

Heat Transfer: Thermal Management of Electronics

By Younes Shabany

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The continuing trend toward miniaturization and high power density electronics results in a growing interdependency between different fields of engineering. In particular, thermal management has become essential to the design and manufacturing of most electronic systems.

Heat Transfer: Thermal Management of Electronics details how engineers can use intelligent thermal design to prevent heat-related failures, increase the life expectancy of the system, and reduce emitted noise, energy consumption, cost, and time to market. Appropriate thermal management can also create a significant market differentiation, compared to similar systems. Since there are more design flexibilities in the earlier stages of product design, it would be productive to keep the thermal design in mind as early as the concept and feasibility phase.

The author first provides the basic knowledge necessary to understand and solve simple electronic cooling problems. He then delves into more detail about heat transfer fundamentals to give the reader a deeper understanding of the physics of heat transfer. Next, he describes experimental and numerical techniques and tools that are used in a typical thermal design process. The book concludes with a chapter on some advanced cooling methods.

With its comprehensive coverage of thermal design, this book can help all engineers to develop the necessary expertise in thermal management of electronics and move a step closer to being a multidisciplinary engineer.

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Heat Transfer: Thermal Management of Electronics By Younes Shabany Bibliography

- Sales Rank: #483489 in Books
- Brand: Brand: CRC Press
- Published on: 2009-12-17
- Original language: English
- Number of items: 1
- Dimensions: 9.75" h x 6.50" w x 1.25" l, 1.28 pounds
- Binding: Hardcover
- 523 pages

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Editorial Review

About the Author

Younes Shabany received his BS in mechanical engineering from Sharif University of Technology in Tehran, Iran, in 1991. He then went to Vancouver, Canada where he obtained his MS in mechanical engineering from the University of British Columbia in 1994. He came to the United States and received a Ph.D in mechanical engineering with a minor in aeronautics and astronautics from Stanford University, California, in 1999. Dr. Shabany has over 18 years of experience in thermal-fluid engineering. He is currently Director of Thermal Engineering & Design and Thermal Architect in Advanced Technology Group at Flextronics International USA, Milpitas, California. In this position, he has been leading thermal design activities in Flextronics' worldwide design centers on a variety of infrastructure, computing, consumer, automobile, medical, and power electronic products. Before Flextronics, he worked for Applied Thermal Technologies, Santa Clara, California, where he was the director for two years. While at Applied Thermal Technologies, he worked with over 60 companies and designed thermal solutions for about as many pieces of electronic equipment including telecom and networking equipment, desktop and laptop computers, biomedical equipment, and consumer products. Dr. Shabany has also been a lecturer at San Jose State University, California, since the summer of 2001. He has taught undergraduate and graduate courses in heat transfer and advanced mathematical analysis including his most favorite course, Heat Transfer in Electronics. He has also advised graduate students on their projects and theses.

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