Application of Larger Probing Area by Cantilevered Probes

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About TSE

As a Technology and Science Enabler in the field of Semiconductor test, TSE has developed the innovative technologies needed by its customer and has engage in continuous research and productivity improvement activities.

Mission:

- **To become a global standard company with leading technology in semiconductor test interface field.**

Technology:

- **To provides the technology getting along customers and the service creating customer's values**

Products:

- **Probe card, Test socket, Handler change kit High parallel interface board, Logic Load board**

Products

Test interface board

Probe card

Change kit

Test socket

Outline

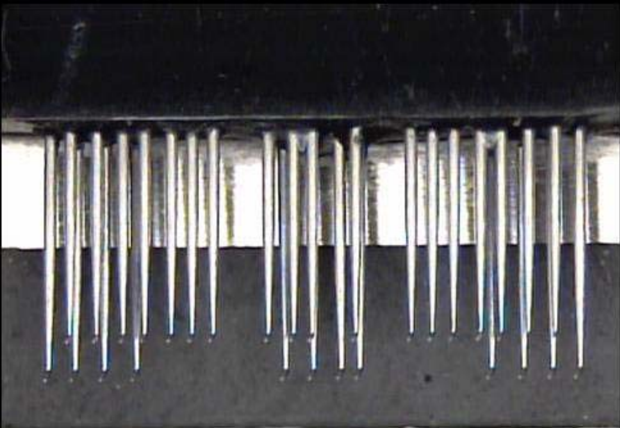
- CPC-Wafer^{TM} Concept
- Roadmap
- Advantage
- Mechanical Data
- Specifications
- Summary

Background

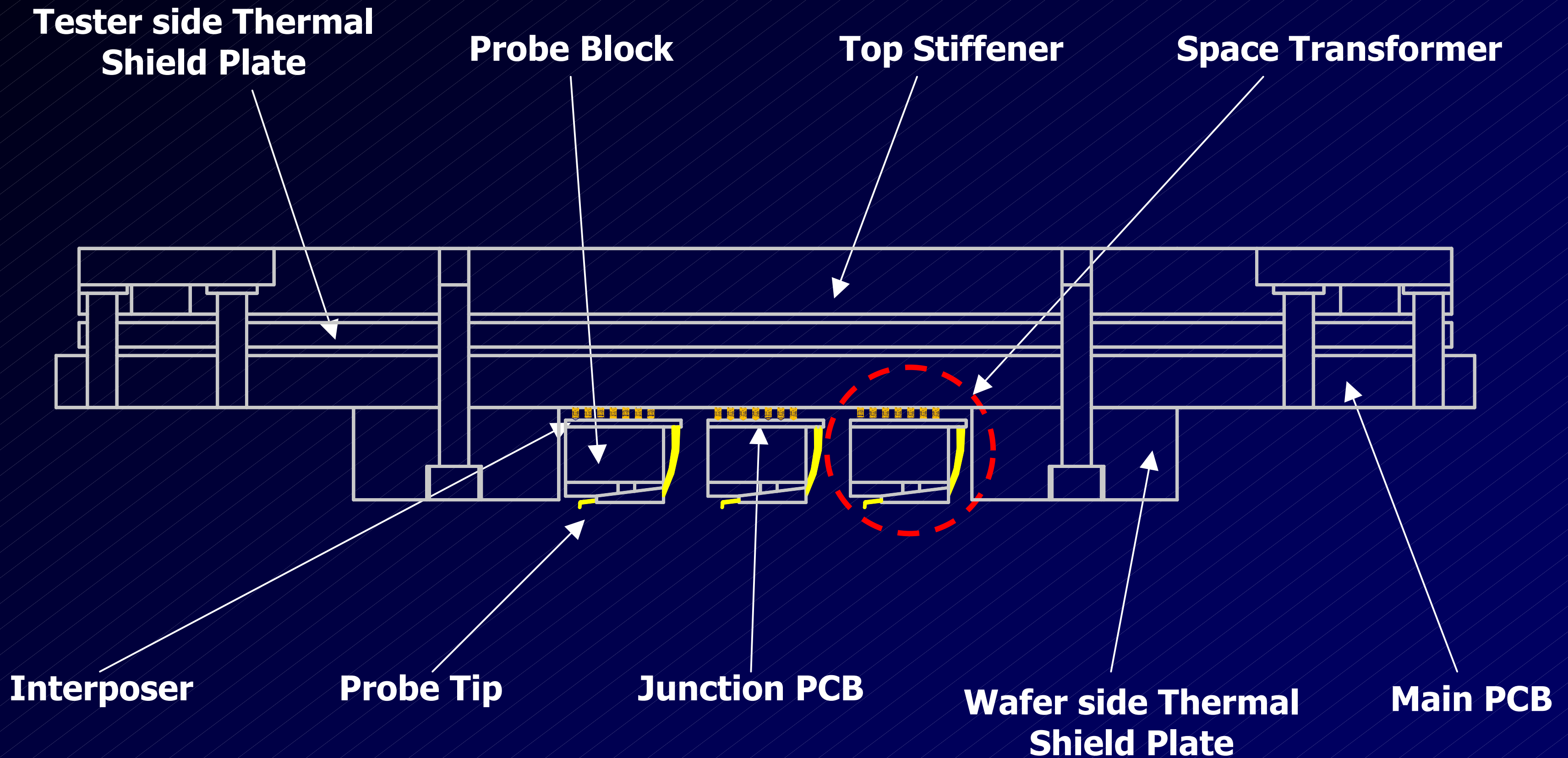
Large Probing Area Probe cards

- chip size increasing– especially NAND flash
- Higher parallel probe card requirement
- Drastically test time increasing
- DDT Technology available

C P C-Wafer™
(Compact Probe Card)



CPC-Wafer™ Structure



CPC-Space Transformer Structure

Needle

Epoxy

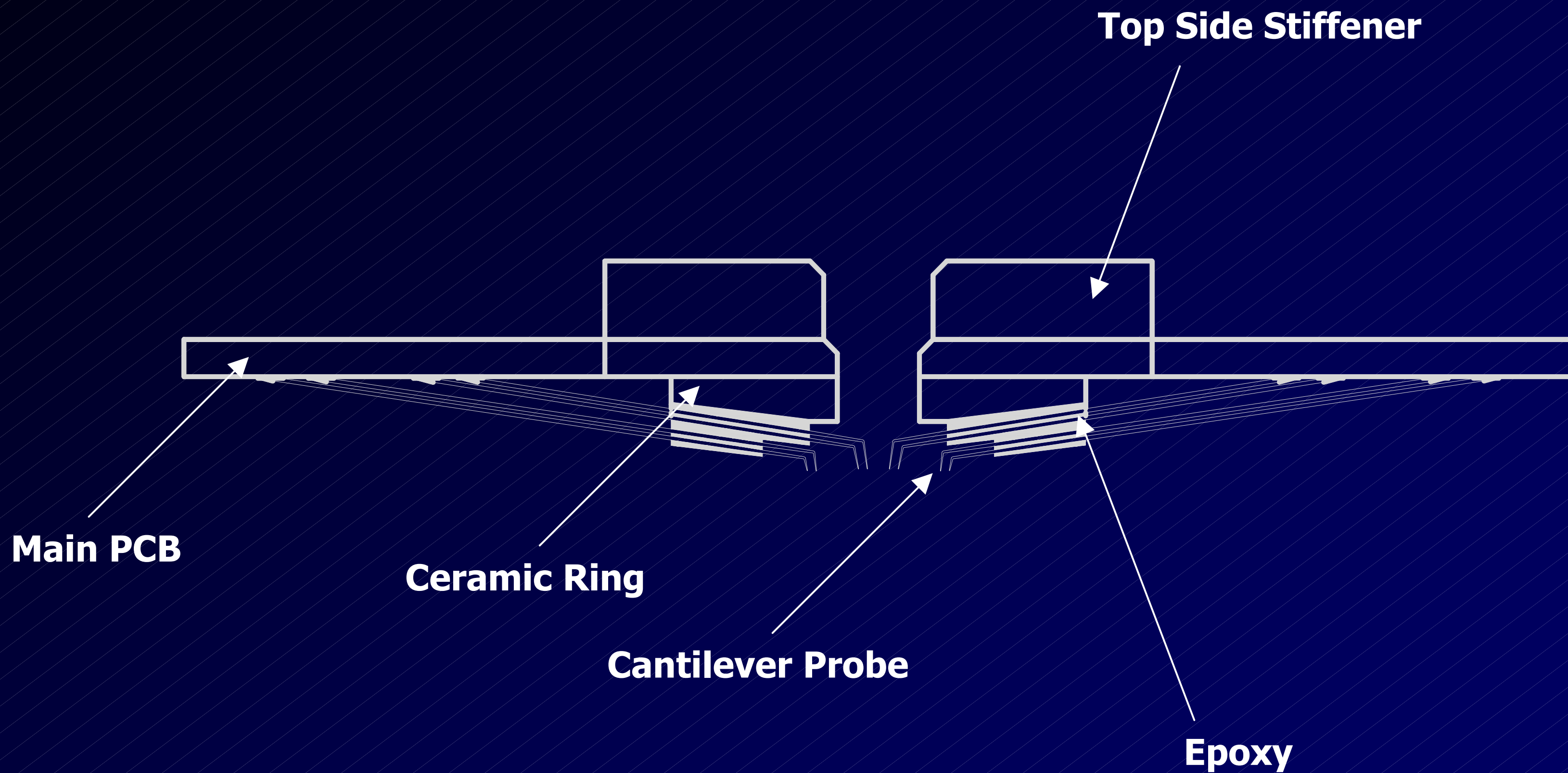
Isolation Tube

Conductive Frame

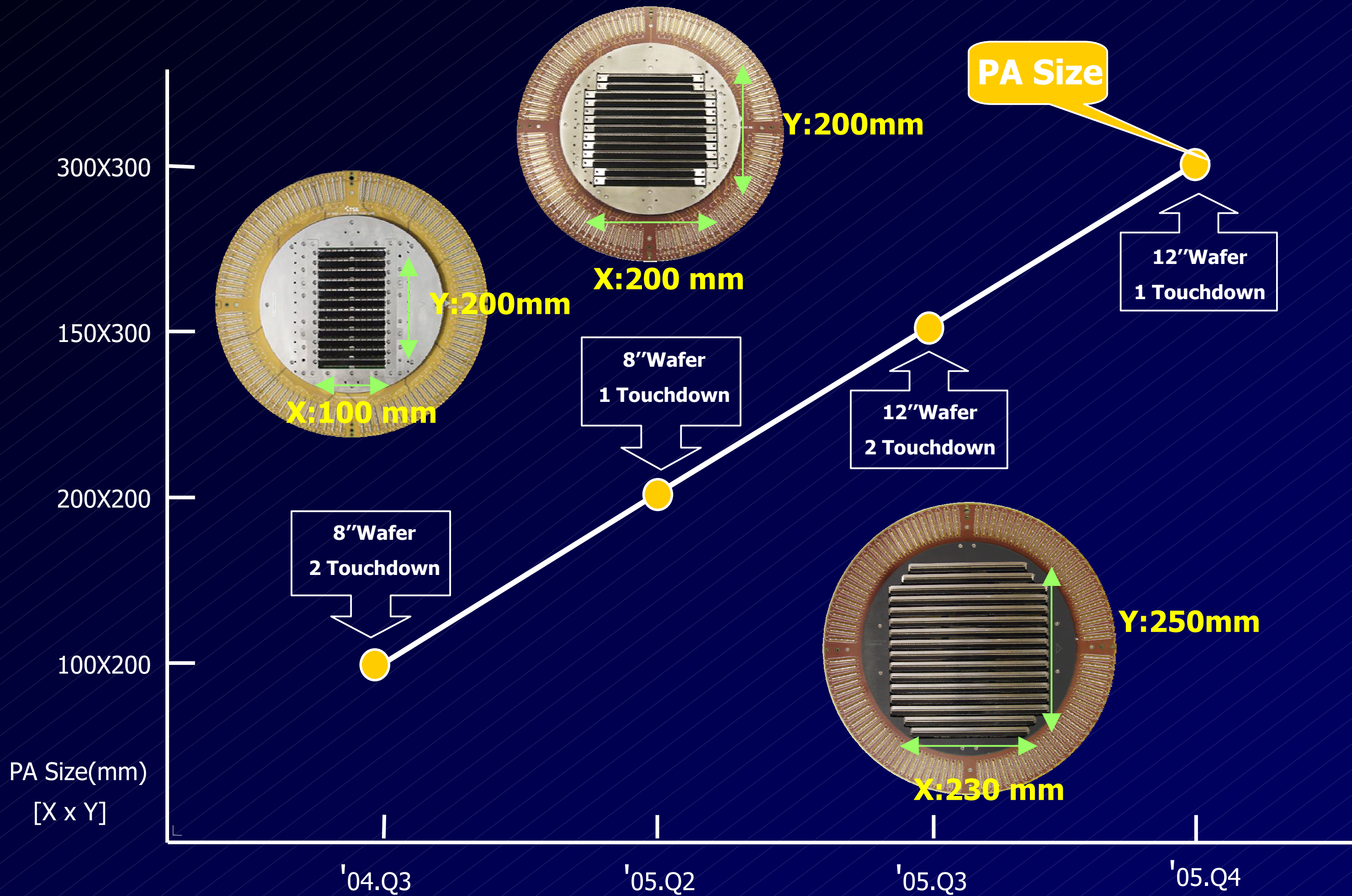
Interposer

JPCB

Conventional P/C Structure



ROAD MAP (PA SIZE)



Roadmap Overview

No.	Item	Year 2005	Year 2006	Remark
1	PA Size	100mmx200mm	300mmx300mm	Planarity<27um
2	Pin Density	100%	211%	DRAM Application
3	Pad Pitch	90um	70um	
4	Operation Speed	>100MHz	>200MHz	Target is @Speed
5	Delivery	3~4weeks	2~3weeks	Repeat Order Case
6	Min.Chip Y Size	7.9mm	5.9mm	Application Limit Overcome
7	Pad Array	△	O	Rectangle,'H'Array

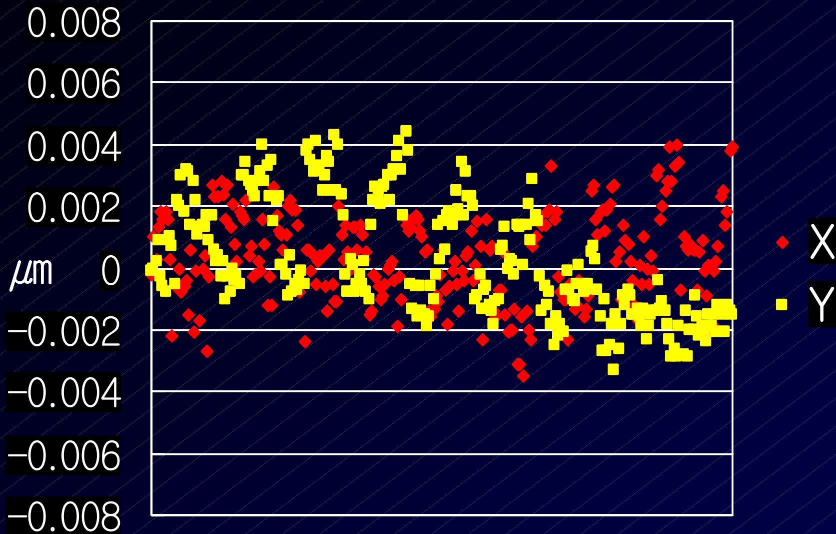
Why CPC-Wafer^{TM} ?

- Large PA(Probing Area) size
- Parallel manufacturing process
- All probe have same scrubbing direction
- Improved contact force uniformity
- Improved electrical signal performance

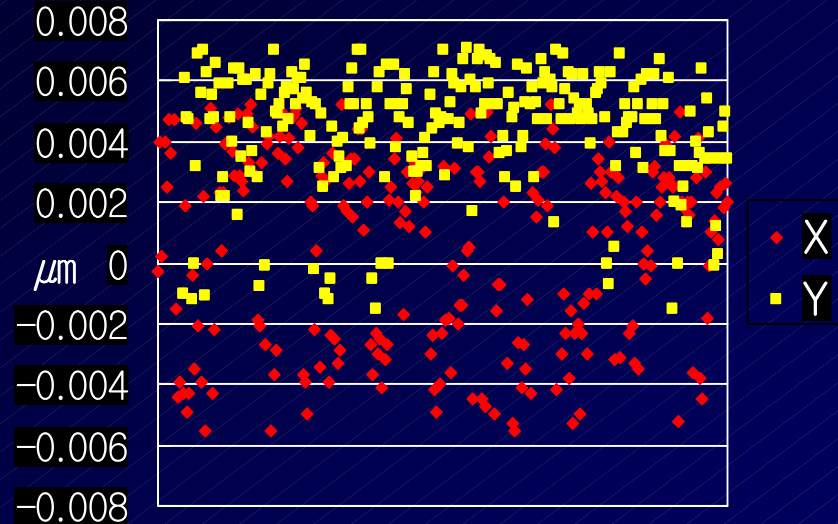
Why CPC-Wafer™ ?(continue)

- **Cantilever probe**
- **Individual/module base replaceable probe**
- **Improved probe planarity**
- **Flexible PH(Probing Head) outline**

X, Y Alignment



BEFORE



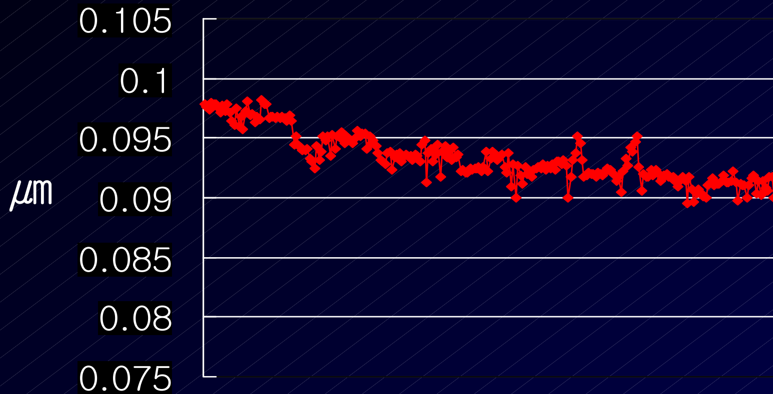
AFTER (10K TD)

RESULT		
	Before	After
X	±4㎛	±5.5㎛
Y	+4.4㎛,-3.0㎛	+7.0㎛,-1.5㎛

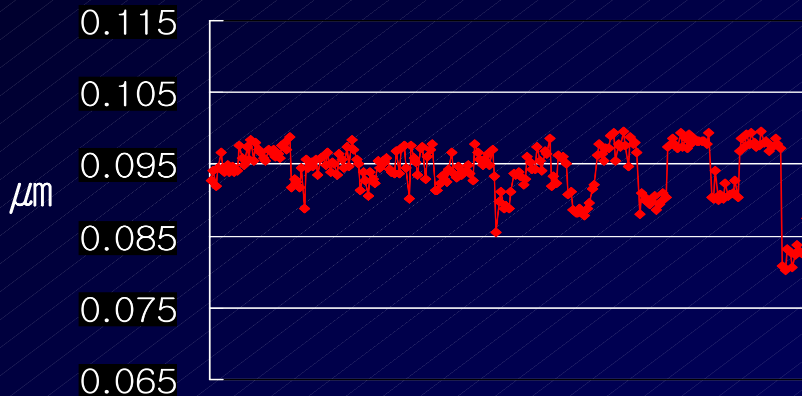
TEST CONDITION

- TEMP : 85℃
- Pin : 5,448Pins
- OD : 85㎛
- PA SIZE : 200mmx200mm

Z - Planarity



BEFORE



AFTER
10K TD

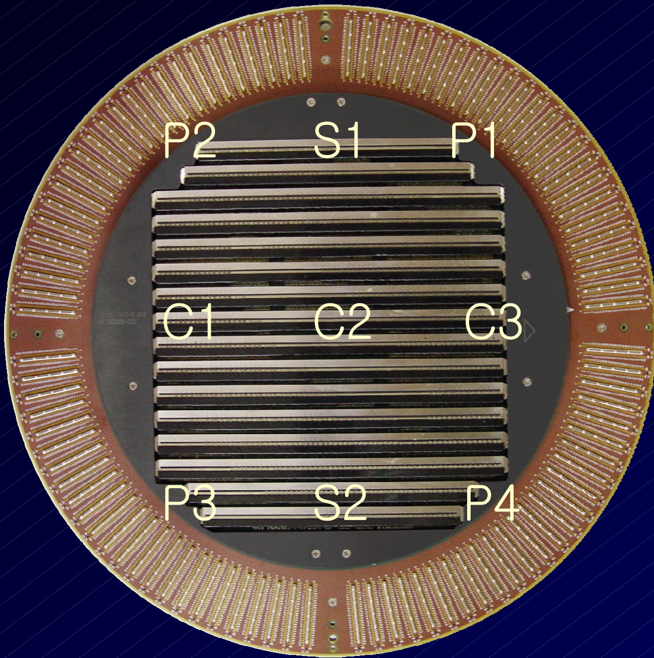
TEST CONDITION

- TEMP : 85℃
- Pin : 3636Pins
- OD : 85㎛
- PA SIZE : 100mmx200mm

RESULT		
	Before	After
Z	8.2㎛	19.3㎛

Thermal Test Procedure

Measuring Position

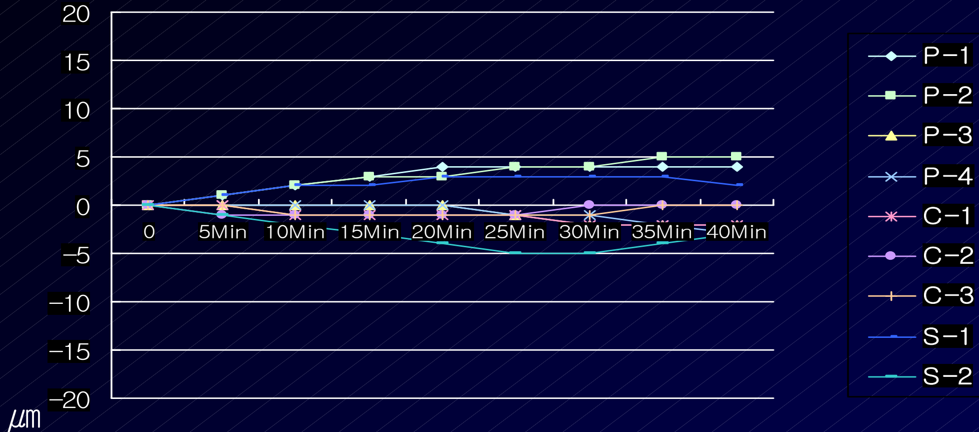


TEST STEP

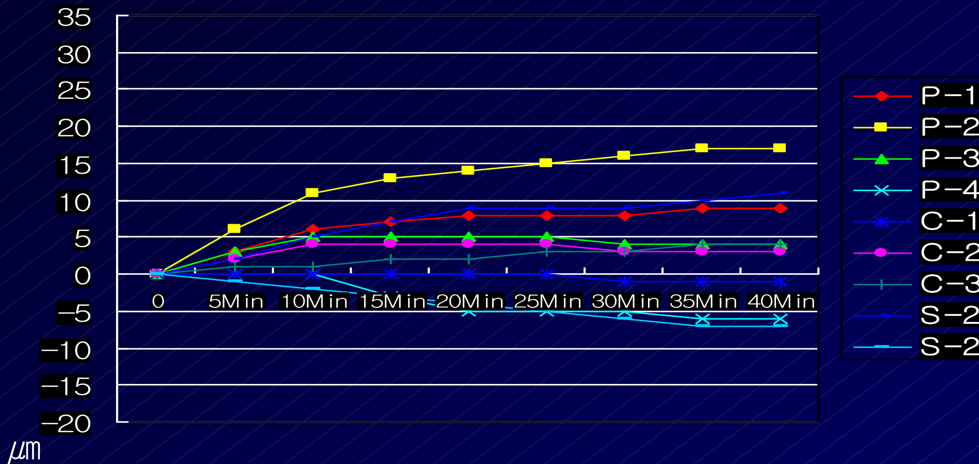
1. Measure the each position
   Before Contact to Wafer
2. Contact for 10min.
3. Recheck each position
4. Repeat above #1. to #4.
   4 or 5 times

Thermal Expansion Test

(X & Y - Axis)



"X" AXIS



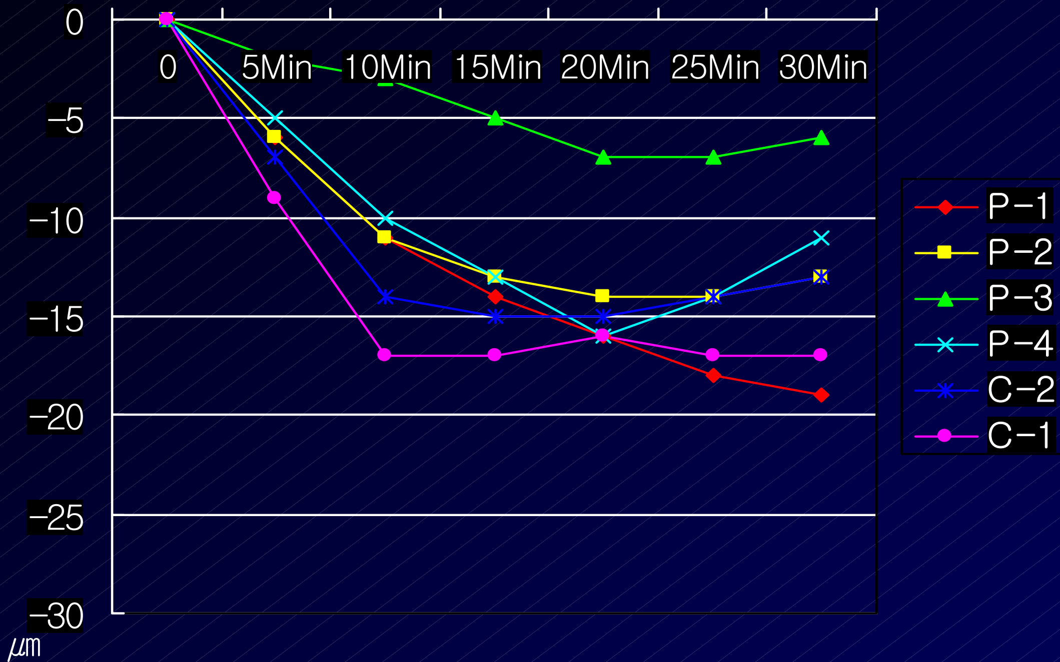
"Y" AXIS

RESULT			
	40min. Later		
		Pos. Movement	Expansion Gap
X	**P1**	**4㎛**	**1㎛**
	P2	**5㎛**	
	P3	**-2㎛**	**1㎛**
	P4	**-3㎛**	
Y	**P1**	**9㎛**	**5㎛**
	P3	**4㎛**	
	P2	**17㎛**	**23㎛**
	P4	**-6㎛**	

TEST CONDITION

- **TEMP : 85℃**
- **Pin : 6120Pins**
- **OD : 85㎛**
- **PA SIZE : 230mmx250mm**

Thermal Test
(Z - Axis)

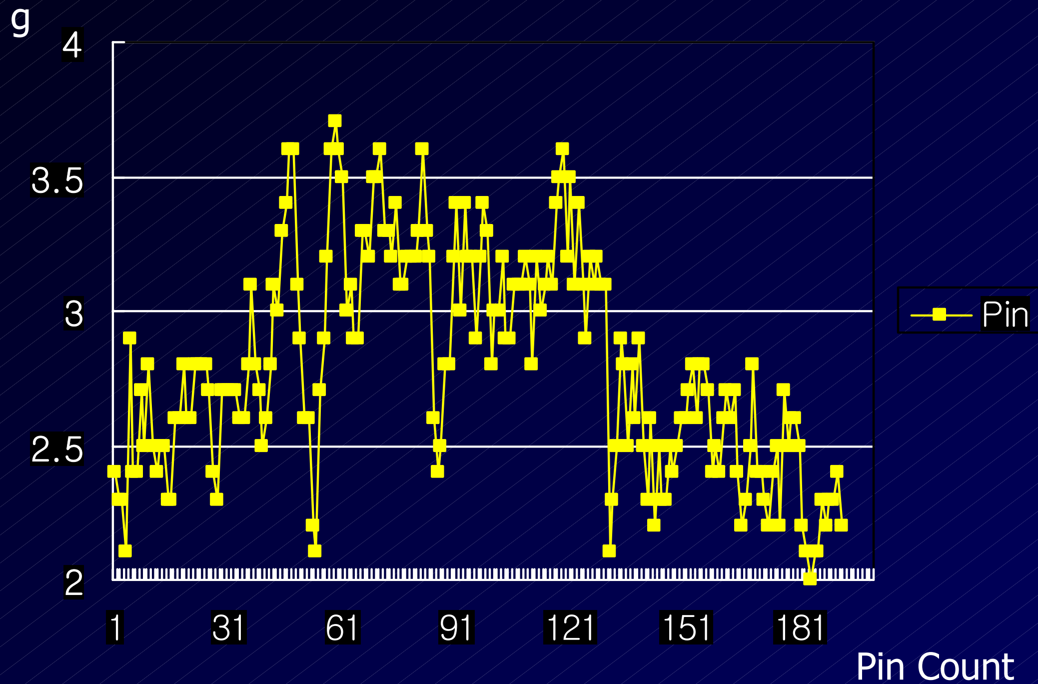


RESULT	
	40min. Later
GAP	13㎛
Z-Down	Min : -6㎛ Max : -19㎛

TEST CONDITION

- TEMP : 85℃
- Pin : 6120Pins
- OD : 85㎛
- PA SIZE : 230mmx250mm

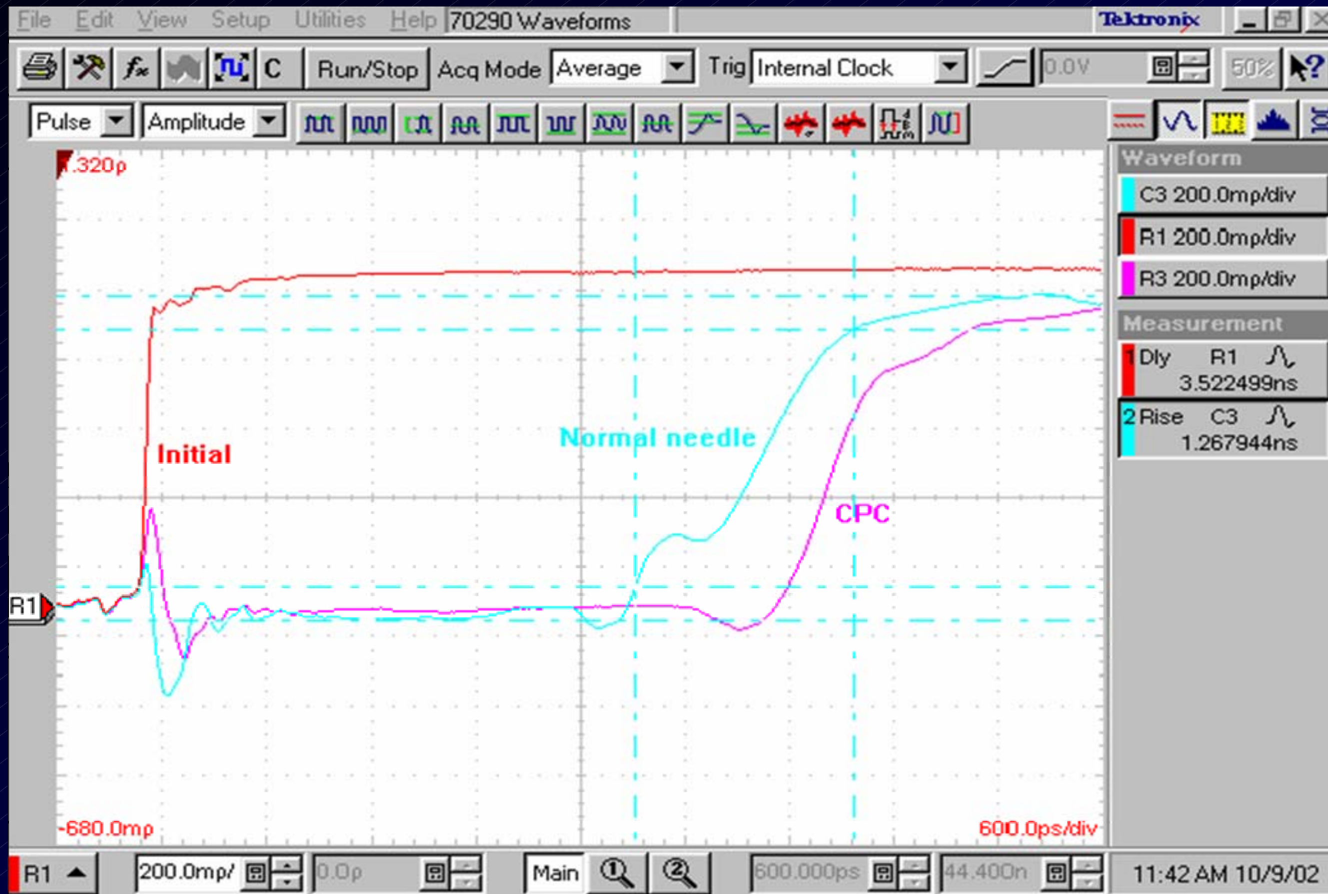
TIP FORCE



TEST CONDITION

- TEMP : Room
- Pin : 340Pins
- OD : 50㎛

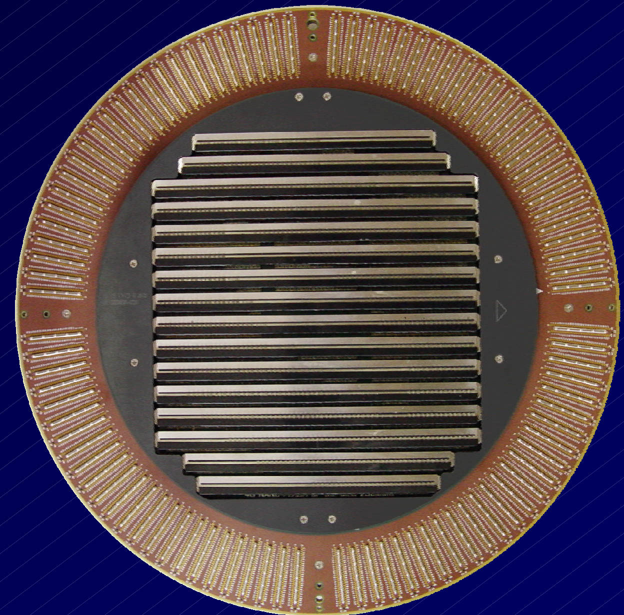
Signal performance



Item / Product	CPC-wafer^{TM}	Cantilever
Tr/Tf	839.5 ps	1267.9 ps
PA Size	200mm X 100mm	120mm X 60mm
Needle length	18mm	68mm

CPC – Wafer^{TM} Specifications

- Tester : AL6050/T5375
- PCB Diameter : Ø440mm X 6.2 Thickness
- Device : NAND Flash
- PA Size : 240mm x 250mm (12" wafer 2 touchdown)
- Probe Depth : 12mm ± 0.2mm
- Minimum Pitch : 90um
- Probe Force : 2.5g/mil
- Max. Scrub Mark : 25um
- Alignment : ±12um
- Planarity : 22um(max-min)
- Tip Shape : Semi-Round
- Tip Size : 23±2um
- Max. Current : 500mA(continuous)



< 2TD/12" NAND Flash >

SUMMARY

- **New solution for full wafer touchdown**
- **Shorter delivery**
- **Short and easy Repair**
- **Application to Any Device**
- **Free Expanded Area (Multiple Probe Block)**

What are next step?

- Minimize contact force difference
- Overcome pad array type
- Improve tip position reliability after >100k TD
- Round tip shape
- Study more stable cleaning period and method

Thank you very much for your attention!

Question ?