

The Future of MMIC Technology

TG



MMICs: A Retrospective

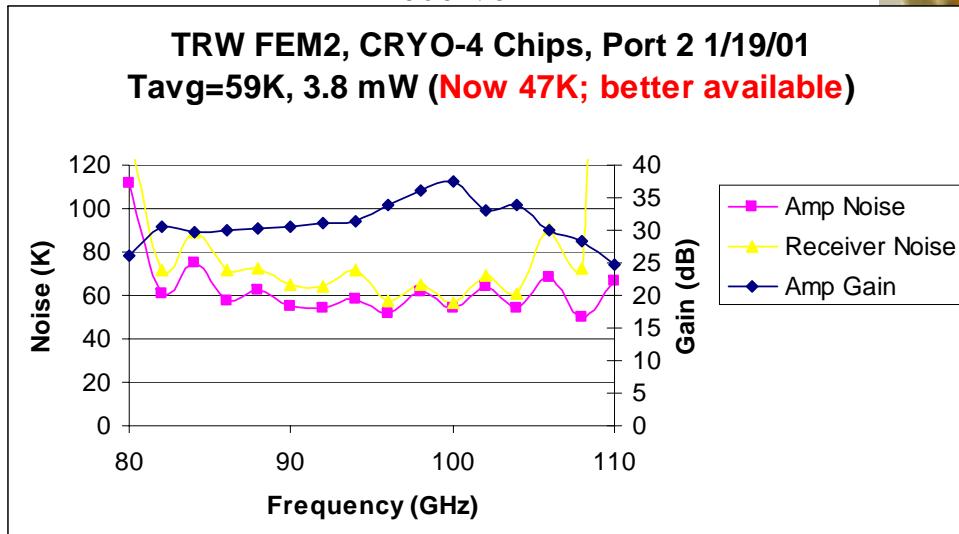
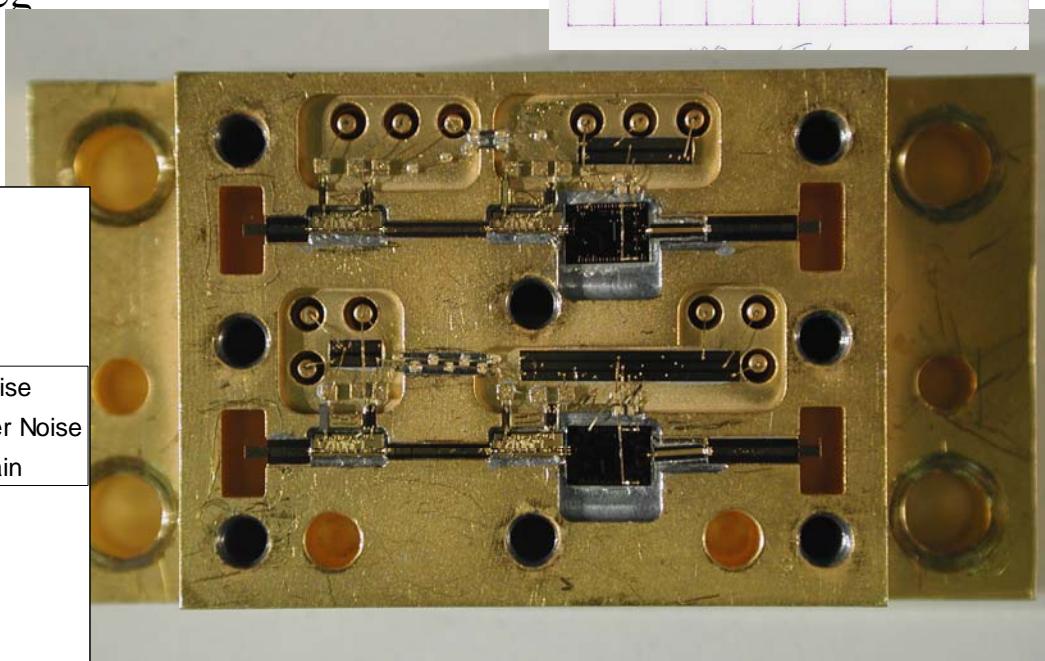
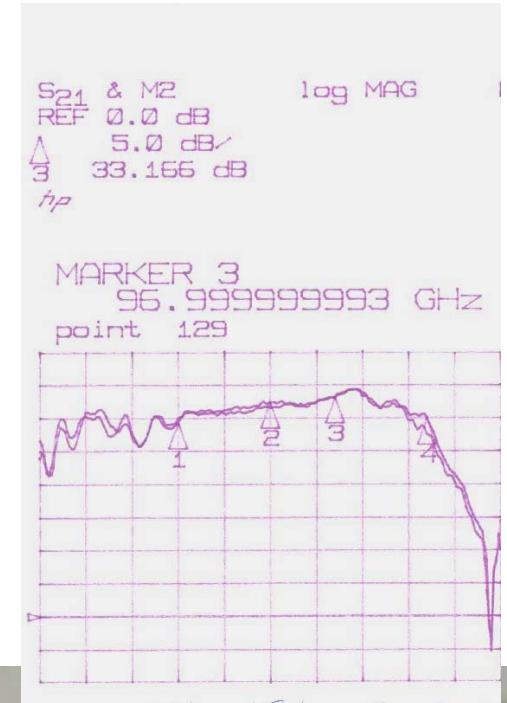
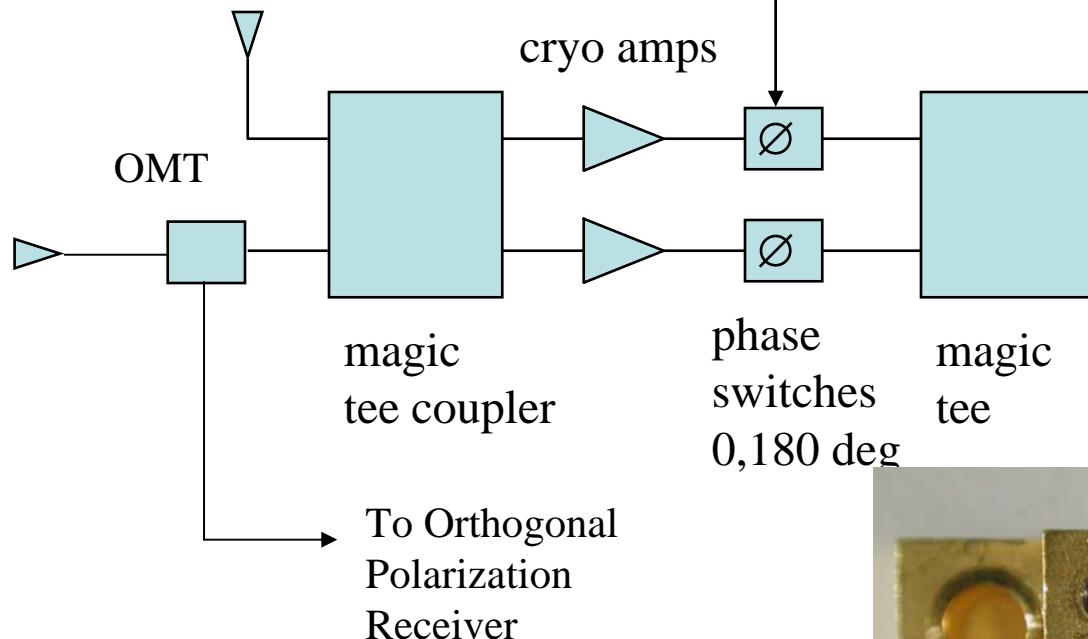
The Future of MMICs

Technology

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Some Systems

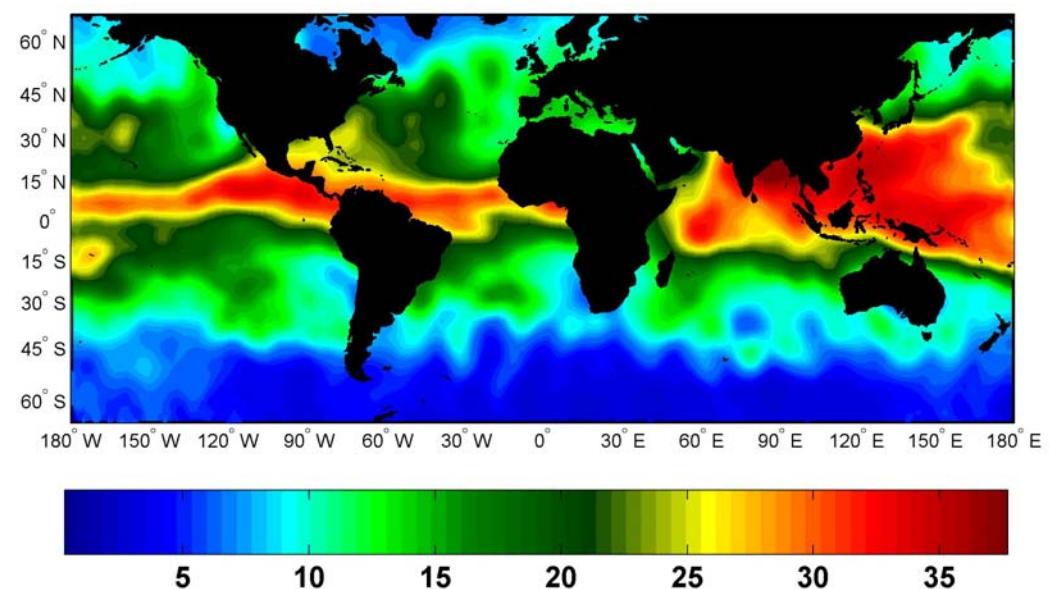
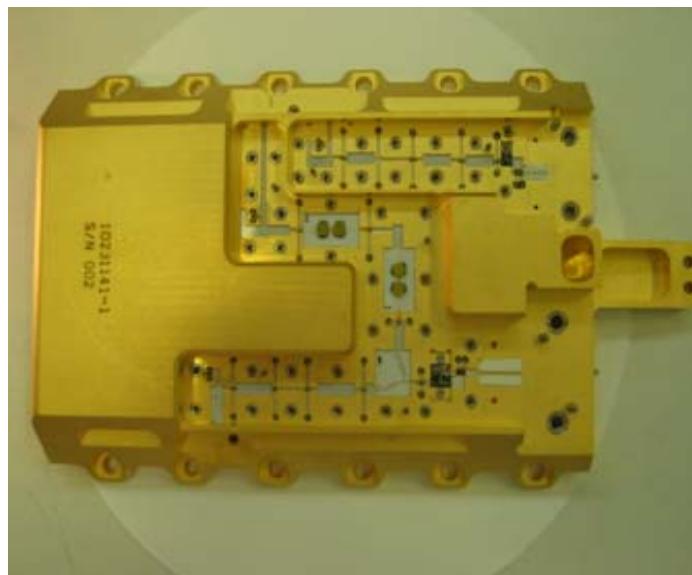
Circa 2000 Planck-LFI 100 GHz Breadboard



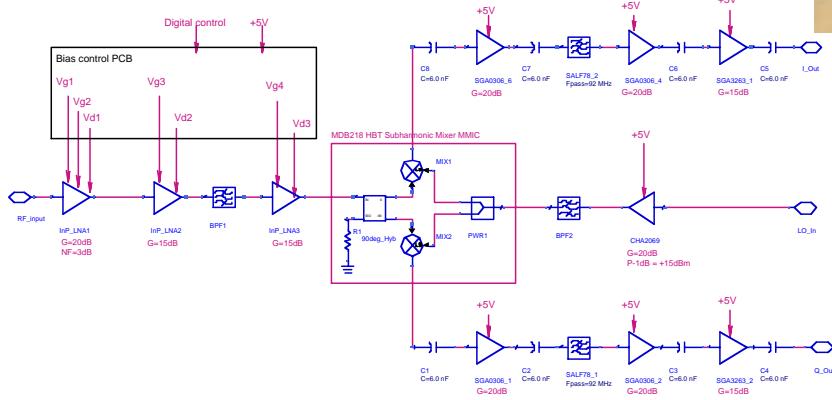
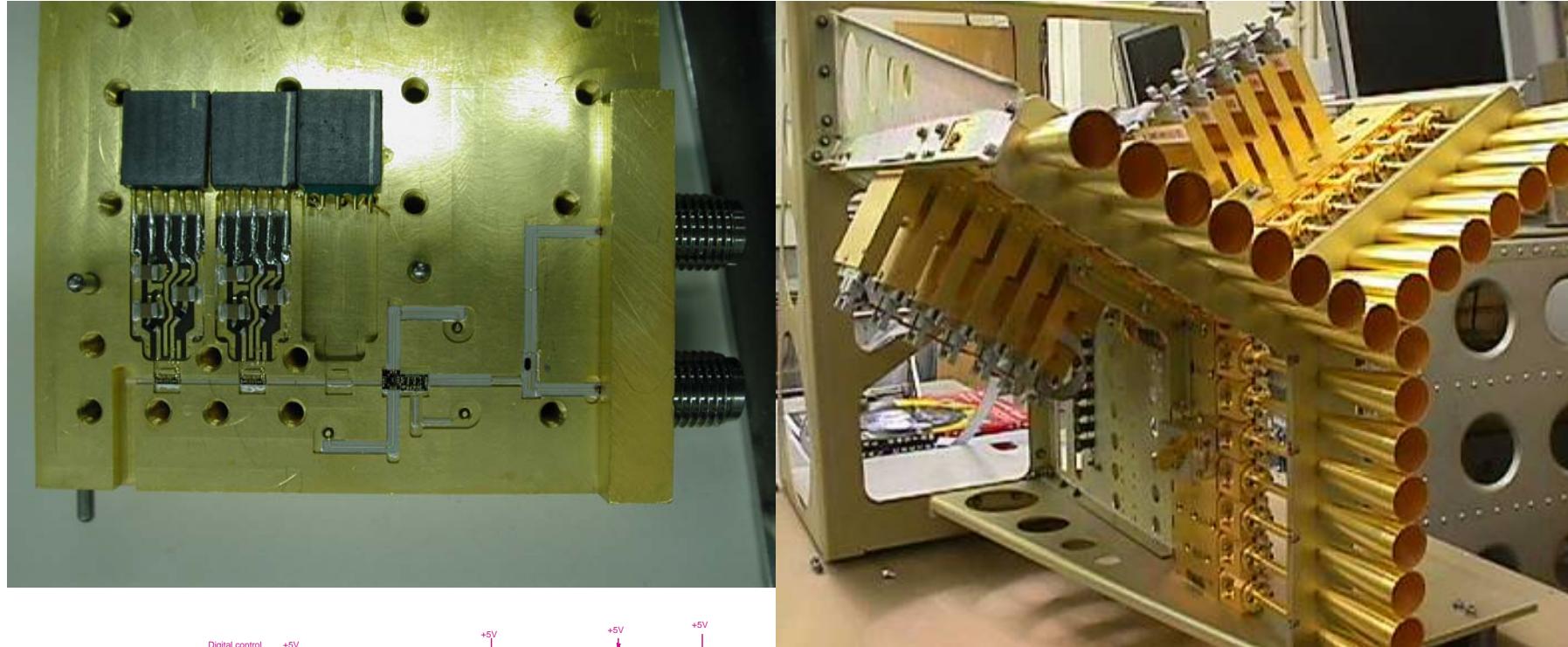
Jason-II AMR



18, 24 and 34 GHz Dicke Switched/Noise
Source cal'd MMIC radiometer



GeoSTAR 50-60 GHz Prototype



QUIET - Focal Plane Arrays

[Bonn, Max Planck Institute for Radio
Astronomy in Bonn](#)

[Caltech, California Institute of Technology](#)

[Columbia, Columbia University in the city
of New York](#)

[JPL, Jet Propulsion Laboratory](#)

[KEK, High Energy Accelerator Research
Organization](#)

[KICP, Kavli Institute for Cosmological
Physics at the University of Chicago](#)

[KIPAC, Kavli Institute for Particle
Astrophysics and Cosmology at the
Stanford University](#)

[Manchester, University of Manchester](#)

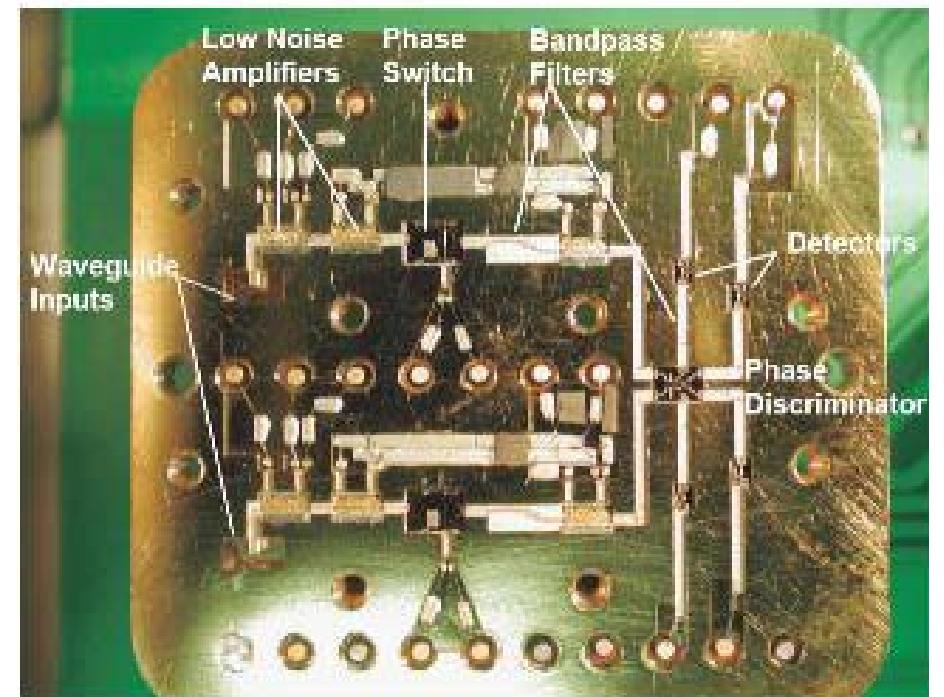
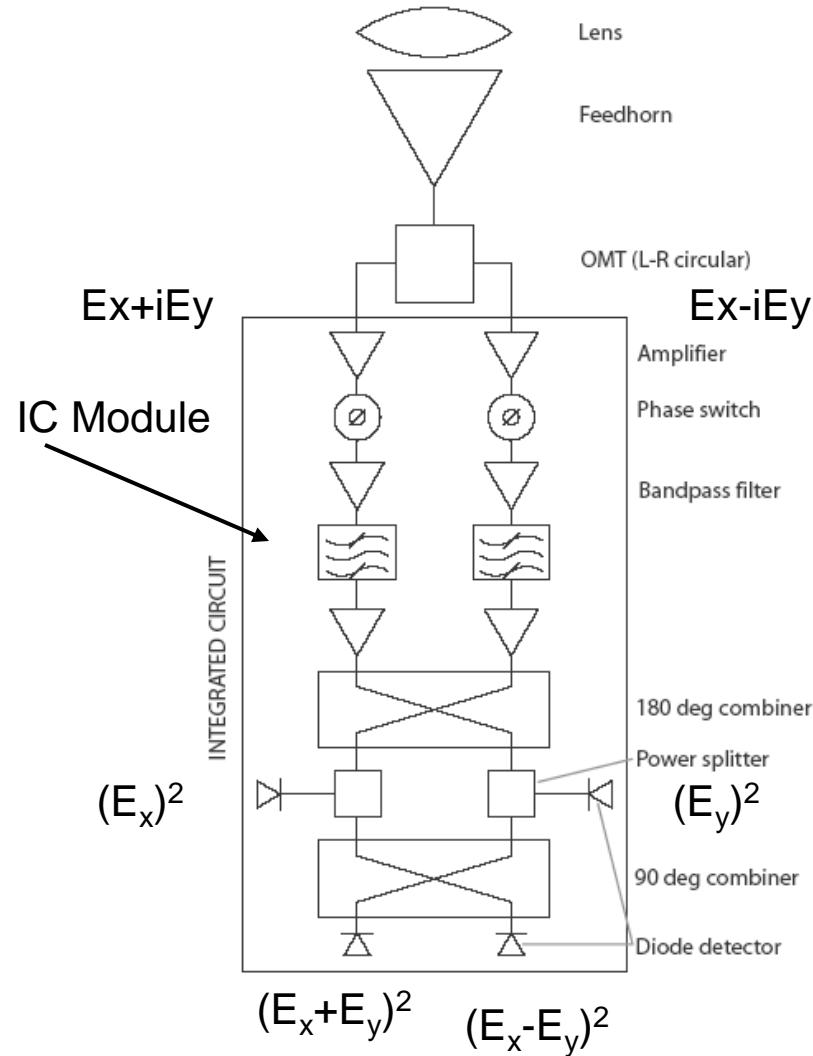
[Miami, University of Miami](#)

[Oslo, University of Oslo](#)

[Oxford, University of Oxford](#)

[Princeton, Princeton University](#)

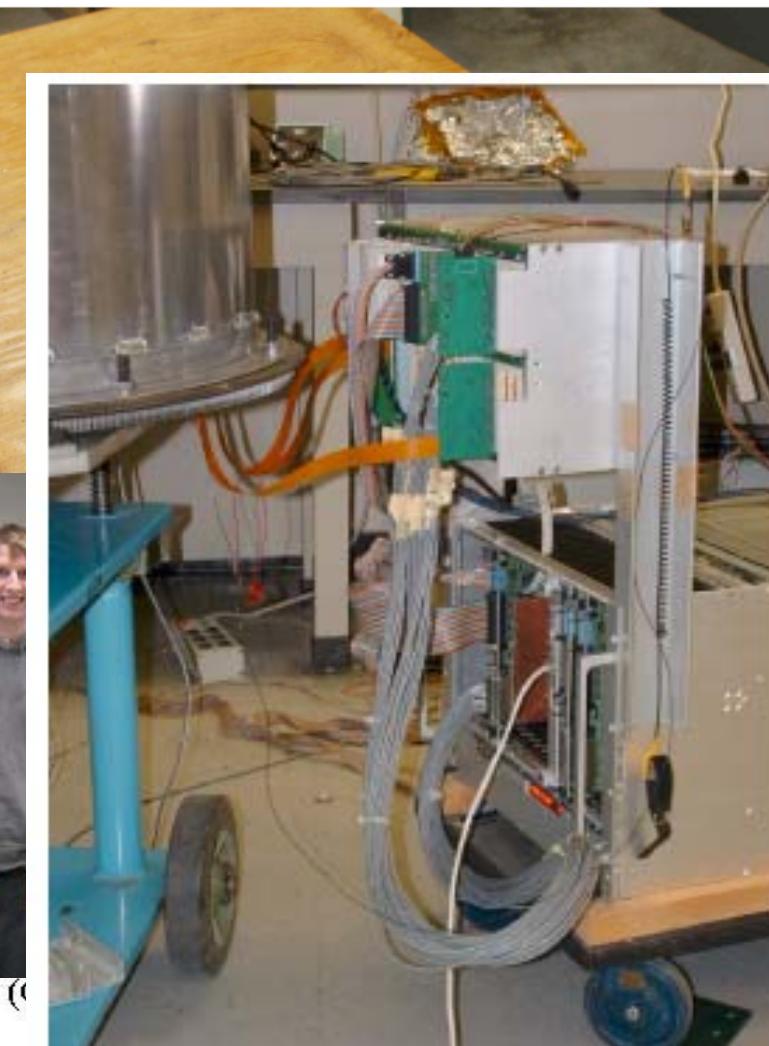
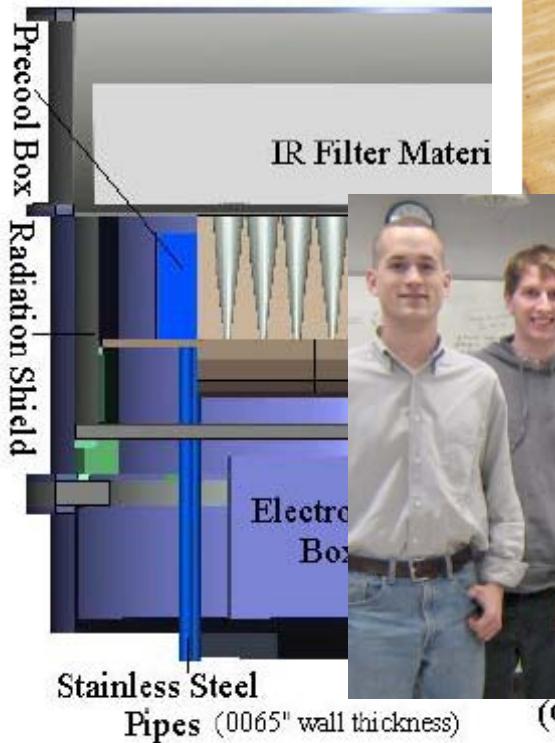
90 GHz Pseudocorrelation Receiver



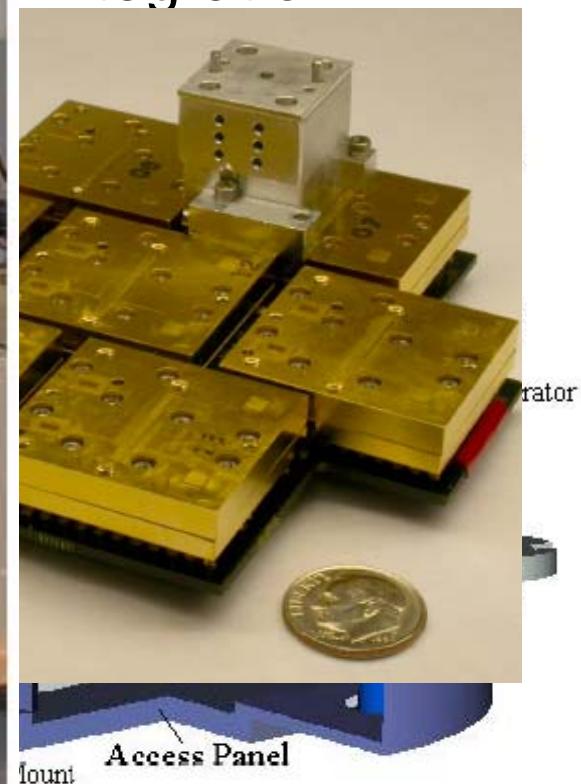
$T_{sys} = \sim 60K$ at cryo temps

91 Element W-band Array

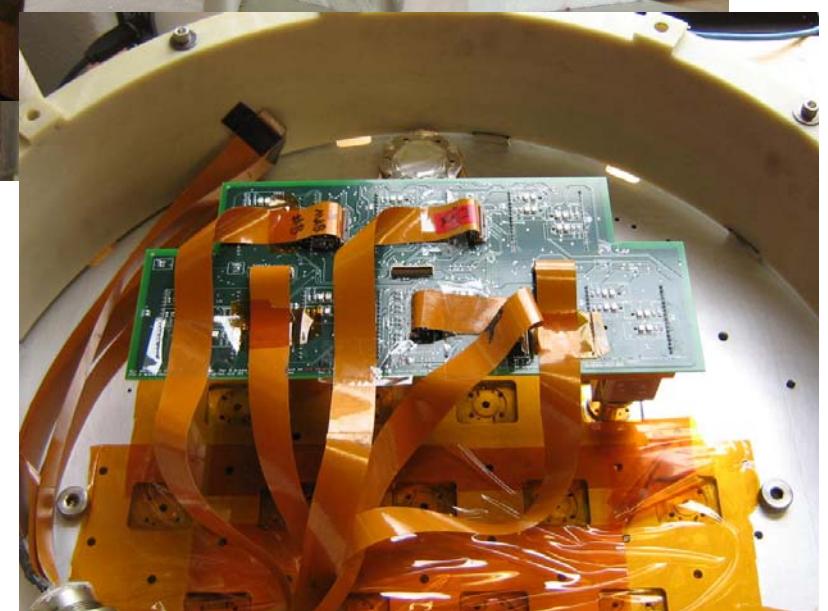
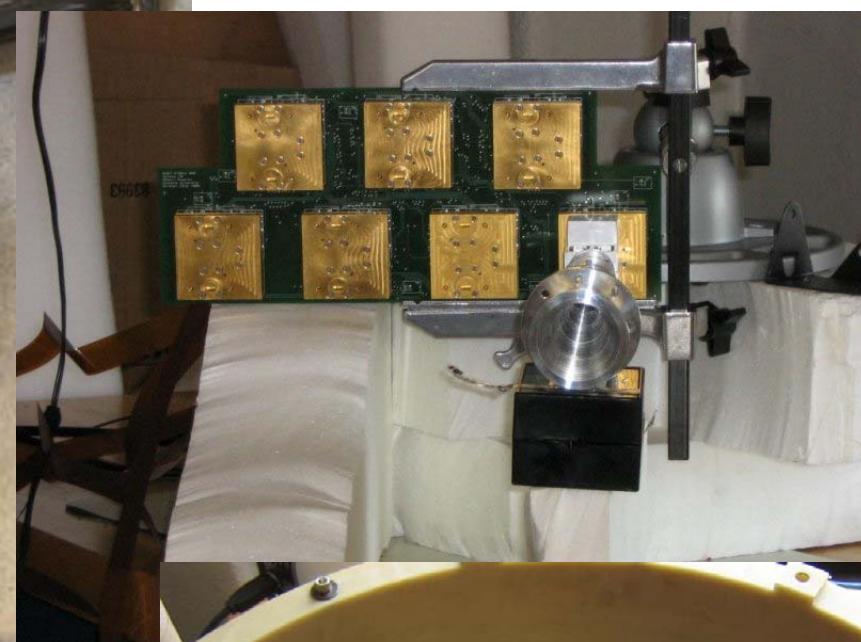
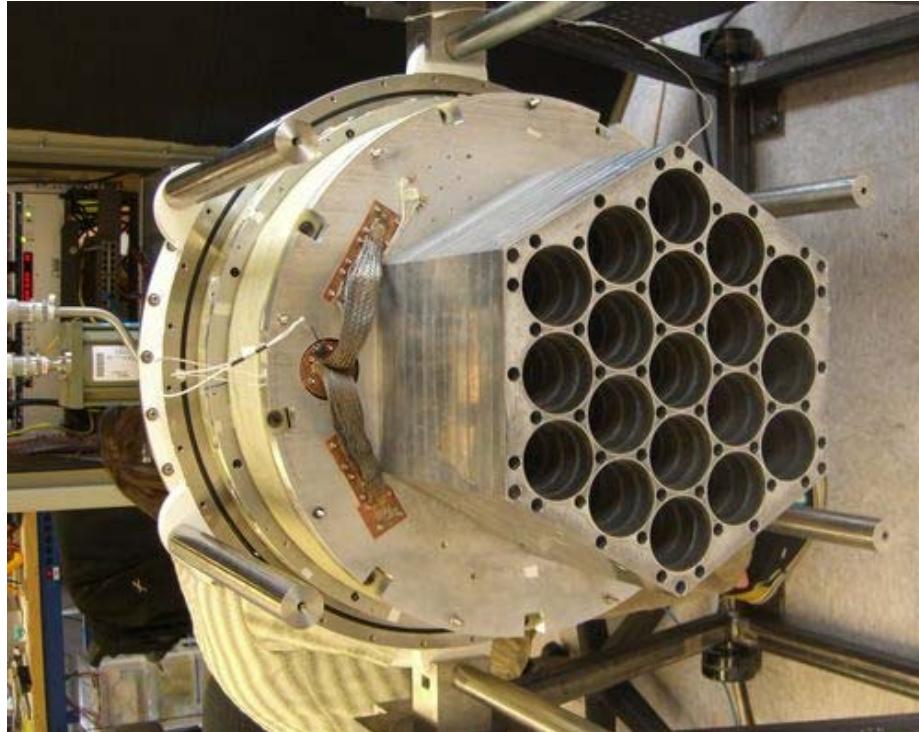
91-Elem



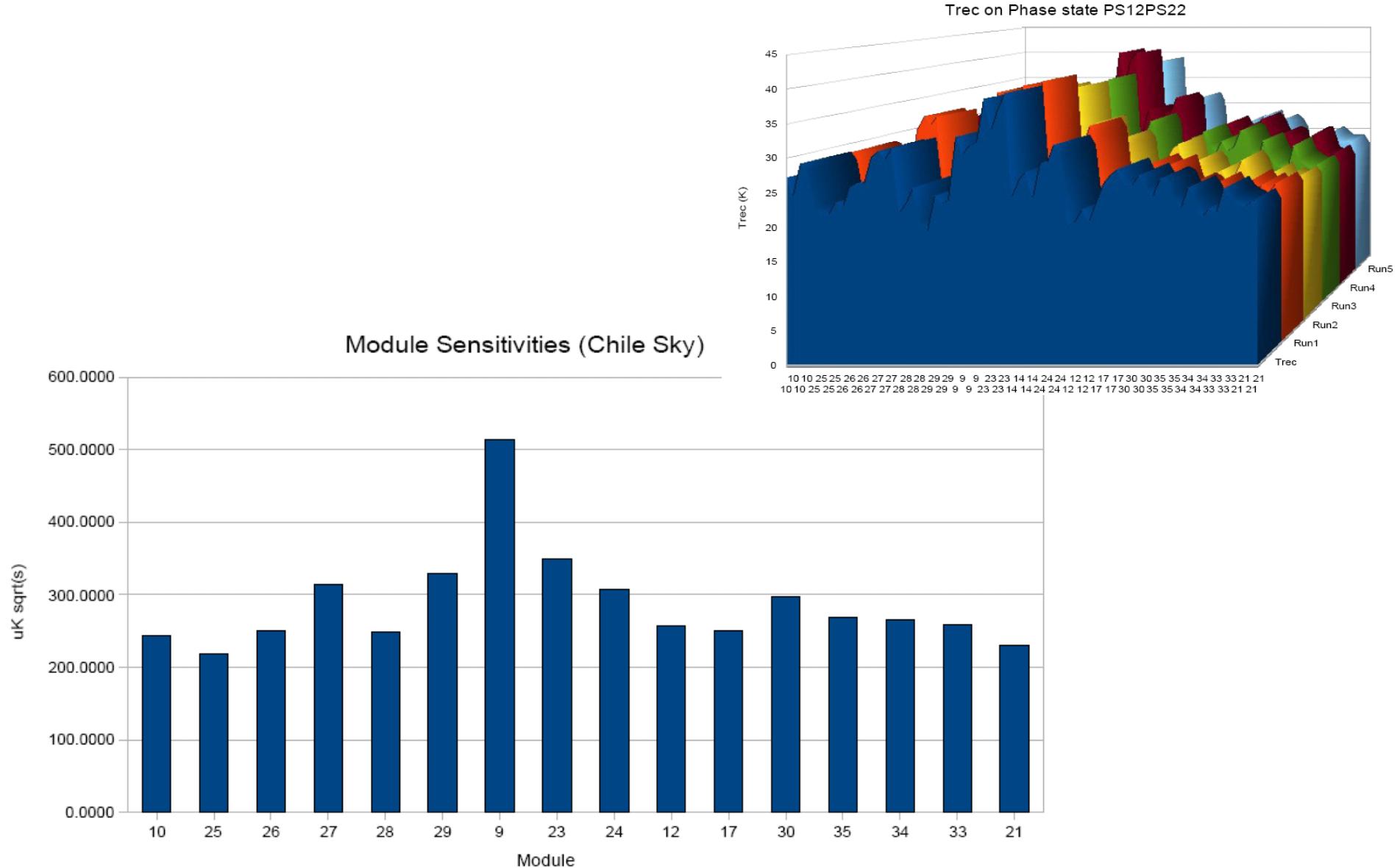
integration



Q-Band Array

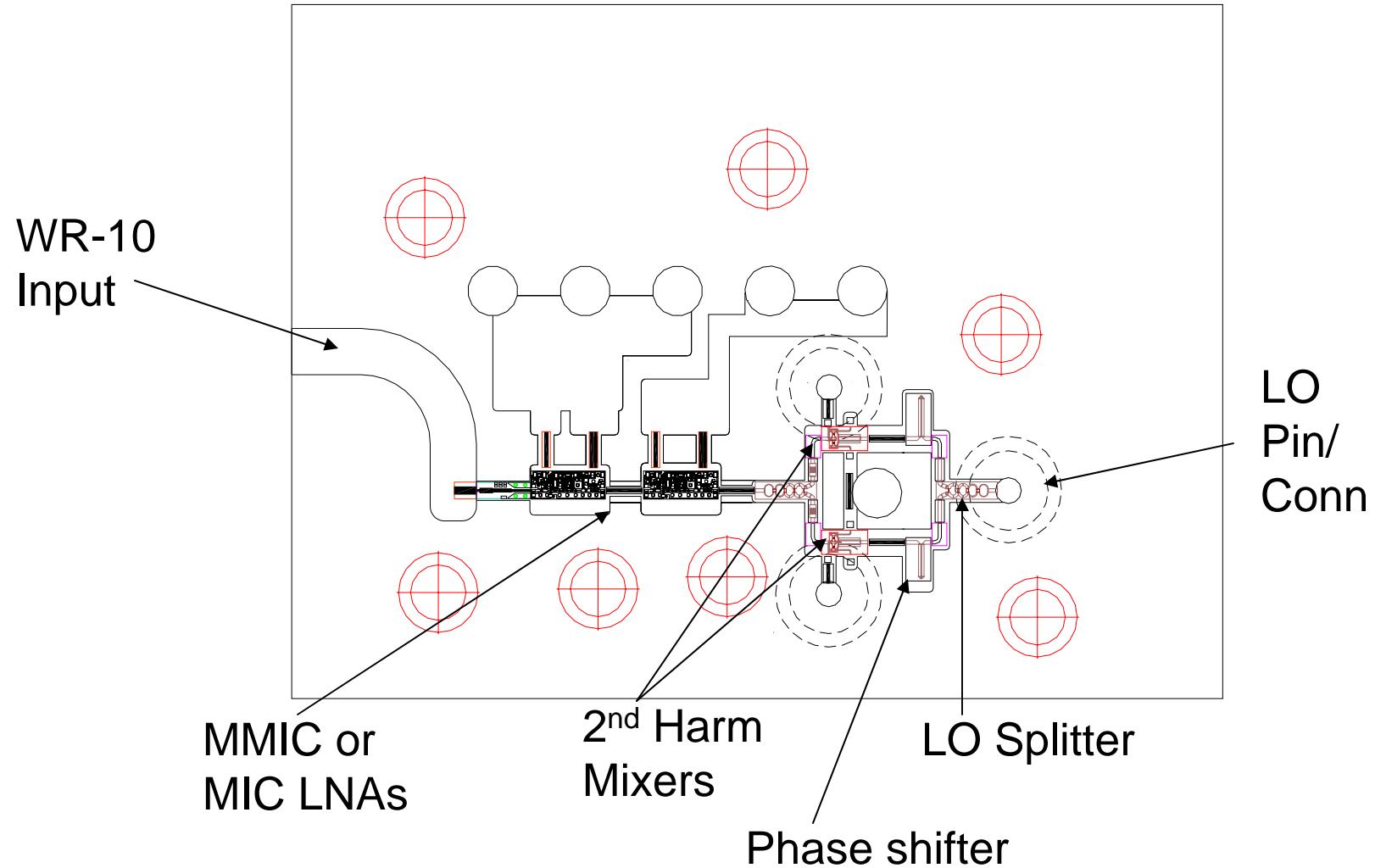


Q-Band Array Performance

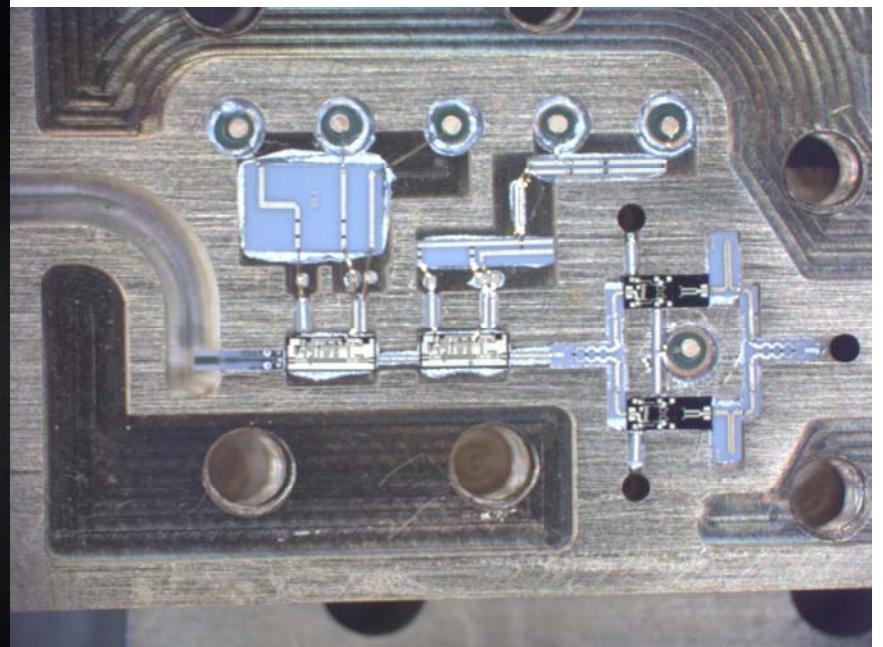
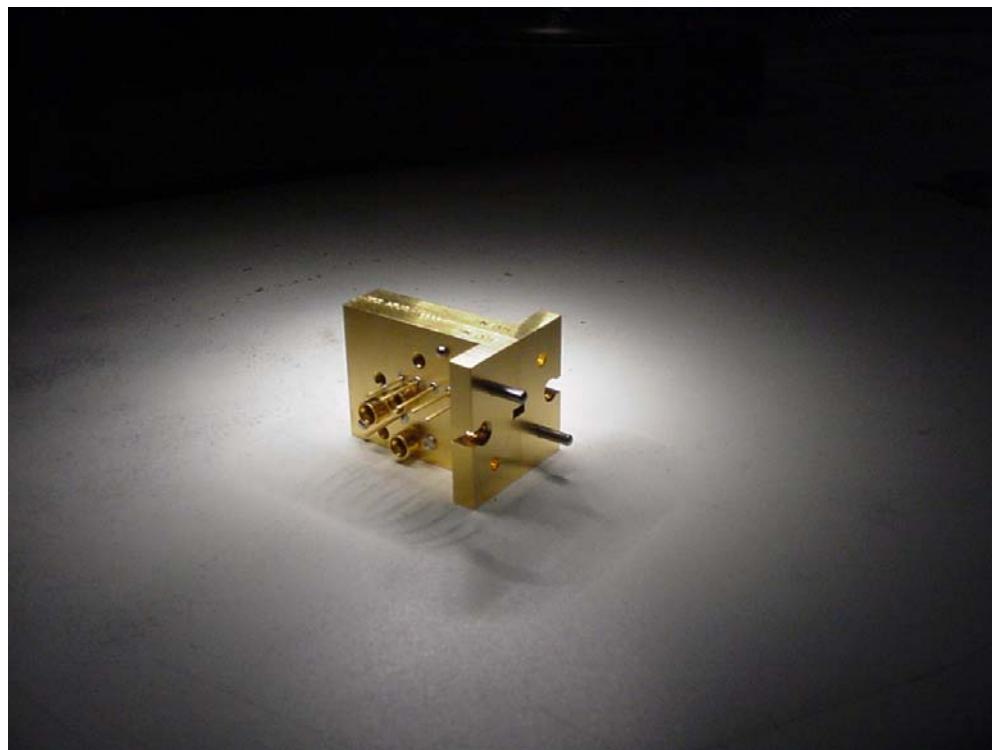


MAS Modules

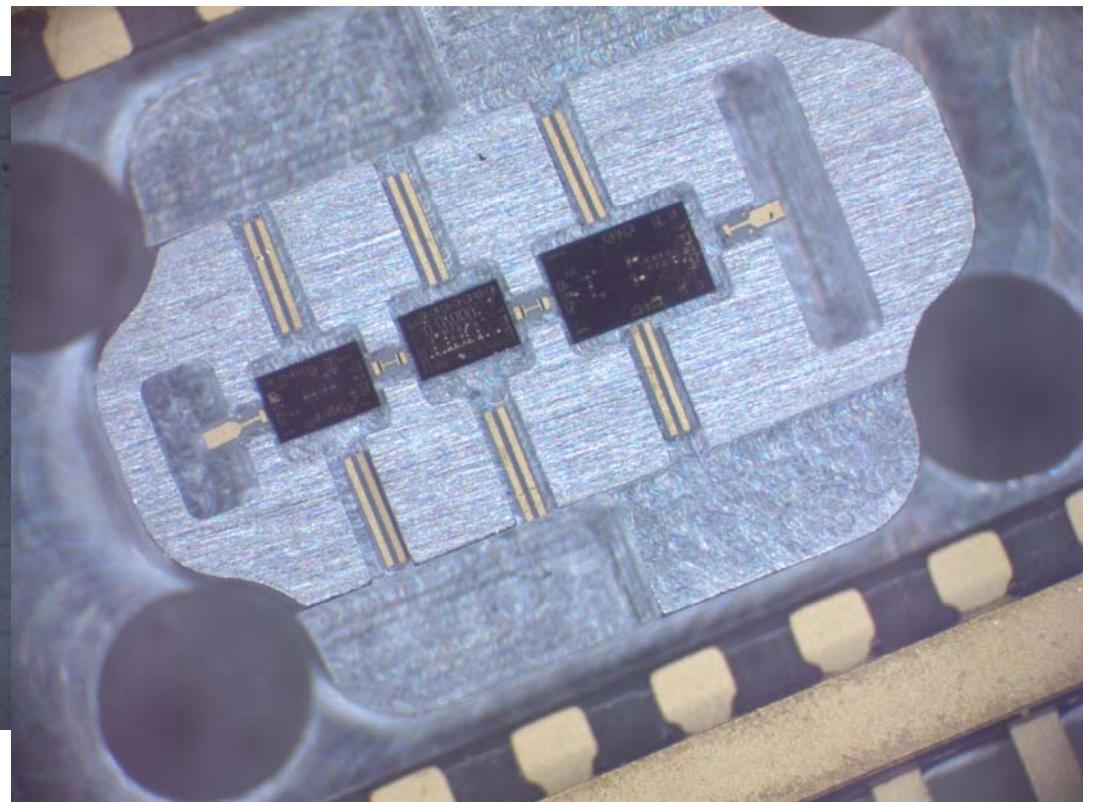
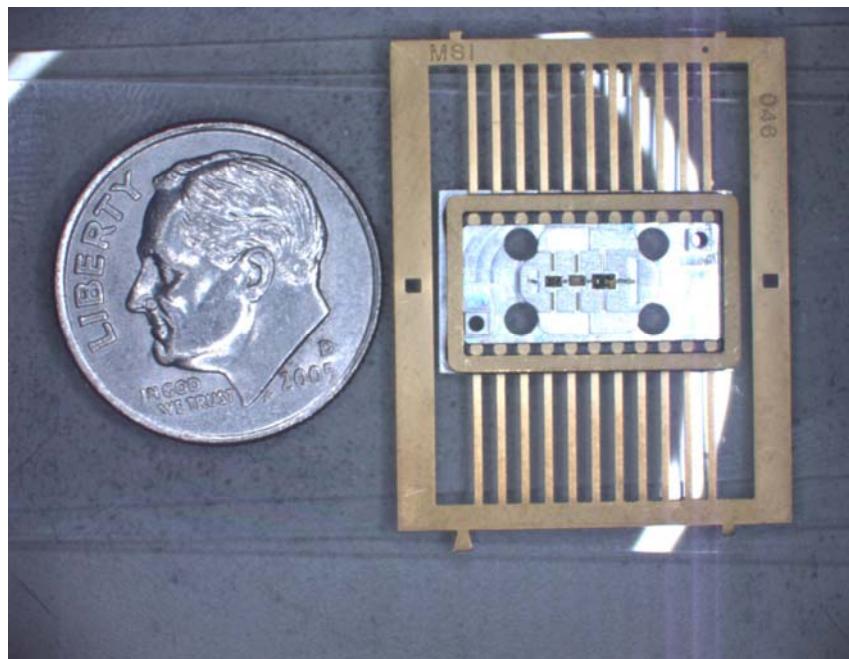
W-Band MAS Module Functions



More MAS...

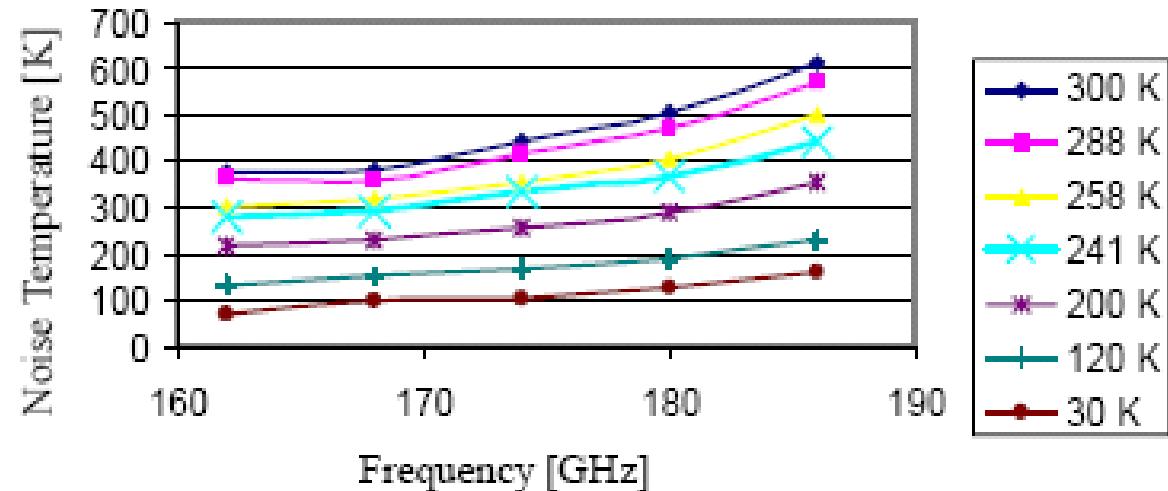
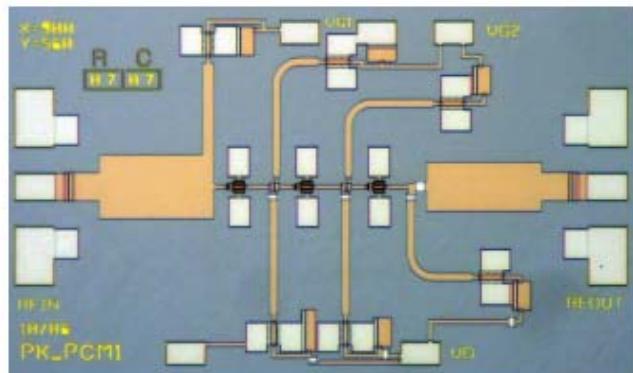


MIMRAM 180 GHz Modules

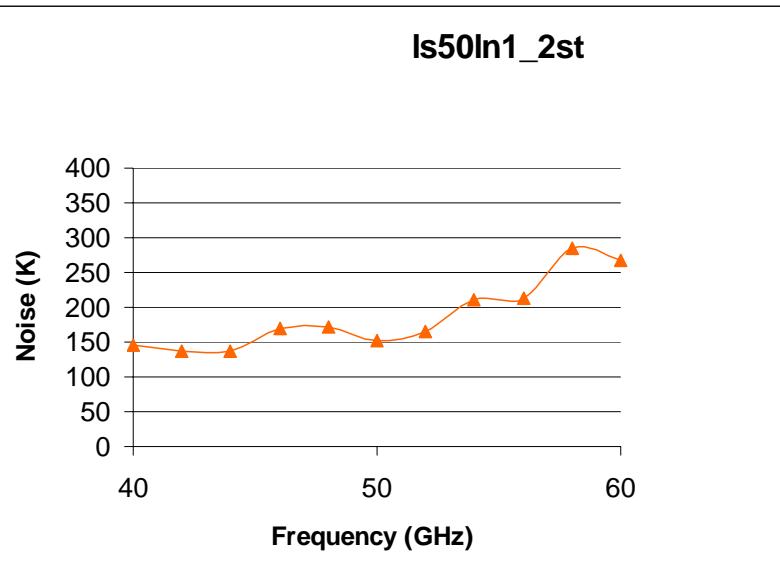


Prospects for better transistors?

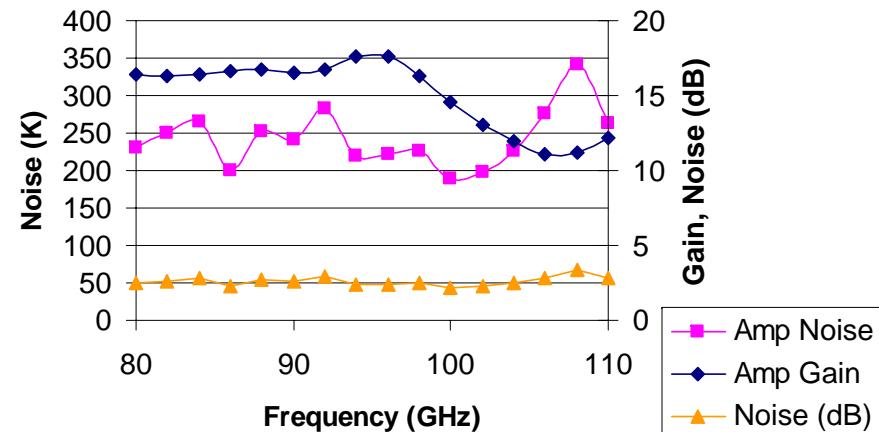
35 nm InP:



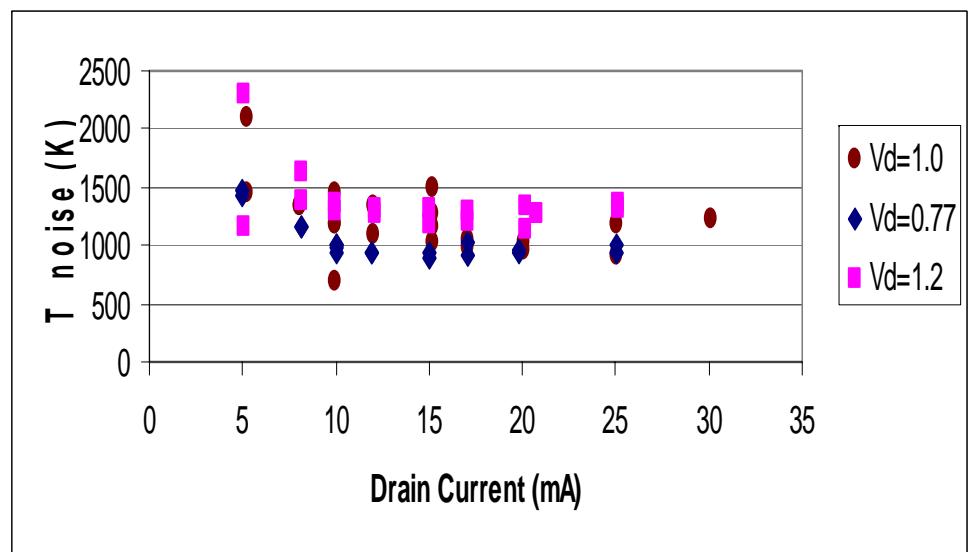
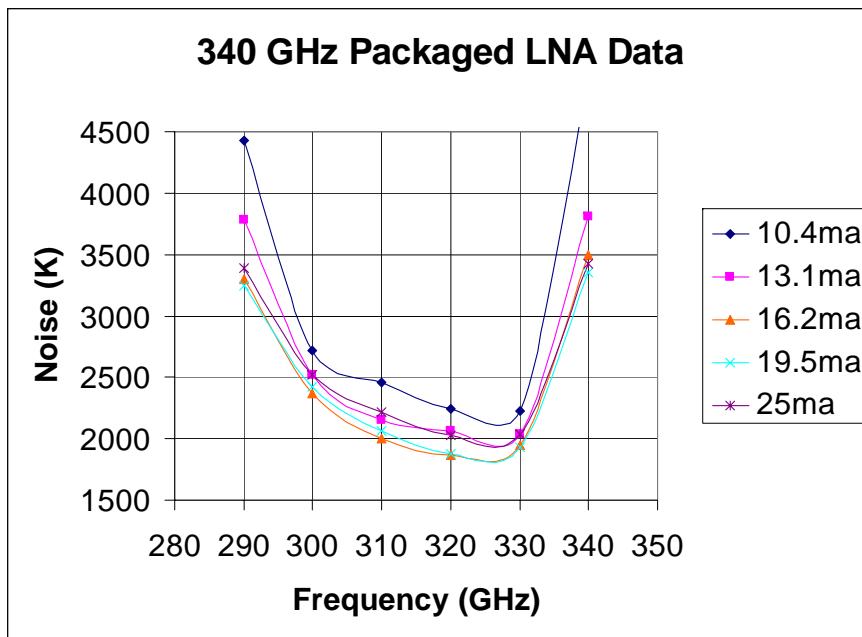
ls50In1_2st



ls90In1_2stg_4f40



283 GHz Die level measurements



Issues and Concerns

- Device level:
 - » No one recipe for all apps
 - » Device repeatability becoming more of a concern
- Module level:
 - » Loss of optimal performance with mass production
 - » Testability (too much integration)
- System level: