

Application Note

HAND SOLDERING LARGE LEADED CERAMIC CAPACITORS

OVERVIEW

Multilayer Ceramic Capacitors (MLCCs) are complex composite mechanical structures composed of alternate layers of dense ceramic and metal electrodes. Alternate electrodes are connected on opposite ends with termination metals, which typically contain glass fits. As such, the MLCC is inherently sensitive to thermal and mechanical shock. The larger size of High Voltage MLCC's increases this sensitivity, in turn requiring greater care with conventional soldering techniques.

Thermal shock encountered with any soldering method can stress the device and lead to fractures ranging from invisible micro-cracks to visible cracks. Accordingly, electrical failures can range from decreased insulation resistance to catastrophic failure [shorts], as well as poor partial discharge performance for High Voltage MLCCS.

In general, with High Voltage MLCC's, care must be taken, with preheat and controlled cooling, to prevent thermal shocking of the part. Large parts should not see more than 50°C difference between preheat and solder temperature.

HAND SOLDERING RADIAL LEADED CAPACITORS

Large leaded capacitors should be preheated prior to hand soldering. However, if the parts cannot be preheated, a heat sink must be attached to the lead between the soldering iron and the body of the capacitor. Spring loaded tweezers or needle nose pliers work well when attached to the soldered lead. Figure 1 shows the location of the lead heat sink and soldering iron tip. The soldering iron tip should contact the pad on the bottom side of the Printed Wiring Board (PWB) to minimize heating of the capacitor.

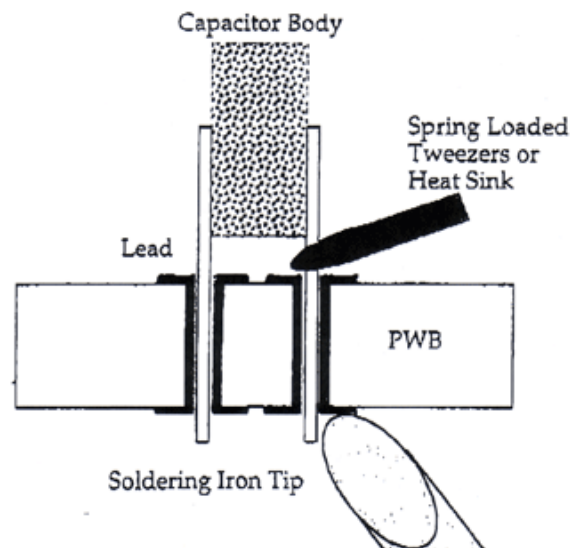


Figure 1. Heat Sink Attachment for Leaded Capacitors

CAUTION: Some assemblies have a number of component leads running to a binding post, resulting in a large bundle of wires. In such cases, large power soldering irons are used to heat the bundles and/or posts, resulting in rapid heat transfer to the components. In these cases, each large capacitor lead needs an individual heat sink to minimize thermal shock cracking.

in cases where parts are mounted to a PC board, and it is not possible to attach heat sinks to each capacitor, the entire assembly with mounted components should be preheated in an air circulating oven. When the set preheat temperature is reached, the board should be removed from the oven, and soldering accomplished as quickly as possible because of the rapid cooling of the assembly. Typically, after 3 to 5 capacitors are soldered, the board must be placed back into the oven, and taken again to the set preheat temperature. This process should be repeated until all of the parts are soldered.

NOTE: For 5n60, Sn62 or Sn63 solders, the oven temperature should be $>125^{\circ}\text{C}$. A fine tip 35 to 50 watt Iron should be used for lead attachment.