IPC-7711	
Number: **5.6.3**	Subject: **J-Lead Installation**
Date: **1/17**	

NOTES

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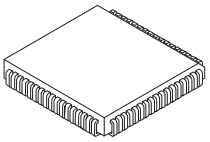
Rework

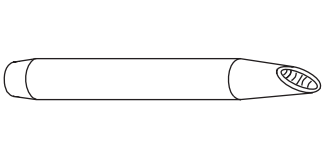
Date: **1/17**

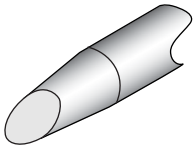
Number: **5.6.4**

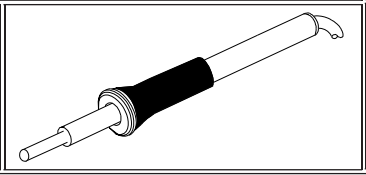
J-Lead Installation

Multi-Lead Method









Board Type: R, F, W, C
See 1.4.2
Skill Level: Intermediate
See 1.4.3
Level of Conformance: High
See 1.5.1

GENERAL REQUIREMENTS

Clauses 1.7 (Basic Considerations), 1.8 (Workstations, Tools, Materials and Processes) and 1.9 (Lead Free) provide important information and guidance about the use of this procedure, including but not limited to tin-lead and lead-free alloys. This procedure is also applicable to lead free products.

EQUIPMENT REQUIRED

Soldering system
Flat faced tip or cup
Flux
Flux-cored solder

MATERIALS

Cleaner
Tissue/wipe
Flux-cored solder

PROCEDURE

1. Install tip into soldering handpiece.
2. Start with tip temperature of approximately 315 °C [599 °F] and change as necessary.
3. Align the component carefully and solder it to the board at diagonally opposite corners to fix it in place. (See Figure 1.)
4. Clean the tip, Procedure 2.8.
5. Apply solder to the face of the tip to cover approximately 1/2 of the face, keeping the solder down toward the end of the tip, and add about the same amount to the top end of the tip, also at the heel. The precise amount of solder will vary between different types of components. (See Figure 2.)
6. Work with one side at a time, and start with a side that does not include a tacked joint.
7. Bring the tip in at a 45° angle in relation to the row of leads. The tip will make contact with the leads and lands where they meet. (See Figure 3.)
8. Maintaining the same angle, draw the tip down the row of leads slowly and steadily. (See Figure 4.)
9. Clean as applicable and inspect to established workmanship requirements.

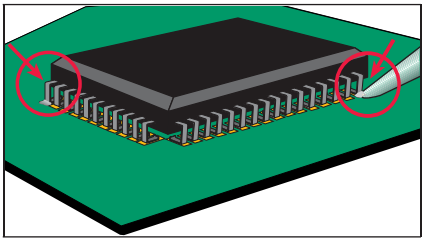


Figure 1 Solder at Corners

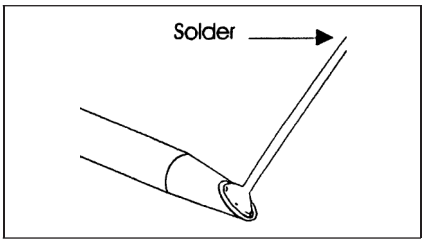


Figure 2 Apply Solder to Tip

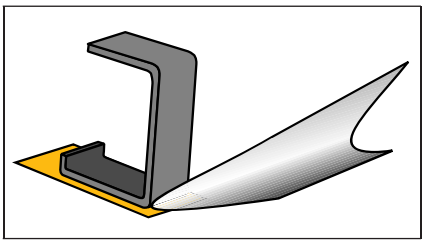


Figure 3 Tip in Contact with Heel

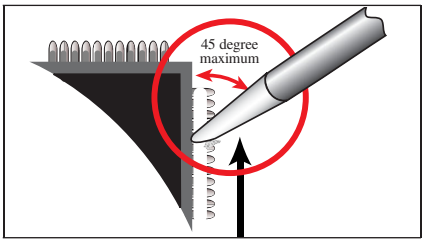


Figure 4 Draw Tip Down

IPC-7711	
Number: **5.6.4**	Subject: **J-Lead Installation**
Date: **1/17**	

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Rework

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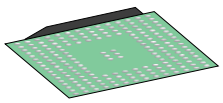
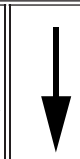
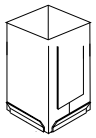
Number: **5.7.1**

BGA/CSP Installation

Using Solder Wire to Prefill Lands







Board Type: R,F,W,C
See 1.4.2
Skill Level: Advanced
See 1.4.3
Level of Conformance: High
See 1.5.1

GENERAL REQUIREMENTS

Clauses 1.7 (Basic Considerations), 1.8 (Workstations, Tools, Materials and Processes) and 1.9 (Lead Free) provide important information and guidance about the use of this procedure, including but not limited to tin-lead and lead-free alloys. This procedure is also applicable to lead free products.

EQUIPMENT REQUIRED

Hot air or hot gas reflow system (representative examples shown by Figures 1-4)
Gas focusing nozzle (sized to BGA dimensions)
Gas supply (if other than ambient atmosphere)
Preheat method (oven, hotplate, high intensity lamp)

OPTIONAL EQUIPMENT

Bake-out (vacuum, convection) oven
X-ray inspection system
Forced (ambient) air cooling system
Inert gas supply, if used
Microscope/vision system

MATERIALS

Flux-cored solder
Flux
Cleaner

PROCEDURE SUMMARY

The procedure outlined below is generic in nature and identifies the procedural steps which need be accomplished to effect BGA or CSP installation. Each step must be tailored to accommodate the attributes and characteristics of the specific system being used (system manufacturers will customarily provide generalized operating procedures which must be further refined to achieve optimum results).

PROCEDURAL PRECONDITIONS

The following preconditions need to be accomplished prior to performing the procedure:

NOTE: If plastic body components are used, see J-STD-033 *Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices* for more information on moisture sensitivity and conditioning the chip and PWB for detachment.

1) Develop a time/temperature profile (TTP) for the specific BGA/CSP component and PCB.

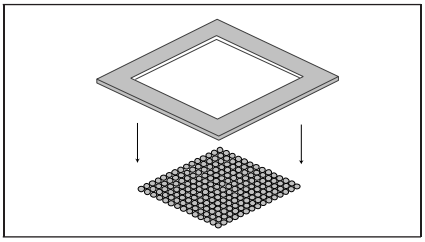


Figure 1 Align Template

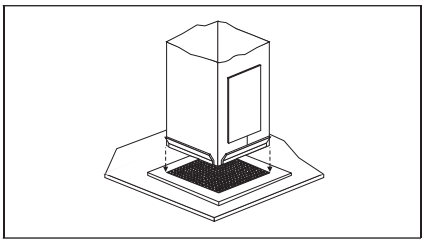


Figure 2 Align Nozzle

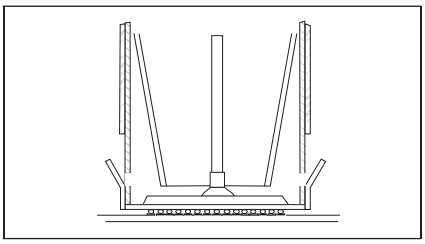


Figure 3 Ball/Land Contact

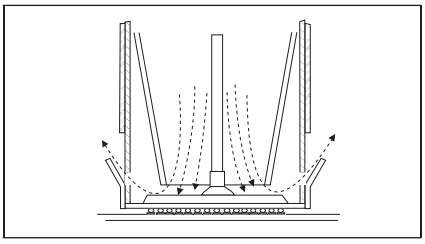


Figure 4 Begin Reflow

2) Bake the PCA to remove entrained moisture which may, if not removed, precipitate measling or delamination.

PROCEDURE STEPS

NOTE: Some systems do not include integrated preheating capability and it may be necessary to preheat the PCA and BGA separately.

1. Prefill lands with flux-cored solder, clean PCA surface and inspect.
2. Place the PCA in the system work piece holder.
3. Coat the prefilled lands with flux.
4. Set hot gas reflow system to achieve the TTP defined by procedural analysis.
5. Perform alignment of gas nozzle to component location (use template, vision system or x-y locator as available/appropriate).
6. Using component placement aids available (vacuum placement pick, x-y locator, etc.), place BGA onto land area while observing indexing/keying indicators to assume proper theta orientation.
7. Bring gas focusing nozzle into reflow position and align nozzle with component.
8. Perform TTP reflow cycle defined by procedural analysis.
9. Perform accelerated cooling cycle if appropriate.
10. Perform x-ray inspection of PCA if appropriate.
11. Clean as applicable and inspect to established workmanship requirements.

NOTES

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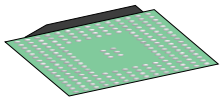
Rework

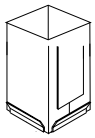
Date: **1/17**

Number: **5.7.1.2**

BGA/CSP Installation

Focused IR Reflow System (with integral preheater)





Board Type: R,F,W,C
See 1.4.2
Skill Level: Advanced
See 1.4.3
Level of Conformance: High
See 1.5.1

GENERAL REQUIREMENTS

Clauses 1.7 (Basic Considerations), 1.8 (Workstations, Tools, Materials and Processes) and 1.9 (Lead Free) provide important information and guidance about the use of this procedure, including but not limited to tin-lead and lead-free alloys. This procedure is also applicable to lead free products.

EQUIPMENT REQUIRED

Focused IR Rework system with integral preheater (for PCB and component heating)
PCB Preheat method if not integral with system (oven, hotplate, high intensity lamp)

OPTIONAL EQUIPMENT

Bake-out (vacuum, convection) oven
Inert gas supply, if used

MATERIALS

Flux-cored solder
Flux (Gel/paste flux) or Solder Paste
Micro-stencil or 'Component Print Frame' for paste/flux
Cleaner

PROCEDURE SUMMARY

The procedure outlined below is generic in nature and identifies the procedural steps which need be accomplished to effect BGA or CSP installation. Each step must be tailored to accommodate the attributes and characteristics of the specific system being used (system manufacturers will customarily provide generalized operating procedures which must be further refined to achieve optimum results).

PROCEDURAL PRECONDITIONS

The following preconditions need to be accomplished prior to performing the procedure:

NOTE: If plastic body components are used, see J-STD-033 Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices for more information on moisture sensitivity and conditioning the chip and PCB for attachment.

1.) Develop a time/temperature profile (TTP) for the specific BGA/CSP component and PCB, referencing the critical temperatures listed below Figure 2.

2.) Bake the PCB assembly to remove entrained moisture which may, if not removed, precipitate measling or delamination.

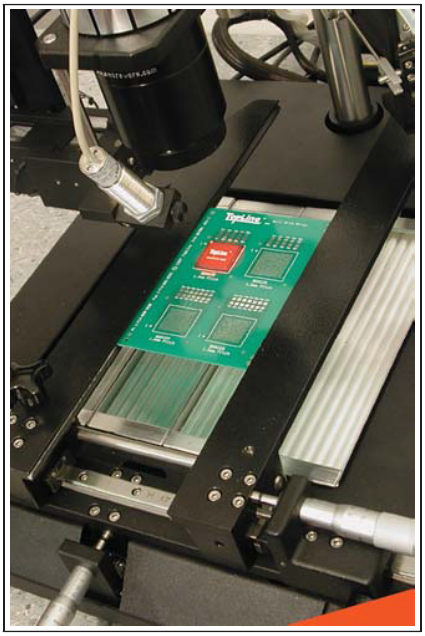


Figure 1

Number: **5.7.1.2**	Subject: **BGA/CSP Installation**
Date: **1/17**	

PROCEDURE STEPS

1. Remove conformal coating (if any) and clean work area of any residual old solder, contamination, oxides or residues.
2. Place the PCB assembly/PCA in the system work piece holder. (Figure 1)
3. Perform alignment of IR to component location.
4. Set Focused IR rework system to achieve the TTP defined by procedural analysis.
5. Apply paste flux or solder paste to BGA site (with stencil).
6. Align and place BGA (using mechanical pick-up and BGA alignment system).
7. Perform TTP re-flow cycle defined by procedural analysis. (Figure 2)
8. Clean PCA as appropriate to customer requirements.
9. Clean as applicable and inspect to established workmanship requirements.

NOTES

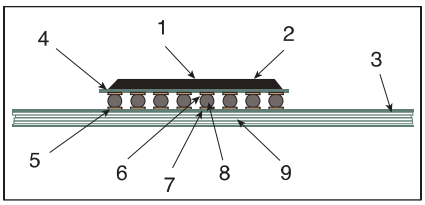


Figure 2 Main Critical Temperatures

1. Topside of Component 225 °C [437 °F]
2. BGA
3. Topside PCB Temperature 155-165 °C [311-329 °F]
4. Upper Ball Temperature 205-215 °C [401-419 °F]
5. Lower Ball Temperature 205-215 °C [401-419 °F]
6. Copper Component Pads
7. Copper PCB Pads
8. Solder Ball
9. PCB

Important Process Notes

Temperature 1 affects 4
Temperature 3 affects 5

High Temperature reduces 1-4-5 Deltas

Ideal Temperatures are

Component Temperature = 225 °C [437 °F] (245 °C Pb Free) [473 °F Pb Free]
PCB Temperature = 155 °C [311 °F] min - 165 °C [329 °F] max
(185-195 °C Pb Free) [365-383 °F Pb Free]

IPC

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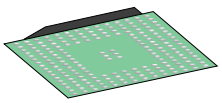
Rework

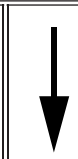
Date: **1/17**

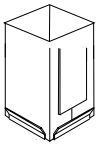
Number: **5.7.2**

BGA/CSP Installation

Using Solder Paste to Prefill Lands







Board Type: R,F,W,C
See 1.4.2
Skill Level: Advanced
See 1.4.3
Level of Conformance: High
See 1.5.1

GENERAL REQUIREMENTS

Clauses 1.7 (Basic Considerations), 1.8 (Workstations, Tools, Materials and Processes) and 1.9 (Lead Free) provide important information and guidance about the use of this procedure, including but not limited to tin-lead and lead-free alloys. This procedure is also applicable to lead free products.

EQUIPMENT REQUIRED

Hot air or hot gas reflow System (representative examples shown by Figures 1-4)
Gas focusing nozzle (sized to BGA dimensions)
Gas supply (if other than ambient atmosphere)
Preheat method (oven, hotplate, high intensity lamp)

OPTIONAL EQUIPMENT

Bake-out (vacuum, convection) oven
X-ray inspection system
Forced (ambient) air cooling system
Inert gas supply, if used
Microscope/vision system

MATERIALS

Solder paste
Cleaner

PROCEDURE SUMMARY

The procedure outlined below is generic in nature and identifies the procedural steps which need be accomplished to effect BGA or CSP installation. Each step must be tailored to accommodate the attributes and characteristics of the specific system being used (system manufacturers will customarily provide generalized operating procedures which must be further refined to achieve optimum results).

PROCEDURAL PRECONDITIONS

The following preconditions need to be accomplished prior to performing the procedure:

NOTE: If plastic body components are used, see J-STD-033 *Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices* for more information on moisture sensitivity and conditioning the chip and PWB for detachment.

1) Develop a time/temperature profile (TTP) for the specific BGA/CSP component and PCB.

2) Bake the PCA to remove entrained moisture which may, if not removed, precipitate measling or delamination.

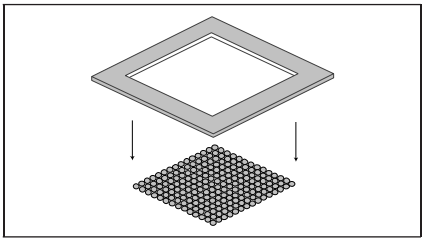


Figure 1 Align Template

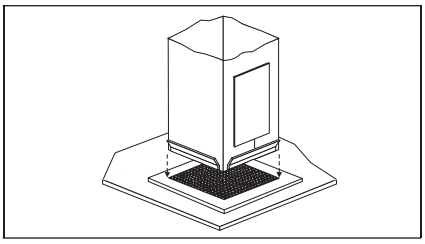


Figure 2 Align Nozzle

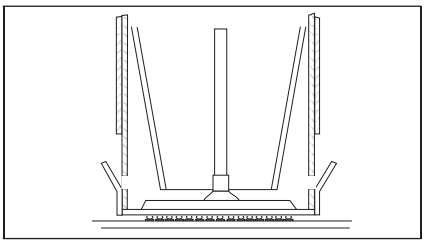


Figure 3 Ball/Land Contact

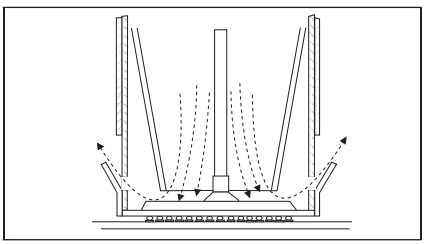


Figure 4 Begin Reflow

IPC-7711	
Number: **5.7.2**	Subject: **BGA/CSP Installation Using Solder Paste to Prefill Lands**
Date: **1/17**	

PROCEDURE STEPS

NOTE: Some systems do not include integrated preheating capability and it may be necessary to preheat the PCA and BGA separately.

1. Clean PCA surface and lands.
2. Apply solder paste (stencil, screen, dot dispense, as appropriate).
3. Place the PCA in the system work piece holder.
4. Set hot gas reflow system to achieve the TTP defined by procedural analysis.
5. Perform alignment of gas nozzle to component location (use template, vision system or x-y locator as available/appropriate).
6. Using component placement aids available (vacuum placement pick, x-y locator, etc.), place BGA onto land area while observing indexing/keying indicators to assume proper theta orientation.
7. Bring gas focusing nozzle into reflow position and accomplish fine alignment.
8. Perform TTP reflow cycle defined by procedural analysis.
9. Perform accelerated cooling cycle if appropriate.
10. Clean PCA as appropriate to customer requirements.
11. Perform x-ray inspection of PCA if appropriate.
12. Clean as applicable and inspect to established workmanship requirements.

NOTES

IPC 7711 Rework	Date: 1/17 Number: 5.7.2.1 **BGA/CSP Installation** **Stay-in-Place Stencil**		
			Board Type: R, F, C See 1.4.2 Skill Level: Advanced See 1.4.3 Level of Conformance: Medium See 1.5.1

GENERAL REQUIREMENTS

Clauses 1.7 (Basic Considerations), 1.8 (Workstations, Tools, Materials and Processes) and 1.9 (Lead Free) provide important information and guidance about the use of this procedure, including but not limited to tin-lead and lead-free alloys. This procedure is also applicable to lead free products.

OUTLINE

The procedure outlined below is generic in nature and identifies the procedural steps which need to be accomplished to affect BGA/CSP installation. This process has been developed for easy placement of BGA with no high end rework system required. This procedure also eliminates the need to repair damaged mask underneath the BGA/CSP prior to installation. Each step must be tailored to accommodate the attributes and characteristics of the specific system being used (system manufacturers will customarily provide generalized operating procedures which must be further refined to achieve optimal results).

EQUIPMENT REQUIRED

Reflow Source (Reflow Oven, Controlled Hot Air, or Other Source)
Squeegee
Tweezers

OPTIONAL EQUIPMENT

Bake-out Oven
X-ray Inspection System
Convective Reflow System

MATERIALS

Stay-in-place Stencil
Solder Paste
Cleaner

NOTE

Moisture sensitive components (as Classified by IPC/JEDEC J-STD-020 or equivalent documented procedure) must be handled in a manner consistent with J-STD-033 or an equivalent documented procedure.

REFERENCE

2.1 Handling Electronic Assemblies
2.2 Cleaning
2.5 Baking and Preheating

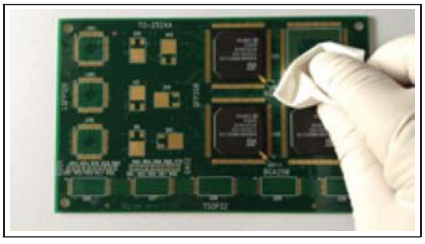


Figure 1 Clean Work Area

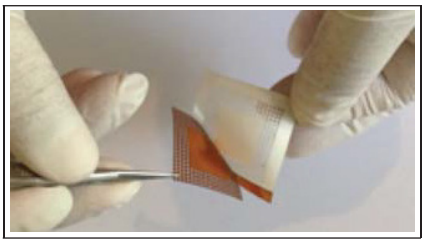


Figure 2 Remove the Liner

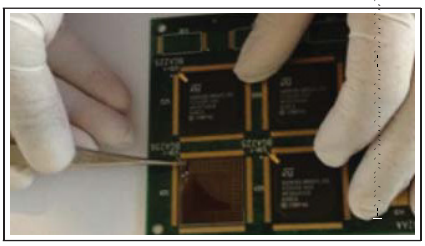


Figure 3 Align Stencil Over Land Pattern

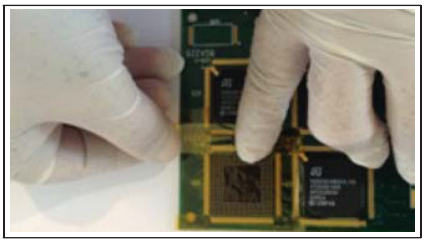


Figure 4 Tape Around Periphery of Stencil

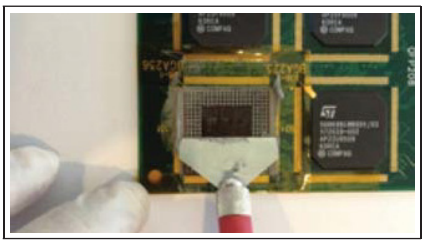


Figure 5 Squeegee Solder Paste

IPC-7711	
Number: **5.7.2.1**	Subject: **BGA/CSP Installation**
Date: **1/17**	

PROCEDURAL PRECONDITIONS

The following preconditions need to be accomplished prior to performing the procedure:

1) Develop a time/temperature profile (TTP) for the specific BGA/CSP component and PCB.
2) Bake the PCB assembly to remove entrained moisture which may, if not removed, precipitate measling or delamination.

PROCEDURE

1. Clean work area of any solder, contamination, oxides, residues or fluxes (see Figure 1).
2. Select appropriate stay-in-place Stencil that matches land patterns of component being installed.
3. Remove the release liner from bottom of stencil (see Figure 2).
4. Align the stencil over the land patterns, as per reference designator, by starting in one corner and working in X and Y directions until alignment is achieved (see Figure 3).
5. Lightly press on liner after alignment to activate the adhesive.
6. Tape off the area around the periphery of the stencil (see Figure 4).
7. Apply a small line of solder paste, the length of one side of the stencil, over the top row of apertures.
8. Squeegee solder paste across the top of the stencil making sure all of the apertures of the stencil are filled (see Figure 5).
9. Remove the tape applied to the periphery.
10. Wipe off excess solder paste from the top of the stencil with a lint free cloth (see Figure 6).
11. Ensure all apertures are filled with solder paste.
12. Install component, as per reference designator, and check alignment (see Figure 7).
13. Reflow solder paste with a reflow station or reflow oven using an established time, temperature profile.
14. Clean as applicable
15. Inspect to established workmanship requirements.

NOTES

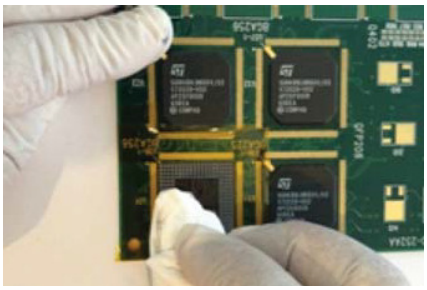


Figure 6 Wipe off excess solder paste

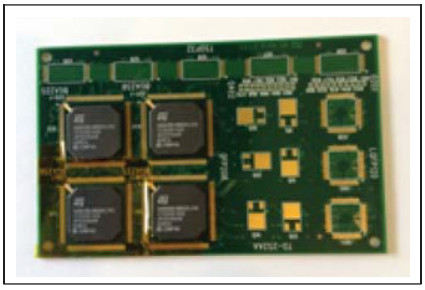


Figure 7 Install component