MULTI-DIE PROBING

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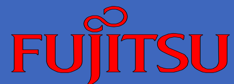

Why multi-die?

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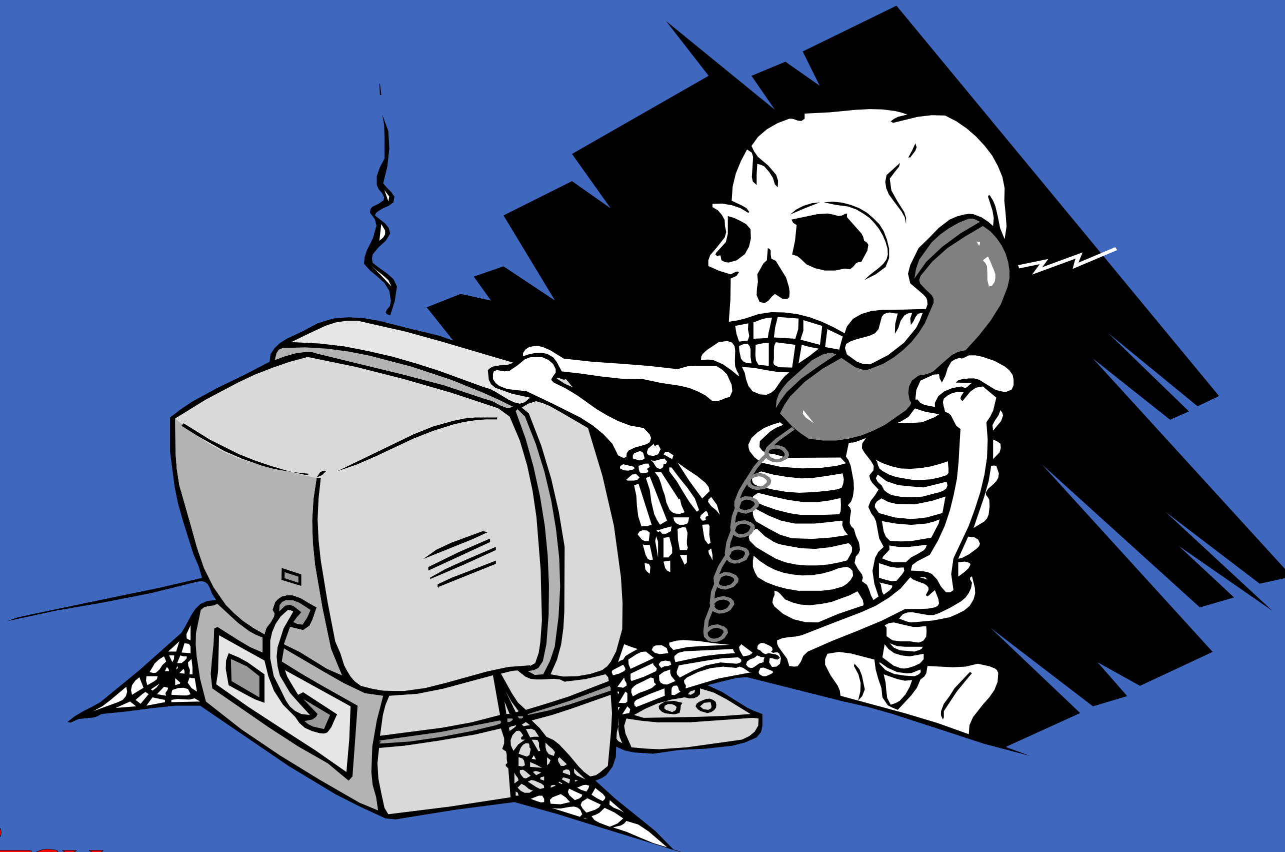
Test times are increasing!



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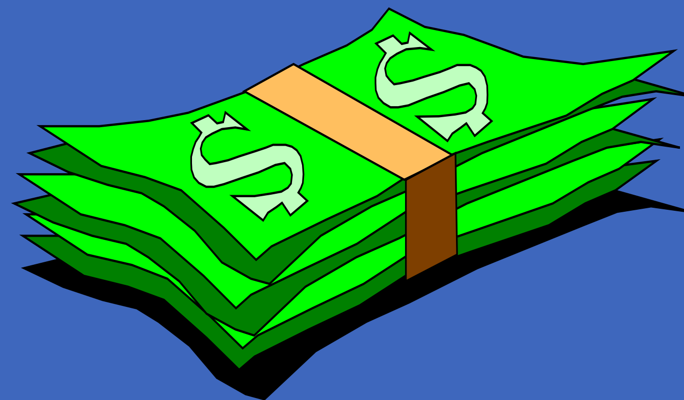
Costs are going up!



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- Hardware Cost: ATE, Probers & Probe Cards
- Direct Labor costs are rising

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Problems and pitfalls of multi-die testing...

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- The Boss
- Cost of hardware
- Probe card design
- Hardware check-out time
- Identifying problems as they occur during testing

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How do we solve this problem?

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CP

CPK

S.P.C.

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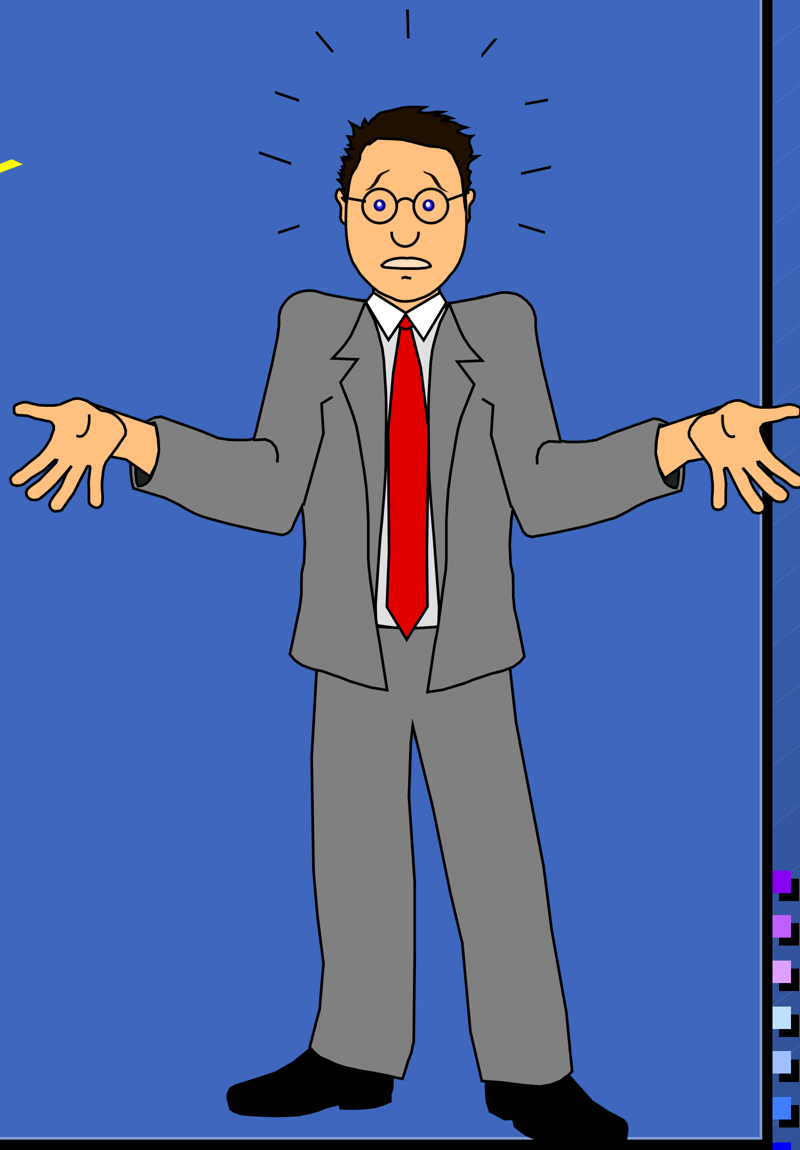

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Not to worry!

S.S.P.C.

Simple Statistical Process Control

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- While testing, compare DUT's good die against all DUTS so that each DUT yields the same
  - If good die varies more than (3 die) DUT to DUT stop testing
  - Future: Program will automatically verify bad DUT on a probe card with previously tested good die

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Compare failure modes

- If more than (3) consecutive common failures, verify the setup
- If more than (6) open failures per wafer, stop and verify the setup

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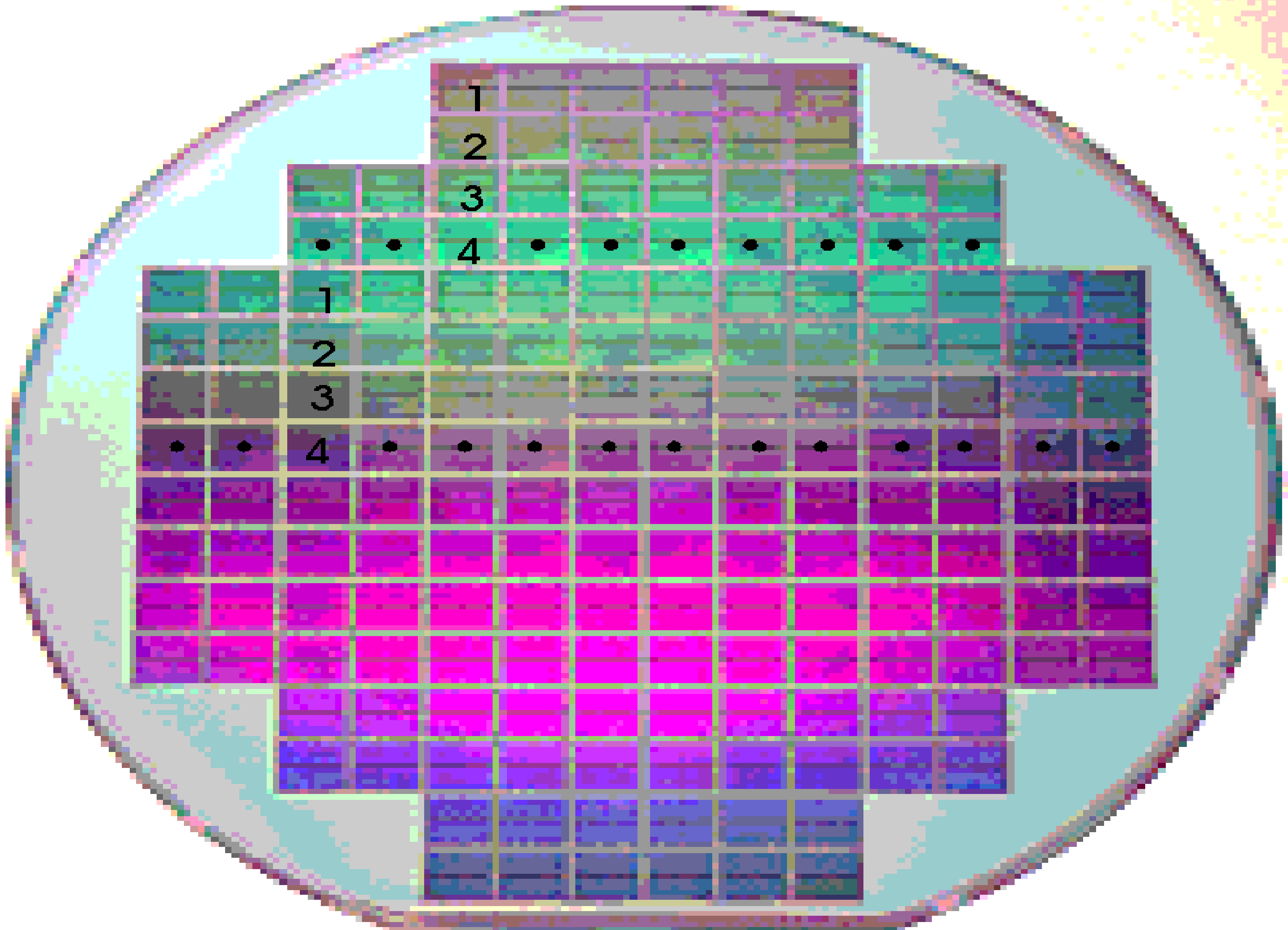
1 x 4 Array

DUT 1
DUT 2
DUT 3
DUT 4



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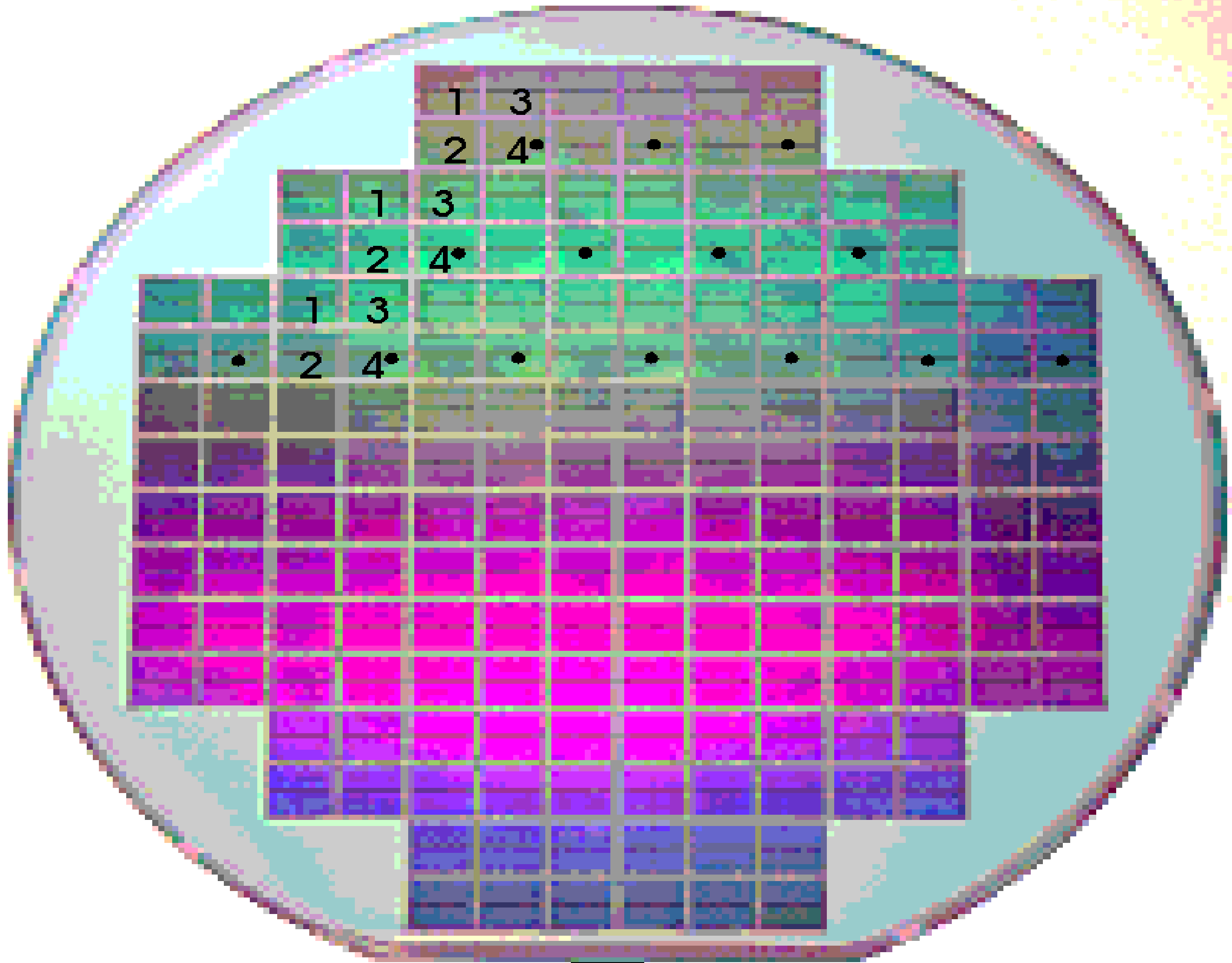
2 x 2 Array

DUT 1	DUT 3
DUT 2	DUT 4



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TRACKING

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- All hardware performance boards and probe cards are tracked to which tester and test head they're on and which wafers were tested with this hardware.

- Setups are automatic:
  - Lot numbers are bar coded
  - Operator ID is bar coded
  - Test program selection is automatically downloaded
  - Automatic probe to pad alignment
  - Future (October) auto probe mark inspection

- All SPC trips require operator ID to clear.

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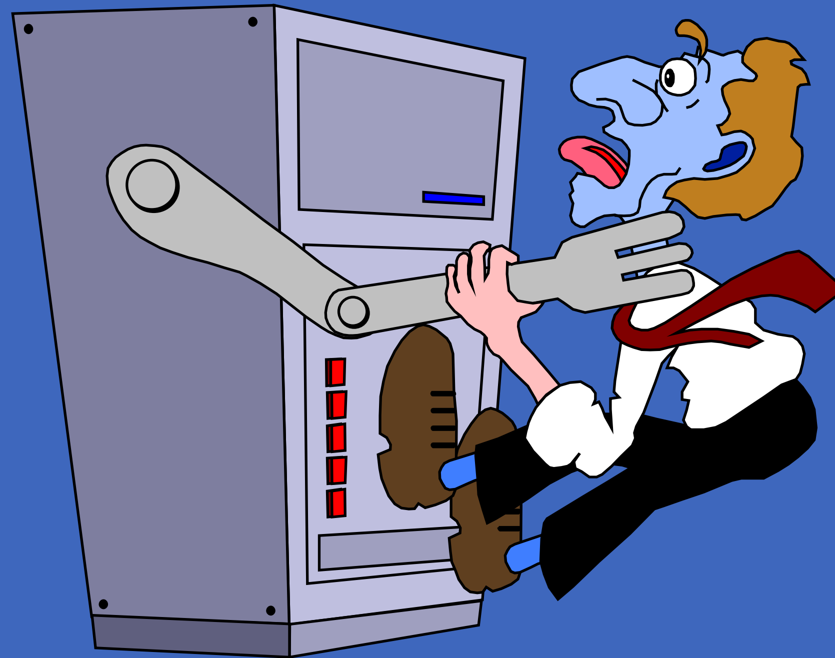
If you don’t have these items in place, multi-die testing can become a nightmare!



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Current 64Meg DRAM Pad Layout

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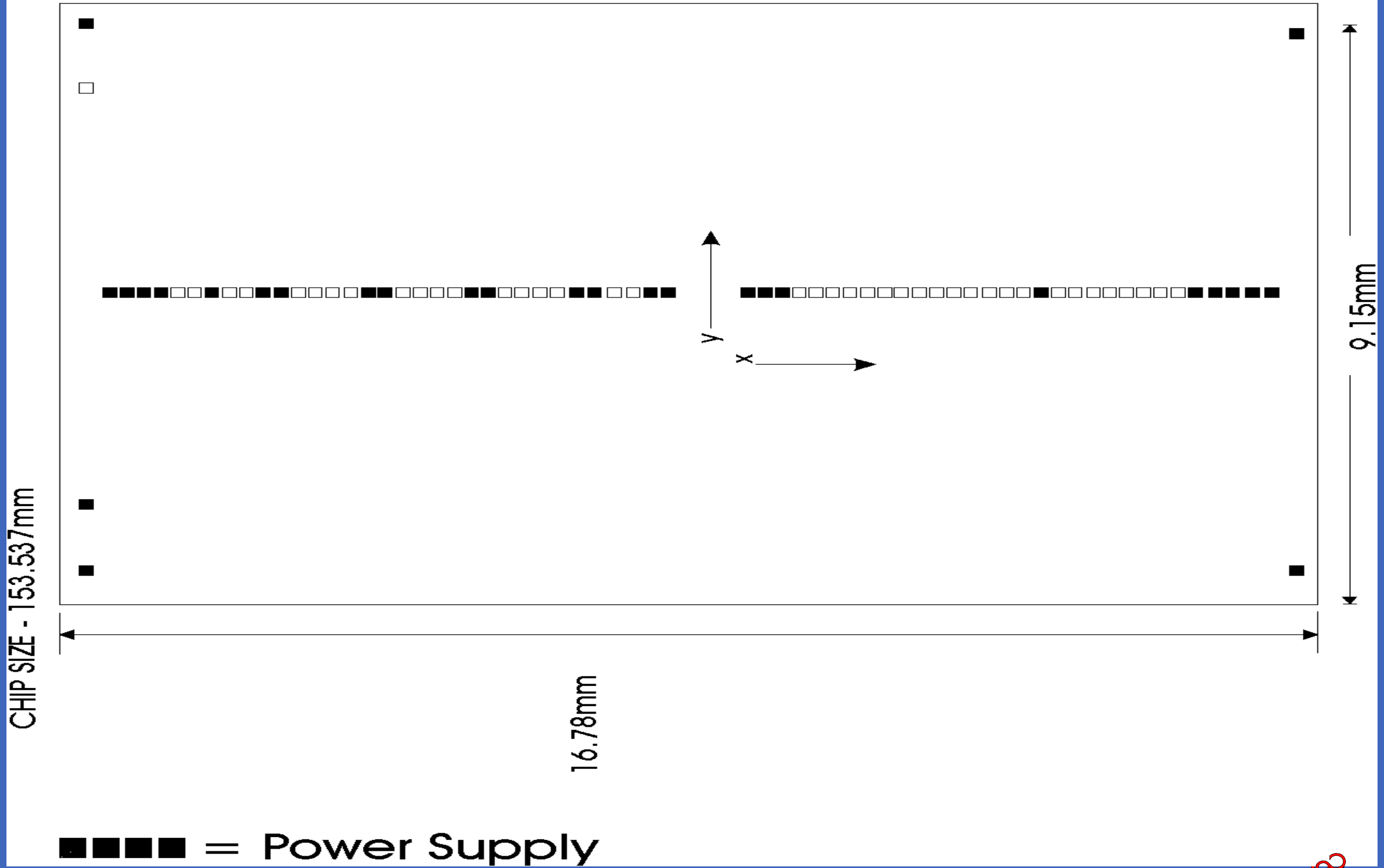
64Meg DRAM



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What is FMI GMD Using For Probe Cards?

- 4Meg DRAM membrane probe cards were qualified for 8 DUT testing
- Currently, 64Meg SDRAM is qualified for 8 DUT tungsten needle probe cards (250 mm diameter)
- Evaluated:
  - Vertical (Cobra)
  - Modified Tungsten
  - Epoxy Ring
- In September we will use a tungsten needle card for 16 DUT (2 x 8) 300 mm diameter
- We would like a 3 X 6 Array (18 DUT) card

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- For the past 18 months GMD has not stepped off the wafer
- Currently using GPIB interface to control prober stepping
- Results: No major probe card repairs with more than 6,000 wafers probed per card

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