

Thermal Analysis of Electronics – These Are Hot Problems

Richard Doyle, PE, SL-IEEE

Abstract:

One of the major causes of fail in electronics is heat, yet engineers rarely analyze the thermal problems. This presentation provides an incite into developing a thermal analysis and providing a better design. It is generally a few hot parts that create the most problems.

Thermal Analysis of Electronics is a method of determining the Reliability of Electronic Systems in a thermal environment. This is critical since high temperatures degrade reliability. The thermal design discussed in this presentation identifies and focuses attention on design weaknesses so that they may be corrected, protected against, or accepted after consideration. This presentation is intended to guide engineers in the thermal design of electronic equipment for improved reliability. It will also help heat transfer experts who are not electronic engineers to provide inputs to the thermal design during the various stages of equipment development. This material allows the attendee to later use these notes to evaluate his/her design as it relates to the thermal environment and determine the probability of failure or probability of success. One will be able to evaluate the best method of improving the overall reliability of the system while generally reducing cost, weight, and size. This tutorial presents the most current techniques for evaluating the thermal characteristics as they relate to the reliability of any part or complex system.

Bio:

Richard Doyle is a Registered Electrical and Civil Engineer in California and has a B.S. in Mechanical Engineering from Oregon State University and a M.S. in Engineering from the University of California, Irvine. Mr. Doyle has more than 30 years of experience in the theoretical analysis and design of electrical and mechanical systems. Mr. Doyle's recent experience includes consulting for the past 20 years in Aerospace, Commercial Electronics, and Nuclear Power Industries. He performed thermal/reliability analysis using computer simulations for different electrical systems including: Digital TV set top boxes, numerous power supplies (a major problem), and Microprocessor, DSP, and ASIC ICs. Previous consulting work included teaching Mechanical Reliability and Thermal Analysis of Electronics to graduate engineers working for the US Navy (Civil Service). These tutorials were taught as a 3 to 5 day seminars and have been presented at many different locations including Washington DC, Louisville, KY, and Port Hueneme, CA. He also presented a course in System Safety Engineering at George Washington University. He is a past president of the IEEE Reliability Society and is the Past Region 6 Director, the Past Division VI Director and has served on the IEEE Board of Directors for four years. He has presented this tutorial numerous times.