# 40 GHz on Wafer Testing For Two Port Devices

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Litton Solid State
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# Agenda

- RF Measurements.
- Device Definition and Setup.
- Probe and Equipment Selection.
- Vector Wafer Calibration, LRM, TRL.
- Multiple Probes.
- Summary

# RF Measurements

- Microwave test time, Step Synthesizer, Phase lock time.  1500ms die.
- DC Tests to simulate RF performance.
- Hfe or Gm to qualify Gain Specification.
- Scattering parameters, Two Port Networks  S21, S11, S12, S22
- Scalar data, Magnitude only
- Active and passive

# Probe Setup

- Off the shelf single probes available.
- Tester RF Coax Connections.
- RF Probe Footprint auto Alignment EG4090u.

# Test Device - MMIC

- Landing Zone 2 mills square
- Pitch 150 microns
- GSG, 50 Ohms
- Reference plane of measurement
- DC Pads

# Probe Selection

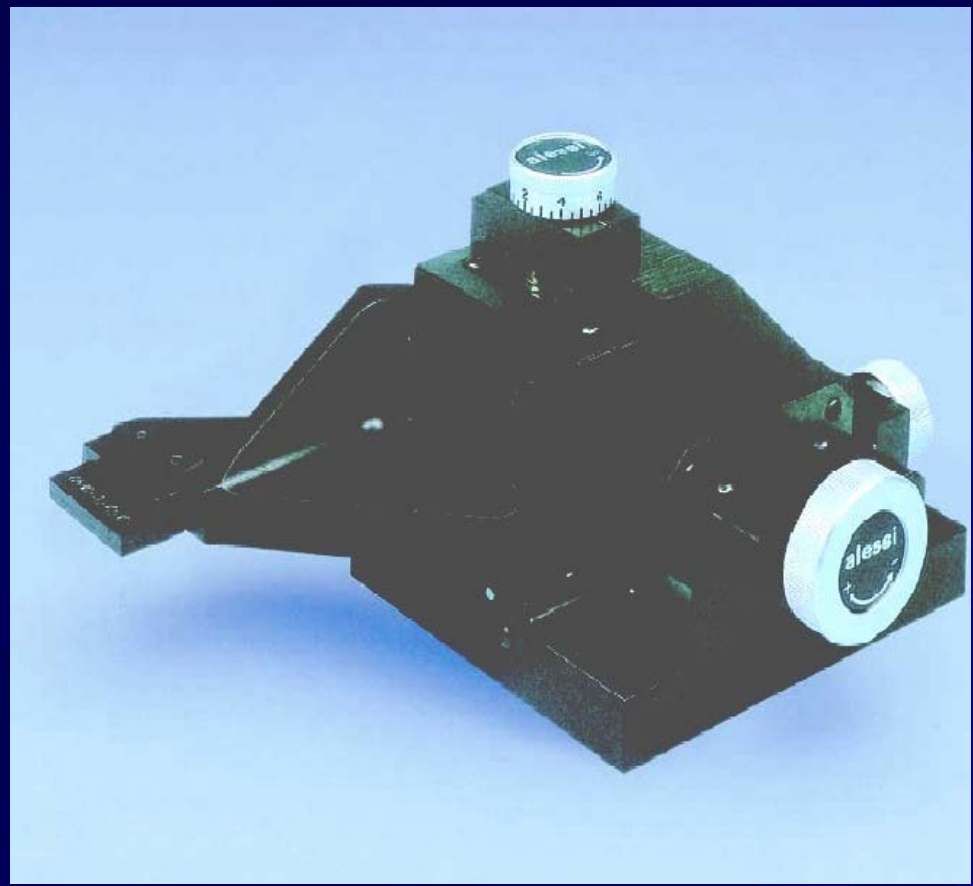
- List of vendors, Cascade, PicoProbe.
- Co-planar Coaxial, Flexible.
- Over travel, skate about 1 mill.
- 4 touch downs are about the limit.

# Other Probe Vendor

- PicoProbe
- GSG, best behaved.
- GS, left to right.
- SG

# Probe Positioner

- Alessi Micropositioner for Microwave probes.



# Test Equipment (component)

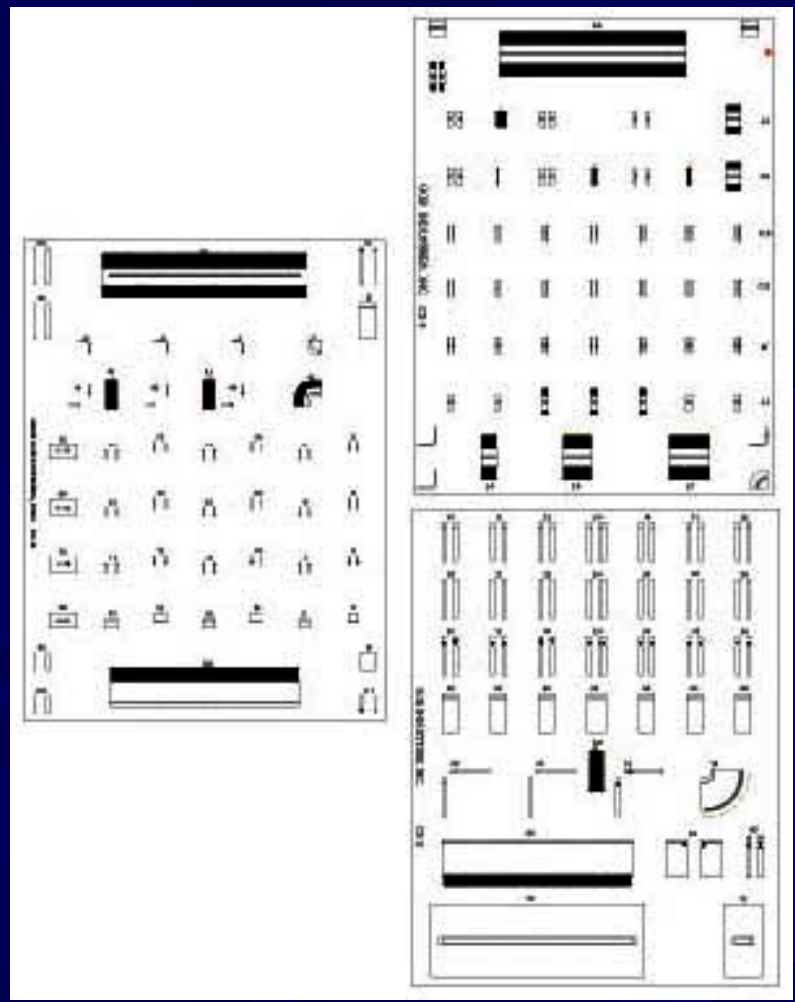
- Agilent (HP) 8510C vector network analyzer, poor mans example.

# Test Equipment (turn key)

- LTX Fusion Systems, 6 GHz example.
- Agilent (HP) RFIC 84000 Narrow Band Tester.

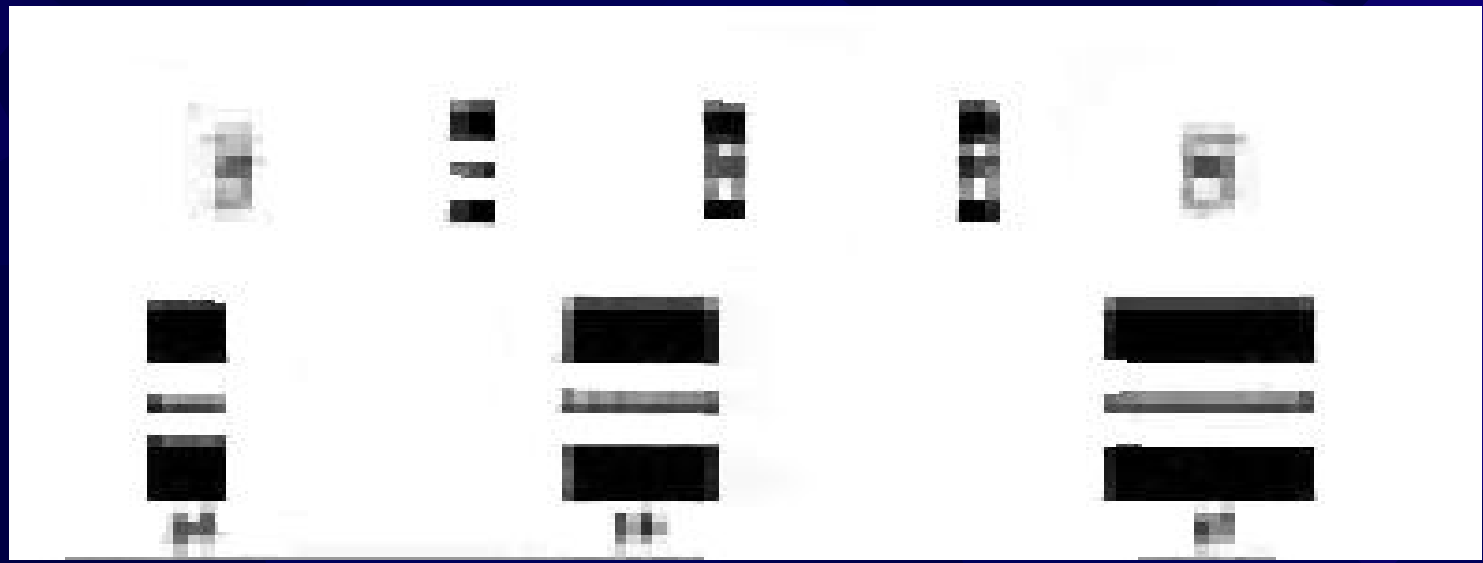
# Calibration On Wafer

- Vector vs. Scalar correction.
- ISS standards
- Build your own standards, TRL. NBS Traceable.



# Calibration Standards ISS

- SOLT; short, open, load, thru (0 delay).
- LRM; line, reflect, match,
- TRL; thru, reflect, line (delay).



# Multiple Probes

- Devices with more than two ports, RF switches.
- Calibration Issues, computer correction.
- DC De-Q'ing with bias tees

# Summary

- RF Measurements.
- Device layout restrictions.
- Measurement touch downs.
- Test Equipment, software and through put.
- Best calibration, LRM for 40 GHz.
- Multiple paths, multiple 2 port Cal's.

# References


- Cascade MicroTech, Beaverton, Oregon, Slide pictures 5,7,9,12 &13 www.cmicro.com 800-550-3279 (Cal Abreu 408-245-3700)
- PicoProbe, Naples, Florida, Slide pictures 8 & 14 www.ggb.com 941-643-4400
- Agilent Tech, Santa Rosa, California, Innovating the HP way, Slide picture 10 www.tm.agilent.com 800-452-4844
- LTX Corp, Westwood, Massachusetts, Slide picture 11 www.ltx.com (Javier Garcia)