35um pitch Fine pitch Probecard

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Roadmap

40um pitch/2000

35um pitch/2001

30um pitch/2002

Roadmap

(A) Survey (Ref: EIAJ)

		2000	2001	2002	2003	2004	2005
	Process	0.18μm	0.15μm	0.13μm	→	→	0.1μm
Aluminum Pad	Advanced tech	50μm	→	40μm	→	→	→
	Mass prod. tech	60μm	→	50μm	→	→	→
Gold Bump	Advanced tech	40μm	35μm	30μm	→	→	→
	Mass prod. tech	50μm	40μm	35μm	30μm	→	→

Roadmap

(B) Cantilever type Probe card

	PAD Pitch	2000	2001	2002	2003	2004	2005
Aluminum Pad	Logic single Dut (Peripheral)	60µm	50µm	45µm	40µm	→	→
	Multi-square （Peripheral Pad）	60µm	→	55µm	→	→	→
	Corner ｐｉｔｃｈ						
	〔1×2、1×4〕	250µm	110µm	70µm	→	→	→
	〔2×2〕	250µm	→	200µm	→	→	→
Aluminum pad	Memory （ＬＯＣ） 〔2×n、4×n〕	80µm	→	70µm	→	→	→
	Chip size(Y)	Over 5mm	→	→	→	→	→
Ｂｕｍｐ LCD Driver	Logic single Dut (Peripheral)	50µm	40µm	35µm	30µm	→	→
	Multi-square （Peripheral Pad）	62µm	55µm	50µm	→	→	→
	Corner ｐｉｔｃｈ	250µm	110µm	70µm	→	→	→

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Demand from test-floors

1. Aluminum Pads

(A)Aluminum Pad

Customer	2001	2002	2003
A	60μm	55μm	45μm
B	70μm	50μm	45μm
C	76μm	52μm	45μm

2. Gold Bump

(B)Gold Ｂｕｍｐ

Customer	2001	2002	2003
D	40μm	30μm ～ 35μm	30μm
E	38μm	35μm	30μm
F	55μm → 40μm (Under evaluation)	30μm ～ 35μm	30μm
G	40μm	30μm ～ 35μm	30μm

Probe Dia. vs No. of tiers

Probe Dia.

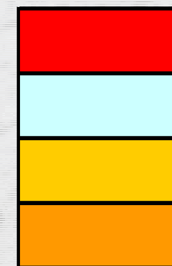
itc	####	####	####	####	####	####
#####	9	8	6	5	4	4
#####	8	7	6	5	4	3
#####	7	6	5	4	3	3
#####	6	5	4	4	3	2
#####	6	5	4	3	3	2
#####	5	4	4	3	2	2
#####	5	4	3	3	2	2
#####	4	4	3	3	2	2
#####	4	4	3	2	2	2
#####	4	3	3	2	2	2
#####	4	3	3	2	2	2
#####	3	3	2	2	2	1

* **Theory**

Pitch x No. of tiers

> Probe Dia. x 1.5

* 1. Slenderization results in the reduction of tiers.
  2. Study a new theory.



No solution

Solution available

Target in 2001

Target in 2002

Challenge

1. To reduce the number of tiers

   Slenderization >>> Hard to process needles

   >>> Hard to assemble needles

2. Taper control

   >>>Actual taper angle

   >>>Long taper(C.F problem)

3. Optimal G. Force

   Aluminum Pads : 4g/60um OD loaded

   Gold Bumps : 1g/60um OD loaded

Solution

* 0.1mm Dia. Probe = Standardization

0.13mm probe material

>>> Establish the process into 0.1mm Dia.

Probe taper 3.5 deg

>>> Extend the variations; 2.5 & 3.0 deg

Probe process and assembly

>>> Miniaturization with precision

Knee Dia. 57um

>>> Reduce the diameter down to 48um

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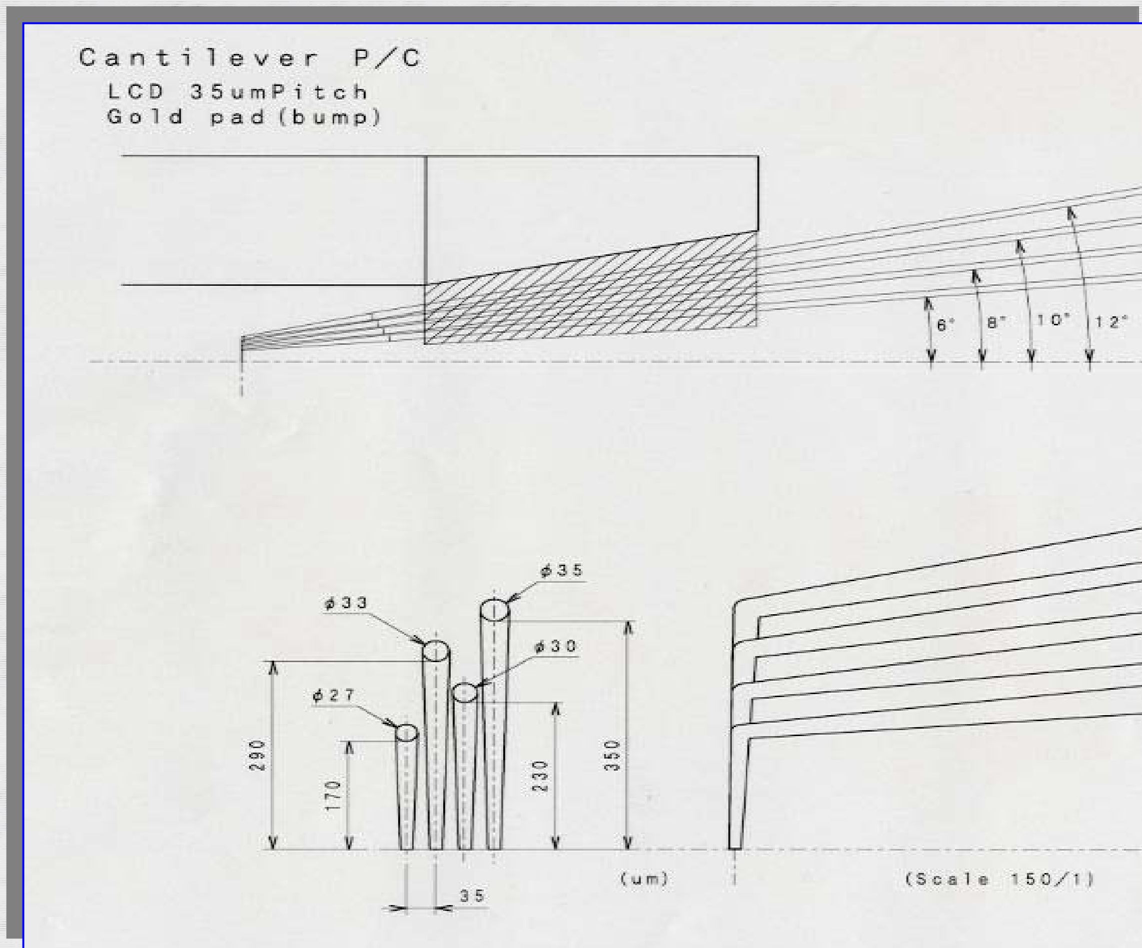
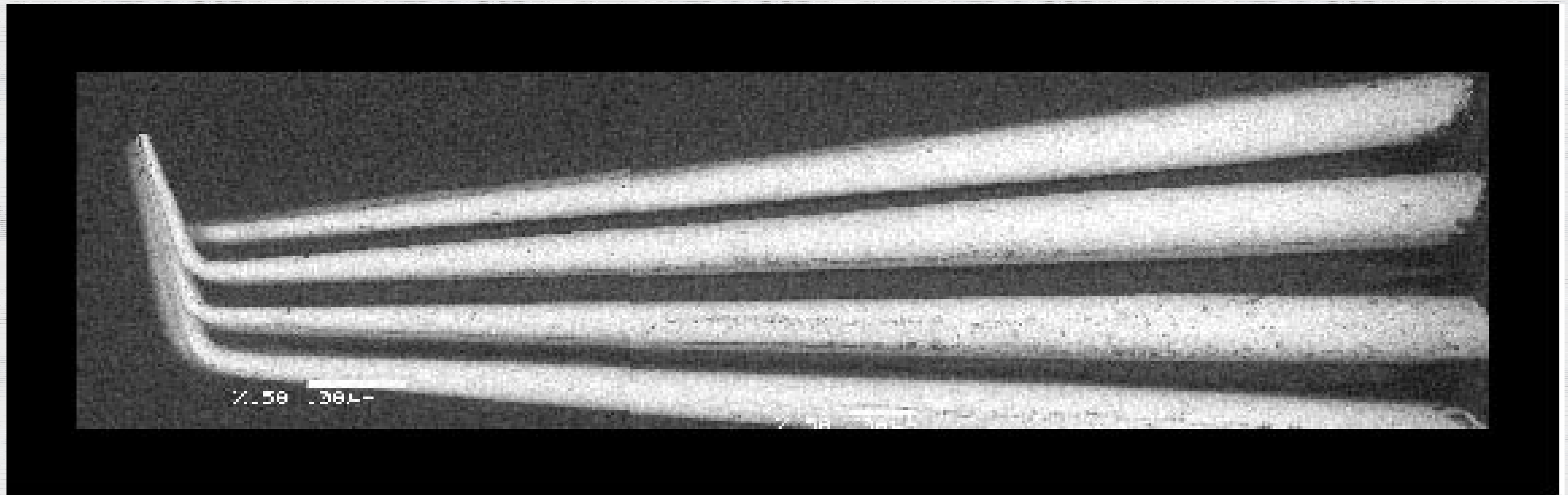
Probe Dimension



35um pitch SEM Image

4 tiers ReW 0.1mm Dia. Probes

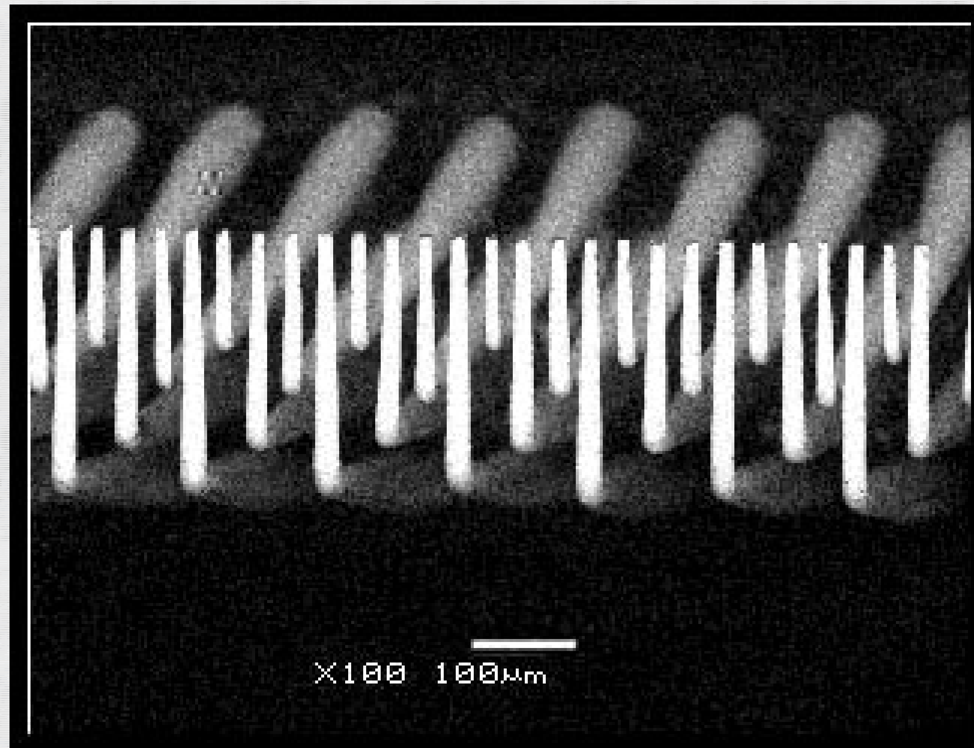


35um pitch SEM Image

4 tiers ReW 0.1mm Dia. Probe

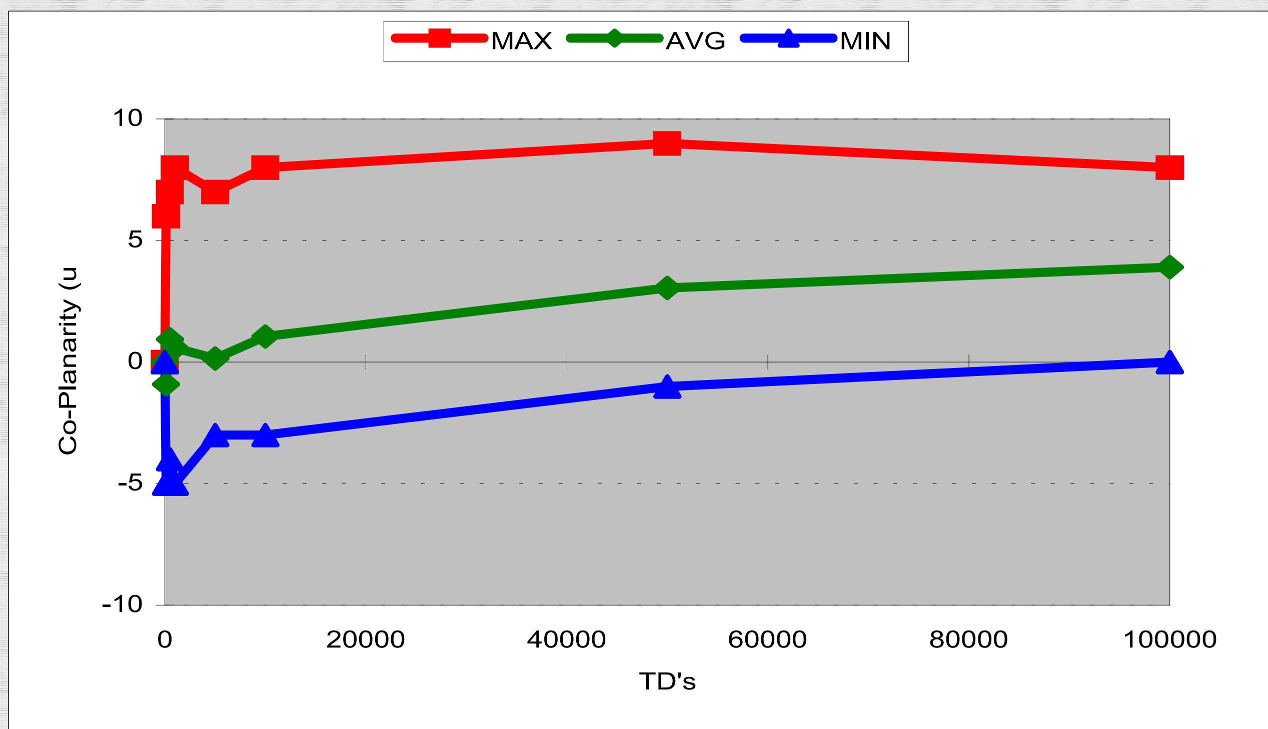
35um pitch SEM Image

4 tiers ReW 0.1mm Dia. Probe



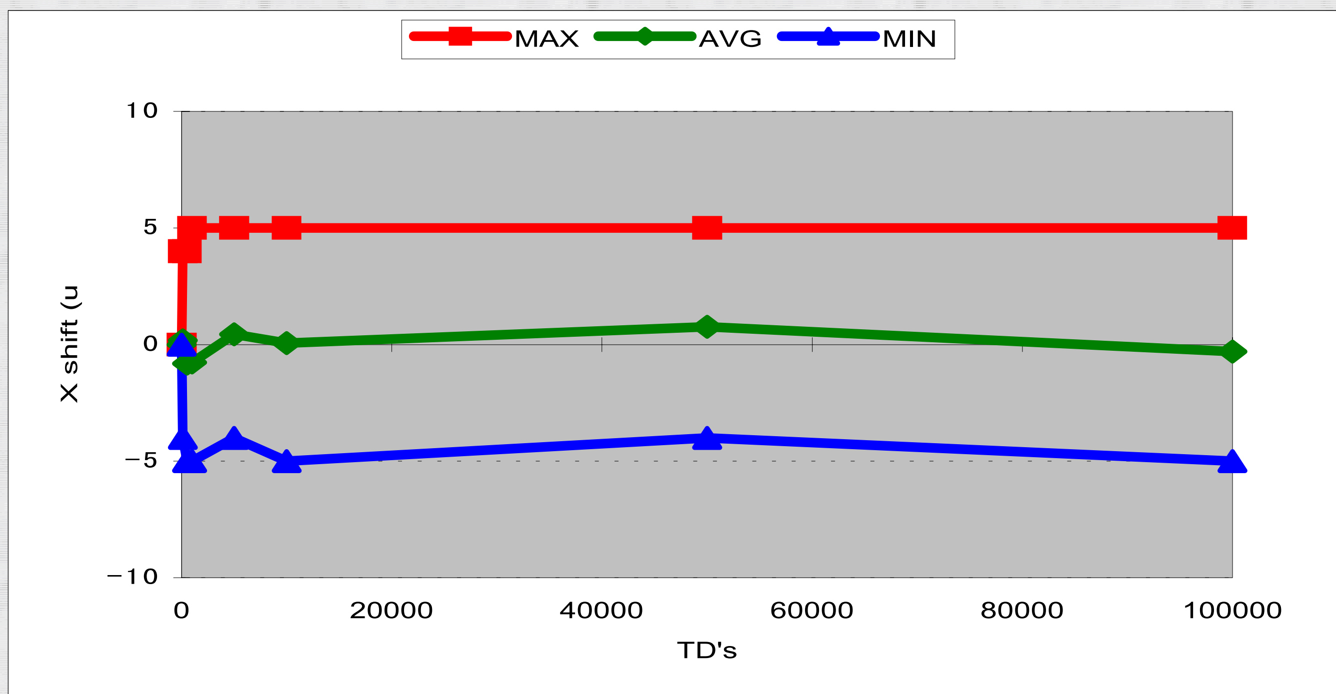
Life test

ReW 0.1mm Dia. 3 deg Taper



Life test

ReW 0.1mm Dia. Probe 3 deg Taper

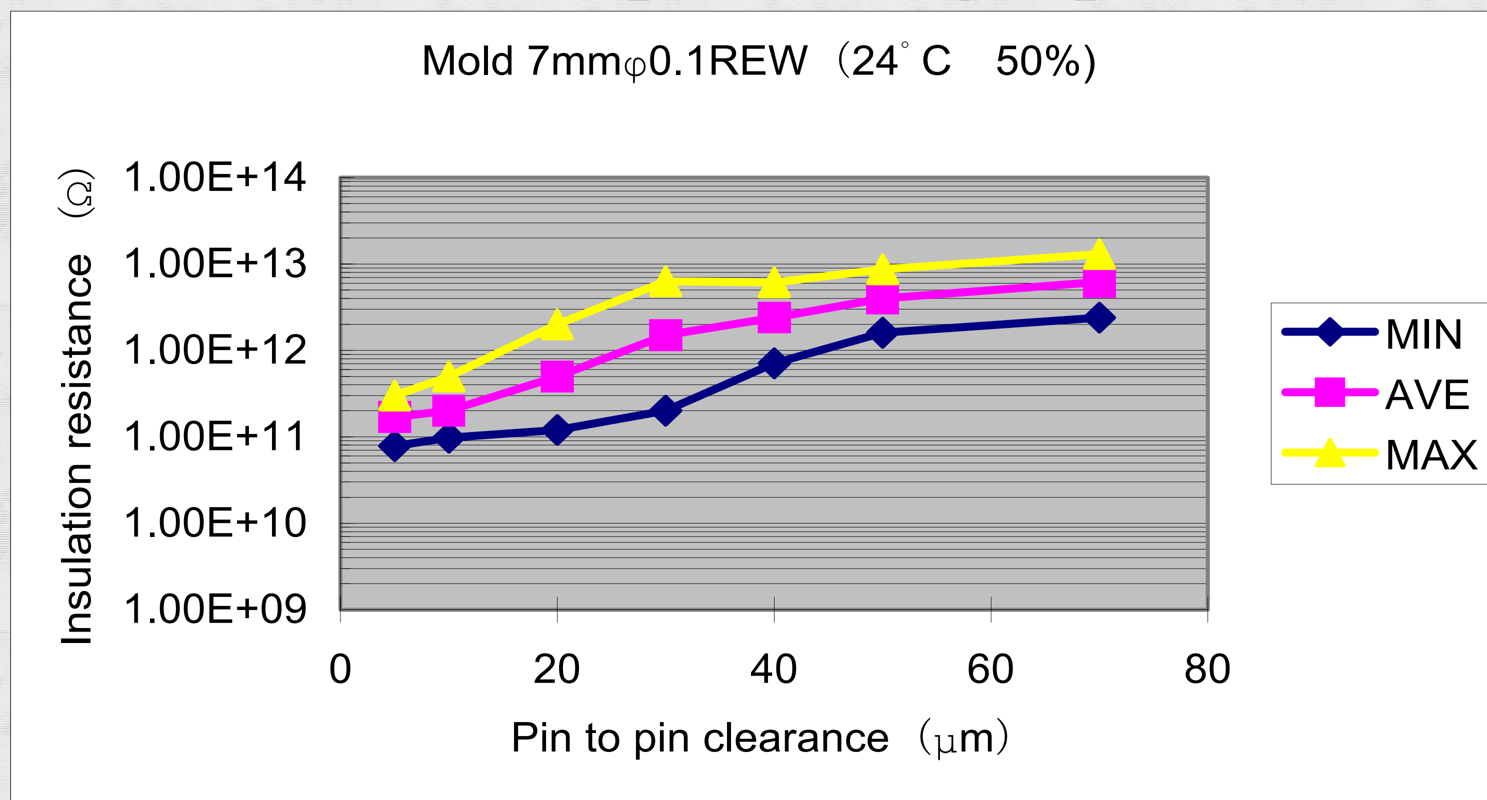


Life test

ReW 0.1mm Dia. Probe 3 deg taper

Life test

ReW 0.1mm Dia. probe 3 deg Taper (Mold:7mm)



Conclusion

1: The tight control of Taper Angle and the reduction of tip length shall give the solution to;

Aluminum Pads 45um / Gold Bumps 35um

2: The followings shall be achieved to pursue the further fine pitch solution:

a. Probe dimension improvement
b. Multiple-tapers' probe introduction

Our targets !!!

Aluminum Pads 35um / Gold Bumps 30um