Introduction of Unique Coaxial Socket with the Use of Flexible Printed Circuit (FPC)

Hokuto (Paul) Kanesashi
Enplas Tech Solutions, inc.

TestConX™

Mesa, Arizona • May 1-4, 2022

enplas

Contents

- Background
- Design Goals for Unique Coaxial Solution
- The Result - Unique Coaxial Socket
- Introduction - Unique Coaxial Socket
- Innovative Features
- Innovative FPC Design Features
- One Pin for all Signal, Power, and Ground
- Internal Evaluation Data
- Summary

Background

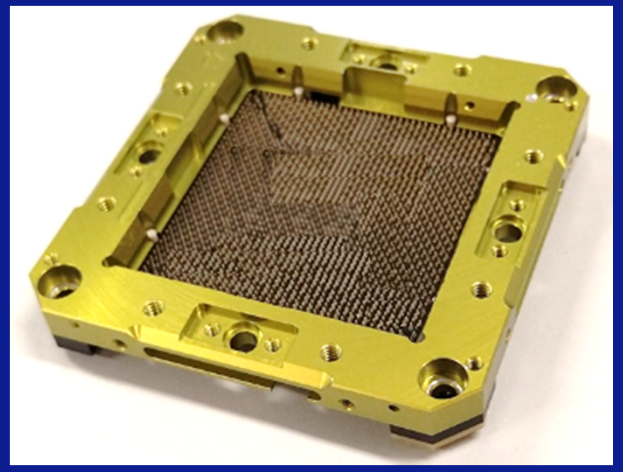
- Coaxial socket has been around for years
- This technology is known to be the best solution for high-speed test, but with high cost
- Trend of IC package will be larger outside dimension and higher pin count
- Easy operation, reduced socket damage, and total cost of ownership will be key design features for coaxial socket when looking at future package trend

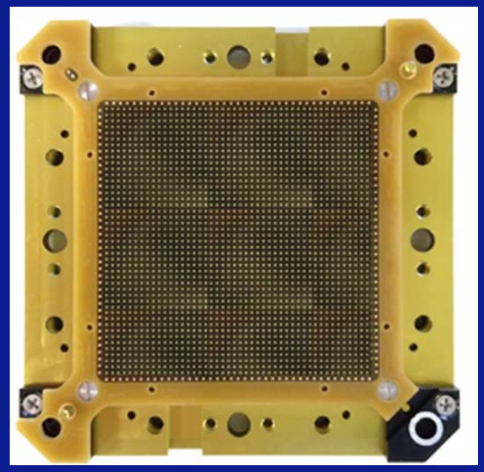
Design Goals for Unique Coaxial Solution

- Robust design which meets the demands of the test floor environment and protects contact pins from damage, reducing the need for delicate handling practices
- Eliminate shorting risk between the PCB and the metal housing
- Exceed all relevant electrical requirements to ensure consistent performance over the socket life
- Reduce total cost of ownership and deliver competitive pricing

The Result – Unique Coaxial Socket

- Innovative new socket. Simple, Robust, Better



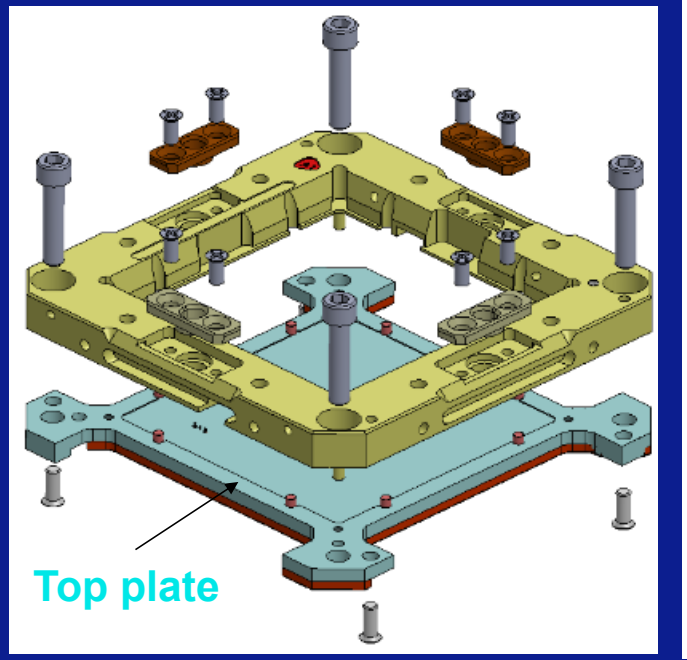


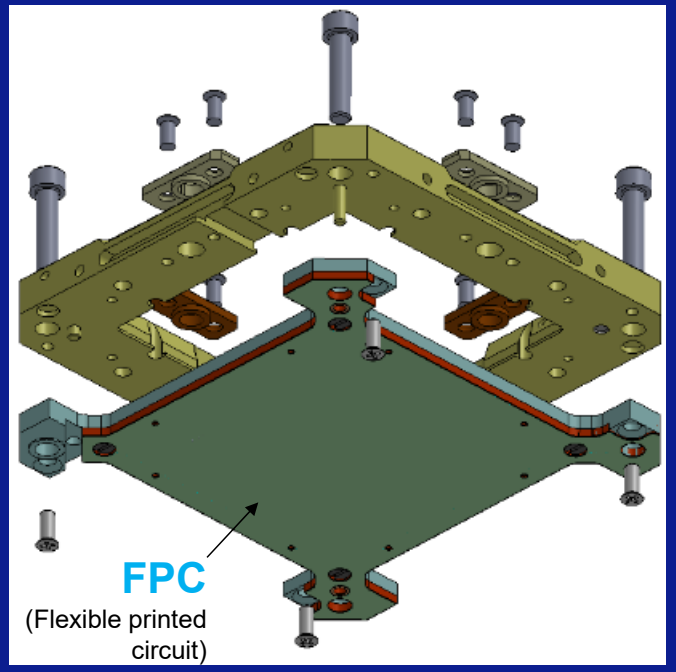
2k Pin Reference Socket

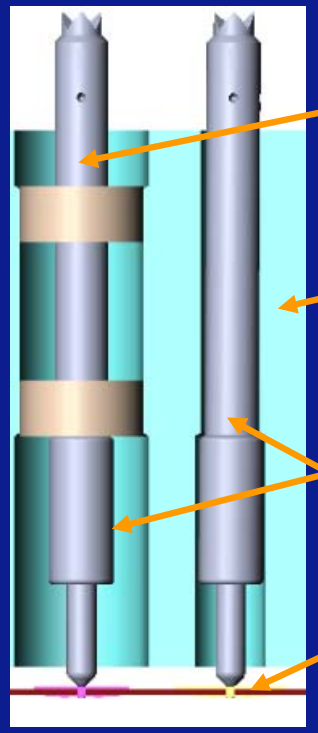
Introduction - Unique Coaxial Socket

Patent pending

- **Concept: Robust and user friendly**





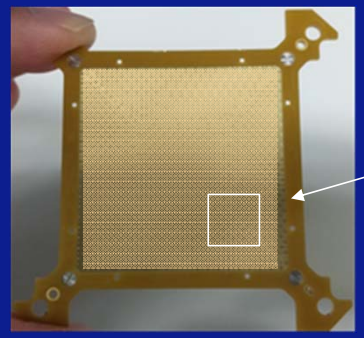


Pin Cross section

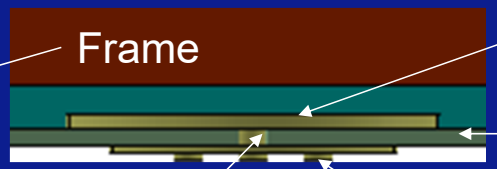
Innovative Features

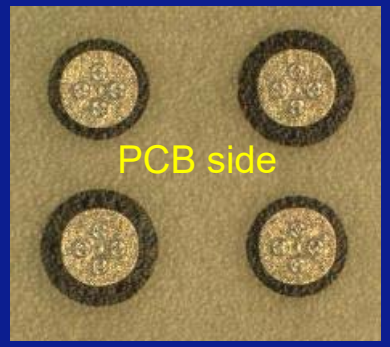
- Simplified contact module design minimizes impedance mismatch variation and removes costly machined metal plate, now only one required
- Contact pins are protected during loading and maintenance by the FPC layer
- Only one pin is used for signal, power and ground

Innovative FPC Design Features

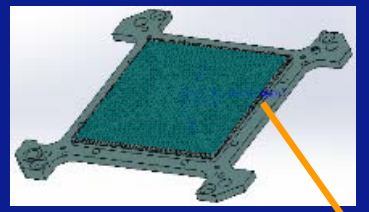


Cross section (FPC with frame)



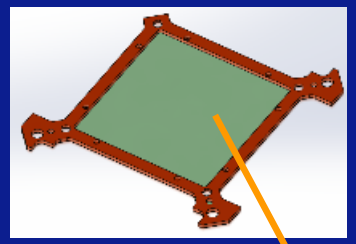


Top plate



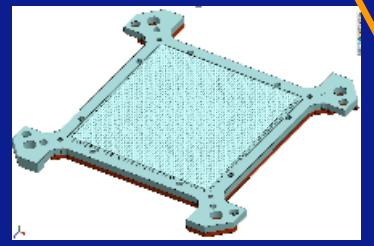
+

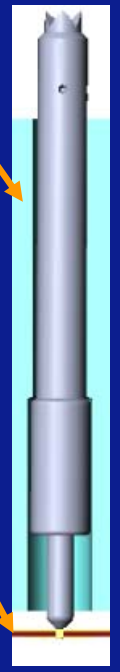
FPC



Assembly

Contact Module

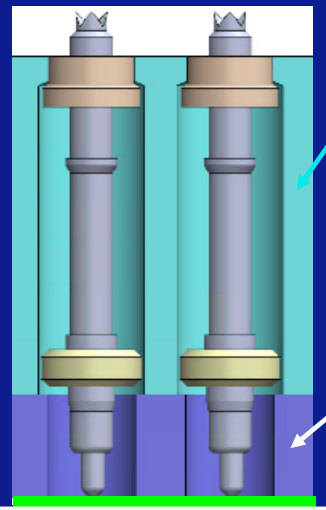




Advantage of FPC (1)

Optimized impedance control

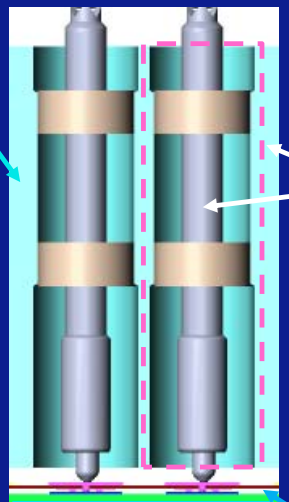
Single plate structure improves impedance control and minimizes impedance mismatch



Top plate (Metal)

Bottom plate (Metal)

Without FPC



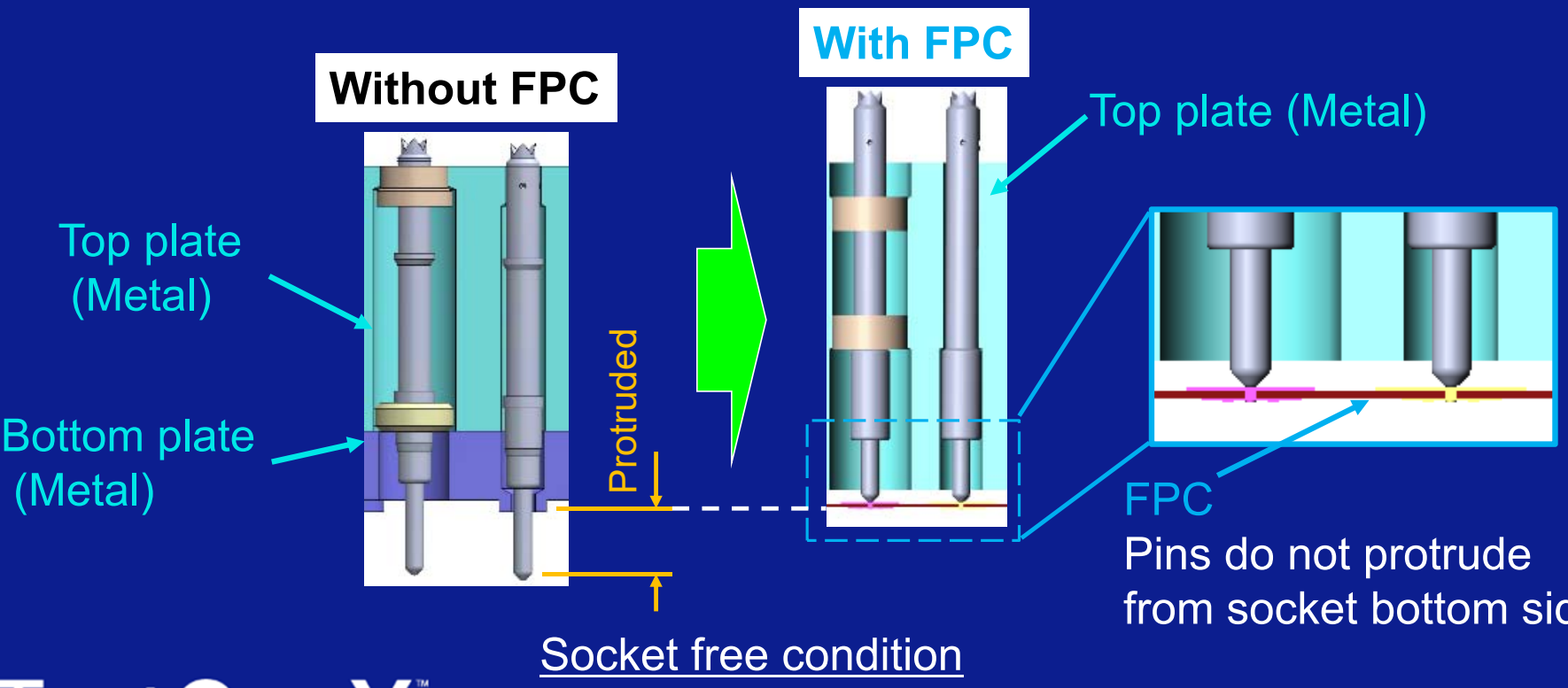
With FPC

FPC

<Structure>
One thick metal plate for pins
- Eliminates concern about hole position offset between two plates

Pin Protection Structure

FPC retains Plunger B to avoid broken pin tip



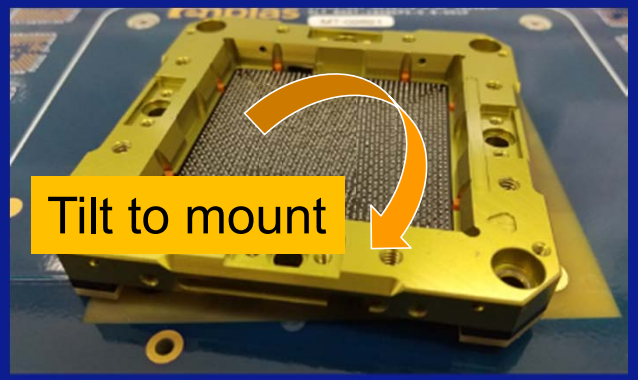
Current Issue without FPC

Support PCB side **pin tip protection and ease of socket mounting**

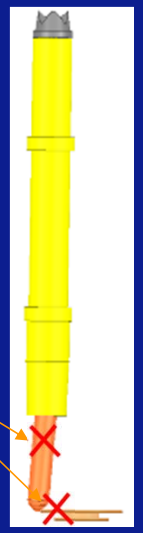
Without FPC

Large protrusion of probe
High risk of damage for Probe and PCB

+

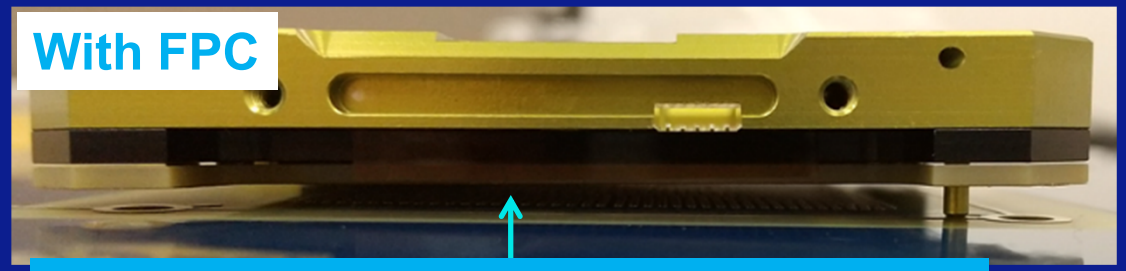


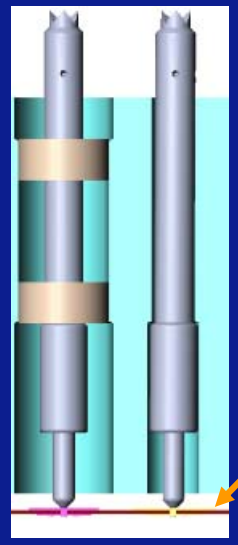
→ Create pin bent, damage

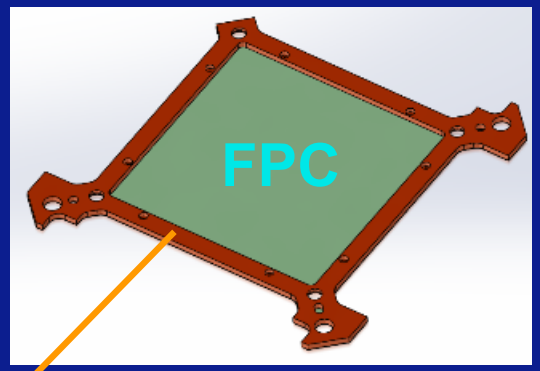


Advantage of FPC (2)

Support PCB side **pin tip protection and ease of socket mounting**

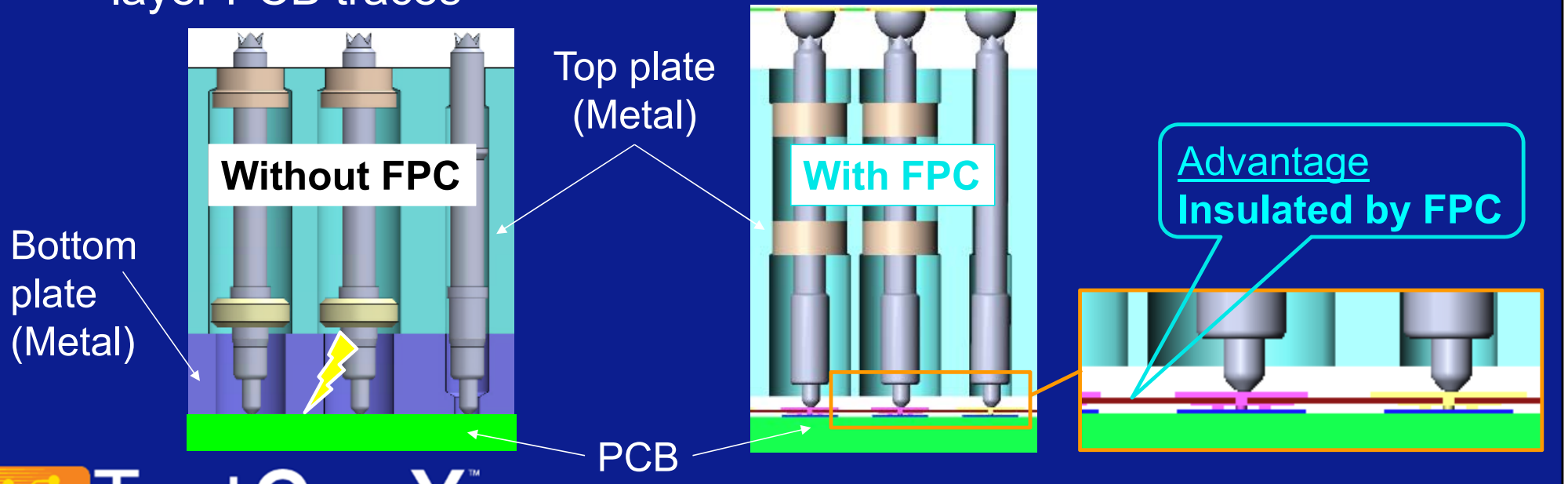






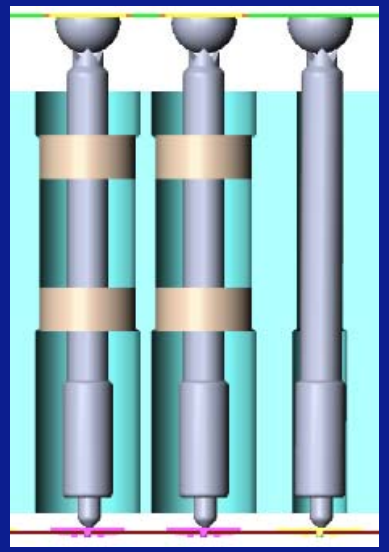
Advantage of FPC (3)

- Insulates between metal body and PCB surface **to prevent a risk of electrical short**
- **Reduces coupling** between grounded metal pin block and top layer PCB traces



One Pin for all Signal, Power, and Ground

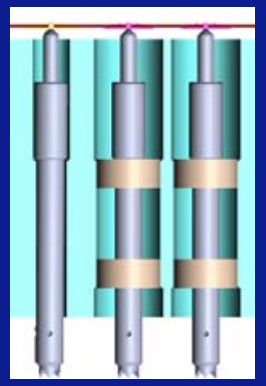
Improve total cost of ownership by one pin with "idiot proof" design



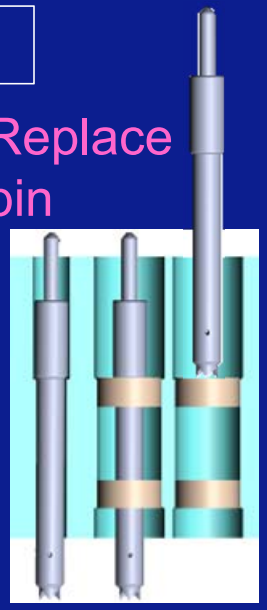
Signal, Power, GND

Easy operation

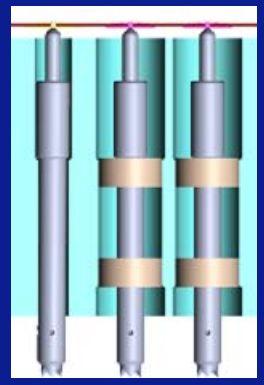
Remove FPC



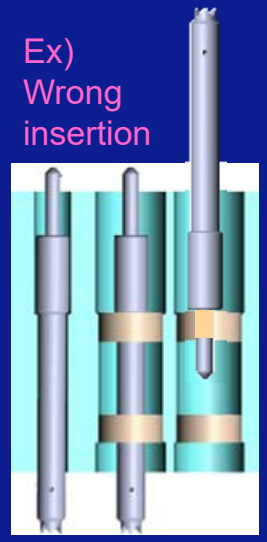
Replace pin



Return FPC



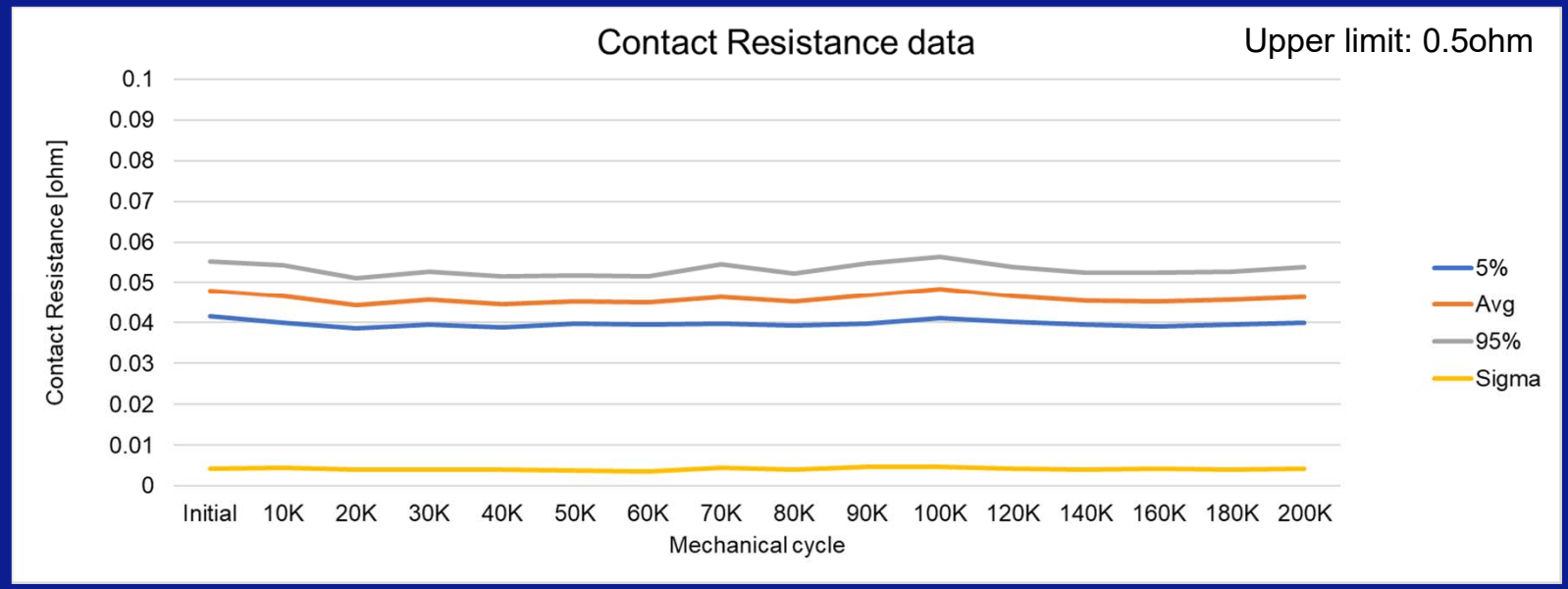
Ex) Wrong insertion



Internal Evaluation Result

Contact resistance data

- Very stable contact resistance



Test condition

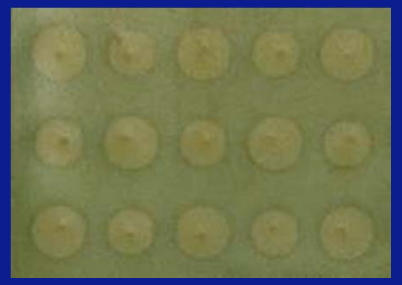
- Mechanical cycle test to 200K at room temperature
- Socket pin count 2,000

Internal Evaluation Result

FPC pad condition check

- Normal witness mark observed

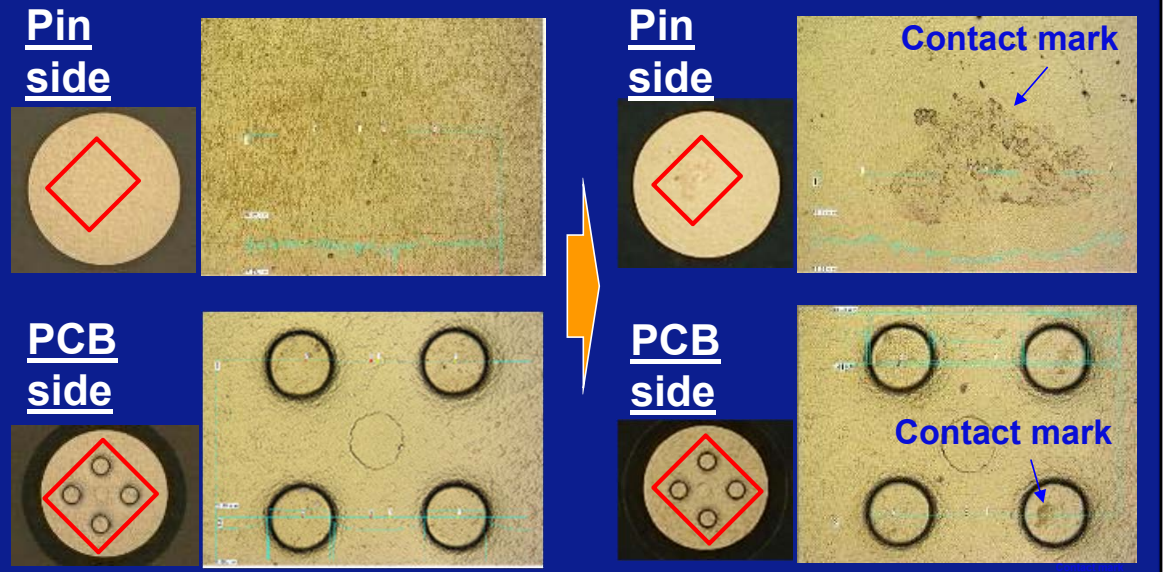
Contact position check



FPC pad to pin (Plunger B)

FPC pad to PCB pad

FPC pad after 200K cycle



Summary

Unique innovation, a new Coaxial socket with many improvements over the current standard

- **Eliminates impedance disconnect between drilled metal plates**
- **Reduces coupling to top layer high speed PCB traces**
- **Significant reduction of shorting risk**
- **A simple, more robust contact module with FPC**
- **One pin for signal, power, and ground**
- **Easier installation and maintenance**
- **Lower total cost of ownership / competitive price**

With Thanks to Our Sponsors!

Premier

Emeritus

Cohu

Johnstech®

Honored

GLOBAL INNOVATION
ISC

WIN SOLUTION

LEENO
Total Interface Solutions

TSE

With Thanks to Our Sponsors!

Distinguished

Industry Partners

With Thanks to Our Sponsors!

Lanyards

Tutorial

Keynote

Keycards

Totebag

Publication Sponsor

COPYRIGHT NOTICE

www.testconx.org