

# Effect of Flux Systems on Electrochemical Migration of Lead- Free Assembly

## ABSTRACT

The reliability concerns regarding surface insulation resistance (SIR) and electrochemical migration (ECM) have been significantly raised in the printed circuit board (PCB) assembly with wide adoption of lead-free assembly materials and process. Moreover, the miniaturization trend of the electronic industry also increases the sensitivity of the functional assemblies to surface contamination and flux residues. There are numerous SIR reliability testing methods and standards, such as IPC, JIS, Bellcore, and Bono, whose predictive power will depend on the field of application including temperature, relative humidity and electric field. Each standard is limited in essence, because the failure mechanism is strongly affected by the chemistry of the assembly materials, e.g. soldering flux, paste, and substrate materials, which will perform differently under various conditions. This paper presents a summary and comparison of the major SIR reliability standards currently in use in the industry and discusses the impact of the different flux systems on the failure mechanisms.

**Key Words:** Reliability, SIR, ECM, Flux Residue, Solder Paste, Chemical Flux, Lead-Free, Root Cause Analysis