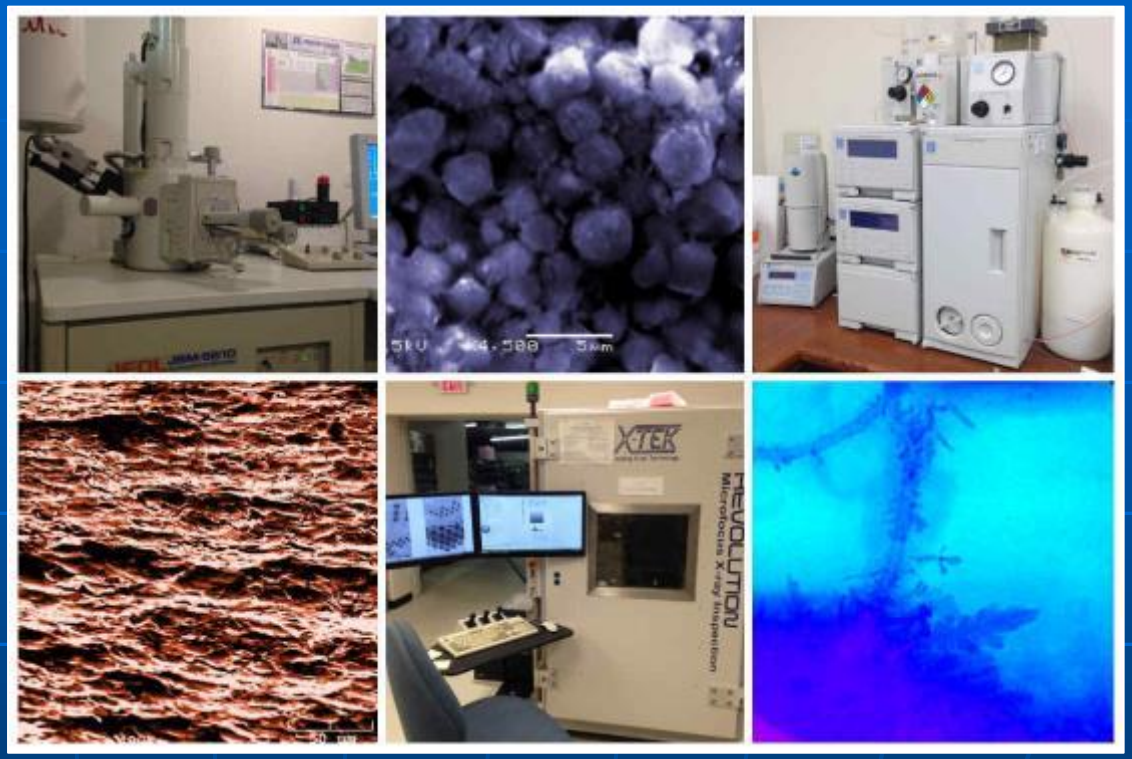
Laboratory Services

Process Sciences, Inc.
310 S. Brushy Street
Leander, TX 78641
512-259-7070
www.process-sciences.com



SMTA
Surface Mount Technology Association
Member Since 1997

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Confidential Analytical Report & Summary

- Prepared For: Mrs. Customer
- Company: PSI Customer
- Analysis Report Number: ####
- Date of Analytical Summary: 5/23/18
- Participating Analyst: PSI Analyst
- Quote #: Q190000

Analyst:	Reviewed by:
PSI Analyst	Peer

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Sample Received:

One (1) PC Assembly was received for analysis. The assembly was identified as WR16436.

Statement of Work:

- The Image BGA component will be subjected to Dye / Pry analysis. The assembly will be submerged in red dye, dried and then the BGA will be separated from the board surface to expose any separated BGA solder connections and/or lifted PC pads.
- The data will be assembled in a formal report and sent to the customer for review.

Analysis Results:

Dye / Pry analysis did not find any defective BGA solder connection or lifted PC pads.

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Testing Equipment:

- A Zeiss Axiovert metallurgical grade microscope for optical images up to 1000X.

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PSI Customer - Assembly - Overview

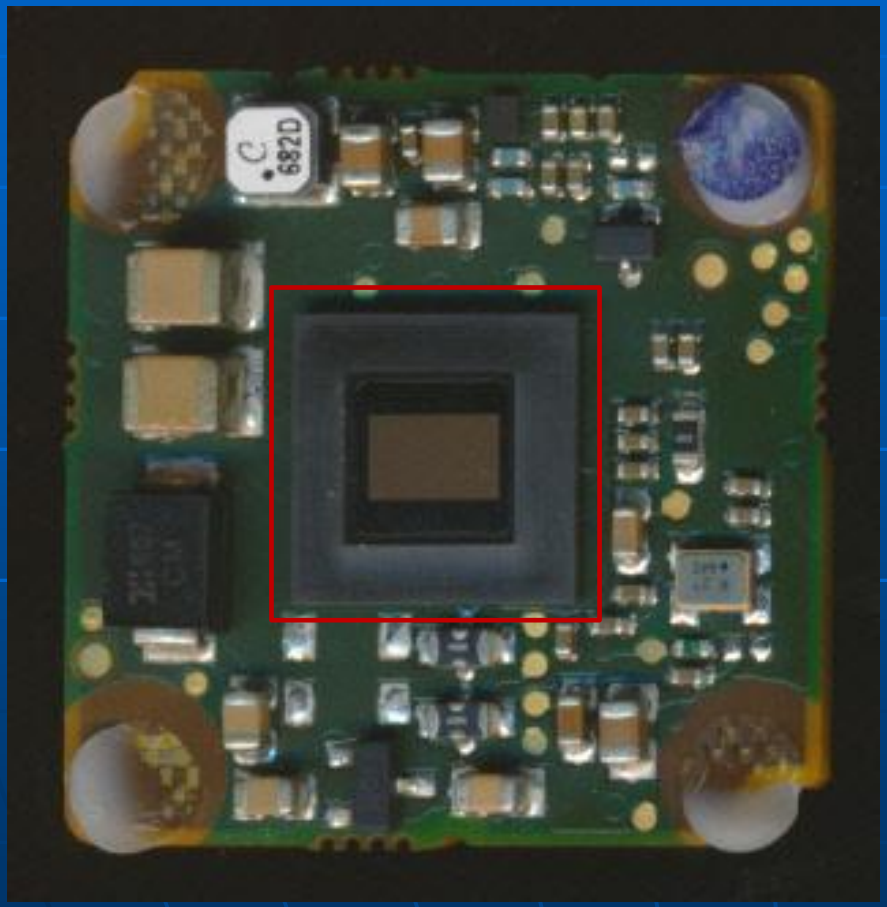

Figure 1
Primary Side Overview
Red Box Indicates the Component Selected For Analysis

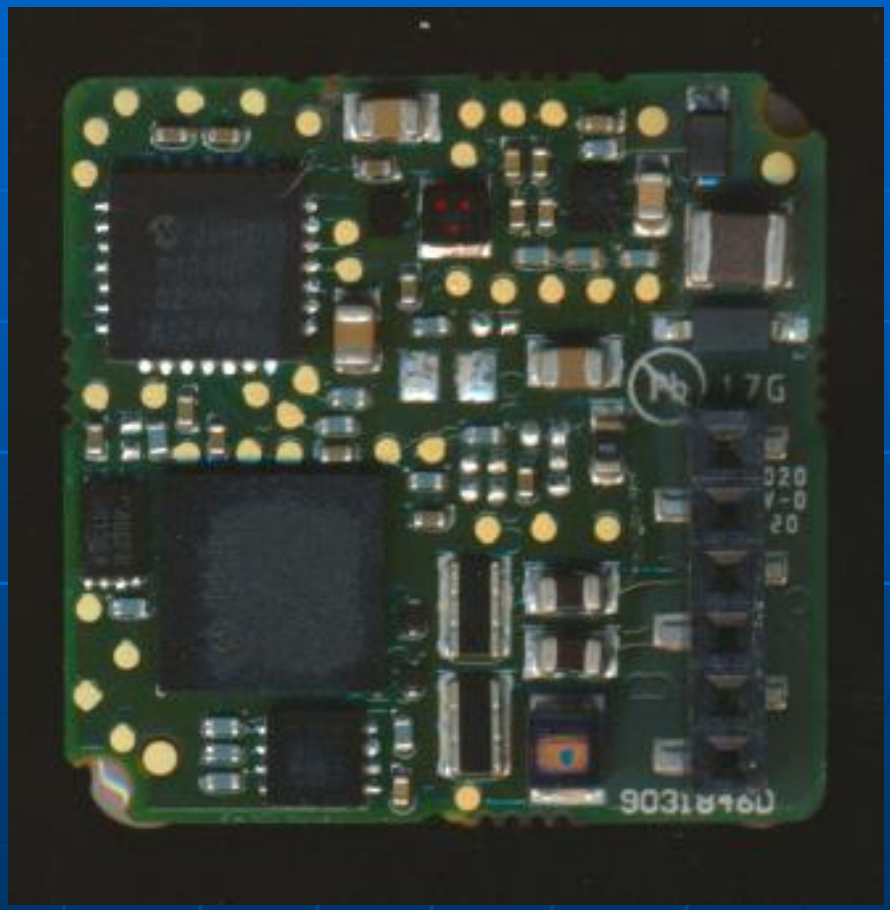

Figure 2
Secondary Side Overview

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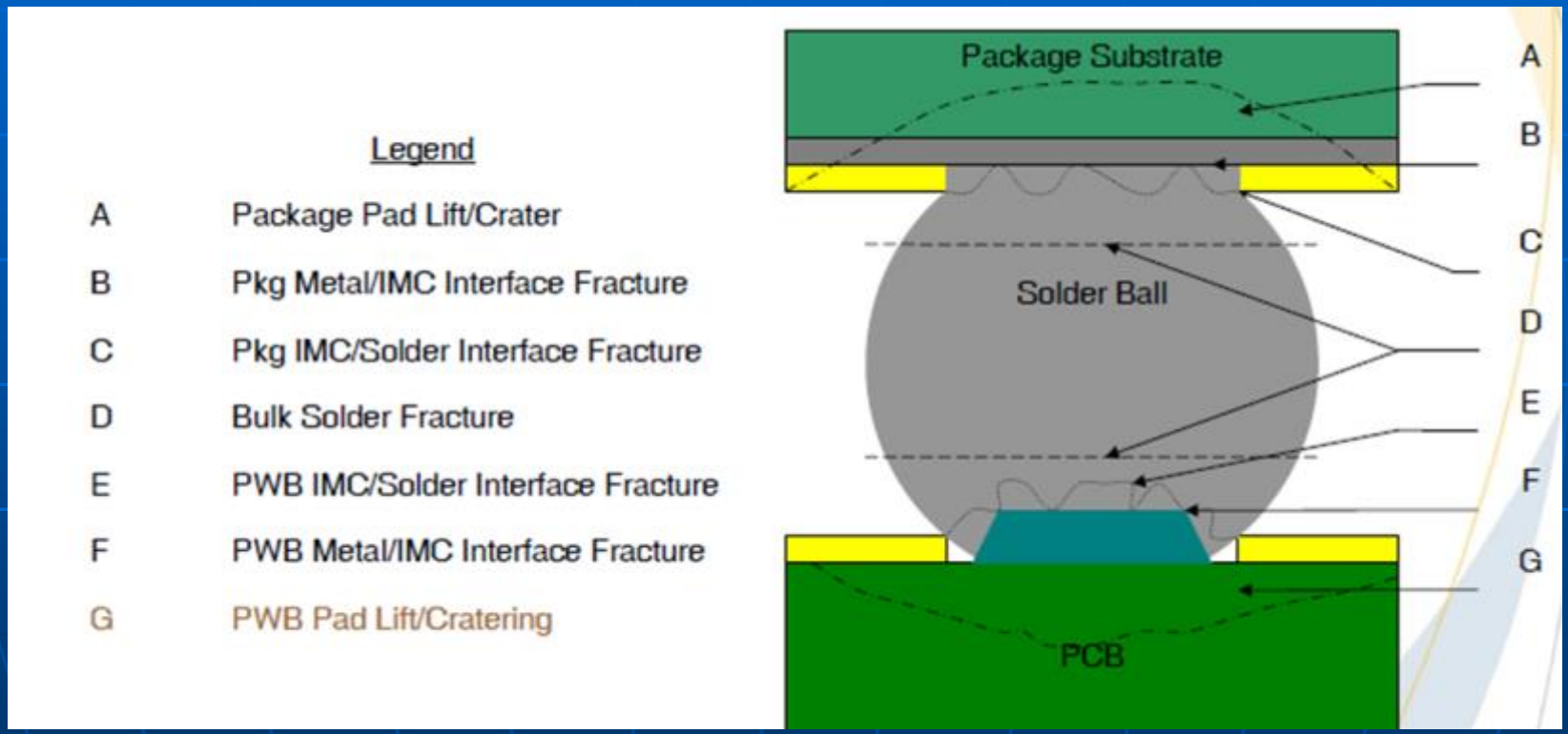
Dye and Pry Separation Types

Typically, as a result of the Dye and Pry test, the component will separate from the board in a manner described below. These are not classified as failures but are normal separations.



Dye and Pry Separation Types and Color Code

NOTE:
If there is red dye at the separation point, this would indicate a crack, open connection or lifted pad was present prior to testing and would be a failure.

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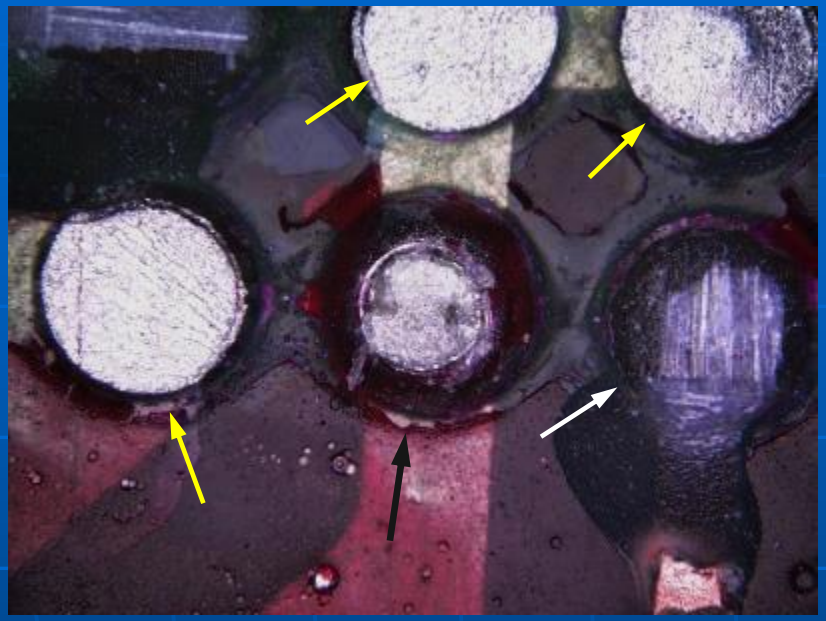
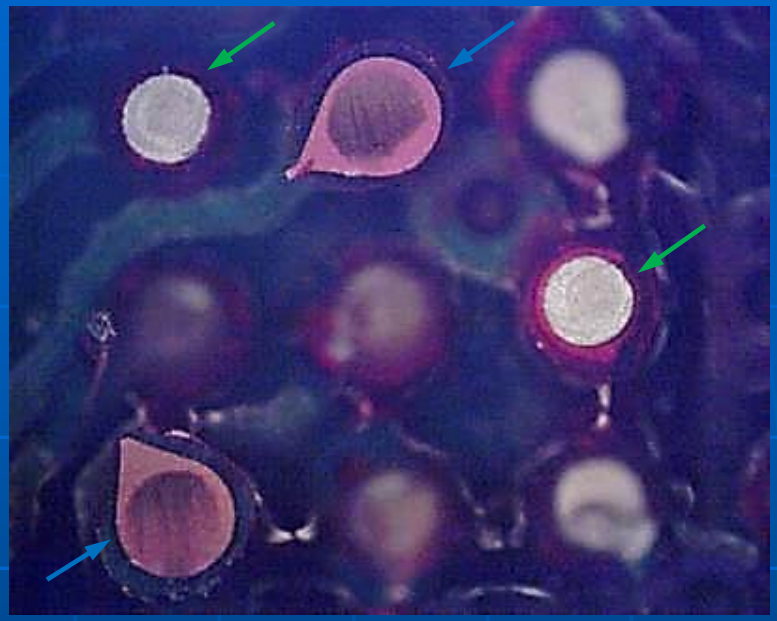
BGA Dye and Pry Separation Examples *(for illustration purposes)*



Examples of Separations at the PWB level



Examples of Separations at the BGA level

The pictures above are an enlarged view of the different types of solder joint separations.

The Blue arrows indicate solder joints where the BGA pad was pulled out the BGA component exposing the bottom side of the BGA copper pad. (Type A)

The Green arrows are solder joints that separated at the BGA pad / solder interface. Any red dye on these pads would indicate a defective solder joint. (Type B&C)

The Black Arrow indicates solder joints that separated within the bulk solder. (Type D)

The Yellow arrows are solder joints that separated at the PCBA pad / solder interface. Any red dye on these pads would indicate a defective solder joint. (Type E&F)

The White arrow indicates solder joints where the PCBA pad was pulled out the PCBA board exposing the PWB laminate material under the copper pad. Any red dye in these areas indicated a lifted copper pad. (Type G)

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PSI Customer – Image BGA – Dye & Pry Analysis

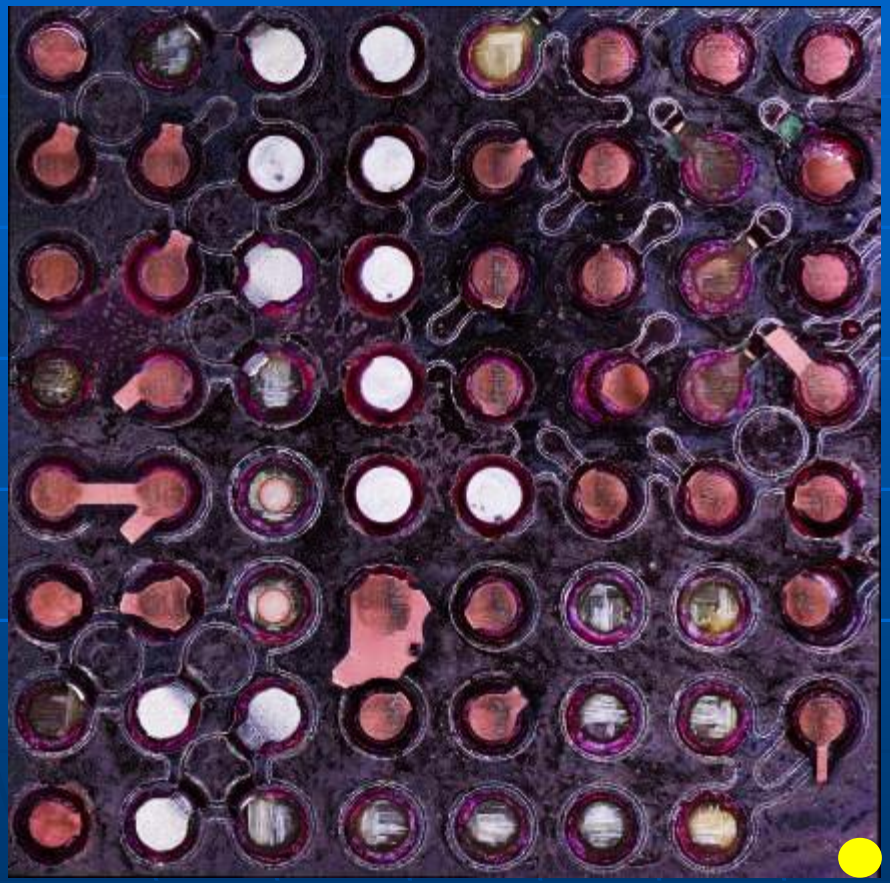

Figure 3
PCB Pads
Yellow dot is location of A1

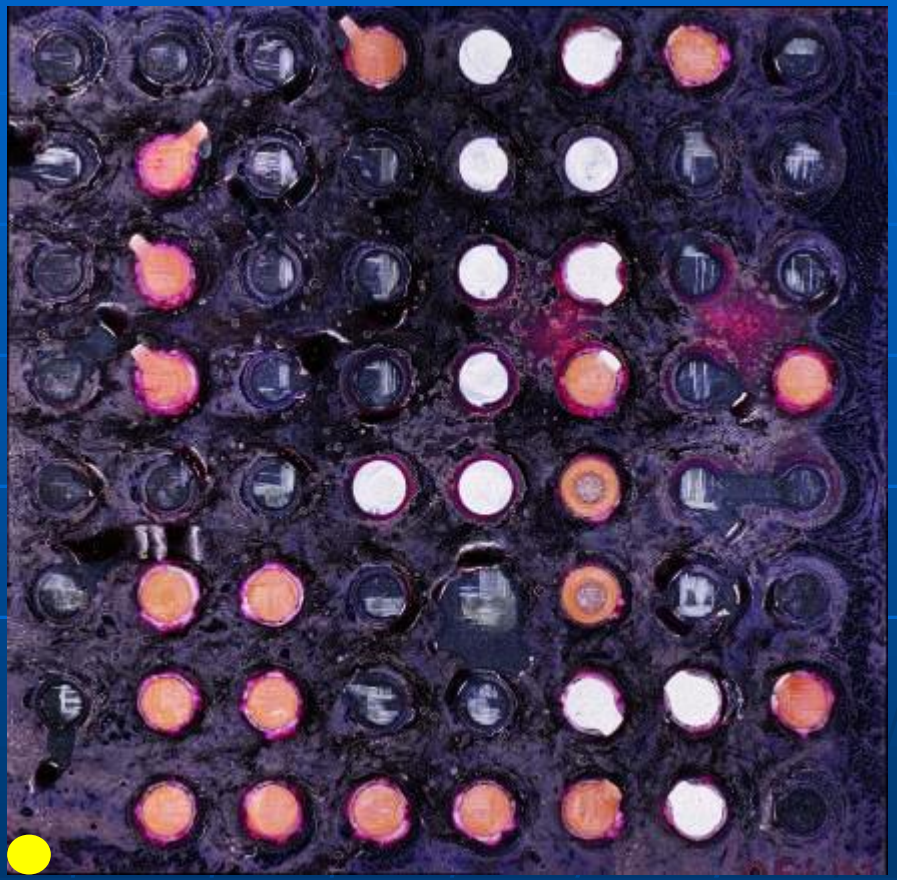

Figure 4
BGA Pads
Yellow dot is location of A1

No defective solder connections.

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PSI Customer - Image BGA - Dye & Pry Analysis

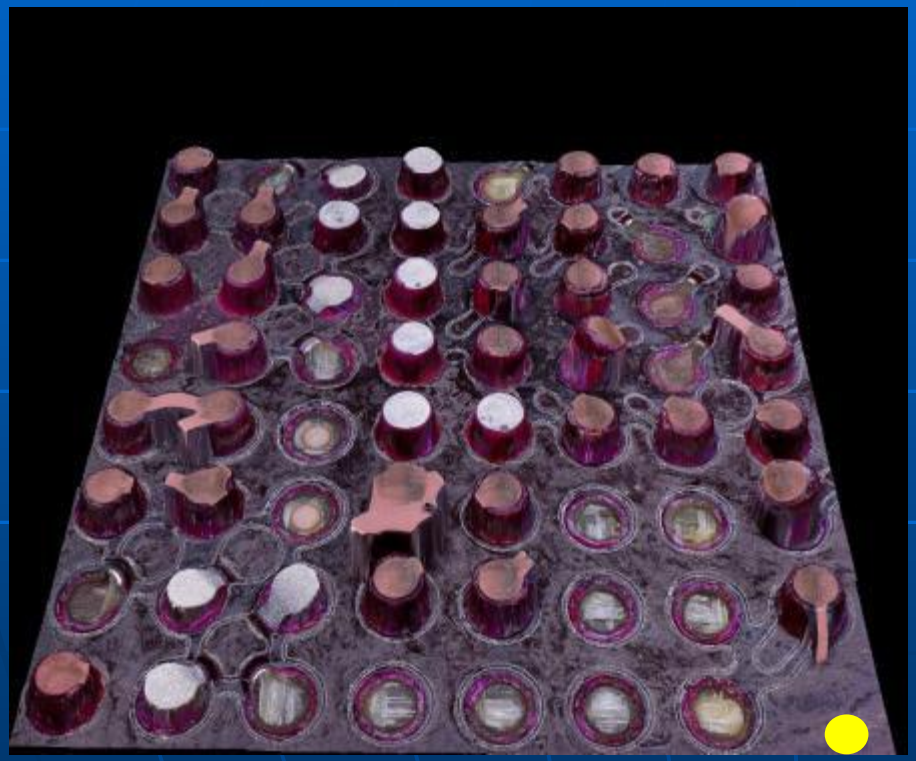

Figure 5
3D View of PCB Pads
Yellow dot is location of A1

Figure 6
3D View of BGA Pads
Yellow dot is location of A1

No defective solder connections.