DESIGN AND ANALYSIS OF HEAT SINKS

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Chapter

1

INTRODUCTION

1.1 INTRODUCTION

This book is devoted to the heat sink which is used to enhance heat transfer from the surface of an electronic component or package to the surrounding environment. Although the presence of the heat sink (and its bonding layer) produces a thermal resistance, when properly designed, the thermal resistance attributed to the heat sink will be substantially lower than the resistance associated with convection and radiation from the bare surface of the component. Thus, thermal design of electronic equipment often requires detailed consideration of the thermal resistance of the heat sink as part of the thermal path between the component junction and the "ground" temperature (usually the environment). The heat sink represents just one element along this thermal path, but, because it may be the controlling resistance, thermal analysis and design of heat sinks are of considerable importance in the development of electronic products. Some typical electronic equipment heat sinks are shown in Fig. 1.1.

This chapter prepares the reader for the study of the methods used for expeditious design and analysis of heat sinks for electronic equipment and electronic components. Section 1.2 deals with the heat-transfer phenomena in terms of the thermal resistances attributed to individual mechanisms. Section 1.3 introduces the concept of the chip package resistance between the component junction and the surroundings and provides the context for the design and use of heat sinks. Section 1.4 provides a summary of the considerations and procedures involved in the design and analysis of a typical array of fins. This introductory chapter concludes with a general discussion of extended surfaces that will serve to introduce the detailed considerations that follow in Chapters 2 through 10.

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