

Project Summary:

Root-Cause Failure Analysis on Conformally Coated Control Boards

DfR Solutions was asked to perform root cause analysis of controller boards that failed during THB and HTOL product qualification testing. High temperature step stress testing showed that the failures were not only related to high temperature conditions. Ion chromatography was performed after contamination was suspected from discoloration of the conformal coating. This test indicated elevated levels of contamination, but did not indicate electrochemical migration and failures could not be induced when subjected to the same testing environment. The root cause failure was determined to be contamination during board fabrication that caused a drop in surface insulation resistance. DfR Solutions recommended an audit of conformal coating supplier and board supplier cleanliness procedures. Other recommendations included differential scanning calorimetry and fast transient testing.

Keywords: temperature-humidity bias, THB, high temperature operating life, HTOL, chloride, contamination, cleanliness, high temperature step stress test, visual inspection, ceramic body resistor crack, voltage drop, excessive leakage current, increase in resistance, electrical characterization, conformal coating discoloration, polyurethane, ion chromatography, circuit analysis, electrochemical migration, ECM, impulse noise, surface temperature, humidity, board fabrication process, SIR, dendritic growth, delamination, separation, differential scanning calorimetry, DSC, fast transient testing, UL, IEC, EN, suppliers, contamination audit