

Base Metal Ceramic Capacitor Developments on X7R Products for Space and High Reliability Applications

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This presentation will outline recent development activity on Multi Layer Ceramic Capacitor (MLCC) products. It will focus on the design, materials and technology used to increase the maximum capacitance values in the 0805 to 1210 sizes, with a focus on power supply typical values- ranges needed, 50V and 100V rated components. Design and Material selection will be discussed in detail within the context of the overall manufacturing process to highlight the key elements needed to qualify these high CV (capacitance volume) values needed to service the next generation of power systems for flight.

These MLCC components are made from Base Metal Electrode technology (BME) which utilises Nickel electrodes and Copper terminations with Barium Titanate based ceramics.

This fundamental BME technology which has been used for a number of years to manufacture higher voltage components 500V to 4000V SMD for industrial applications, has been modified to allow the development of Military and Space grade "High voltage" ceramic devices. These components have been manufactured in clean room environments to be able to withstand the comprehensive reliability testing required for qualification and are undergoing the long term Life testing required for Space application.

This data will be presented to highlight the performance of the MLCC Insulation Resistance over time and the other key electrical parameters with a discussion on the long term reliability of these devices.

Flexible termination materials can also be used on these high voltage devices and this material will bring advantages over the normal base metal termination systems .

It also displays a significant performance enhancement with respect to thermal cycling and this data will be discussed with respect to the role that can play in mitigating against any electrostrictive forces seen with the higher voltages. An additional section covering the outgassing analysis of the different material termination types including the flexible termination will be presented.