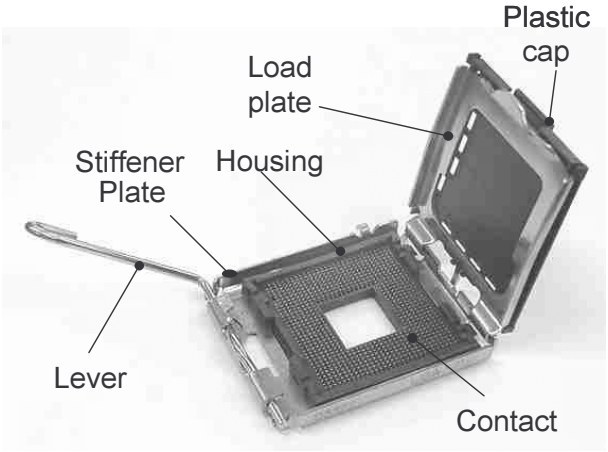
# 1. Introduction

## 1.1 Parts number and name

This specification covers the requirement of application of LGA 775 and LF-LGA 775 Sockets. The socket consists of a stiffener plate, load plate, lever, housing, contact, solder ball and plastic cap.

| Part number | Description |
|---|---|
| 1746664-1<br>1746664-2<br>1746664-3<br>1717649-1 | LGA775 Socket (Leaded) |
| 1-1746664-1<br>1-1746664-2<br>1-1717649-1 | LF LGA775 Socket (Lead free) |

**Figure 1**




**Socket configuration ( at open )**

**Figure 2**

## 1.2 Outline

The stiffener plate holds the lever and it has a hook to retain the lever after actuation to sustain the Z axis load. The housing holds an array of the contacts. Also the solder balls are attached to the bottom surface of the contact. The stiffener plate and load plate cramp the housing and LGA package at same time so that the socket generates the Z axis load to make the electrical contact to all of the connecting pads on LGA package.

## 1.3 Notices

The socket are placed on the PCB by automatic application tooling (typically vacuum pick and place). The plastic cap on the load plate is used to facilitate this process.The socket must be in “CLOSE” position before mounting on the PCB. If the socket is operated before SMT, it need to be checked

1) if the tab of load plate is latched with the step of the load lever.
2) if the lever is properly retained with the hook of the stiffener plate by observing.

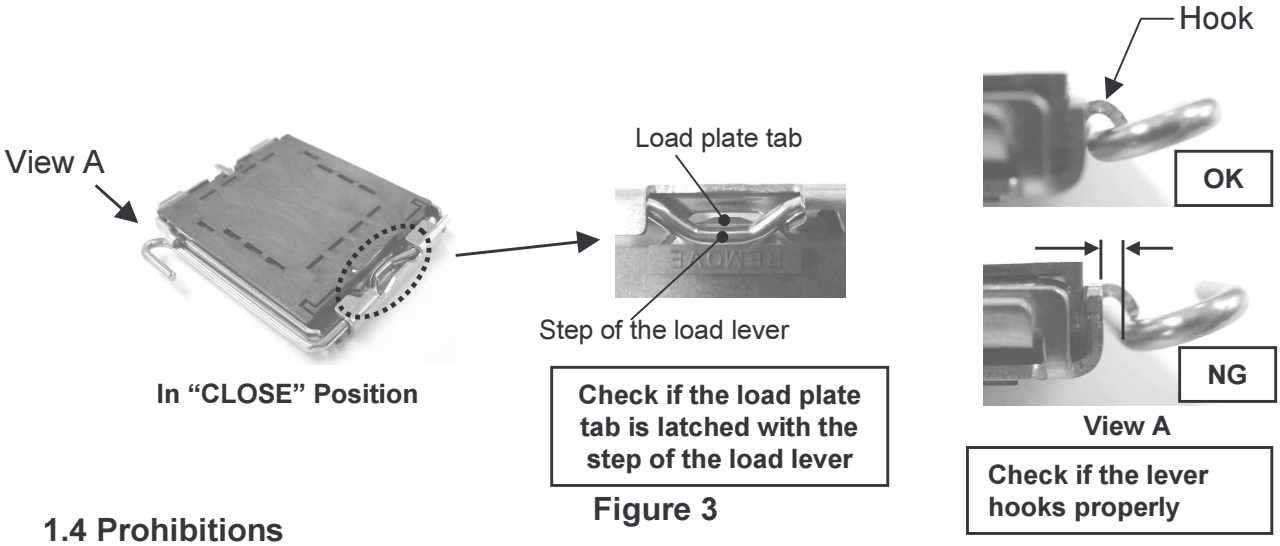
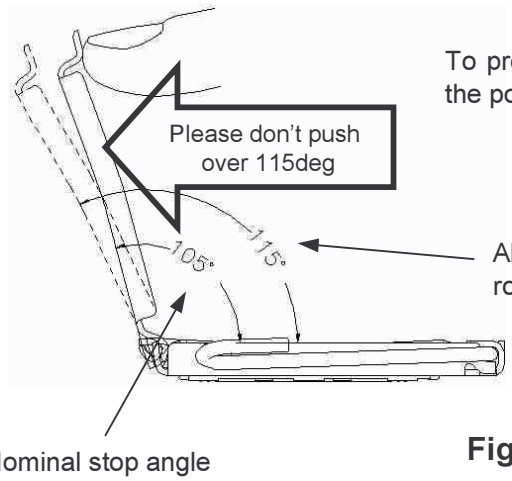



Figure 3

## 1.4 Prohibitions

**A. Push load plate from stop position**




To prevent load plate deformation, refrain to push load plate from the position where it stops.

Figure 4

**B. Touch contacts and solder balls**

To prevent contact deformation and solder ball paddle deformation, refrain to touch contacts and solder balls.

**C. Storage after SMT**

Do not leave the socket more than a day with processor package installed but heat sink load isn’t applied. It may cause solder ball damage.

# 2. Reference materials

## 2.1 Drawings

Customer Drawings for the product part numbers are available from the service network. If there is a conflict between the information contained in the Customer Drawing and this specification, the Customer Drawings shall take precedence.

## 2.2 Instruction sheet

Instruction sheet 411-78141 provides operation method of the socket.

# 3. Requirement

## 3.1 Safety

Do not stack product package so high that the shipping containers buckle or deform.

## 3.2 Storage

**A. Ultraviolet light**

Prolonged exposure to ultraviolet light may deteriorate the chemical composition used in the socket material

**B. Shelf life**

The sockets should remain in the shipping container until ready for use to prevent deformation or oxidation to the solder balls. The sockets should be used on a first in, first out basis to avoid storage contamination that could adversely affect performance.

**C. Chemical exposure**

Do not store sockets near any chemical listed below as they may cause stress corrosion cracking in the solder balls.

| | | | | |
|---|---|---|---|---|
| Alkalies | Ammonia | Citrates | Phosphates Citrates | Sulfur Compounds |
| Amines | Carbonates | Nitrites | Sulfur Nitrites | Tartrates |

## 3.3 PCB

**A. Material**

The PCB material shall be glass epoxy(FR-4) .

**B. Thickness**

The PCB thickness shall be 1.6mm.

**C. Allowable bow**

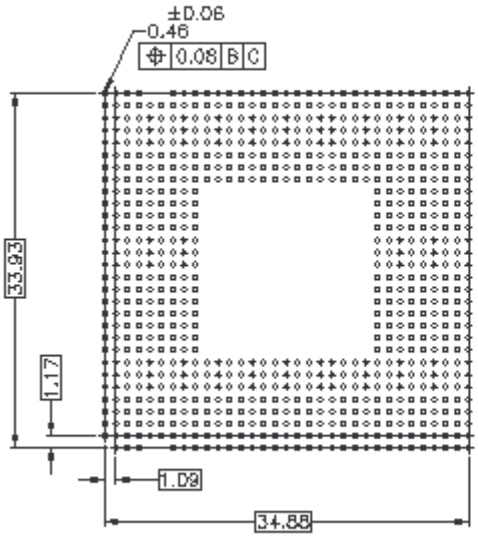
Maximum allowable bow of the PCB before reflow shall be 0.1 mm per 25.4 mm over the length of the socket grid area.

**D. Pads**

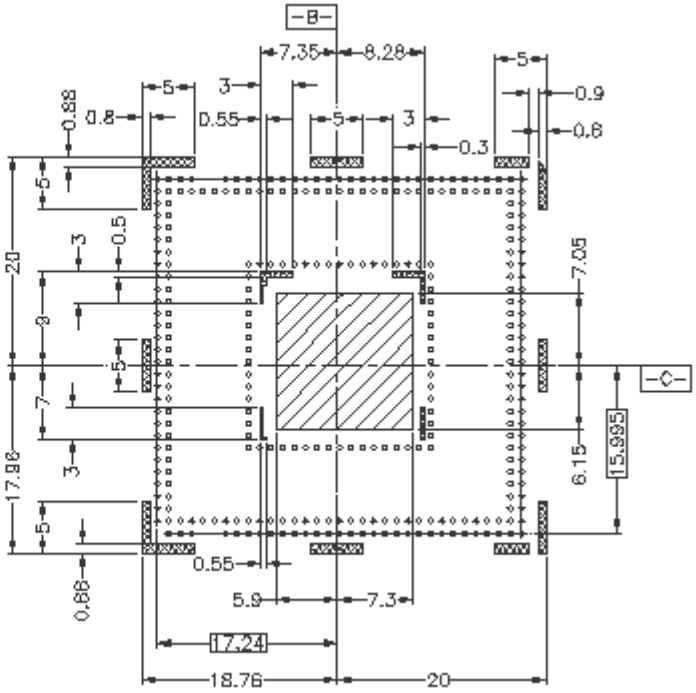
The PCB circuit pads must be solder able in accordance with test specification 109-11.

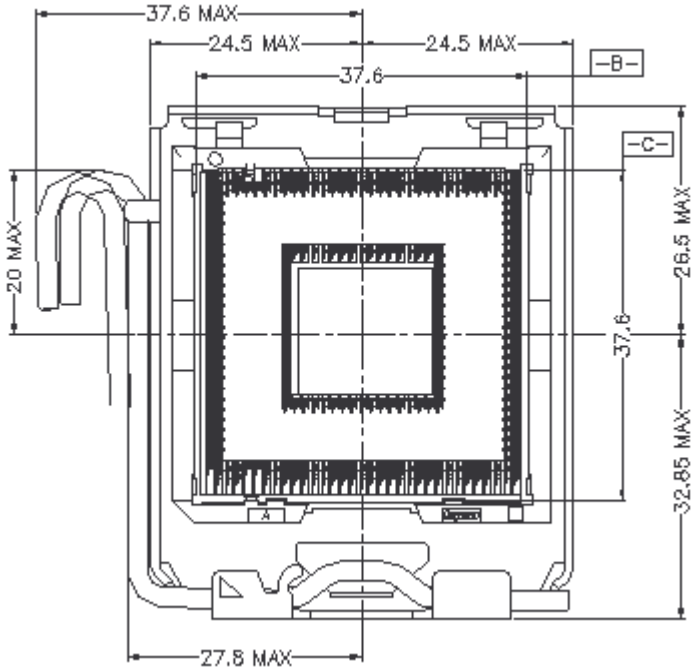
**E. Layout and the the volumetric zone for center cavity component**

The circuit pads on the PCB must be precisely located to ensure proper placement and optimum performance of the sockets. The PCB layout must be designed using the recommended dimension provided as below.




**Reference Pattern Layout**




**Assembly occupation area**

1.8mm Maximum component height

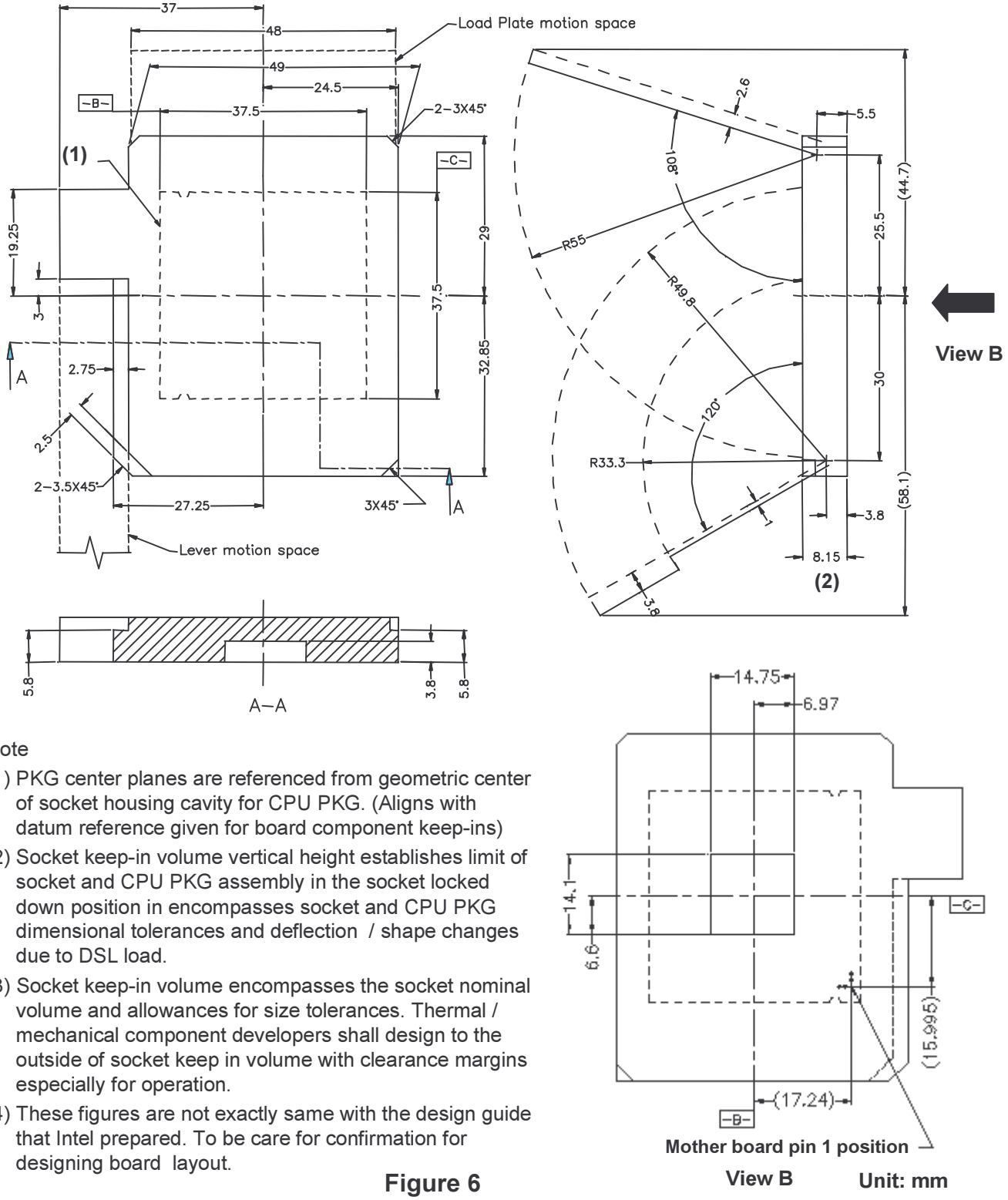
**Housing stand off location and volumetric zone for the component of center cavity**

**Unit: mm**

**Figure 5**

## 3.4 Socket volumetric keep-in

Care must be used to avoid interference between adjacent sockets and other components.




Note

(1) PKG center planes are referenced from geometric center of socket housing cavity for CPU PKG. (Aligns with datum reference given for board component keep-ins)

(2) Socket keep-in volume vertical height establishes limit of socket and CPU PKG assembly in the socket locked down position in encompasses socket and CPU PKG dimensional tolerances and deflection / shape changes due to DSL load.

(3) Socket keep-in volume encompasses the socket nominal volume and allowances for size tolerances. Thermal / mechanical component developers shall design to the outside of socket keep in volume with clearance margins especially for operation.

(4) These figures are not exactly same with the design guide that Intel prepared. To be care for confirmation for designing board layout.

**Figure 6**

## 3.5 Solder paste characteristic

1. For sockets with tin lead solder balls (P/N : 1746664-1), alloy type shall be 63/37 Pb.(melting point 183deg.C)

2.For sockets with lead free solder balls (P/N : 1-1746664-1), alloy type should be Sn/Ag/Cu. (this type of alloy has a melting point between 217deg.C and 220deg.C)

3. Recommended flux incorporated in the paste should be “no clean” type. Other fluxes, such as rosin mildly active(RMA)type, are acceptable.

4. Paste will be at least 80% solids by volume.

5. Minimum viscosity of screen print shall be 5X10% cp (centi poise).

6. Minimum viscosity of stencil print shall be 7X10% cp (centi poise).

## 3.6 Stencil design

Recommended stencil design is 0.13-0.15mm thk with 0.46mm hole diameter.

## 3.7 Reference solder volume

Minimum solder volume for each circuit pad is calculated by multiplying the area of the pad by the stencil thickness :

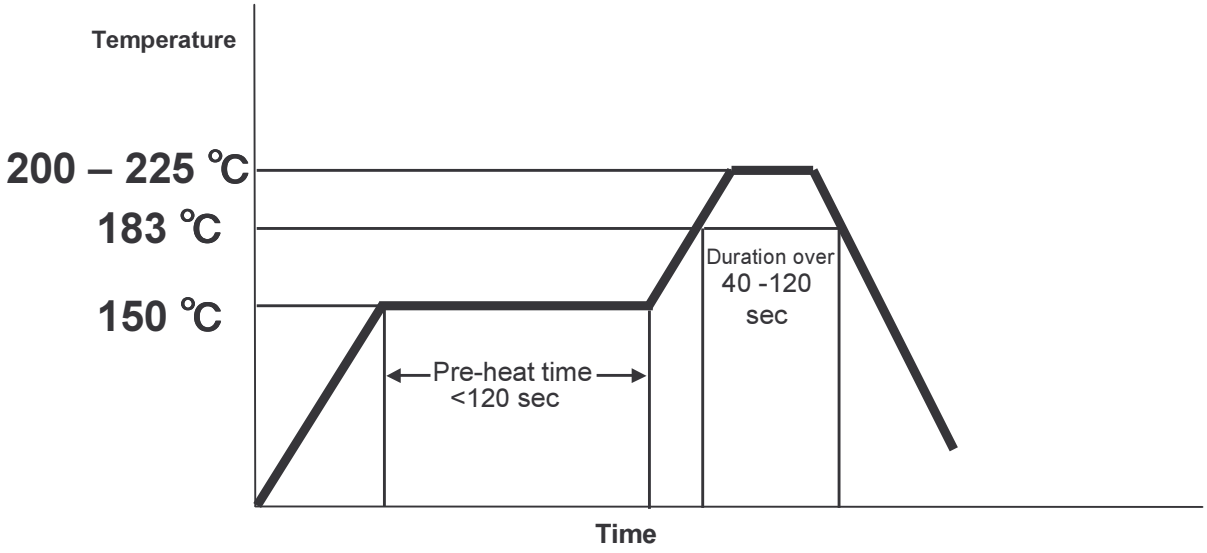
$(Pi \times (0.46)^2/4) \times 0.13 = 0.022\ mm^3$

## 3.8 Soldering

The sockets should be soldered using hot air convection or nitrogen oven with a minimum of five chambers (zone) recommended. The solder paste should be applied using an automatic screening process.

Due to many variables involved with the reflow process (i.e. board size and thickness, component density, count and orientation), it is recommended that trial runs be conducted under actual manufacturing condition to ensure product and process compatibility. Reference reflow temperature profile are shown in the following page.

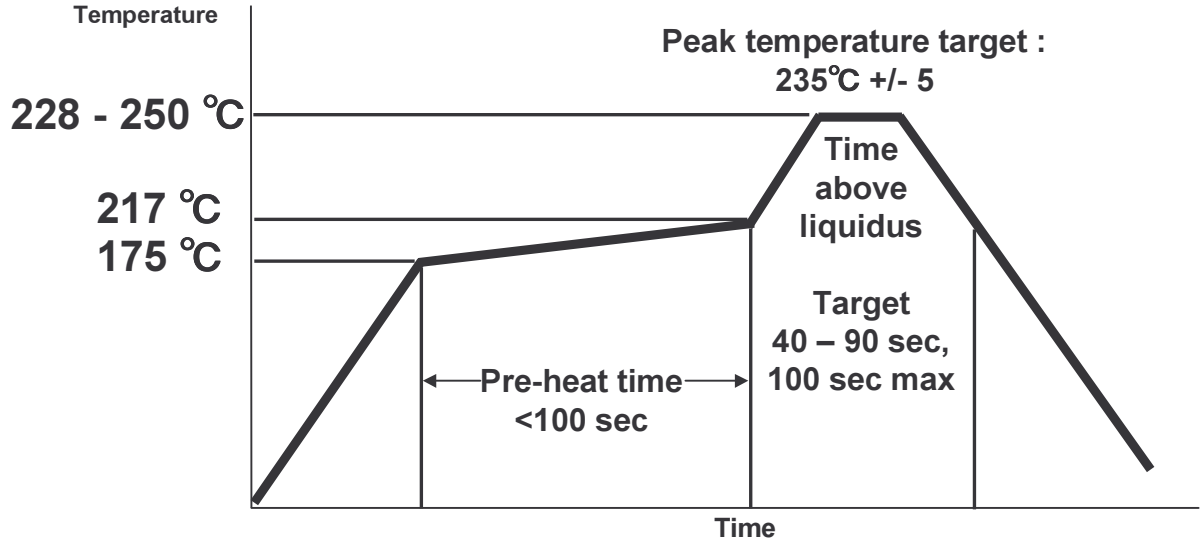
## Leaded




**Reference reflow temperature profile**

Temperature measurement points should be on the surface of the pads under the solder ball of the socket.

## Lead free




Temperature measurement points should be on the surface of the pads under the solder ball of the socket.

**Figure 7**

## 3.9 Pick and place

The socket is supplied with JEDEC tray. Refer the customer drawing for the parts positions in the tray. The recommendations for the placement is shown in Figure 8.

Pick and place (PnP) cap assembled on the socket for both socket pick and place and contamination protection purposes. Do not discard PnP cap after reflow

Pick LGA775 socket from the center of the PnP cap since center of gravity since center of geometry is roughly equal to center of gravity. If there is issue on pick, the position may be able to shift toward the center of gravity. The center of gravity is indicated on the customer drawing.

LGA775 socket weights up to 35g, balance between appropriate nozzle selection and head traverse rate

| Item | Specification |
|---|---|
| Placement nozzle | 15mm min vacuum nozzle or<br>10mm min nozzle with/inter O-Ring |
| Placement nozzle pick surface | Pick and place cap center |
| Table speed | Once the socket is on, slow the table speed down as slow as possible to avoid socket shifting |
| Placement sequence | Place socket last to avoid socket shifting |

**Figure 8**

## 3.10 Checking installed socket

The housing must be seated on the PCB not exceeding the dimension as below.

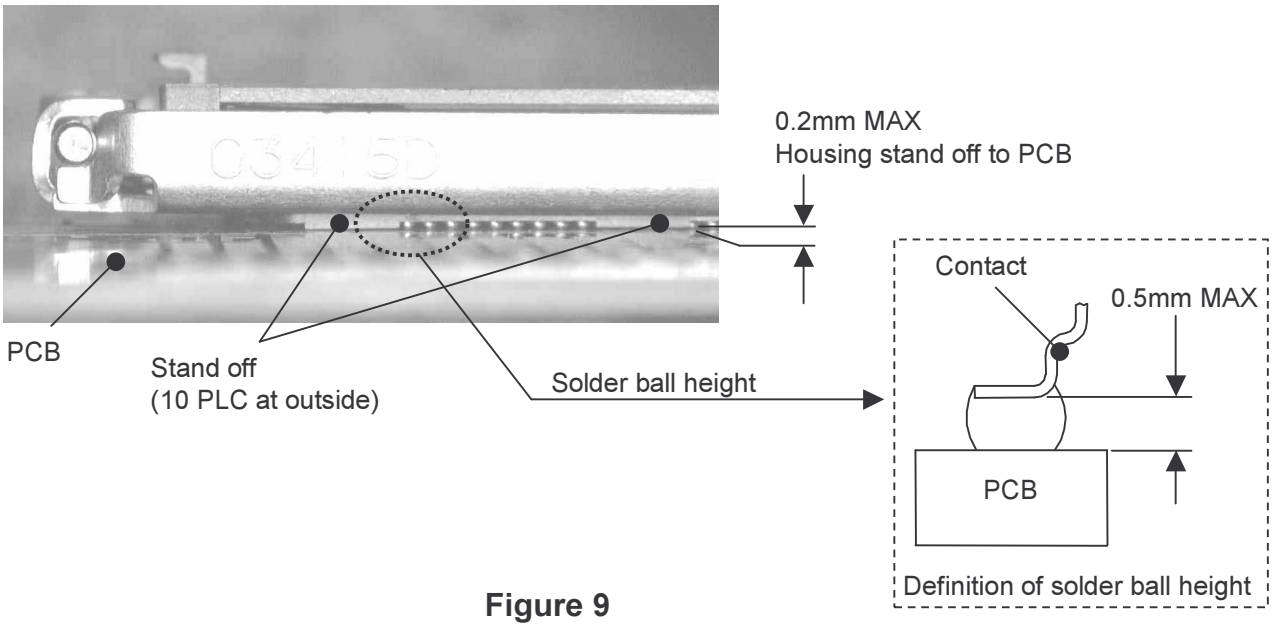



**Figure 9**

## 3.11 Rework

The rework process specification is shown in Figure 10 for LGA775 ( leaded ) while the process for LF-LGA775 is under development.

Improper rework set up may induce damage to surrounding components. Surrounding components may reach partial reflow during rework.Recommend to monitor both socket and other component solder joint temperature during socket rework.

Recommend each board not see more than two rework cycles on a product. Desoldering could cause delaminating and lifting pad.

Recommend rework profile measure point at solder ball pad surface

| LGA775 socket ( Leaded ) rework process | Specification |
|---|---|
| Peak socket body temperature | 260℃ for 40 seconds |
| Peak solder joint temperature | 205 – 225 ℃ |
| Time above liquidus | 45 – 280 seconds |
| Critical ramp rate ( 170 – 180 ℃) | 0.35 – 0.75℃/second |
| Placement force | 50 gf maximum |
| Peak solder joint temperature at post solidify time | 160℃ maximum |
| Temperature readings difference between TC's | 15℃ maximum |

**Figure 10**

## 3.12 Heat sink load

Static compressive load from heat sink must meet the requirement shown in Figure 11. If the compression load reduction during the usage is estimated, the heat sink must be designed by considering the load reduction during the product life.

All of the reliability evaluation has done with the samples having the static compressive load shown in Figure 11. Tyco can't ensure the product reliability that doesn't meet the static compressive load requirement.

| | |
|---|---|
| Maximum static compressive load from heat sink | 196 N |
| Minimum static compressive load from heat sink | 88.2 N |

**Figure 11**