BGA

REBALLING INSTRUCTIONS

Notice

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VER 2.0 PART NO. 41-132

BGA REBALL STARTER KIT

Inventory of Kit Items	**Qty.**	**Part No.**
SolderQuik™ Preform (customer specified)*	10	41.xxx
BGA Fixture*	1	43.xxx
Instruction Booklet, BGA Reballing Starter Kit	1	41.132
BGA Reballing - Quick Guide	1	41.134
Flux syringe w/plunger	1	41.144
Brush, horsehair w/Alum. handle	1	41.125
Tweezers, sharp	1	41.126
Cleaning tray, conductive	1	41.149
Conductive rigid mat	1	41.143
De-ionized water bottle, 250 ml.	1	43.302
Desoldering braid, 0.210” wide	2	41.123
Acid brush	2	41.129
IPA wipes	20	41.130
Test tube (disposable with cap)	1	41.133
Black plastic case	1	41.150

* BGA preforms and fixtures are part dependent.

Available BGA Fixtures

Fixture part no.	Package size
43-001	21 x 21 mm
43-002	23 x 23 mm
43-003	27 x 27 mm
43-004	31 x 31 mm
43-005	35 x 35 mm
43-006	40 x 40 mm
43-007	42.6 x 42.6 mm
43-008	15 x 15 mm
43-009	25 x 25 mm
43-010	29 x 29 mm
43-011	45 x 45 mm
43-012	19.5 x 19.5 mm
43-013	32.5 x 32.5 mm
43-014	37.5 x 37.5 mm
43-015	42.5 x 42.5 mm
43-016	26.9 x 26.9 mm
43-017	42.8 x 42.8 mm
43-018	33 x 33 mm
43-100	Flexible Fixture

If the specific dimensions of the package being reballed are not listed above, call Emulation Technology for custom orders and the latest available sizes.

* The flexible fixture is adjustable from 5mm to 57mm square (or rectangle).

Customer Supplied Items

Oven (recommended for moisture removing bake)

Hot air reflow system, convection oven, or conveyor reflow oven.

Soaking beaker (recommended for cleaning fixtures)

Soldering iron (or other tool for BGA ball removal)

Static safe workstation

Microscope (recommended for inspection)

DI water

Finger cots

Before You Begin

Safety Considerations

Prior to the use of this product, review all safety markings and instructions including Material Safety Data Sheets.

WARNING: A warning denotes a hazard that can cause injury.
CAUTION: A caution denotes a hazard that can result in loss to property or equipment.

Do not proceed beyond a **WARNING** or **CAUTION** notice until you have understood the hazardous conditions and have taken appropriate steps.

Ventilation:

Flux fumes from soldering and desoldering can be harmful. Use general or local exhaust ventilation to meet TLV requirements. Consult Material Safety Data Sheets (MSDS) for Threshold Limit Value (TLV) numbers.

Personal Protective Equipment:

Chemicals used in reballing process can cause skin irritation. Use appropriate personal protective equipment when performing cleaning, soldering and desoldering activities.

Lead Warning:

The USEPA Carcinogen Assessment Group lists lead and its compounds as teratogens and its components to be a Class B-2 carcinogen. IARC. California Proposition 65 requires a posted warning that lead can cause birth defects or other reproductive harm.

When working with ESD sensitive parts make sure your work area is ESD safe by using:

Finger cots
Conductive work mat or table top
Grounding heel strap and wrist strap

Sensitivities

Moisture Sensitivity

Plastic BGA packages are moisture absorbent. The package fabricator designates the sensitivity level of each package design. The sensitivity level has an exposure time limit associated with it. JEDEC used a standard atmosphere of 30°C at 60% relative humidity to develop the time limit of exposure. Included in this instruction booklet is a moisture level table (see page 19).

When the exposure exceeds the allowed time, the JEDEC standard specifies a bake out. The standard baking time is 24 hours at 125°C. Enclosure in a moisture barrier bag with a desiccant should immediately follow the baking. This bake out will prepare the package for a solder process.

ESD Sensitivity

The sequence of package removal, reballing, and remounting on a PCB or other substrate provides numerous chances for ESD damage.

Temperature Sensitivity

BGA packages are sensitive to temperature stresses in three ways:

- Rapid changes in temperature induce stresses due to non-uniformity of internal temperatures. Rapid heating of only one side of a BGA package can induce stresses on a large die.
- Excessive temperature: Plastic BGA packages are much like printed circuit boards. Their substrates are glass reinforced and typically have a T_g (glass transition temperature) of approximately 230°C. Above the glass transition temperature the coefficient of thermal expansion increases, adversely effecting internal stresses. Keeping the substrate below this temperature is very important.
- Non-uniformity of heat application: The hot air system used by Winslow Automation is a convection oven rather than a gun type hot air delivery system. The oven provides uniform heating to parts that is essential for effective soldering. Further, the oven delivers low speed hot air thereby reducing temperature stress due to temperature differentials. The paper of the preform tends to insulate the pads of the substrate from the air. Consequently, the soaking time of the oven allows time to bring the pads up to solder wetting temperature uniformly. When the heating profile is completed, the preform is light brown in color. Higher flow temperature will cause the preform to progress in color to deep brown and even black.
- <u>We recommend that BGA components never exceed 220 degrees C.</u>

Stress Sensitivity

Internal stress arises from temperature gradients and from structural loads. Thermally related stresses are more prominent in reballing packages even though both of these sources exist in the process. Winslow Automation attempts to minimize the risk of temperature induced catastrophic fractures through closely controlled temperature cycling. Uniformity of heat application is critical to minimizing the stresses in a package.

BGA Deballing Process

There are many tools on the market which will remove residual solder from BGA components. These include hot air vacuum tools, solder wick, and (our preferred method) low temp wave solder (220deg C.) Any of these tools, if used properly, work well with our Solderquik BGA Preforms. Because good temperature controlled soldering irons are relatively wide spread and inexpensive, a process for deballing using solder wick is detailed below. Be sure to use caution throughout the deballing process, as it contains numerous potentially damaging mechanical and thermal stresses.

Tools and materials (Included in kit)

- Flux
- Solder wick
- IPA Wipes (isopropyl alcohol)
- Conductive mat

Additional recommended tools

- Microscope
- Fume extraction system to help remove fumes created during desoldering.
- Safety glasses
- Scissors (to cut desoldering braid)

Preparation

- Preheat solder iron
- Put on finger cots
- Pre-inspect each package for contamination, missing pads, and solderability.
- Put on safety glasses

Warning:

The following processes require the use of hot soldering irons that can cause burns. The solder used contains lead, known to the State of California to cause cancer or reproductive toxicity. Solder flux is harmful if swallowed and can cause skin irritation. Avoid breathing solder flux fumes. IPA used in the process is flammable and harmful if swallowed or inhaled. Provide local and general ventilation to meet TLV numbers. See page 29 for more warning information on chemicals used in the processes.

Note: A moisture removing bake is recommended before deballing.

STEP — 1

Step 1 — Flux package

With the package pad side up on top of the conductive mat, apply a small amount of flux onto the balls of the BGA package. Too little flux makes ball removal difficult.

STEP — 2

Step 2 — Ball removal

Using the desoldering braid and soldering iron remove the solder balls from the pads of the package.

Place the solder braid on top of the flux, then place the soldering iron on top of the braid. Allow the soldering iron to heat the braid and melt the solder balls before you glide the desoldering braid over the package surface.

CAUTION: Do not press down on the package with the soldering iron. Excessive pressure may crack the package or scratch the pads. (See Figure 1)

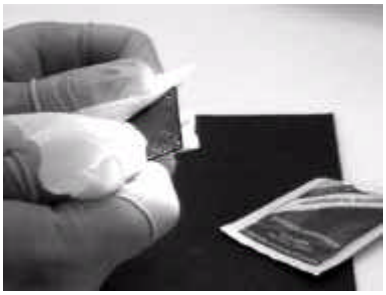
FIGURE 1

To achieve the best results, take one final pass over the package with a clean portion of the desoldering braid. A small amount of solder should be left on the pads to make reballing easier.

Step 3 — Clean package

Immediately clean the package with an isopropyl alcohol wipe. Prompt cleaning of the part will make flux residue easier to remove.

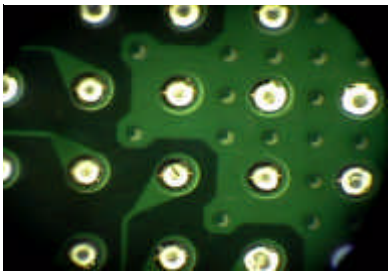
STEP — 3



Remove the isopropyl alcohol wipe from its package and unfold the wipe.

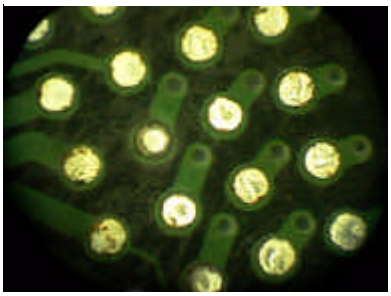
Using a rubbing motion over the surface of the package, remove the paste flux. Keep moving the package to a cleaner portion of the wipe. Always support the opposite side of the package while cleaning. Do not bend package corners.

FIGURE 2



CLEAN

FIGURE 3



CONTAMINATION

STEP — 5

STEP — 6

2. Always use a new isopropyl alcohol wipe for each package.

Step 4 — Inspection

We recommend that inspection be done under a microscope. Look for clean pads, damaged pads, and un-removed solder balls. (See Figures 2 and 3.)

NOTE:
Because of the corrosive nature of the flux, we recommend extra cleaning if the parts are not to be reballed immediately

Step 5 — Extra cleaning

Apply DI water to the pads of the package and scrub the package with the brush that comes with the kit.

NOTE: To achieve the best cleaning results, brush the package in one direction and then turn the package a quarter turn and brush in the same direction. Follow with a circular brushing.

Step 6 — Rinse
Brush well and rinse the package with DI water. This will help flush flux residue from the package. Then allow the package to air dry. Re-inspect the package per Step 4.

If packages are to sit for more than a few minutes before reballing, it is essential to make sure they are very clean. Submerging the package in water for any length of time is NOT recommended.

NOTES

A word about flux…

The flux we use in house and send with the kits is Alpha Metals WS609.

The process was designed using WS609 and it's use is strongly recommended because it has been extensively tested, and it works.

If for any reason you would rather use a different flux, that flux should have the following basic properties:

- Mild to medium activity organic acid
- It must be a paste flux, as the tackiness is essential for ball attach
- It must be water soluble, otherwise, paper removal and cleaning is very difficult.

No Clean fluxes are generally ill suited to this process. They typically have too low an activity to provide for good wetting. No Clean fluxes tend to make paper removal more difficult because they are not water soluble. Also, the quantity of No Clean flux required in this process is so great that extra cleaning will most likely be required.

BGA Reballing Process

Tools and materials

- Preform
- Fixture
- Flux
- DI water
- Cleaning tray
- Cleaning brush
- Tweezers, blunt 6”
- Acid brush
- Reflow oven or hot air system

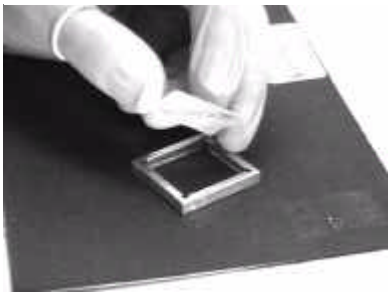
Additional recommended tools

Microscope
Finger cots

Preparation

- Make sure the BGA fixture is clean before you start.
- Preset temperature profile for reflow equipment. Refer to page 22 for temperature profile instructions.

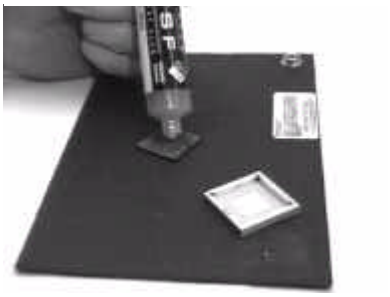
STEP — 1



Step 1 — Insert preform

Place preform into the fixture with the SolderQuik™ logo facing down onto the step of the fixture. Ensure that the preform fits loosely in the fixture. If the preform needs to bend or bow to fit in the fixture the process will not work. These problems are usually caused by dirty fixtures or poorly adjusted flexible fixtures.

STEP — 2



Step 2 — Apply flux to package

Use the paste flux syringe to apply a small amount of flux to the package.

NOTE: Make sure package is clean before you begin.
(Refer to page 8 and 9 for cleaning instructions)

STEP — 3

Step 3 — Spread flux

Use the acid brush from the kit to spread the paste evenly over the entire pad side of the package. Cover each pad with a thin layer of flux.

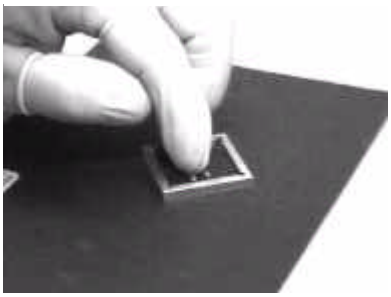
Be sure all pads are covered with flux. A thinner layer of flux works better than a thicker layer.

STEP — 4

Step 4 — Insert Package

Place the package into the fixture with the fluxed side of the package against the preform.

STEP — 5



Step 5 — Seat Package

Seat the preform and the package into the fixture by gently pressing down on the package. Make sure that the package sits flat against the preform.

STEP — 6

Step 6 — Reflow

Place the fixture into the hot air convection oven or hot air reballing station and start the reflow heat cycle.

All reballing stations used must have their temperature profiles reset to the developed profile.

(For more information see page 22 for details on the reflow profile.)

STEP — 7

Step 7 — Cool down

Using tweezers, remove the fixture from the oven or reballing station and place it on the conductive tray. Allow the package to cool for about 2 minutes before removing it from the fixture.

STEP — 8

Step 8 — Paper removal

When the package has cooled, remove the package from the fixture and place it solder ball side up in the cleaning tray.

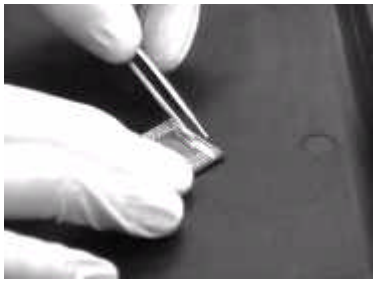
STEP — 9

Step 9 — Soak

Apply the de-ionized water to the BGA preform and wait about 30 seconds for the carrier to soak before continuing.

STEP — 10

STEP — 11



STEP — 12

STEP — 13

Step 10 — Peel back carrier

Use the pointed tweezers from the kit to remove the carrier from the package. The best method for removing the carrier is to start in one corner and peel the paper away from the package.
The paper should peel off in one sheet. If the paper tears during removal, stop and add more de-ionized water. Wait another 15 to 30 seconds before continuing.

Step 11 — Remove paper fragments

Occasionally a small amount of paper remains after the preform removal. Remove the paper fragment with the tweezers. Softly run the tweezer points between the balls while lifting the paper away from the package.

CAUTION:
The tip of the tweezer is sharp and could scratch through the fragile solder mask if you are not careful.

Step 12 — Cleaning

Immediately clean the package with DI water after removing the paper preform. Apply a generous amount of DI water and scrub the package with the brush.

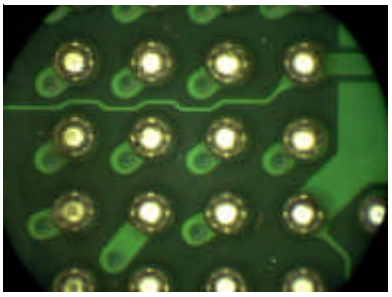
CAUTION:
Support the package while brushing to avoid mechanical stress.

NOTE:
To achieve the best cleaning results, brush the package in one direction and then turn the package a quarter turn and brush in the same direction. Follow with a circular brushing.

Step 13 — Rinse package

Rinse the package with DI water. This will remove small bits of flux and paper broken loose during the previous cleaning steps. Allow package to air dry. Do not wipe package dry with dry paper towel.

FIGURE 4



Step 14 — Inspect package

Use a microscope to inspect the package for contamination, missing balls, and flux residue. Repeat Steps 11 through 13 if the package needs additional cleaning.

Figure 4 shows cleaned solder balls.

FIGURE 5

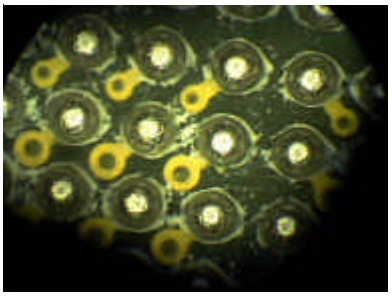


Figure 5 shows corrosive residue around the base of the ball.

CAUTION:
Because the process does not use a no-clean flux, careful cleaning is essential to prevent corrosion and prevent long term reliability loss.

The best way to determine if the package has been cleaned properly is to use an Ionograph or equivalent piece of equipment to test for ionic contamination.

Note: The cleaning process in steps 9 - 13 is only one possible method. Some or all of these steps may be replaced by an aqueous batch clean or spray rinse process.

Cleaning Fixtures

During the reballing process, the BGA fixtures tend to get sticky and dirty after many uses. Figure 10 points out the steps on the fixture. It needs to have the flux residue removed so that the package and preform will seat in the fixture properly. The following process will work on both the flexible and fixed fixtures**.** An ultrasonic cleaner with DI water also provides an excellent cleaning solution for the fixtures.

Tools and materials

- Cleaning tray
- Cleaning brush
- Beaker
- DI water

Additional recommended tools

- Small beaker or container

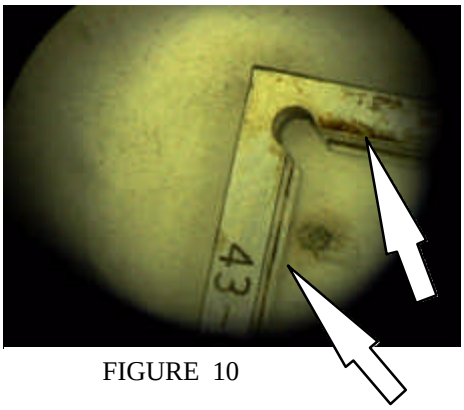


FIGURE 10

STEP — 1

Step 1 — Soak

Soak BGA fixture in warm DI water for about 15 minutes.

STEP — 2

Step 2 — Scrub with DI water

Remove fixture from the DI water and scrub the fixture with the brush.

STEP — 3

Step 3 — Rinse Fixture

Rinse the fixture with DI water. Allow to air dry.

Bake and Dry-Packaging

The bake out procedure is a very important one to follow to ensure your packages will not “popcorn” during reballing. We highly recommended that you bake your packages before any reflow cycle if exposed to moisture and/or atmosphere for any extended period of time.

Additional recommended tools

- Approved bake out oven
- ESD safe, moisture barrier bag
- Desiccant

Preparation

- Pre-inspect each package for contamination, missing pads, and solderablity.
- Check for cleanliness.

Step 1 — Package moisture level

Select the moisture level from the following table to determine if baking is required for your packages. The BGA fabricator is responsible for specifying the moisture sensitivity level of the package. It is important to know the atmospheric exposure time of your packages. If the exposure time exceeds that for sensitivity levels 2 through 5, then 24 hours of baking at 125°C should follow. (**Note:** When you are not sure of the atmosphere exposure time of your packages, we recommend that you assume that the exposure time has been exceeded.)

CAUTION: Never bake BGA packages in plastic trays that are rated lower than 135°C. Further, do not use trays which are not clearly marked with their maximum service temperature.
Do not let solder balls touch metal surfaces during the bake process.

Step 2 — Bake

Preset the oven temperature and time according to the moisture level from Step 1. When the oven reaches operating temperature, place BGA packages in the bake out oven.

Step 3 — Dry packaging

Place the packages into an ESD safe moisture barrier bag along with fresh desiccant after the bake out cycle. The desiccant will help keep the packages dry during storage and shipping.

Moisture Level Table	
Sensitivity level	**Exposure Time 30°C @ 60% RH**
Sensitivity level 1	Unlimited
Sensitivity level 2	One year
Sensitivity level 3	168 hours
Sensitivity level 4	72 hours
Sensitivity level 5	24 hours

Flexible Fixture Setup - Optional

The best fixture to use for most applications is the static fixture because it does not require any setup. However, there may not be a static fixture for every size package being reballed. This is where the flexible fixture comes in handy. The flexible fixture can be setup to fit any size package from 5mm to 57mm, and can also be setup for rectangular size packages.

Tools and materials

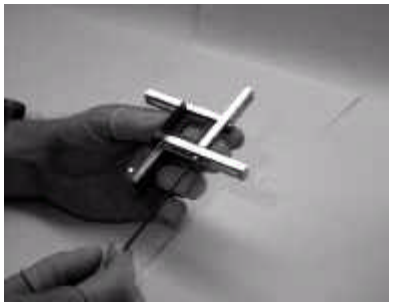
- Flexible fixture
- 5/64” hex key driver
- Sample package
- Gauge set

Additional recommend tools

- Metric calipers or accurate ruler

Packages in flexible fixture
Size range 5mm to 57mm

STEP — 1



Step 1 — Flexible fixture setup

Loosen all of the shoulder screws until the fixture parts are free to slide but retain right angles.

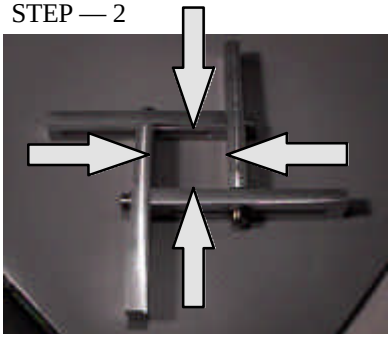
Note: Do not loosen the shoulder screws too much. If the screws are out too far the fixture is hard to use and keep square (See Figure 6).

FIGURE 6

Step 2 — Determine the fixture dimension setting

Adjust the fixture so that the package loosely fits in it, and tighten the screws. Step 2 shows the fixture with the arrows pointing to the step. Insert the package to seat on the step of the fixture. The fixture adjustment should allow easy removal of the package.

STEP — 2

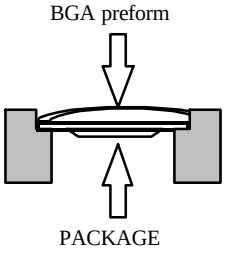


Step 3 — Check BGA preform fit

The last step is to test the fixture with a BGA preform and package in the fixture to ensure a correct fit.

Caution: The preform must not bow or buckle after placing it into the fixture. (For example see Figure 7) If the preform does not fit in the fixture without bowing, re-adjust the fixture.

FIGURE 7



Note: Figure 7 is shown with the preform on top of the package for the purpose of clarity only! During the actual process the package would be on top of the preform.

Reflow Temperature Profile

As with all soldering processes, the temperature profile is the key element to soldering success. Emulation Technologies BGA reballing process is very simple and repeatable, as long as time is taken to setup a temperature profile for the hot air reflow equipment being used.

Every package type may require a different thermal profile. Starting with the general profile shape below and altering it to account for package material, package mass, and package size should yield satisfactory results.

Remember to adjust the profile based on the measured temperature of the component. The oven temperature will usually be different.

CAUTION: Do not heat packages above 220°C. There could be a chance of damaging the package.

Recommended reflow machine:
Any hot air machine with:

- Time controlled heating cycle
- Temperature range 20– 240°C
- Circulating air flow

General guidelines:

- Temperature ramp up 1ºC/second
- Peak temperature should be 200C to 210C
- Remain above liquidus (183C) for 45-75 seconds
- Larger components or heatsinks will necessitate longer heat cycles

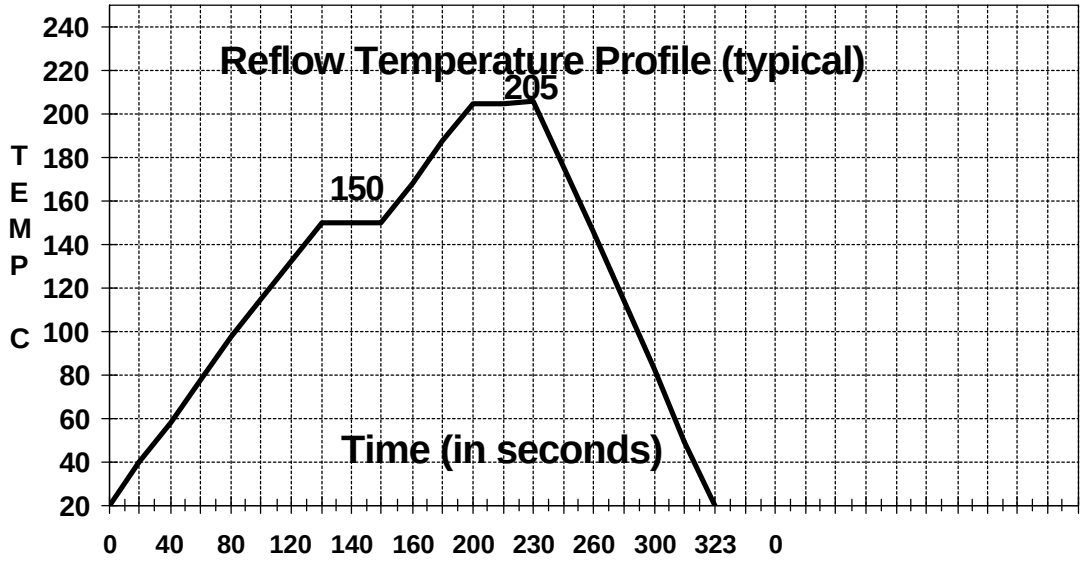
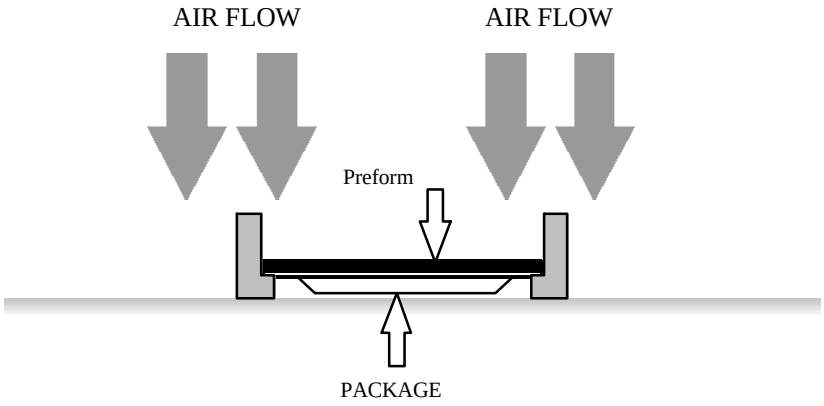


FIGURE 9

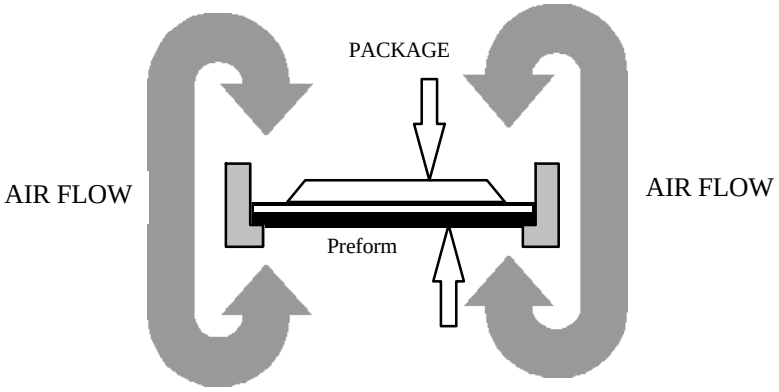
WRONG WAY

FIGURE 10



RIGHT WAY

FIGURE 11



Air flow setup

The hot air machine being used will dictate how the fixture must be supported. Provide support to the fixture so that air circulation reaches the bottom of the package or preform. Do not place the fixture flat on a surface as shown in Figure 10.

Figure 11 shows the correct way of heating the package. Most ovens have racks that will allow air to move freely about the fixture. Hot air tools, used to remove packages from PC boards, do not support the fixture. A preferred hot air tool supplies hot air to both the top and underside of the fixture. Those types of hot air tools may require spacers or shims under the fixture to allow hot air to flow under the fixture.

Air flow all around the package ensures even heating of the package. Packages not uniformly heated may develop a temperature gradient within the package. High temperature gradients lead to high stresses that could damage the package.

Measure package temperature

To create working temperature profiles, thermocouples are placed on various areas of the package and their temperatures are monitored until an optimized profile has been found. This method of package heating ensures uniform heat distribution and minimum thermal shock to the package. Develop working profiles for the particular hot air system being used. Record time and temperature data.

Frequently Asked Questions

Q — *Why doesn't Emulation Technology, Inc. supply fluxed desoldering braid with their kit?*

A — Emulation Technology, Inc. purposefully provided paste flux and flux-free desoldering braid so that there will be no chemical intermixing between a fluxed braid and a customer supplied flux.

Q — *How do I know the package is cleaned sufficiently?*

A — The best way to determine if the package has been cleaned properly is to use an Ionograph or equivalent piece of equipment to test for ionic contamination.

Q — *What should the balls look like after reballing?*

A — After reflow, the balls on the package should be spherical and smooth. An orange peel texture to the balls usually signifies too long a time above reflow, too hot a reflow temperature or too slow of a cool-down cycle.

Q — *The paper is sticking to the package during the paper removal step. What can I do?*

A — Applying more water and allowing the paper to soak for a longer time usually solves this problem. Increasing water temperature also has a positive effect. This problem is usually indicative of a reflow cycle that is too hot or too long.

Q — *One ball did not attach during the reballing process? What can I do?*

A — Flux application and thermal profiling are often the cause of ball attach problems. Apply a small amount of flux to the pad and put an individual ball on the flux and reflow. This will attach the ball that did not stick the first time. If many balls did not attach, you will have to deball and start over.

Q — *After several uses, the preforms stop fitting properly into the fixtures. Why is this?*

A — Flux can build up on the inside of the fixture and cause preform fit problems. Clean the fixture with the instructions on page 16-17.

Glossary

Array: A group of elements, for example, solder balls or pads, arranged in rows and columns in one plane.

Bake & dry pack: Bake in an oven for a time based on the JEDEC moisture level table and vacuum pack with a desiccant.

BGA: Ball Grid Array

Base Metal: The underlying metal surface to be wetted by solder.

BT substrate: Substrate used for BGA packages having high heat resistant thermosetting resin of the additional polymerization type with two main components B (Bismaleimide) and T (Triazine Resin)

Crazing: The presence of numerous minute cracks in the referenced material (for example, solder mask crazing).

Desiccant: A drying agent used to lower the moisture content of air inside a closed space.

Dewetting: A condition that results when molten solder coats a surface and then recedes to leave irregularly-shaped mounds of solder that are separated by areas that are covered with a thin film of solder and with the base metal not exposed.

DI water: Water that has had ions in it removed so that it does not conduct electricity well.

Electrostatic discharge (ESD): The transfer of electrostatic charge between bodies or surfaces that are at different electrostatic potentials.

Eutectic solder: The lowest melting point composition possible for a mixture of lead and tin. Eutectic solder is 63% Tin and 37% Lead.

Flux: A chemically and physically active compound that, when heated, promotes the wetting of a base metal surface by molten solder by removing minor surface oxidation.

Foreign material: Any material that is foreign to the microcircuit or package, or any native material displaced from its original or intended position within the microcircuit package.

Hermetic package: A package that provides absolute sealing from external moisture.

High temperature solder: Solder that is 90% lead and 10% tin.

Humidity indicator card: A card containing chemically impregnated, humidity sensitive, color changing spots used to detect the approximate relative humidity of air.

IPA: Isopropyl Alcohol

JEDEC: Joint Solid State Products Engineering Council

Moisture barrier bag: A bag or pouch used to provide a dry environment for moisture sensitive items during shipping and storage.

Non-wetting, Solder: The partial adherence of molten solder to a surface that it has contacted; base metal remains exposed.

Pad: The electrical contact area on a package substrate.

Pb: Lead, a heavy, soft, malleable, metallic element that is bluish gray in color.

Popcorning: Catastrophic loss of BGA package due to moisture within the package converting to steam from applied heat and rupturing the package.

Porosity: A condition of a solder coating with a spongy, uneven surface that contains a concentration of small pinholes and pits.

Pinholes and voids: Holes penetrating entirely through the solder layer.

Semiconductor die: The actual integrated circuit that has been imprinted on silicon or another semiconductor.

Sn: Tin, a low melting, malleable, ductile metallic element nearly approaching silver in color.

Solder: A metal alloy used in numerous joining applications in microelectronics. The most commonly used solders are tin-lead alloys.

Solderability: The ability of a metal to be wetted by molten solder.

Solder mask: Protective coating applied to electronic components to protect the area from deposits of solder.

TBGA: Tape Ball Grid Array

Via: An opening in the dielectric layer(s) through which a conductor passes upwards or downwards to subsequent chip or package conductive layers for electrical interconnections or for heat transfer.

Wetting: The formation of a relatively uniform, smooth and unbroken film of solder, adhering to the base metal.

MSDS: Material Safety Data Sheets

TLV: Threshold Limit Value; a term used to express the airborne concentration of a material to which nearly all persons can be exposed day after day, without adverse effects.

Safety Precautions

SOLDERING PASTE FLUX

WARNING: Harmful if swallowed, can cause skin irritation. Avoid contact with eyes, skin, and clothing. Avoid breathing smoke when soldering or desoldering. Keep in tightly closed container. Use with adequate ventilation. Wash thoroughly after handling.

PRECAUTIONARY STATEMENT: Breathing flux fumes may cause respiratory system irritation or damage. Prolonged or repeated skin contact can result in a rash. Breathing vapors can result in headache and irritation of the mucous membranes.

FIRST AID PROCEDURES: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If contacted, immediately flush eyes or skin with plenty of water for at least 15 minutes. If swallowed, and victim is conscious, have victim drink water or milk.

Consult MSDS for further health and safety information.

SOLDERQUIK™ PREFORMS

WARNING: This product contains a chemical known to the State of California to cause cancer or reproductive toxicity.

PRECAUTIONARY STATEMENT: May be toxic if ingested. Repeated inhalation or ingestions of lead can result in systemic poisoning. Ingestion of lead metal can affect kidneys, gastrointestinal, reproductive and neurological system. FIRST AID PROCEDURES: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If contacted, immediately flush eyes with plenty of water for at least 15 minutes. If swallowed and thought to be overexposed, the person should have a blood lead analysis done.

Consult MSDS for further health and safety information.