

Accelerated testing of High Density PWBs to Characterize CAF Formation Failures

Conductive anodic filament (CAF) formation was first discovered by Bell Labs in the 1970's. It is an electrochemically driven failure characterized by an abrupt, unpredictable loss of insulation resistance, within the bulk of glass-reinforced epoxy printed wiring boards (PWBs). Recently, in the electronics industry, there has been an increase in concern due to these failures, particularly in applications where reliability in harsh environments is critical. This recent rise in CAF failures is partly due to shrinking conductor geometries, coupled with the increased use of electronics in hot, humid environments, conducive to electrochemical migration. Because of this increase in CAF failures, standards bodies such as IPC have developed test methods to rate the CAF resistance of PWBs. Researchers at CALCE conducted accelerated tests to investigate the effect of parameters including laminate materials, manufacturers, conductor spacings, delayed DC voltage bias, placing conductors diagonally with respect to the fiberglass weave and exposure to lead-free reflow temperatures, on the time to failure due to CAF formation in high density PWBs. CALCE observed, in addition to the effects of the selected parameters, that employing existing CAF test standards can induce failure mechanisms other than CAF in fine pitch conductor spacings.