「維基夥伴獎學金」獎助生成果報告書

簡報檔

Backside Via Hole and Flip-Chip Packaging of GaAs MMICs for W-Band Applications

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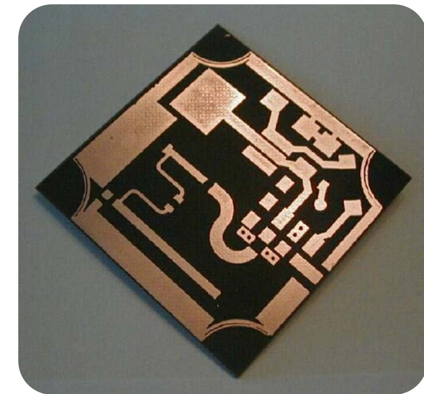
What is MMIC?

- **Monolithic microwave integrated circuit (MMIC)**
  1. " Monolithically"- the active and passive components are formed on the same semiconductor substrate
  2. Using an insulating crystalline material as both the dielectric and the active layer material

- **The advantages of MMIC**
  1. Reduced size and weight
  2. Enhanced reproducibility and reliability
  3. Enhanced system performance
  4. Wider bandwidth and higher frequency

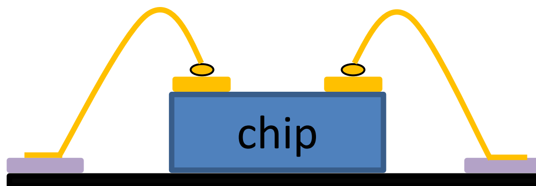


Sammy Kayali, et al. "GaAs MMIC Reliability Assurance Guideline for space applications," 1996

Electronic Packaging

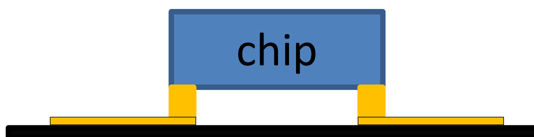
国立交通大學
National Chiao Tung University

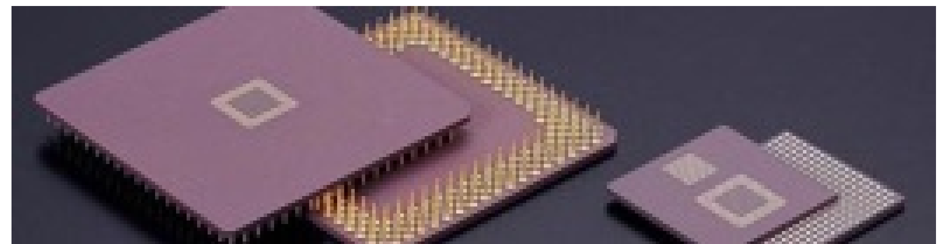
Wire Bonding



- **The main functions of packaging**
  1. Mechanical support
  2. Protection from the environment
  3. Power and signal distribution
  4. Thermal stabilization

Flip Chip





Sammy Kayali et al. , GaAs MMIC Reliability Assurance Guideline for space applications, USA, 1996

Objectives

- Achieve high RF performance of GaAs MMIC packaging in W-band
  - Via Hole Grounding
    - ✓ Optimize ICP etching parameters for via holes of GaAs MMIC that its profile must have the flat bottom, smooth and the slanted sidewall.
  - Flip-Chip
    - ✓ The Flip-Chip technique is an attractive solution to connect MMICs on the substrate with good electrical performance.
    - ✓ Design the Flip-Chip parameters to reduce the losses in high frequency.

Conclusions

- GaAs has been used extensively in the development of MMICs because of its suitability for both high frequency transistors and low loss passive components.
- Flip-Chip has become a promising technique over wire-bonding, due to its features of short and stable electrical interconnection and high reliability.
- In order to reduce transmission losses for both MS and CPW MMICs, the Flip-Chip parameters should be optimized to reduce transmission losses from the Flip-Chip bumps in high frequency.