

Updated Magnetics Classic Offers Some Practical Info, But Little Insight In Theory

Transformer and Inductor Design Handbook, Fourth Edition. by Colonel Wm. T. McLyman, CRC Press, 2011, about 600 pages, hardback, ISBN: 978-1-4398-3687-3. Website: www.crcpress.com

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This book covers topics in transformer and inductor design and how they relate to various converter circuits. Included are magnetics fundamentals, magnetic materials, catalog material on cores, various aspects of transformer and inductor design (including three-phase transformers), transducers for flyback and forward converters, input filter design, current, rotary, planar, autotransformer and saturable (magnetic amplifier) transformer design, the "quiet converter," winding capacitance and leakage inductance, and a chapter titled "Derivations for the Design Equations." The author is an old hand at magnetics and has been associated with Caltech's JPL.

This book might be optimal for power electronics design in the style of a half century ago. It contains useful information, but little insight into why things are as they are. Design formulas are given without derivation, leaving the reader at the mercy of whatever assumptions might or might not be valid for the application. The derivation chapter is inadequate, offers little insight into how design formulas are derived from basic principles, and is reminiscent of how bench-oriented power engineers often thought about magnetics design in the 1960s. There is no hint of the '70s breakthroughs by Slobodan Cuk, of current-ripple steering. Obsolete units are used in the early chapters along with historic misnomers such as "magnetic force" for magnetic field intensity ($A/m \neq N$). The "quiet converter" does not look that quiet compared to those with ripple steering.

This book seems to have little to offer to a reader seeking a deeper understanding of the essential insights into magnetics and their use in converter circuits. It might appeal to the kind of designer who throws circuits together on the bench and simply wants a few formulas (valid or otherwise in this case) to occupy a calculator. The better methods of magnetics design optimization are absent. This book might be considered to heavily lean on the "practical" side of power electronics, though it is insufficient in developing what is to be practiced. It might be cheaper to download catalogs from the major magnetics suppliers for some of the material in the book. There are brief descriptions of some useful techniques—for instance, how to best wind transformers in configuring the layers.

Conclusion? If money is burning a hole in your pocket, add this book to your library. It is a current edition of an old classic and would serve to complete a magnetics library in a historic sense. For those who are new to power electronics, it does contain practical methods that are worth knowing, though what theory is given should be avoided; it is better to learn it from a better source.

About The Author



Dennis Feucht has been involved in power electronics for 25 years, designing motor-drives and power converters. He has an instrument background from Tektronix, where he designed test and measurement equipment and did research in Tek Labs. He has lately been doing current-loop converter modeling and converter optimization.