

## PROCESSING RECOMMENDATIONS

### For Samtec's SEAM8/SEAF8 Vertical Connectors

The method used to solder these high density connectors is the same as that used for many BGA devices even though there are some distinct structural differences. BGA's have spherical solder balls attached to the leads while the SEAX8 components employ the unique solder charge design.

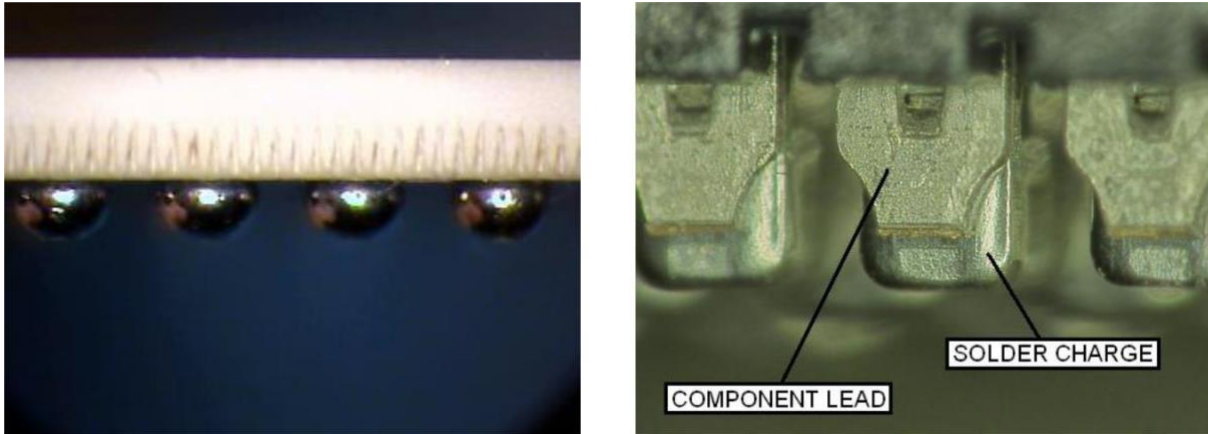


Fig. 1. Solder Balls on BGA v. Solder Charges on SEAX8

Another difference is that unlike the uniform grid arrangement of BGA's, the leads of the SEAX8 are in pairs with alternating pitches of 1.20mm and 0.80mm.

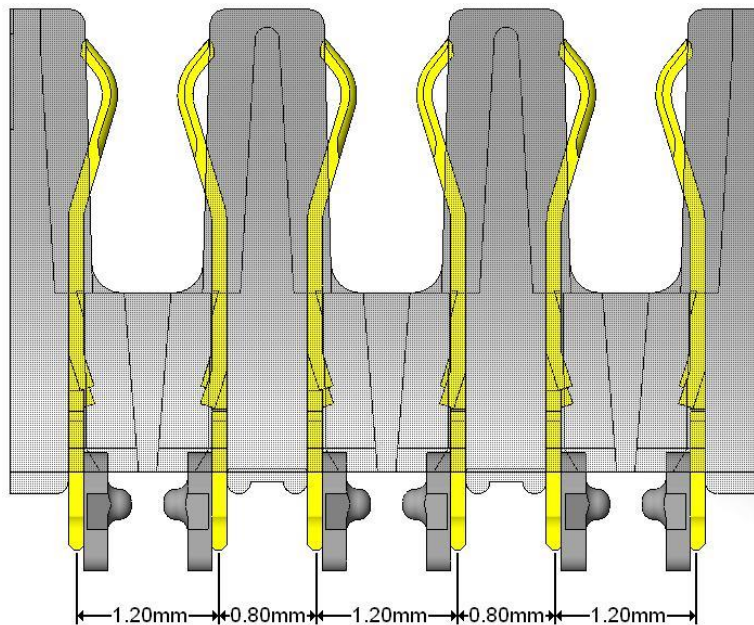


Fig. 2. Alternating Pitch of SEAX8

These differences are minor, however, and customers will have success by following the simple guidelines detailed in this document.

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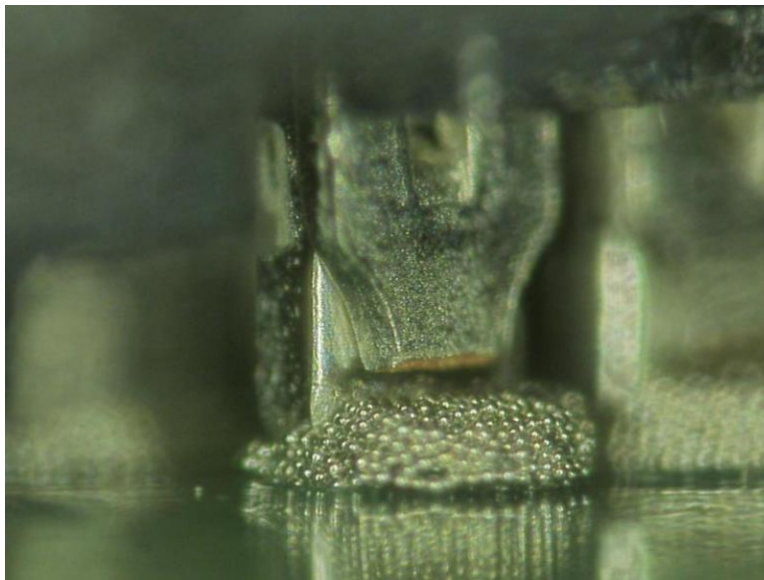
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#### 1. Basic Recommendations

- **Minimum** stencil thickness to be .005" (0.13mm),
- Follow our recommended footprints and stencil designs, found here:
  - [SEAM8 – Surface Mount Footprint](#)
  - [SEAF8 – Surface Mount Footprint](#)

#### 2. Solder Screen Printing Process

- Complete solder pad coverage is critical. The recommended aperture size is intentionally larger than the pad to ensure that the solder charge comes into contact with the solder paste (see Fig. 3). If this does not occur, proper wetting will not be achieved. Automated inspection of each print is recommended. If solder paste does not completely cover the solder pad the assembly should be rejected, cleaned and re-printed.
- Stencil cleaning may need to be monitored more frequently to ensure complete solder pad coverage is maintained.



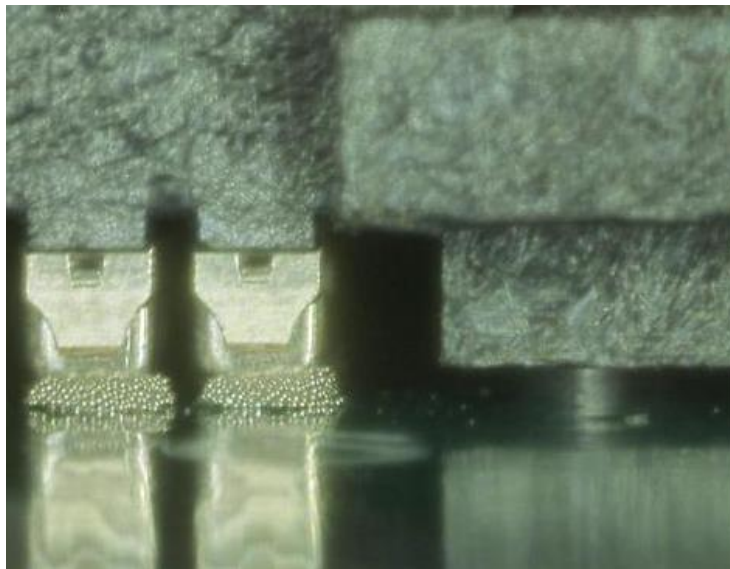
**Fig. 3.** Solder charge location relative to solder print. Notice good contact between solder charge and paste.

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#### 3. Component Placement

- The connector must be fully seated. As previously stated and shown in Fig. 3, it is critical that the solder charge comes into contact with the solder paste to ensure proper wetting. When using automated pick and place equipment, ensure the Z-axis dimension fully seats the solder charges onto the board surface. Due to nominal variances in solder charge positioning, i.e., coplanarity, not all charges will contact the board at the same time. Fig. 4 illustrates a fully seated connector prior to reflow.
- As the solder charges reflow, the weight of the connector causes it to settle so that the body rests on or just slightly above the board after processing. This phenomenon is why the upper coplanarity specification of .006" (.15mm) is acceptable for the SEAX8 connector family (see Fig. 5 below).



**Fig. 4.** A fully seated SEAX8 connector prior to reflow.



**Fig. 5.** The insulator housing of a reflowed SEAX8 connector will rest on the board surface or slightly above.

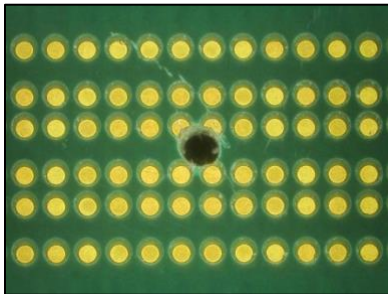
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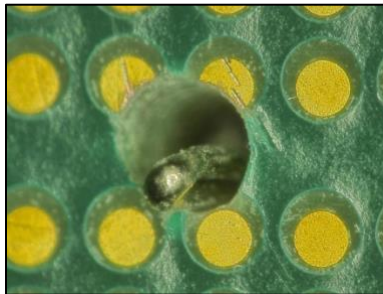
#### 4. Proper Profiling

- Samtec strongly recommends the use of a low level oxygen environment (typically achieved through nitrogen gas infusion) in the reflow process to increase the wettability of the soldering surfaces. **8 and 10 rows are released for nitrogen environment processing only. 8 and 10 rows are not recommended for air only processing.** SEAX8 testing has consistently shown a dramatic increase in solder yields in a low level oxygen environment as opposed to an air environment. Many variables affect the level of residual oxygen required to optimize a given reflow process, but generally the levels should be less than 1000 ppm.
- The importance of properly profiling the fully populated printed circuit assembly cannot be overstated. The reflow process that forms the solder joint is sometimes overshadowed by other processes but is critical to ensuring the solder charge reaches proper reflow conditions. Certain components can be sensitive to time and temperature, so both variables must be controlled and thermal profiling must be performed prior to processing or production. Thermocouples should be placed as close to the solder charge as possible (underneath the part) in the center and on the outside edge.
- The steps below detail a widely accepted method to attach thermocouples to array components.
  - Step 1 - Drill holes (0.040" max dia.) in PCB at thermocouple locations (center and corner)
  - Step 2 - Place thermocouples through holes (to just above Board Level) from bottom of PCB
  - Step 3 - Place thermally conductive aluminum tape over drilled holes on bottom of PCB
  - Step 4 - Place array component over thermocouples on PCB

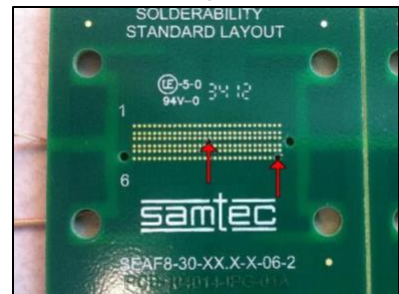
Step 1



Step 2



Step 2



Step 2



Step 3



Step 4



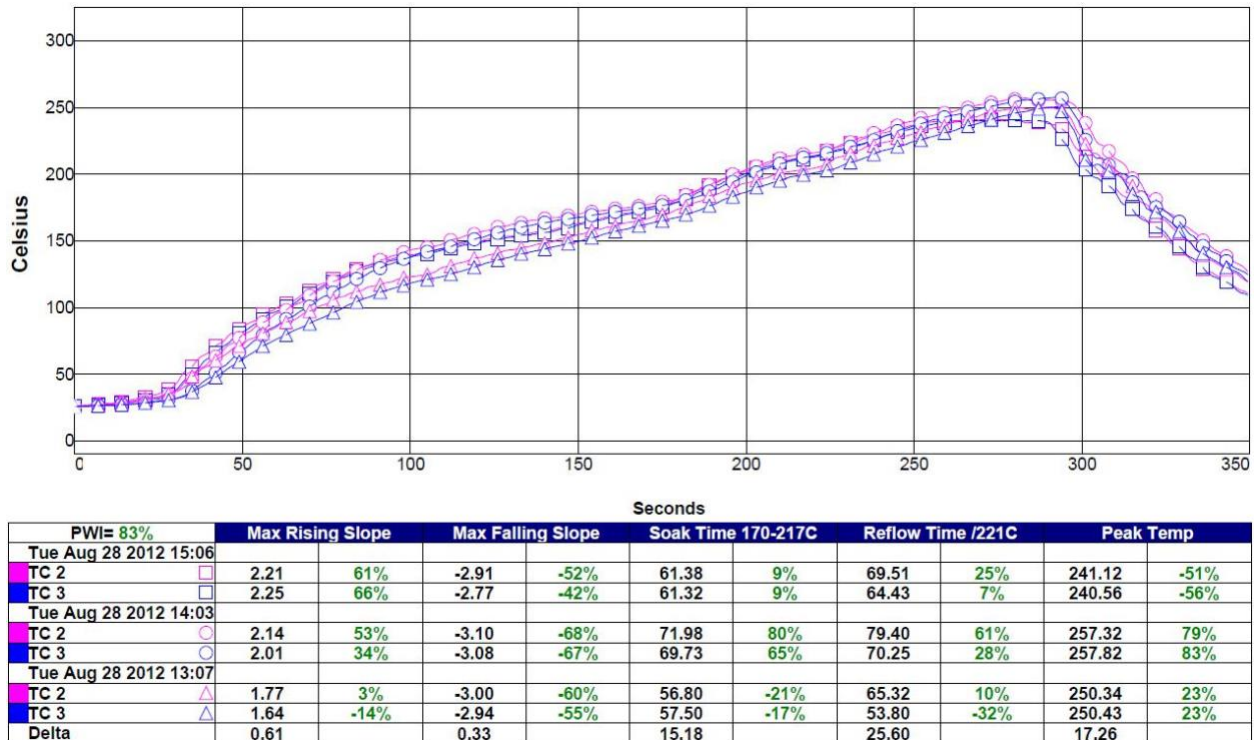
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Due to the variances in solder pastes and applications (board design, oven type, component density, etc.), Samtec does not specify a recommended profile for our connectors. Our suggestion is to use a profile within the parameters of the solder paste manufacturer's guidelines. These parameters can usually be found on the solder paste manufacturer's website.

The SEAX8 components are lead free reflow compatible and compliant with the reflow profile parameters detailed in IPC/JEDEC J-STD-020D. This standard requires that components be capable of withstanding a peak temperature of 260°C as well as 30 seconds above 255°C. The parts can also withstand three reflow passes.

Shown below are the lead-free profiles (overlaid) that have been tested during SEAX8 product qualification. Please note that these profiles may be used as recommendations but Samtec strongly suggests that each customer perform their own reflow profile study prior to processing or production.



**Fig. 6. Tested Lead-Free Profiles**

### 5. Rework Considerations

- Should rework be required, the method used will depend on the severity of the defect. Total connector replacement is accomplished using a Hot-Air rework system and methodology similar to traditional BGA rework methods. For more information on rework, please see the application note found here:
- [SEARAY™ 0.80mm SEAM8/SEAF8 Rework Guidelines](#)

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### For Samtec's SEAM8/SEAF8 Vertical Connectors

#### 6. Handling

- These connectors are typically packaged in trays or tape and reel which protect the solder charges from damage. They should be handled like any other BGA or IC device.
  - Avoid resting the connector on the solder charges except during final placement onto the board,
  - When using tape and reel packaging, ensure the bottom of the pocket is protected as it travels through the feeder,
  - Avoid touching the solder charges,
  - When a partially used tray needs to be stored, use the flat cover from the original shipment or an empty tray to cover connectors. Band trays using flex wrap or rubber bands.

For further information or questions about anything in this document or processing questions about any Samtec connectors, please contact the Interconnect Processing Group at:

Phone: 1 (800) SAMTEC9 or 1 (800) 726-8329

E-mail: [ipg@samtec.com](mailto:ipg@samtec.com)