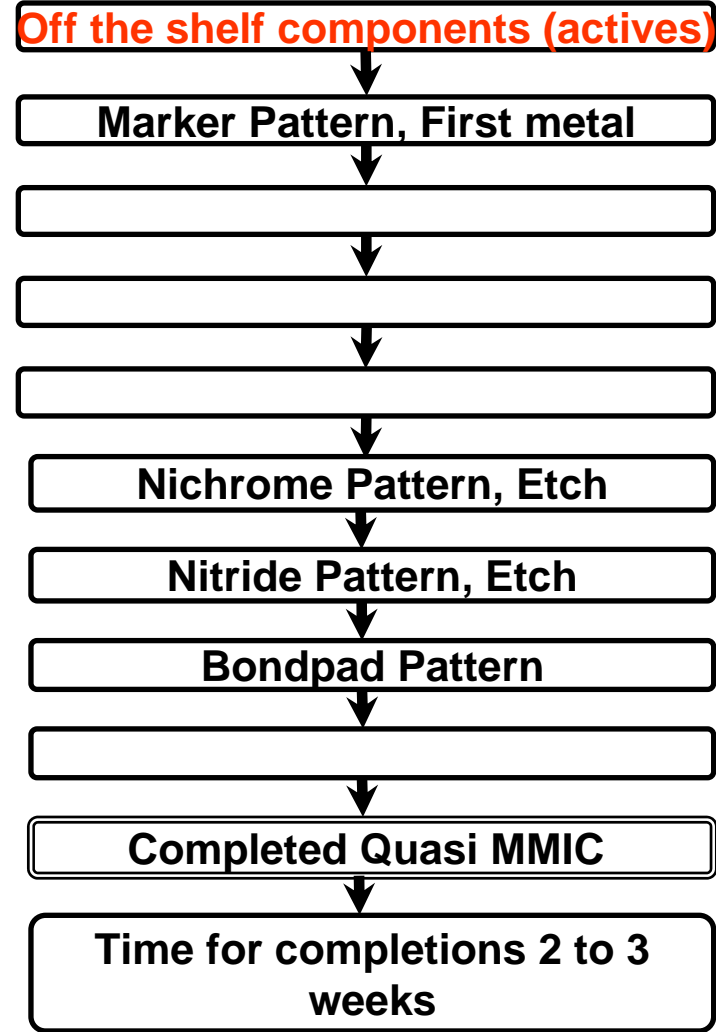


MMICs and Quasi MMICs Fabrication Steps

MMICs Fab Steps

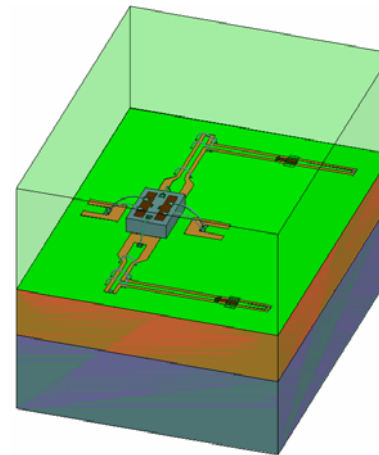
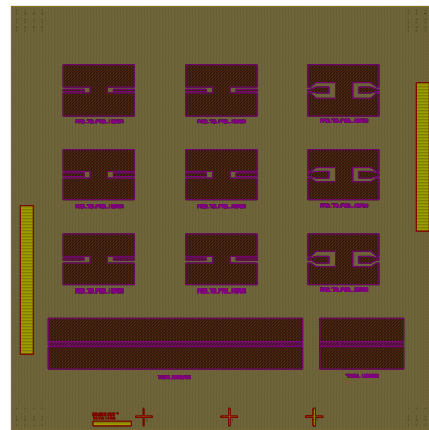
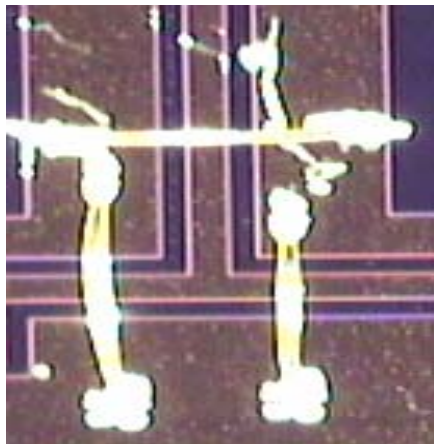


Quasi MMICs Realisation Steps

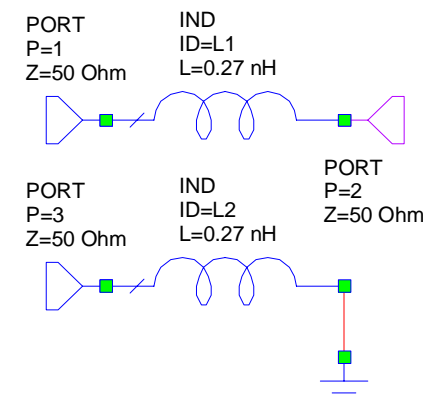


Steps involved

- Interconnect performance Evaluations
 - Mechanical Evaluations (lengths, curvatures)
 - EM 3D Simulations
 - Interconnect Models
 - Layout Designs for Interconnect Evaluations
 - Interconnect Realisations
 - Interconnect Measurements

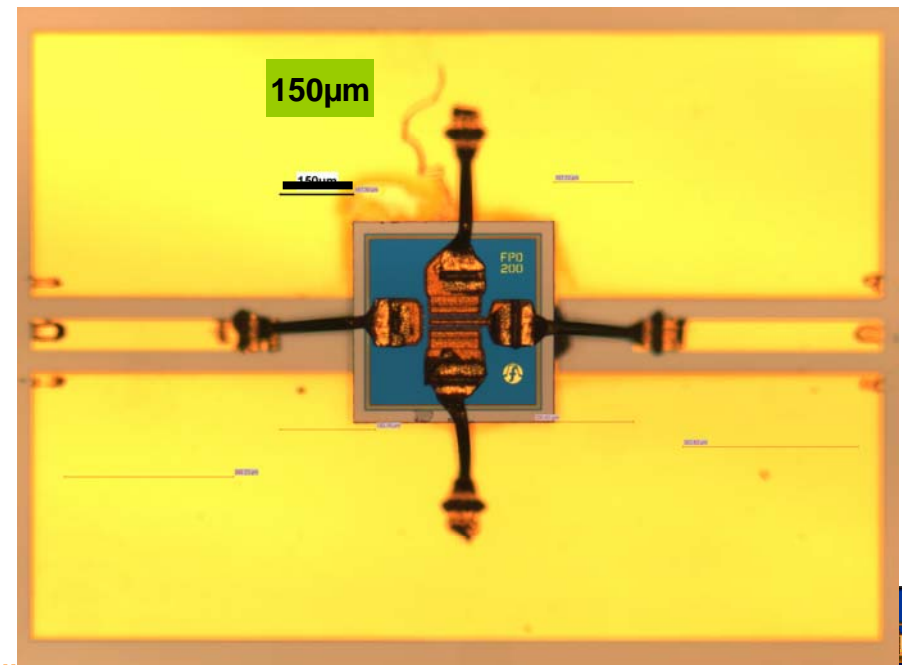
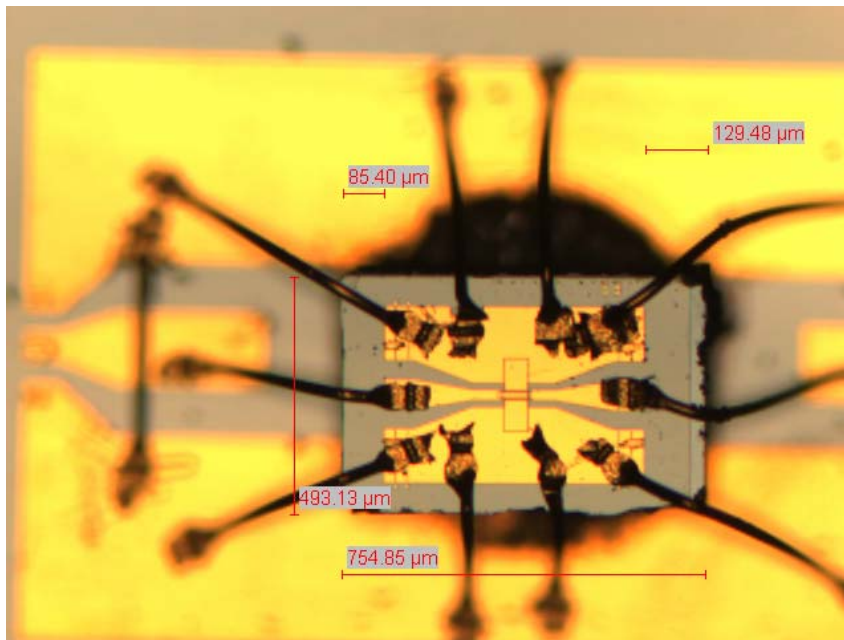


Bondwire
=
Inductance 0.27nH

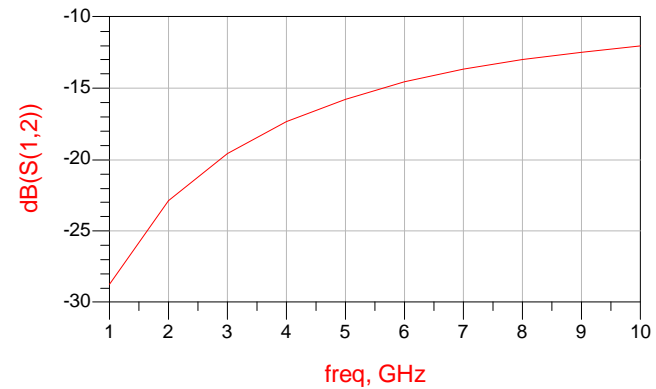
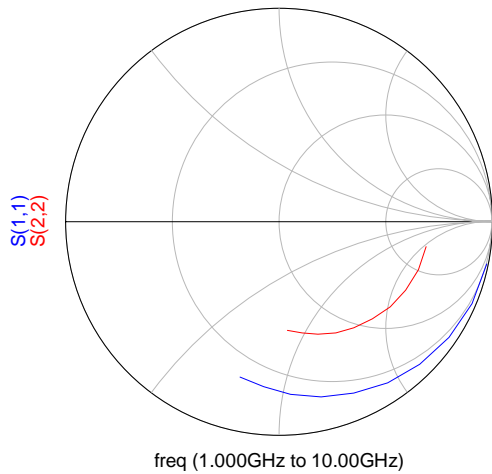
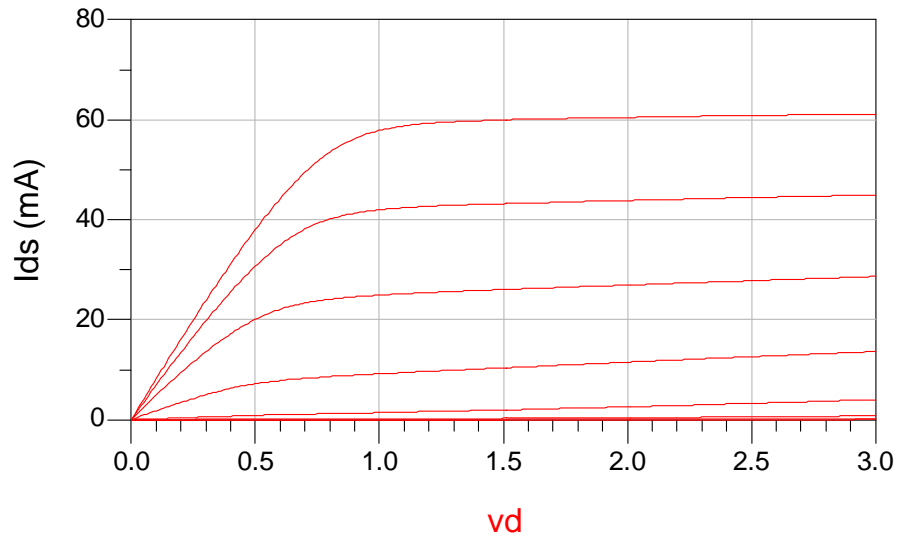


Steps involved

- Active Device Evaluations
 - Electrical
 - Layout
 - Bonding
 - Characterisations
 - Models



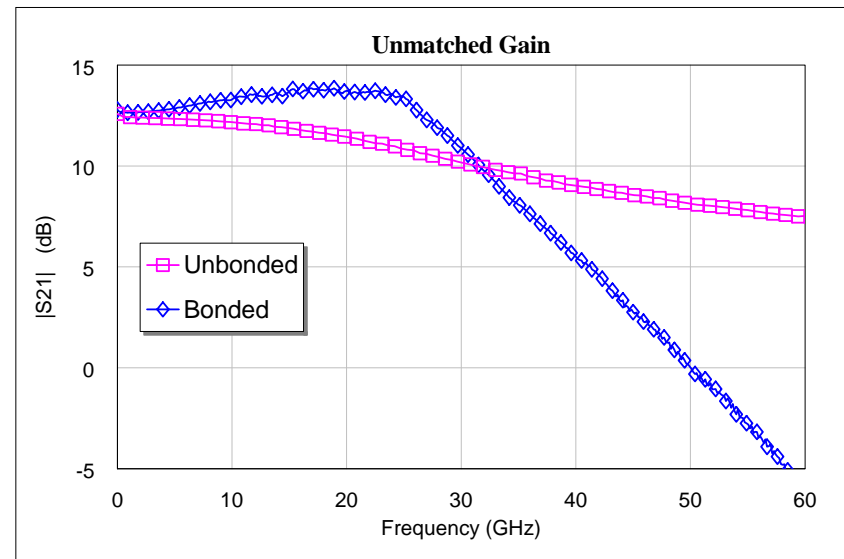
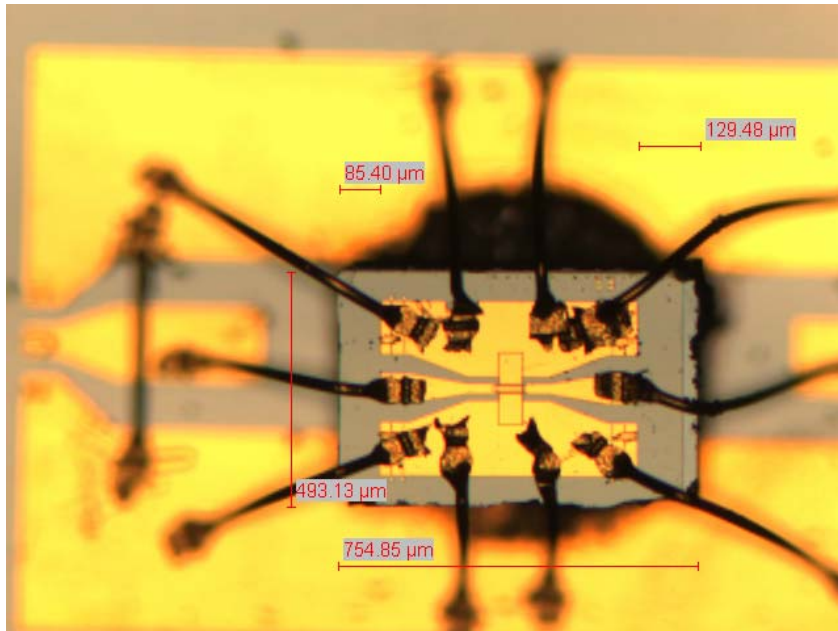
Evaluations and validations RFMD Bonded Device



Bias point for S-Parameters = 0.3 V_{ds}, 2 mA



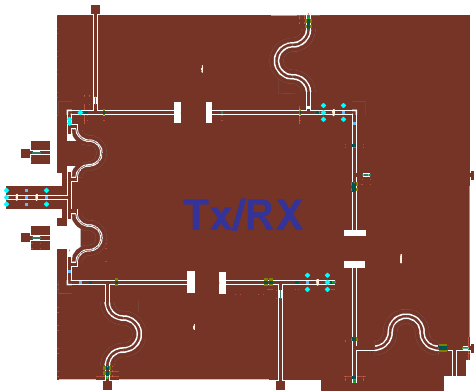
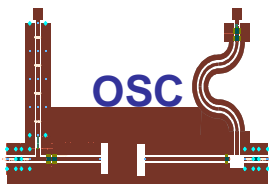
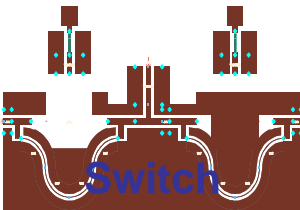
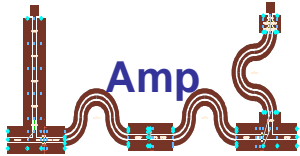
Evaluations and validations - Glasgow 50nm Device



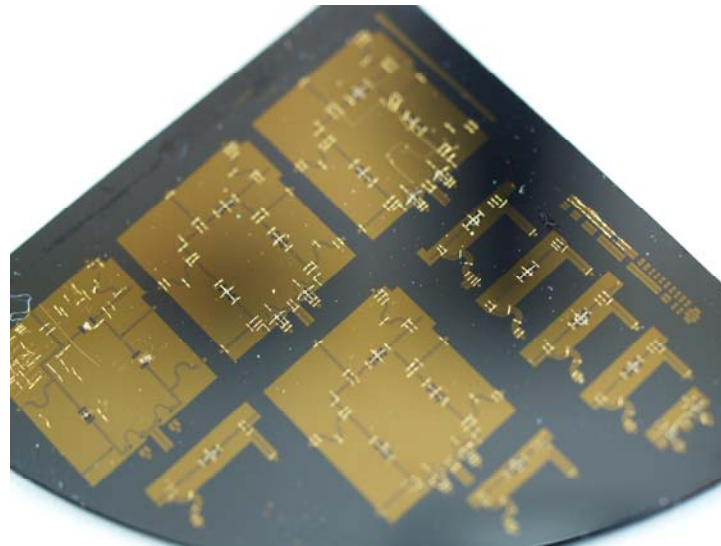
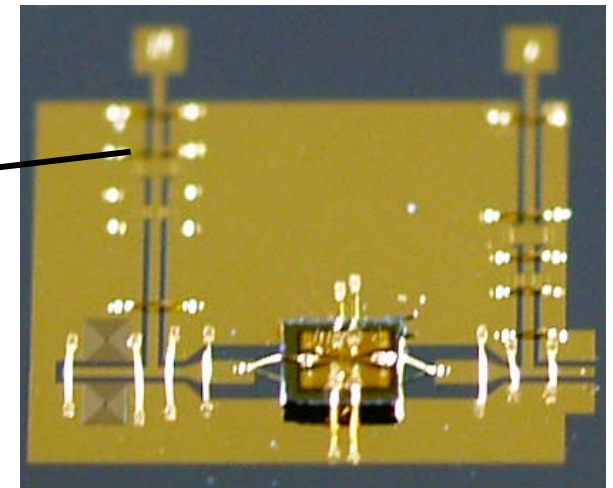
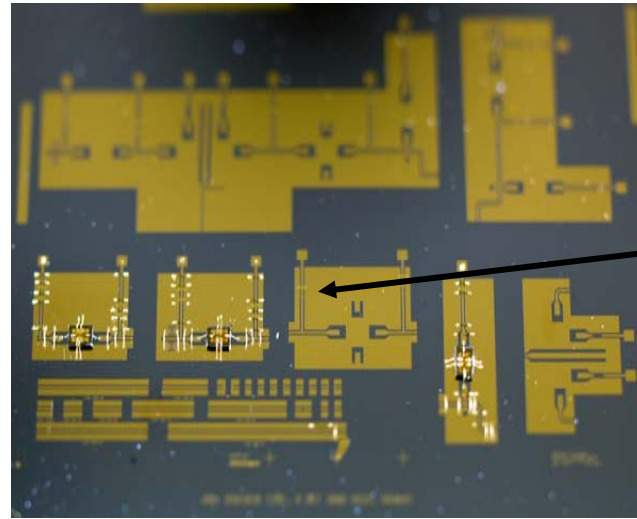
Glasgow 50nm Device Gate width 2x50um
Bias condition: $V_d=0.8V$, $V_g=-0.4V$

Evaluations and validations

Quasi MMIC Schematic/modelling Tx/RX – Two Design Topologies



Design Layout



Fabricated Quasi MMICs Operating at 10GHz



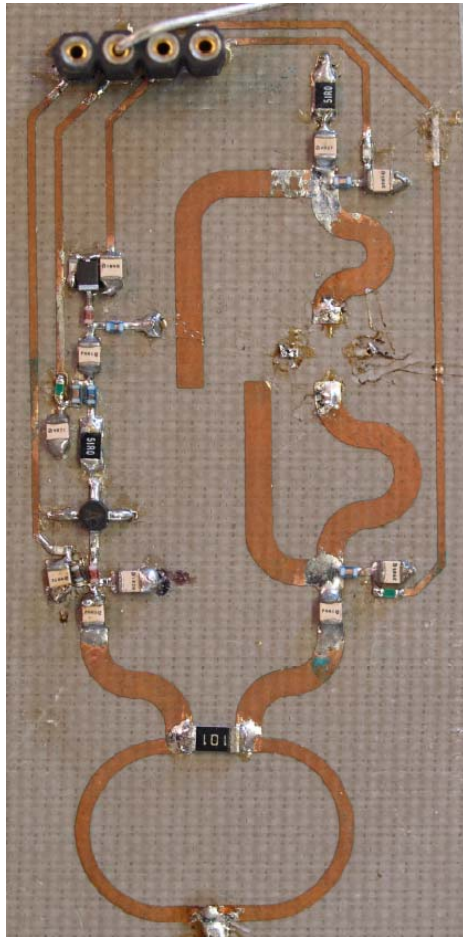
Conclusions

- Quasi MMIC Fabrication Technology has been developed
- Validations of the process have been demonstrated up to 10GHz
- Full circuit realisation turn around - 2 to 3 weeks
- An increase in chip size : 20 – 30% compared to MMICs
- Very economical compared to full MMICs



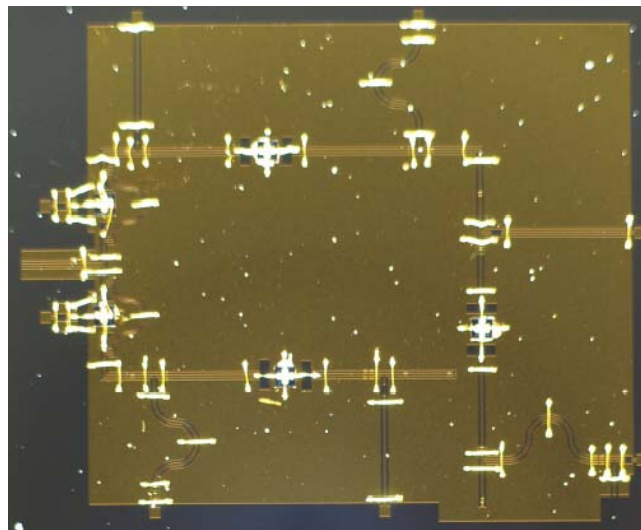
Conclusions

TX/RX Hybrid



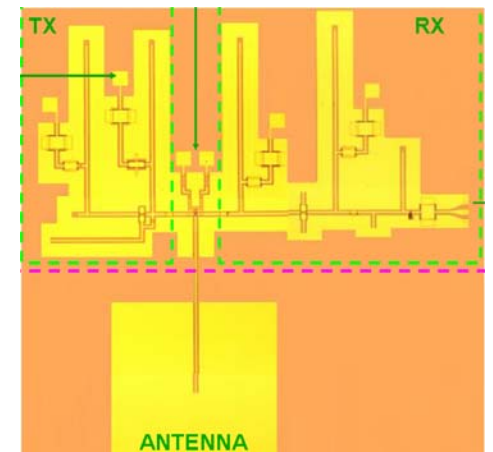
2.5GHz (10cmx5cm)

Quasi MMIC TX/RX



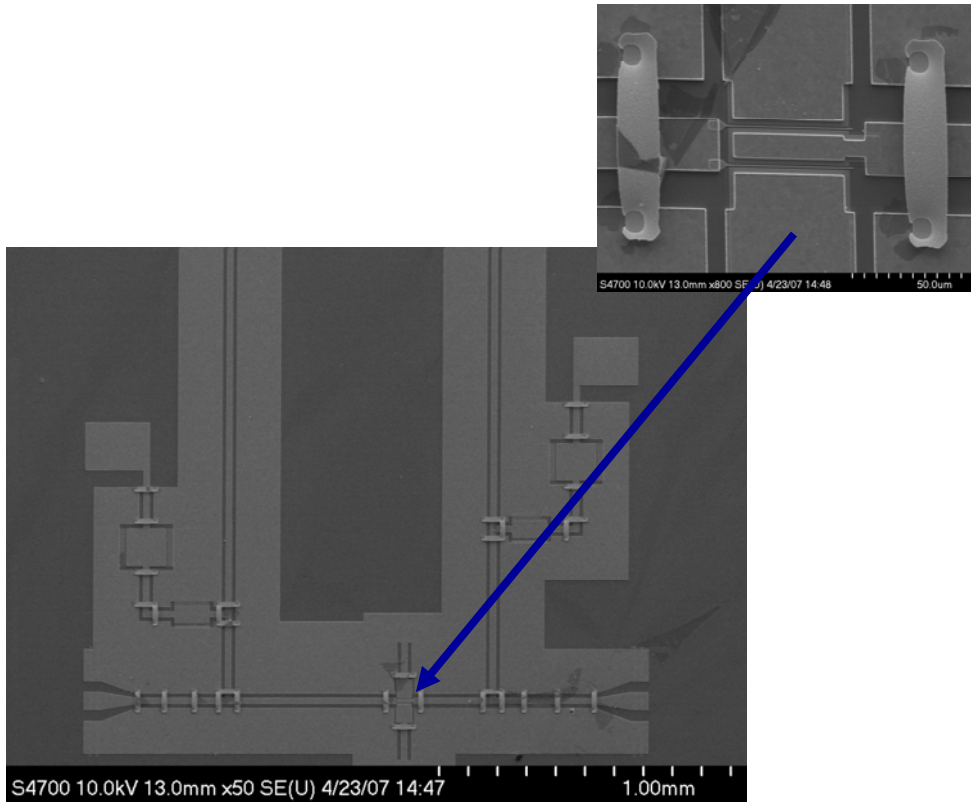
10GHz (1cmx1cm)

MMIC TX/RX

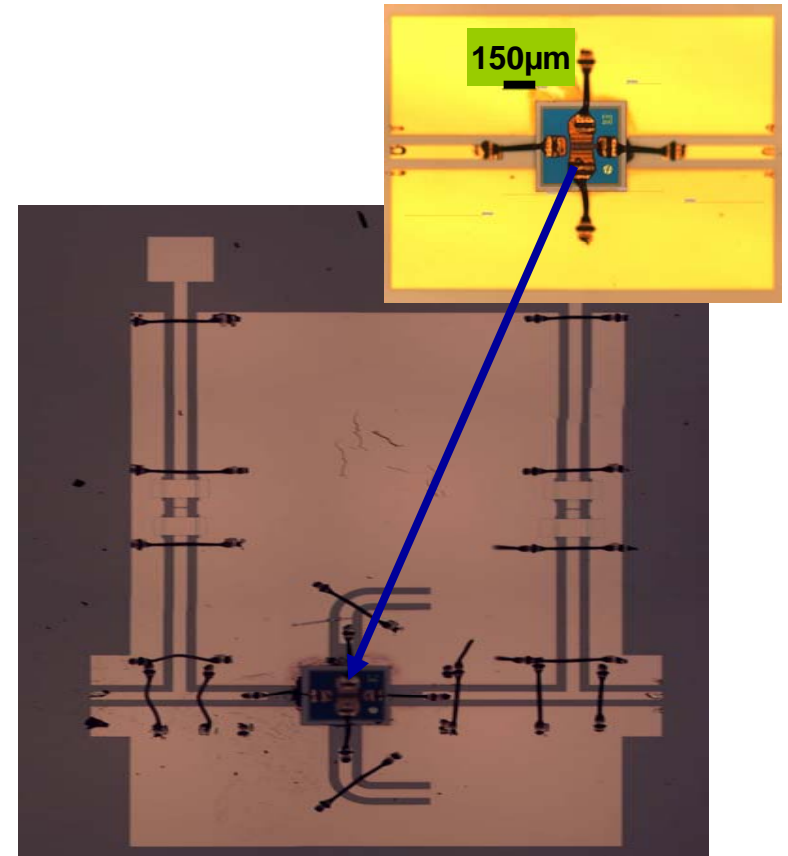


24GHz (0.5cmx0.5cm)

Conclusions



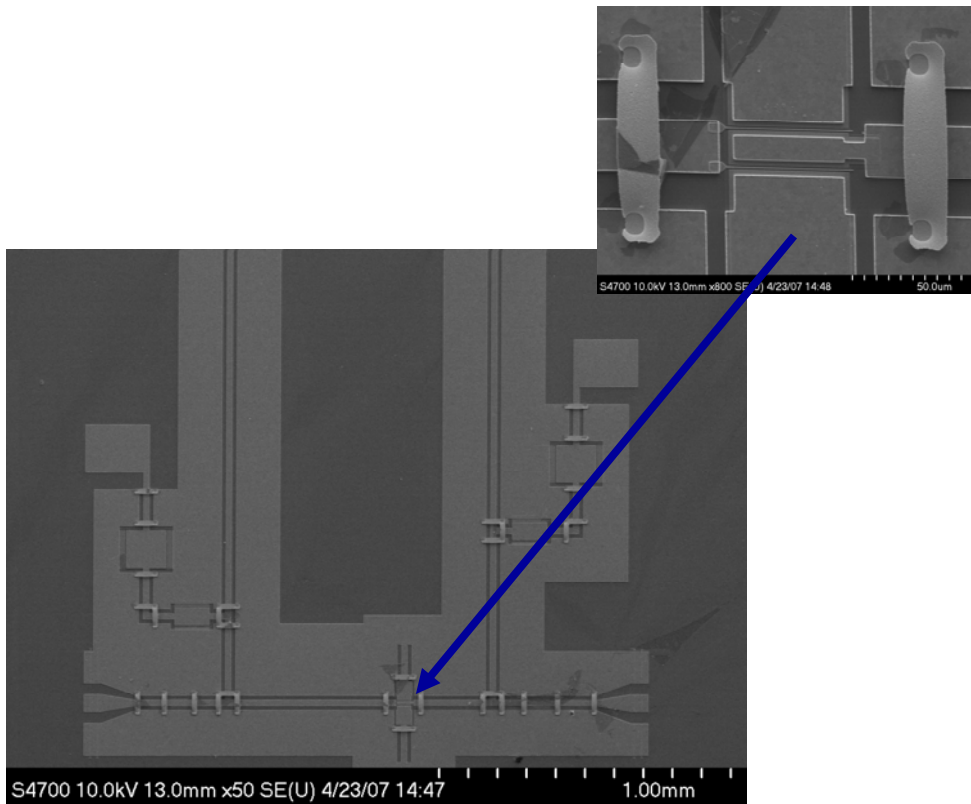
Fully Integrated MMICs



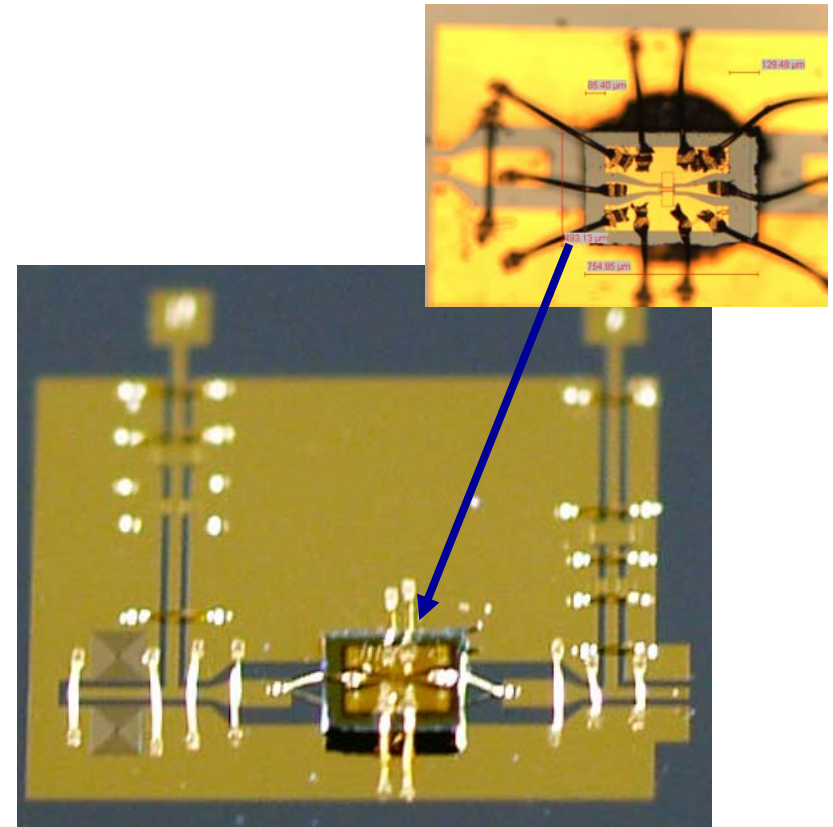
Quasi Integrated MMICs

Quasi MMIC is NOT to replace Fully Integrated MMICs

Conclusions



Fully Integrated MMICs



Quasi Integrated MMICs

Quasi MMIC is NOT to replace Fully Integrated MMICs