SOCKET F (1207)

1. INTRODUCTION

This specification covers the requirements for application of lever-actuated Socket F 1207 position onto printed circuit (pc) boards. These sockets accept 1207-position LGA package with 1.1mm x 1.1mm contact pattern. The socket consists of housing, contacts, a stiffener plate, an upper plate, a lever, and a pick-up cap. The housing retains grid contacts. The housing features 0.6mm diameter surface-mount solder balls attached to the bottom surface of the contacts. The stiffener plate is attached to the housing and it holds an upper plate and a lever. A locking latch on stiffener plate holds the lever in place after the upper plate is closed. The sockets are placed on the PCB by automatic application tooling (typically vacuum pick and place). The pick-up cap covering the top of the socket is used to facilitate this process. In addition, the pick-up cap protects the socket contact cavities until the package is installed. The pick-up cap must be removed right before installing the package.

Please see detailed installation process of CPU package in 411-78212.

There are 3 types of socket that are difference of location side of lever and its shape as shown Figure 1.

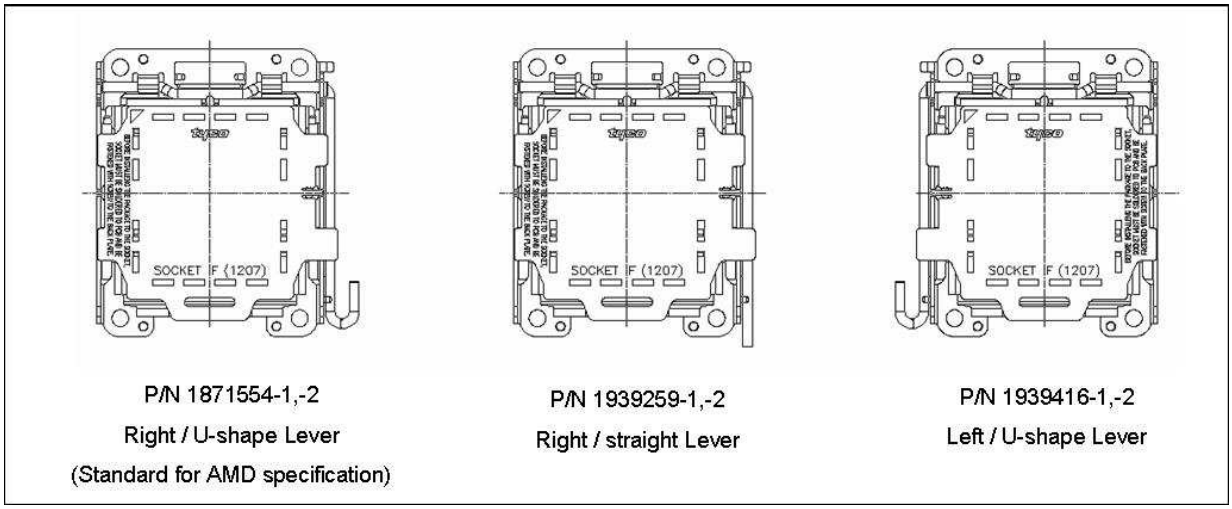


Figure 1

Basic terms and features of this product are provided as below.
(Photos used in this document show P/N 1871554-X.)

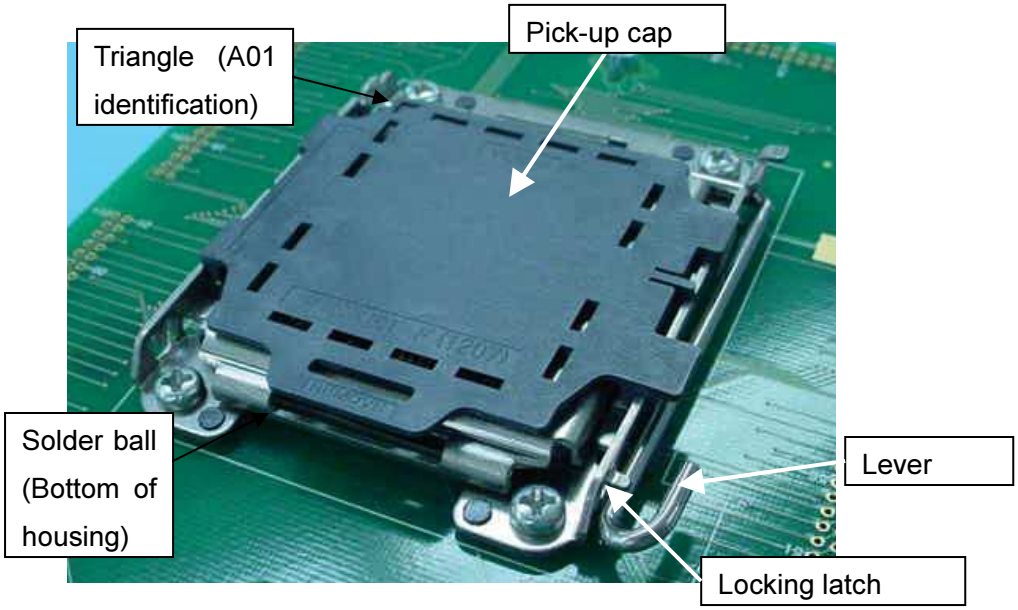


Fig.2 : Socket in "Close" position

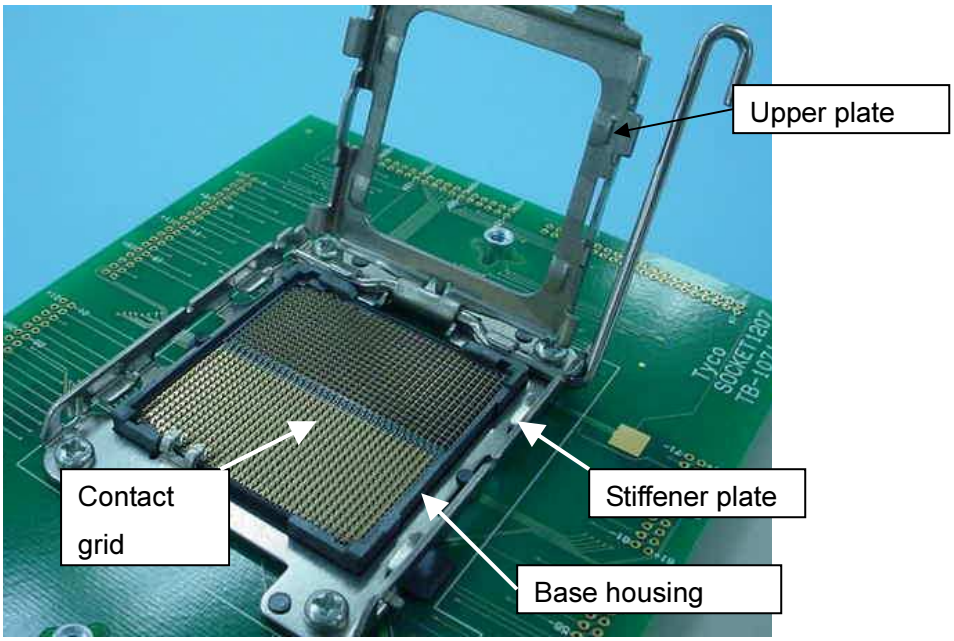


Fig.3. : Socket in "Open" position

Note: This socket is provided to customer in "close" position. Don't actuate the socket before it is soldered on PCB.

2. REFERENCE MATERIAL

2.1. Drawings

Customer Drawings for product part numbers are available from service network. If there is a conflict between the information contained in the Customer Drawings and the specification or with any other technical documentation supplied, the Customer Drawings shall take precedence.

2.2. Specification

Product Specifications (108-series) provides product performance and test information.

2.3. Instructional material

Instruction Sheets (411-series) provide assembly instructions. Documents available which pertain to this product are: 411-78212 Lever-Actuated Socket F 1207 position.

3. REQUIREMENTS

3.1. LGA package

The socket accept 1207 position LGA package having gold-plate lands with a diameter of 0.83+/-0.05mm. The lands of the package must be within 0.2 maximum material condition (MMC) for feature true position.

3.2. Safety

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

3.3. Storage

A. Environment

The temperature range allowance for storing the sockets is -40 deg C to 60 deg C

B. Ultraviolet Light

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

C. Shelf life

The sockets should remain in the shipping containers 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.

D. 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

3.4. PC board

A. Material

The PC board material shall be glass epoxy (FR-4 of G-10).

B. Thickness

The PCB thickness shall be 1.6mm - 2.4mm.

C. Warpage

Maximum allowable bow of the PCB after SMT at socket area shall be 0.15mm maximum (Fig.4)

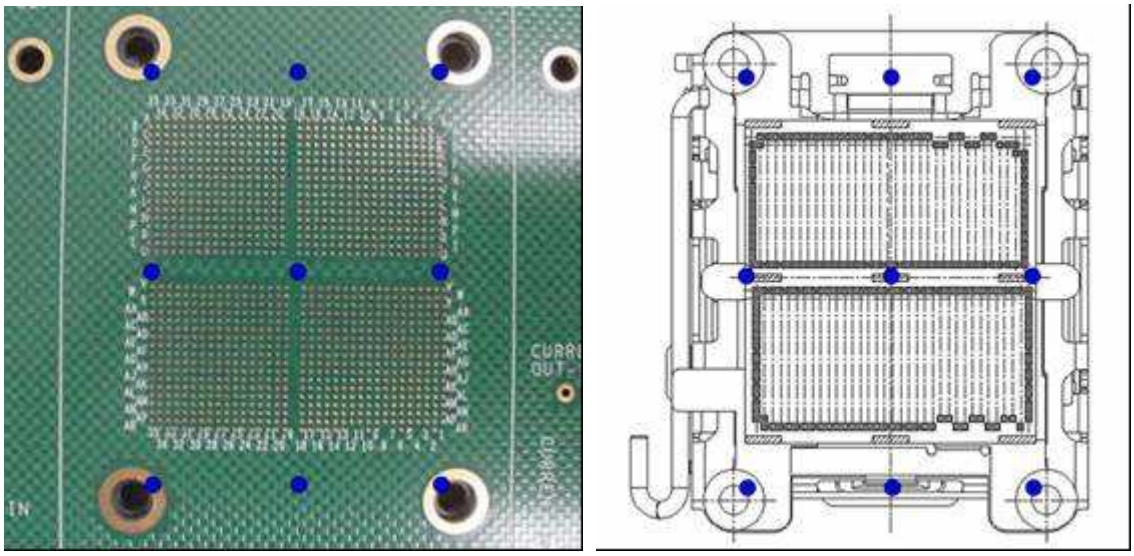


Fig.4 Recommended measurement position of PCB warpage after SMT

D. Layouts

The circuit pads on the PCB must be precisely located to ensure proper placement and optimum performance of the socket. The PCB layout must be designed using the referenced dimensions provided in Customer drawings.

3.5 Back plate

A. Design

Back plate design should be flat at the screw hole area if 0.3mm thickness or thicker insulator is used. If the back plate requires step, the area should be less than 11mm dia from center of hole. The step at the screw hole will increase the socket and PCB warpage after fastening the screw. It may cause failure of socket (fig 5)

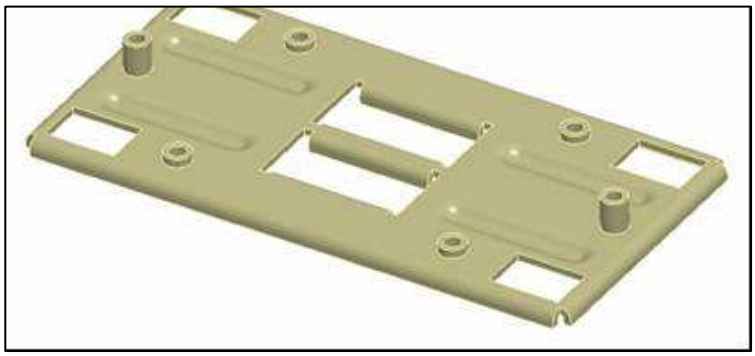


Fig 5a. Recommended back plate design （Based on AMD design）

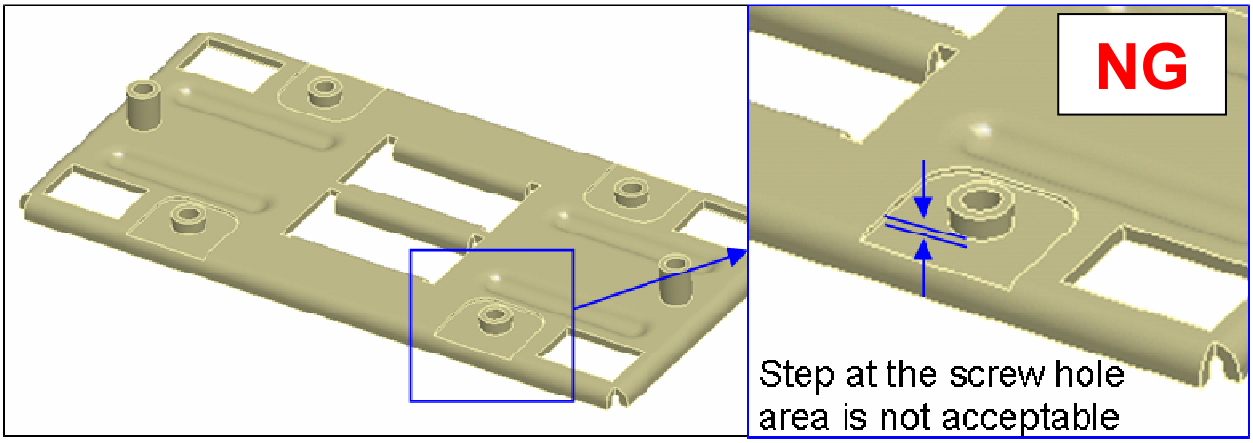


Fig 5b. NOT acceptable back plate design (it has step at screw hole area)

B. Warpage

Maximum allowable bow of the back plate warpage shall be under 0.15mm of concave (against to PCB) and 0.5mm of convex. (Fig 6)

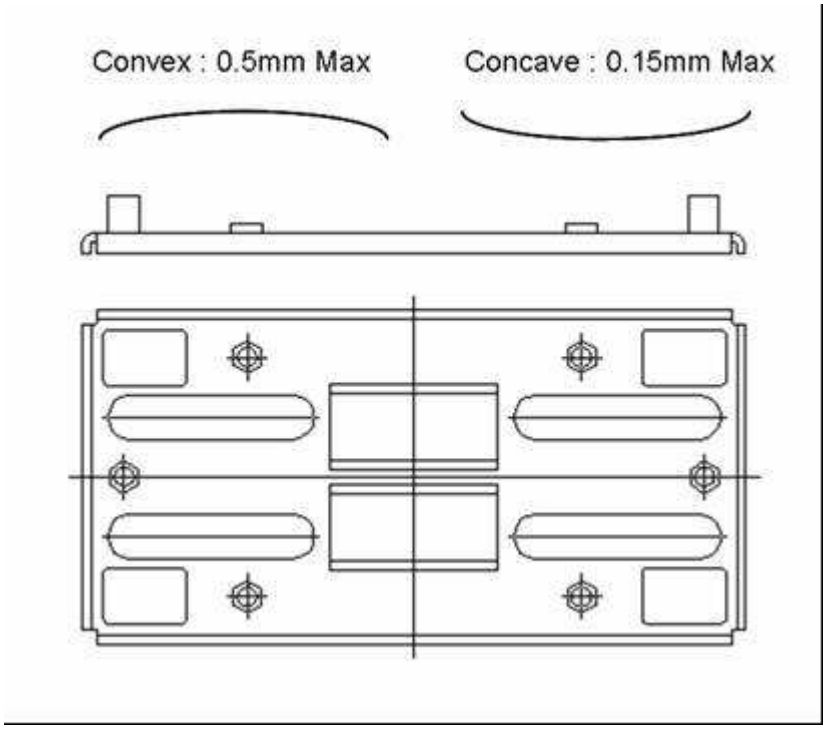


Fig 6. warpage direction

3.6 Back plate and PCB condition after screw fastening

Back plate and PCB condition should be confirmed by below step

1. Fastening screw No.1 (top-left side) only (Fig 7)
2. Confirm the clearance between PCB and back plate at No.2 position (except insulator)
   Recommended clearance should be 1.5mm maximum
   If the clearance exceeds 1.5mm, there is possibility of large warpage of PCB or back plate, or not recommended back plate shape. It may cause defect of socket

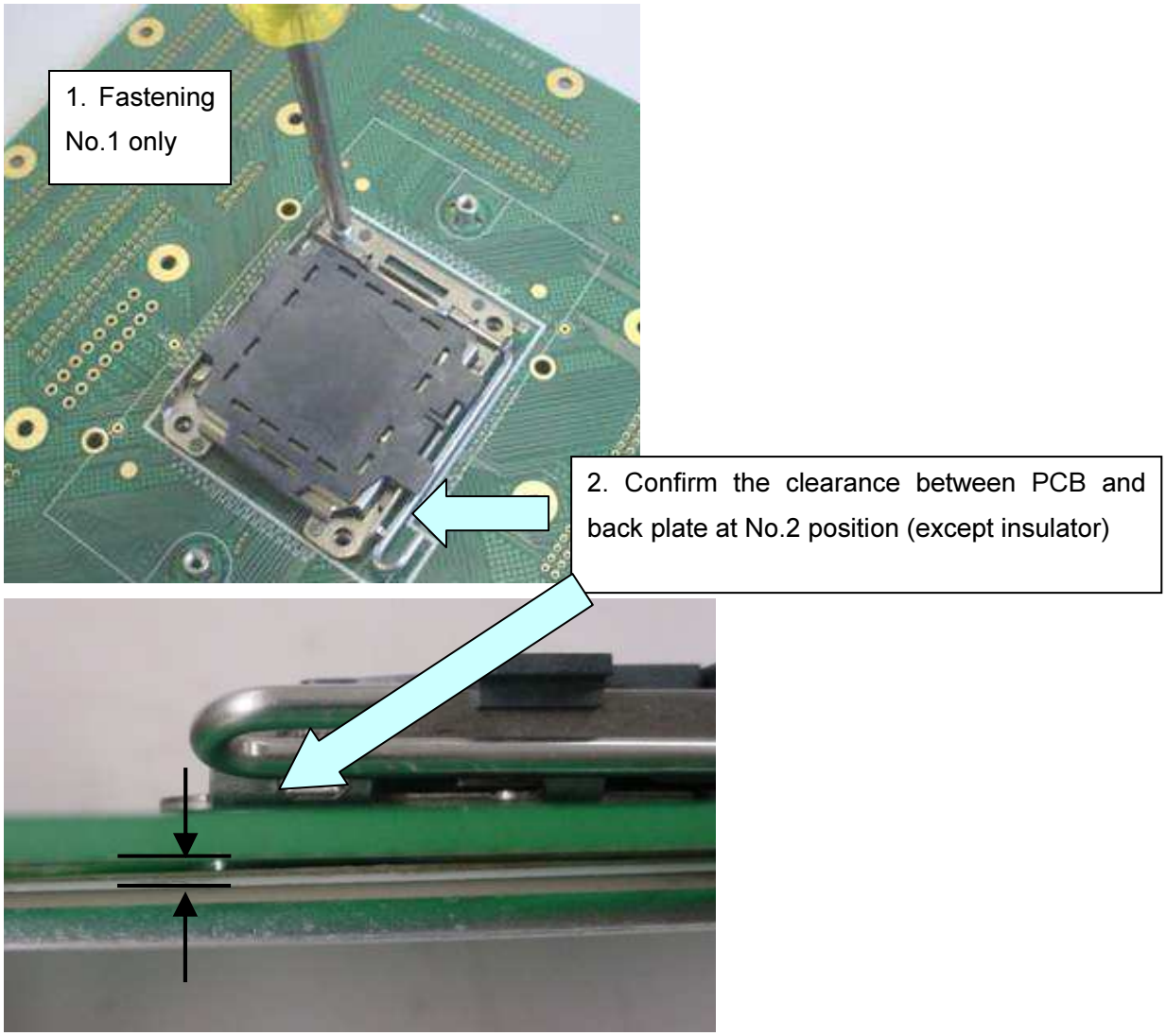


Fig 7 Confirmation of clearance between PCB and back plate

3.7. Solder paste characteristics

1. For sockets with Tin-lead solder balls, alloy type shall be Sn63/Pb37.
   (melting point 183deg.C)
2. For sockets with lead free solder balls, alloy type shall be Sn/Ag/Cu or Sn/Ag.
   (this type of alloy has a melting point between 217deg C and 221 deg C)
3. Recommended flux incorporated in the paste should be "no clean" type. Other fluxes, such as rosin mildly active (RMA) type, are acceptable. DO NOT WASH THE SOCKET.
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).

3.8. Solder paste thickness

Solder paste thickness for the solder balls shall be 0.15mm.

3.9. Stencil design

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

3.10. Reference solder volume

Minimum solder volume for each circuit pad is calculated by multiplying the area of the pad by the stencil thickness: $(Pi \times (0.46)^2/4) \times 0.15=0.025mm^3$.

Note: Solder volume may vary depending in solder paste condition.

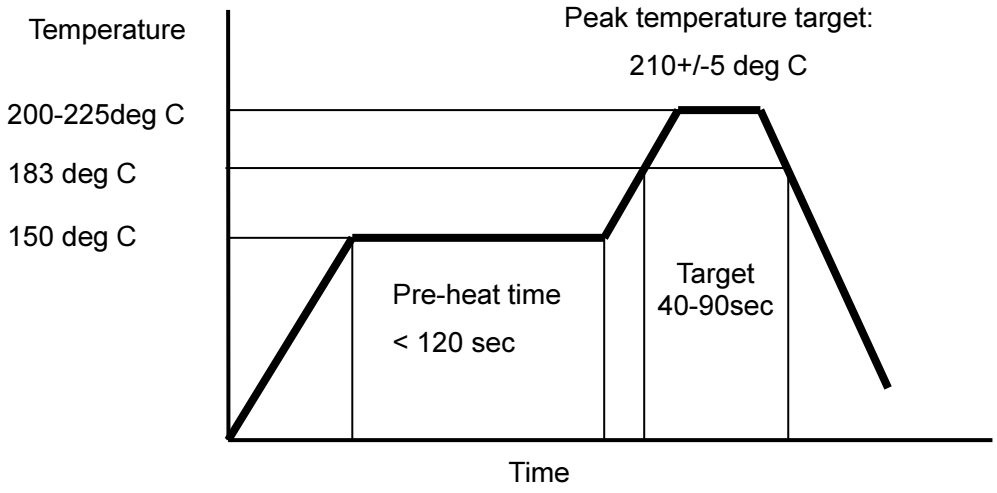
3.11. Soldering

The sockets should be soldered using hot air convection or nitrogen oven with a minimum of seven or eight 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 profiles at solder ball positions are shown in the Figure 8.

Temperature at pick-up cap should be 260degC maximum.

Leaded type



Lead Free type

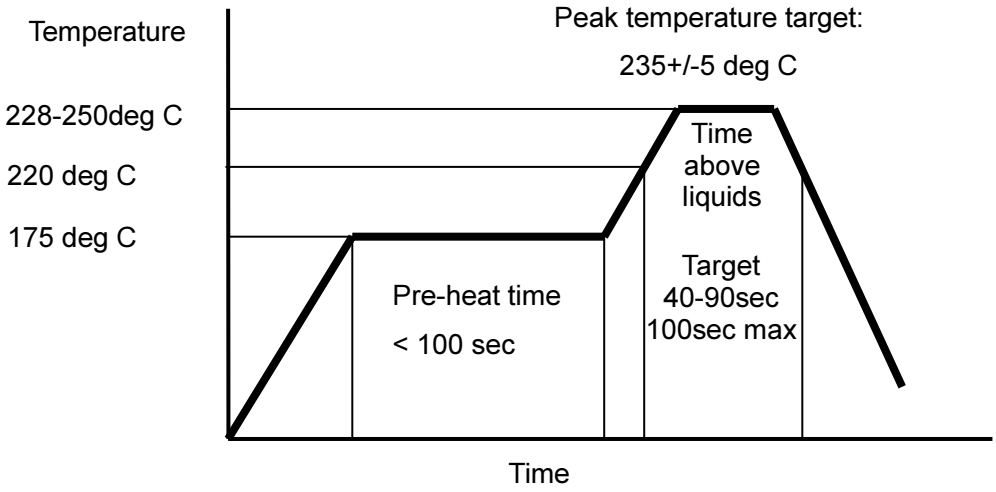


Figure 8

Temperature measurement points should be on the surface of the pads under the solder ball of the socket. (Fig 9)
Temperature range in socket area should be less than 15deg C

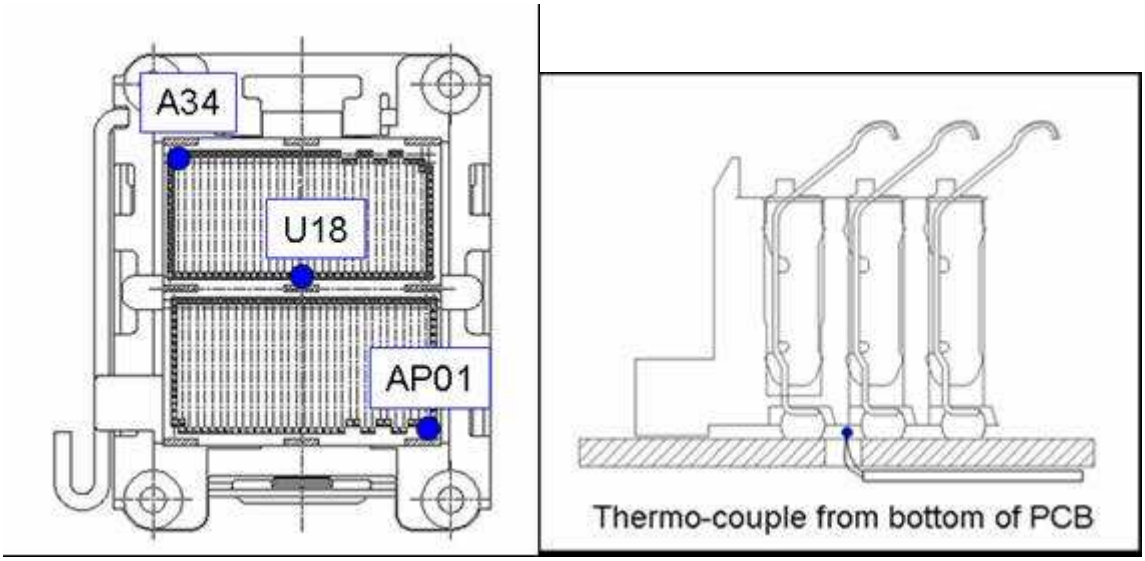


Fig 9) Recommended temperature measurement position for SMT

3.12. Socket placement

The socket is supplied with tray. Refer the customer drawing for the parts position in the tray. Pick-up cap assembled on the socket is for socket pick and place process and contamination protection. Do not discard pick-up cap after reflow. Socket placement aims at gravity point of the socket. The gravity point is indicated on the customer drawing.

The socket A01 position must be aligned with the A01 position PCB circuit pad. When placing the socket on the board, make sure that the solder balls are aligned with the matching pads before seating the socket onto the board.

Caution: The socket must be handled only by the outer perimeter of the socket to avoid deformation, contamination, of damage to the solder balls.

3.13. Checking Installed Socket

The housing must be seated on the PCB not violating the dimension shown in Figure 10.

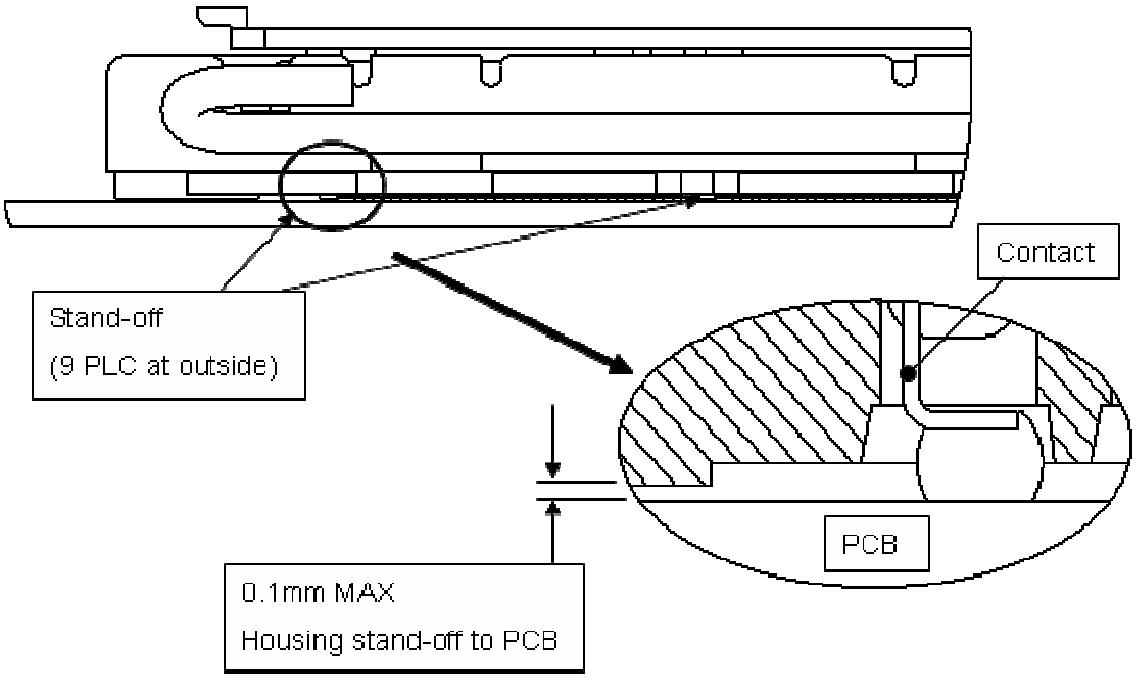


Figure 10). After SMT on PCB

The pick-up cap on top of the socket must be removed right before CPU installation (the device must not be installed unless this pick-up cap is removed).

Note: Due to the tight pattern associated with these solder balls, inspection techniques must provide a clear picture of possible areas of shorting, X-ray or electrical test equipment will be used to inspect solder joints.

3.14. Alignment

Proper installation is ensured by aligning the A01 identifier (embossed triangle) of the device with the triangle (A01 identifier) of the socket.

3.15. Polarization

The socket contact cavity pattern is designed with missing cavities. The device is polarized to the socket by matching half circle bytes of CPU and alignment key. The patterns must align before the package is installed onto the socket.

3.16. Repair or rework

The socket is not repairable. Discard and replace any defective or damaged socket. Do not re-use the socket after removing it from the PCB.

The rework process specification is shown in table1 for socket F 1207.

Improper rework set up may induce damage to surrounding components. Surrounding components may reach partial reflow during rework process. 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. De-soldering could cause delaminating and lifting pad.

Recommended rework profile measurement positions are at solder ball pad surface, same with Fig.9. Housing surface should be measured also

Table 1) Rework process setting

Parameter	Socket F 1207 (Leaded)	Socket F 1207 (Lead free)
Peak socket body temperature	260degC for 40seconds	260degC for 40seconds
Peak solder joint temperature	200-225degC	228-250degC
Time above liquidus	40-120 seconds	40-120 seconds
Critical ramp rate	0.35-0.75degC/ second (170-180degC)	0.35-0.75degC/ second (210-220degC)
Placement force	50gf maximum	50gf maximum
Peak solder joint temperature at post solidify time	160degC maximum	190degC maximum
Temperature difference between thermo couples	15degC maximum	15degC maximum

3.17. Heat sink load

Static compressive load from heat sink must meet the requirement as following. 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 been done with the samples having the static compressive load as following. Tyco can't ensure the product reliability that doesn't meet the static compressive load requirement

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Maximum static compressive load from heat sink is 400.4N.

Minimum static compressive load from heat sink is 266.9N.