#### VIRTUAL EVENT

# TestConX

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# Coaxial Elastomer Socket for Crosstalk Shielding

#### Yunchan Nam, Changsu Oh, Bohyun Kim, Seungho Woo, Wonhui-Choi, Matt Hansen

#### **TSE Corporation**



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- Data Rate Trends of 5G Era
- Crosstalk
- Type of Socket for Final Test
- Introduction to Coaxial Elastomer Socket
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- Summary







#### **Crosstalk**

#### ✓ Electromagnetic Interference Between Two Circuits or Conductors





Coaxial Elastomer Socket for Crosstalk Shielding

<sup>₄</sup> 2021

#### **Crosstalk**

✓ Cable Structure to Prevent Crosstalk

#### ✓ Bit Error Protection & High Speed Signal Transmission



< Structure of Coaxial Cable >





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## **Type of Socket for Final Test**



#### **Spring Socket**

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- ✓ Long Lifespan
- Pin Appliance.
- ✓ Repair



#### **Elastomer Socket**



- High Speed
- Fine Pitch

 $\checkmark$ 

 $\checkmark$ 

- Price Competitiveness
- ✓ Mass Production
- ✓ Low Ball Damage

Coaxial Elastomer Socket for Crosstalk Shielding

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### **Type of Socket for Final Test**







#### **Introduction to Coaxial Elastomer Socket**

## Coaxial Type Elastomer socket



#### **Dielectric Material**

Short Protection with

**Metal Housing** 

#### <u>Signal Pin</u>

• Electrode Diameter Tuned

for Characteristic Impedance



# TestConX<sup>®</sup>

## **Introduction to Coaxial Elastomer Socket**



#### **Coaxial Type Elastomer Socket**

- Low Inductance
  - → For High Frequency
- Low Cost
  - → Price Competitiveness



#### **SI Performance Comparison**



< Pin Array >



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## SI Performance Comparison Frequency Domain (Spring Probe vs Elastomer Socket)



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< Insertion Loss >



#### < Return Loss >



#### < Crosstalk >

(Single-Ended)	Spring Probe Socket		Elastomer Socket	
	8GHz	16GHz	8GHz	16GHz
Insertion Loss	-0.78dB	-1.58dB	-0.41dB	-1.30dB
Return Loss	-7.92dB	-5.22dB	-10.52dB	-5.89dB
Crosstalk	-35.96dB	-34.90dB	-45.52dB	-41.40dB





## SI Performance Comparison Frequency Domain (Coaxial Spring Probe vs. Coaxial Elastomer Socket)



(Single-ended)	Coaxial Spring Socket		Coaxial Elastomer Socket		
	8GHz	16GHz	8GHz	16GHz	
Insertion Loss	-0.07dB	-0.15dB	-0.02dB	-0.08dB	
Return Loss	-19.34dB	-15.42dB	-23.40dB	-17.57dB	
Crosstalk	-51.52dB	-44.66dB	-68.76dB	-62.93dB	

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## SI Performance Comparison Time Domain



## **Electrical Performance Comparison - Initial**

## Typical Elastomer



Number of Pins

Cre	es	#1	#2
Resistance (mΩ)	MIN	41.76	45.97
	MAX	85.68	97.58
	AVG	58.56	65.30
	STD	7.32	8.85

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**Number of Pins** 

Cres		#1	#2
Resistance (mΩ)	MIN	32.02	36.14
	MAX	80.97	91.84
	AVG	57.00	64.63
	STD	14.45	17.06





## **Electrical Performance Comparison – Touch Downs**

## Typical Elastomer





16.45

21.41

24.62

31.70

STD

9.40

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Insertions		Initial	Contacts	Contacts	Contacts	Contacts
Resistance (mΩ)	MIN	35.08	51.26	64.37	81.52	94.72
	MAX	86.14	124.74	152.84	180.91	213.62
	AVG	63.37	86.34	106.99	136.22	171.83
	STD	14.15	17.77	20.8	25.33	29.64

Coaxial Elastomer Socket for Crosstalk Shielding



### **Summary**

- Crosstalk shielding becomes important as the required frequency and speed increase.
- For spring socket, Coaxial spring socket are proposed to improve crosstalk.
- We propose a Coaxial Elastomer socket that has the advantage of elastomer socket and can be improved up to crosstalk.
- As a result of the SI Simulation analysis of the test socket, the Coaxial Elastomer socket has the best signal characteristics.
- Therefore, the Coaxial Elastomer socket is expected to be a test socket solution with a high frequency characteristics a lower unit price than the coaxial spring socket.





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RF



#### **ELASTOMET SOCKET & INTERPOSERS**

- High performance and competitive price
- High speed & RF device capability
- Various customized design to meet challenge requirement

#### POGO SOCKET SOLUTIONS

- Excellent gap control & long lifespan
- High bandwidth & low contact resistance

#### THERMAL CONTROL UNIT

- Extreme active temperature control
- Safety auto shut-down temperature monitoring of the device & thermal control unit
- Full FEA analysis & Price competitiveness

#### **BURN-IN SOLUTIONS**

- Direct inserting on the board without soldering
- Higher performance BIB solution









CONTACT ISC CO., LTD **ISC HQ** Seong-nam, Korea **ISC International** Silicon-valley, CA Tel: +82-31-777-7675 / Fax: +82-31-777-7699 Email: <u>sales@isc21.kr</u> / Web: <u>www.isc21.kr</u>

#### WIN IWIN Co., Ltd.

#### The test probe for high signal integrity at extremely high speed test

#### Spring probe by stamping



250 kinds of spring probe pin

300 kinds of test socket (44,000 Pin count socket possible)

One piece spring probe

Three piece spring probe

High speed product → 0.63mm free length

spring probe pin available

Finest Pitch → 0.15mm Pitch





Spring probe by stamping

		Patented
Pitch(mm)	Free Length(mm)	Current Carrying(Amps)
0.15/0.2/0.25	2.17~	0.5~
0.3	1.5~	1.5~
0.35	2.08~	1.8~
0.4	0.8~	2.5~
0.5	1.5~	3.0~
0.65	1.13~	9.0~
0.8	3.14~	3.0~

#### Automation Pin assembly and Quality control





pins socket

Top Figure: Socket CRES, Force, Stroke test Bottom Figure: Data displayed

#### Socket and Lid



(by IWIN)



- Stamped piece parts attached to a

reel fed into the assembly machine

Bottom Figure: Data display 5,903

Pin assembly

(Fully automated machines)

#### Spring probe pins for High speed

#### Extremely short spring probes by stamping





One piece spring prob **Design approach** 

0.50

00.32





Insertion Loss - HPSP28063F1-01



Return Loss - HPSP28063F1-01 0.00 -10.00 62.01GHz -20.00 -30.00 -40.00 -50.00 Curve Info dB(St(Dim),Dim)) -60.00 -70.00 0.00

### SOLUTION

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#### **High Performance Probe solution**

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