INTRODUCTION

In the previous chapter, the inherent material properties of components for power electronics were examined. In most cases these properties were measured on toroids because their magnetic cross-sectional area is constant and they have an uninterrupted magnetic path. This makes for ease of interpretation of the measurements. However, while toroids are still used in some applications, designers of magnetic circuits (including those for power electronics) find it more practical to rely on many other shapes for technical and economic reasons. Because the shape of the component influences the performance of the device, modified component parameters including material and shape considerations must be developed. This chapter will list the possibilities of core shapes used in power electronics. In addition, several new changes in the overall height to cross-section brought about by mounting on PC boards will be discussed. Since, very often the magnetic component is the largest on the board, the shape of the component takes on much more importance.

4.1-FERRITE CORE SHAPES

Ferrite cores possess one advantage over other magnetic materials in that they come in a large variety of shapes. This feature is made possible by the part-forming process in which the ferrite powder is pressed in a die before sintering to final dimensions. The die can be complex as long as the pressed part can be ejected from the die. Some parts such as round-leg E-cores must be pressed with legs up which creates a need for a minor adjustment. A variety of ferrite shapes for power applications are shown in Figure 4.1

4.1.1 Pot Cores

Pot cores are sometimes used ungapped in power applications with a solid center post since there is no need for the adjustor found in telecommunication applications. The shielding to protect a low-level telecommunication signal in LC circuits is not necessary. There may be some advantage to the shielding in that it does provide the lowest leakage inductance. Besides cost,
another drawback to pot cores is the difficulty of bringing out heavy leads to carry the high currents. The closed structure also makes it difficult for heat to escape. Since pot core dimensions all follow IEC standards, there is interchangeability between manufacturers.

4.1.2-Double Slab Cores

In slab-sided solid center pot cores, a section of the core has been cut off on each side parallel to the axis of the center post. This opens the core considerably. These large spaces accommodate large wires and allow heat to be removed. In some respects, these cores resemble E-cores with rounded legs. See Figure 4.2