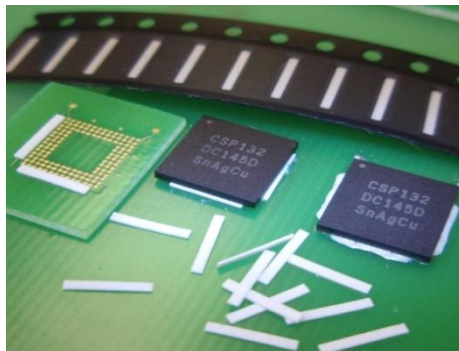


*PLACE-N-BOND<sup>tm</sup>*  
Partial Underfilm Technology  
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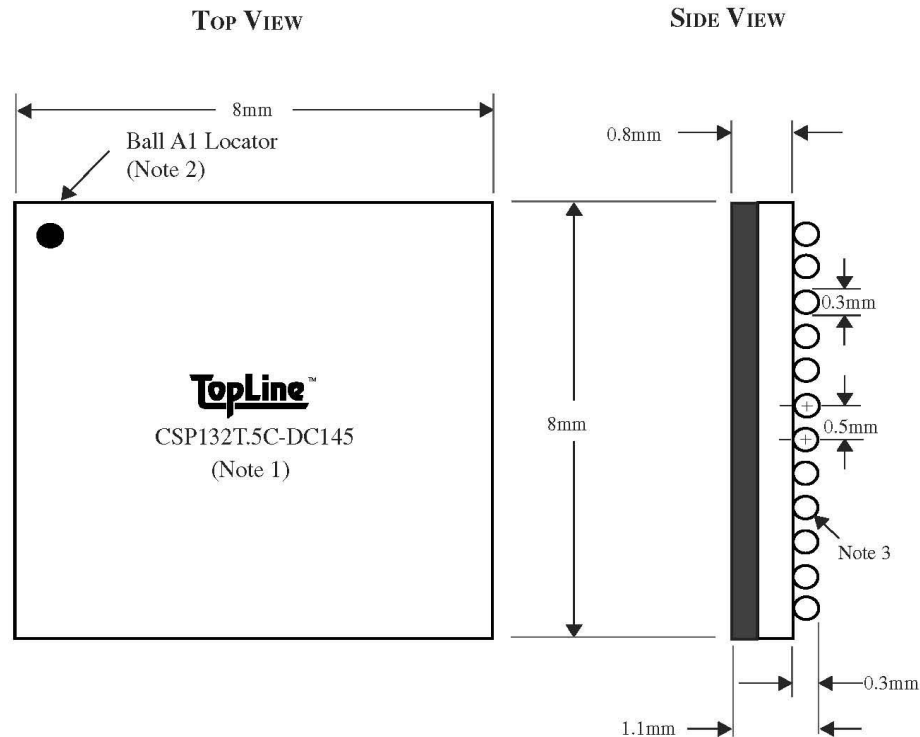
## Testing and Implementation

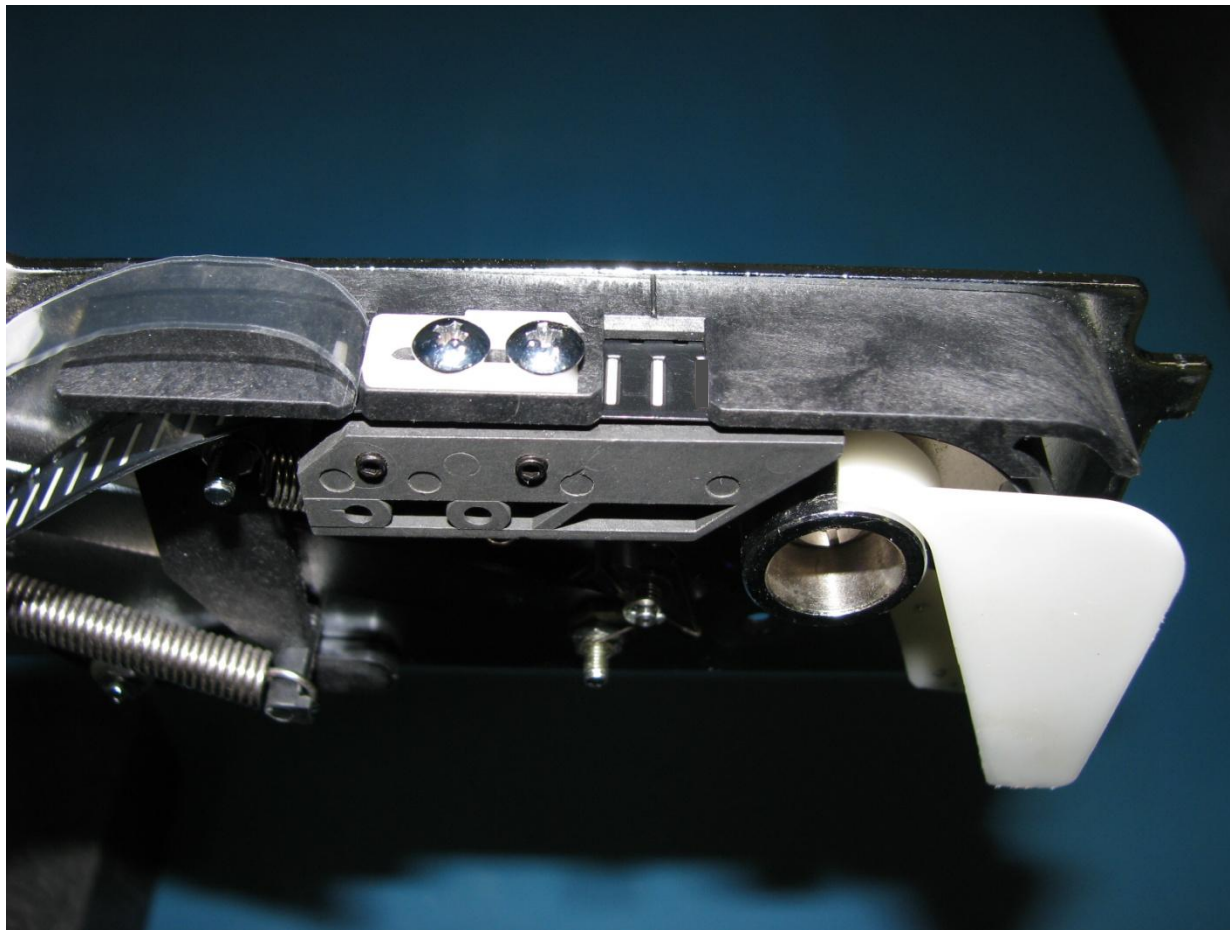


## Reliability analysis (Underfilm vs. Bare)

To further review the capability of the Partial Underfilm Technology, we conducted testing similar to the underfill testing that has been presented by various studies. First, a test vehicle was designed that contained one board mounted with ten 132 pin BGAs.

A standard .004" solder screen was first placed. Five of the BGAs would receive no additional support and five would receive a boundary pattern of partial underfilm of .008" thickness.



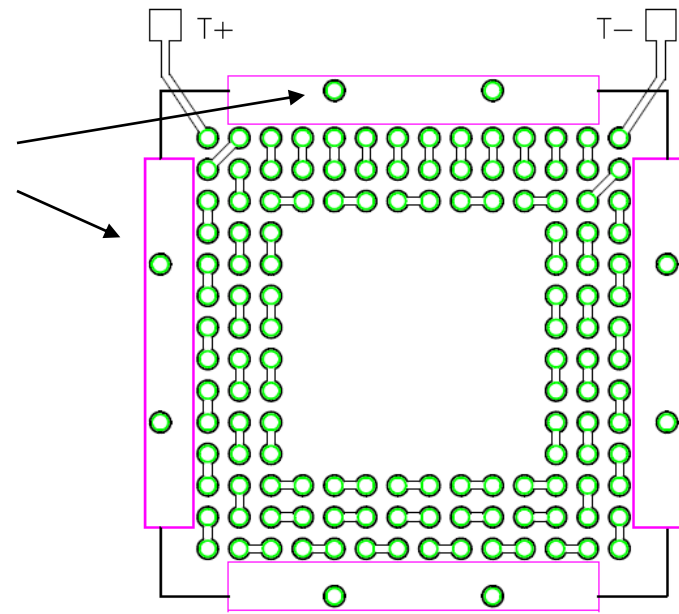


*0.008" thick partial underfilm component shown in standard EIA-481 compliant carrier tape and SMT feeder.*

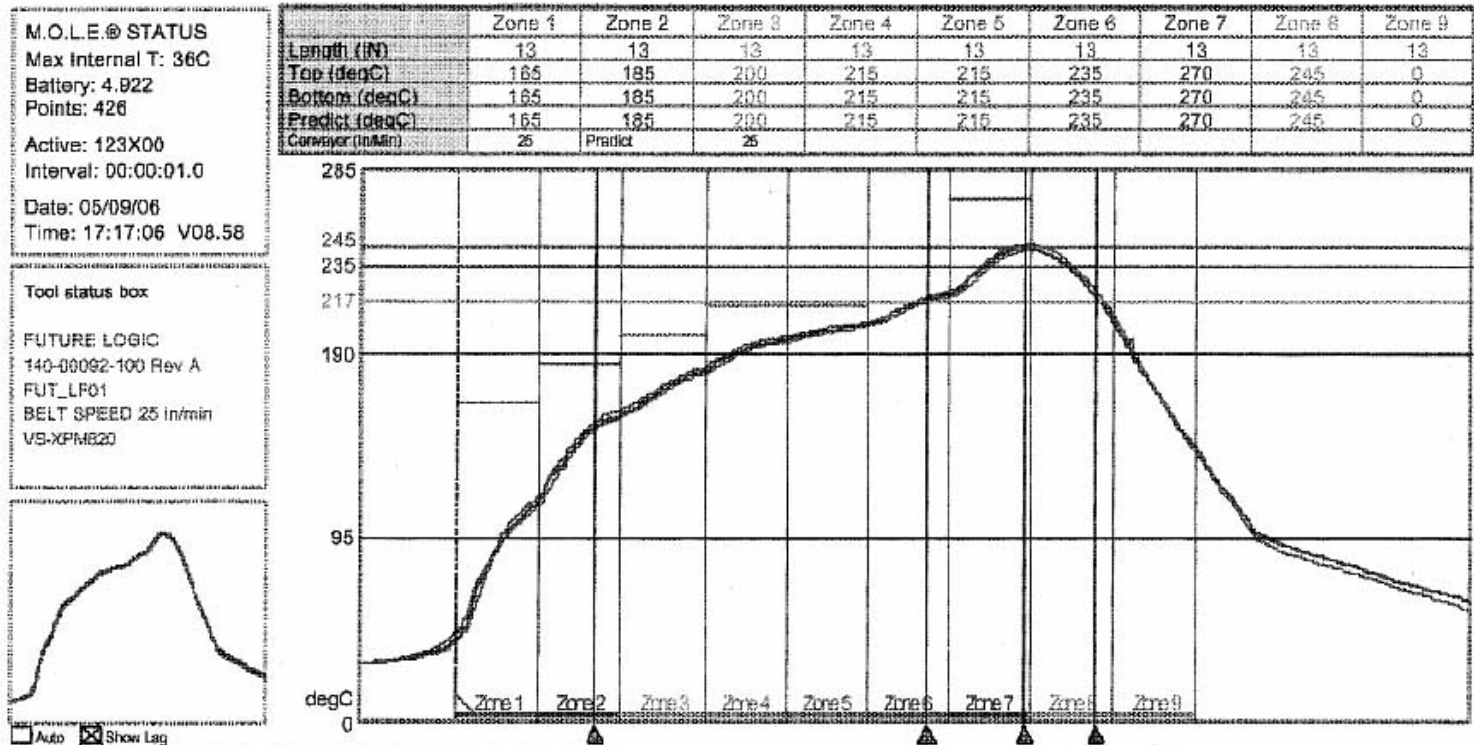
*Component placement for testing was conducted on MYDATA SMT line utilizing standard feeders.*

# Test Board Layout

Individual BGA site with Daisy Chained Solder Pads, Continuity Test Points, "Tacky Pads" and Underfilm outline

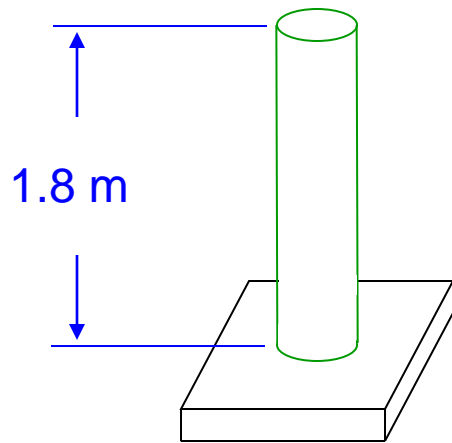


The boards were reflowed utilizing a standard SAC 305 profile



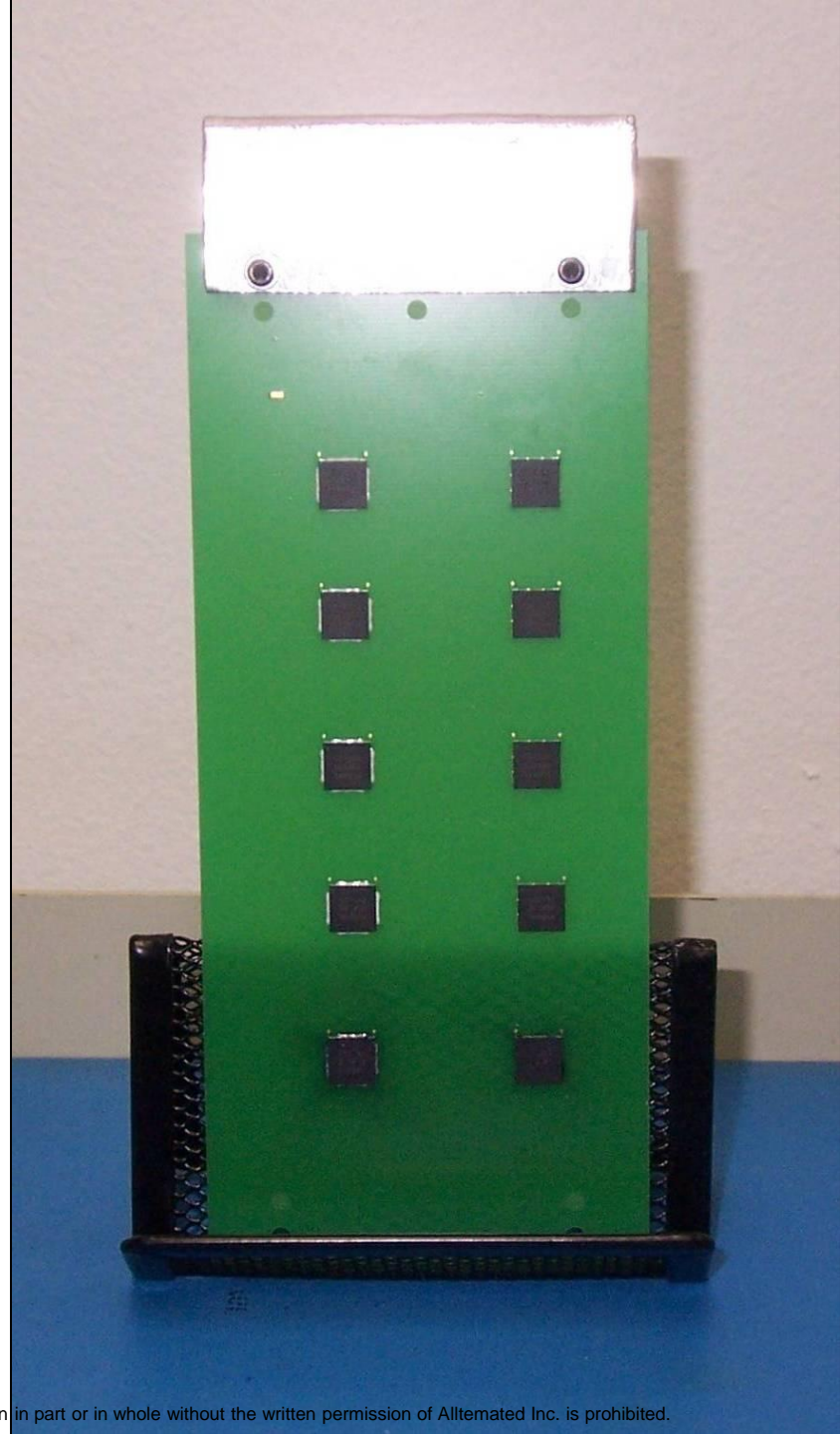
## Test Vehicle and Drop Test

After reflow, x-ray and electrical test, a 32-gram weight was attached to the top creating the Test Vehicle for reliability analysis (pictured at right).



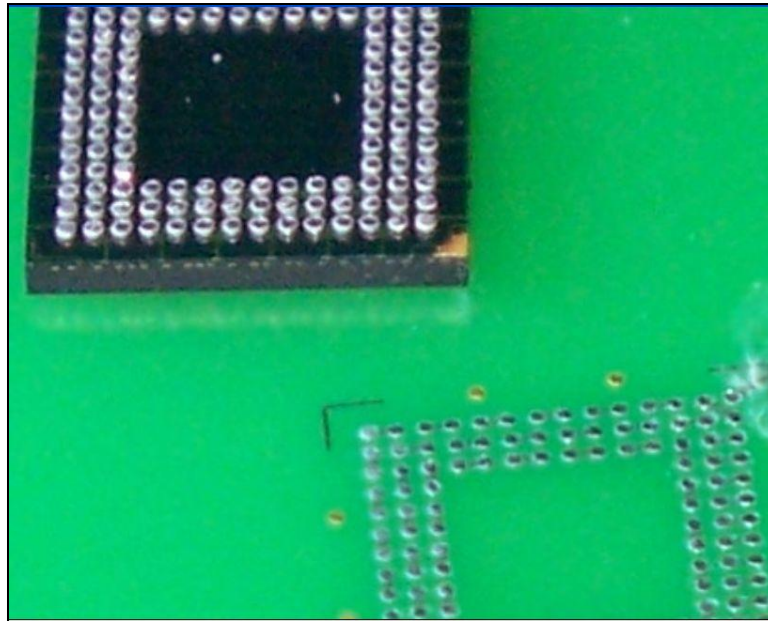
*Figure 4 (Test Vehicle for drop test analysis)*

These .042" thick boards were repeatedly dropped from a height of six feet onto a steel gage block. After each drop, a continuity test was conducted to ensure that the product was still in working condition using the traces at T+ and T- shown in figure 3.



## RESULTS

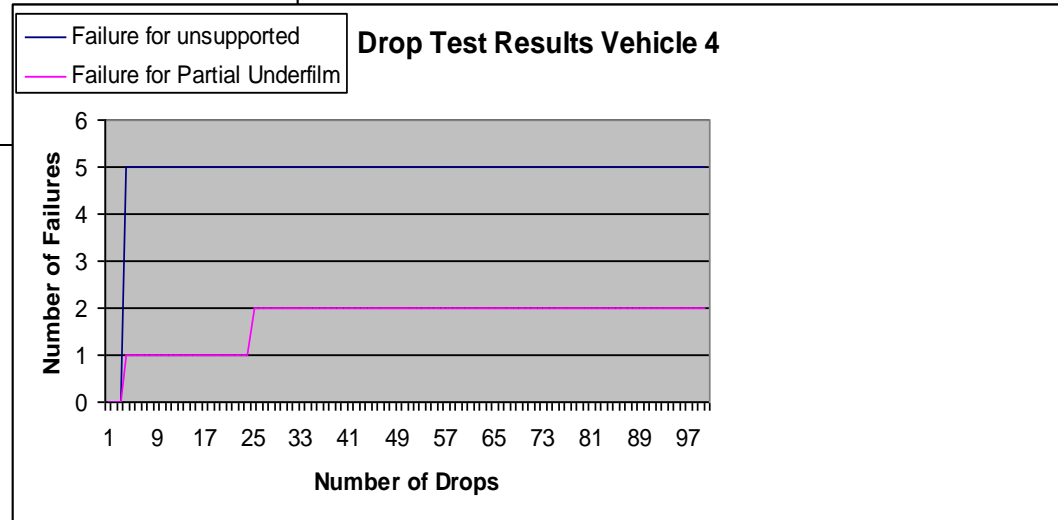
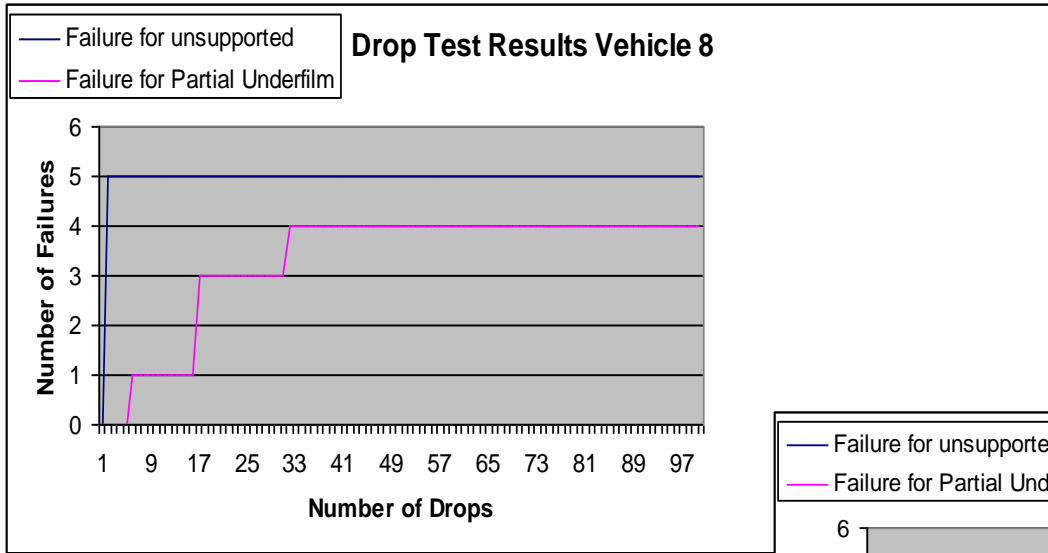
After the first few drops, all of the unsupported BGAs failed and completely fell off of the Test Vehicle altogether. As for the Partial Underfilm Technology BGAs, although not process optimized, 40% had continuity after 100 drops.



*Failed, unsupported BGA*

# Drop Test Results

Two of the test vehicle data results are shown below



As can be seen, the results are significantly different between the unsupported BGAs and Partial Underfilm supported BGAs.

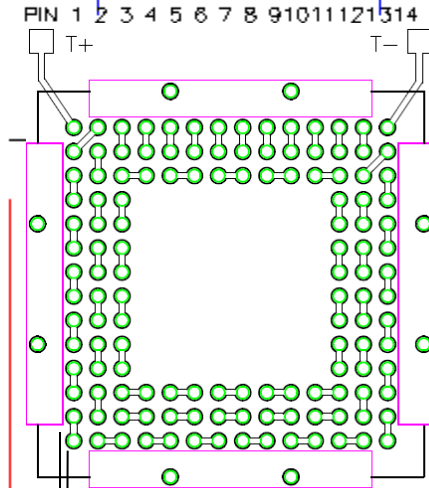
# PLACE-N-BOND Design Guidelines - Part Selection Guide

Currently Supporting Various BGA Packages: 1mm down to .4mm pitch

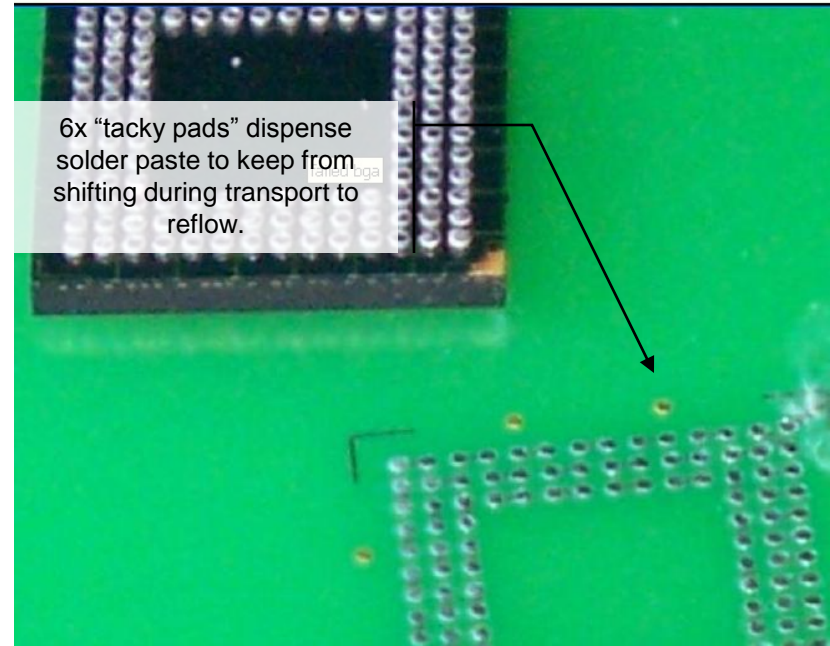
| <i>PLACE-N-BOND</i> ™ Part Number | I-Shape        | Thickness mm<br>(tolerance +/- 0.025) | Thickness in<br>(tolerance +/- 0.001) | Width mm<br>(tolerance +0.051/-0.076) | Width in<br>(tolerance +0.002/-0.003) | Length mm<br>(tolerance +/- 0.178) | Length in<br>(tolerance +/- 0.007) | overall maximum length including breakaway tab mm | overall maximum length including breakaway tab in | BGA Standoff Range*<br>(Gap Fill) Post Reflow From PCB Seating Plane to Bottom Side of BGA Substraight Surface (mils) |
|-----------------------------------|----------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|------------------------------------|------------------------------------|---|---|---|
| RP-113178-01                      | Rectangle      | 0.254                                 | 0.010                                 | 0.762                                 | 0.030                                 | 5.842                              | 0.230                              | 6.420   | 0.253   | 11 to 15  |
| RP-113178-02                      | Rectangle      | 0.229                                 | 0.009                                 | 0.762                                 | 0.030                                 | 5.842                              | 0.230                              | 6.420   | 0.253   | 10 to 14  |
| RP-113178-03                      | Rectangle      | 0.206                                 | 0.0081                                | 0.762                                 | 0.030                                 | 4.000                              | 0.157                              | 4.578   | 0.180   | 9 to 12   |
| RP-113178-04                      | Rectangle      | 0.206                                 | 0.0081                                | 0.762                                 | 0.030                                 | 5.842                              | 0.230                              | 6.420   | 0.253   | 9 to 12   |
| RP-113178-05                      | Rectangle      | 0.165                                 | 0.0065                                | 0.762                                 | 0.030                                 | 4.000                              | 0.157                              | 4.578   | 0.180   | 8.5 to 12   |
| RP-113178-06                      | Rectangle      | 0.165                                 | 0.0065                                | 0.762                                 | 0.030                                 | 5.842                              | 0.230                              | 6.420   | 0.253   | 8.5 to 12   |
| RP-113178-07                      | Rectangle      | 0.432                                 | 0.017                                 | 0.762                                 | 0.030                                 | 4.000                              | 0.157                              | 4.578   | 0.180   | 18 to 26  |
| RP-113178-08                      | Rectangle      | 0.432                                 | 0.017                                 | 0.762                                 | 0.030                                 | 5.842                              | 0.230                              | 6.420   | 0.253   | 18 to 26  |
|                                   | Corner Shape   |                                       |                                       |                                       |                                       | Leg Length                         | Leg Length                         |   |   |   |
| RP-113178-09                      | L - 90° Corner | 0.254                                 | 0.010                                 | 0.762                                 | 0.030                                 | 5.842                              | 0.230                              | 6.420   | 0.253   | 11 to 15  |
| RP-113178-10                      | L - 90° Corner | 0.229                                 | 0.009                                 | 0.762                                 | 0.030                                 | 5.842                              | 0.230                              | 6.420   | 0.253   | 10 to 14  |
| RP-113178-11                      | L - 90° Corner | 0.206                                 | 0.0081                                | 0.762                                 | 0.030                                 | 4.000                              | 0.157                              | 4.578   | 0.180   | 9 to 12   |
| RP-113178-12                      | L - 90° Corner | 0.206                                 | 0.0081                                | 0.762                                 | 0.030                                 | 5.842                              | 0.230                              | 6.420   | 0.253   | 9 to 12   |
| RP-113178-13                      | L - 90° Corner | 0.165                                 | 0.0065                                | 0.762                                 | 0.030                                 | 4.000                              | 0.157                              | 4.578   | 0.180   | 8.5 to 12   |
| RP-113178-14                      | L - 90° Corner | 0.165                                 | 0.0065                                | 0.762                                 | 0.030                                 | 5.842                              | 0.230                              | 6.420   | 0.253   | 8.5 to 12   |
| RP-113178-15                      | L - 90° Corner | 0.432                                 | 0.017                                 | 0.762                                 | 0.030                                 | 4.000                              | 0.157                              | 4.578   | 0.180   | 18 to 26  |
| RP-113178-16                      | L - 90° Corner | 0.432                                 | 0.017                                 | 0.762                                 | 0.030                                 | 5.842                              | 0.230                              | 6.420   | 0.253   | 18 to 26  |



5.842 mm x .762 mm  
PLACE-N-BOND Strip



## **PLACE-N-BOND Design Guidelines** **Strip Placement**

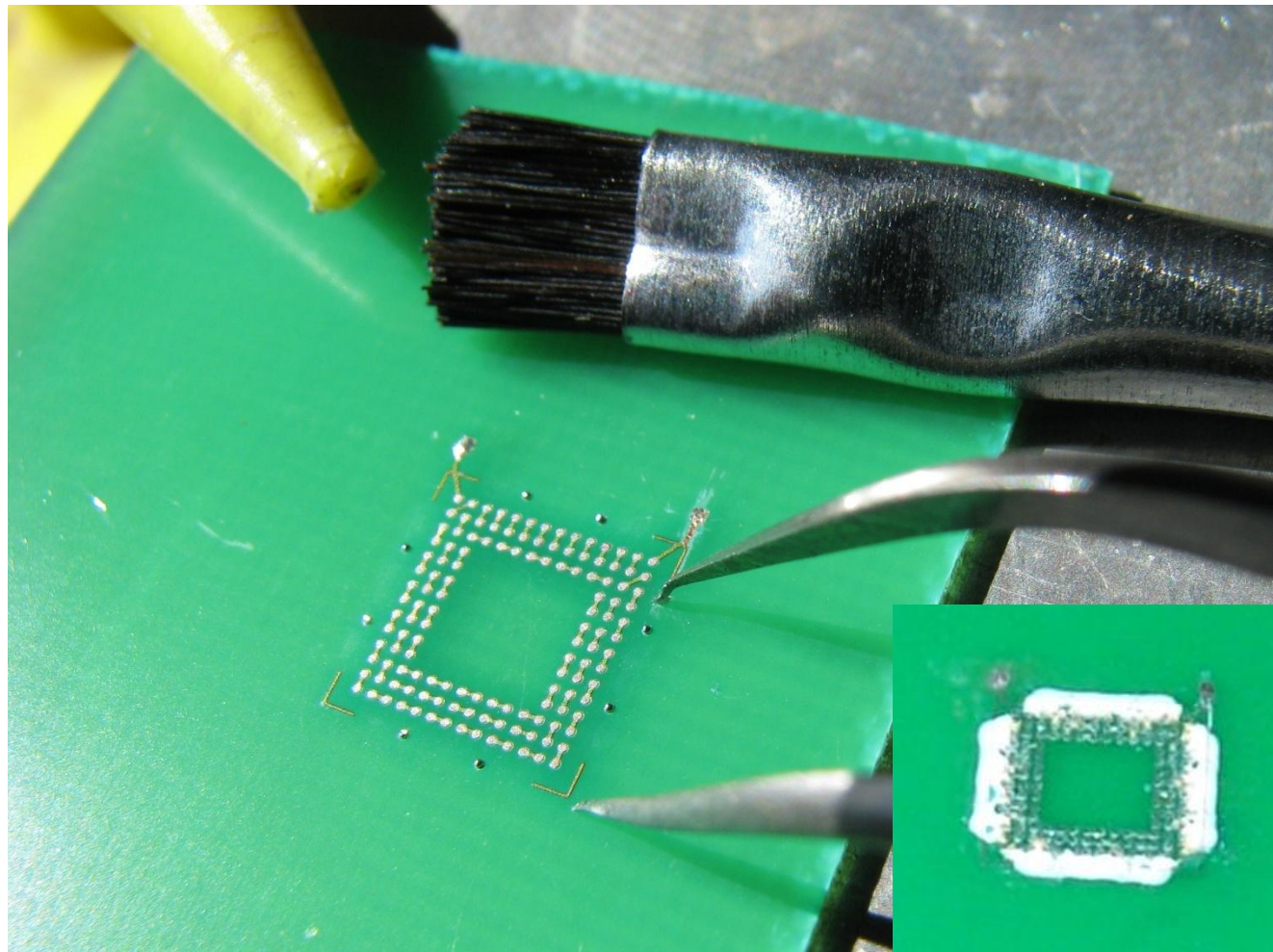


**.15 mm edge of PLACE-N-BOND Strip to BGA balls  
(minimize distance from balls to Strip edge)**

**.25 mm recommended keep out from BGA edge**

## *PLACE-N-BOND Design Guidelines – Rework Procedure*

- Heat to 135 C (275 F) (hot plate shown)
- Peel softened Underfilm from PCB
- Clean residue with brush IPA



## DISCUSSION

Utilizing off the shelf *PLACE-N-BOND™* and Topline components we were able to demonstrate a significant improvement in solder joint reliability.

We know that the costs for implementation, training, maintenance, equipment and general overhead are insignificant compared to that of traditional underfill technology. The individual films are a few pennies in high volume.

Some additional benefits are; the complete migration of the technology from prototype to production facilities, OEM's can move the manufacturing process without concern for capability with *PLACE-N-BOND™* technology and *PLACE-N-BOND™* is reworkable improving final yield.

# CONCLUSION

By utilizing the *PLACE-N-BOND™* Technology, lead-free assemblies can be greatly improved without investing in additional equipment, factory space or PCB space. Through careful design consideration, the process can be optimized to improve the yield and performance of electronic devices. **This technology is currently in high volume production and has become the preferred low cost solution to get products to pass drop testing requirements.**

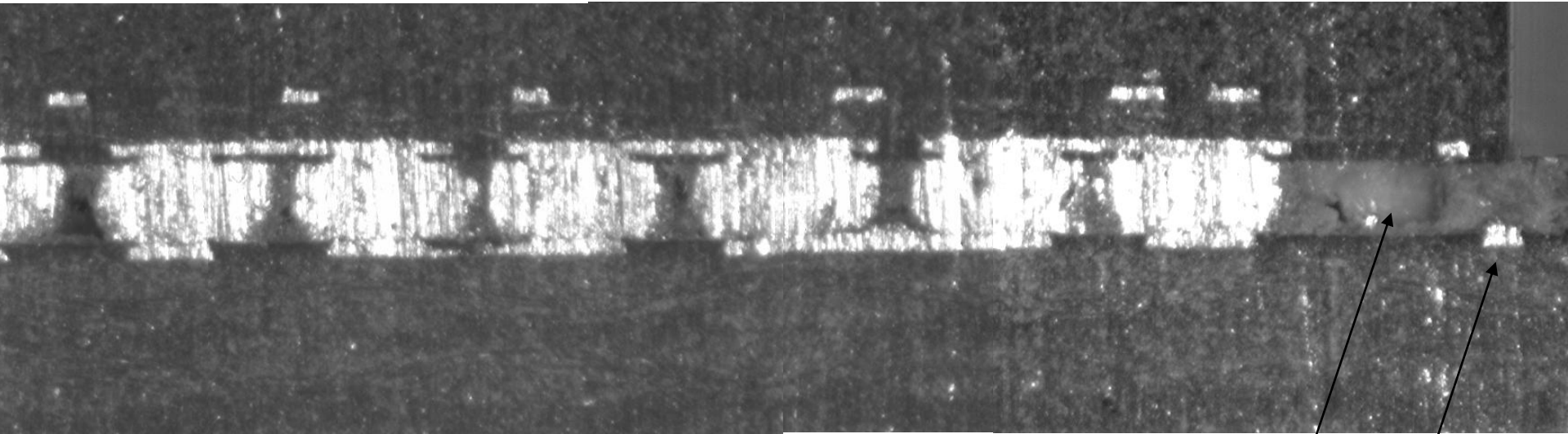
Contacts:

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[Dave.Skupien@ActionIR.com](mailto:Dave.Skupien@ActionIR.com) mobile 1-847-477-7587 USA

# Section view: BGA132 .5mm pitch SAC 305



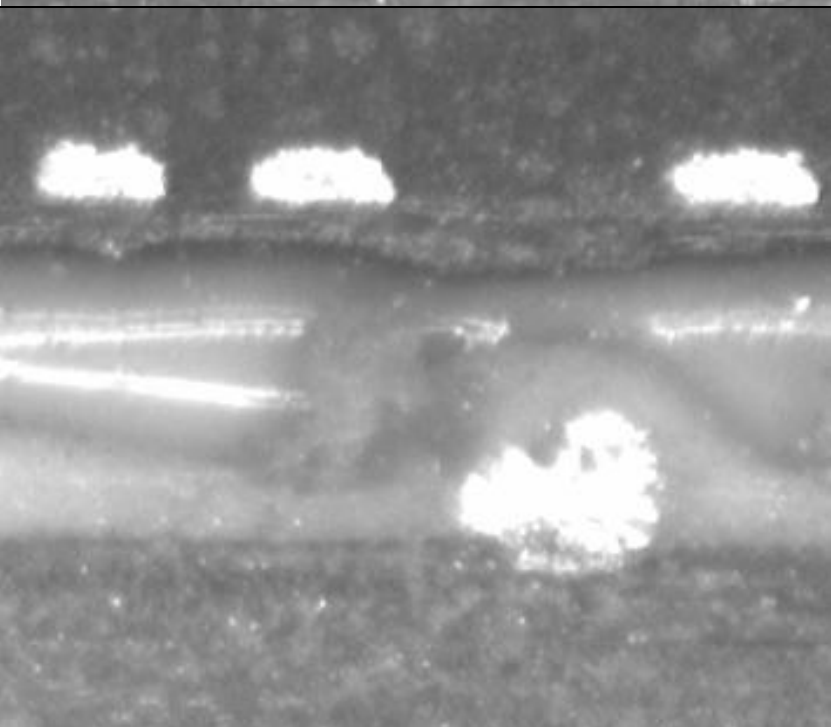
Reference photo 3

PLACE-N-BOND Underfilm

Tacky Pad



# Section view: "Tacky Pad" on PCB



Reference photo 8

Reference photo 9

# Market Comparison

|                                      | <u>PLACE-N-BOND</u><br><u>Underfilm</u> | <u>Fluxing Underfill</u> | <u>Underfill</u> |
|--------------------------------------|---|--------------------------|------------------|
| Pick & Place from Tape & Reel        | YES                                     | no                       | no               |
| Re-workable                          | YES                                     | no/maybe                 | no/maybe         |
| Eliminates an entire factory process | YES                                     | no                       | no               |
| Compatible with ANY solder paste     | YES                                     | no                       | YES              |
| Decreased factory cycle time         | YES                                     | \$                       | \$               |
| Factory floor space required         | NO                                      | \$                       | \$               |
| Dispensing equipment needed          | NO                                      | \$\$                     | \$\$\$           |
| Secondary curing oven needed         | NO                                      | NO                       | \$\$             |
| Capital equipment needed             | NO                                      | \$\$                     | \$\$\$           |
| Adds time and equipment              | NO                                      | \$\$                     | \$\$\$           |
| Fumes emitted                        | NO                                      | yes                      | yes              |
| Limited Shelf life                   | NO                                      | yes                      | yes              |
| Air Entrapment Possible              | NO                                      | yes                      | yes              |
| Cure rate / temp. control needed     | NO                                      | yes                      | yes              |
| Cleaning required                    | NO                                      | maybe                    | maybe            |
| Pre-bake required                    | NO                                      | maybe                    | maybe            |
| Provides maximum reliability         | maybe                                   | maybe                    | maybe            |

# 18th Annual SMT VISION 2010 awards

*Winner*



Winner “Best new Product”  
SMT VISION AWARD<sup>2010</sup>

Presented at IPC/APEX



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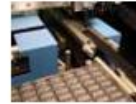
## PLACE-N-BOND Underfilms



## Precision Designed Tape



## Tape and Reel



## IC Programming



## AirPouch Void-Fill for Packaging



## Premium Cover Tape



## Design and Assembly Services



## Plastic and Cardboard Reels



## Barrier Bags



## Cable and Harness Assemblies



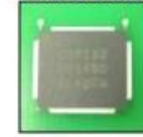
## Component Reclamation



## Board Rework



## Enhancement



Alltemated launches line of *PLACE-N-BOND™* Pick and Place Underfilms for BGA Solder Ball/Joint Reliability Enhancement.

Click here to get a Data Sheet

## *PLACE-N-BOND™*

## Alltemated achieves ISO9001:2008 registration

To demonstrate our continuing commitment to quality, Alltemated is registered to the ISO9001:2008 Standard. Follow this link to see our certificate: [ISO9001:2008Cert.pdf](#).

## We Accept Credit Cards

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**Alltemated is now set up to accept Credit Card payments.**

## Low and Medium Volume USB Duplication



Alltemated, Inc is now equipped to handle your need for Low and Medium Volume USB Duplication.

## Standard Carrier Tape Tool List