

# **Cracking Problems and Mechanical Characteristics of PME and BME Ceramic Capacitors**

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Most failures in multilayer ceramic capacitors (MLCCs) are caused by cracking that create shorts between opposite electrodes of the parts. A wide use of manual soldering makes this problem especially serious for space industry. Experience shows that different lots of ceramic capacitors have different susceptibility to cracking under manual soldering conditions. This simulates a search of techniques that would allow revealing capacitors that are most robust to soldering-induced stresses. Currently, base metal electrode (BME) capacitors are introduced to high-reliability applications as a replacement of precious metal electrode (PME) parts. Understanding the difference in the susceptibility to cracking between PME and BME capacitors would facilitate this process.

This presentation gives a review of mechanical characteristics measured in-situ on MLCCs that includes flexural strength, Vickers hardness, indentation fracture toughness, and the board flex testing and comparison of characteristics for BME and PME capacitors. A history case related to cracking in PME capacitors that caused flight system malfunctions is considered and mechanisms of failure discussed. Possible qualification tests that would allow evaluation of the resistance of MLCCs to manual soldering are suggested and perspectives related to introduction of BME capacitors discussed.