

# Technical White Paper

## Power Bead SMT Process Guide



### About This Paper

The objective of this document is to assist customers in understanding the selection process of our latest designs for SMD Power Beads and the most effective mounting procedures for that design to a PCB.

### Product Introduction

Power Beads consist of a ferrite core and copper conducted clip with a nickel and tin coating (Cu/ Ni/Sn). They are designed for high efficiency in high power density DC to DC buck converter applications.

### PCB (Print Circuit Board) Soldering Pad

The long term trend in power electronics development has been toward reducing component size while at the same time still delivering the requisite high power efficiency. To achieve these dual objectives, the new designs for power beads have adopted the use of the 'narrow body' model. This type of design achieves the goal of having a reduced foot print on the PCB but the need to handle the higher power means an increased component height. As a result, the 'sitting area' of the power bead is relatively small in relation to the overall volume of the part thereby creating a possible issue with the strength of the solder joint due to the component height. With the increased height comes the danger that the Power Beads may wobble or lean if there is any type of bulge on the solder pad. This can happen particularly when using a conventional HASL (Hot Air Solder Leveling) PCB. To have a better result our recommended soldering pad on the PCB should be coated by one of the following methods; electroplating, electrolytic-plating or organic coating. These techniques will help eliminate any bulge.



### Solder Paste Stencil Printing

The layout of the soldering pad area on the PCB is recommended to be 1.1-1.3 times larger than the pad of the actual power bead (refer to Figure 1).

It is also recommended to have a different shape and slightly smaller solder paste area on the soldering pad to reduce the risk of the component shifting after the completion of the reflow process. The shape shown in Figure 2 is recommended.

Figure 1

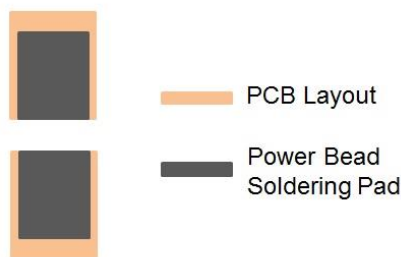
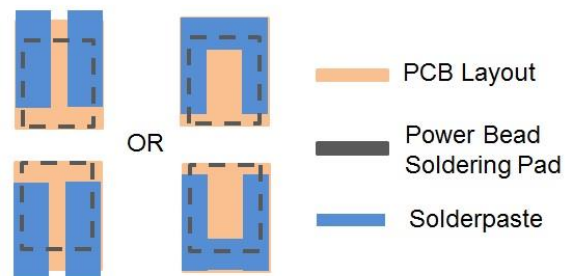


Figure 2



Customers can contact the ITG sales team with any questions based on the different assembly issues.

### Pick and Place

Power Beads that are made of high density ceramic and copper materials and can vary in weight. Therefore the selection of the nozzle and the speed of the pick and place procedure will have a direct impact on stability and accuracy during the pick and place process. There is no one nozzle that is suitable for every type of power bead because the contact surface of every type of bead nozzle and the component pad are different. Therefore, selecting the appropriate nozzle will be critical to the success in the SMD mounting operation. The specific nozzles for the different types of components are available in the market place.

The speed of pick and place movement is another critical factor. An optimized selection of nozzles and moving speed combination will lead to high production values.

### Reflow Process

Due to their material content the body of a power bead could become an unintentional 'heat sink' meaning that it can attract heat and become a 'hot spot' during the reflow process. This means that the reflow oven needs to have the correct heat compensation factor to ensure that the solder-paste has melted completely and formed a good solder joint. We suggest using **N<sub>2</sub> (nitrogen) reflow oven** as it exhibits

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better heat compensation factors than a conventional reflow oven.

Please refer to the standard of profile JEDEC J-STD-020D for further reference.

### Washing

We strongly recommend drying the PCB right after washing process. Power beads are made of Mn-Zn ferrite and the body will not oxidize after washing. However, if the PCB is not being immediately dried, the copper clip may form a small dot of oxidation and this could affect the contacts. If the power beads have already been soldered on to the PCB, there shall be no electrical or mechanical impact on performance of the components.

In addition, some power bead designs have labels and markings on the top of the component to assist with the identification during the pick and place SMT process. If the PCBA needs to be washed after assembly, it cannot be guaranteed that labels will not peel off the part during washing process. Also, some labels need additional time for drying so we won't recommend the parts with labels on the top be used for the washing process. But be advised that even if the component marking is removed after the washing process it does not have any effect on the electrical or mechanical operation of the components.

### Conclusion

There are a number of very substantial considerations and decisions that need to be made in selecting the right Power Bead and in addition the correct method and equipment for mounting the beads in the SMT world. Careful considerations in the planning stages of each one at the beginning will save an extensive amount of problems at the end of the process.

ITG is one of leading companies in the design and manufacture of power beads. If customers have any additional assembly or selection issues that may not be covered or satisfactorily explained in this document, please contact us at; [sales@ITG-Electronics.com](mailto:sales@ITG-Electronics.com).