Burn in test at finer pitch less than 0.25 mm at lower cost

Sang Yang (Samuel) Pak
IWIN Co., Ltd.

Introduction

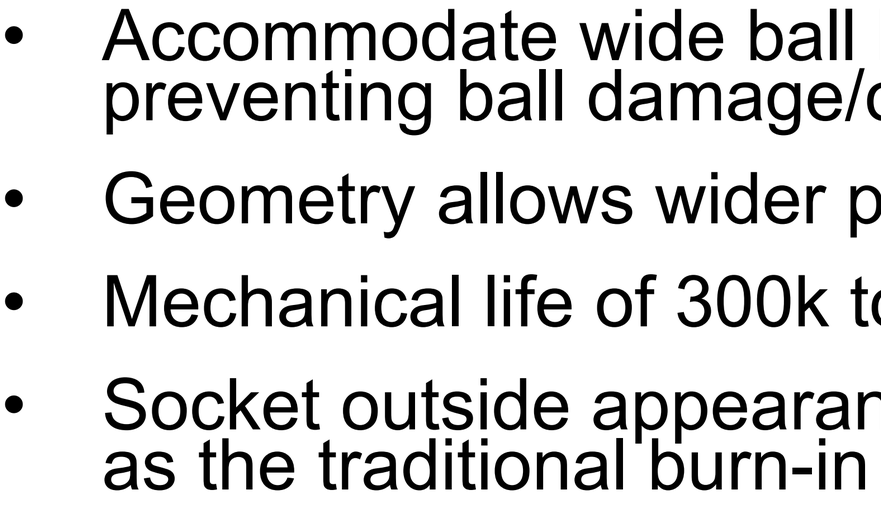
Due to high temperature test, tolerance control should be tightened as BGA balls become soft. Previous burn in test pins provide at most 0.25 mm of travelling. Tolerance for the height of BGA balls at chip maker is not small enough such as +/-0.05 mm which causes wide range of the compressed height, 0.20 mm ~ 0.30 mm, and wide range of the spring force between minimum and maximum height, resulting combination of open failure and ball damages. Lots of trouble can be prevented at reasonable cost.

Comparison of Technology

- Provide longer traveling distance > 1.0 mm.
- Accommodate wide ball height tolerances with controlled spring force preventing ball damage/open failure.
- Geometry allows wider pitch as well as smaller pitch <0.25 mm.
- Mechanical life of 300k touchdowns compared to 10k touchdowns.
- Socket outside appearance and most of the mechanism remain same as the traditional burn-in contact socket.
- Reasonable make cost and lead time by stamping technology and full automation.
- Provide much superior signal integrity and insertion loss.

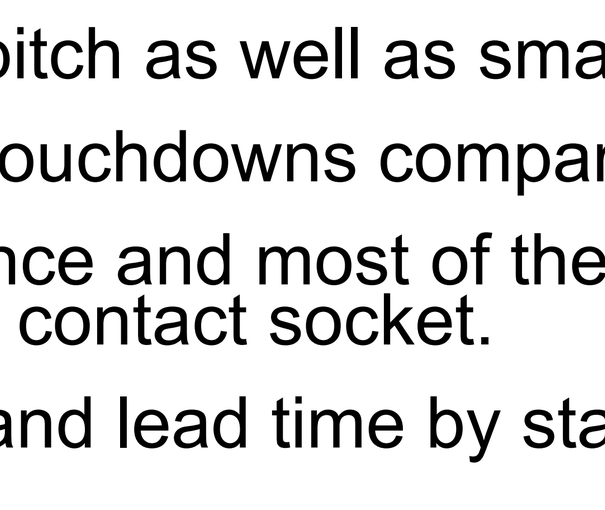
Various Test sockets

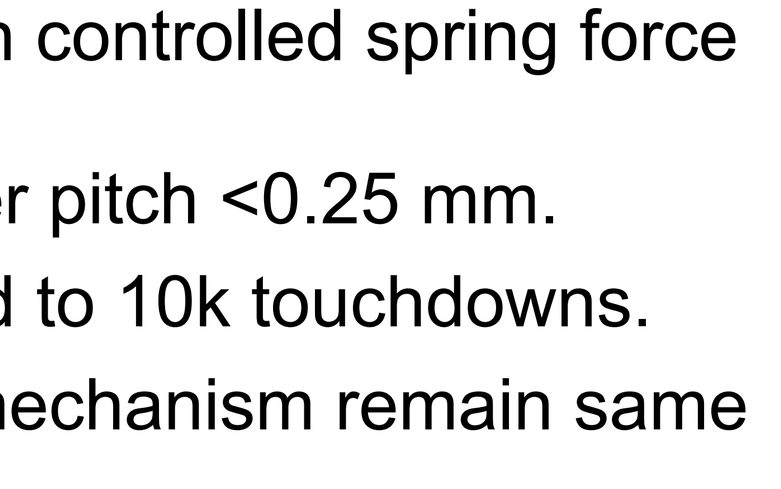
Traditional Pin shape



Drop in replacement with traditional burn in contact socket possible

8,495 pin count





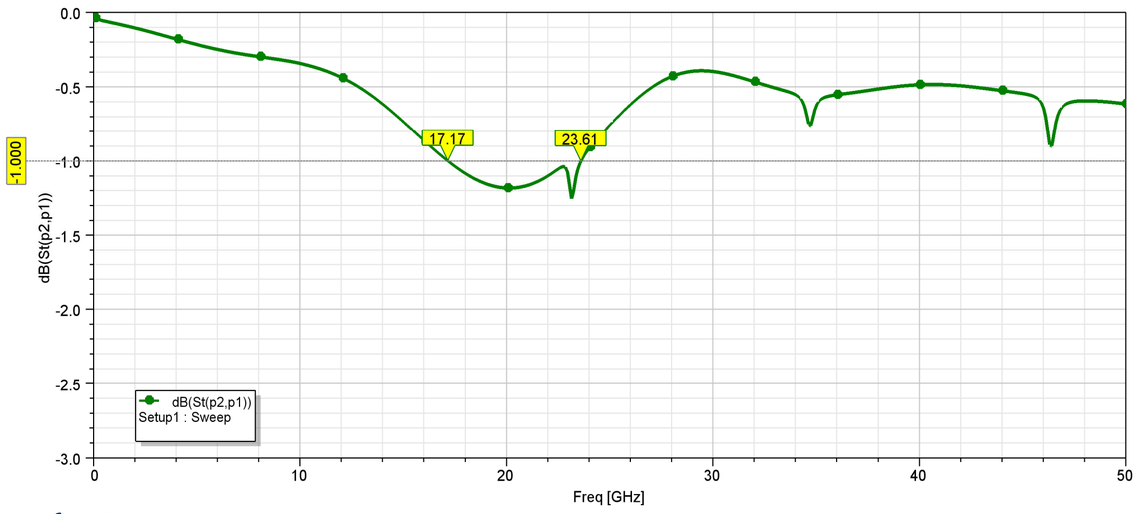
Longer pin but good for high frequency

Signal Integrity

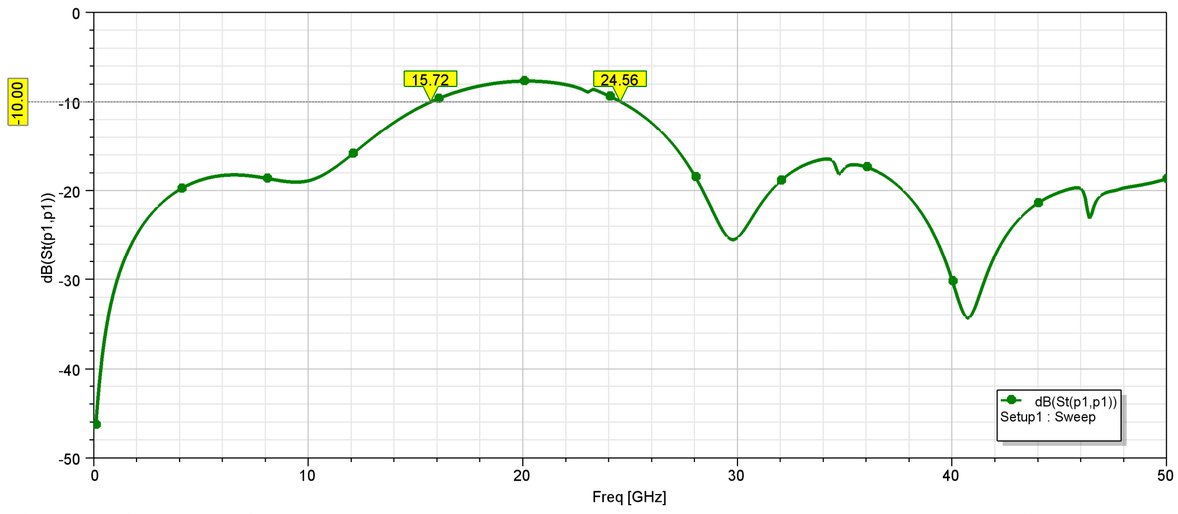
Case study #1 TTSP 27850C4-01

Pin length 8.50mm / 4 sharp tips crown / for 0.4mm pitch / Beryllium Copper

Insertion Loss, TTSP 27850C4-01



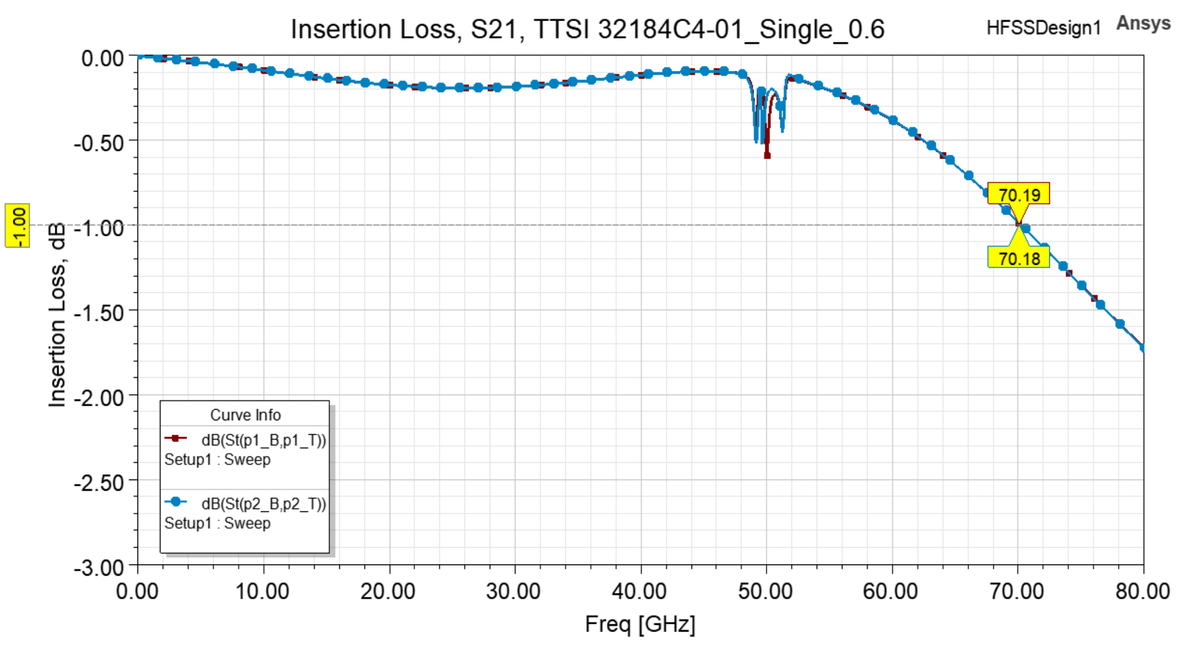
Return Loss, TTSP 27850C4-01

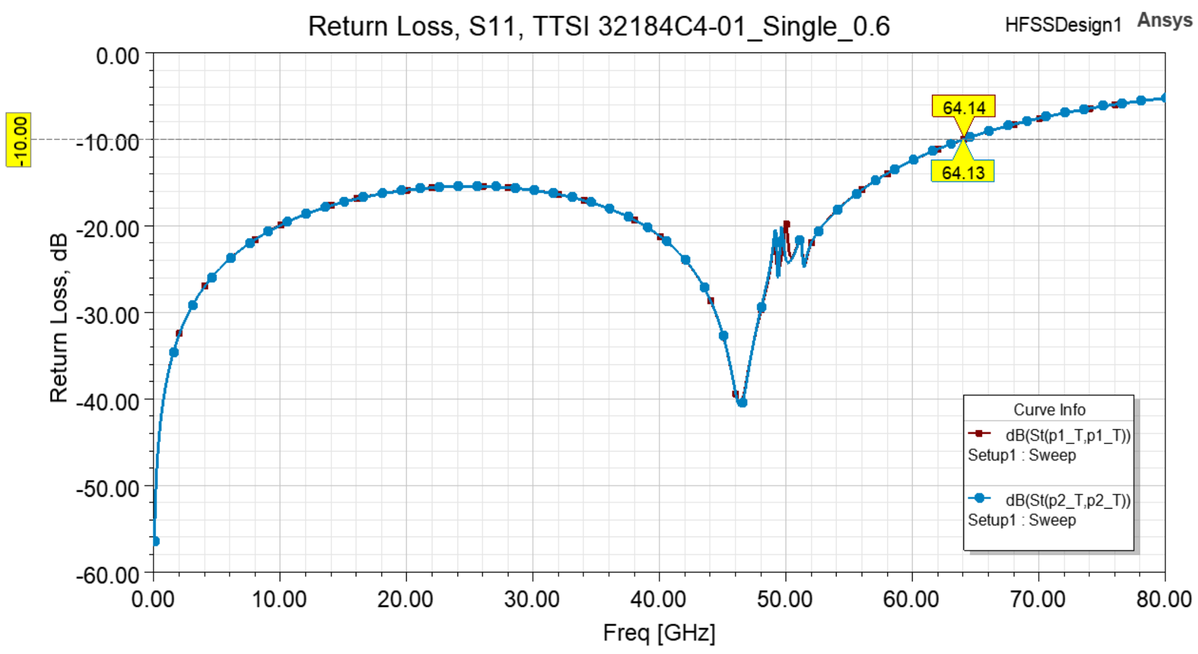


✓ Drop in replacement possible to replace the traditional memory burn in sockets, or soldering to PCB

Case study #2 TTSI 32184C4-01

Pin length 1.84mm / 4 sharp tips crown / for 0.4mm pitch / Beryllium Copper



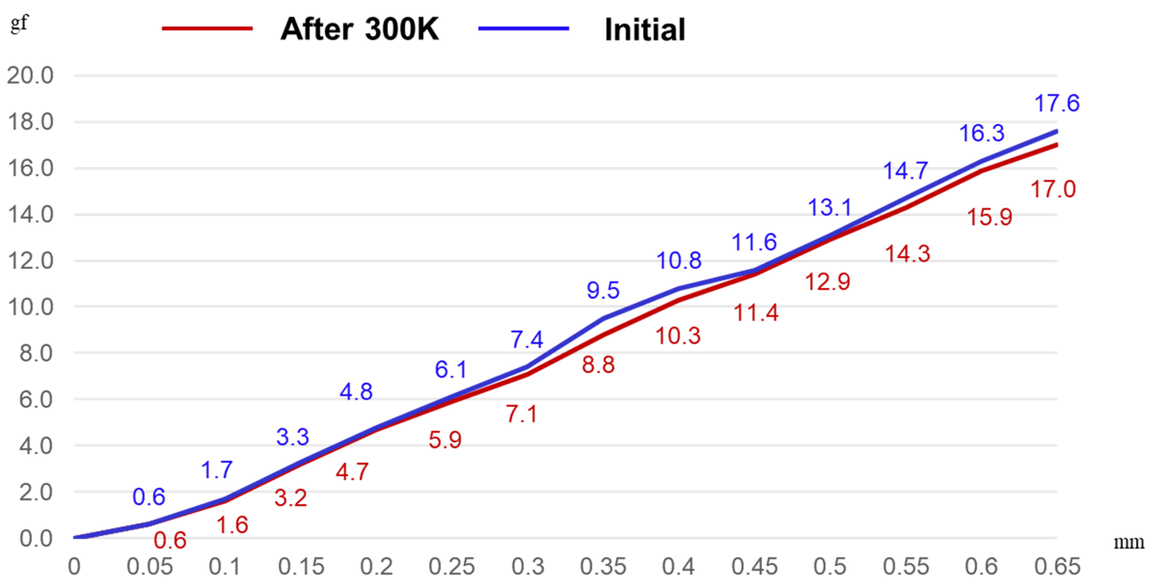


✓ Designed for higher frequency or to replace elastomer for high temperature.

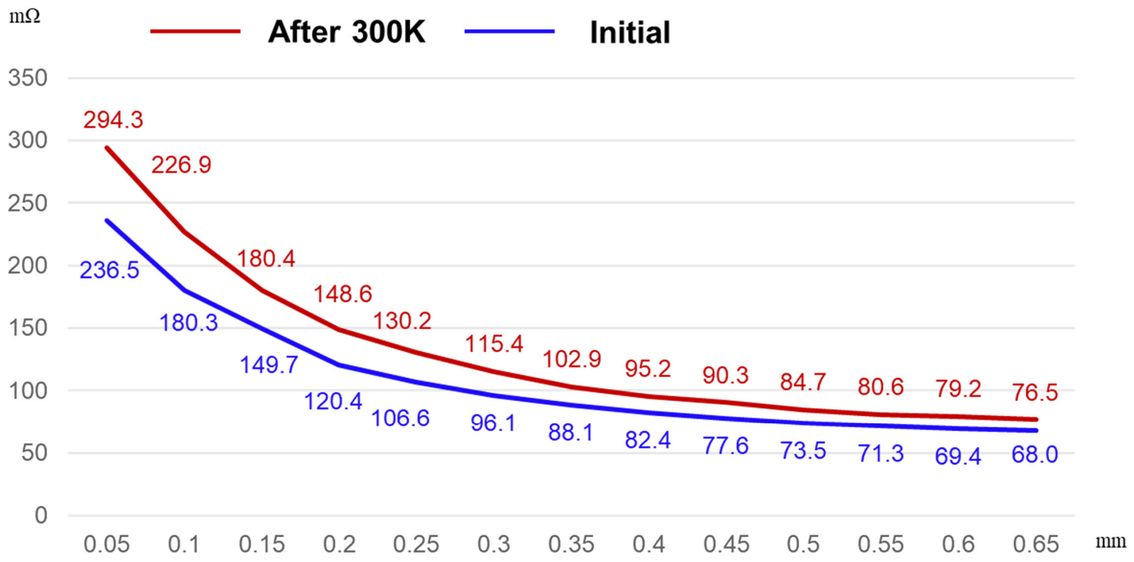
Mechanical Performance

Sample size 20 pcs, Average data, Measured Before/After 300k mechanical touch downs

Contact Force



Resistance

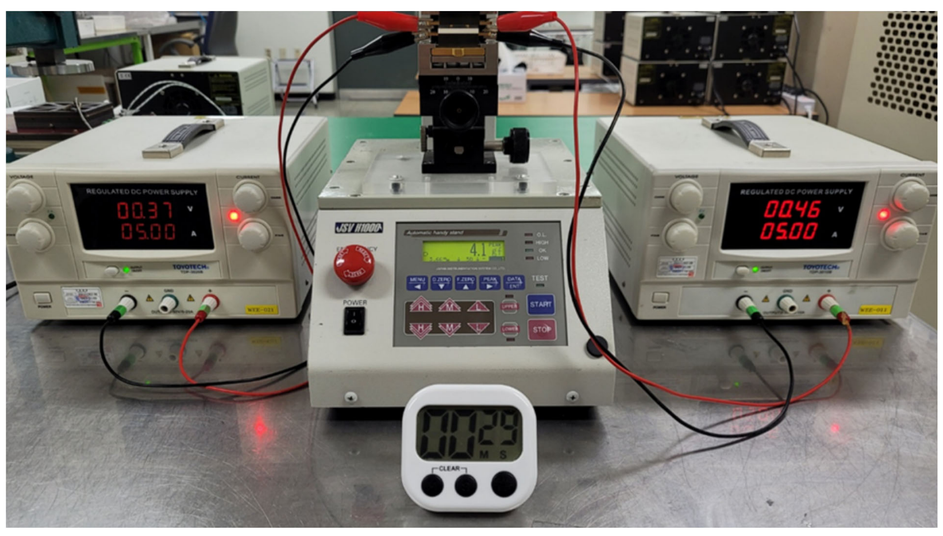


Current Carrying Capacity(CCC)

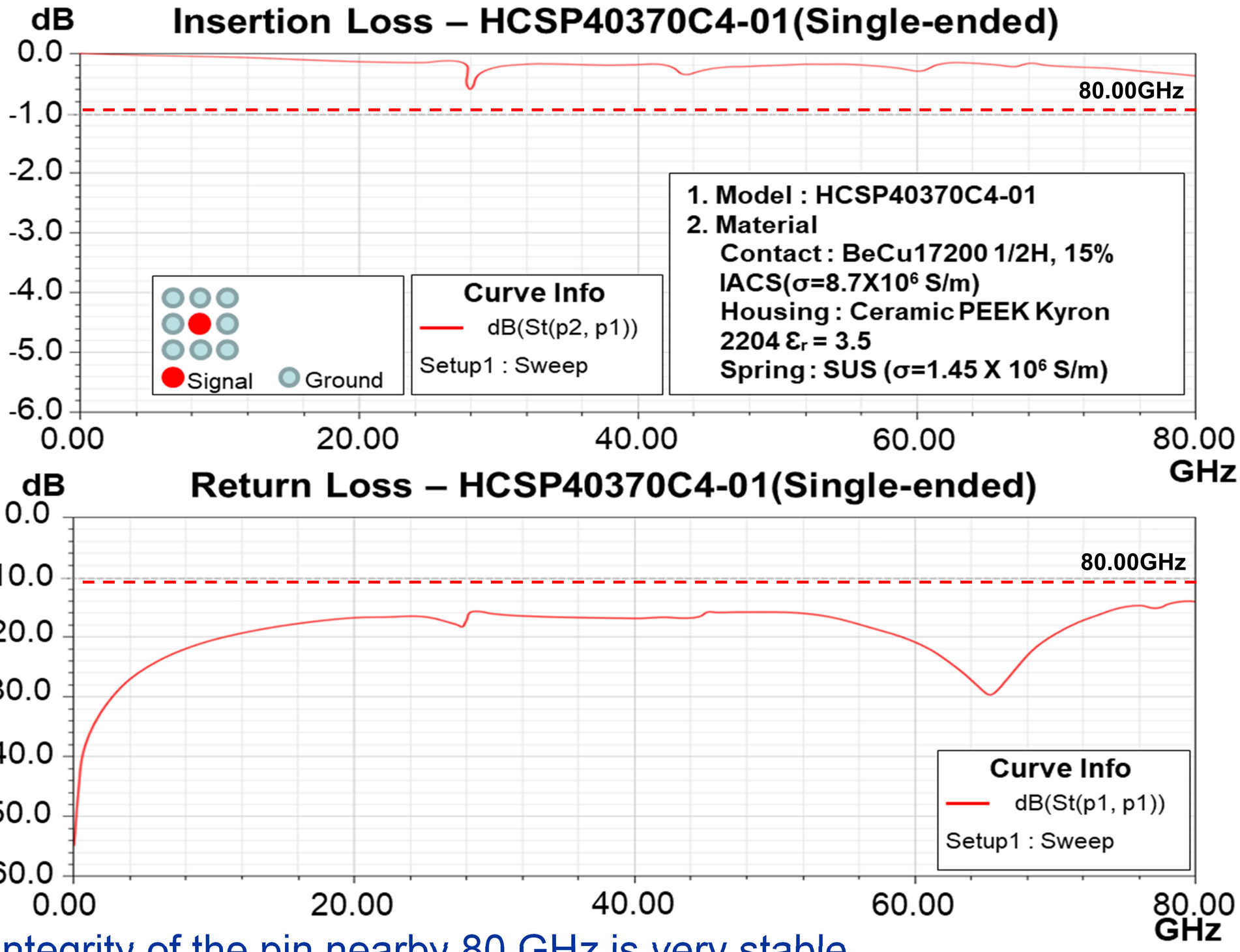
Current	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
1.0A	OK	OK	OK	OK	OK
1.5A	OK	OK	OK	OK	OK
2.0A	OK	OK	OK	OK	OK
2.5A	OK	OK	OK	OK	OK
3.0A	C/F Changed	C/F Changed	C/F Changed	C/F Changed	C/F Changed

✓ Demonstrate much higher Current Carrying Capacity than traditional burn in pins, and lower resistance.

CCC Measuring Machine



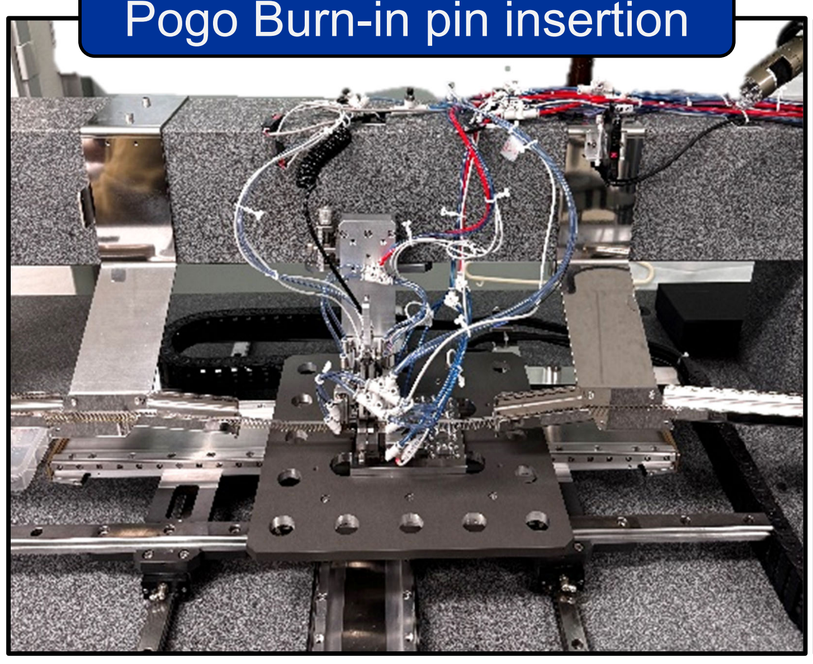
HCSP40370C4-01 – 3.7mm length / 4 sharp tips crown / 0.5mm pitch / Beryllium copper material



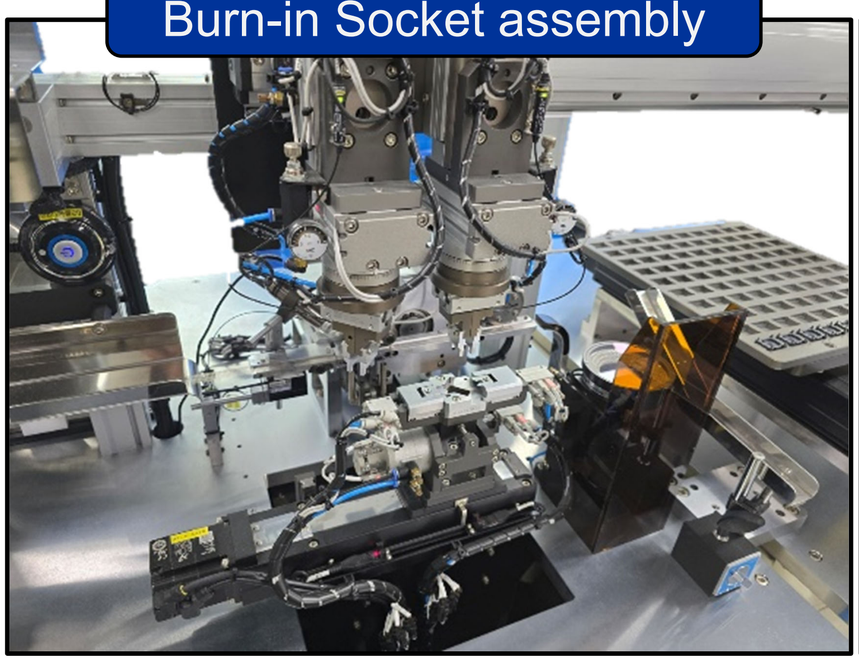
✓ Signal Integrity of the pin nearby 80 GHz is very stable.

Automation

Pogo Burn-in pin insertion



Burn-in Socket assembly



Auto Socket Inspection

Summaries

Spring probes provide low, stable contact resistance and high electrical performance, ensuring reliable signal integrity over the pin's lifespan. This enhances the overall quality and reliability of semiconductor testing.

New technologies for finer pitches and longer travel distances overcome the limitations of traditional burn-in pins, enabling cost-effective high-frequency testing without sacrificing performance.

Automated stamping technology and statistically controlled manufacturing processes ensure consistent quality and high-volume production, improving efficiency and lead time in semiconductor testing.

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