SUPERAPEX CORPORATION

www.superapexco.com

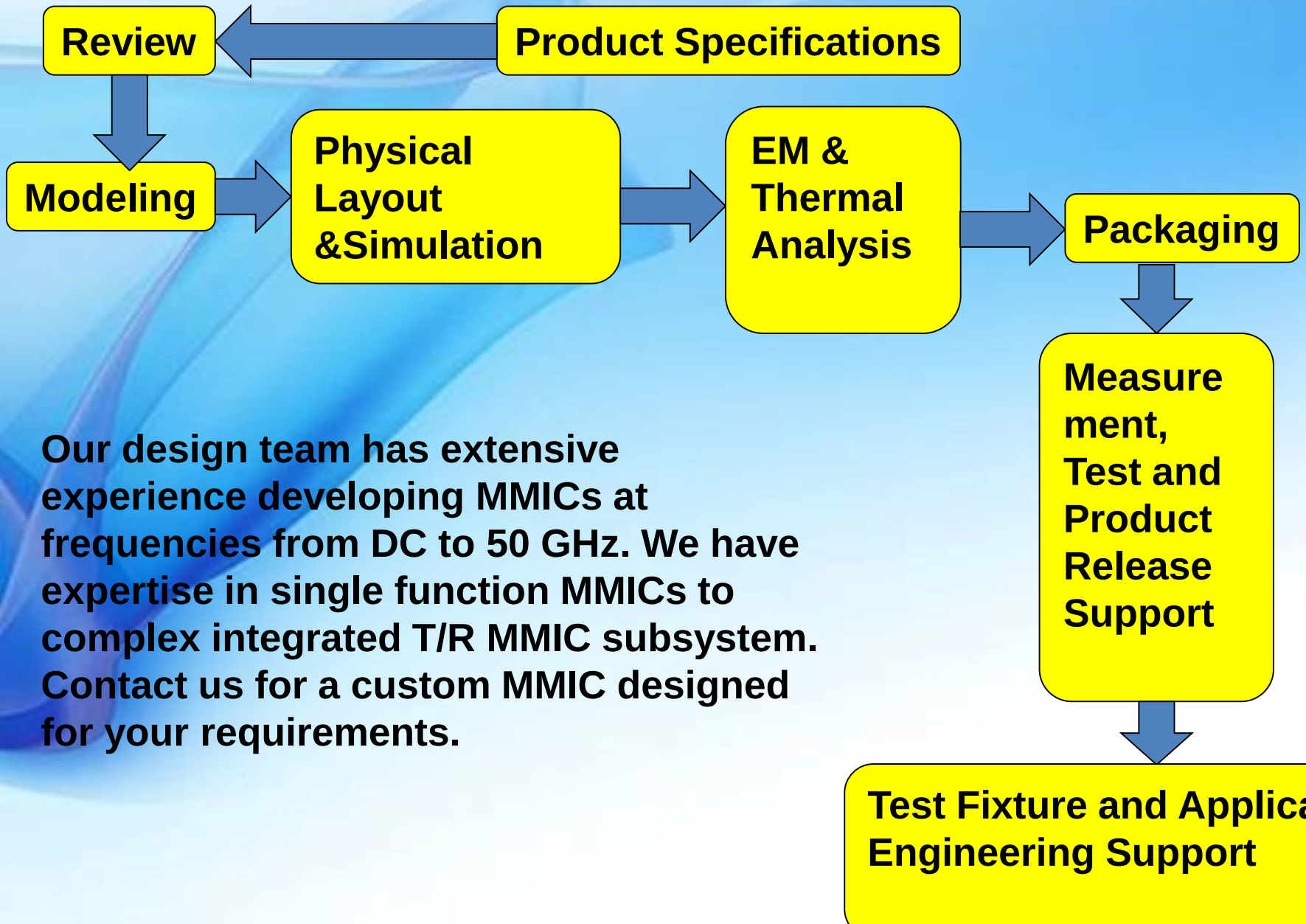
Company Background

SuperApex Corporation is a microwave & RF company located in Chicago, USA. We provide the innovative solutions, products and services for our customers around the world. The company provides GaAs MMIC products, RF/Microwave/Millimeter-wave modules and chip packaging solutions. We have completely proprietary intellectual property rights for all the products we design and manufacture. SuperApex works with our customers from feasibility contracts through to new product introductions and supply. The company prides itself on working closely with its clients and developing long-term partnerships which offers success to all parties.

What are we able to do ?

1) Expertise in the design & development of components and subsystems.
2) RF, Microwave and Millimeter wave markets.
3) DC-50GHz: RF, microwave & mm-wave.
4) Multi-technology: GaAs and GaN.
5) MMICs, packaging, modules, sub-systems.

MMIC Product Development Cycle



Our design team has extensive experience developing MMICs at frequencies from DC to 50 GHz. We have expertise in single function MMICs to complex integrated T/R MMIC subsystem. Contact us for a custom MMIC designed for your requirements.

MMIC Design Flow

1)Product Specifications

2)Physical Layout and Simulation

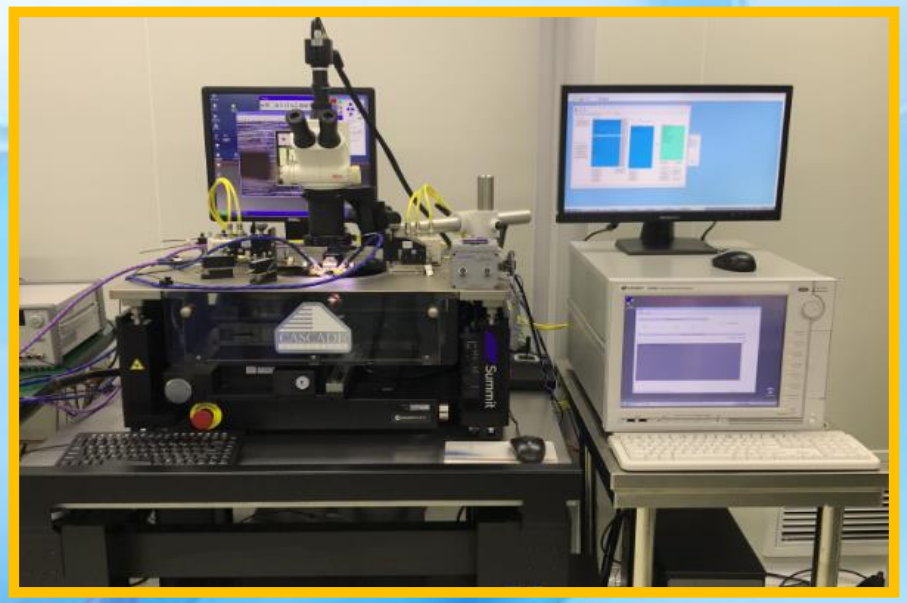
3)Electromagnetic Analysis and Thermal Analysis

4)Packaging

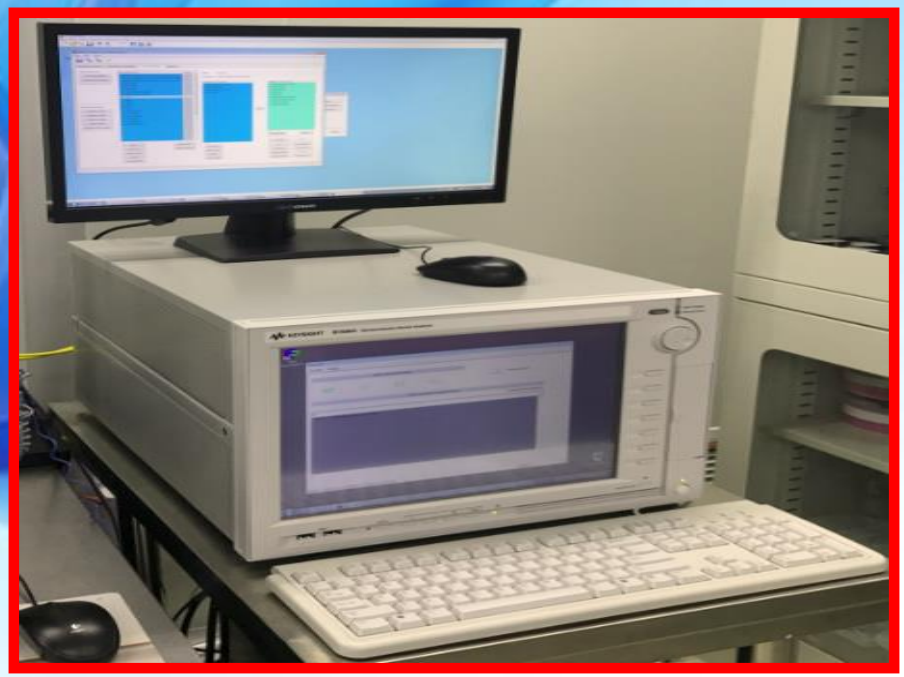
5)Measurement, Test and Product Release Support

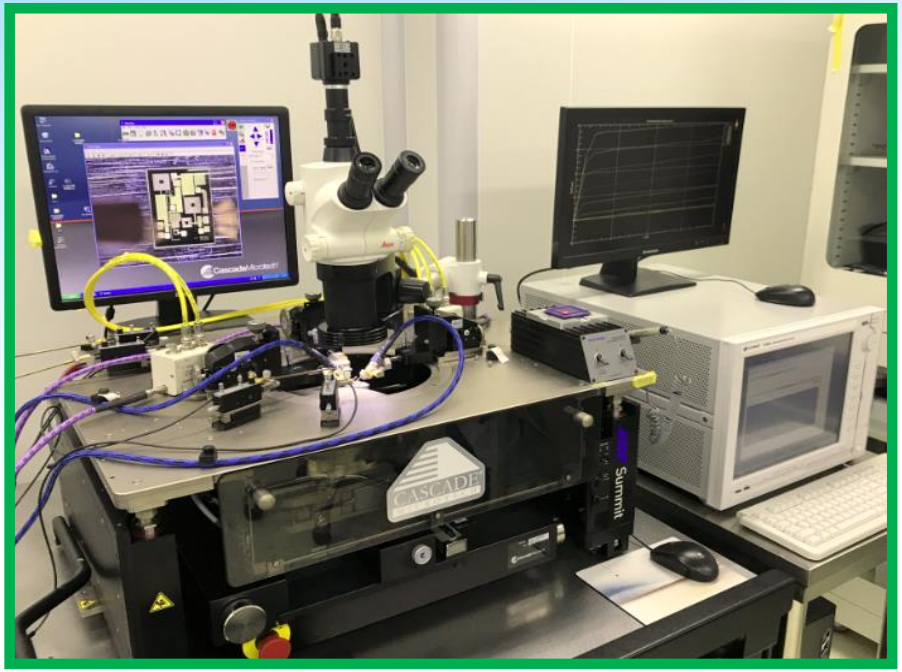
6)Test Fixture and Application Engineering Support

Modeling

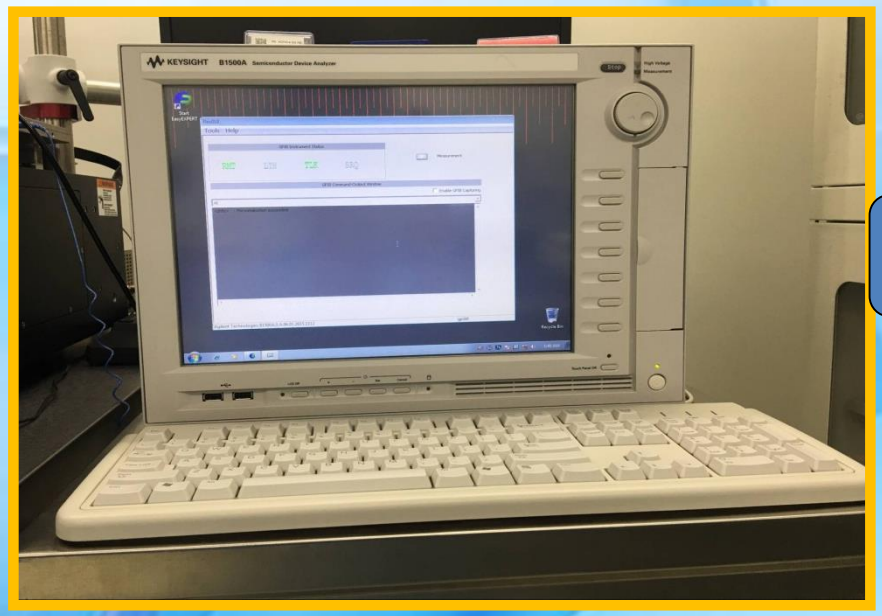


B1500A + IC-CAP to optimize foundry PDKs



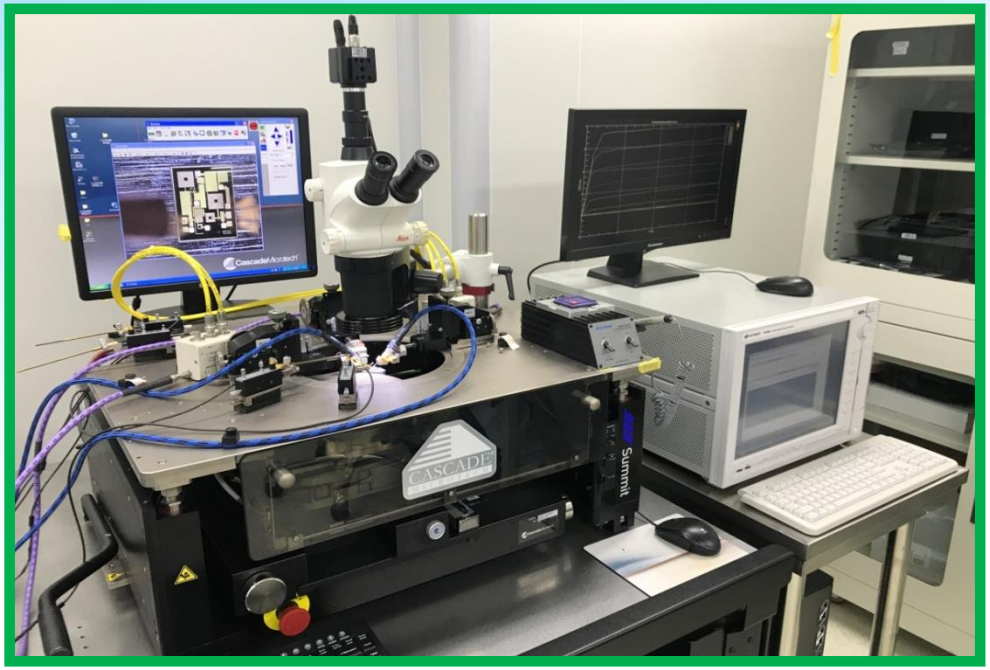


Modeling Facilities



B1500A

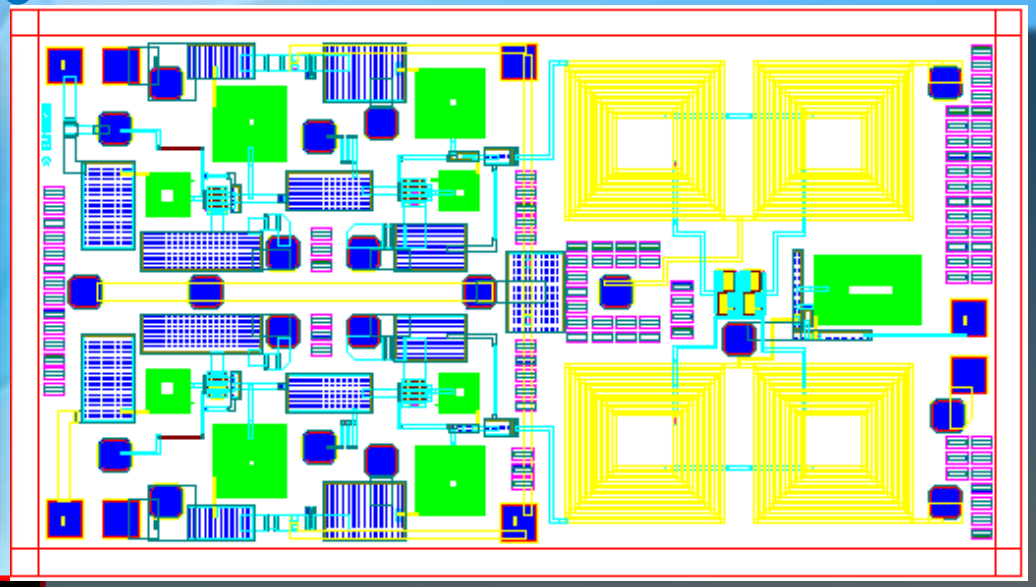
Modeling Platform

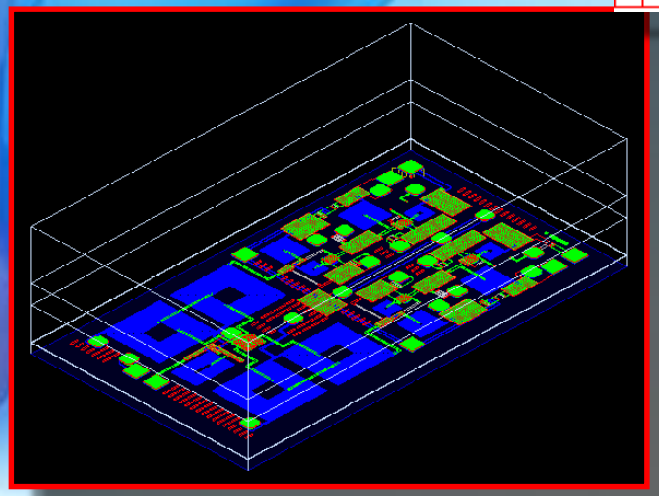


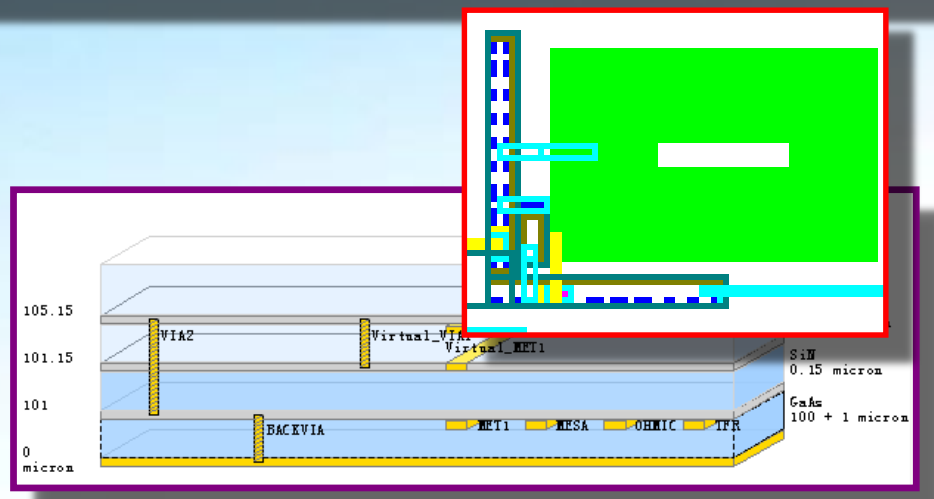
Simulation Platform

Design Software

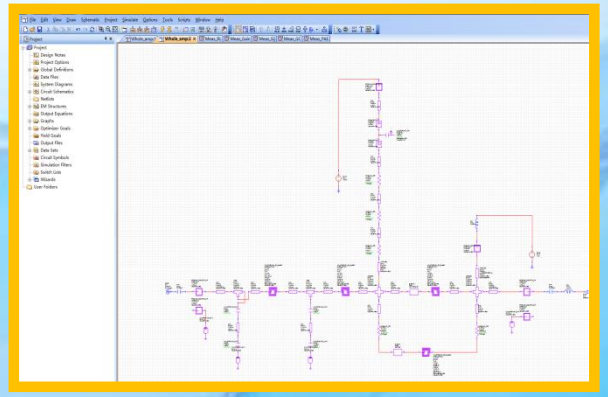
- ADS
- HFSS
- CADENCE
- MICROWAVE OFFICE



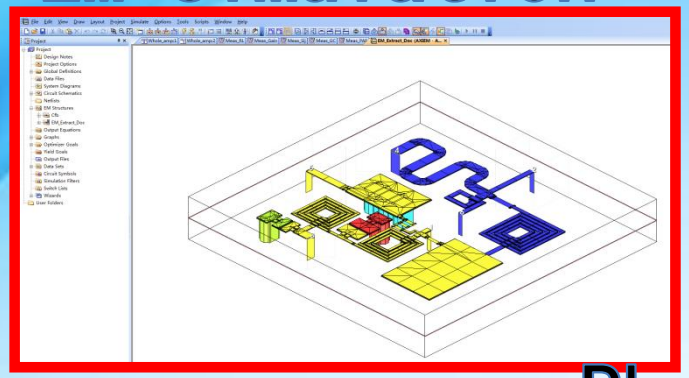




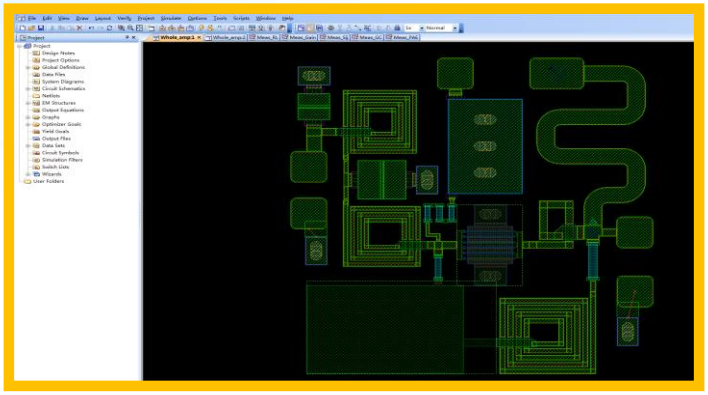
Schematic Simulation



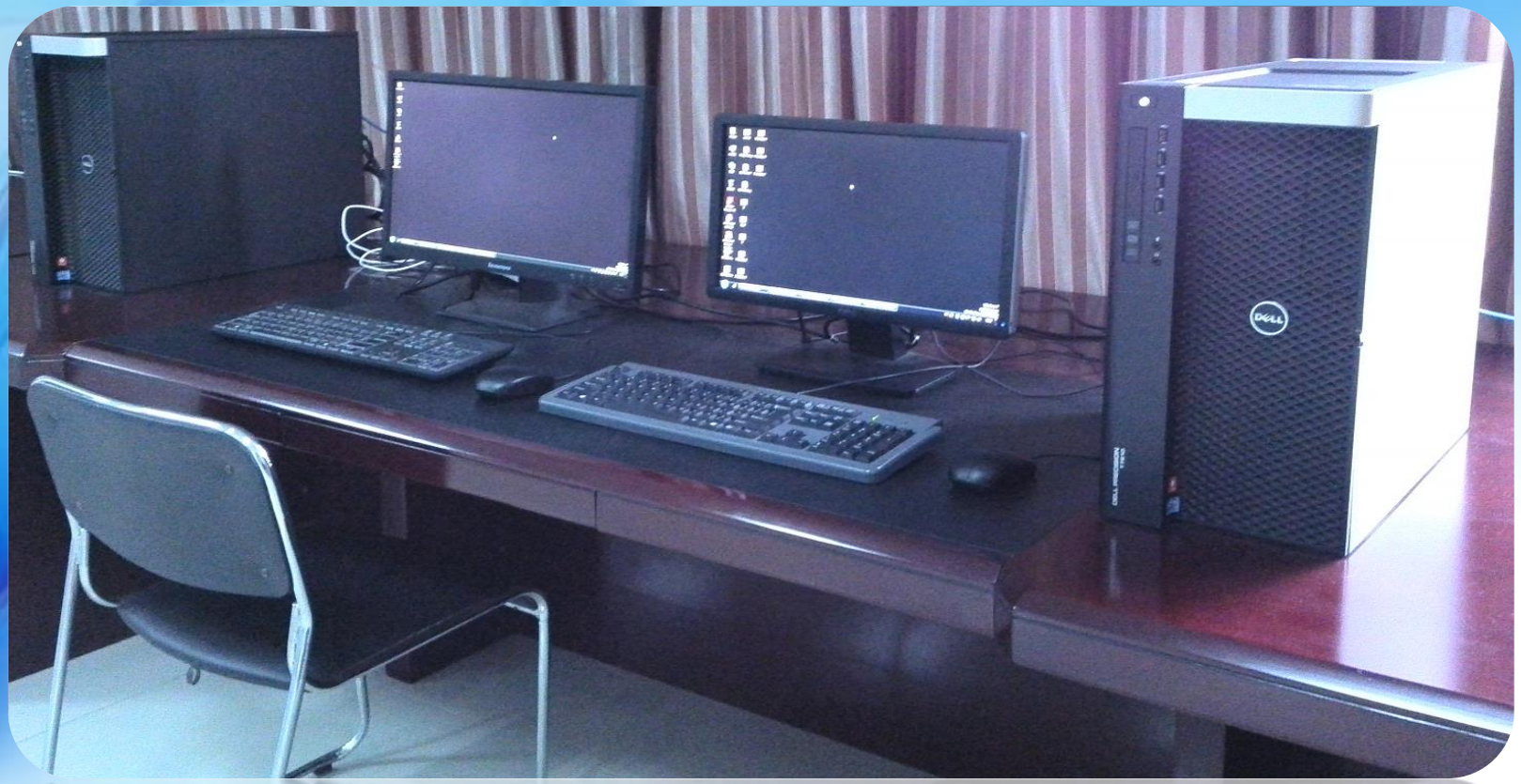
EM Simulation



Physical Layout



High Performance Workstations and Servers for MMIC Design



Foundry Service Providers

We leverage all the commercially available foundry service providers worldwide

Wafer Processing after Fabrication from Foundry

Wafer Test

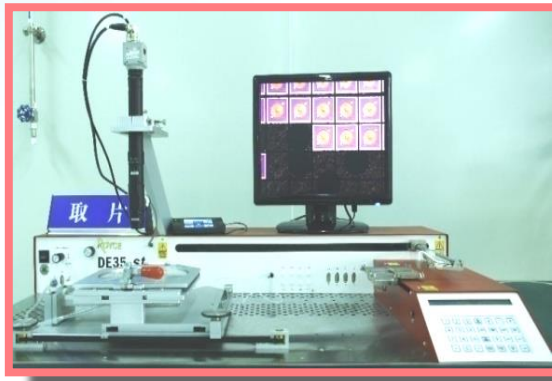
Wafer Foil

Dicing

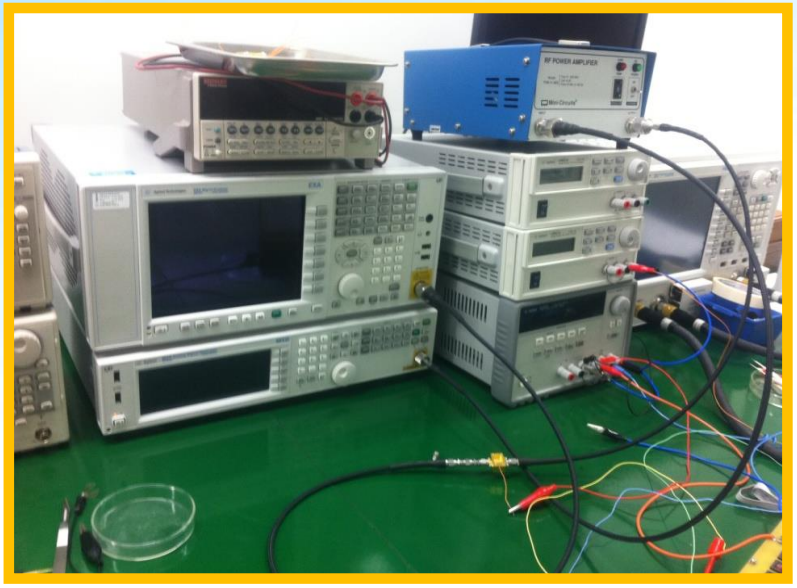
Cleaning

Exposure

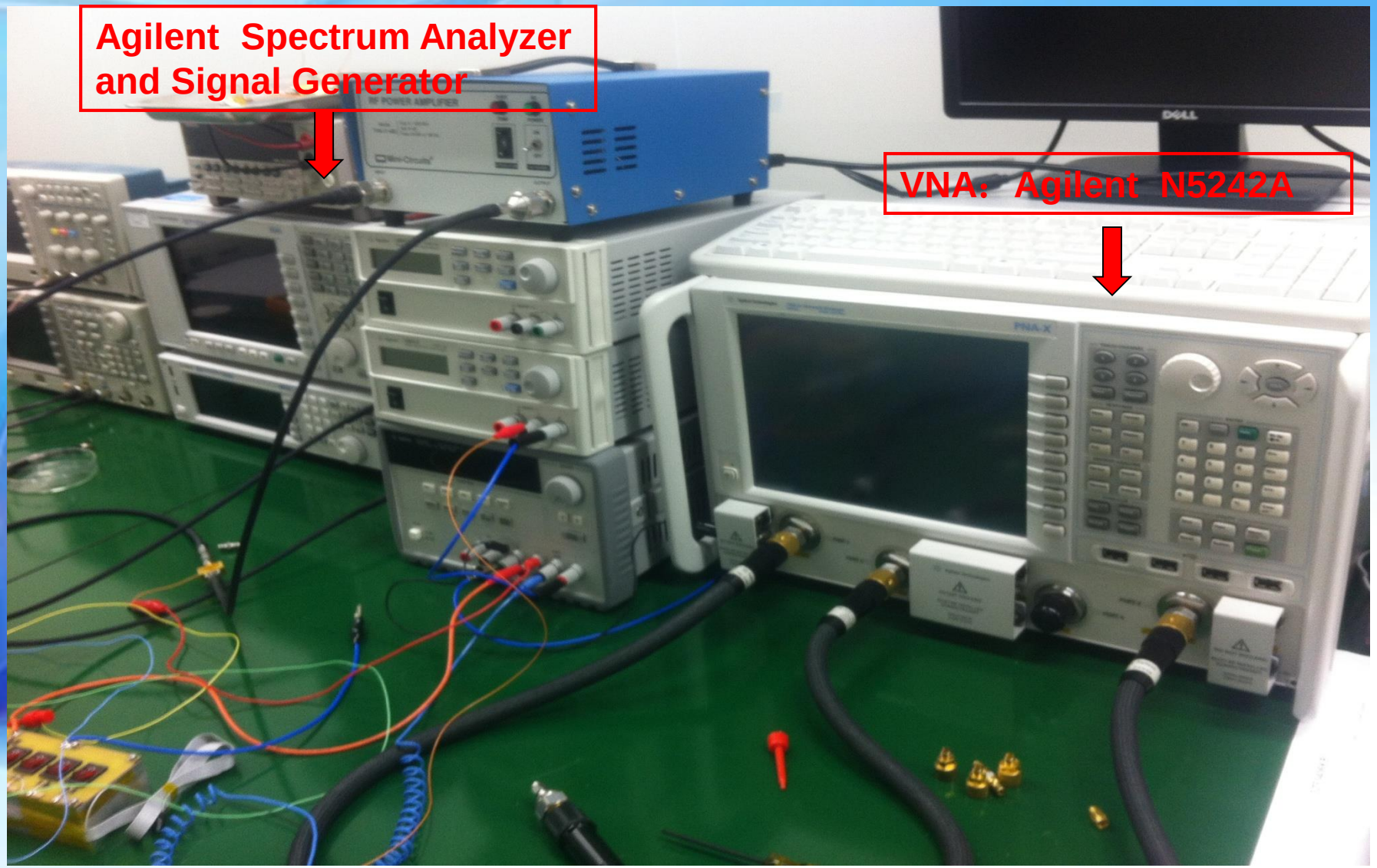
Die Pick-Up



MMIC Test Equipment



Some Major Test Equipment II



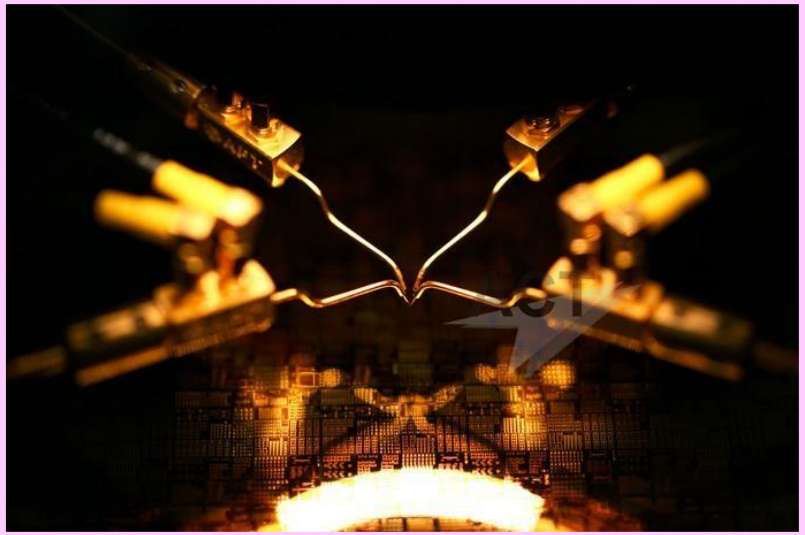
Wafer Probing Station

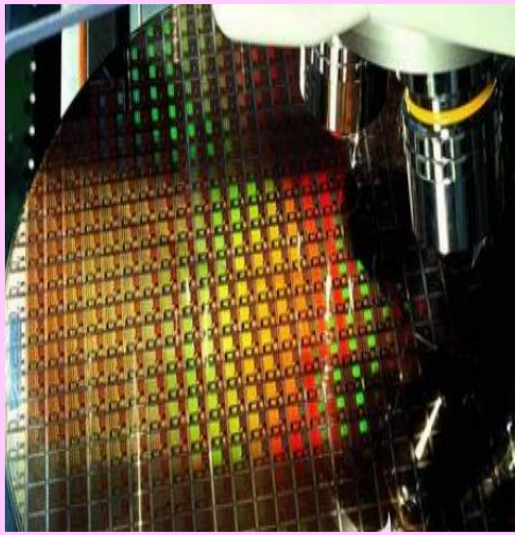
Cascade Summit12000

On-wafer test

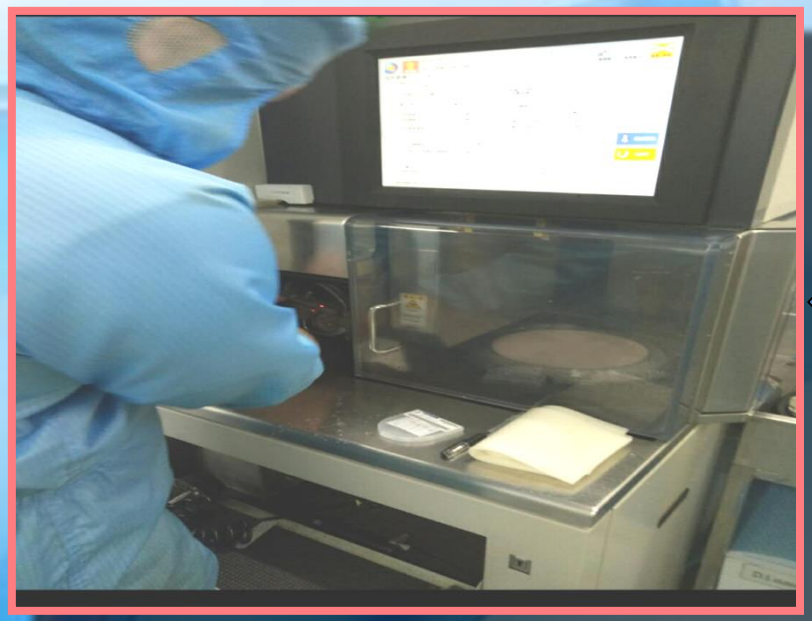
Die chip test

Wafer & Chip Test Facility



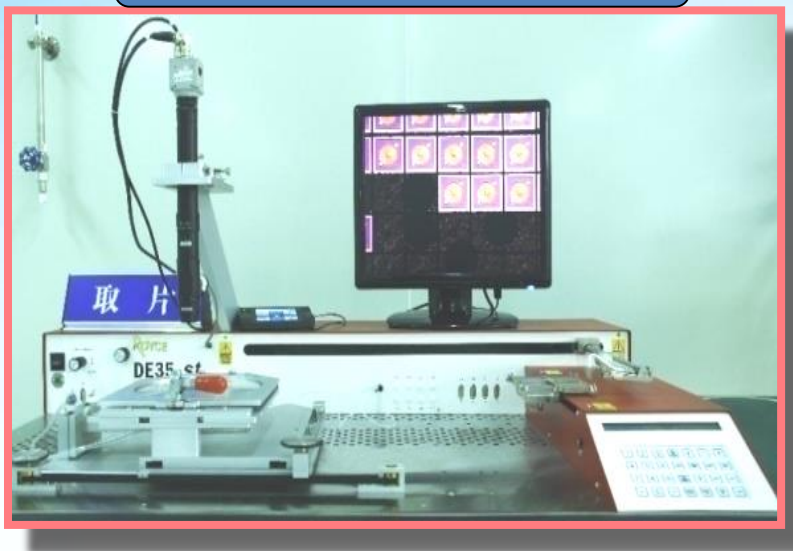


Dicing and Die Pick-Up Facility



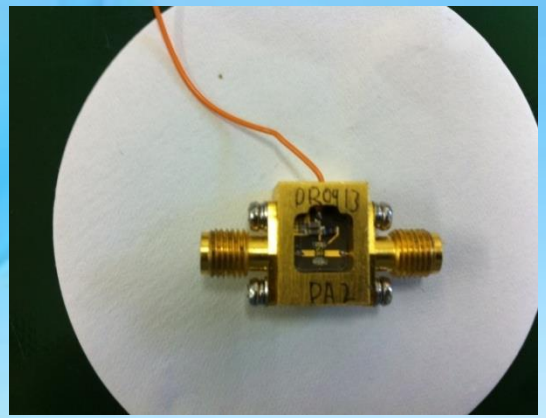
dicing

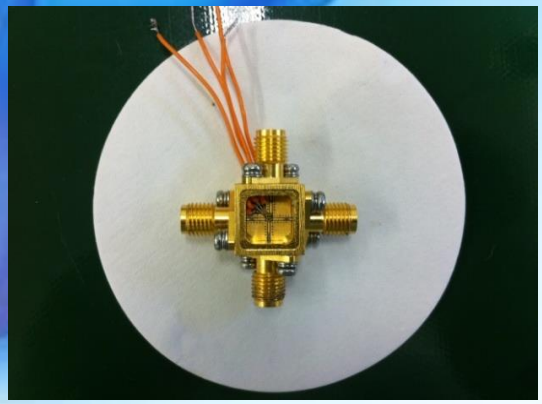
Automatic die pick-up

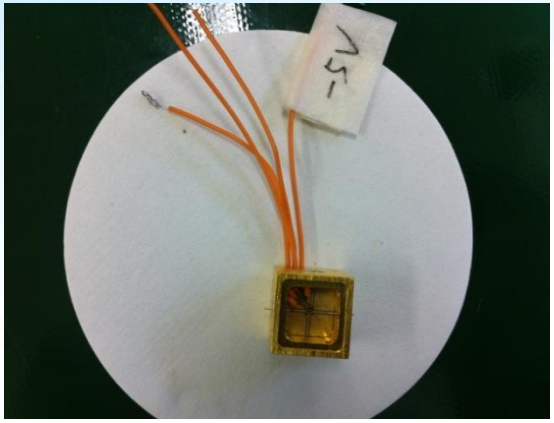


Reliability and Environmental Test

Use the test fixture to simulate all kinds of product real life tests including extreme temperatures, thermal shock, vibration, aging and ESD, etc. per MIL STD.



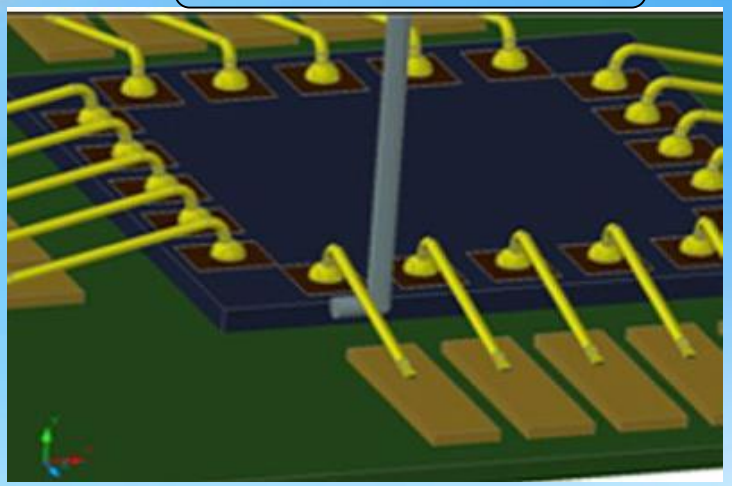




Reliability Test Facility

High/Low Temperature

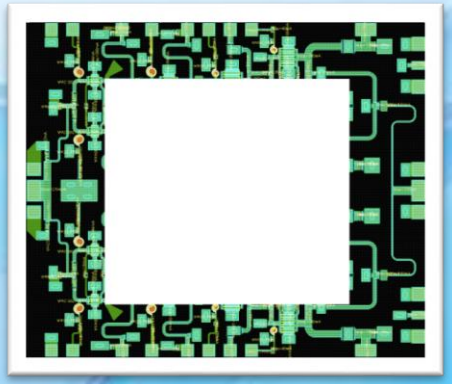
Shear Strength Test

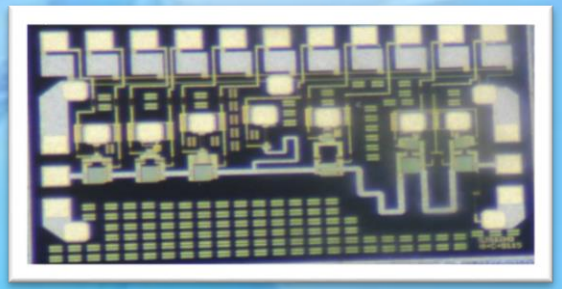


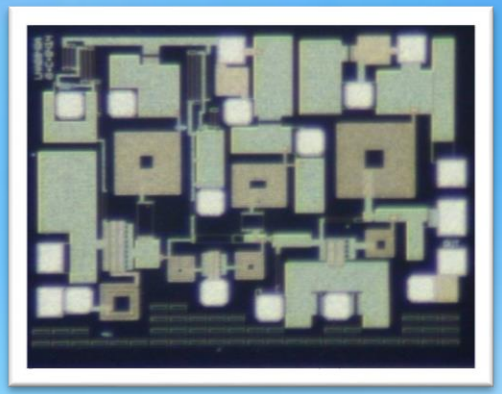
Aging Test

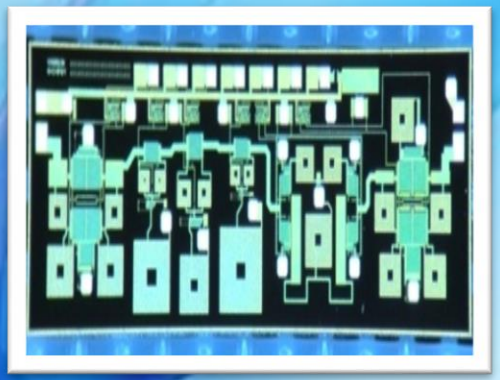
ESD Test

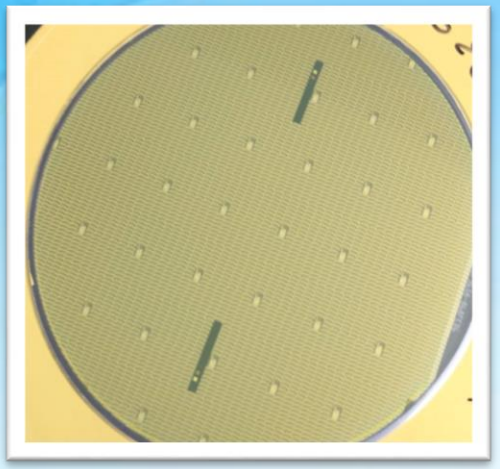
Our GaAs MMIC Products Cover Standard T/R chips from P, L, S, C, X, Ku, K to Ka Band

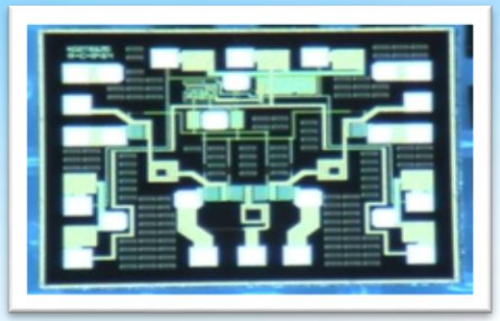


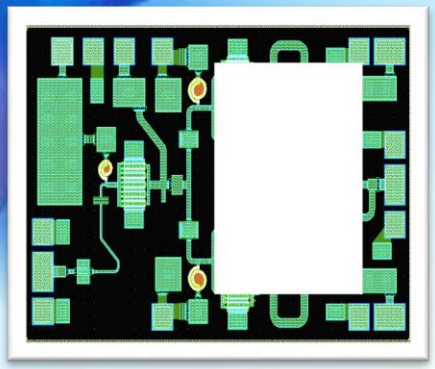


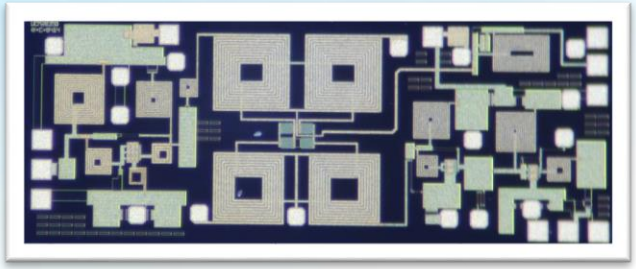


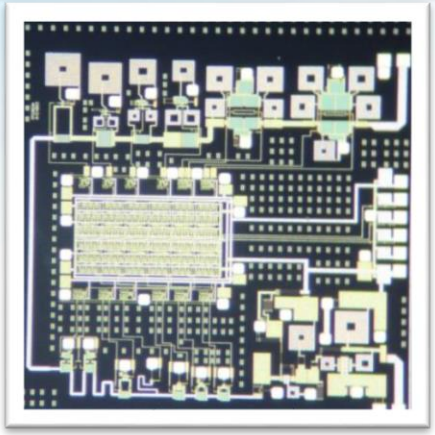




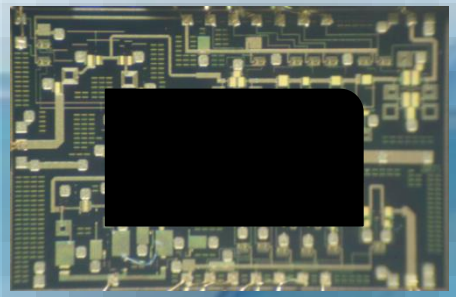


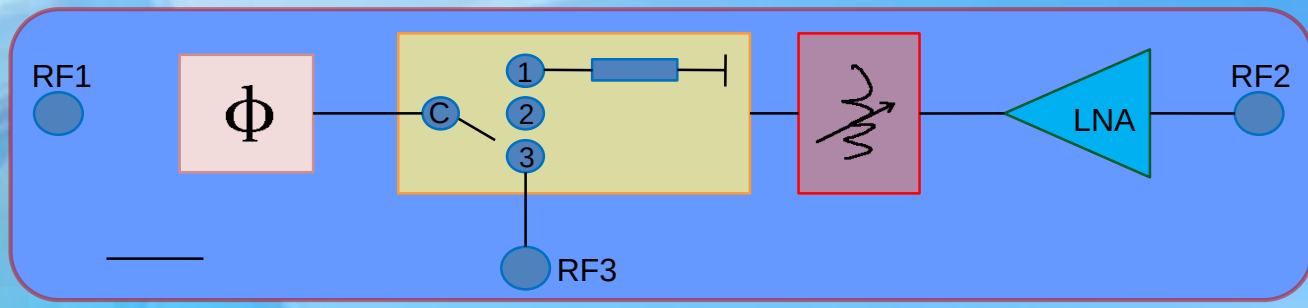


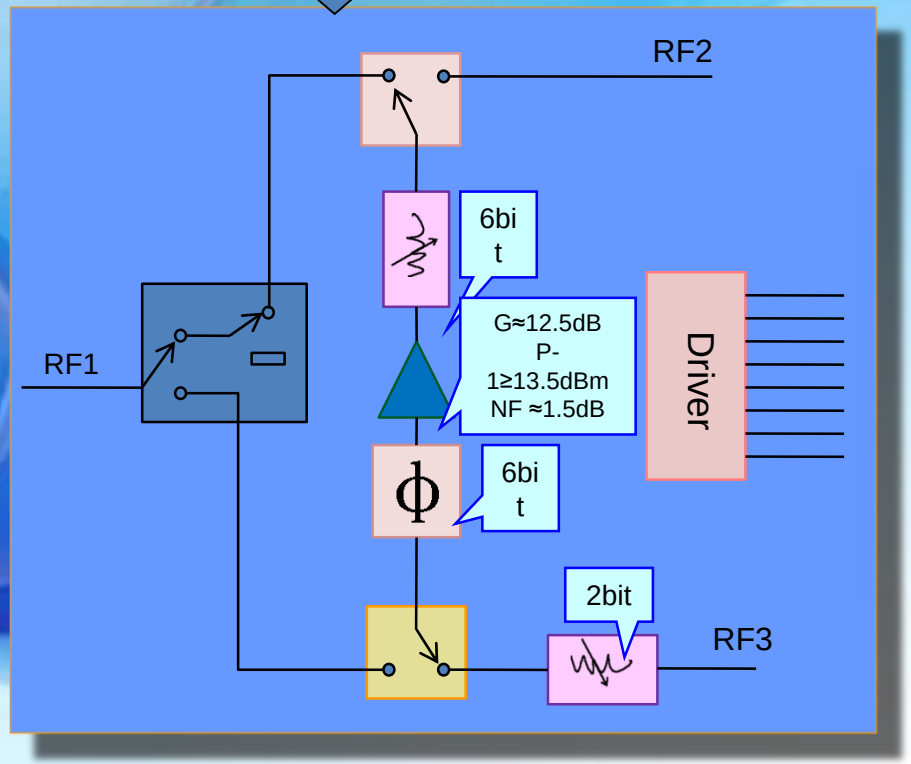




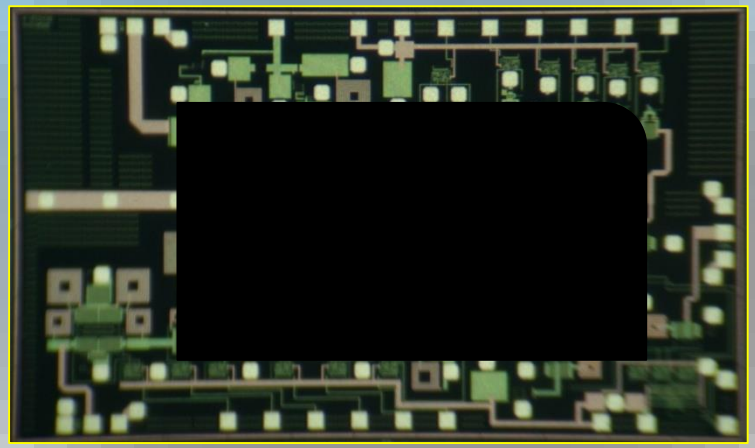
GaAs Multi-Function Core Chips





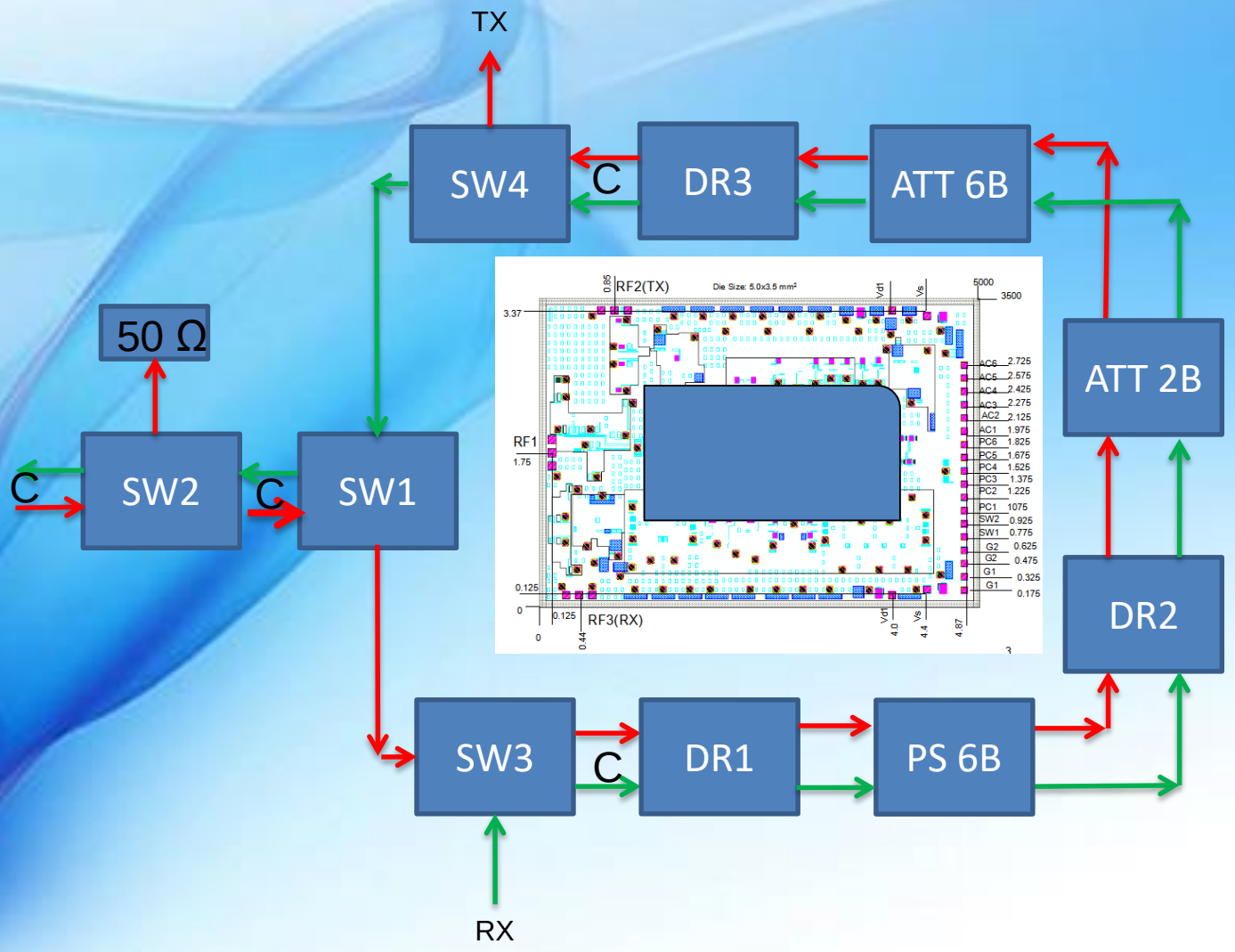


X Band MFC Core Chip



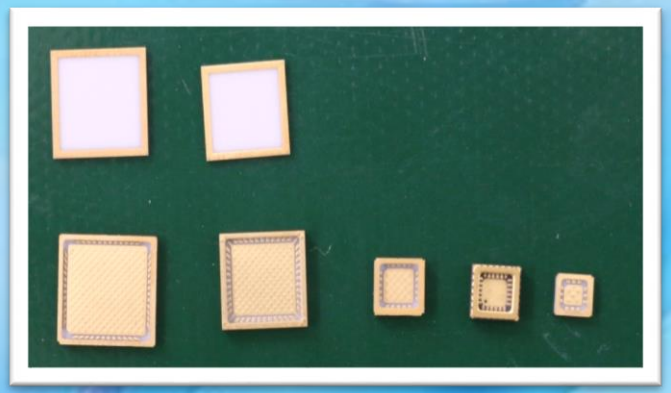
S Band MFC Core Chip

GaAs MFC Core Chip

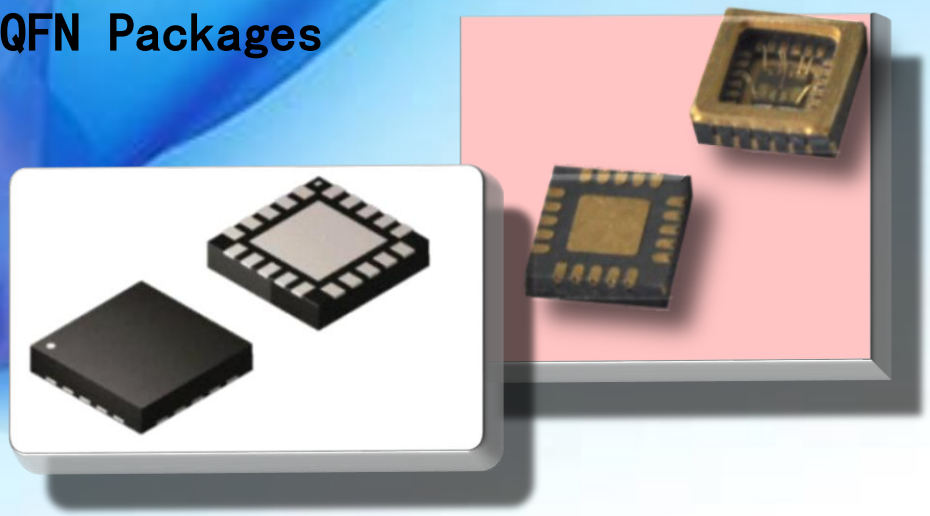


X Band MFC Core Chip

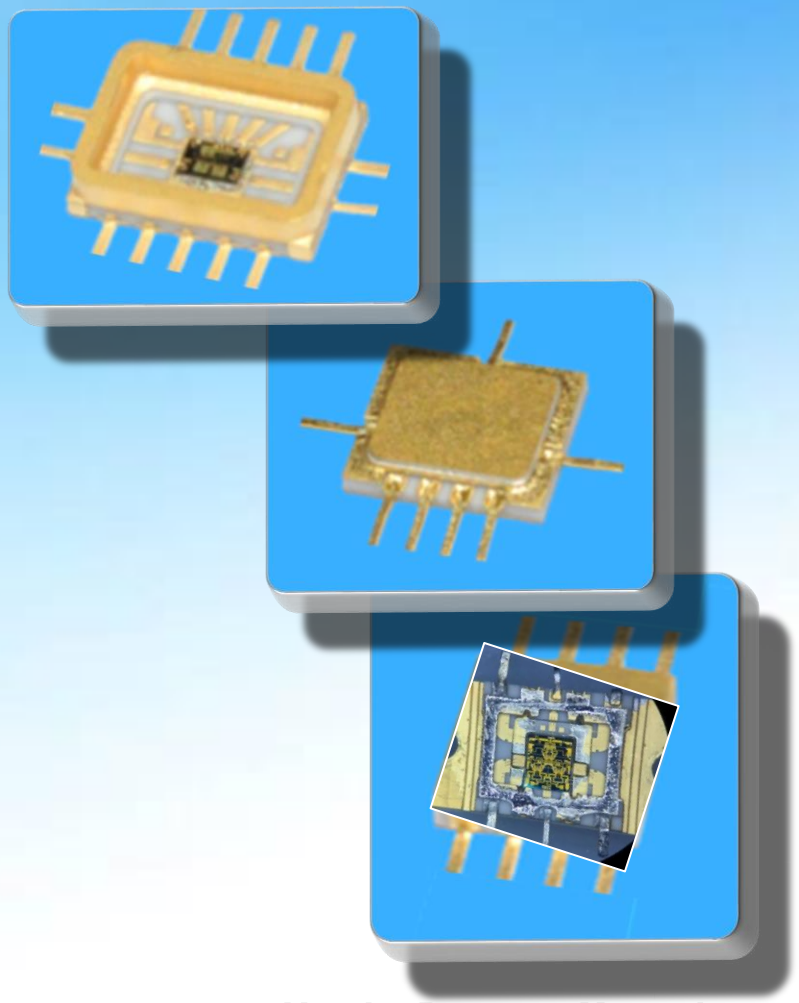
MMIC Metal, Ceramics and Plastic Packaging



3X3、4X4、5X5、6X6、7X7、
8X8 Metal Ceramics SMD
QFN Packages



Plastic SMD QFN Packages



High Power Metal
Ceramics Packages

Major Products in Development in 2019 and Beyond

1) SATCOM Products

a. Driver Amplifiers (Bare Die + QFN Packaged Chips)
b. Power Amplifiers (Bare Die + QFN Packaged Chips)
c. Ku and Ka LNA for LNB
d. Up and Down Converters
e. Some GaN PAs and Switches in the near future

2) 5G Products

a. 28GHz and 38GHz T/R Integrated Chips as FEM
b. 28GHz and 38GHz PA

3) Test and Measurement Products

a. DC~ 60/70/80 GHz Distributed Broadband Amplifiers
b. Dc~70/80/90/100 GHz Power Detectors

New Products being Planned in the near future

1. Wideband Distributed Amplifiers

- DC ~ 6GHz, P1dB = 27 dBm (0.5W)
- DC ~ 6GHz, P1dB = 30 dBm (1W)
- DC ~ 6 GHz, Gain=13dB, P1dB=23dBm
- DC ~ 40GHz, P1dB = 13 dBm
- DC ~ 67GHz, P1dB = 11 dBm
- DC ~ 90GHz, P1dB =10 dBm

2. Wideband Low Noise Amplifiers

- 20MHz ~ 8GHz, NF=1.3dB maximum, Gain=26dB
- 20MHz ~ 12GHz, NF=1.5dB maximum

3. Wideband Switches

- DC ~ 40GHz SPST , GaAs Technology
- DC ~ 67GHz SPST, GaAs Technology
- DC ~ 50GHz SP2T, Low Insertion Loss, VPIN Technology
- DC ~ 50GHz SP3T, Low Insertion Loss, VPIN Technology
- DC ~ 40GHz SP4T, VPIN Technology
- DC ~ 67GHz SP2T, VPIN Technology

5-70GHz Power Detector

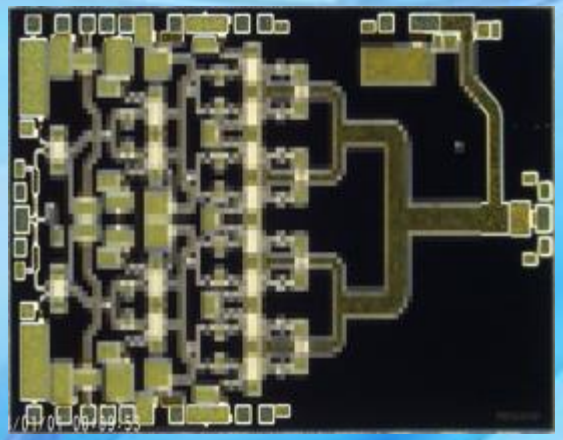
Frequency	5-70GHz
Flatness	2dB
Dynamic Range	30dB
Maximum Input Power	13dBm
Input Return Loss	-10dB

10-100GHz Power Detector

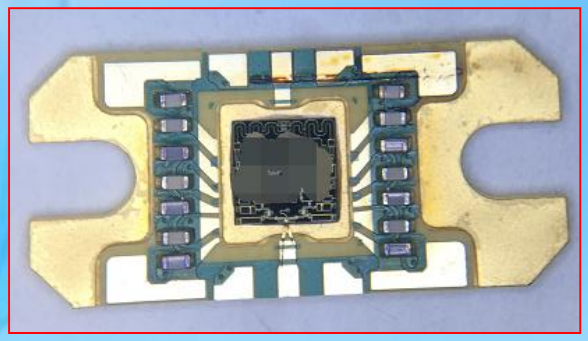
Frequency	10-100GHz
Flatness	2dB
Dynamic Range	30dB
Maximum Input Power	10dBm
Input Return Loss	-10dB

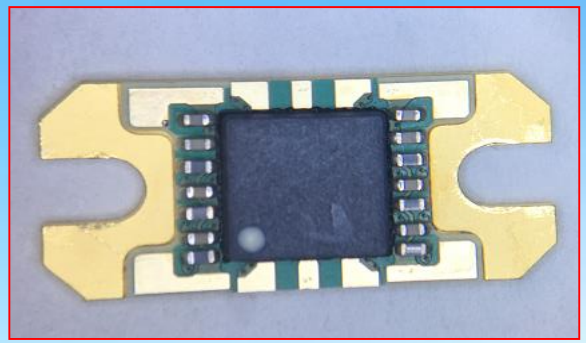
SATCOM Products in Ku and Ka Band

18-26GHz 1.5w PA

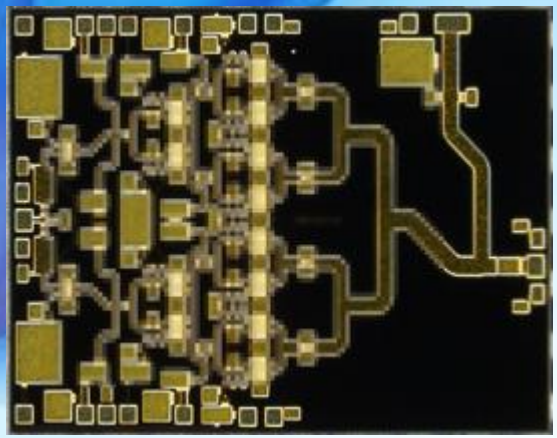


Carrier Form package

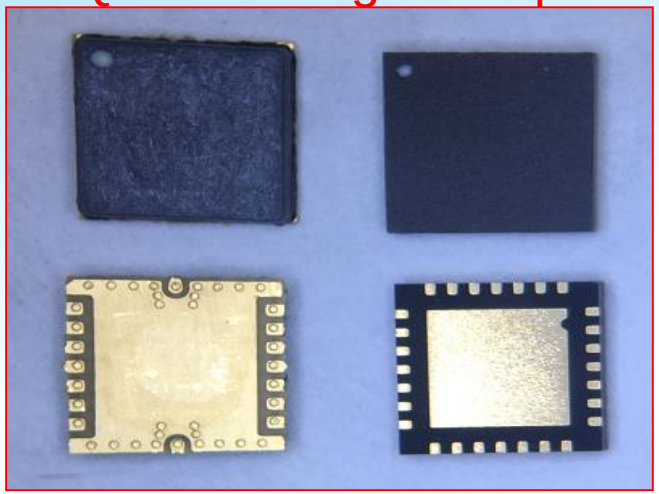




27-33GHz 2w PA



QFN Packaged Chips



SuperApex Currently Existing Products for T & M

1. Power Detectors

- SAC1001Q3: DC ~ 20 GHz, Dynamic Range = 30 dB
- SAC1002: 1 ~ 40 GHz, Dynamic Range = 30 dB

2. Wideband Distributed Amplifiers

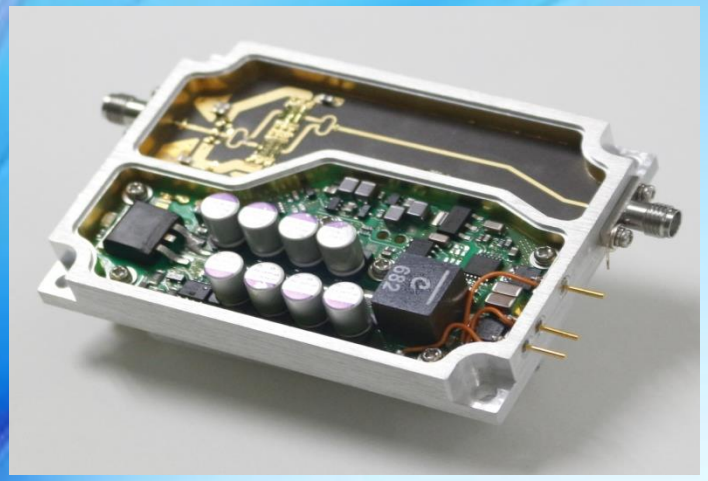
- SAC3045: 2 ~ 20 GHz, NF = 3 dB, Gain = 16 dB, P1dB = 14 dBm
- SAC3051Q5: DC ~ 22 GHz, NF = 3 dB, Gain = 16 dB, P1dB = 14 dBm
- SAC3064Q5: DC ~ 30 GHz, NF = 4 dB, Gain = 16 dB, P1dB = 24 dBm
- SAC3065Q4: DC ~ 40 GHz, Gain = 10 dB, P1dB = 18 dBm
- SAC3910: 22 ~ 38 GHz, Gain = 15 dB, P1dB = 24 dBm
- SAC3911: 24 ~ 40 GHz, Gain = 12 dB, P1dB = 15 dBm
- SAC3912: 20 ~ 38 GHz, Gain = 8 dB, P1dB = 18 dBm
- SAC3923: 1 ~ 20 GHz, Gain = 11 dB, P1dB = 28.5 dBm
- SAC3925: 26 ~ 38 GHz, Gain = 16 dB, P1dB = 26 dBm, PAE = 25%

Some Connectorized Modules based on Our MMICs

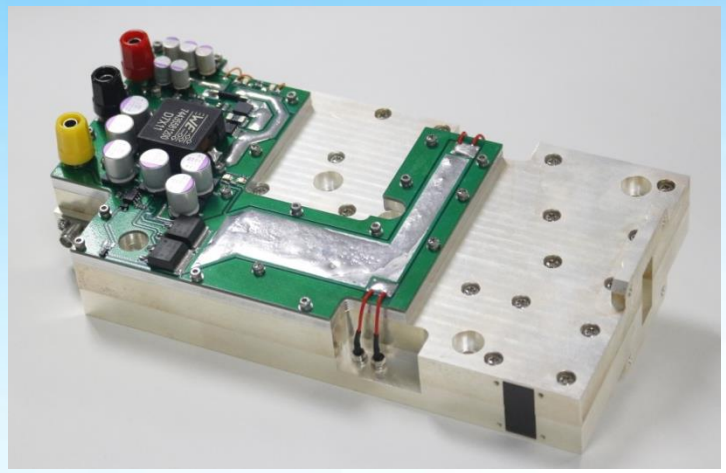
22-26GHz 3w PA

5.3-5.9GHz 4w PA

Some Connectorized Modules based on Our MMICs



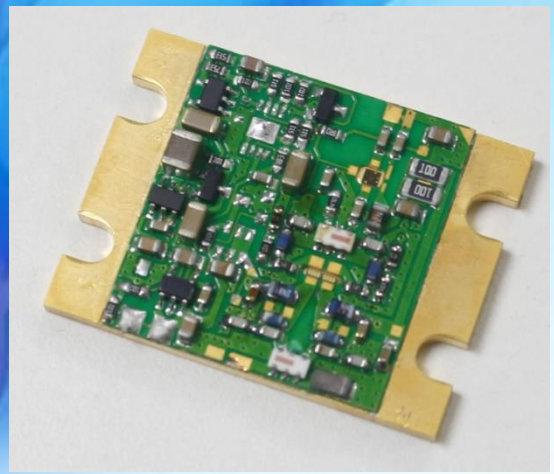
Ku 10W PA



Ku 40W PA

Some Connectorized Modules based on Our MMICs

Based on our own MMIC chips, we can build most of standard modules including LNA, PA, Phase Shifter, Attenuator, Mixer, and Switch modules. We can also design and build custom modules and subsystems according to our customers' specific requirements.



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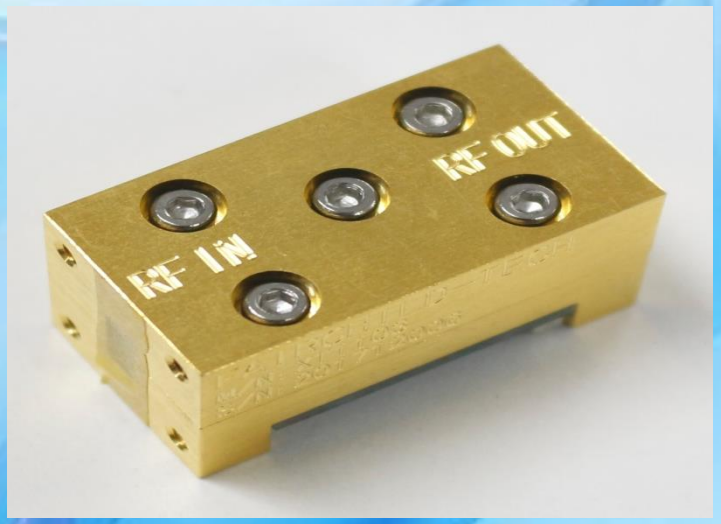
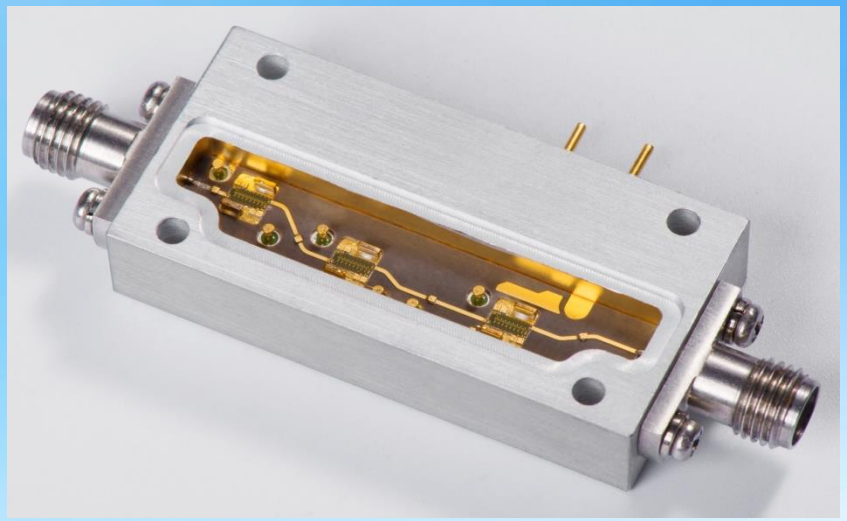
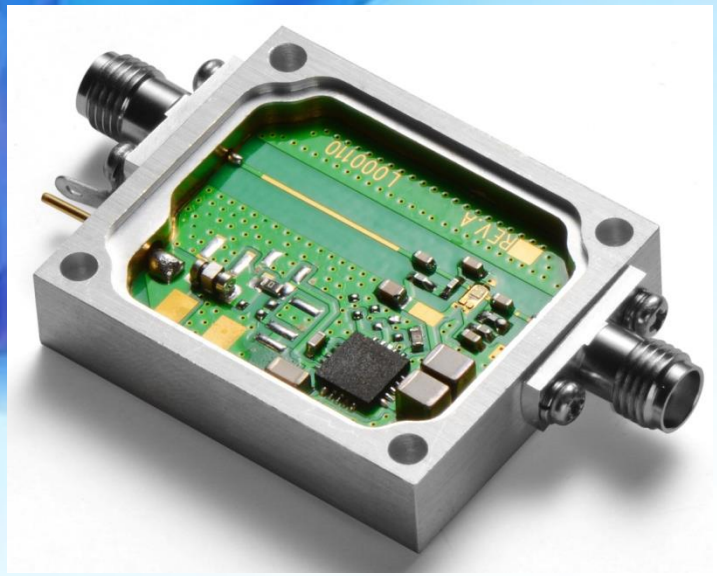
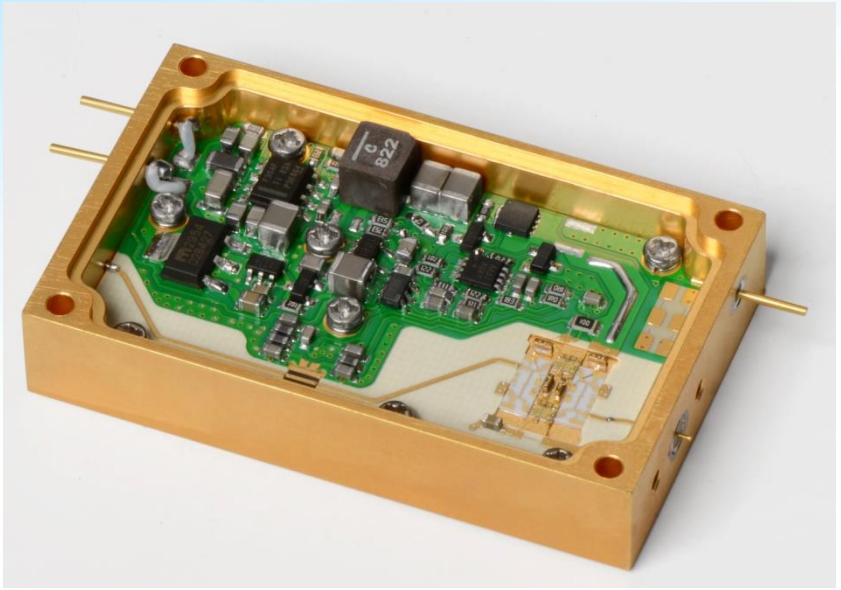
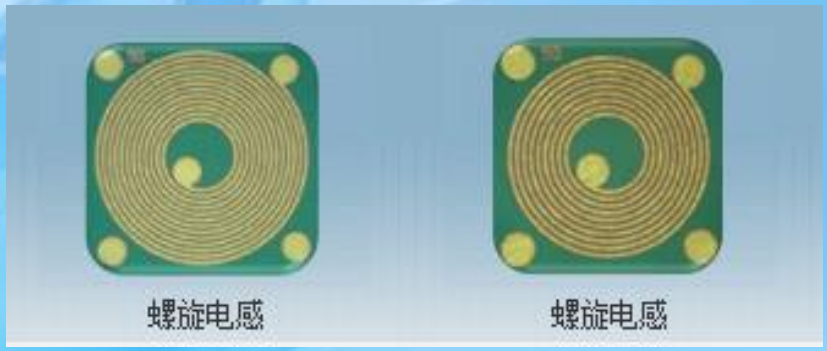








Spiral Inductors based on GaAs Technology



Model Number	Turns	Inductance (nH) (typ.)	Rs@DC (Ohm)	Rs@GHz (Ohm)	Q@GHz	Resonant Frequency (GHz)	Chip Size (m×mm)
SAC6005A	3.5	5	1.0	3.7@4.0	26.5@4.0	16.5	0.75×0.75
SAC6007P5A	4.5	7.5	1.3	6.0@4.0	27.0@4.0	12.8	0.80×0.80
SAC6010A	5.5	10	1.6	8.0@4.0	26.0@4.0	11.3	0.80×0.80
SAC6015A	6.5	15	2.1	5.6@4.0	26.5@4.0	8.5	0.80×0.80
SAC6020A	7.5	20	2.6	7.5@2.0	28.5@2.0	7.0	0.80×0.80
SAC6050A	9.5	50	5.1	10.6@1.0	28.5@1.5	2.8	0.95×0.95
SAC6090A	12.5	90	8.0	26.3@1.0	26.5@1.0	1.8	1.10×1.10
SAC6200A	17.5	200	14.0	30.0@1.0	23.0@1.0	1.0	1.37×1.37