



TIPS

Thin Interconnected Package Stacks



Neuchatel 16th February 2010

“medical applications will be realised, where miniaturisation and high functionality are the primary objectives”

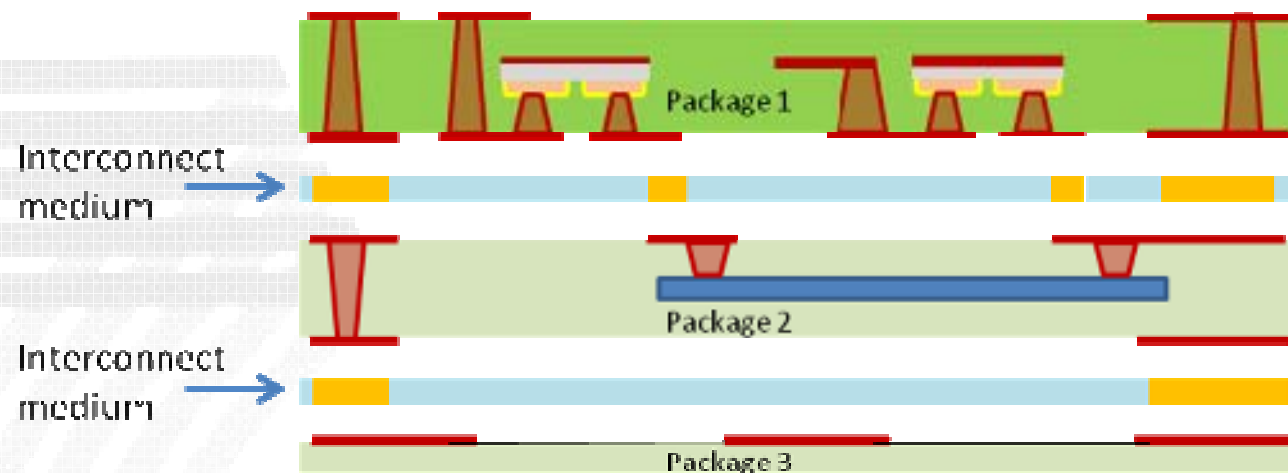


TIPS Consortium

- Formed from the experiences of a successful FP 6 Project called SHIFT.
- Six Partners
- Project duration 36 months
- Total Project budget 4.3M Euro with an EU contribution of 2.75M Euro
- Started 8th September 2008

Consortium Aim

- To develop technologies for (i) ultra thin packages and for (ii) stacking (utp) packages to realise the next generation of medical devices (e.g. hearing aids (HA) and implantable cardio defibrillators (ICD)).



- To develop reliability and cost models to support the industrialisation road map.
- To deliver demonstrators and exploit the technology through the end user partners.

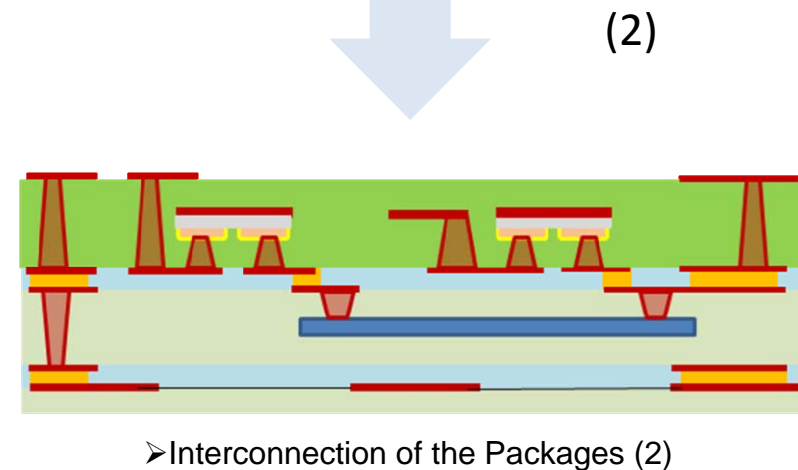
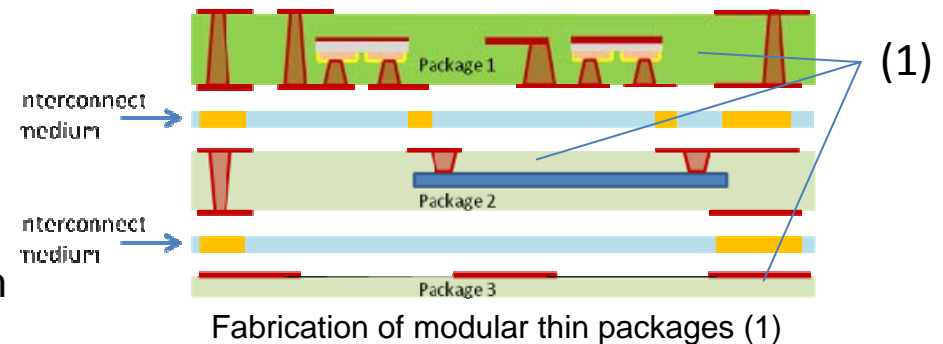
Target Specification

Packages:

- Package thickness : 60 -100 μm .
- Thickness of embedded chips: 20 μm
- Pitch on the chips down to 40 μm
- Number of I/Os: 8 – 200
- Off package interconnect pitch: 500 μm
- Batch processing

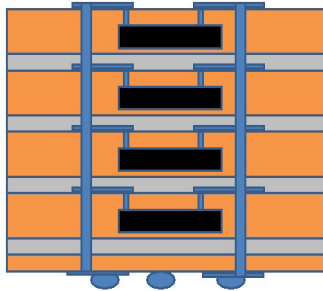
Stacks:

- Total thickness below 1 mm.
- Max. 10 packages stacked
- Interconnect thickness: 15- 30 μm
- Interconnection of flexible packages.
- Lead free soldering
- Additional SMD components on top.



Ultra Thin Chip Package Considerations

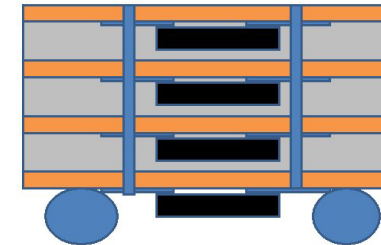
Design 1 – UTCP version
face-up



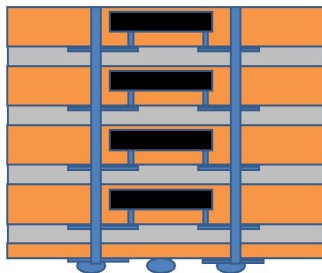
Design 1 – flip chip version
face-up (5 layer)



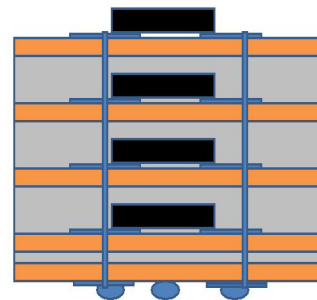
Design 1 – flip chip version
face-up (4 layer)



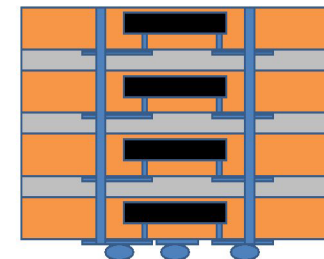
Alternative design – UTCP
version face-down (5 layer)



Alternative design – flip chip
version face-down

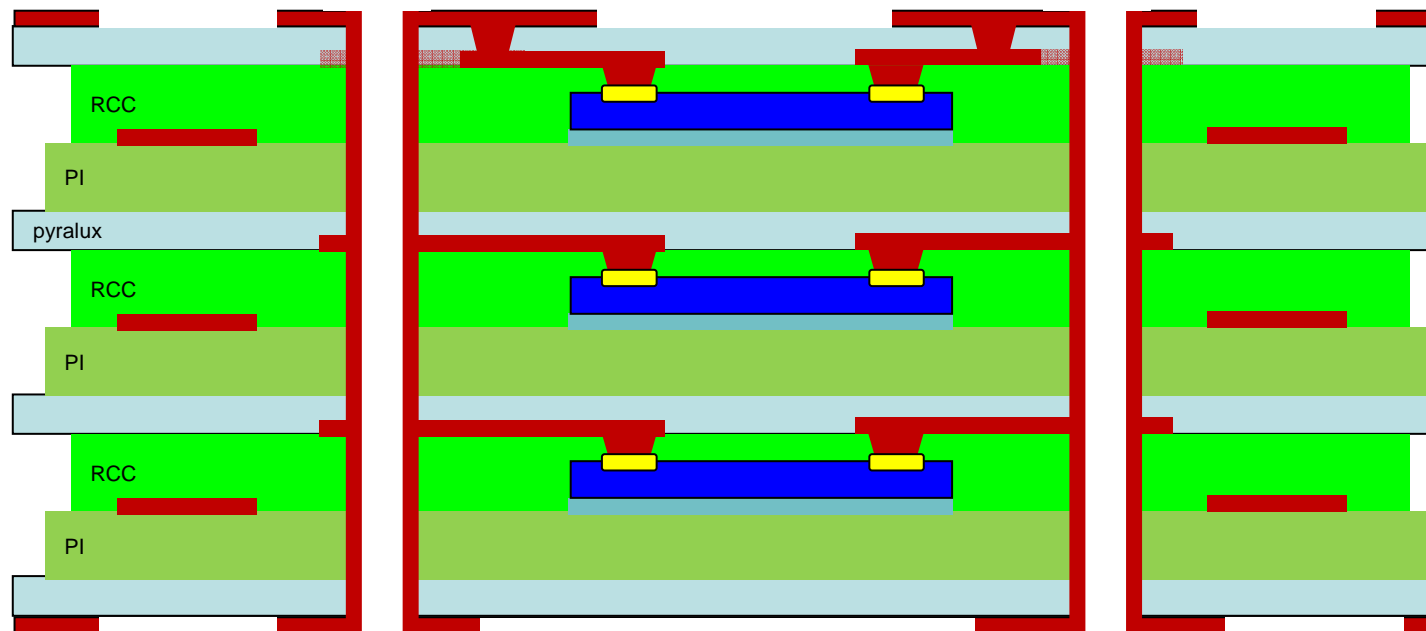


Alternative design – UTCP
version face-down (4 layer)



Stack Build Up Considerations

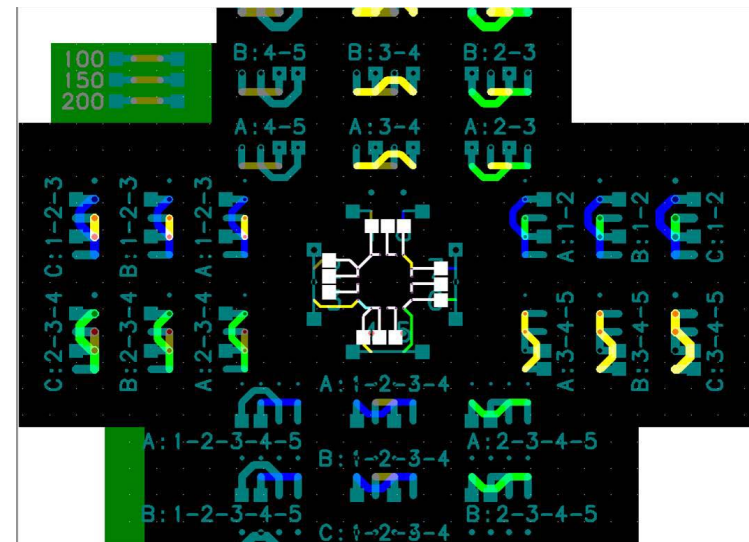
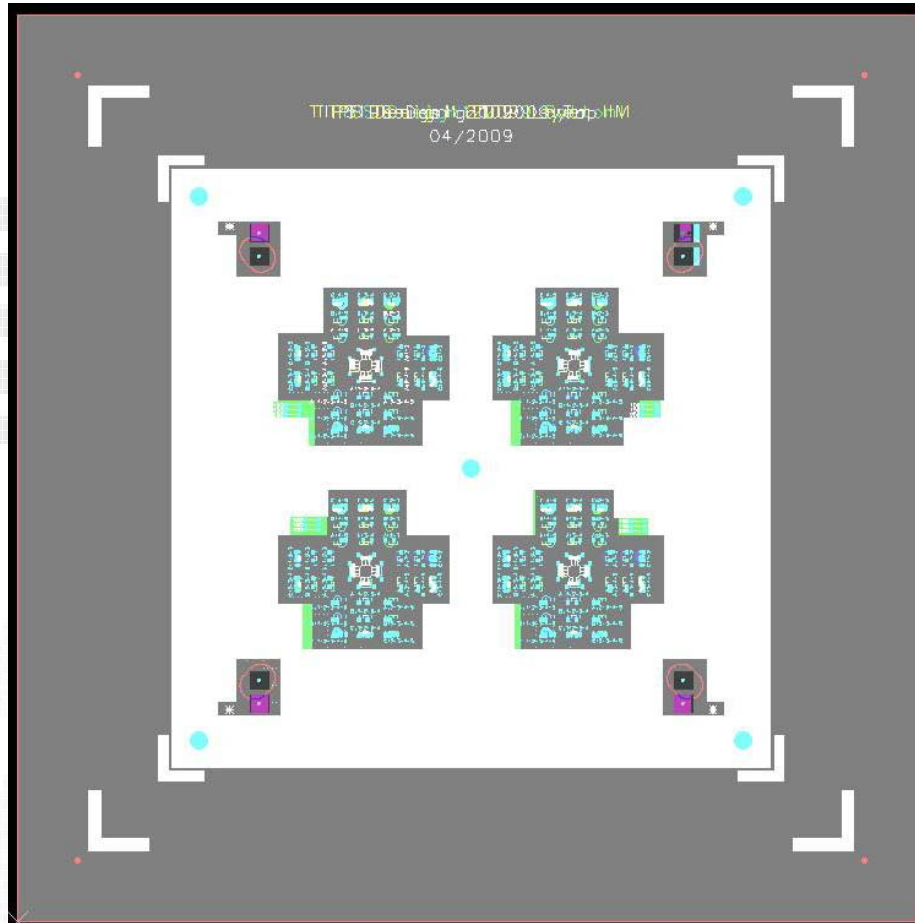
- Laser / Mechanical drilling - Plating / Structuring



Progress to date

- Approaching 18 month mark, no publishable results at present.
- Building of first test patterns.
- To enhance wider industrialisation, chosen to work with available fabrication processes which can mean panels as large as 400mm X 300mm.
- Typical package size is 3mm X 3mm.
- Main challenge is
 - registration of layer build up in the packages and with package to package stacking.
 - Maintaining flatness
 - Scaling up from small experimental panels to large industrial panels

Test Package and Stack



Appendices



(1) Consortium Members

<p>Zarlink</p> <p>End User and project coordinator Electronic Modules for Implants Owner of WP 6 and 8</p>	<p>Oticon</p> <p>End User Hearing Aids Owner of WP 1 and 5</p>
<p>Hightec</p> <p>Industrialisation Partner Thin Film Technology Owner of WP 2</p>	<p>Wurth</p> <p>Industrialisation partner PCB Technology Owner of WP 7</p>
<p>IMEC</p> <p>Research Institute Ultra Thin Packages and Modelling Owner of WP 4</p>	<p>TUB</p> <p>Research Institute Stacking technologies Owner of WP 3</p>

(2) Work Packages

<p>WP1 Requirements and Specifications</p> <ul style="list-style-type: none"> End user requirements Electrical Test and Reliability Strategies Qualification and production procedures 	<p>WP2 Ultra Thin Package Technologies</p> <ul style="list-style-type: none"> Fabrication of Ultra Thin Packages Integrated Components Single and Double Sided packages
<p>WP3 Stacking Technologies</p> <ul style="list-style-type: none"> Electrical and Mechanical Integration of packages High reliability Easy to implement 	<p>WP4 Modelling and Reliability</p> <ul style="list-style-type: none"> Thermo-mechanical reliability modelling Exploring power limitations Reliability testing on dedicated test structures
<p>WP5 Hearing Aid Demonstrator</p> <ul style="list-style-type: none"> Miniaturisation Four times density improvement on foreseeable silicon developments 	<p>WP6 ICD Demonstrator</p> <ul style="list-style-type: none"> Miniaturisation Electrical simulation of embedded systems Integration into next generation of ICD's
<p>WP7 Industrialisation and Cost Modelling</p> <ul style="list-style-type: none"> Cost Modelling Development of assembly processes Supply chain development 	<p>WP8 Management and Exploitation</p> <ul style="list-style-type: none"> Plan, monitor and report on technical and financial progress of the project Dissemination and exploitation