

VSCC

Vertical Spring Contact Card for Bump Probing

Patrick Mui, JEM America Corp. (Presenter)

Kaz Okubo, JEM America Corp.

Toshio Kazama, NHK Spring., LTD

Shunsuke Sasaki, NHK Spring Co.,LTD.

Yoshio Yamada, NHK Spring Co., LTD

Akira Okuma, NHK International

Outline

- ✍ VSCC Concept
- ✍ Electrical and Mechanical Data
- ✍ Maintenance
- ✍ Specifications
- ✍ Roadmap
- ✍ Summary

Vertical Spring Contact Card

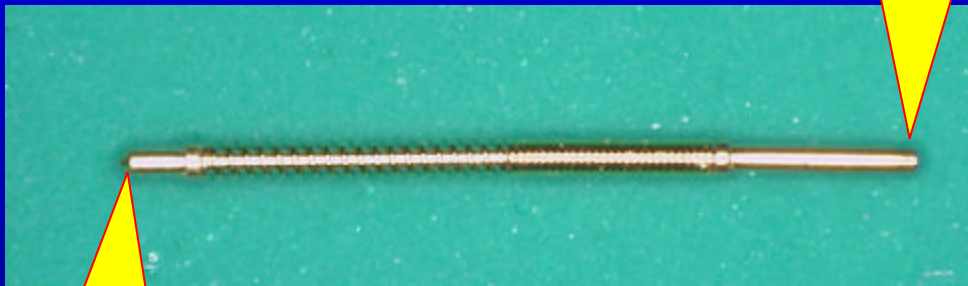
Features:

- ✍ For probing area arrays (solder or Cu bumps).
- ✍ Mechanically-isolated probes.
- ✍ Stable alignment and planarity.
- ✍ Replaceable probes and head.
- ✍ No floating probes.
- ✍ Low, linear probe force.
- ✍ Two different tip shapes.

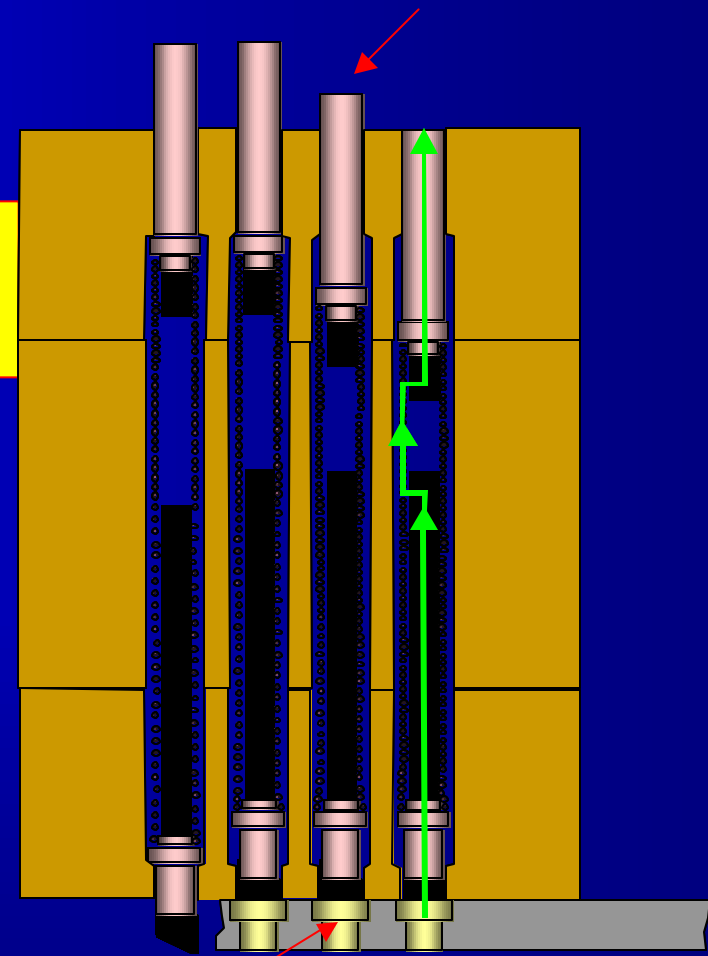
Vertical Spring Contact Card

Bump side

Contact to Bump
(Flat or pointed
Tip)



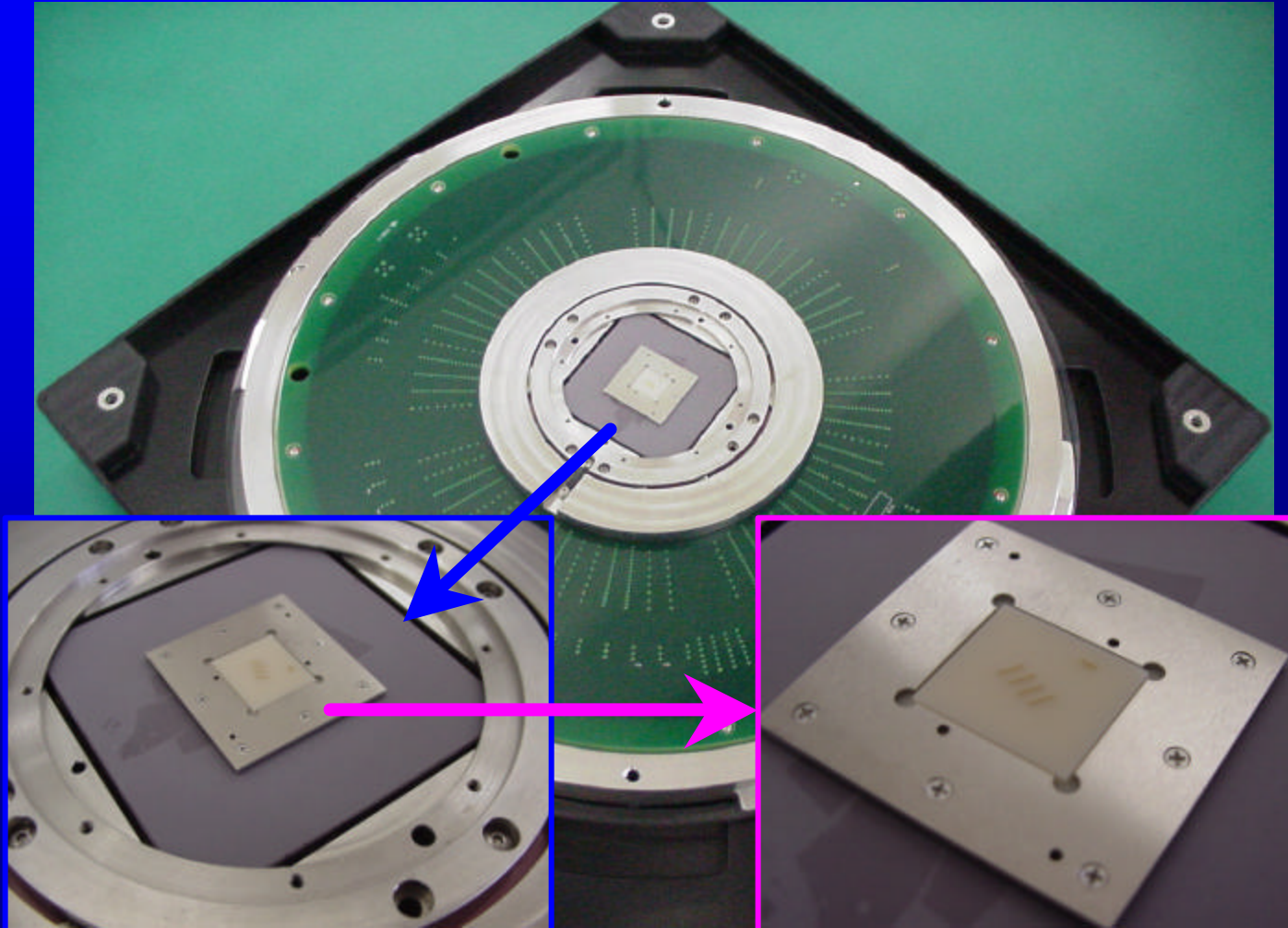
Contact to Interposer
(Conical Tip)



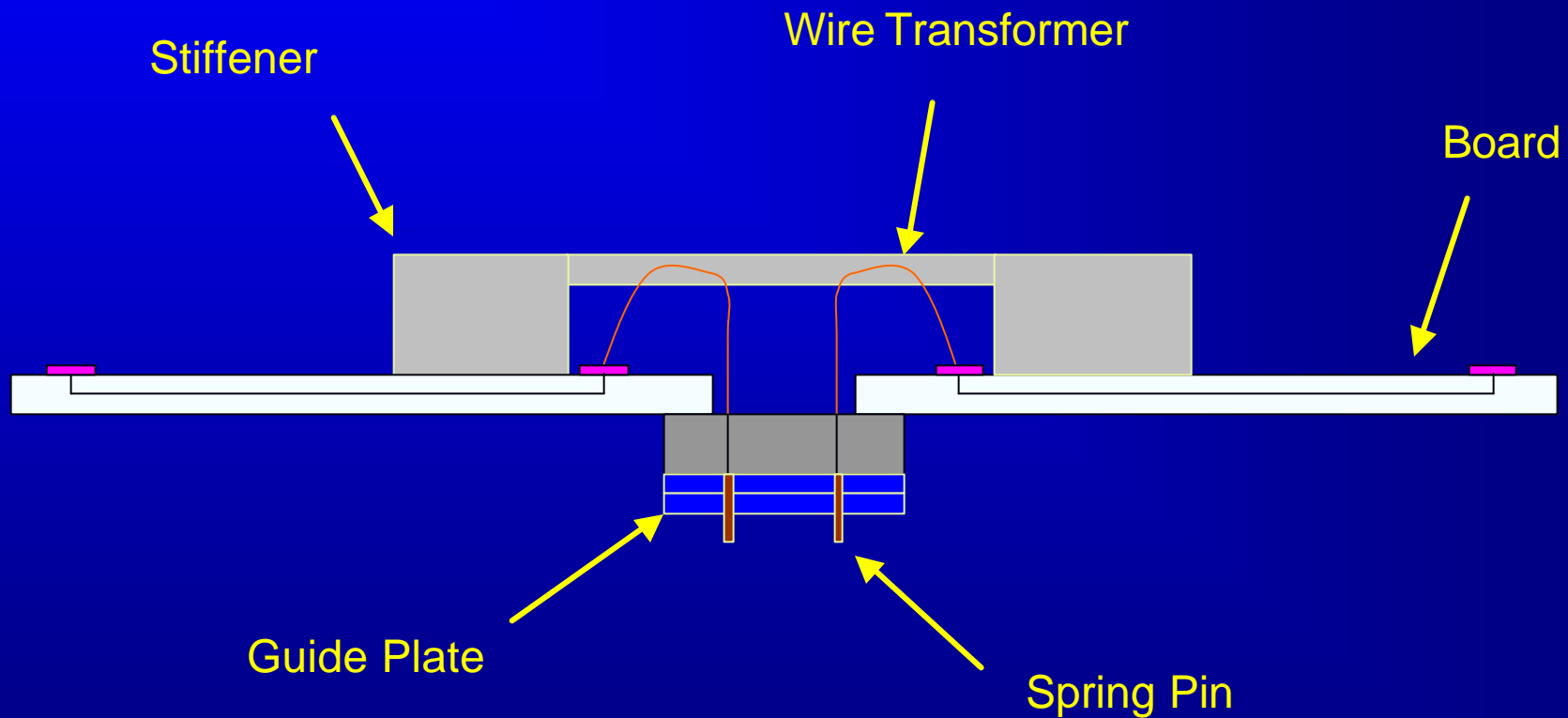
MLO \ MLC side

Probe Head Aerial View

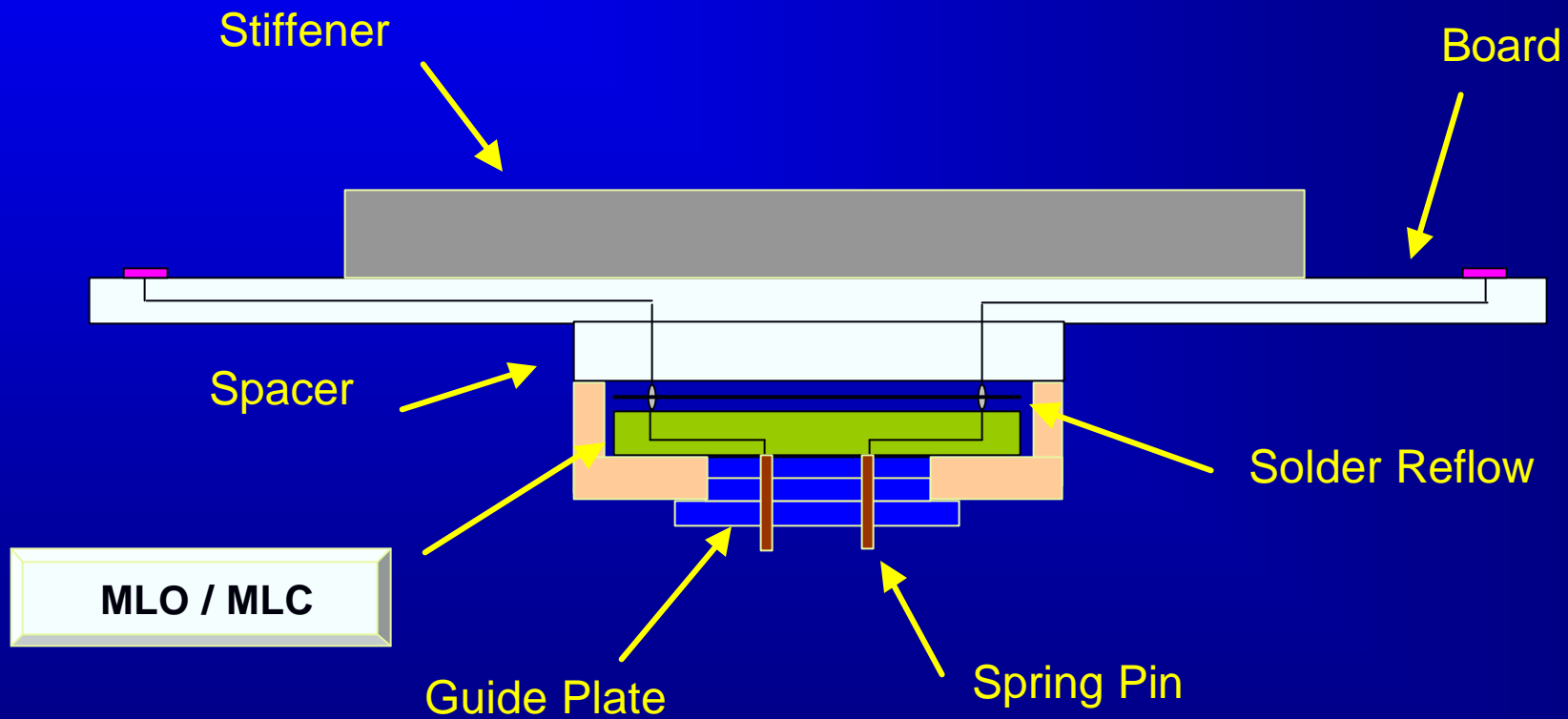
Probe Head with PCB



VSC Configuration (Wire Transformer Type)

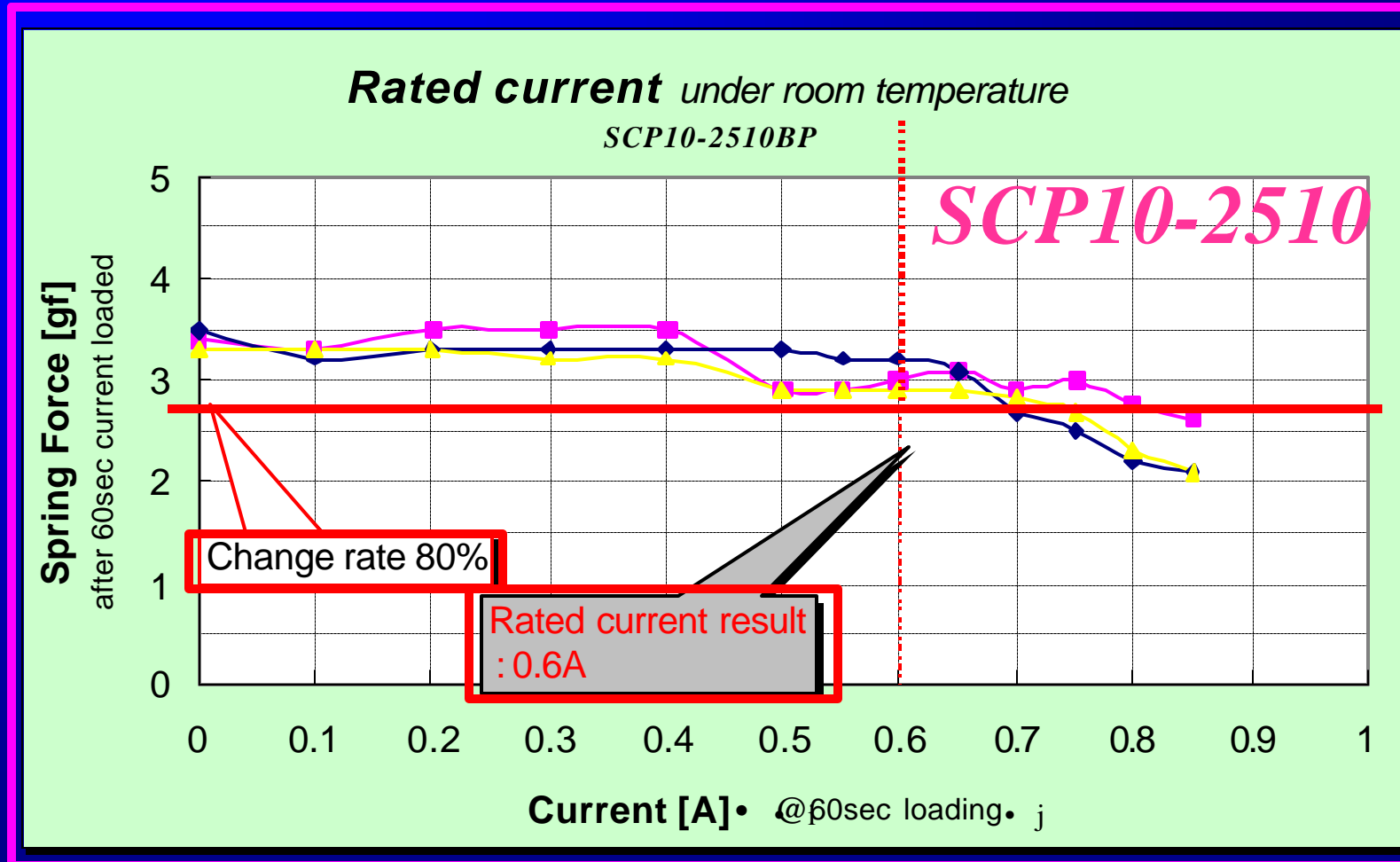


VSC Configuration (Space Transformer with MLO/MLC)



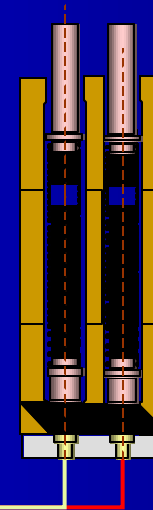
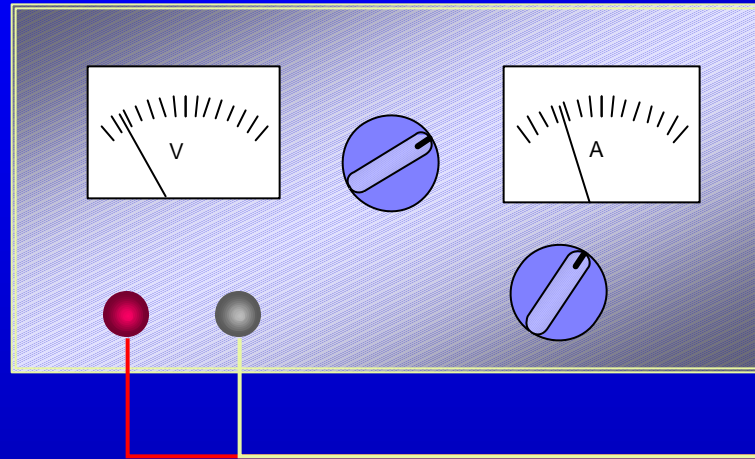
Current Rating under room temp

For 150um pitch pin



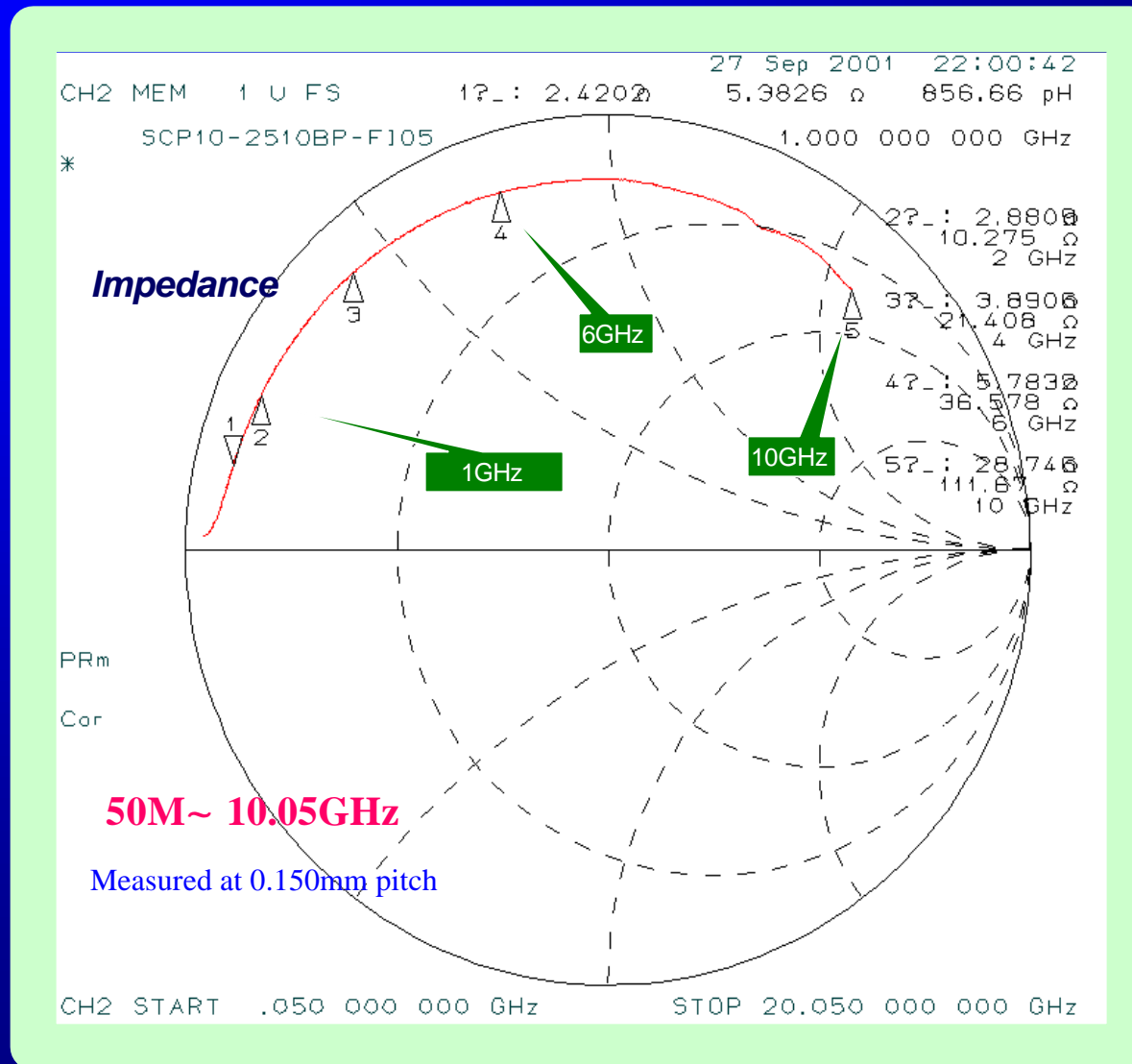
Dielectric Breakdown Voltage

Voltage Source



SCP14-3010	0.2mm Pitch	AC	400V (for 1 minute)
SCP12-2510	0.175mm Pitch	AC	400V (for 1 minute)
SCP10-2510	0.15mm Pitch	AC	300V (for 1 minute)

Impedance - S_{11} Short Measurement

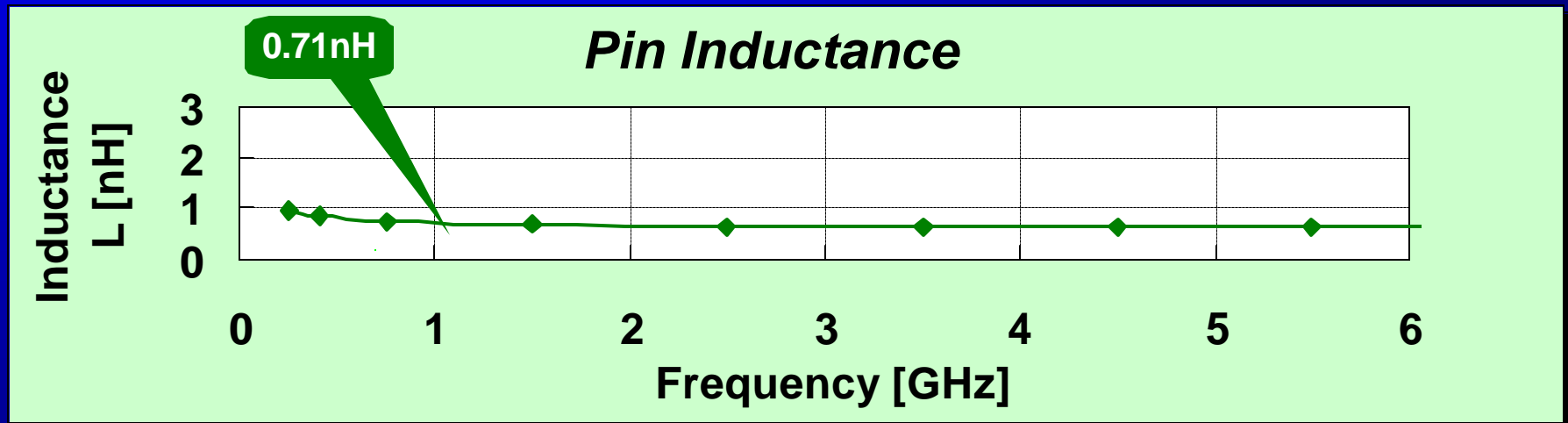


Smith Chart

Inductance

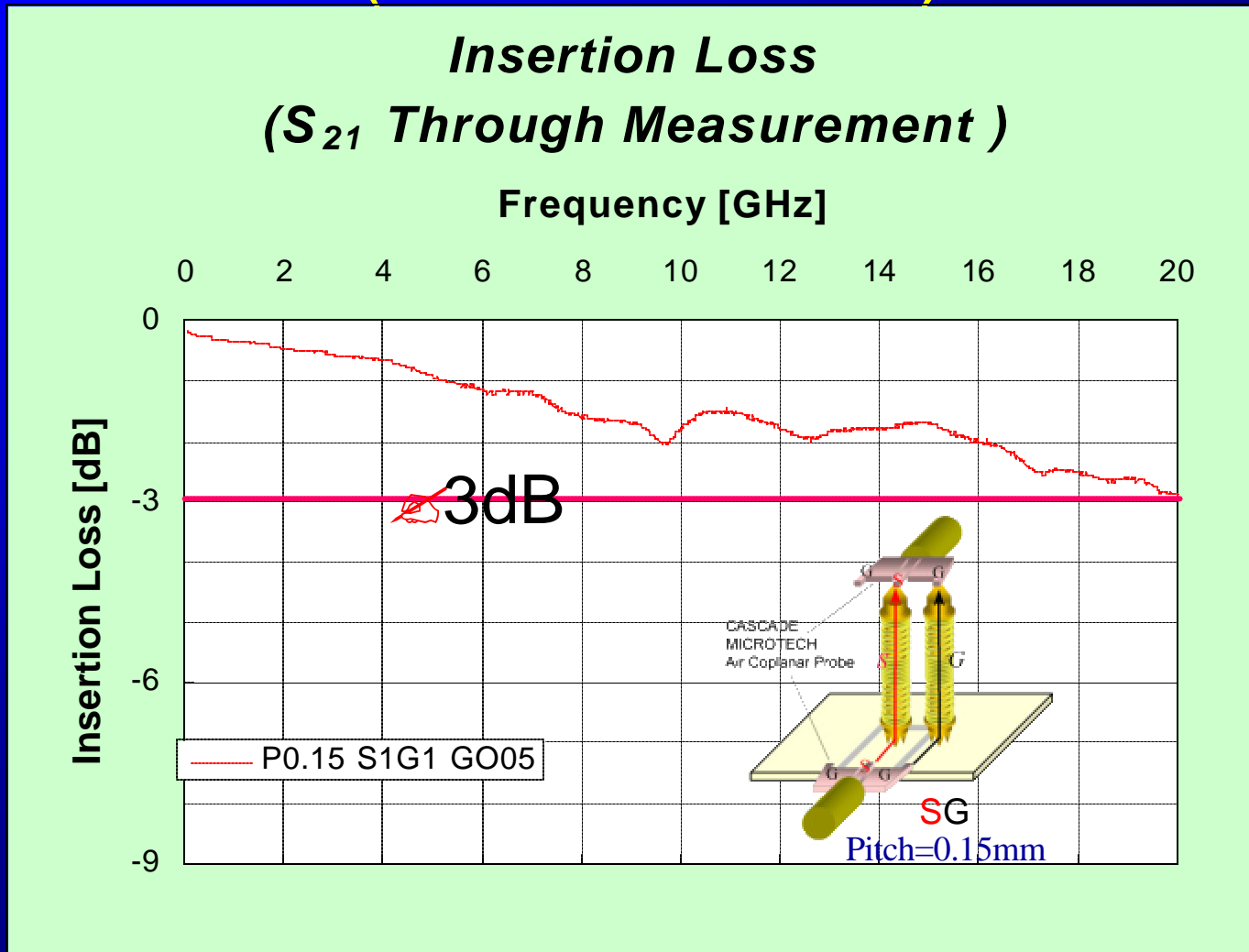
SPICE Equivalent Circuit Model Simulation
by S-NAP Circuit Simulator

DUT=SCP10-2510BP

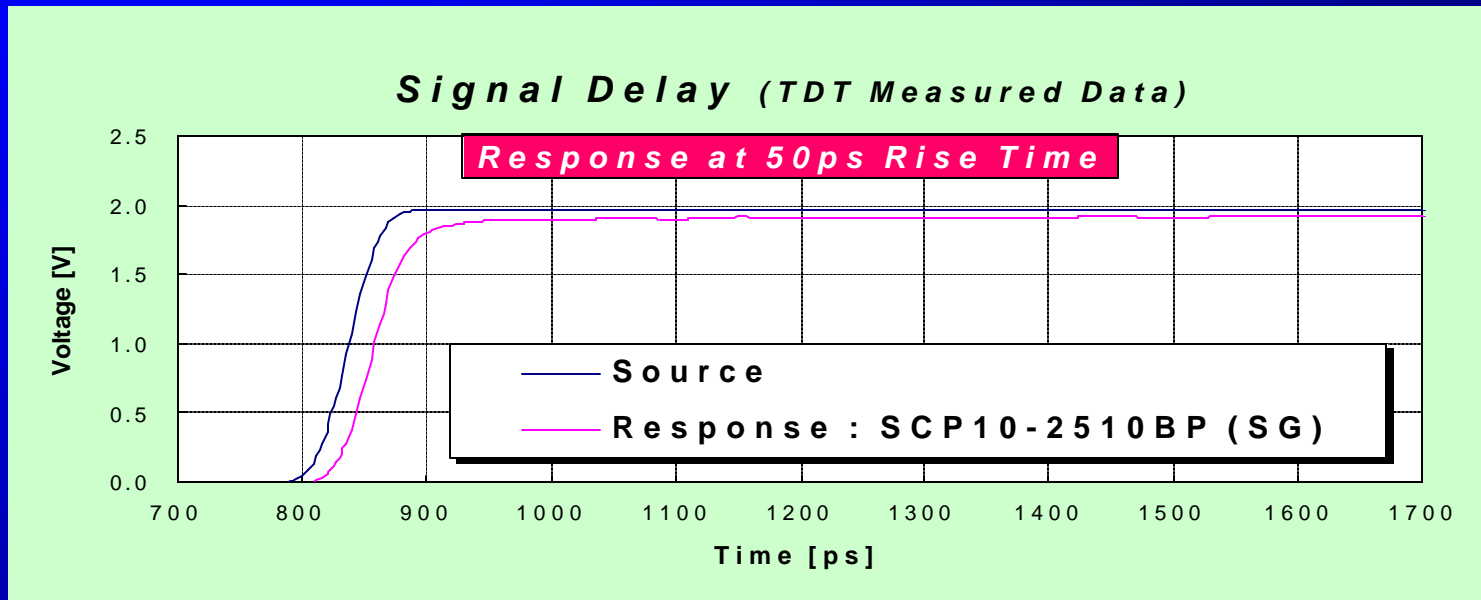


Operating Frequency (Insertion Loss)

DUT=SCP10-2510BP



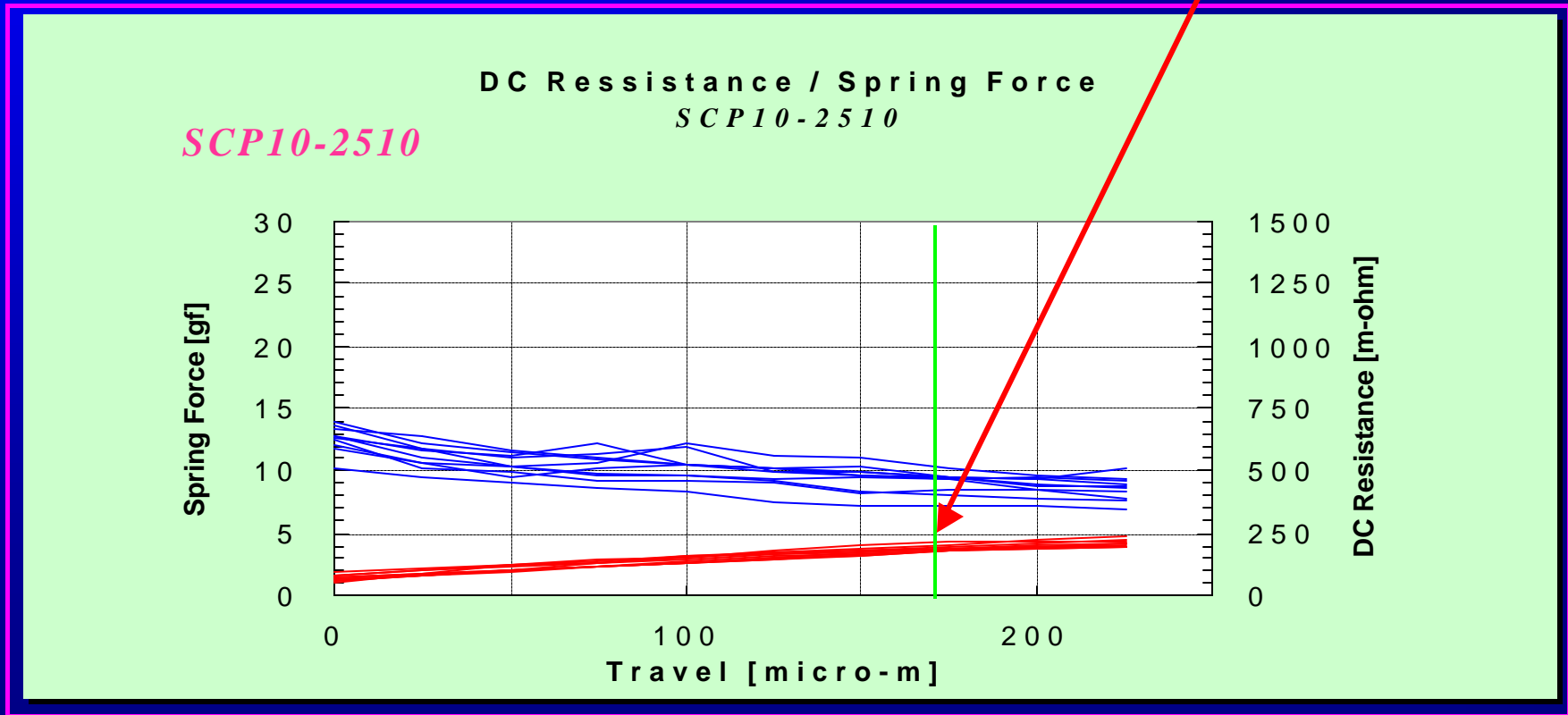
Signal Integrity (TDT Measurement)



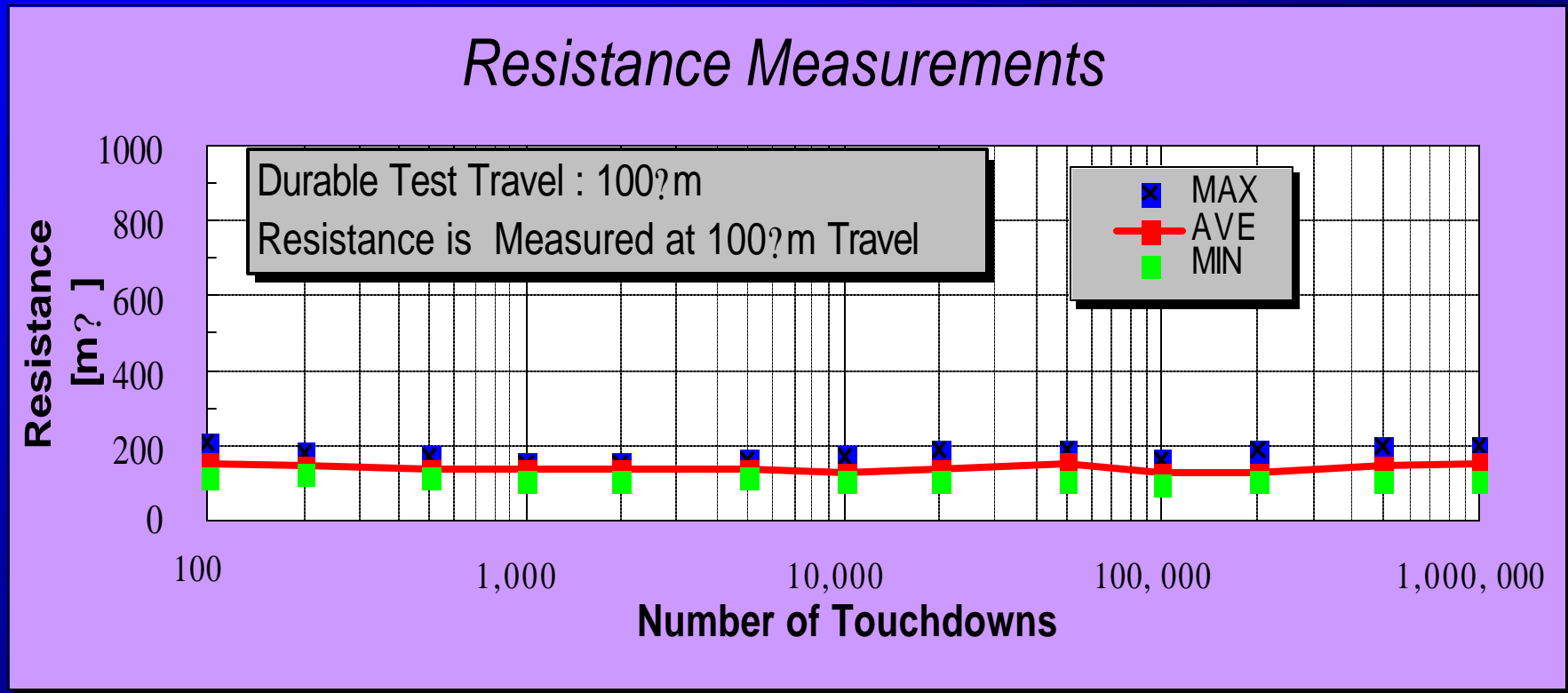
Rise Time [ps]		Delay [ps]
Source	Response	
50	58.6	20.8
100	108.3	22.6
200	208.4	24.7
300	309.0	26.4
400	406.9	28.6
500	506.9	30.0

Force / Resistance - Travel Curve

Average = 3.81gf @170um OD



CRES vs Touchdowns



Solder Bump Deformation After Probing

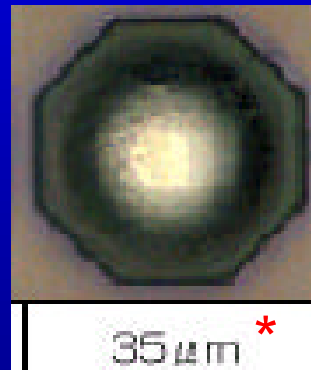
- Temp.: 85 degree
- O.D. : 170 μm

* Contact Deformation Diameter is measured on Xaxis

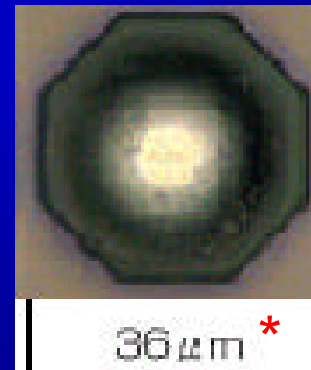
Top View
of Non-Contact
Solder Bump



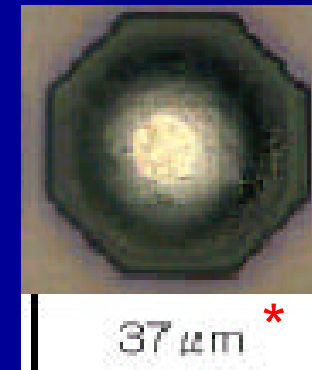
First
contact



3 times
contact



6 times
contact

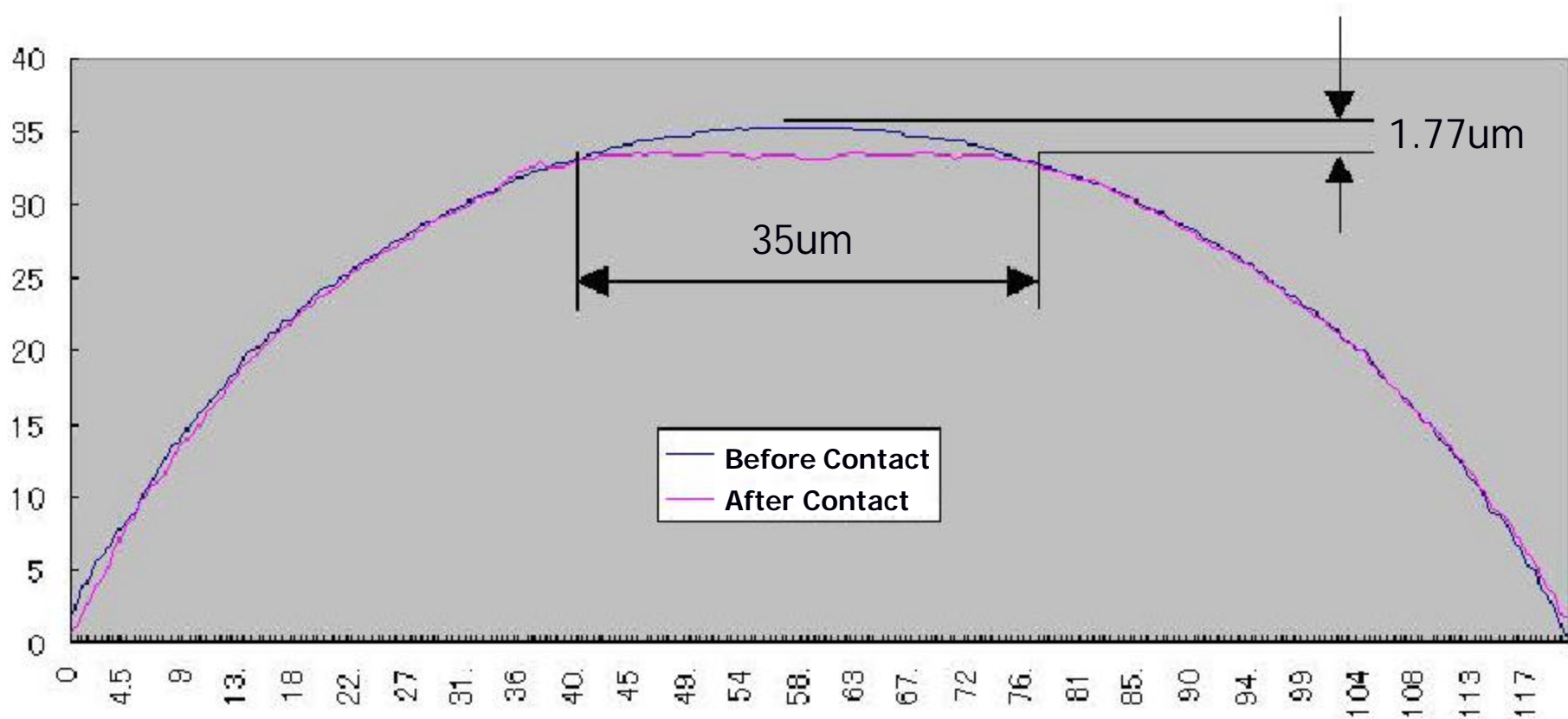


Ball Deformation Measurement

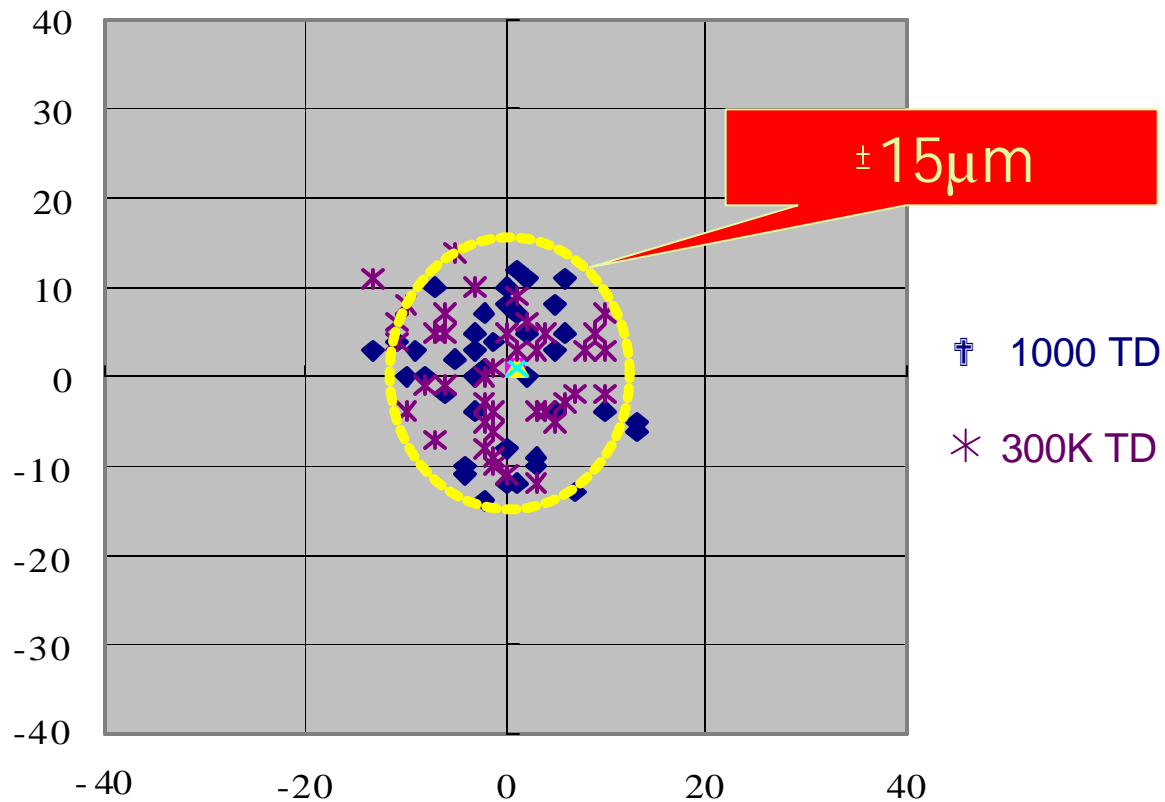
Temp.: 85 degree

TD: 1 time

OD: 170um



Probe Alignment at 85°C

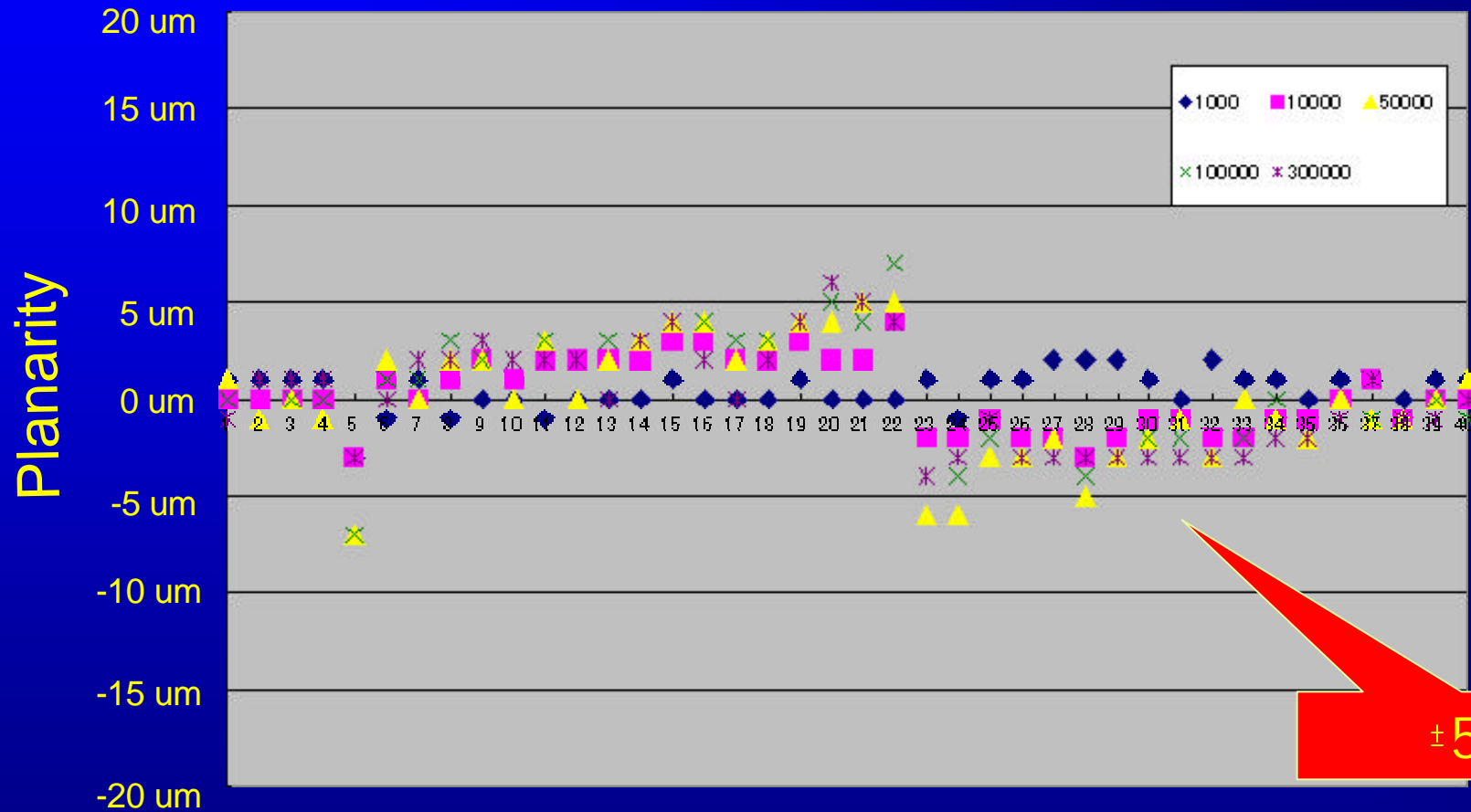


Condition

Number of probes: 40pins

Number of DUT: Single

Planarity



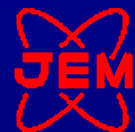
Condition

Number of probes: 40pins

Number of DUT: Single

SWTW 2002

NHKニッパツ



Cleaning Procedure

Cleaning Sheet

Lapping film with 1- μm grain size

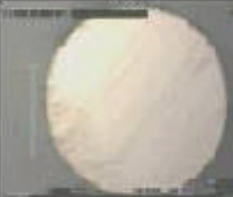



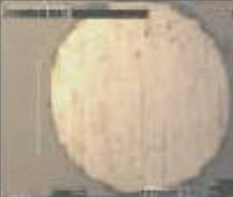
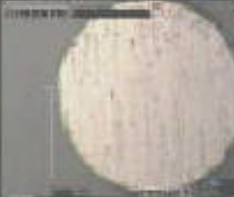

















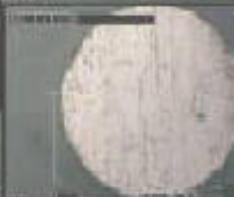
Conditions

? OD : 100 μm

? Wiping action : 150 μm

? Number Touchdowns : 5~ 10

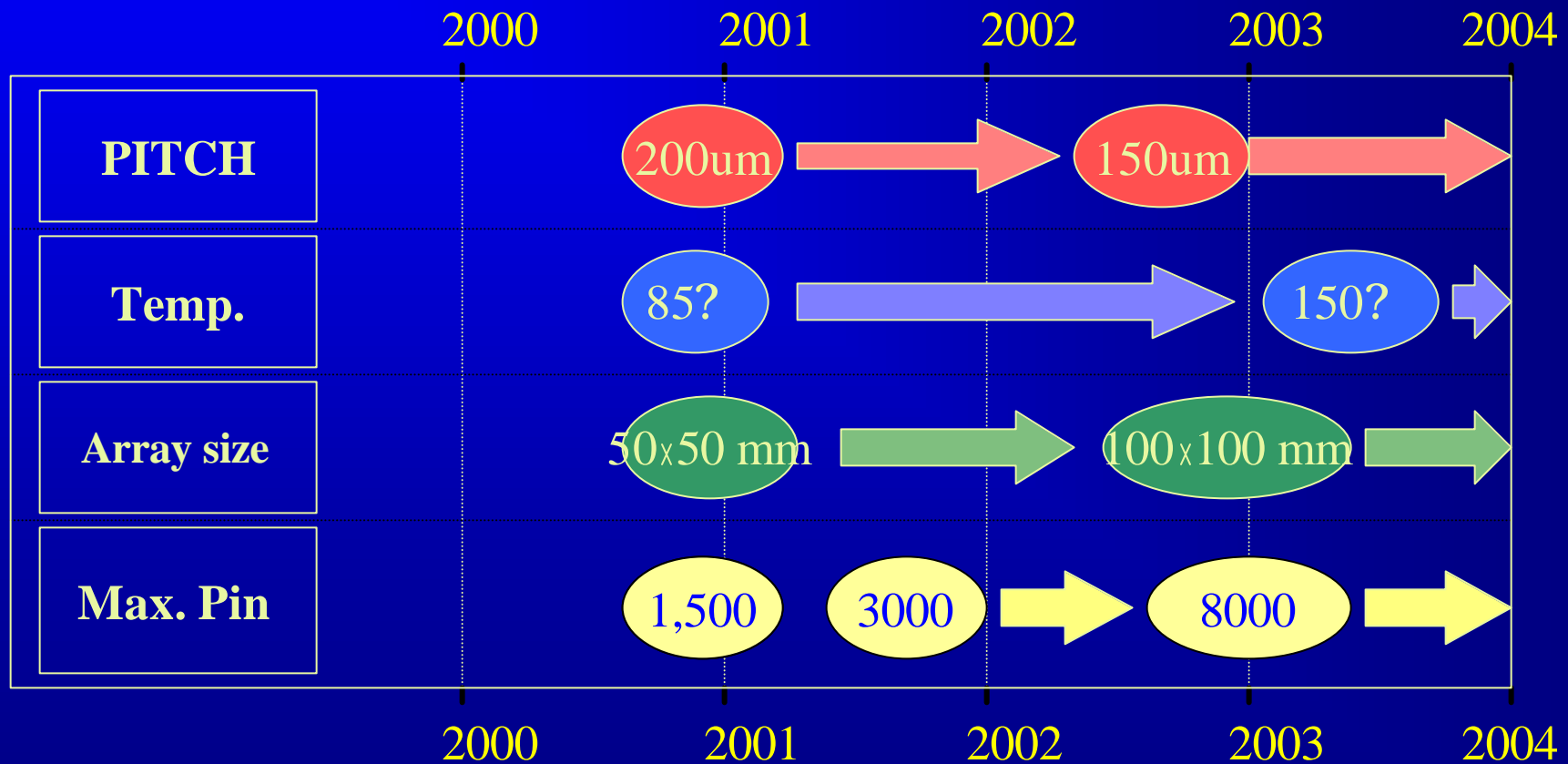
Tip Cleaning

		Number of Wipes				
	Initial	3K TDs	5 Times	10 Times	20 Times	30 Times
No.1						
No.2						
No.3						
No.18						

Specifications

✍ Alignment	: ± 15 μm
✍ Planarity	: ± 15 μm
✍ Minimum Pitch	: 150 μm
✍ Material	: P7, Steel
✍ Tip Diameter	: 75 - 100 μm
✍ Tip Length	: 250-300 ± 20 μm
✍ Contact Resistance	: less than 1 ohm
✍ Contact Force	: 4.1 - 6 g
✍ Recommended OD	: 170 - 200 μm
✍ Maximum Current	: 500 mA
✍ Temperature Range	: 25 - 85 °C

Road Map



Summary

- ✍ New solution for area arrays.
- ✍ Stable mechanical and electrical performance.
- ✍ Very easy to repair.
- ✍ Proven in production at multiple sites.