Effect of interior geometry on local climate inside an electronic device enclosure

Electronic enclosure design and the internal arrangement of PCBs and components influence microclimate inside the enclosure. This work features a general electronic unit with parallel PCBs. One of the PCB is considered to have heat generating components on it. The humidity and temperature profiles near the surface of PCBs depend on various factors like inter-PCB spacing, controlled opening size, and heat capacity of various parts. The effect of above mentioned factors on the humidity and temperature profiles are investigated for both transient and steady state operating conditions of the electronic device. The experiments are conducted for the case of condensed water present in the enclosure. A rectangular enclosure made of aluminium is used for the study. PCBs closer to heated surfaces are found to have lower relative humidity and less probability to failure. This is confirmed by impedance measurements on the PCBs. Enclosures with smaller opening sizes are observed to have lower relative humidity. Results also show possibility of using heat capacity of materials to store and release heat energy for control of humidity. This paper provides an improved understanding of the effect of internal geometry of the device and related enclosure design parameters on the humidity and temperature profiles inside the electronic device enclosure.

General information
State: Published
Organisations: Department of Mechanical Engineering, Materials and Surface Engineering
Contributors: Joshy, S., Jellesen, M. S., Ambat, R.
Pages: 779-783
Publication date: 2017

Host publication information
Publisher: IEEE
Keywords: Humidity, Temperature, Thermal mass, Electronic enclosure, Microclimate
DOIs:
10.1109/ITHERM.2017.7992565
Source: FindIt
Source-ID: 2372617654
Research output: Research - peer-review › Article in proceedings – Annual report year: 2017