Silicon Micro-Cantilever Probe Card
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1. Schematics

- Single crystal probe material
- Cr/Au metal wiring
- Application of semiconductor and MEMS manufacturing processes
2. Sample

- Sample 8X device testing probe card
3-1. SEM of Needles(1)

Probe Needles for square pad array
3-2. SEM of Needles(2)

Magnified view of the probe needles
3-3. SEM of Needles(3)

Probe needles for pads 300micron apart
3-4. SEM of Needles (4)

Probe needles for LCD testing (65 micron pitch)
4-1. Probe Mark(1)

The Probe mark is made only by the back half of the tip. The size of the probe mark is less than 20micron.
4-2. Probe Mark(2)

SRAM pad and the probe mark

Enlarged view
5-1. Pin Force Measurements (1)

![Graph showing OT check with error range of ± 0.5g. The x-axis represents displacement, and the y-axis represents load. The graph includes multiple data points and lines representing different conditions or measurements.]
5-2. Pin Force Measurements (2)

Possible Variation of Pin Force

![Chart showing variation of pin force with displacement](chart.png)
5-3. Tip Position Measurement

Tip position distribution

![Graph showing the distribution of tip positions with axes X (mil) and Y (mil) ranging from -0.3 to 0.3.]
5-4. Tip Planarity Measurement

![Graph showing Tip Planarity Measurement with distance and height values.](image-url)
5-4. Resistivity

- Resistivity of current samples
  - Rs = 0.04 $\Omega/\square$
  - Resistance : 1.2 $\Omega$

- Samples with metal improvements (under development)
  - Rs = less than 0.02 $\Omega/\square$
  - Resistance : less than 0.6 $\Omega$

- Leakage Current
  - less than 1 Nano Ampere
6-1. Characteristics(1)

- High resilience
- No plastic deformation
- Controllable Gram-Force
- Usable with gold bump pad
- Repeatable Mass Production
6-2. Characteristics(2)

- Fine pitch possible (>65 •)
- Short pin length (less than 2mm)
- Accurate pin position (within 5 • throughout its lifetime)
- Small scrub mark (<20 •)
- Low Leakage Current (<1nA)
7. Current State of Development

- **Step 1**: complete
  - Designing and simulation of the probe block
  - Process development of the probe block
  - PCB design and Assembly process development
  - Electrical properties characterization

- **Step 2**: under process
  - Process optimization for the yield improvement
  - Mass production preparation
  - Problem analysis and improvement

- **Step 3**: 4th QT 2000-: Mass production
8. Probe Design Goal

- Fine Pitch: 45 μ
- Tip shape variation
  - Round, octagonal
- Freedom of pin positioning
- Frequency Capability higher than 1Ghz
- 128 Multi-Die Testing
- Assembly improvement