TestConX 2020 Poster Session

Developing a wafer connector with 200,000 interconnection pads

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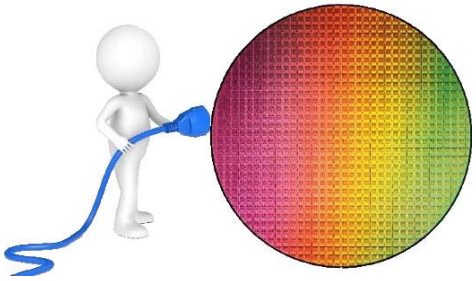


A wafer connector ?

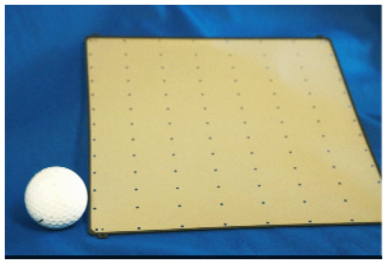
Design Constraints

Square wafer: 215mm x 215mm
>200,000 I/O pads
Contact pitch: 0.45mm
CRES: <20 mΩ/contact
High current load

Objectives

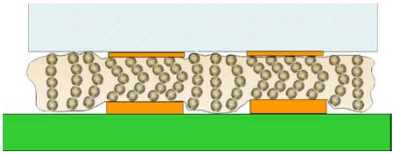
Size	Minimize overall size
Thickness	Minimize electrical path length
Power rating	20K Amps at 0.8V (entire wafer)
Environment	Data center
Mounting holes	Must accept an array of holes

Contactor as delivered



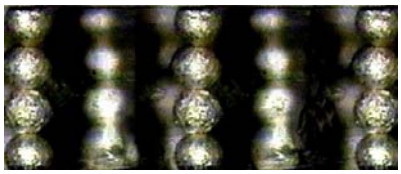
219mm x 219mm (with frame)
1.4mm thick frame
>200,000 contact locations
Holes in elastomer to match wafer
0.11mm thick anisotropic conductive elastomer

Anisotropic conductive elastomer - PariPoser®



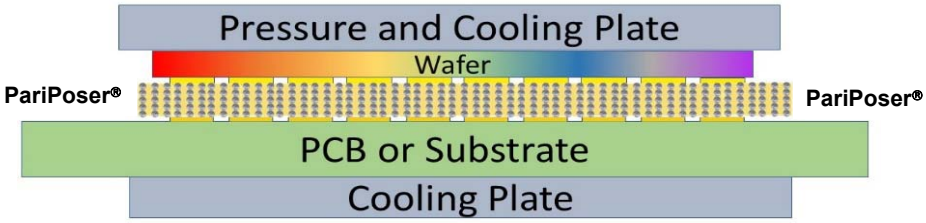
>4,000,000 conductive columns
Multiple columns per contact
CRES: <20 mΩ average

SEM photo of particle columns



Silver plated nickel particles
Magnetically aligned columns
90% silicone, 10% metal filled
Insulation resistance >200MΩ

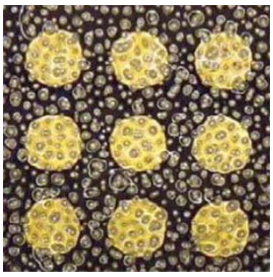
Connector Assembly



Some Engineering Challenges

Elastomer

The elastomer material had to be very consistent over a large area. There were over 30,000,000 particles in the contactor – each with a diameter of 20-25μm that had to be aligned properly.



Conductive columns in the elastomer viewed from above the contact pads

The elastomer material was thin (110 μm) and had to be held taut to avoid folds or wrinkles. The required array of mounting holes created non-uniform stresses when the material was stretched taut.

Frame

The thin frame had to be strong and stiff – and it could not distort into a potato chip shape. This was accomplished by using 6061-T6 aluminum (due to its low internal stresses).

Assembly

The connector mechanical assembly had to keep a uniform pressure over the entire surface and keep the surfaces flat relative to each other since the compression per contact was only 30 μm.

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