

HYMSTAC INTERPOSER

Miniaturized High Density Solderless interconnect solutions

ENGINEERING SUPERIOR SOLUTIONS

Hyperboloid, Spring Probe, High Speed and Filtered Interconnects

Aerospace & Defense, Industrial, Medical, Space, Test & Measurement, Transportation

24 September 2013 | Jean Sébastien Lefrileux, Expert Engineer



Agenda

- 1. HYMSTAC Description**
- 2. HYMSTAC for LGA connection**
- 3. Example of Land Grid Array ATMEL 625 points assembly**
- 4. Space validation of the device**
- 5. Conclusion**

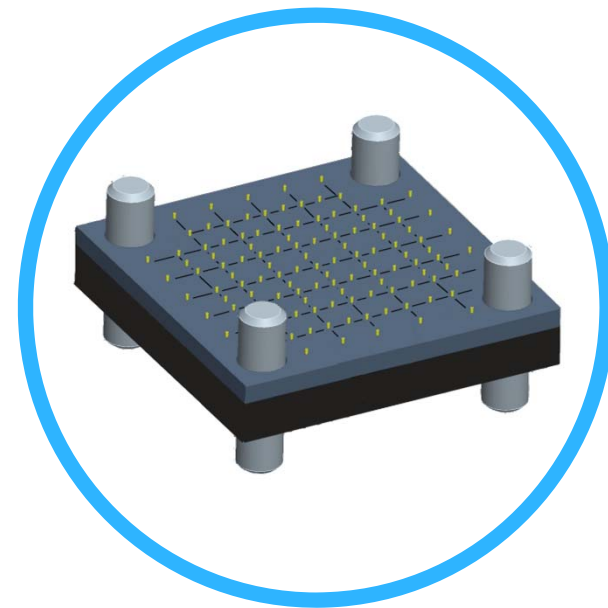


HYMSTAC: Description

- ▶ Solderless High Density Stacking Connector

- ▶ Main applications

- ▶ PCB Stacking
- ▶ MCM Interconnection
- ▶ QFN Interconnection
- ▶ High Frequency Test equipment

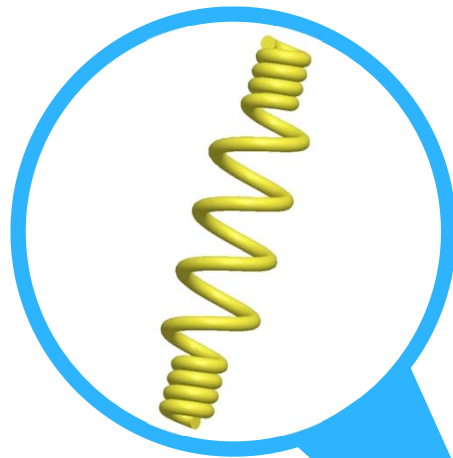


Markets

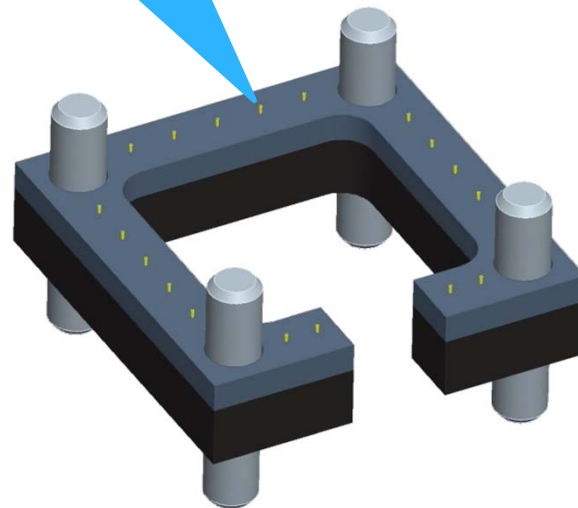
- ▶ Commercial Aviation
- ▶ Space
- ▶ Defense
- ▶ IT Systems
- ▶ Medical
- ▶ Automotive
- ▶ Telecommunications
- ▶ Test & Measurement



HYMSTAC: Principle



Non representative shape



- ▶ A single conductive spring is inserted into insulators
- ▶ Electrical and mechanical functions are achieved thanks to one piece

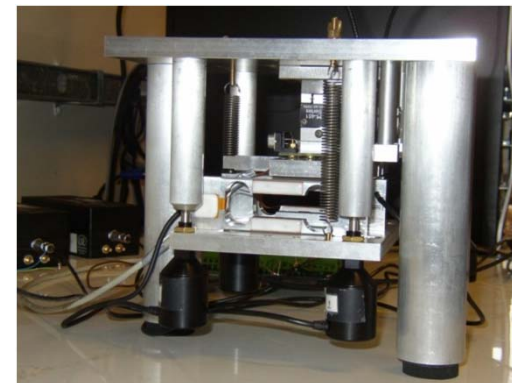
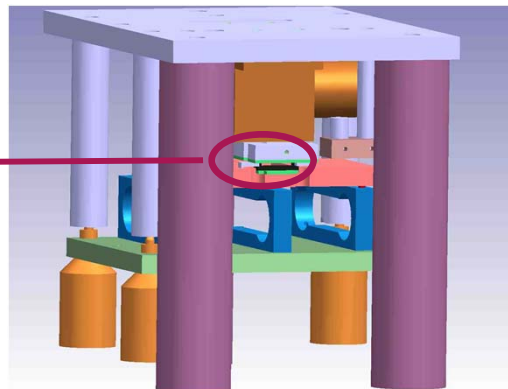
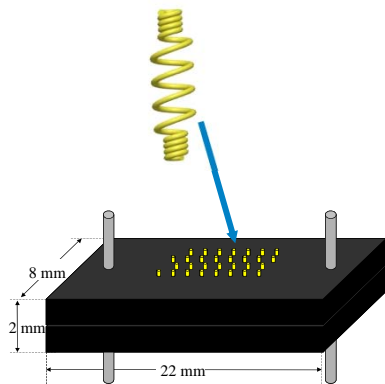
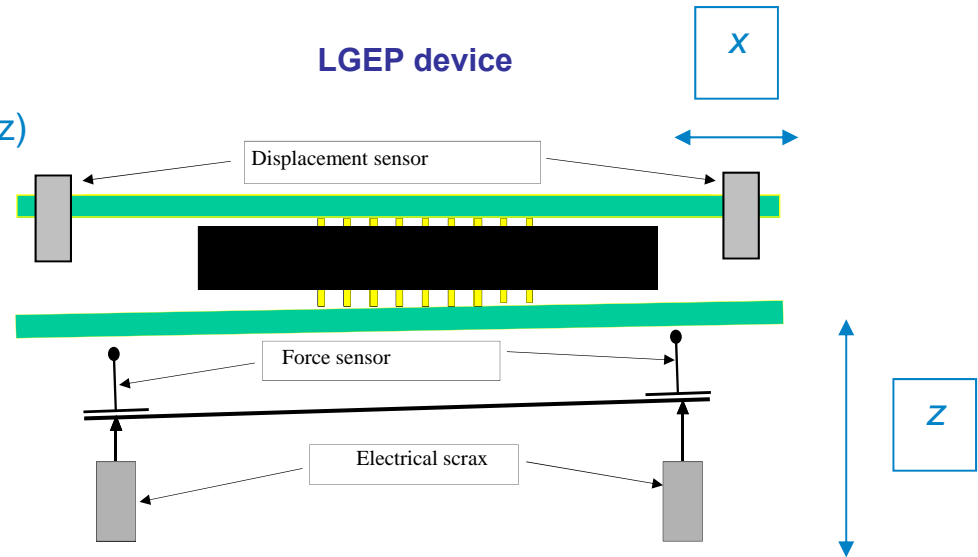
HYMSTAC: Characterization

▶ Static Characterization

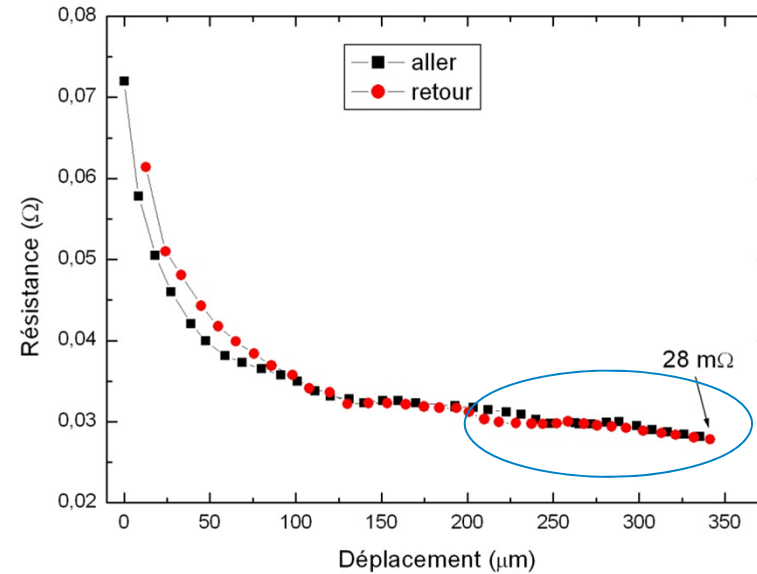
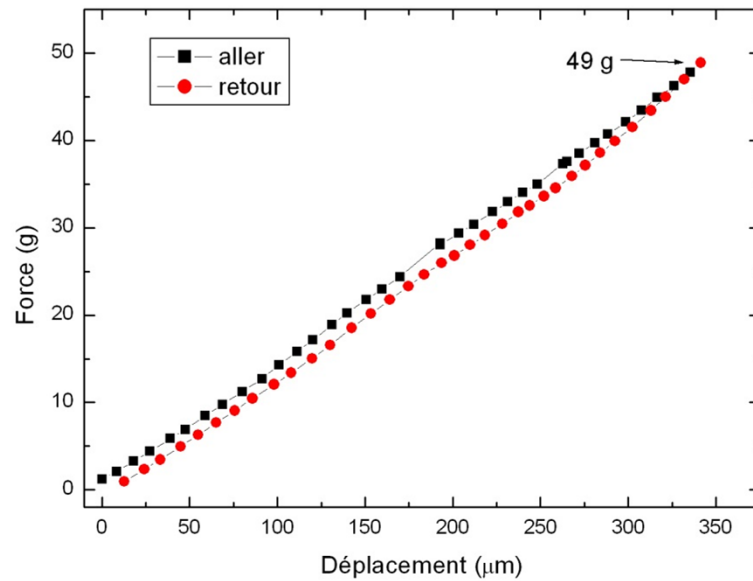
- ▶ Force versus displacement (z)
- ▶ Contact resistance versus displacement (z)

▶ Dynamic Characterization

- ▶ Fretting



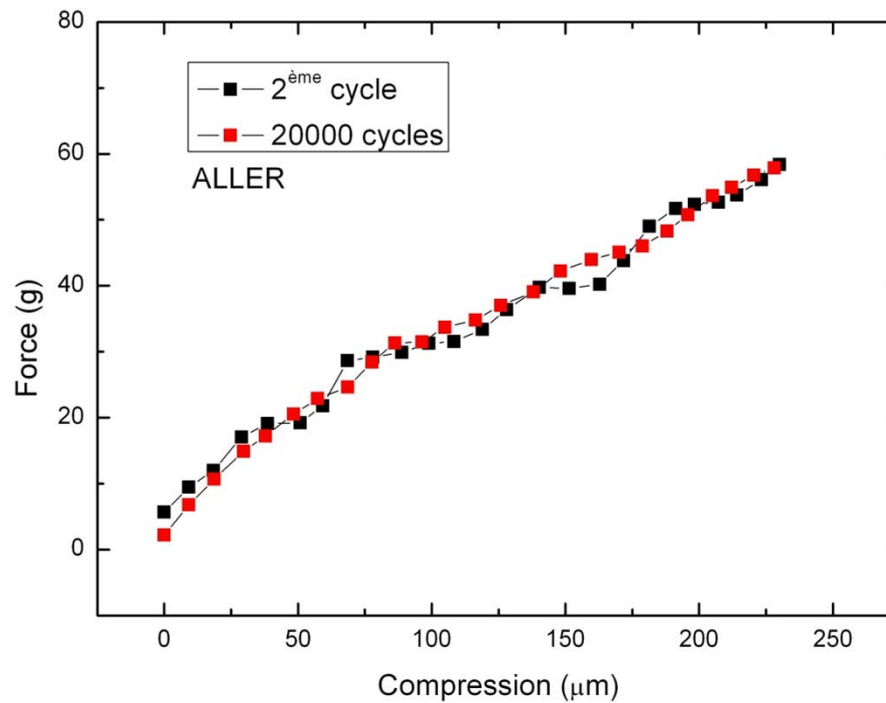
HYMSTAC: Force & Contact Resistance



- ▶ Force = 49 g @ maximum displacement
- ▶ Total Contact Resistance : 28 mΩ



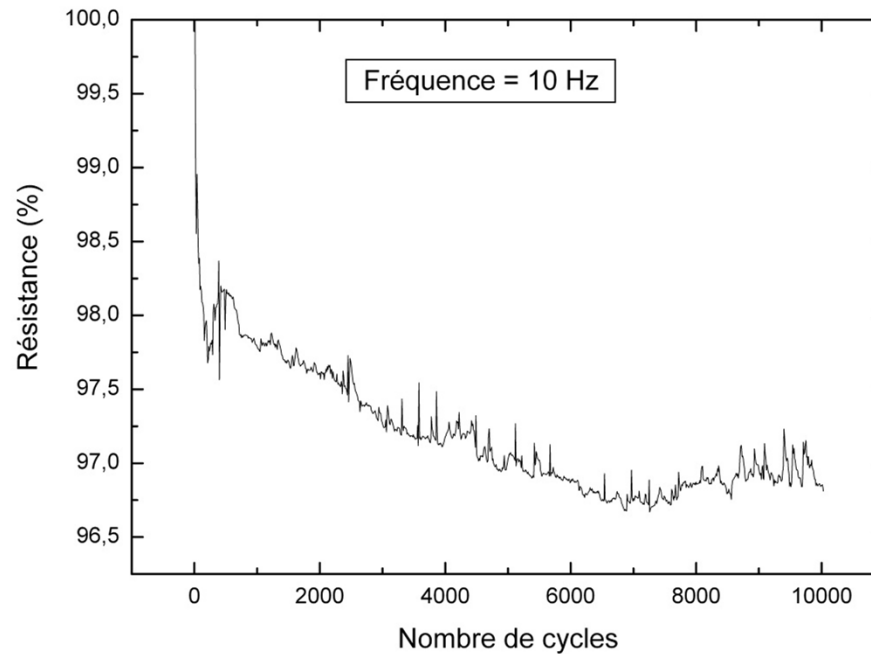
HYMSTAC: Endurance



► No loose of performances after 20 000 cycles!



HYMSTAC: Fretting Characterization



⇒ No visual defect @
the surface of PCB

- ▶ Fretting experiment : 10 Hz @ +/- 40 μm
- ▶ 10 000 cycles performed
- ▶ No degradation

⇒ HYMSTAC technology is fretting resistant!



HYMSTAC Interposer

LGA Connection



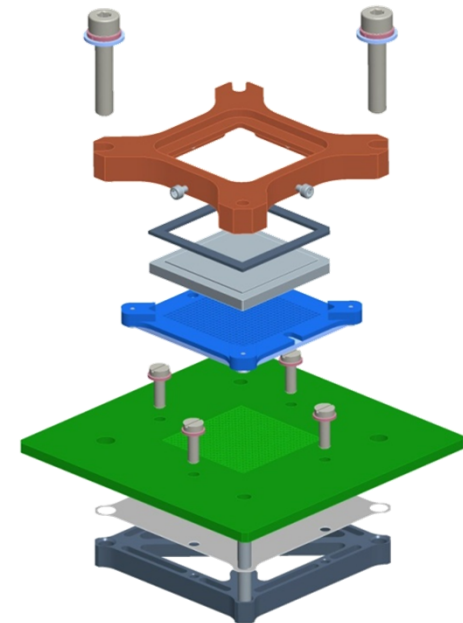
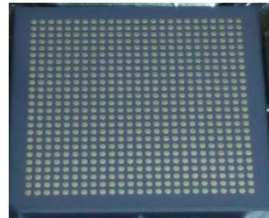
HYMSTAC for LGA Connection

Solderless interconnection solution between a print circuit board (PCB) and a ATMEL component like « land grid array » (LGA)

Pressure connector:
Hypertac interposer



ATMEL component
LGA (349/472/625)

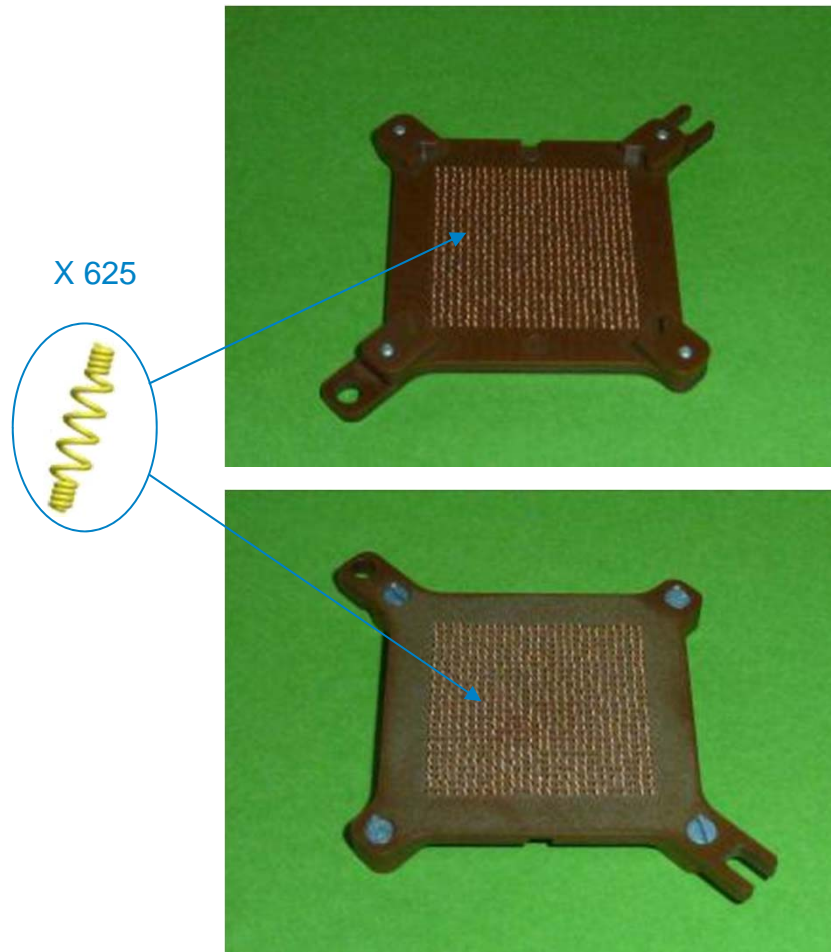


Main Benefits

- ▶ Quick mounting and dismounting and non destructive
- ▶ Elastic electrical contact (with spring) very robust to thermal cycling
- ▶ Compatible with harsh environments (Space and Aeronautics)



Hymstac Connector: 625 points



Material insulator : TORLON
 CTE : 16 ppm/°C

Performances

Height 2.15 mm / Pitch of 1 mm

Deflection: 0.3 mm

Total contact resistance: 30 mΩ

Insulation resistance > 5.10³ MΩ

Current: 1 A maximum

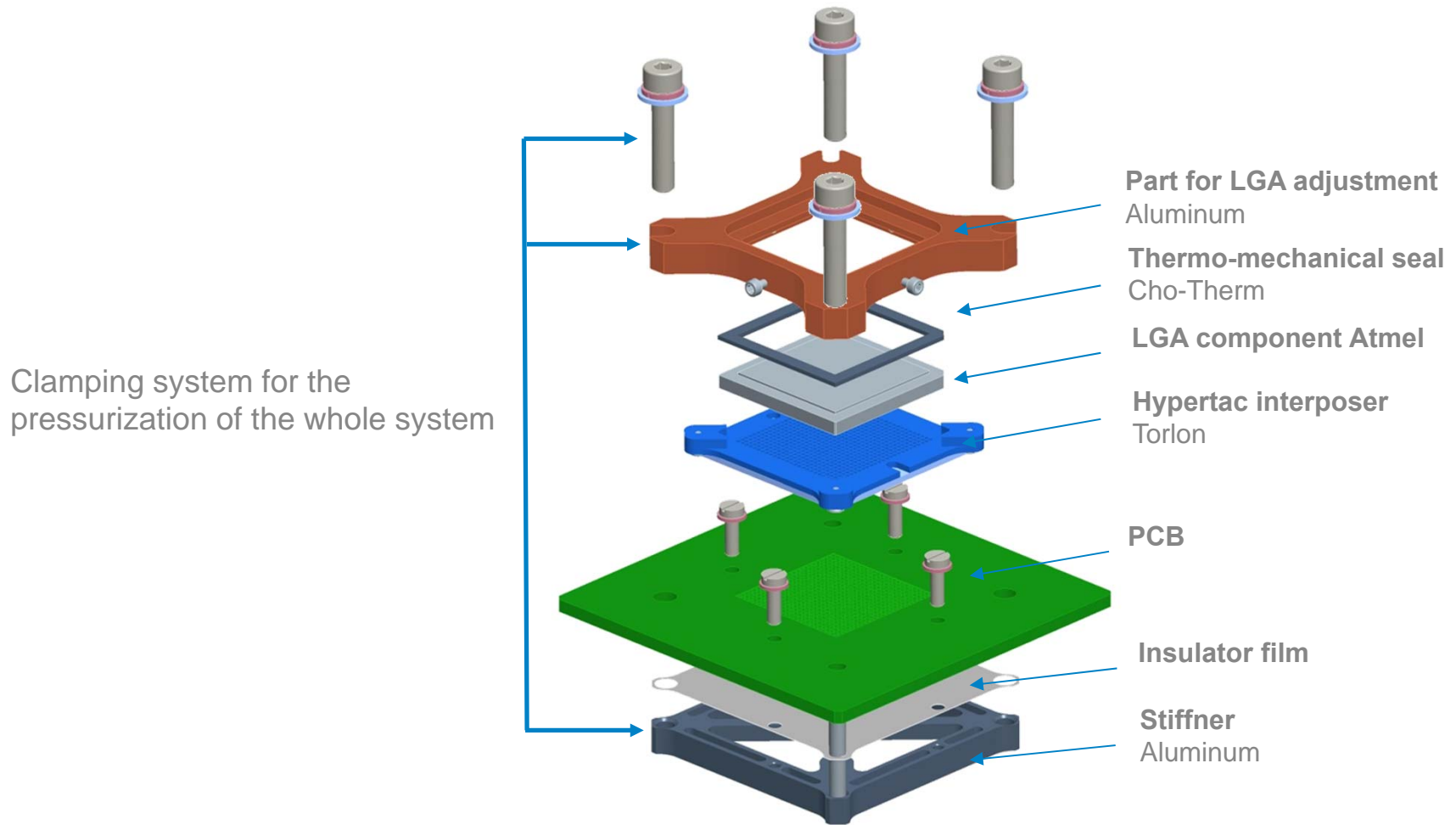
Force maximum per contact: 0.5 N

Thermal shocks: -55°C/+125°C/ x250

Random Vibration: 48 g rms 10-3000 Hz
 30 min without opening (> 1 ns)

Attenuation: 1dB @ 3GHz

Hymstac Connector: Assembly PCB/LGA



The elements can withstand temperature as high as 150 °C.

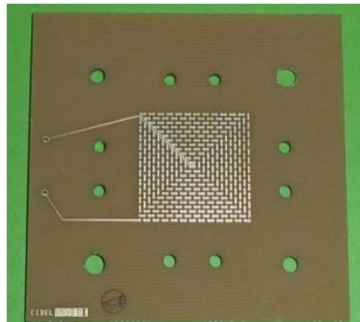
HYMSTAC Interposer

Example of Land Grid Array ATMEL 625 points assembly

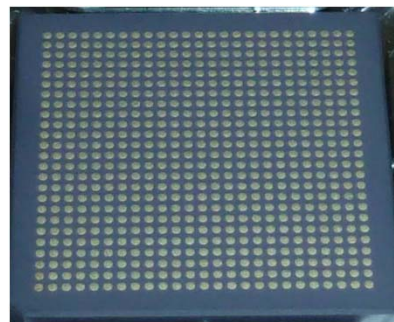


Land Grid Array 625 points assembly

- ▶ Validation of the interconnect solution was performed with an ATMEL land grid array (LGA) 625 points (daisy chain).
- ▶ This LGA was chosen because it's the most critical in term of size (largest) and pitch (smallest).
- ▶ Validation with an LGA 625 points covers LGA 349 and 472.



PCB



LGA



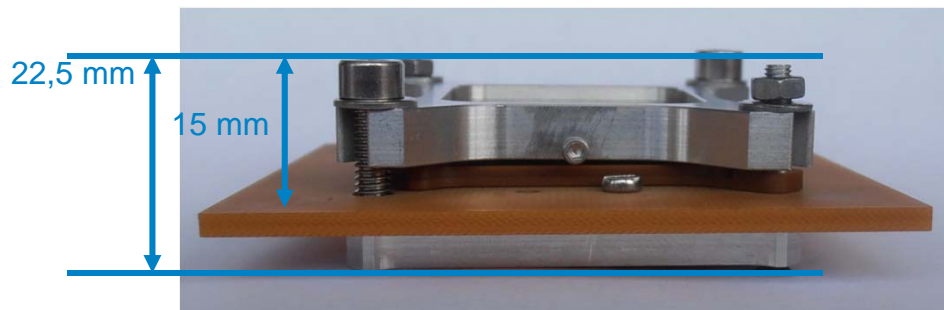
Interposer



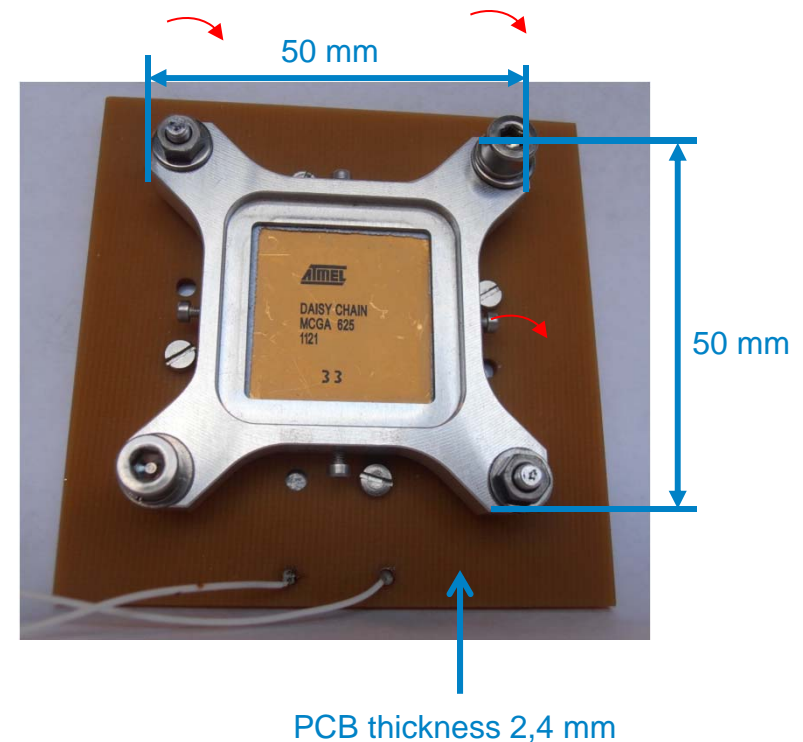
Clamping system

Land Grid Array 625 points assembly

- ▶ Assembly according Hypertac procedure (easy procedure, no special training) :
centering correctly LGA / Hymstac / PCB
- ▶ Pressurization of the clamping system (torque value 5,5 N.cm).



Weight of the clamping system = 30g
(without PCB and LGA)

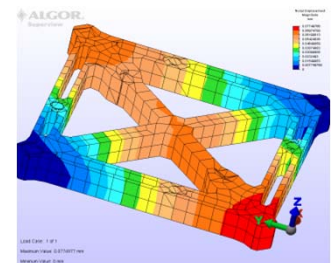
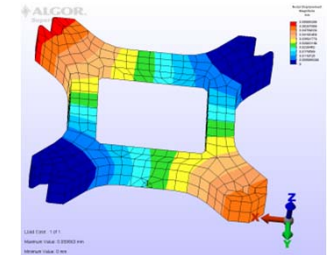
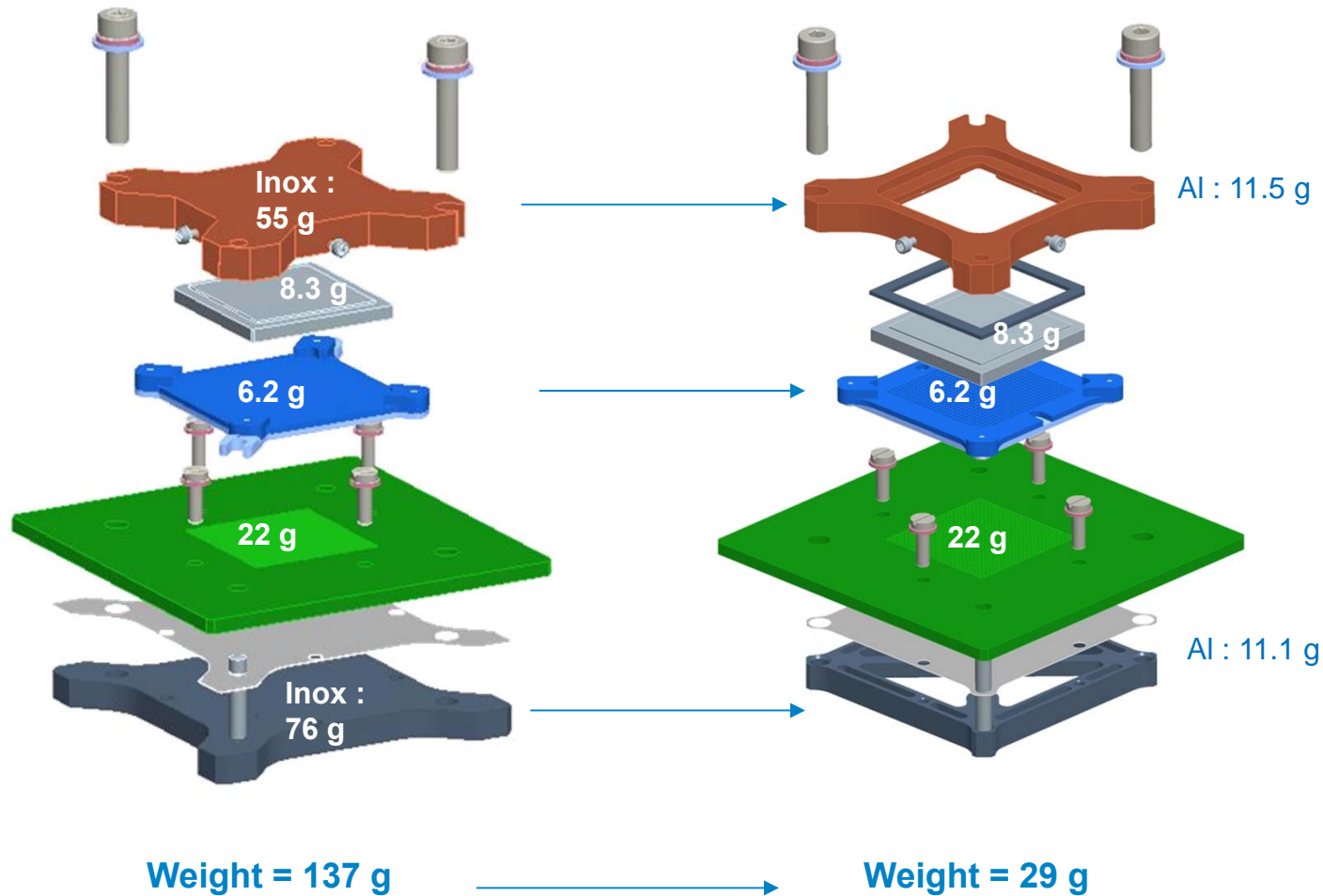


HYMSTAC Interposer

Space validation of the device



Space Validation



HYMSTAC Connector: 1st tests

First evaluation of the assembly in harsh environment

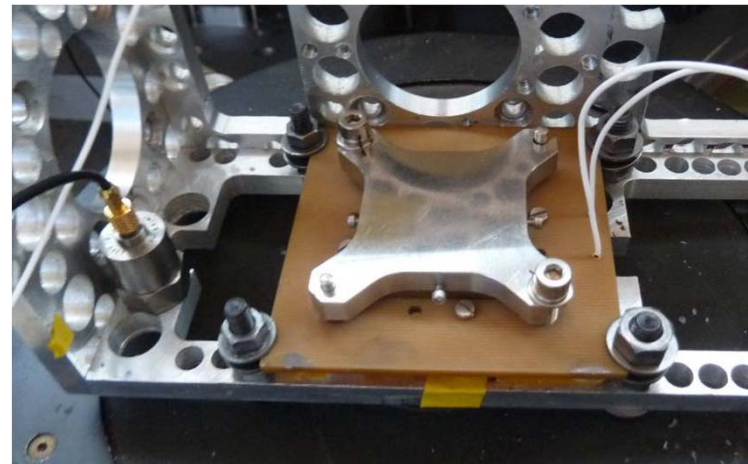


1 - Electrical continuity

- ▶ Basic test: measure the resistance of the system to ensure the good functioning.
- ▶ Good stability in time: measure after the clamping and the following days.

2 - Rapid variation temperature

- ▶ Scale of temperature [-55°C ; + 100°C].
- ▶ 5 cycles: no opening of the circuit.



HYMSTAC Connector: 1st tests

3 - Sinusoidal vibrations

- ▶ High level of vibration applied: frequency sweep between 10 to 2000 Hz
- ▶ Acceleration: 20g during 30 minutes per axe, i.e. 1h30 of test (according to ESCC 3401)
- ▶ No electrical cut under 20 ns detected

4 - Temperature rise

- ▶ Measure of the temperature rise of the assembly versus the intensity
- ▶ Maximum temperature detected on the top of case:

for example $P = 3.8 W$ ($I = 0.3 A$) $\Delta T = 45^{\circ}C$

HYMSTAC Interposer

Conclusion



HYMSTAC Interposer: Conclusion

- ▶ HYMSTAC contact performances are : low and stable compression forces, low contact resistance, vibration and fretting resistant ...

- ▶ A careful choice of material for the assembly was done to avoid important gap of the coefficient of thermal expansion (CTE)

- ▶ HYMSTAC connection with a LGA has shown promising results in term of :
 - ▶ Assembly,
 - ▶ Performances,
 - ▶ Weight saving,

- ▶ A validation according 1 queue test that is in progress thanks to CNES / Thales Alenia Space / Hypertac

Thank You For Your Attention

Any Questions?

