Corrosion in Electronics

Electronic control units, power modules, and consumer electronics are used today in a wide variety of varying climatic conditions. Varying external climatic conditions of temperature and humidity can cause an uncontrolled local climate inside the device enclosure. Uncontrolled humidity together with a number of other factors including the presence of hygroscopic contamination resulting from the Printed Circuit Board Assembly (PCBA) manufacturing process can introduce deviation from desired functionality or even intermittent or permanent failure of the device. Additional factors are the miniaturization and high density packing combined with the use of several materials, which can undergo electrochemical corrosion in the presence of water film formed due to humidity exposure and bias conditions on the PCBA surface. This article provides a short review of the corrosion reliability issues of electronics due to the use of electronics under varying humidity conditions. Important PCBA aspects, which are fundamental to the corrosion cell formation under humid conditions, are discussed. Effect of hygroscopic residues from the process and service and their role in assisting water film build up and corrosion is presented. Various failure modes resulting from the corrosion and influence factors are discussed including humid and gaseous conditions.

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