Canopy® and MDC® Presentation

April 2013

www.legacyelectronics.com

Why Stack Components?

Certain applications can benefit from stacking technology from either a pricing, density or availability standpoint.

- The highest density parts may be cost prohibitive. When first released they can often be 8-10x more expensive than previous density parts.
- The highest density parts may be difficult to get in volume even if their cost if acceptable.
- The part may not be available yet, in this case you can build a module that is twice the standard highest density.
- The part may have never been available. For instance, perhaps a x16 bit part at high density. This could be made from two x8 parts stacked in some cases.
- The highest density parts may go end of life for older types of memory.

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Existing Stacking Technologies

EXISTING SOLUTIONS

- Ring Chip Stack
- Folding/Flex PCB
- Stacked PCB's

CHALLENGES

- Production yield
- Rework issues
- Complicated process
- Heat dissipation
- Impedance control
- Trace length violations
- Decoupling capacitors
- High cost

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Canopy® and MDC® enabled high density advantages

- Simple reliable process adapted to your environment
- Uses industry standard materials and processes
- No design rule violations
- Impedance control and trace lengths
- Simple rework with standard tools
- Manufacturing kits include on-site support, stencils, carriers, components and PCB designs
- Low Cost, Quality and logistics

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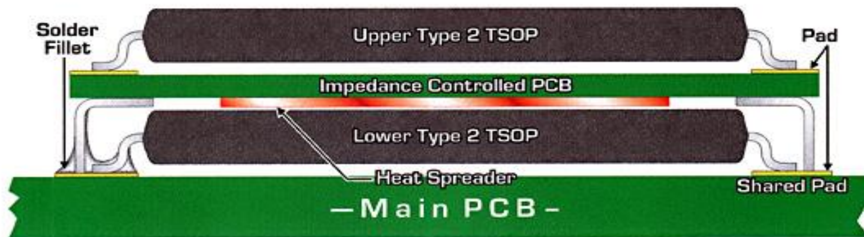
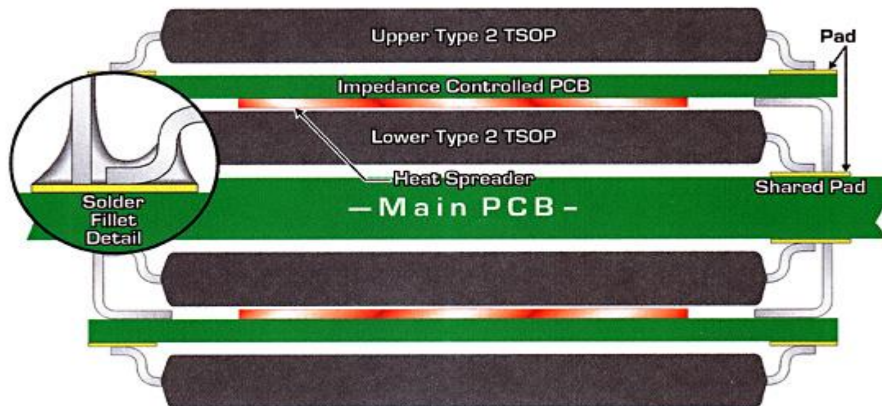
Legacy Electronics' Solutions

TSOP Canopy®





- SINGLE SIDED CANOPY®

- Impedance control
- Heat spreader
- Leads never touch
- Single reflow

- DOUBLE SIDED CANOPY®

- One reflow/side
- Excellent solder joint integrity

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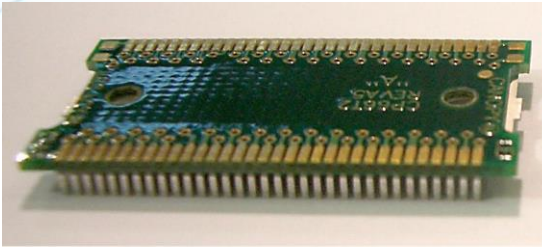
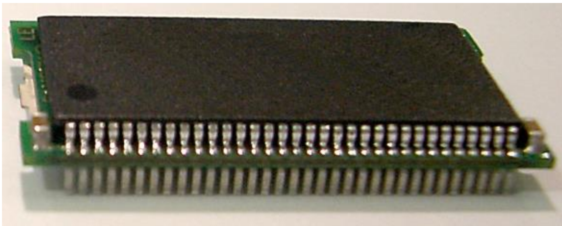
TSOP CANOPY® Assemblies



- Bare TSOP CANOPY®



- Populated TSOP CANOPY®

- TSOP CANOPY® Module

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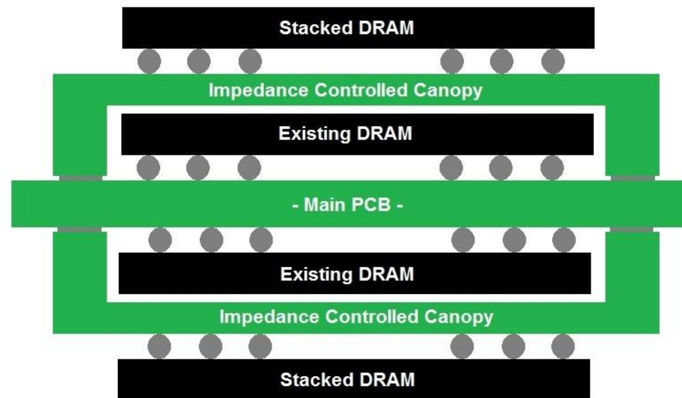
BGA Canopy®

Single Sided BGA CANOPY®

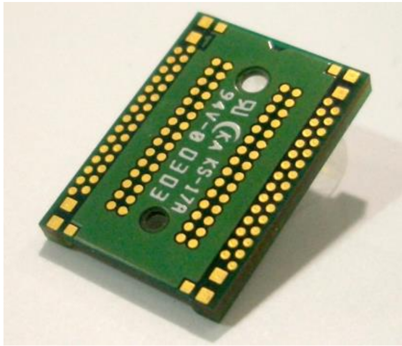
- Impedance control
- PCB acts as a Heat spreader
- Single reflow



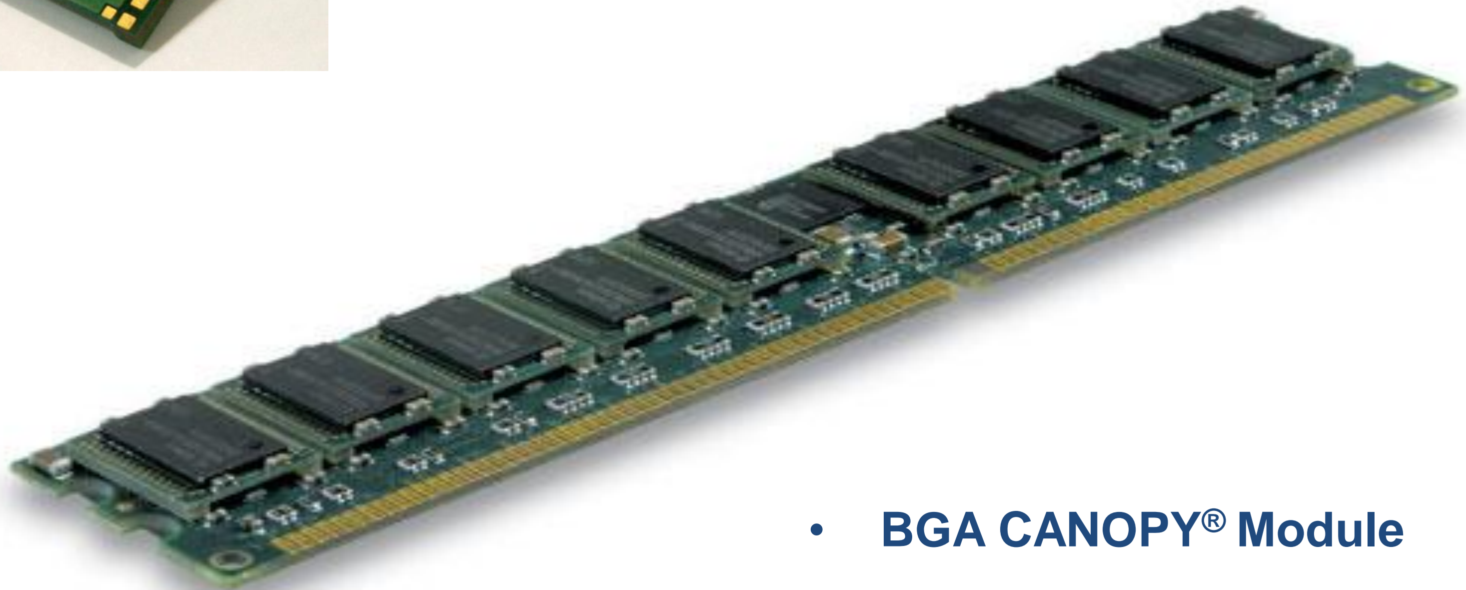
Double Sided BGA CANOPY®

- One reflow/side
- Excellent solder joint integrity
- Custom Main PCB footprint required

BGA CANOPY® Assemblies



- Bare BGA CANOPY®



- BGA CANOPY® Module

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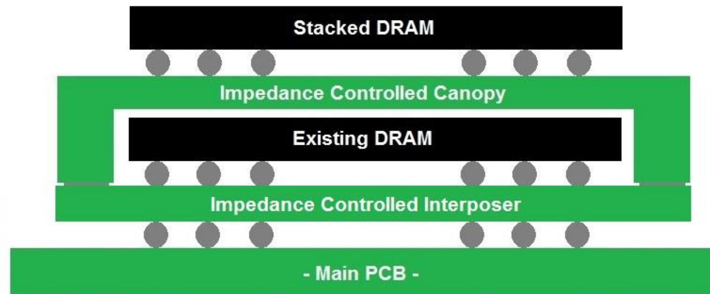
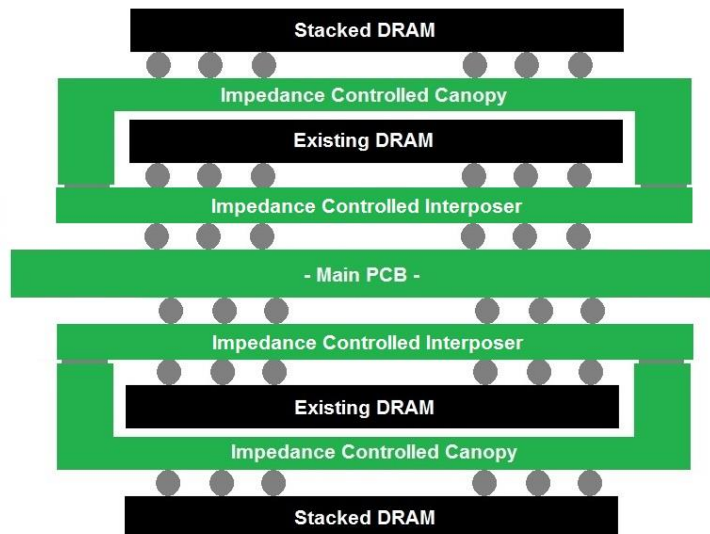
BGA Multi Device Canopy®



Single Sided MDC®

- Impedance control
- Trace lengths matched from interposer to Canopy®
- PCB acts as a Heat spreader
- Single reflow



Double Sided MDC®

- One reflow/side
- Excellent solder joint integrity
- JEDEC Standard Main PCB footprint
- Easily added to existing designs

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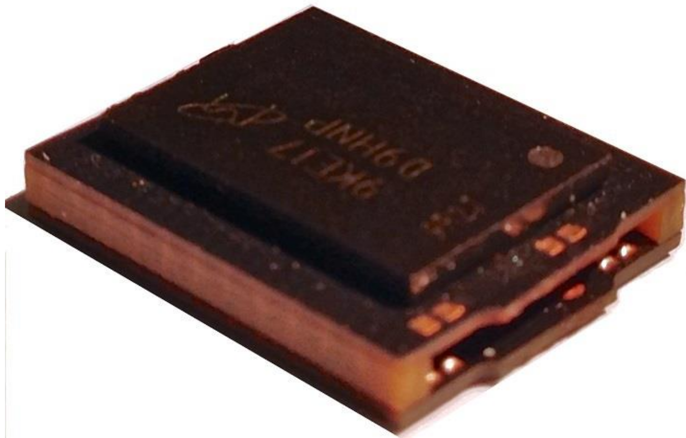
MDC® Assemblies



- BGA MDC®

- BGA MDC® Module

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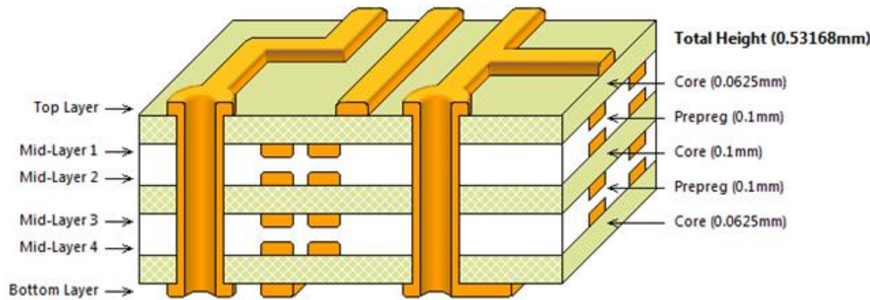
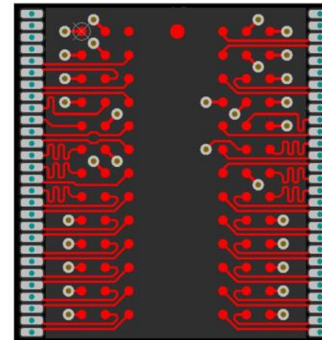
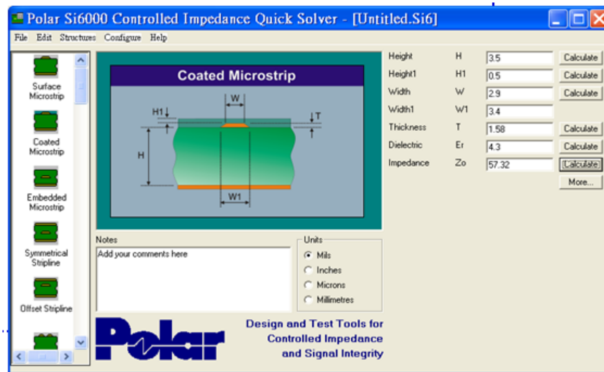
Constraints driven PCB Design

- Every Canopy® and MDC® design utilizes the latest tools to ensure controlled impedance and signal quality.

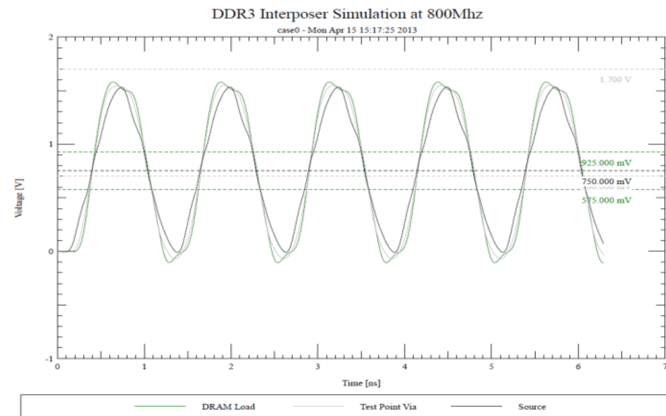




- Altium PCB design and schematic capture



- Polar Instruments Impedance Solver



- Cadence SI and Waveform Analysis

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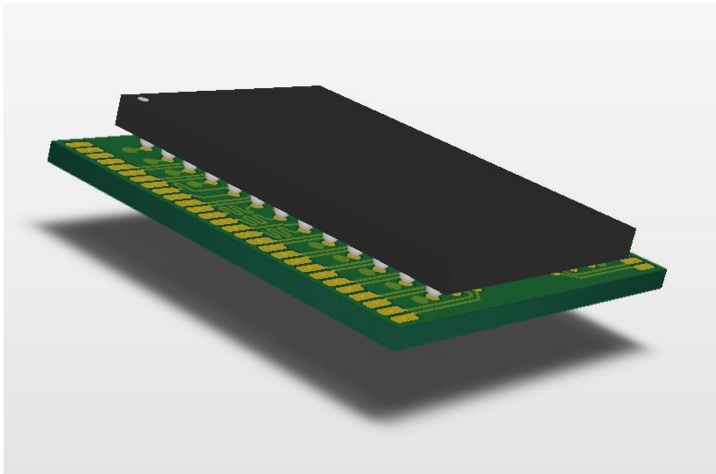
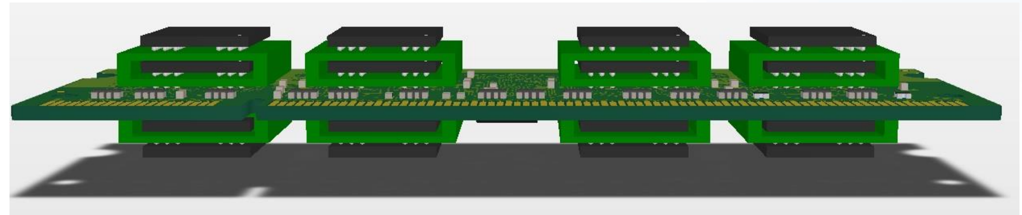
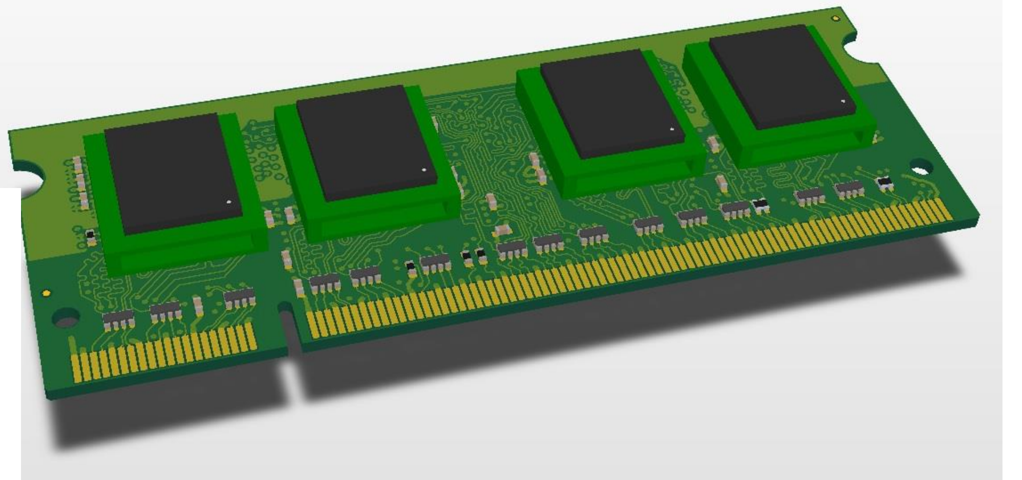
MDC® 3D PCB Design

MDC designs are 3D modeled to ensure proper clearance and manufacturability. This also enables thermal and airflow analysis.

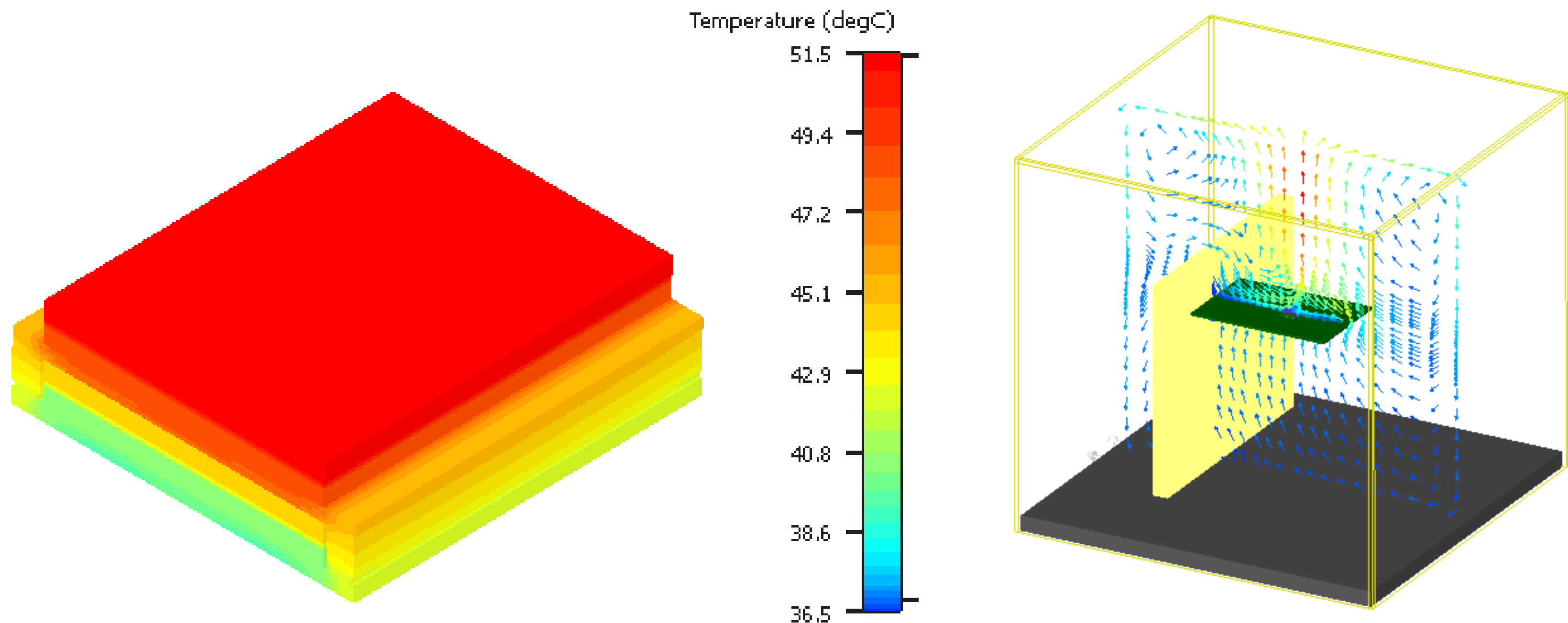






Thermal Modeling of Existing MDC®

- Existing MDC® designs have been extensively modeled with Mentor Graphics' FloTherm ® software to simulate JEDEC still air performance.
- Both the bottom and top DRAM remained within the manufacturer's specifications and only varied 4.2° Celcius.



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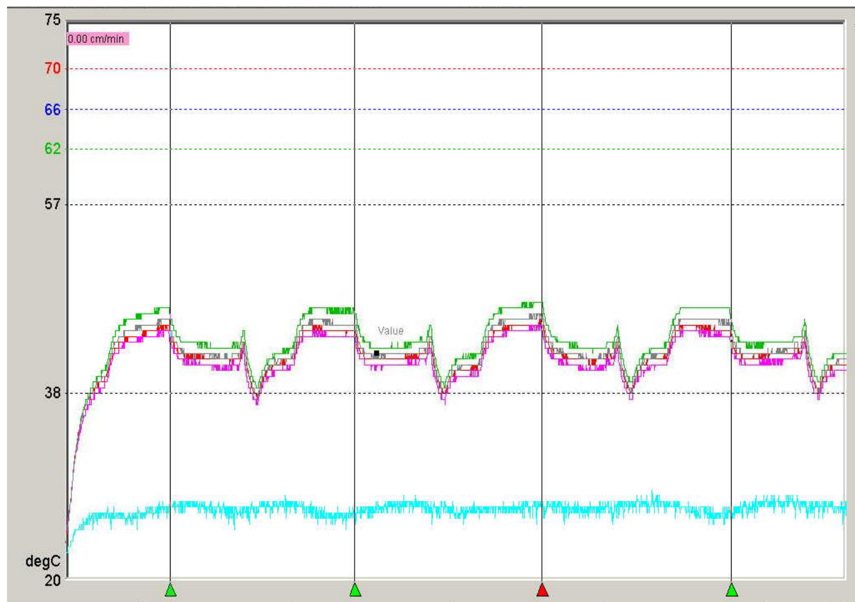
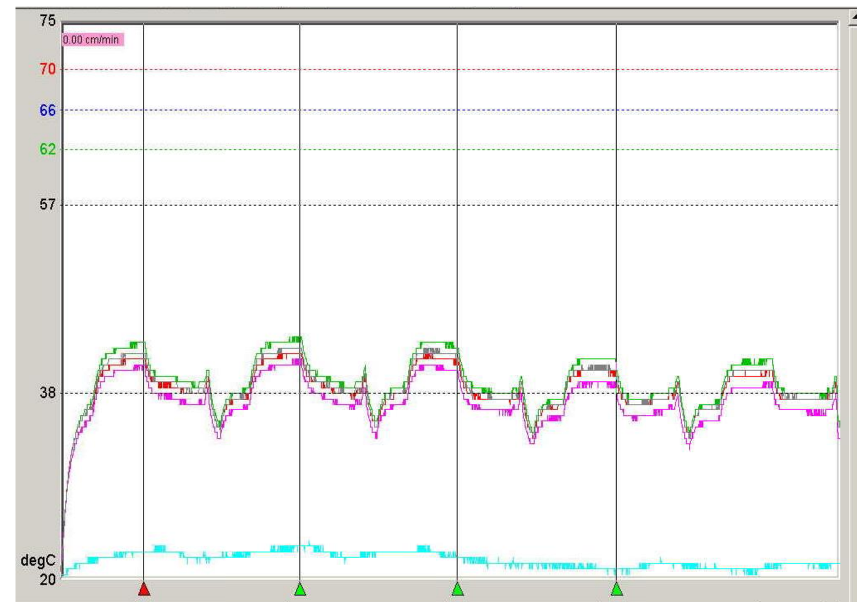
Thermal Verification of Existing Canopy®

- Test conducted using Ultra X, Inc. “Ram Stress Test” RST Pro 2 with 601AE-Mid-Tower (4)5.25 EXP(2)3.5 EXP and 460 Watt PSU.
- Legacy’s Canopy® 3D assemblies provide excellent thermal matching between upper and lower tier components.



Two Chassis Fans



Three Chassis Fans

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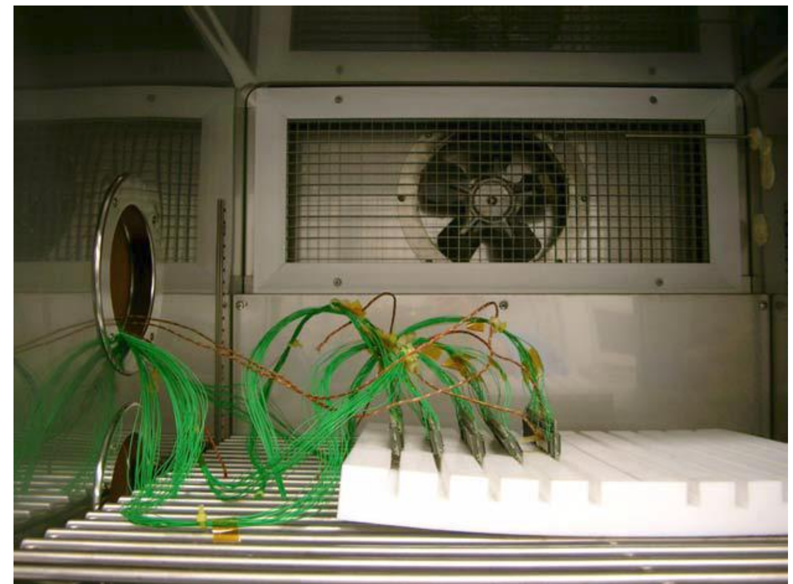
Mechanical Performance of Existing Canopy®

- Existing Canopy ® designs were independently tested by STS.

- Single zone chamber condition NTC-D 0c to 100c for 3000 cycles per IPC-9701 specification.

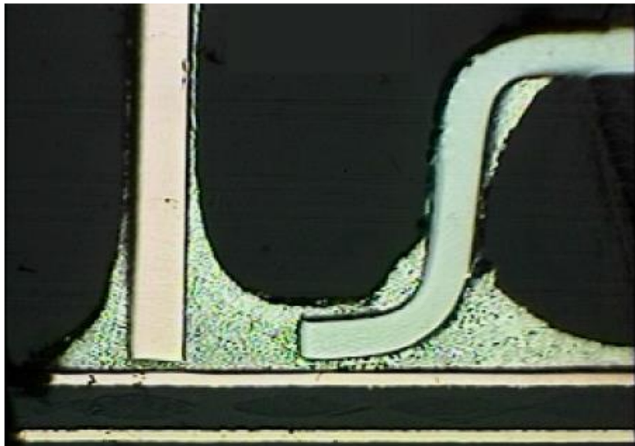
- Solder joint integrity was continuously monitored during the temperature cycles.

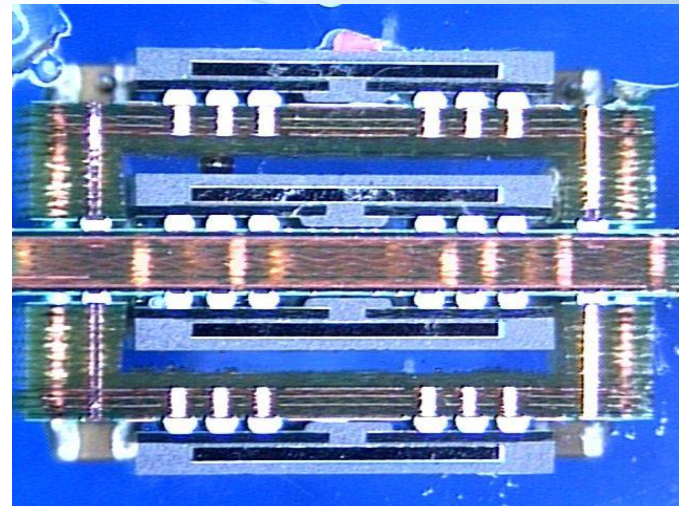
- All units passed the testing criteria.



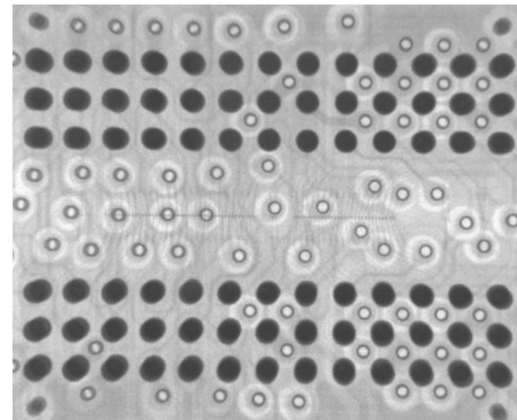
Process Verification of Canopy® and MDC®

- Cross sectional analysis has been performed to ensure solder joint integrity and quality.





- X-Ray inspection on site for non-destructive continuous process monitoring.



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Feature / Benefit Summary of MDC® and Canopy® Solutions

FEATURE	BENEFIT
• Longevity of supply and price	• Enhanced performance
• Double the memory density	• Proven reliability
• Increased flexibility	• Lower cost
• Available as manufacturing kits	• Single vendor solution
• Custom designs offered	• Unique product set
• Made in the USA	• Process high density solutions in-house