Application Specification

Mod5 Series 0.50mm Pitch
Flip-Top™ BGA Socket

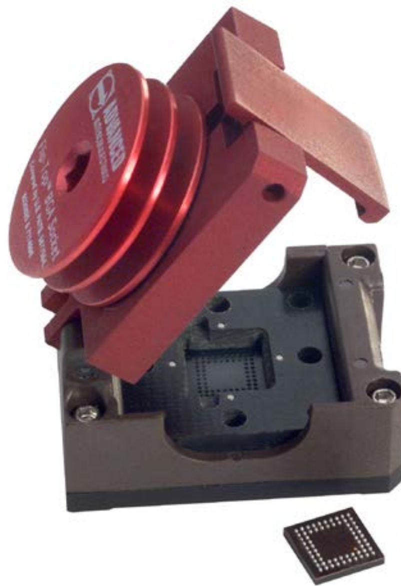

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Table of Contents

1.0	Introduction	3
2.0	Scope	3
3.0	Product Overview	3
4.0	Part Number Structure	5
5.0	Shipping	5
6.0	PC Board Design	5
7.0	PC Board Application Procedure	6
8.0	Solder Paste and Disposition	8
9.0	Solder Reflow	8
11.0	Cleaning	10
12.0	Mounting on PCB	10
13.0	Socket Actuation	10
14.0	Storage	11
15.0	Revision History	12

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1.0 Introduction

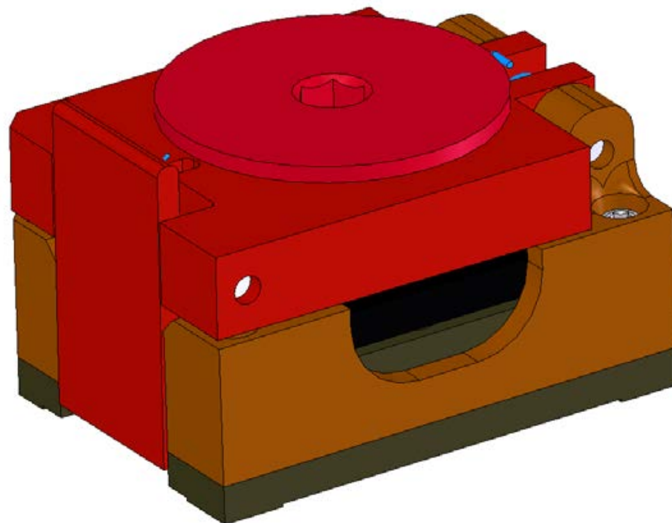
The Mod5 Series 0.50mm pitch Flip-Top™ BGA Socket was designed for testing and validation of 0.50mm pitch Ball Grid Array (BGA) devices. It is designed for direct surface mount on a PCB.

2.0 Scope

This application specification document covers the Mod5 Series 0.50mm pitch Flip-Top™ BGA Socket. [see Fig. 1].

3.0 Product Overview

There are two (2) assemblies that make up this connector system; an insulator stack assembly (referred to as lower assembly) and an upper guide box assembly (i.e. upper assembly). The lower assembly incorporates fine pitch spring probes, with gold plated, crown-point contactor tips, and a floating alignment plate [see Fig. 2]. The lower assembly is the portion of the connector system that would typically be mounted to the PC board (motherboard).



[Fig 1]

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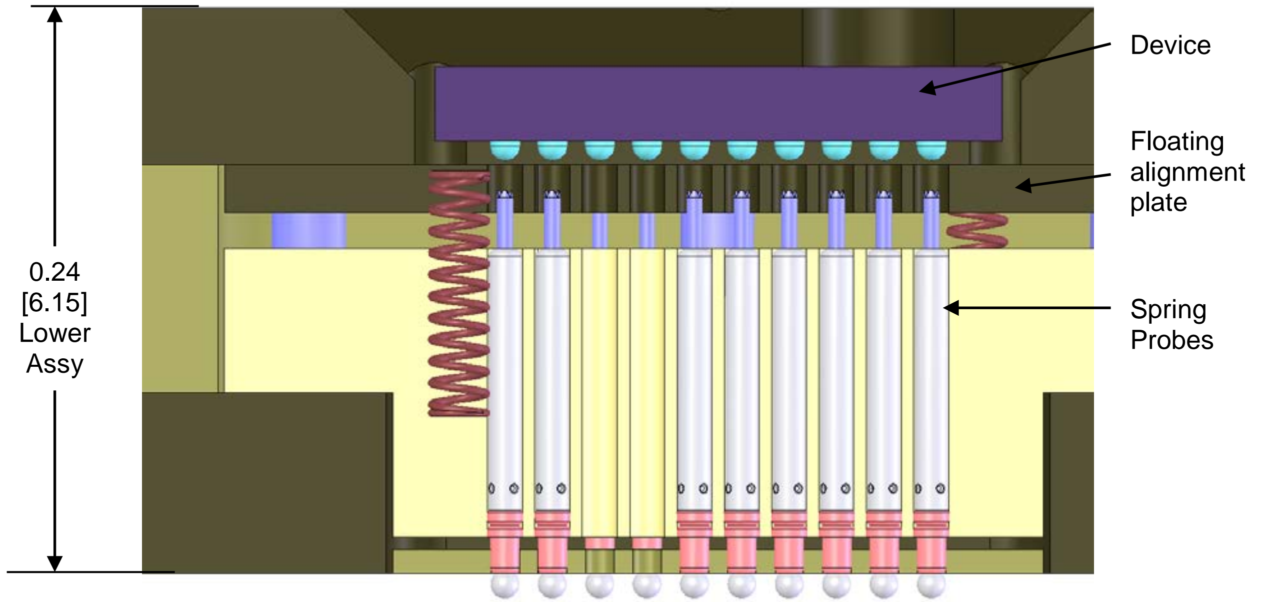
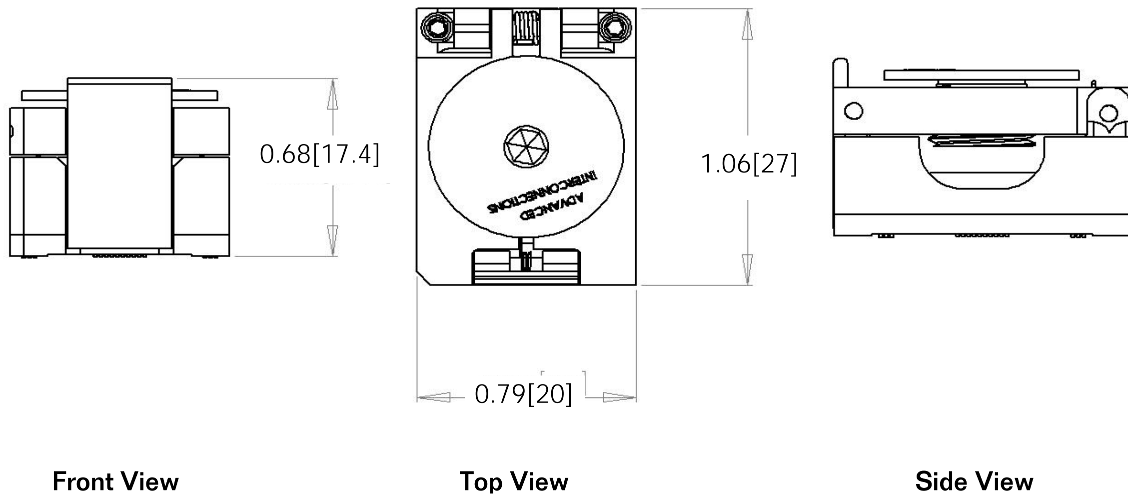


[Fig 2]



[Fig 3]

Overall dimensions for the socket, which accommodates footprints up to a 22x22 square grid (484 positions maximum) are shown in Fig 3. Maximum BGA device size is 12mm square.

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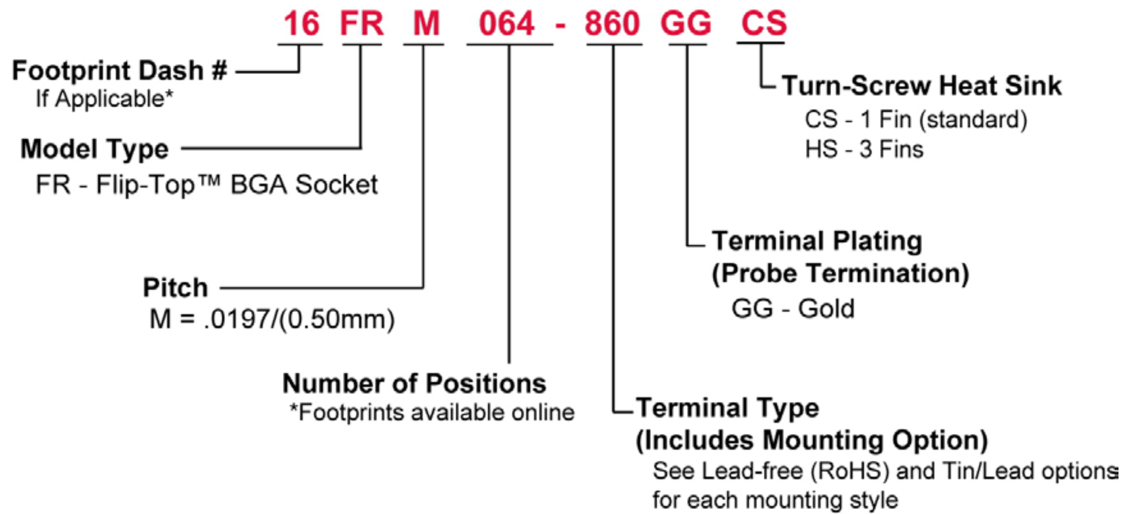
4.0 Part Number Structure

4.1 Part number structure



[Fig 4]
Sample P/N for 64 position footprint number 64-16

5.0 Shipping

5.1 Standard shipping is in a tray, packed in foam.

6.0 PC Board Design

Proper PC board design affects connector reliability and performance. The following recommendations are intended to ensure reliable electrical connections, while maximizing manufacturing yields and aiding in possible rework applications.

6.1 PC board pad size .010”/.012” [0.25/0.35]
6.2 Copper defined solder pads.
6.3 Pad materials: Copper with Immersion Gold or Immersion Silver.
6.4 Solder mask clearance must be greater than the PC board pad size and be registered properly so that .002" (0.05mm) minimum clearance is met all around the pad.

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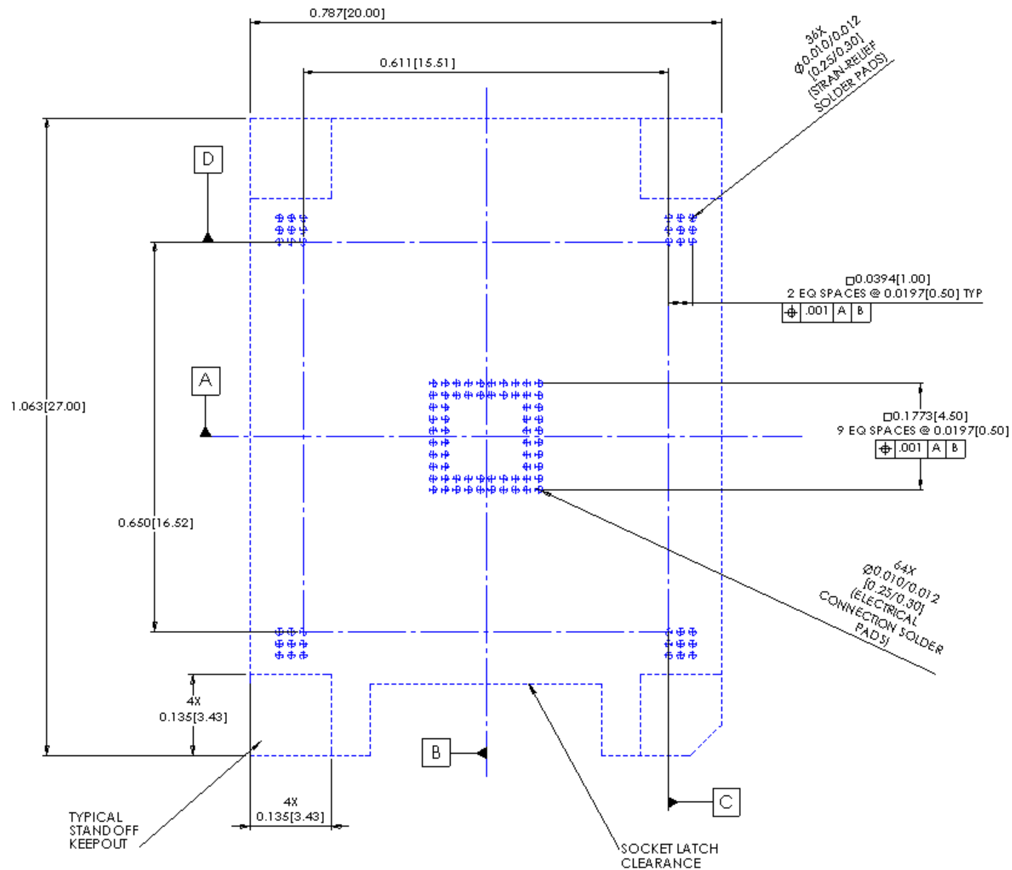

[Fig 5] **SMT Plus Model** (Bottom view)

7.0 PC Board Application

7.1 Refer to Fig 5 for example PCB layout for footprint 64-16; see assembly drawings for others.

7.2 Lower assembly placement utilizes typical SMT placement procedures.

SMT Plus option (terminal mounting types -862 & -863): Place lower assembly onto custom PCB footprint. [See Fig 5]

7.3.1 Modifications for adhesive- and screw-mounting options:

SMT Standard adhesive/epoxy option (terminal mounting types -860 & -861): Before reflow: apply an adhesive (i.e.Loctite® CHIPBONDER® 348™) on the lower assembly as shown before placement on PCB and prior to soldering. Gently depress lower assembly manually, onto PCB footprint. [See Fig 5A]
Note: Loctite and CHIPBONDER are registered trademarks of Henkel AG & Co. KGaA

Screw-mount option (terminal mounting types -864 & -865): After reflow: fasten socket, through PCB (use .067" dia. clearance holes), with #0-80 screws and washers provided, into tapped holes as shown. Tighten to 1.20 lb-in with a .050" (CF) hex drive (supplied); do not over tighten. [See Fig 5B]

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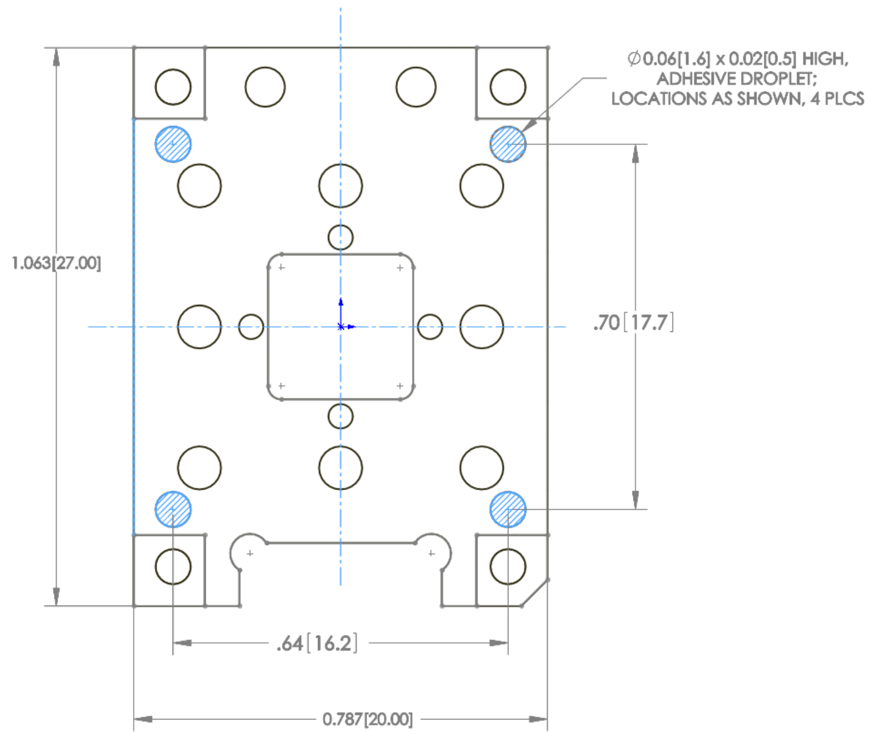
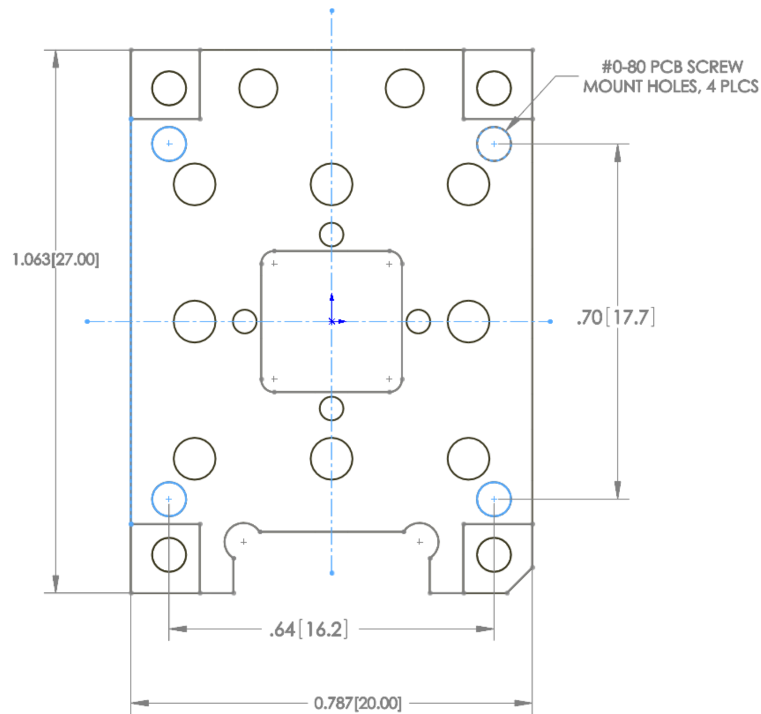


[Fig 5A] **SMT Standard Model** (Bottom view)



[Fig 5B] **SMT/Screw Mount Model** (Bottom view)

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8.0 Solder Flux/Paste

8.1 To make the product easier to use, a no-clean RMA Flux is recommended.
  8.1.1 If using a solder paste, a no-clean solder paste is recommended.
8.2 Standard product requires the use of eutectic SnPb solder paste.
8.3 Recommended solder paste for lead-free, RoHS compliant product is 96.5Sn /3.0Ag /0.5Cu.
8.4 Recommended stencil thickness is .003 inches (0.08mm).
8.5 Recommend a round aperture diameter of .011 inches (0.28mm) for a .003 inches (0.08mm) thick stencil. This combination gives a paste volume of approximately .285 $^{10^{-6}}$ in^3

9.0 Solder Reflow

All recommended temperatures are on top surface of the board, either inside or in close proximity to the connector ball grid array.

<u>9.1 For standard SnPb product:</u>

9.1.1 To obtain temperature equalization at all the BGA locations, soak at 130° C to 160° C before reflow for 120 seconds max.
9.1.2 Reflow time above 183° C should be between 45 seconds and 75 seconds.
9.1.3 Peak temperature should be between 210° C and 217° C.
9.1.4 The maximum temperature on the board should not exceed 230° C for more than 10 seconds.
9.1.5 A nitrogen environment of equal to or greater than 4,000 ppm O^2 can improve stability, but it is not required.
9.1.6 Maximum ramp rate should be 3° C per second.
9.1.7 See Figure 6A for sample profile.

<u>9.2 For lead-free RoHS compliant product:</u>

9.2.1 To obtain temperature equalization at all BGA locations, soak at 150° C to 210° C prior to reflow for 60-90 seconds.
9.2.2 Reflow time above 219° C should be a maximum of 90 seconds.
9.2.3 Peak temperature should be between 235° C and 250° C.
9.2.4 The maximum temperature on the board should not exceed 260° C for more than 10 seconds.
9.2.5 The maximum total cumulative time to ramp up, soak, and reflow the board shall be limited to 330 seconds.
9.2.6 Nitrogen environment of equal to or greater than 4,000 ppm O^2 can improve stability, but it is not required.
9.2.7 Maximum ramp rate should be <2.5° C per second. [Fig. 6B]

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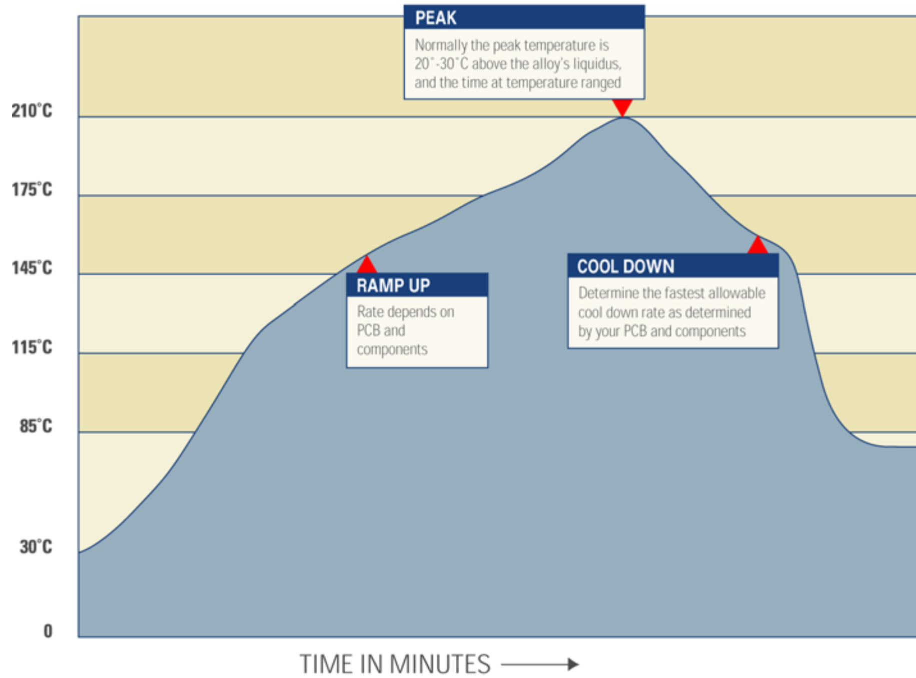

Fig. 6A

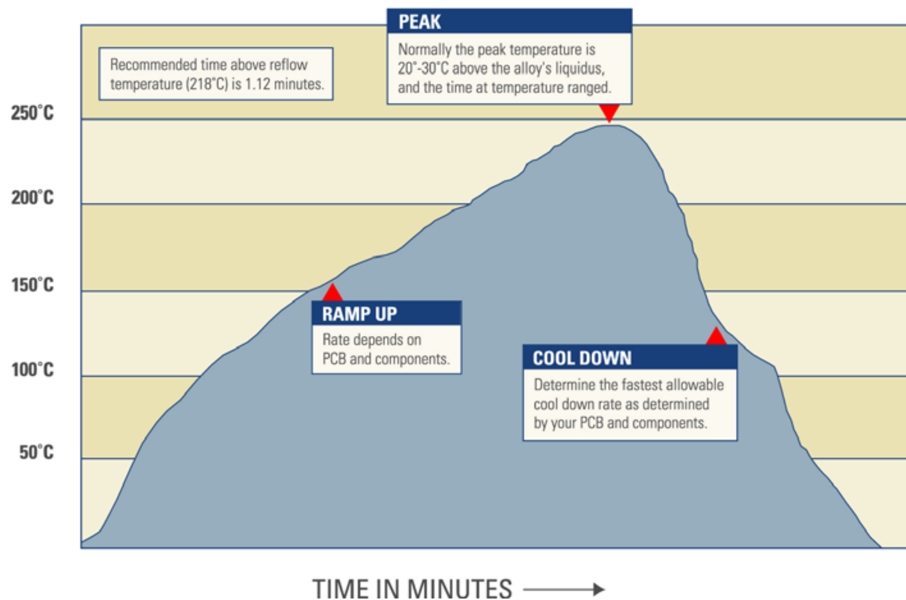

Fig. 6B

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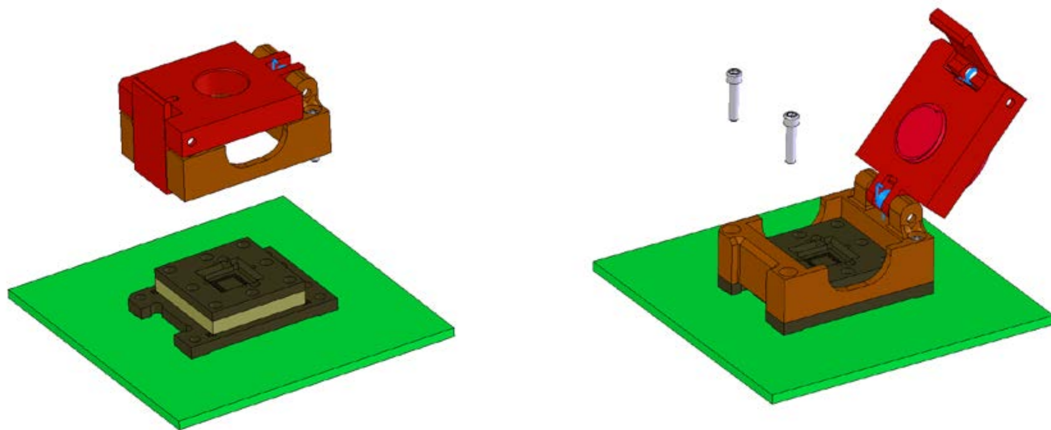
11.0 Cleaning

The connector and board assembly can be washed with an appropriate cleaner to remove any residue or contaminants after reflow.

12.0 Mounting the Guide Box Assembly

After reflow to the PCB, carefully mount the guide box down onto the lower assembly, matching the guide posts on the hinge side to the alignment holes in the base insulator. Assemble the upper guide box assembly with four (4) #0-80UNF-9/32-3A SHCS; tighten to 1.20 lb-in with a .050" (CF) hex drive; do not over tighten.



[Fig 7]

13.0 Actuation of the Socket

Release the locking arm and open the socket. Place DUT (device-under-test) into the hole in the lead-in insulator, aligning A1 position on the BGA with the chamfered corner of the Flip-Top BGA Socket. Very gently nudge the package side-to-side until the solder balls find the guide holes in the alignment plate and the device drops down slightly into final position. Place the custom support plate over the device, with the square ram facing (touching) the DUT package (i.e. ram side down), and the square flange facing the heat sink turn-screw [Fig 8]. Close the lid, latch the locking arm completely vertical, and slowly advance the heat sink turn-screw until the first slight resistance is felt. This may be done by hand or with a 1/8" hex drive (supplied). Past this initial contact point, turn the heat sink screw 90°-110° (approx 1.0 lb-in); for the largest position counts, turn to 110°-135° (approx 3 lb-in *MAX*) [Fig 9]. To remove the DUT, reverse the order of operations above. Recommended withdrawal is with a vacuum tool; lead-in insulator has an optional tweezer slot.

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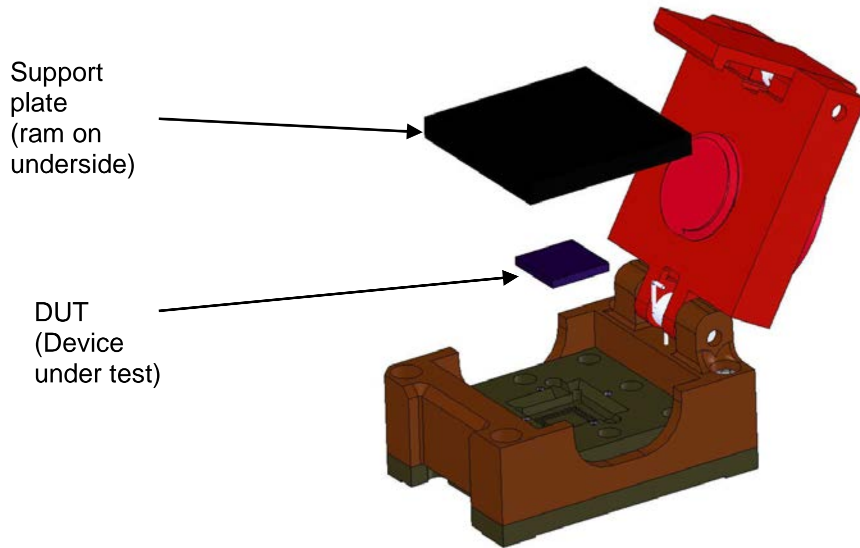
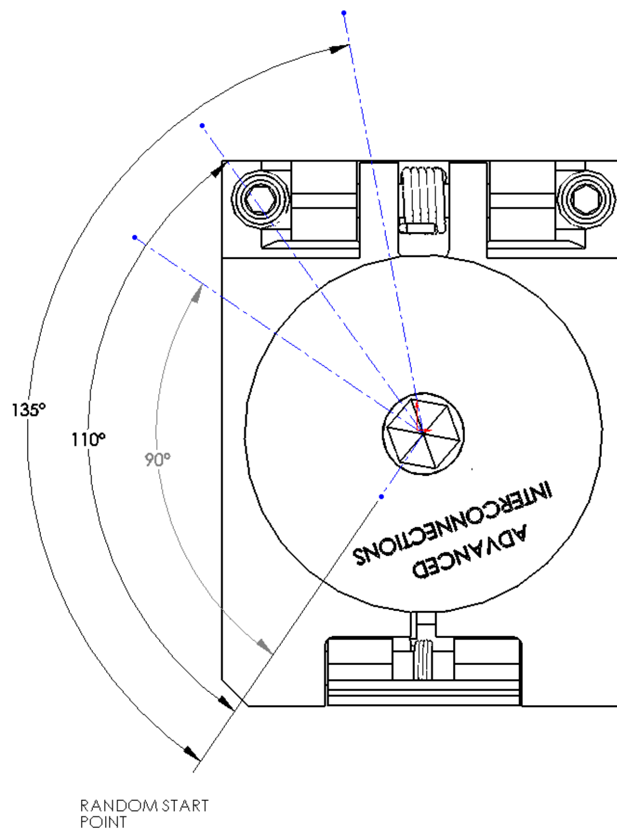


[Fig 8]



[Fig 9]

14.0 Storage

No special storage requirements

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15.0 Revision History

REV.	DESCRIPTION	BY	DATE
0	New Release	C Palagi	05-19-10
1	Update Part Number Structure and Packaging Add patent website	A Cibelli	10-20-16

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