New Probing Technology Evaluation

“Fine Pitch & Small Pads”

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6/4/00

The Need to Evaluate New Technology

- Small Pads
- Small Pitch
- Small Scrub
- Low Contact Resistance
- Minimal Tip Wear
- Online Cleaning

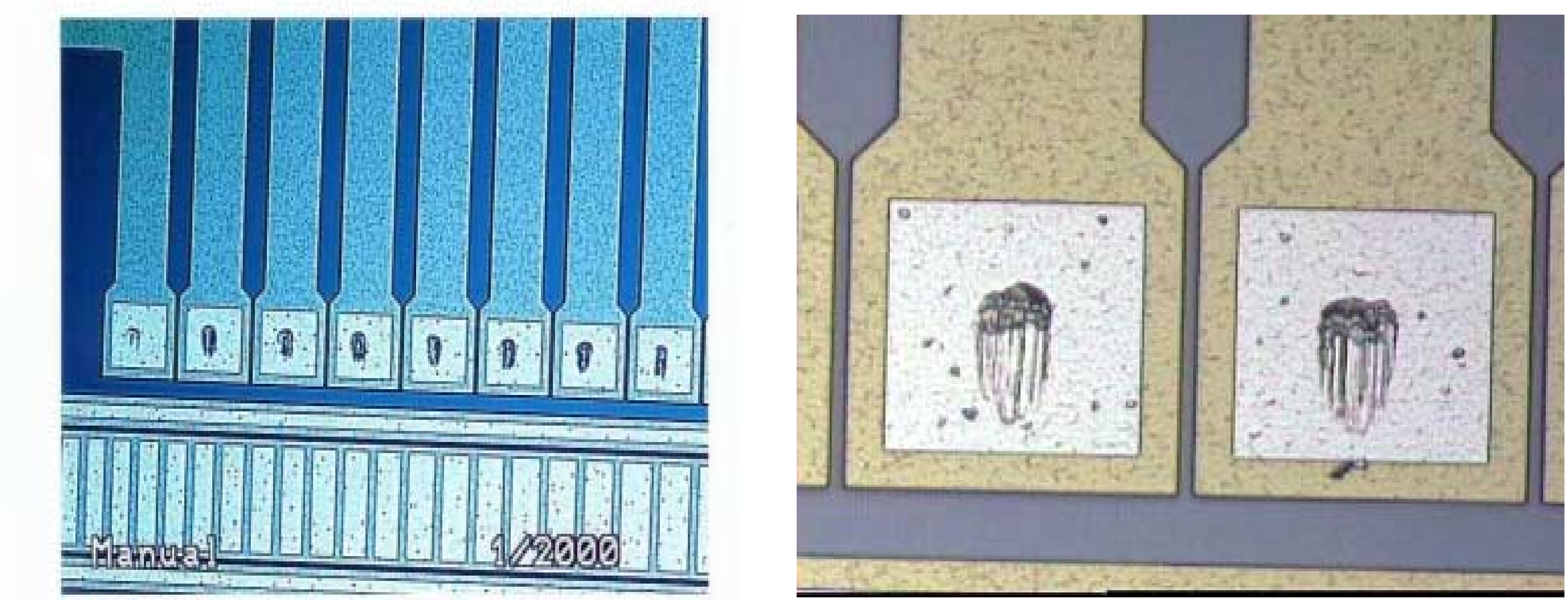
Evaluation Platform

- Keithley 256 channel tester
- TSK APM90A
- Test wafers
  - 208 I/O’s
  - 50 X 50 µm pad
  - 70 µm pitch
- Blank Al Wafers
- P4 Probe Card

Initial Test Set-up (Challenges)

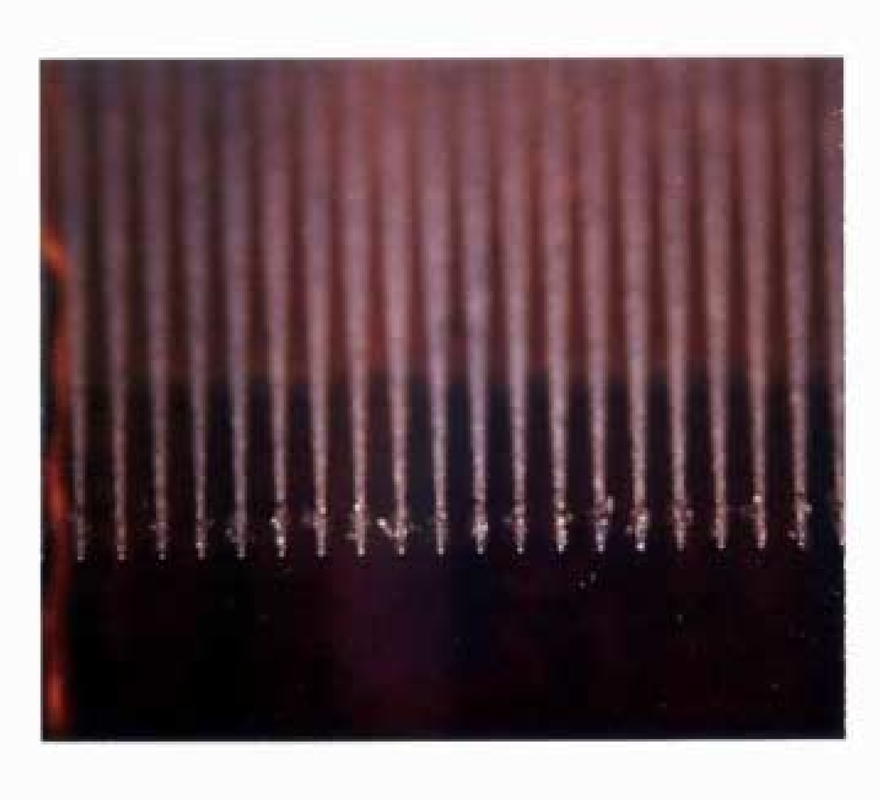
- Determine proper lighting program on Prober.
- Debris between wafer and chuck top causing inconsistent scrub marks.

Scrub Marks



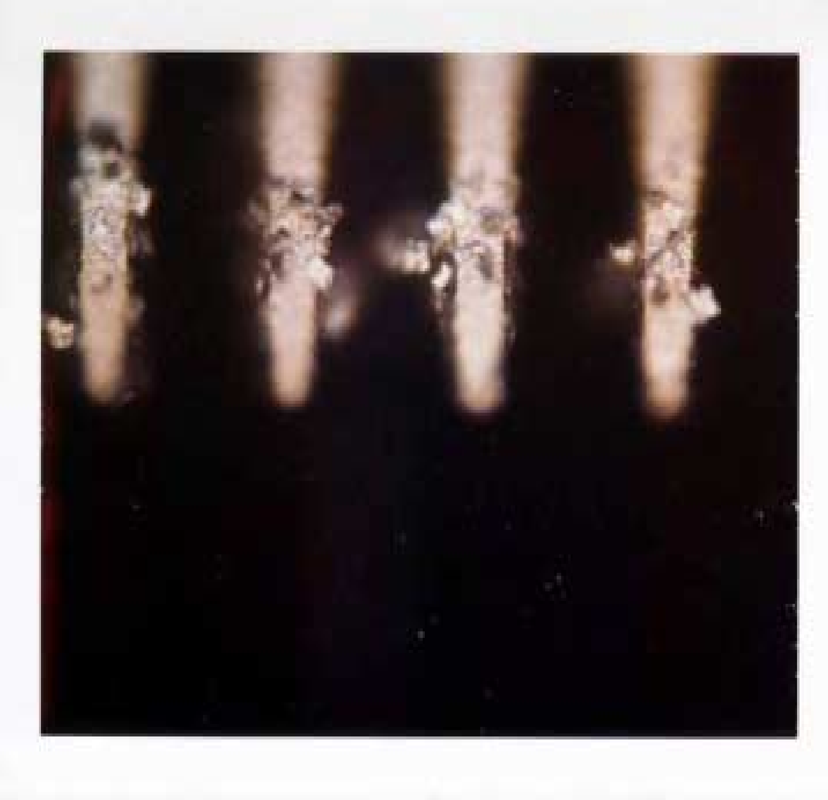
Typical scrub mark on the test wafer measured 25µ X 14µ

Online Cleaning



100 magnitude

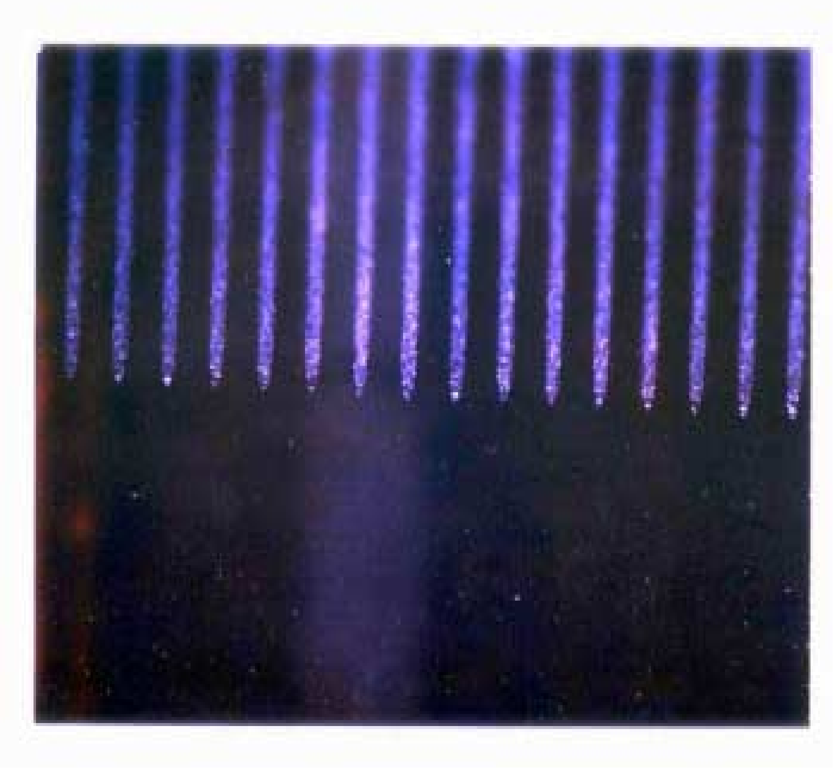
Before Cleaning at 1000 TD



300 magnitude

Before Clean at 1000 TD

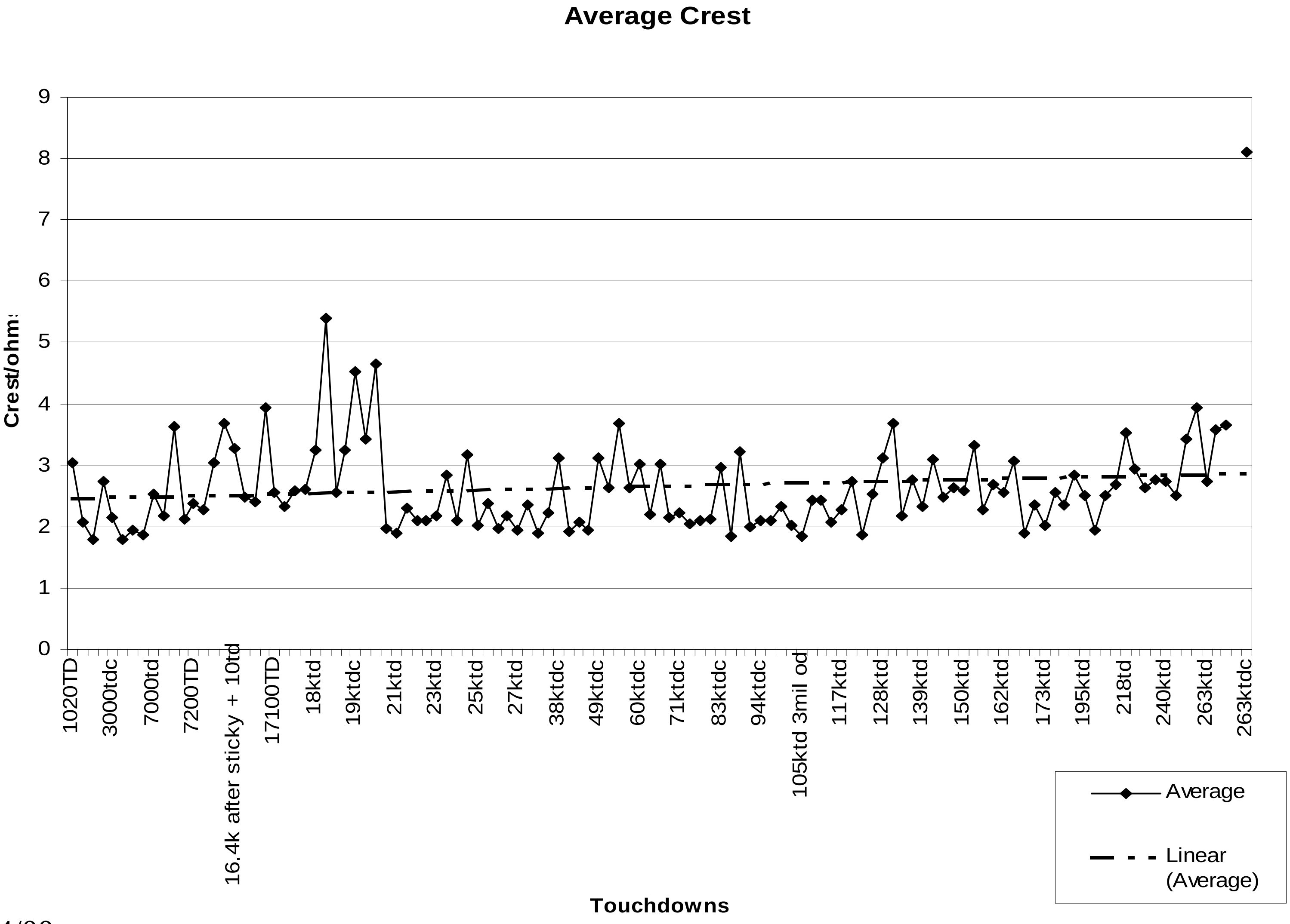
Online Cleaning



- Probe Tips After Cleaning with Permacel Tape
- Cleaning Parameter: 3X with 2 mil OD

- Permacel Tape after removing the debris from probes

Contact Resistance



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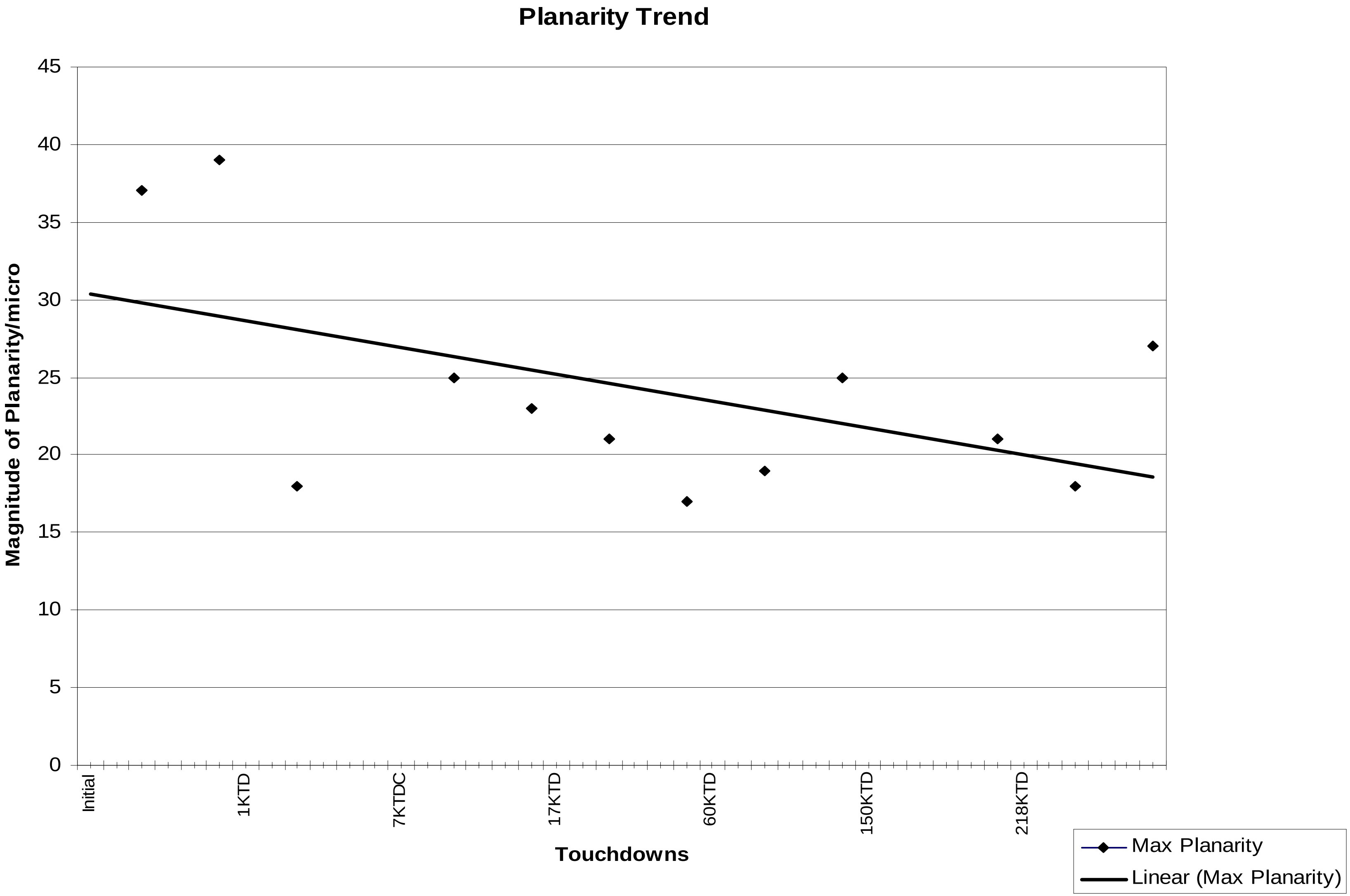
Positional Data

1st Quadrant				2nd Quadrant				3rd Quadrant				4th Quadrant			
Pads	DX	DY	DZ	Pads	DX	DY	DZ	Pads	DX	DY	DZ	Pads	DX	DY	DZ
1	-4	-21	-9	53	15	0	-5	105	-1	23	4	157	-12	4	0
2	-2	-22	-4	54	18	-2	-5	106	-2	22	9	158	-12	6	4
3	-2	-23	-9	55	19	-1	-11	107	0	23	-1	159	-12	3	4
4	-2	-21	-4	56	19	-3	0	108	-5	22	4	160	-13	5	-1
5	-3	-22	-9	57	19	-2	-6	109	-3	21	4	161	-13	2	0
6	-4	-21	-9	58	19	-2	-11	110	-3	23	15	162	-14	5	1
7	-2	-21	0	59	20	0	-12	111	-2	21	0	163	-13	3	3
8	0	-23	-6	60	20	0	-7	112	-2	21	-2	164	-14	3	-4
9	-2	-23	-5	61	21	0	-11	113	-4	22	4	165	-15	3	7
10	-1	-23	-1	62	19	0	-6	114	-3	22	0	166	-13	3	3
11	-1	-21	-5	63	20	0	-6	115	-2	22	-2	167	-14	2	2
12	-2	-22	0	64	20	0	-12	116	-4	19	2	168	-13	2	2
13	0	-22	-1	65	20	1	-6	117	-2	20	3	169	-13	1	3
14	0	-23	0	66	20	0	-6	118	-4	20	9	170	-13	2	-3
15	-1	-23	0	67	20	1	-5	119	-2	17	9	171	-13	1	1
16	-2	-21	-5	68	20	0	-11	120	-2	18	9	172	-14	1	1
17	0	-21	-5	69	19	2	-17	121	-1	21	10	173	-19	1	9
18	0	-21	-5	70	18	0	-11	122	-4	19	5	174	-14	2	-3
19	0	-20	1	71	18	1	-6	123	-3	25	-1	175	-15	2	-4
20	0	-21	-5	72	18	0	-6	124	-3	18	9	176	-14	2	-2
21	0	-21	-1	73	21	0	-12	125	-2	19	10	177	-14	2	2
22	0	-21	0	74	20	-2	-11	126	-3	18	10	178	-14	1	2
23	0	-20	1	75	20	-2	-11	127	-3	19	10	179	-14	0	2
24	0	-21	0	76	20	-4	-11	128	-3	18	17	180	-15	0	-4
25	0	-22	-5	77	20	1	6	129	-7	20	7	181	-14	1	-3
26	0	-21	-1	78	21	-3	0	130	-2	19	11	182	-14	0	-3
27	-1	-22	1	79	20	-1	-11	131	-2	21	6	183	-18	2	2
28	-1	-22	0	80	19	0	-12	132	-3	19	11	184	-15	2	2
29	0	-22	0	81	18	-1	-5	133	-3	18	12	185	-15	2	1
30	-1	-22	0	82	19	0	-6	134	-3	18	7	186	-15	1	-4
31	0	-21	5	83	18	0	-11	135	-2	19	12	187	-14	2	2
32	0	-21	0	84	20	0	-11	136	-3	19	7	188	-15	1	3
33	0	-21	-1	85	20	1	-8	137	-3	20	7	189	-15	3	2
34	-2	-20	0	86	18	0	-8	138	-3	18	7	190	-14	4	8
35	-1	-21	0	87	17	2	-8	139	-3	17	7	191	-16	5	-3
36	-1	-21	1	88	18	0	-14	140	-4	16	13	192	-15	1	3
37	0	-22	1	89	19	2	-13	141	-3	18	13	193	-15	0	1
38	-2	-22	5	90	18	1	-8	142	-3	19	6	194	-15	0	-3
39	-1	-21	6	91	20	1	-13	143	0	19	6	195	-14	1	1
40	-1	-22	4	92	20	0	-2	144	-4	17	1	196	-14	0	2
41	0	-22	4	93	18	0	-7	145	-1	18	1	197	-13	5	3
42	0	-22	5	94	19	0	-13	146	-1	17	11	198	-15	-1	3
43	0	-22	6	95	17	1	-3	147	-2	19	18	199	-15	2	1
44	-1	-22	5	96	18	0	-13	148	0	18	6	200	-16	0	20
45	-1	-22	6	97	19	1	-13	149	-1	18	6	201	-15	1	-4
46	-1	-22	1	98	16	0	3	150	-1	18	12	202	-21	6	10
47	0	-23	1	99	18	1	-8	151	-3	16	1	203	-14	3	1
48	-1	-23	5	100	17	1	4	152	-4	17	12	204	-14	1	4
49	0	-22	5	101	18	2	-8	153	-4	17	5	205	-14	1	2
50	-1	-22	6	102	17	2	7	154	-4	18	6	206	-14	1	3
51	-1	-24	0	103	17	0	-13	155	-1	19	1	207	-18	2	2
52	0	-22	6	104	17	0	-8	156	0	17	4	208	-16	-1	2
min	-4	-24	-9		15	-4	-17		-7	16	-2		-21	-1	-4
max	0	-20	6		21	2	7		0	25	18		-12	6	20
mag	4	4	15		6	6	24		7	9	20		9	7	24

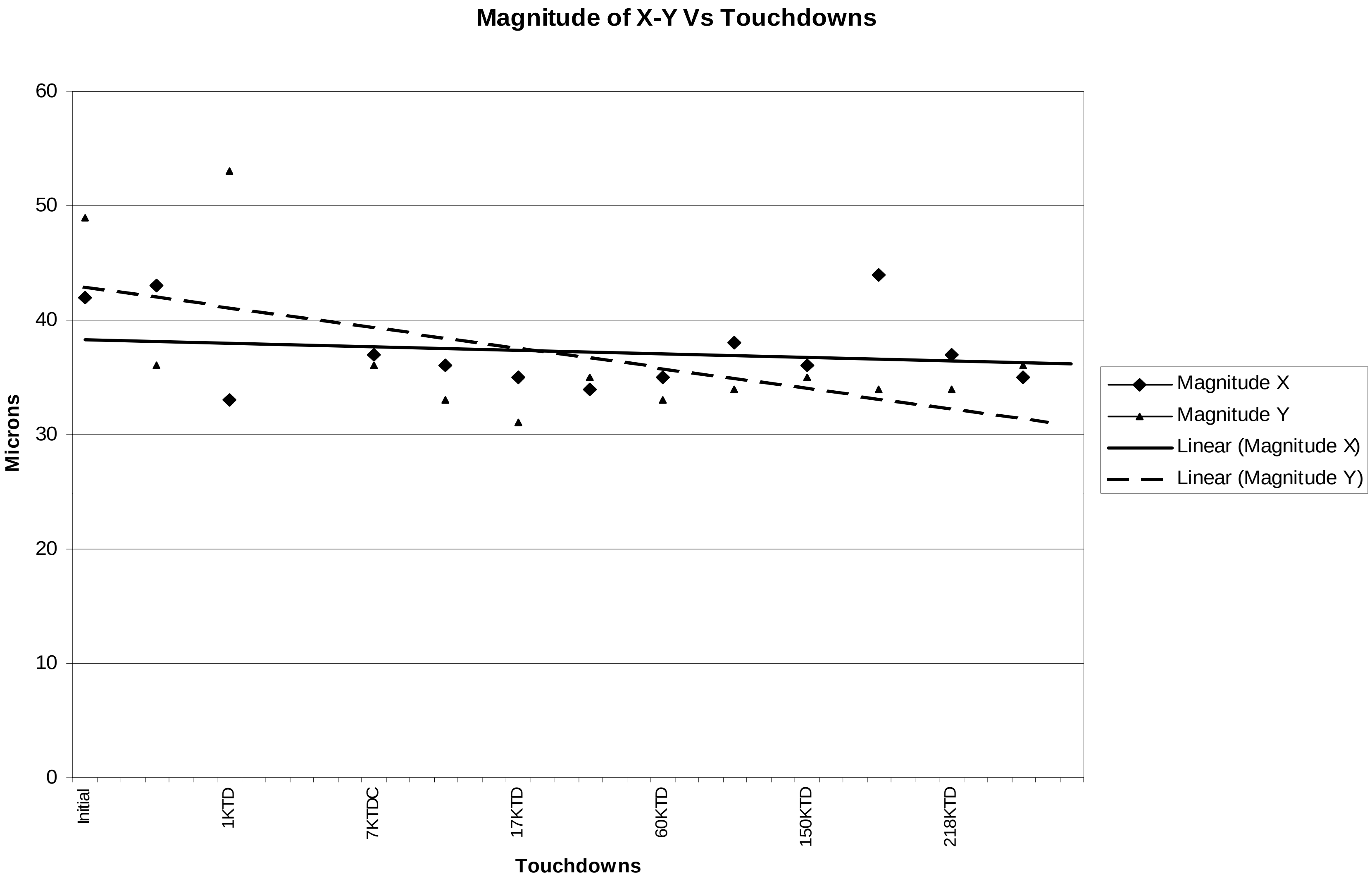
Note:

- Data was taken with TSK APM90A
- Lighting Algorithm 0 was used
- Data was taken at the beginning of the evaluation

Planarity Trend



X-Y Positional



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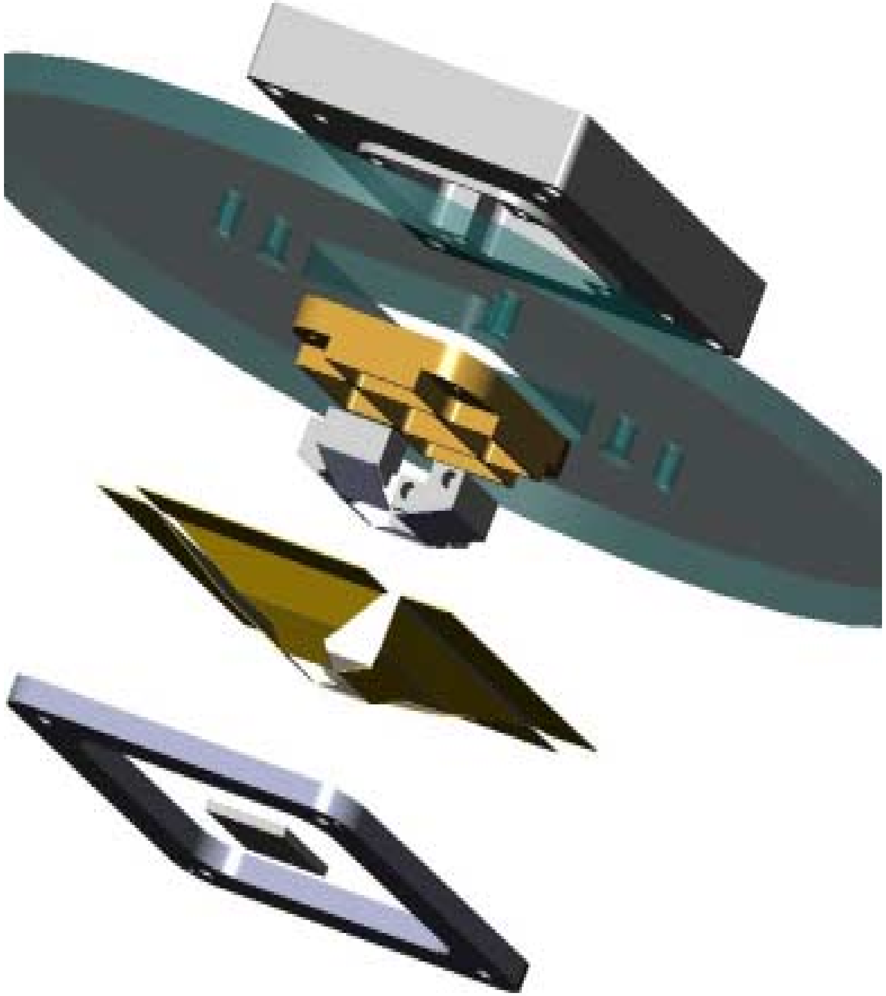
P4™



Photolithographic

Pattern

Plated

Probe

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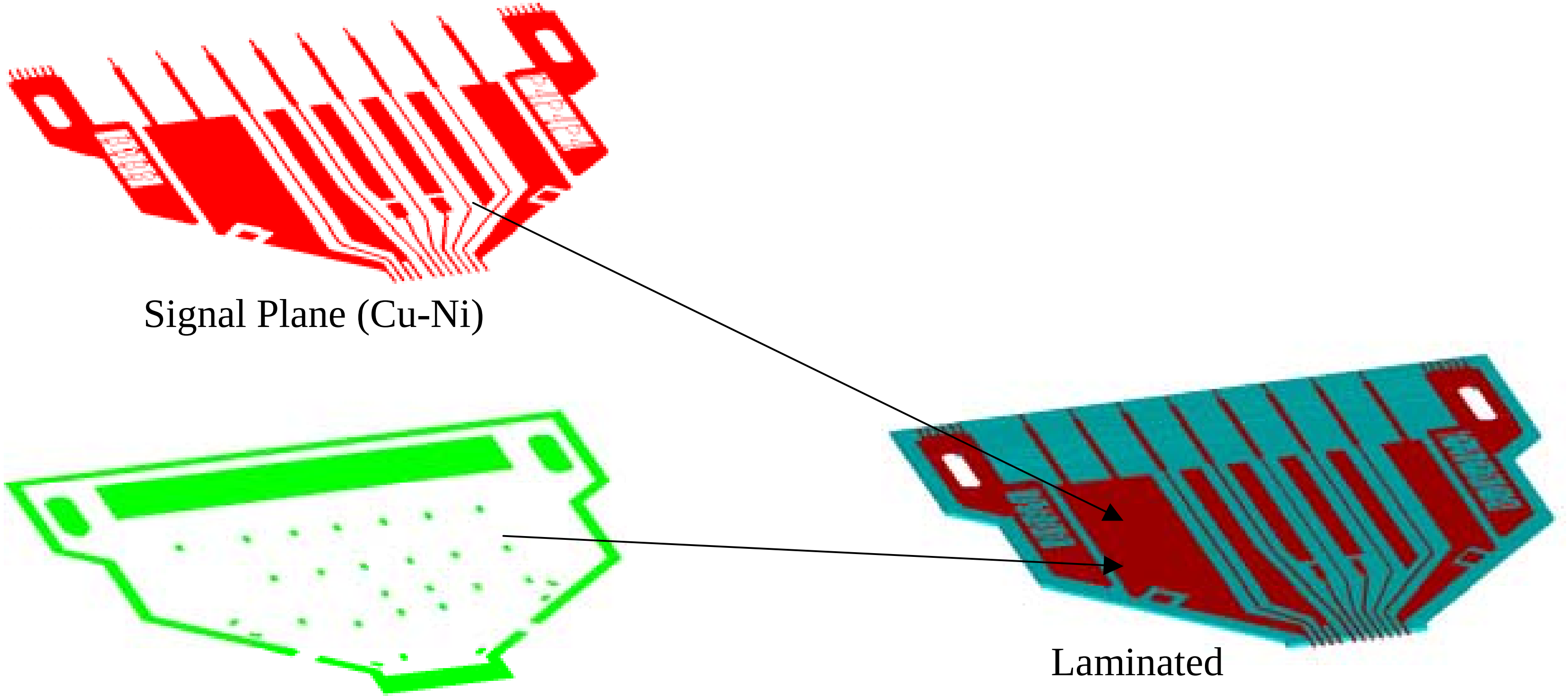
Lamination Components

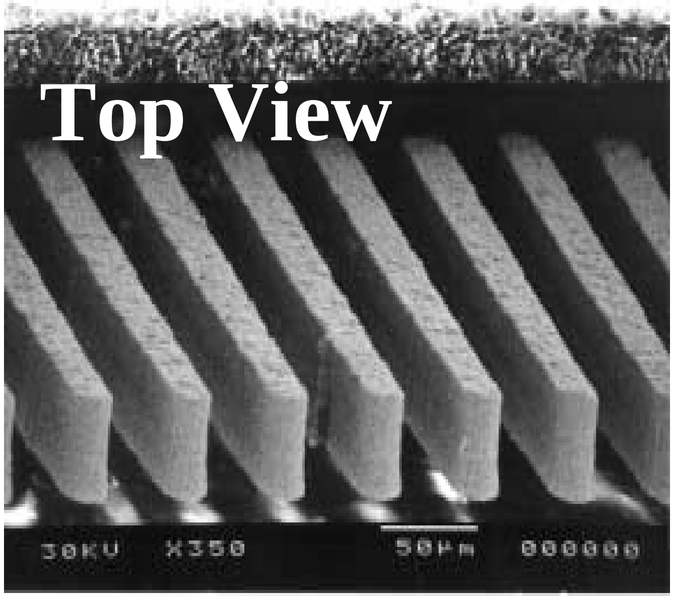


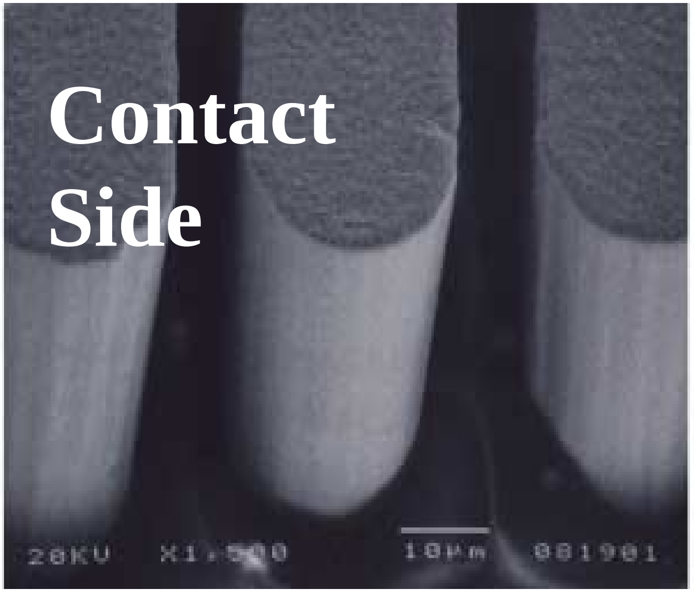
Signal Plane (Cu-Ni)

Ground Plane
(Dielectric-Nickel)

Laminated
Contact Set

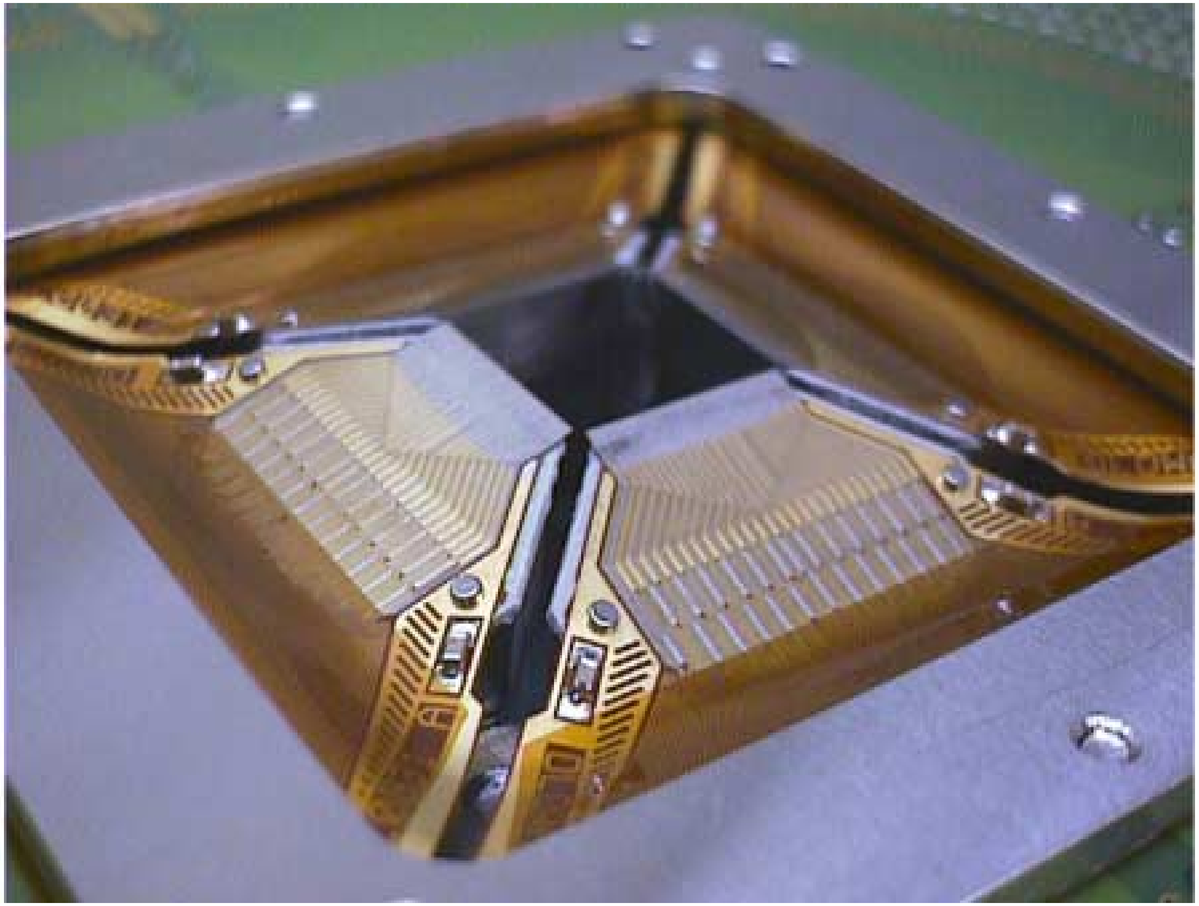
P4™ Probes





50µm Pitch Probes

P4™ Probe Card Contacts



Conclusion

- P4™ is able to meet the test requirements of our test wafer.
- A small and consistent scrub mark was achieved with less than 75µm of over drive.
- A nondestructive cleaning method has shown to be reliable.