

## Ph.D. title :

# Pulsed time domain characterization of high power GaN transistors



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## Objectives

- test GaN transistors with **very high power** in CW and pulsed excitations (around 100 W in pulsed mode) and measure non linear effects at these powers
- study the time domain **behavior** of a transistor all along a customized **burst of pulses**, and compare its performances before and after different strong excitations
- extend these results to amplifiers behavior

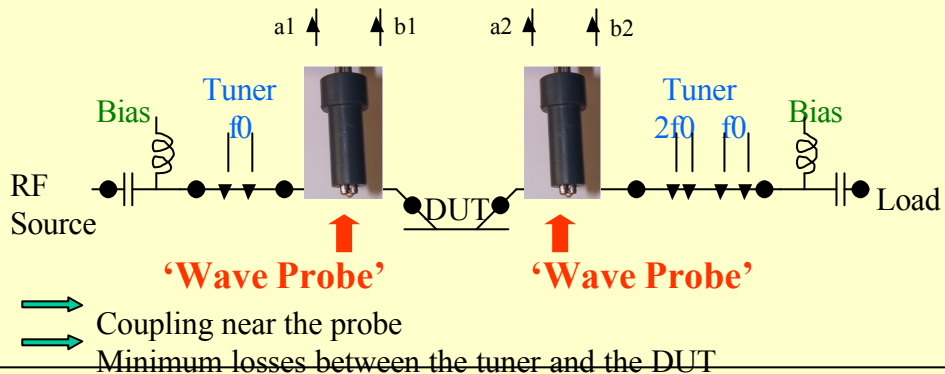
## Outline

- Developments around the LSNA
- A dedicated bench for load-pull time domain measurements
- Discussion

## Developments around the LSNA

Our approach : DUT = 'Wave Probe' = Tuner

RF measurement unit (LSNA)



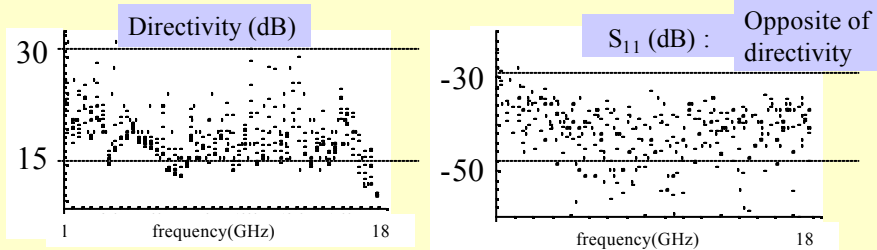
## Developments around the LSNA

### Directivity of the wave probe and directivity of the calibrated LSNA

Reflection on a “connected” 50 Ohms load

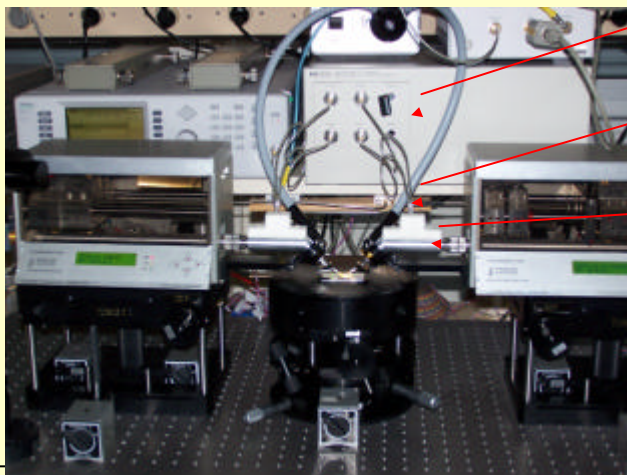
Wave probe result

LSNA relative calibration



Modern calibration algorithms widely improve the system directivity  
 Note that our bench topology keeps the calibration valid when the tuners are moved

## A dedicated bench for load-pull time domain measurements

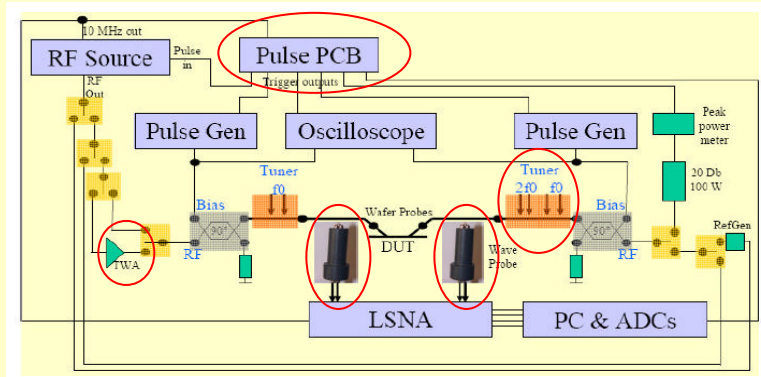


LSNA (4 inputs)

Wave Probe

Bended line

## A dedicated bench for load-pull time domain measurements



Bias tees : courtesy of Cardiff University

## Discussion

1. How much can a transformer of impedance improve matching capabilities for strongly mismatched transistors in our passive load-pull bench ?

## Discussion

2. How can we judge the influence of the “wave probe” coupling method on group delays for harmonic frequencies phase measurements (better or not) ?

## Discussion

3. Is it interesting to measure the dynamical bias effects induced by a burst of RF pulses ?