



SWTEST
2026 CONFERENCE

35th
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**High-Volume Wafer Testing Solutions for
Released-MEMS and BioChip Applications**

HTSI Hermes
Testing

Hermes Testing Solutions Inc.

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Upward Probing System: volume Architecture for Released-MEMS Wafer Testing Solution

High-

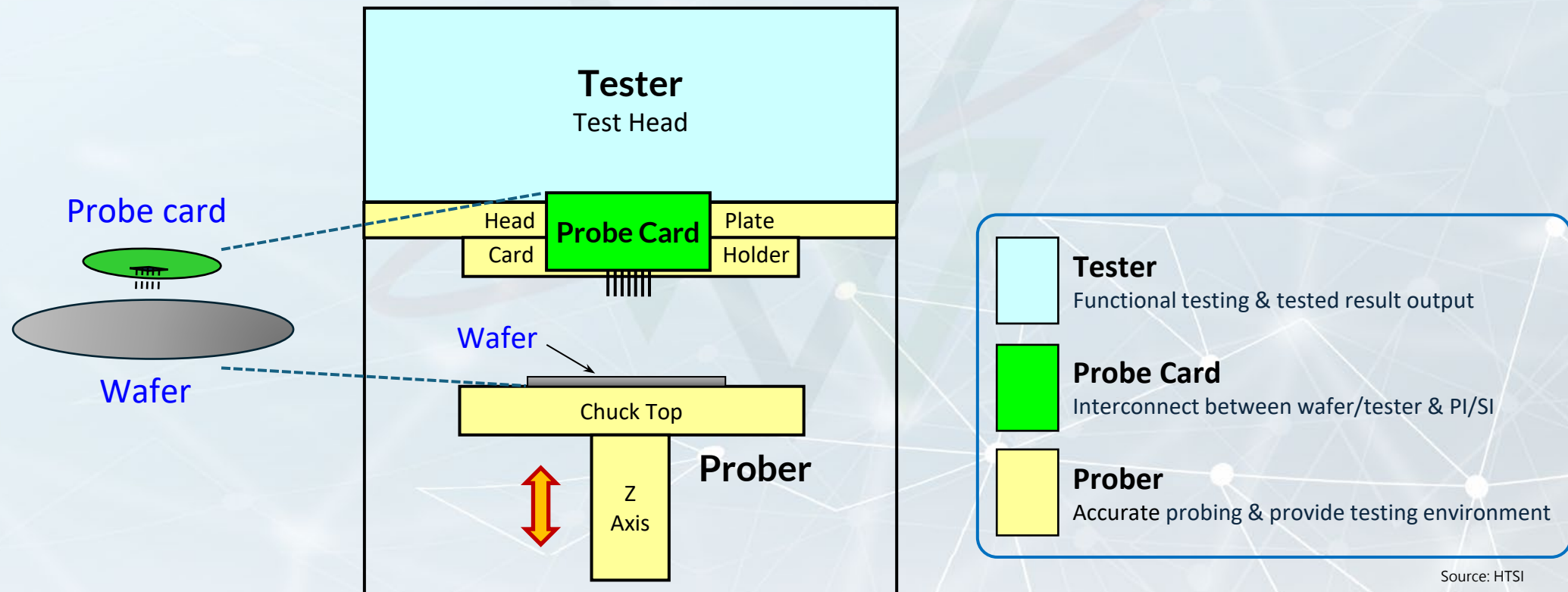
Outline

Released MEMS Wafer Testing Solution

- Introduction of conventional chip probing
- Released MEMS Wafer Structure
- Key challenges for Released MEMS Wafers Testing
- Upward Probing System (UPS)
- Conclusion

Introduction of conventional chip probing

A test Cell

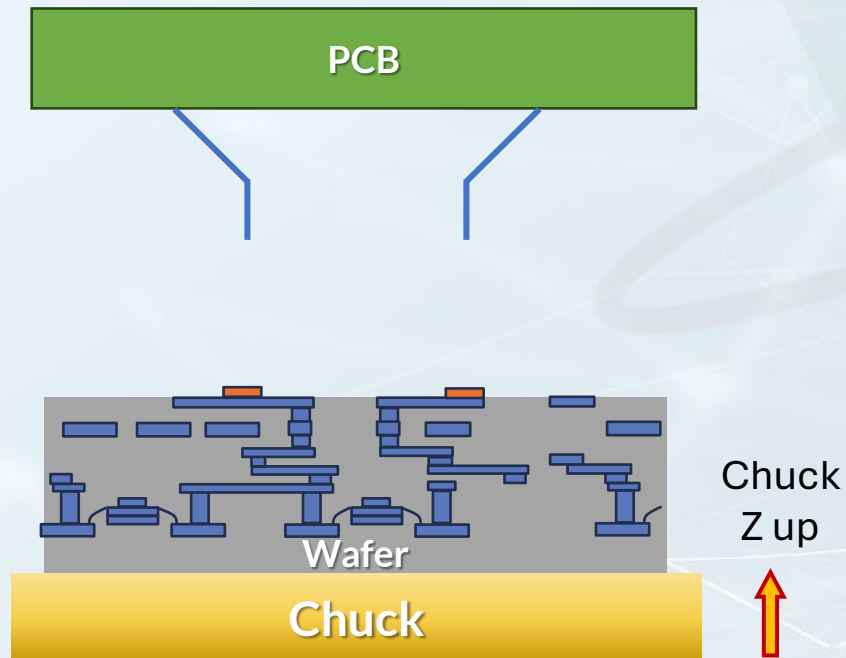


Source: HTSI

Introduction of conventional chip probing

Chip probing motion

Probing Motion

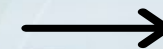
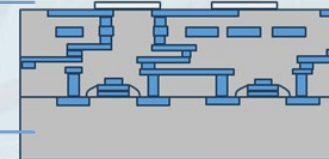


BCF was created

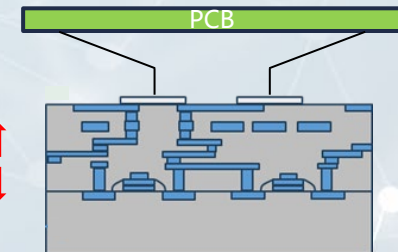
Source: HTSI

Logic/Memory wafers (side view)

I/O Pad
Interconnect wiring
Transistor
Si



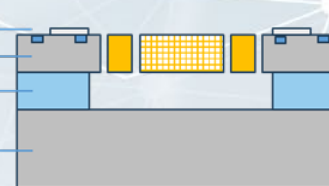
Probing Motion



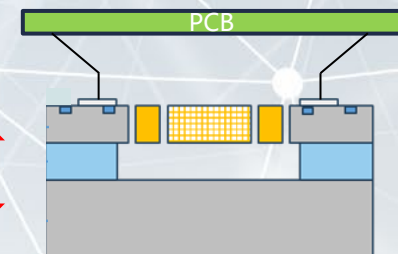
Probe contact at solid part

Usual MEMS wafers (side view)

I/O Pad
MEMS
Box
Si



Probing Motion



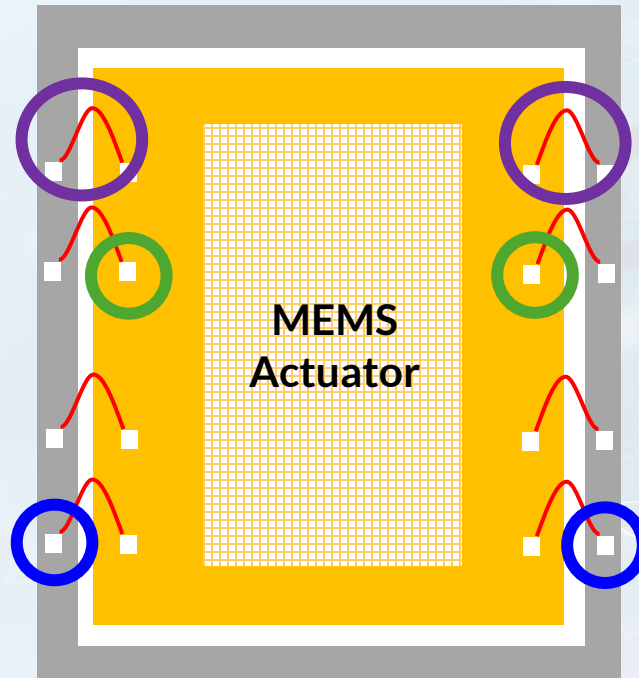
Source: HTSI

Released MEMS Wafers Structure

Chip Structure

Schematic diagram

(Top view)



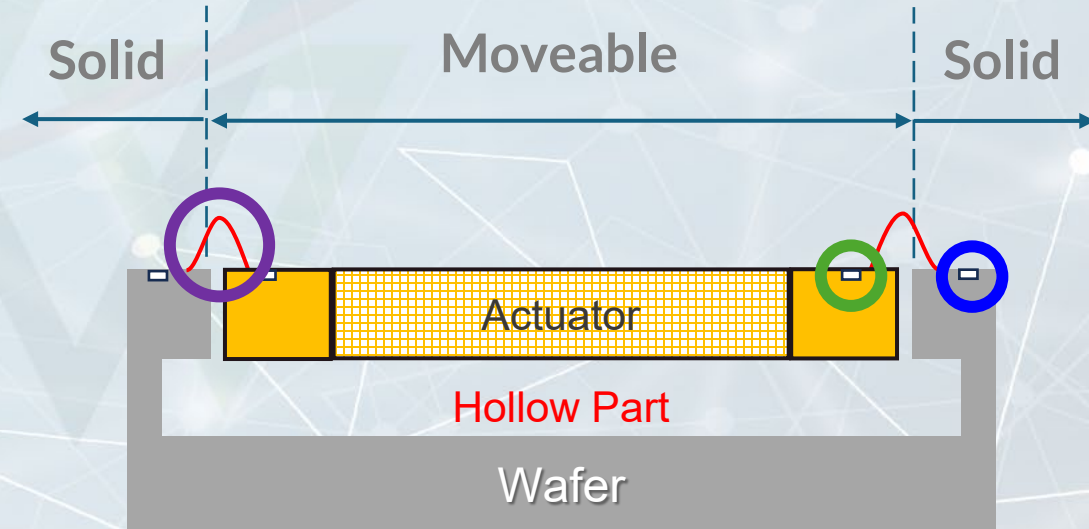
ECF

Electrical
Connection
Frame

Pad for
probing

Pad for
Wire bond

Cross section



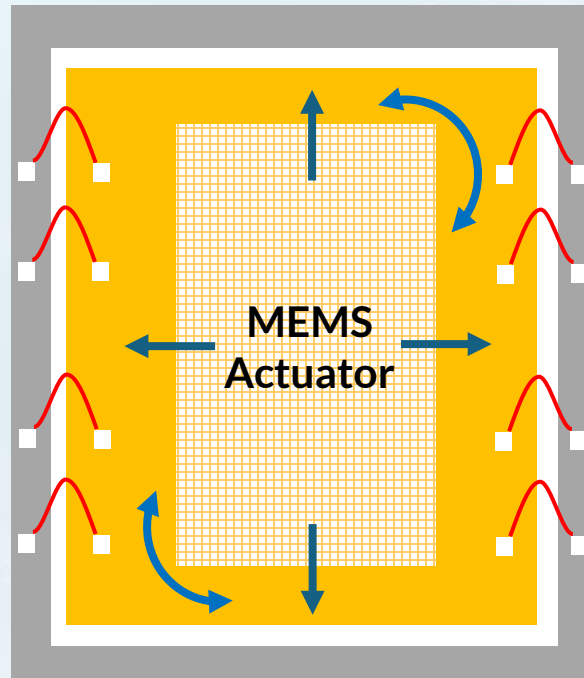
Source: HTSI

Released MEMS Wafers Structure

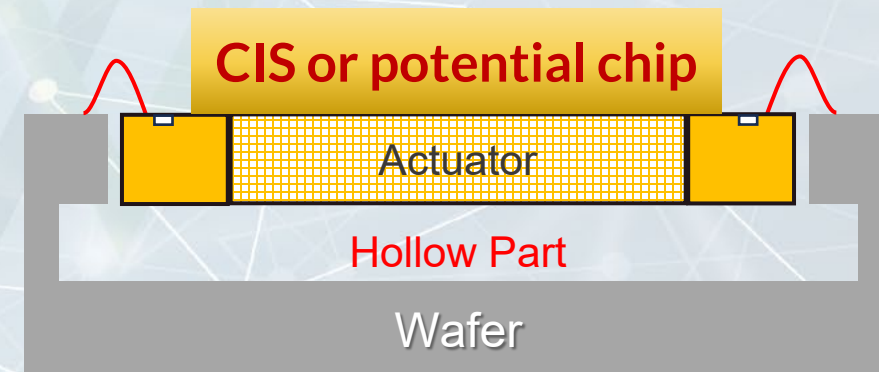
Application Example

5-Axis Movement

(Top view)



Possible Application After Package



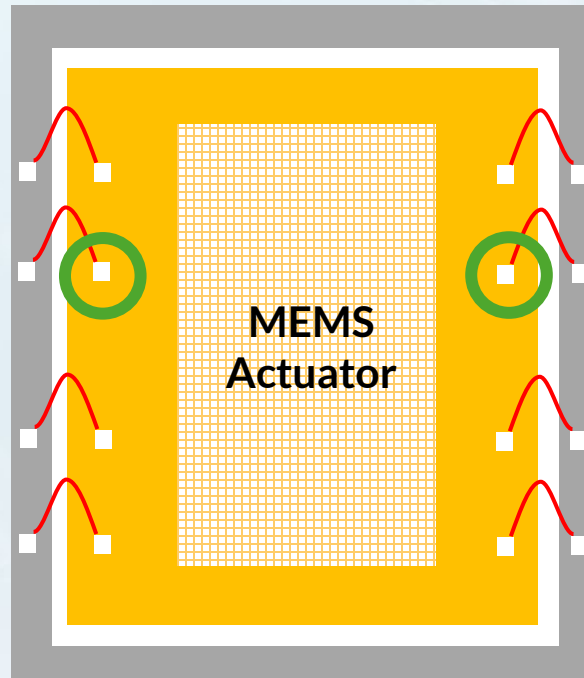
Source: HTSI

Released MEMS Wafers Structure

Testing Requirement

Schematic diagram

(Top view)

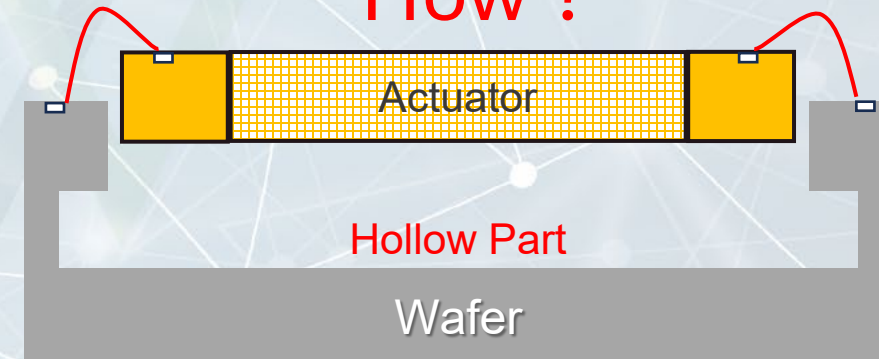


Pad for probing

Cross section

Require to lift released MEMS structure and force V measure C to validate moving distance of actuator

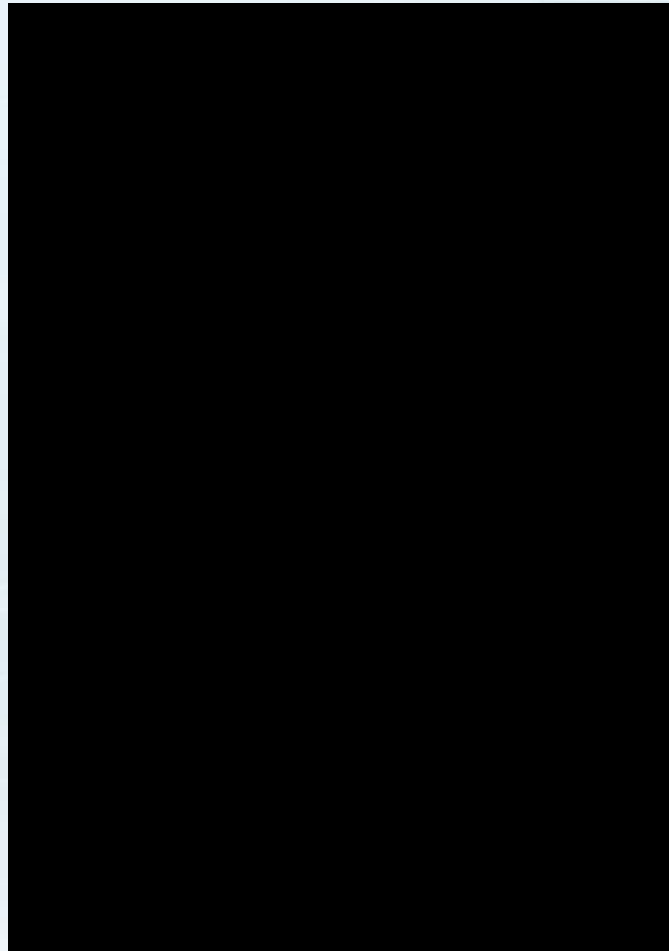
How ?



Source: HTSI

Key challenges for Released MEMS Wafer Testing

BCF procedure will damage released MEMS wafer



Conventional Probing

0% yield



Damage



Chuck Z up



Released MEMS wafer

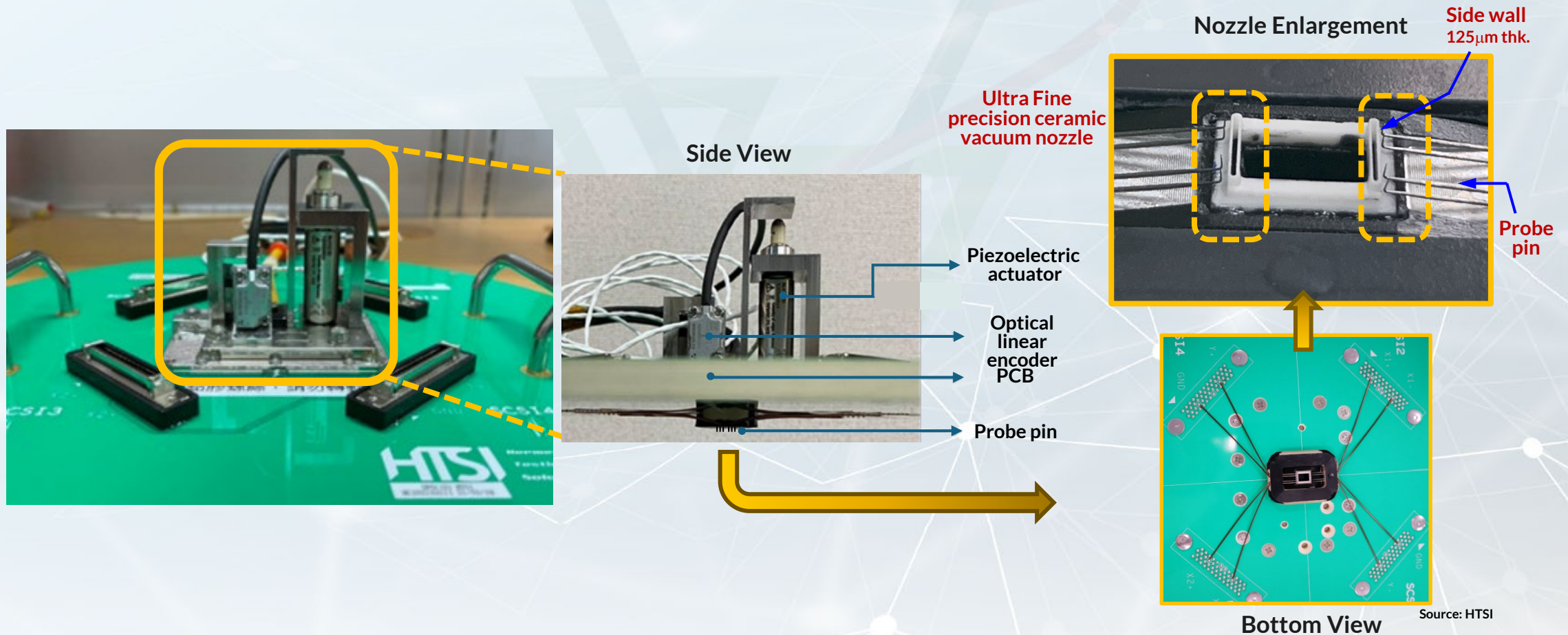
- The probe can not contact stably
- Causes chip damage or crack

Chuck

Source: HTSI

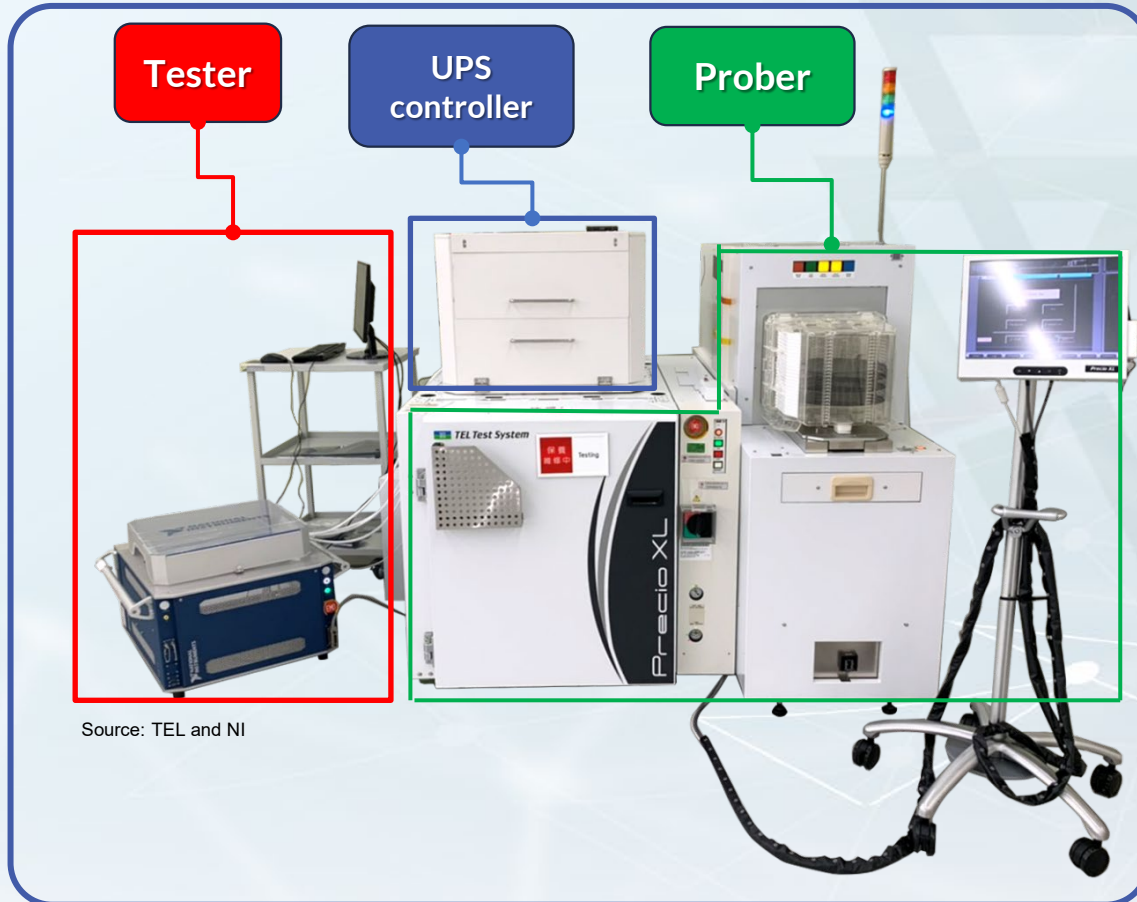
HTSI Solution—Upward Probing System (UPS)

Probe card with Piezo Motor & Vac. Nozzle

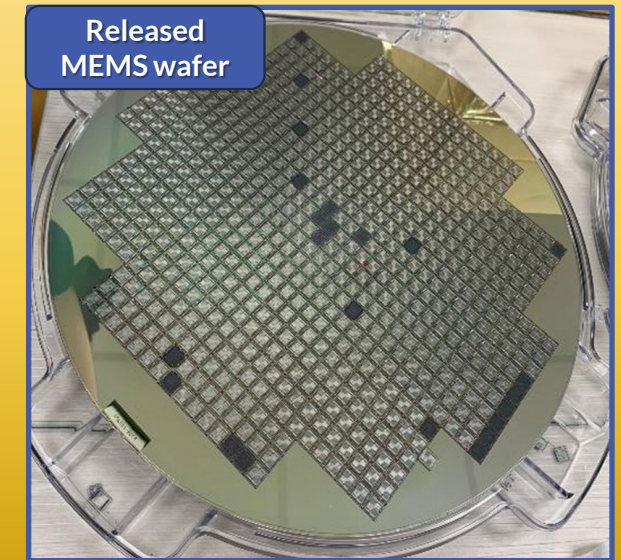


HTSI Solution—Upward Probing System (UPS) ^{35th} ANNIVERSARY

Integrated Work of Entire Test Cell



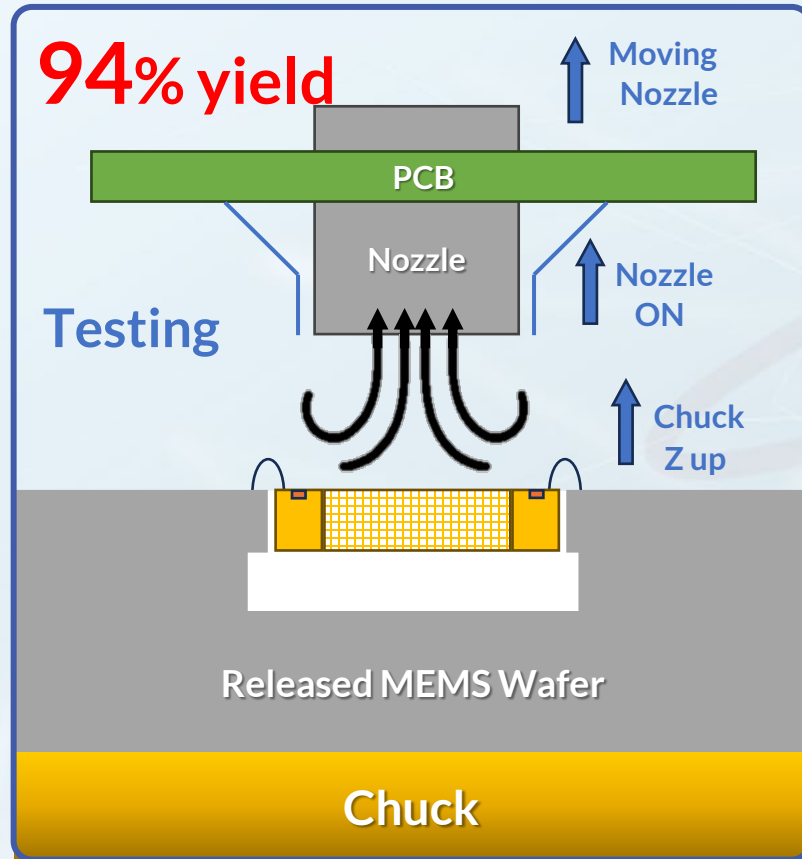
UPS integrates a prober, probe card, and tester to realize an innovative vacuum-assisted probe card and automated probing methodology.



HTSI Solution—Upward Probing System (UPS)

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Probing with UPS



(Side view)



(Top view)

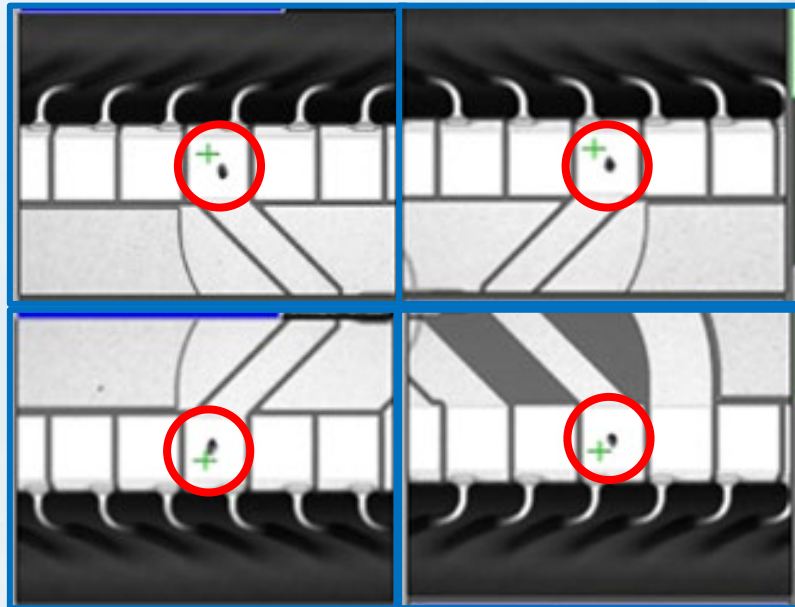


Source: HTSI

HTSI Solution—Upward Probing System (UPS) ^{35th} ANNIVERSARY

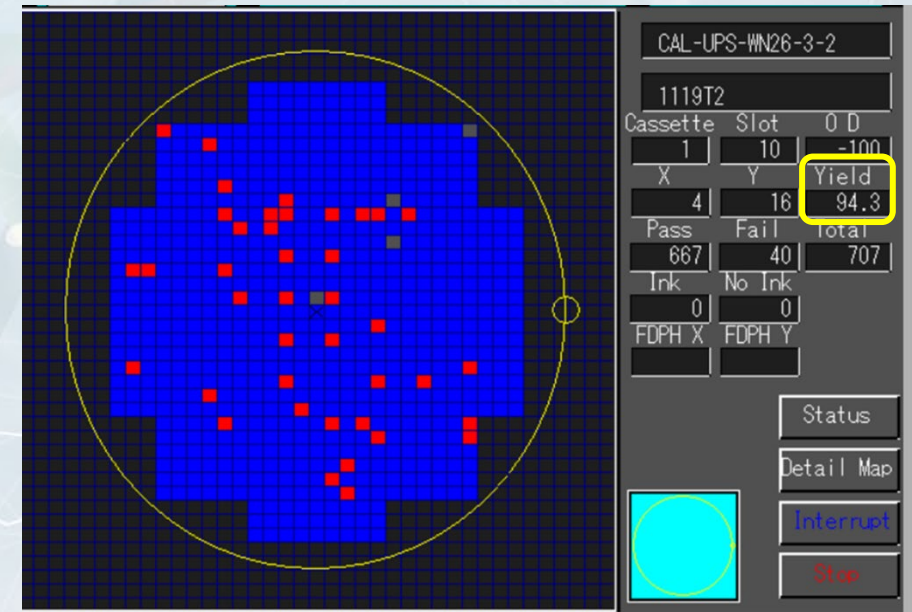
Realize Released MEMS Wafer Testing via automated UPS

Probe Mark



Source: HTSI

Testing Result
94% Yield (with HTSI UPS)

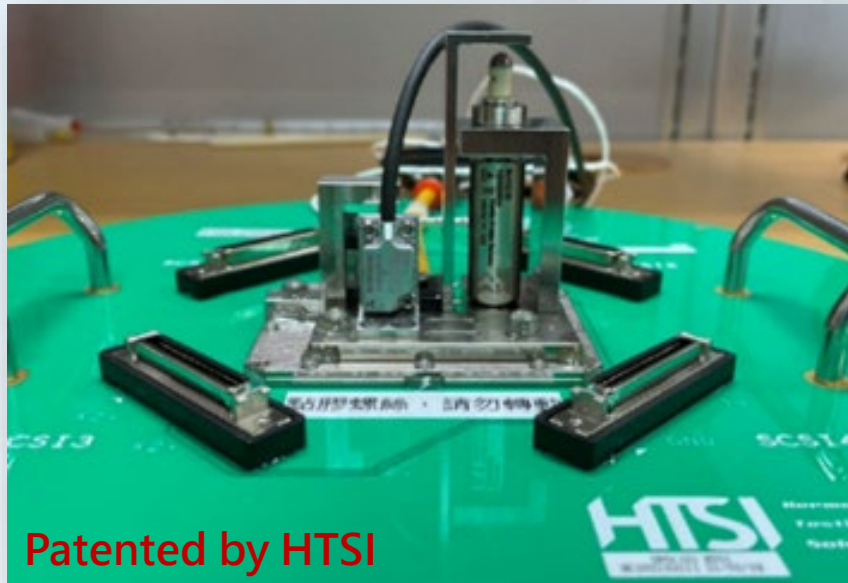


Source: TEL

■ Pass ■ Fail

Conclusion

The significance of the probing system (UPS) for released MEMS wafers is not only in providing a new, stable testing method for mass production, but also in enabling the industry to develop an entirely new mindset for chip design.



Patented by HTSI

Source: HTSI

Outstanding Supplier Award

Says customer :

“ For the first time, the Probe Card supplier side is providing solutions in reverse to the design and the production sides ”



Source: HTSI

Liquid Injection System: volume Architecture for Biochip Testing Solution

High-

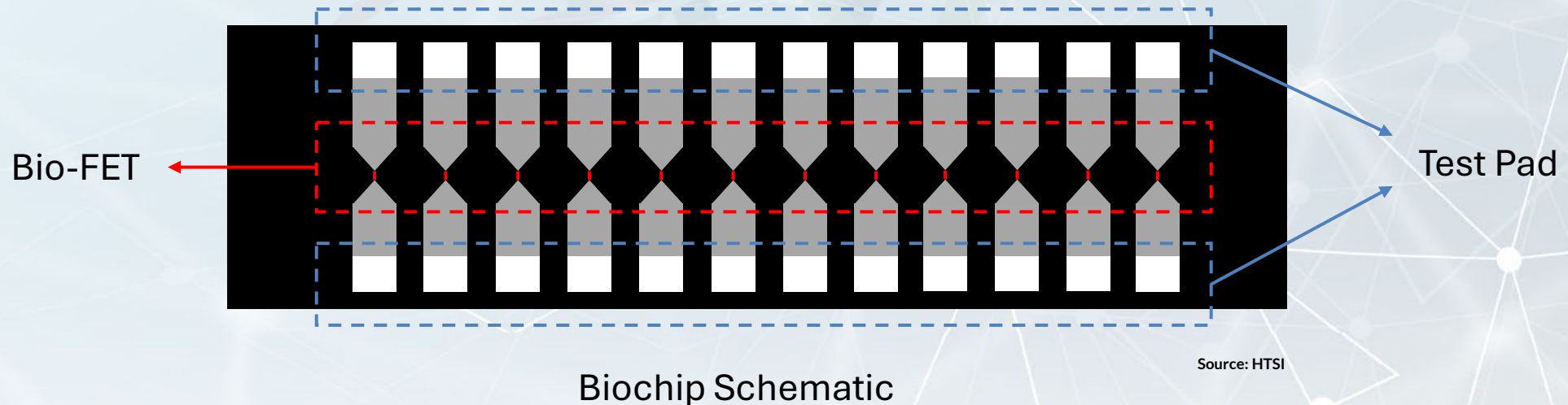
Outline

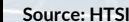
Biochip Testing

- What is biochip and how is it tested
- Mass Production Testing Solutions
- Design of Experiment & Verification
- Conclusion

What is Biochip?

A biochip is a device that integrates biosensing elements with a semiconductor chip, enabling the conversion of biochemical reactions into measurable electrical signals. Biochips are widely used in fields such as medical diagnostics, DNA analysis, and biosensing.

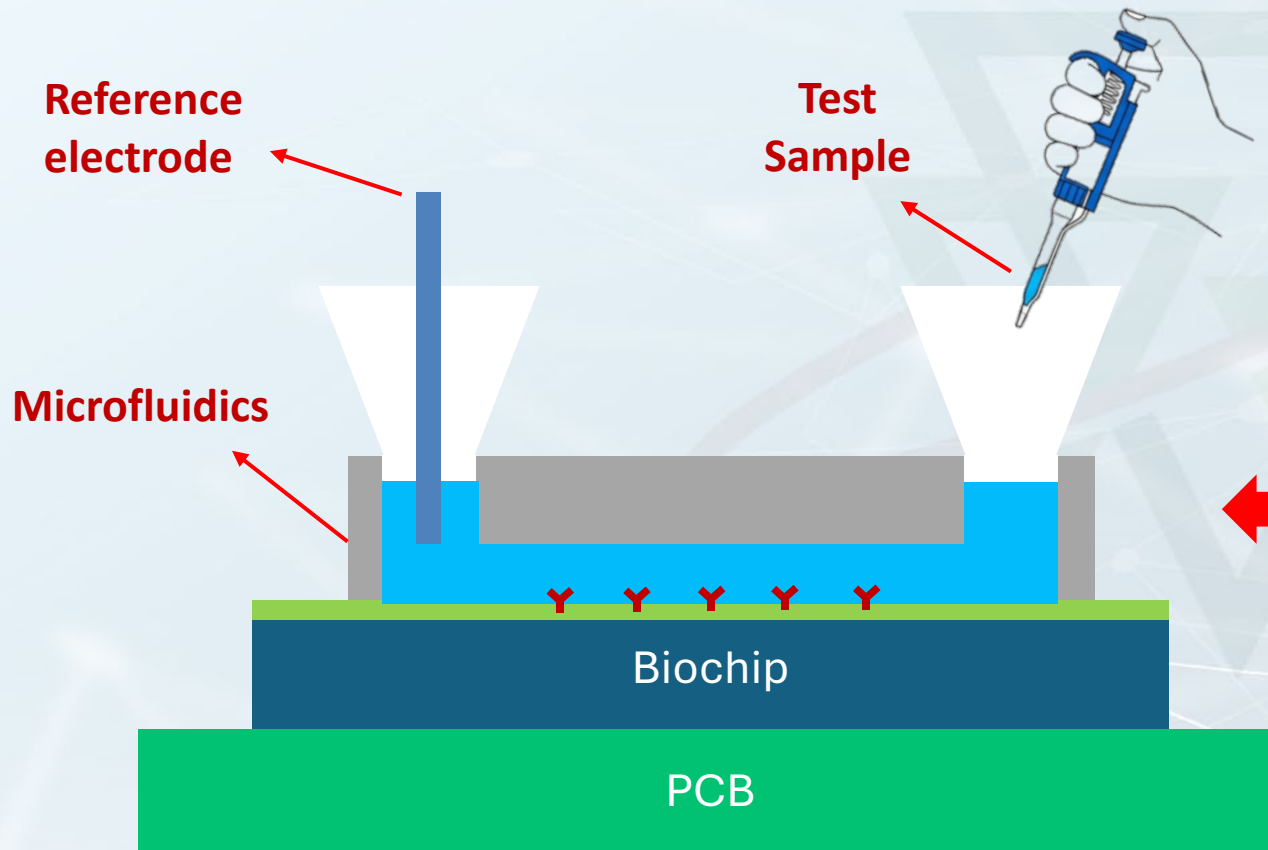




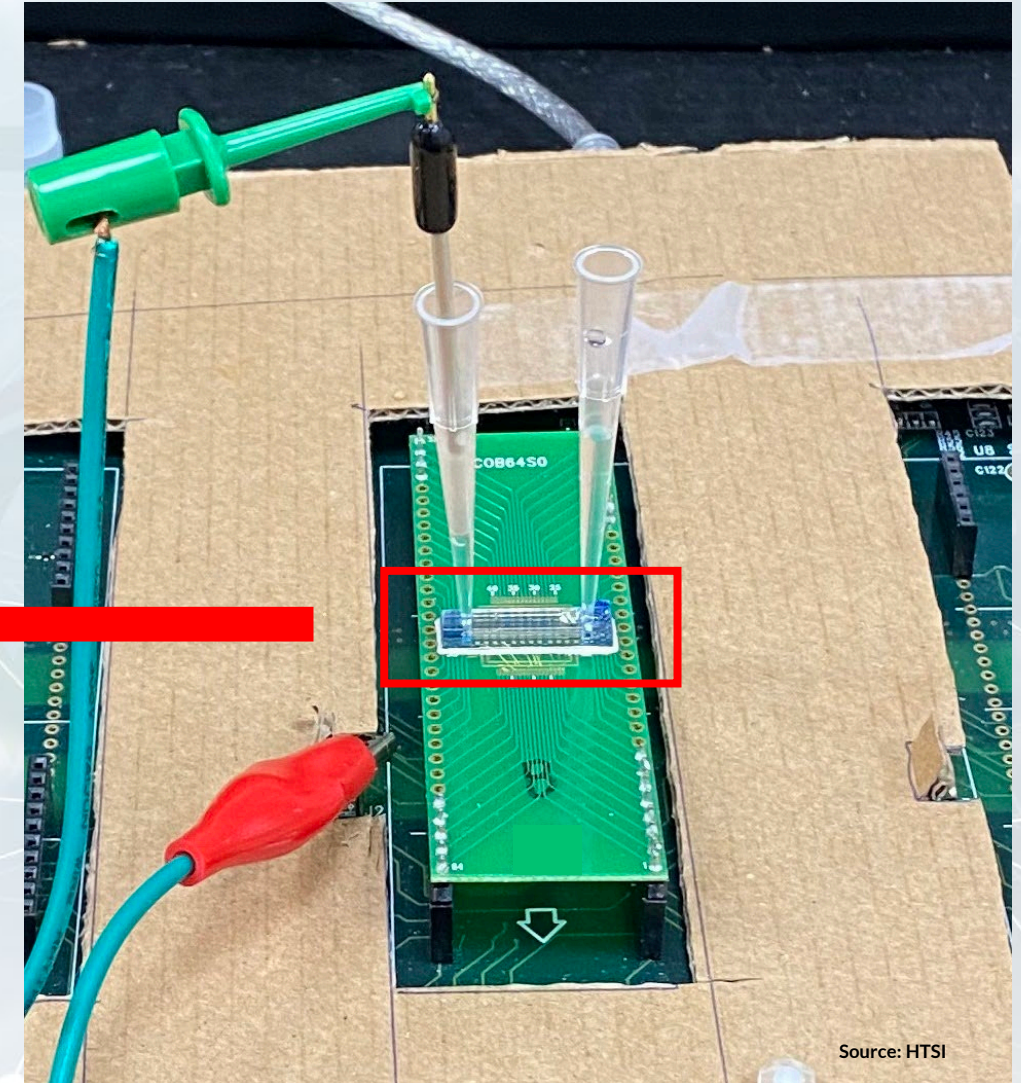
- 18

How is the Biochip measured?

Conventional testing platform



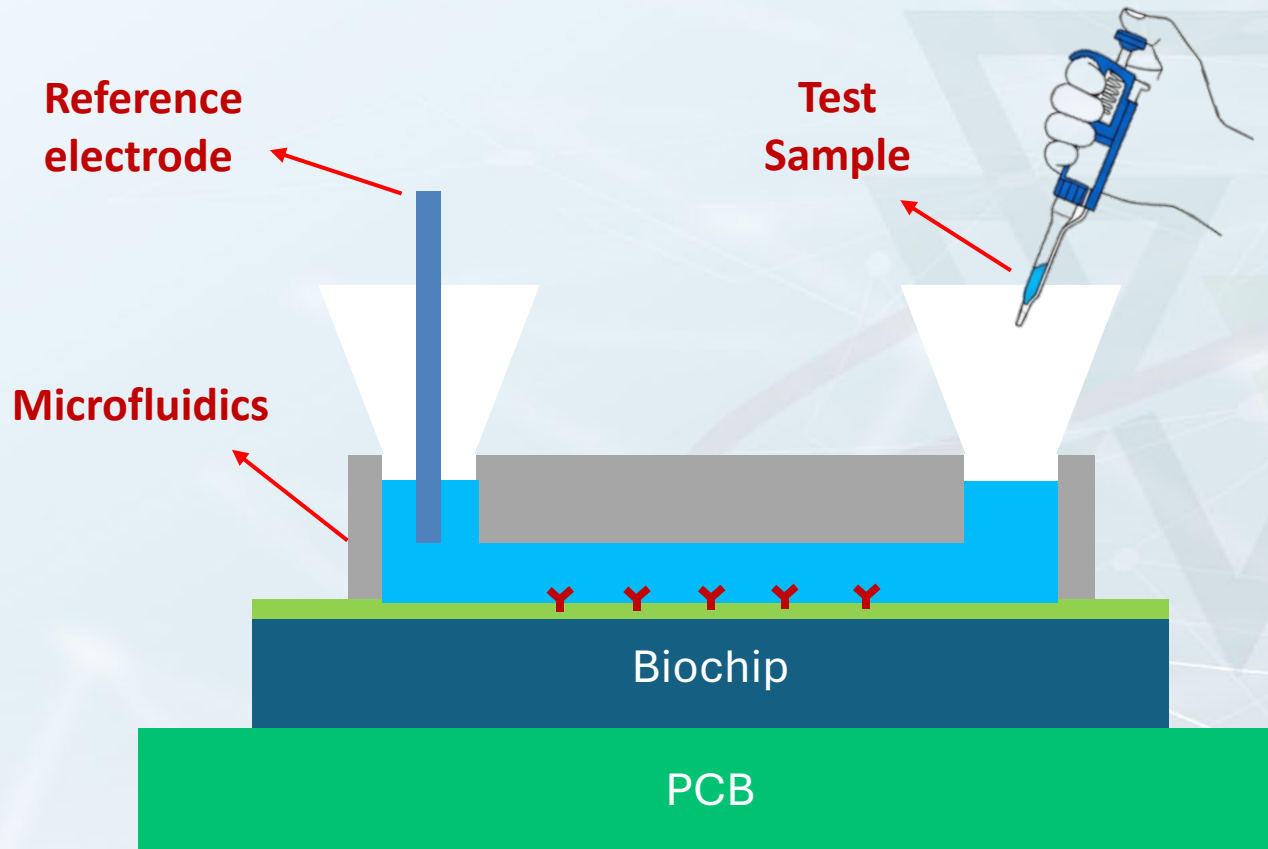
Source: HTSI



Source: HTSI

How is the Biochip measured?

Conventional testing platform



Source: HTSI

Key challenges

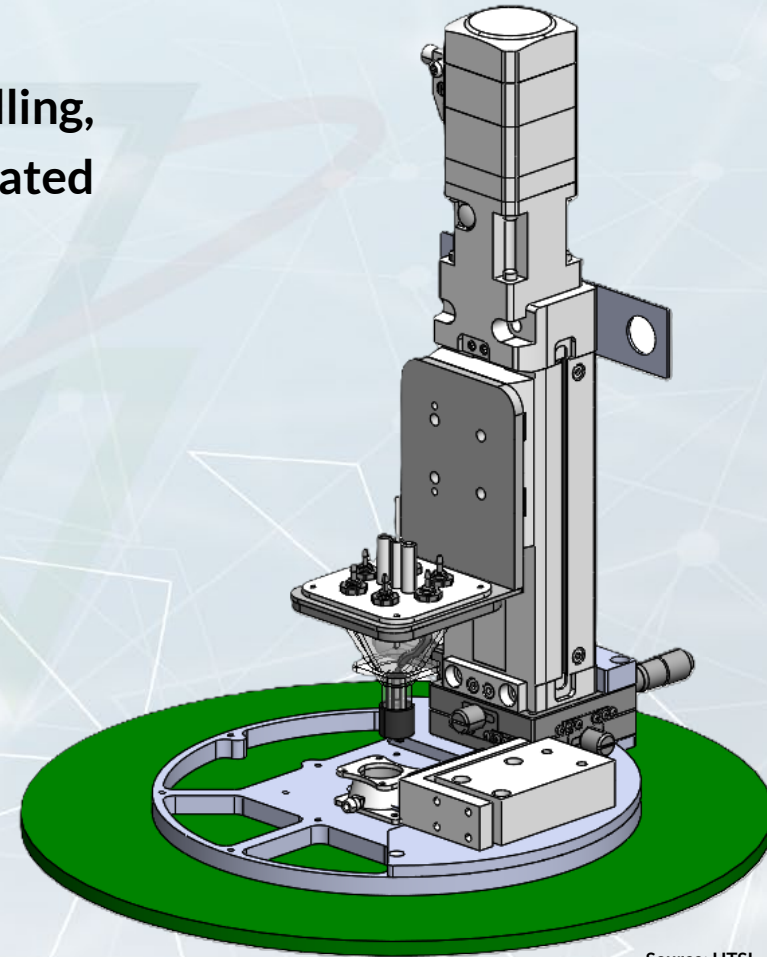
- **Signal sensitivity**
 - The electrical signals are often very small, requiring high-precision measurement.
- **Contamination control**
 - Residual liquids from previous tests can affect results, so thorough cleaning is critical.
- **Automation**
 - Multiple test cycles with different reagents require efficient and repeatable processes.

Liquid Injection Testing (LIT)

The core concept of LIT is to combine liquid handling, cleaning, and electrical measurement into one automated platform, ensuring both accuracy and efficiency.

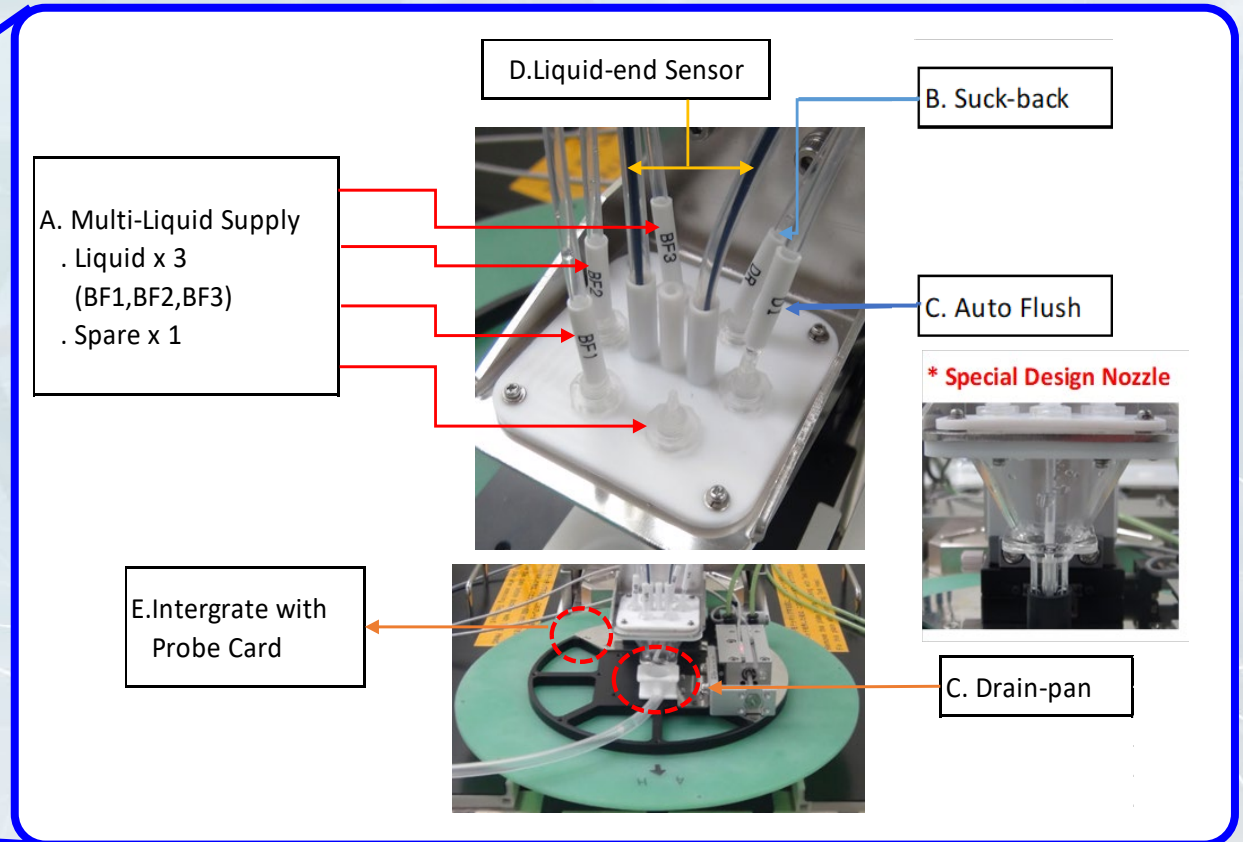
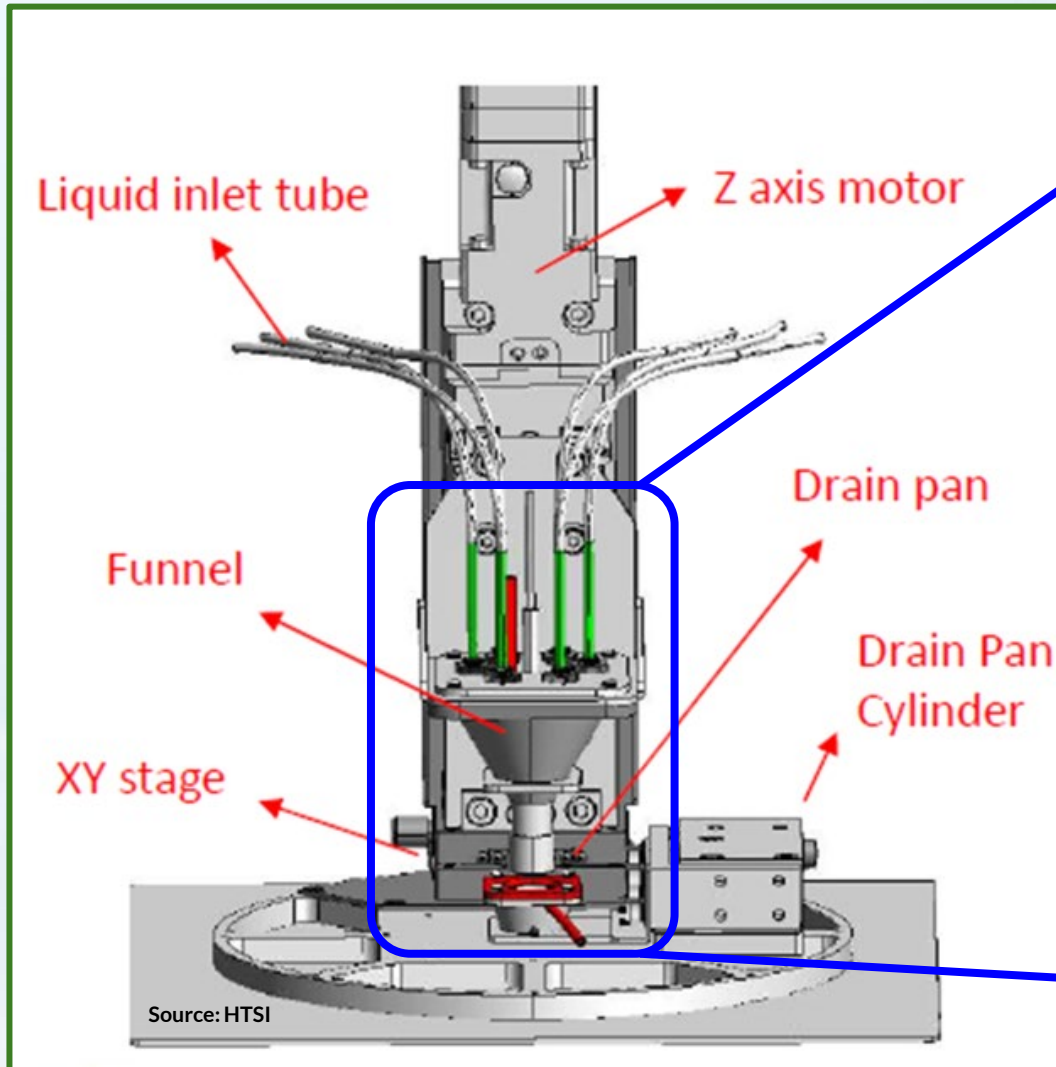
Key Feature

- Fully integrated with prober.
- Auto testing including auto cleaning.
- LIT controller in-between prober & tester.
- Programable of solvent sequence.
- Integrated cantilever probe card design.



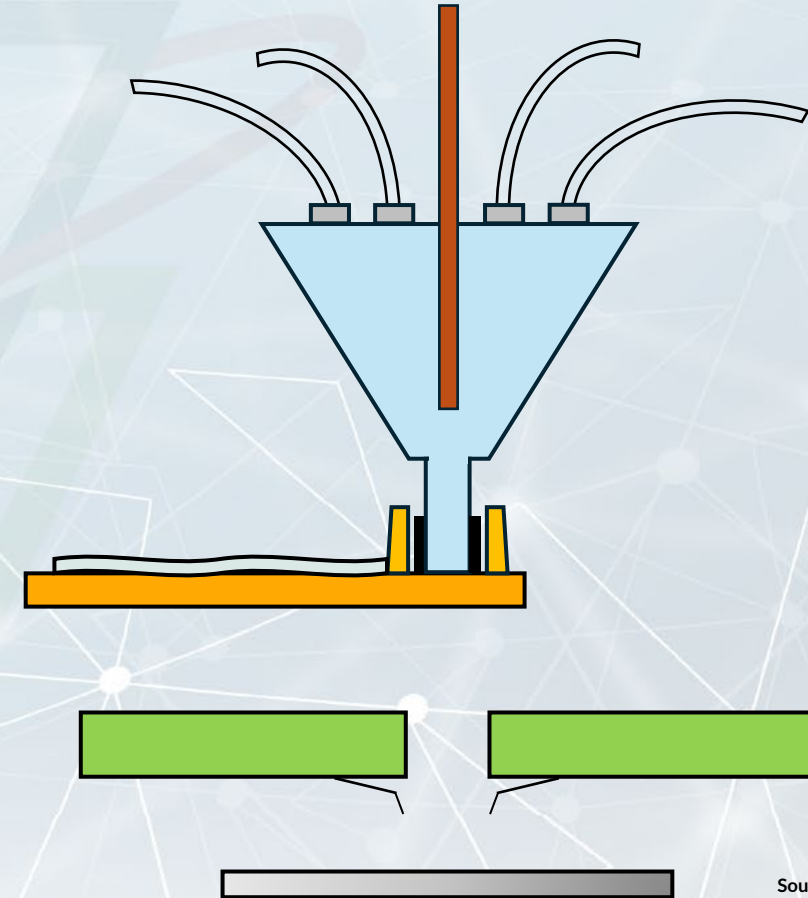
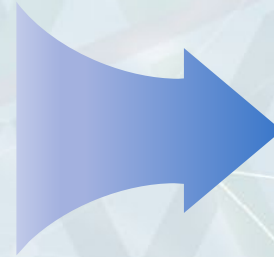
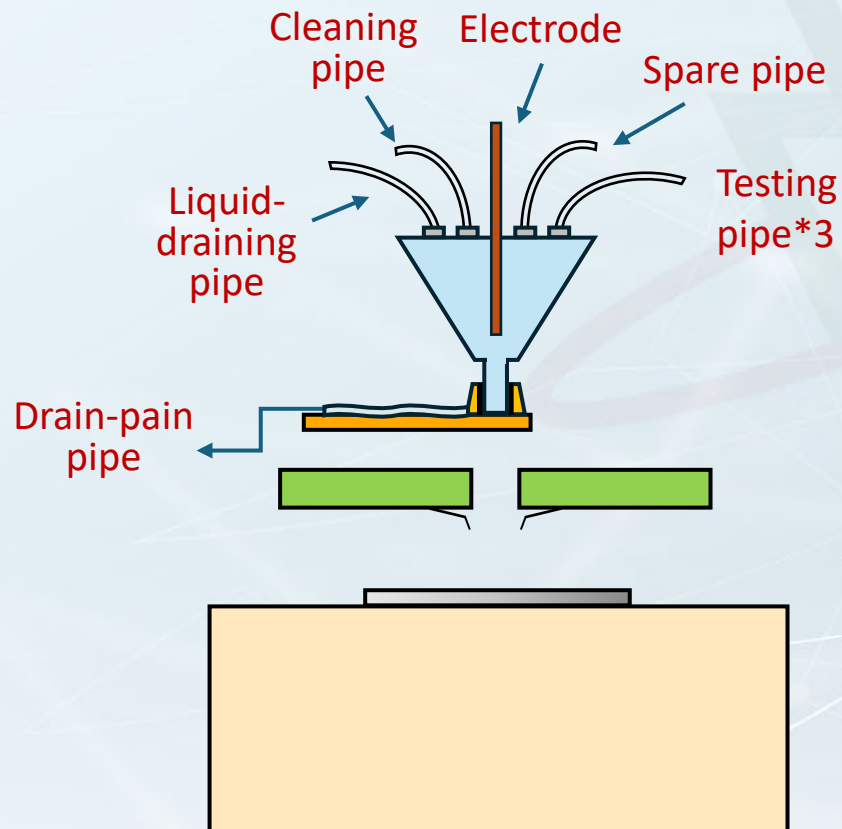
Source: HTSI

Liquid Injection Testing (LIT)



LIT Testing Procedure

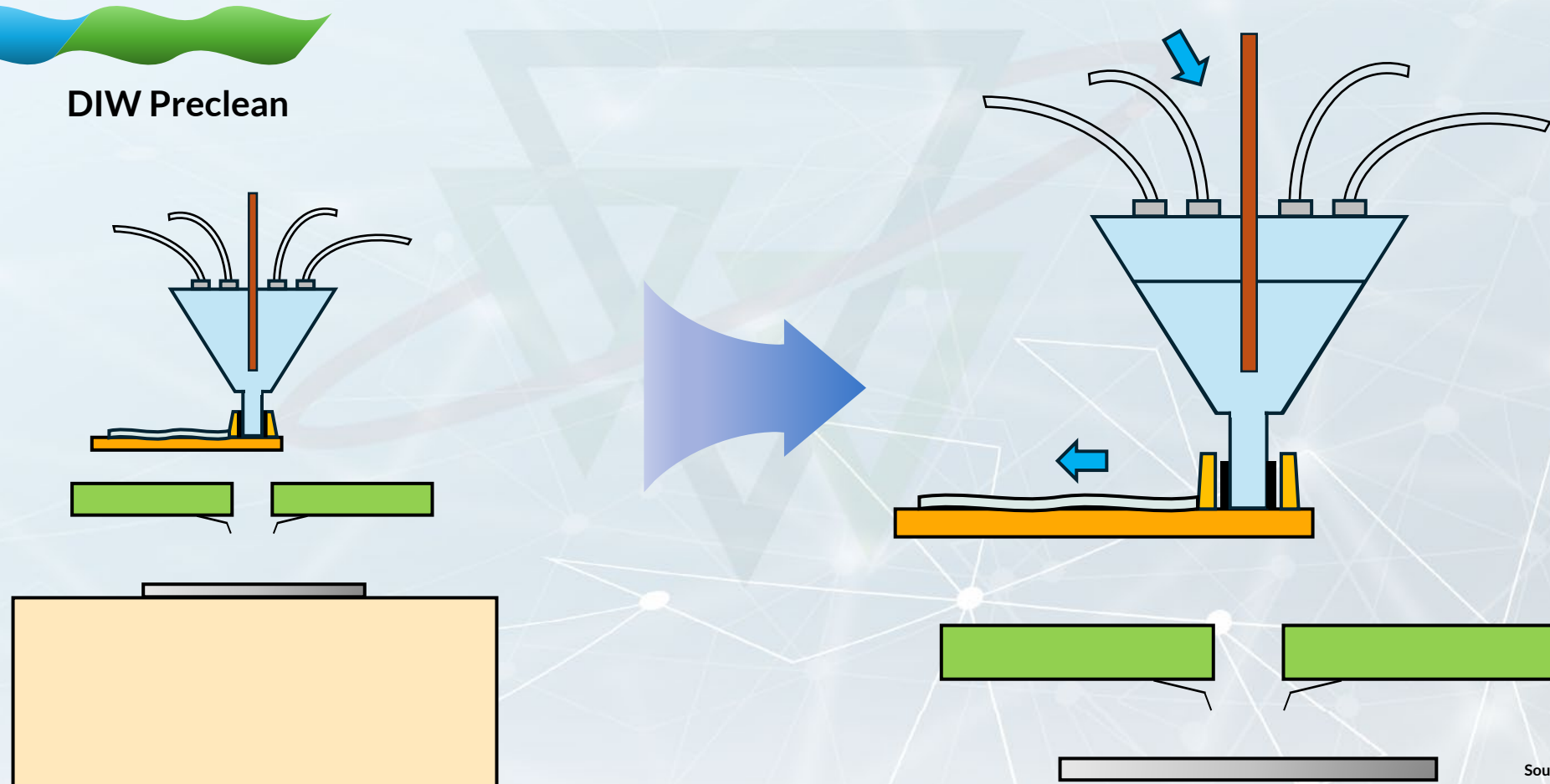
LIT Module Check



Source: HTSI

LIT Testing Procedure

LIT Module Check



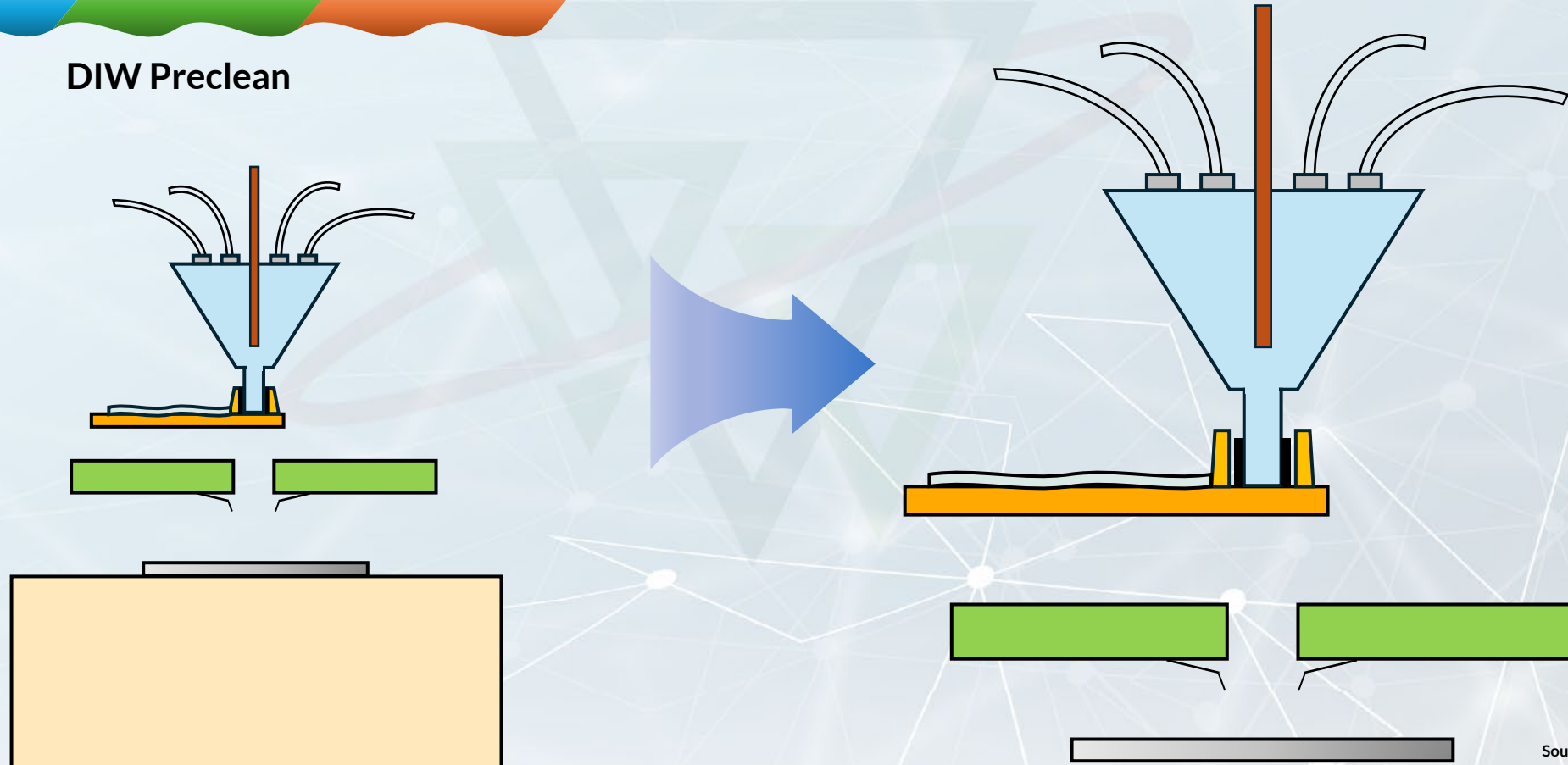
Source: HTSI

LIT Testing Procedure

LIT Module Check

Ready

DIW Preclean



Source: HTSI

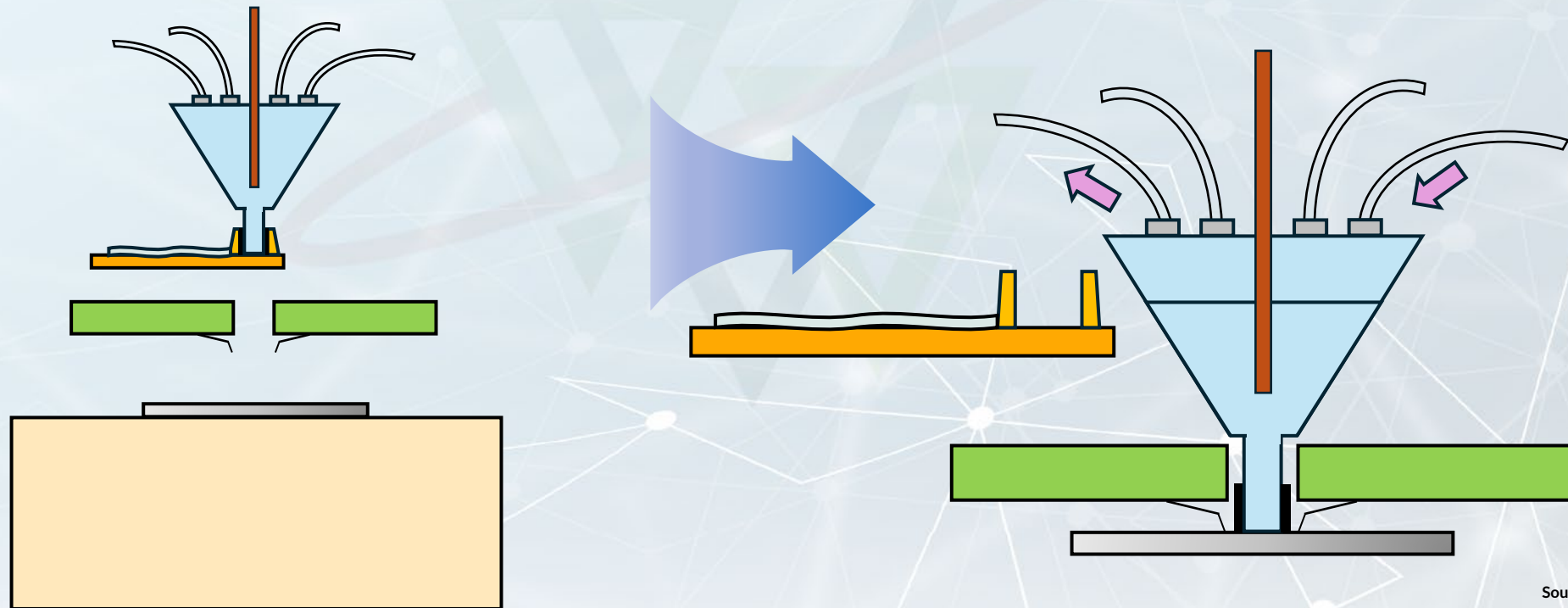
LIT Testing Procedure

LIT Module Check

Ready

DIW Preclean

Buffer Sol'n
& Testing



Source: HTSI

LIT Testing Procedure

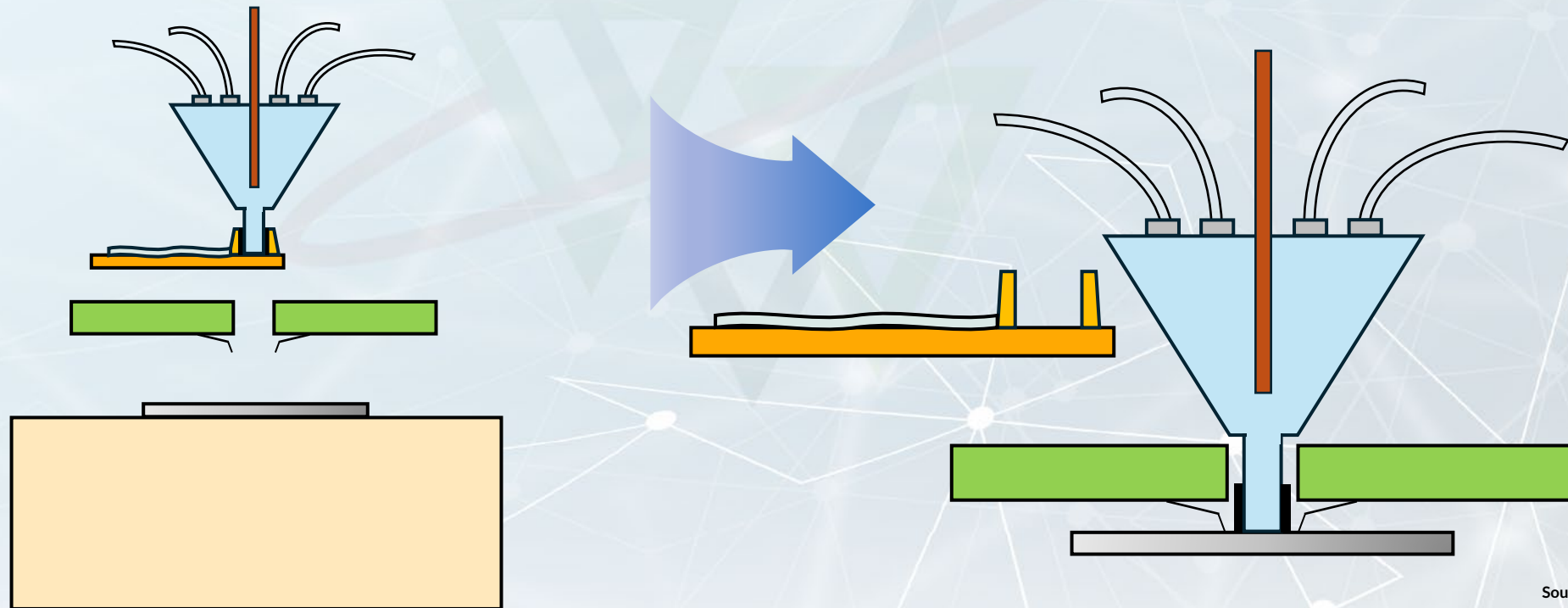
LIT Module Check

Ready

Reset & Cleaning

DIW Preclean

Buffer Sol'n
& Testing



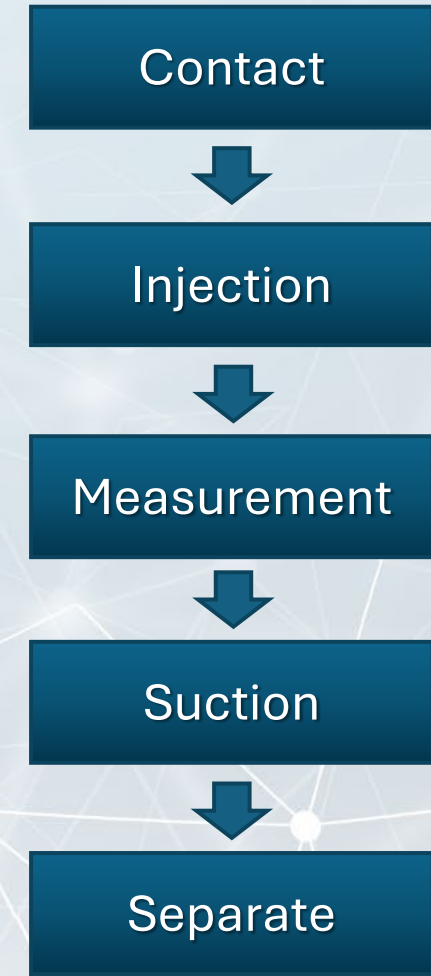
Source: HTSI

Design of Experiment

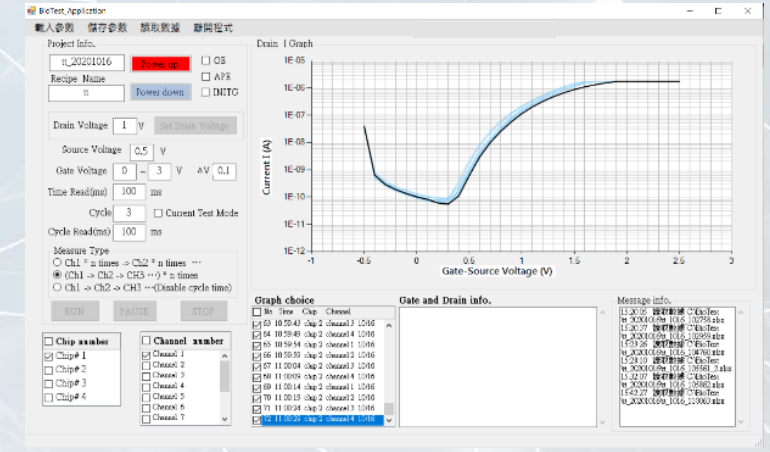
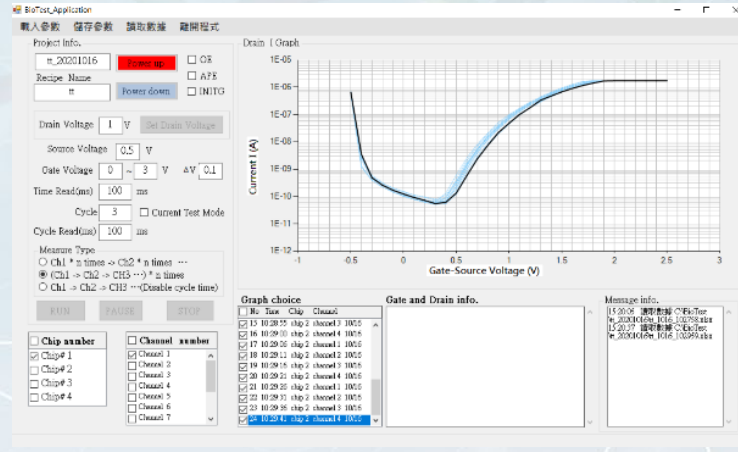
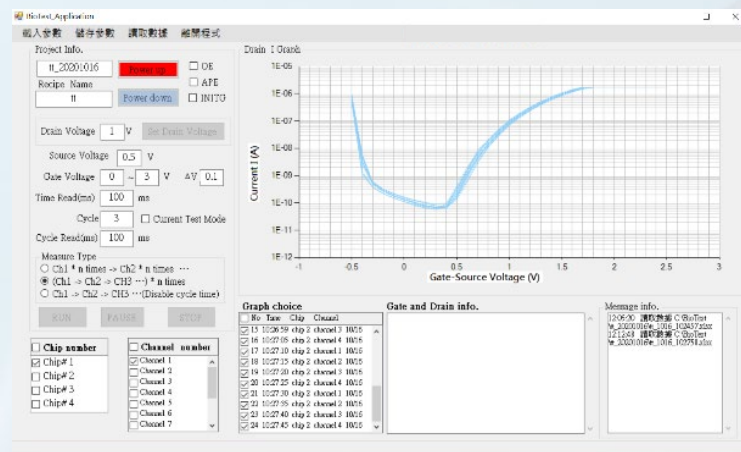
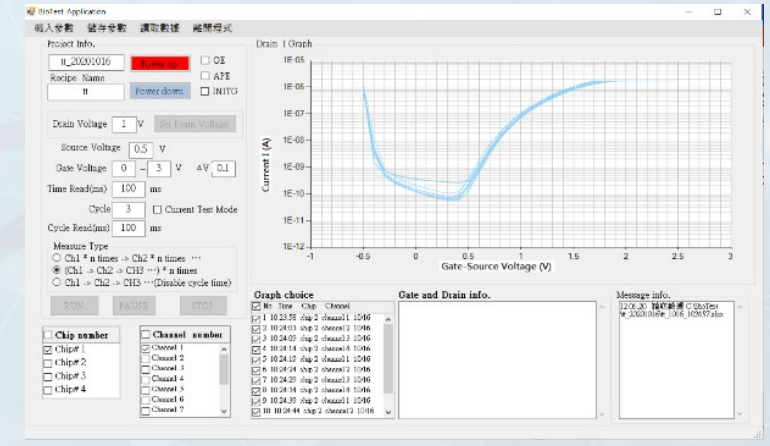
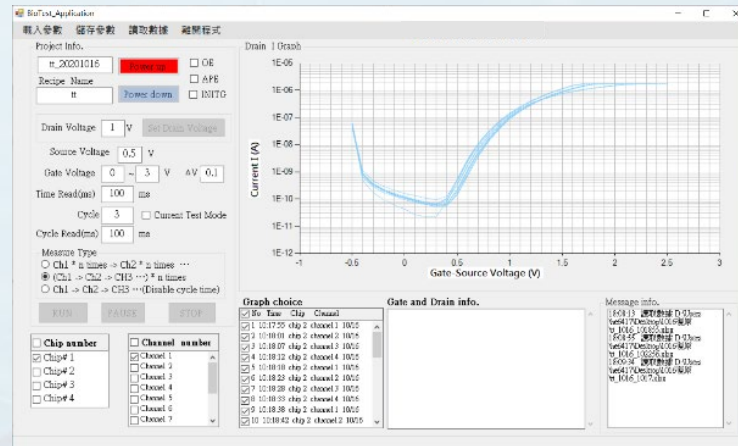
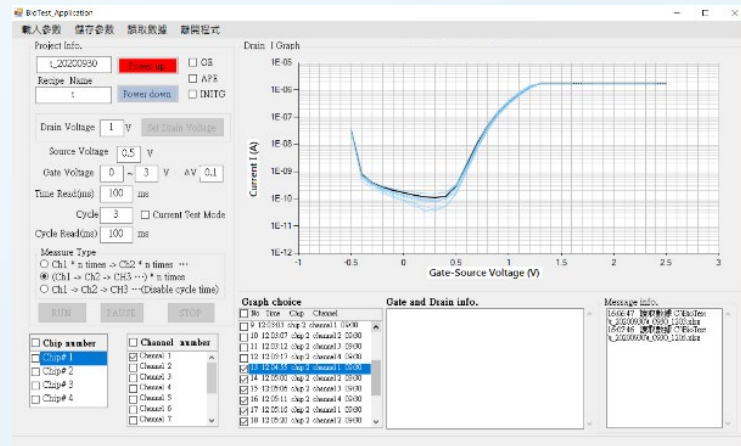


This is for illustrative.
Not an actual measurement.

Patented by HTSI



Verification



Source: HTSI

The LIT system can provide a stable and efficient measurement method.

Conclusion

- Biochips are becoming increasingly important in modern diagnostics and sensing technologies, but their testing introduces unique challenges due to the combination of biological reactions and electrical measurements.
- A successful testing solution must ensure precision, cleanliness, stability, and automation.
- Our LIT solution is designed exactly for this purpose—integrating liquid handling, cleaning, and probing into a single platform, enabling reliable and efficient biochip testing.
- We believe this approach not only improves measurement quality but also accelerates the development and production for biochip applications.

Aiming for Excellence, Persisting in Reliable Solutions.

HTSI, founded in 2004, provides comprehensive semiconductor test solutions, backed by strong technical expertise and regional support across Taiwan, China, Japan, Singapore, Malaysia, etc.



<https://www.hermes-testing.com.tw/en/>



Thank you