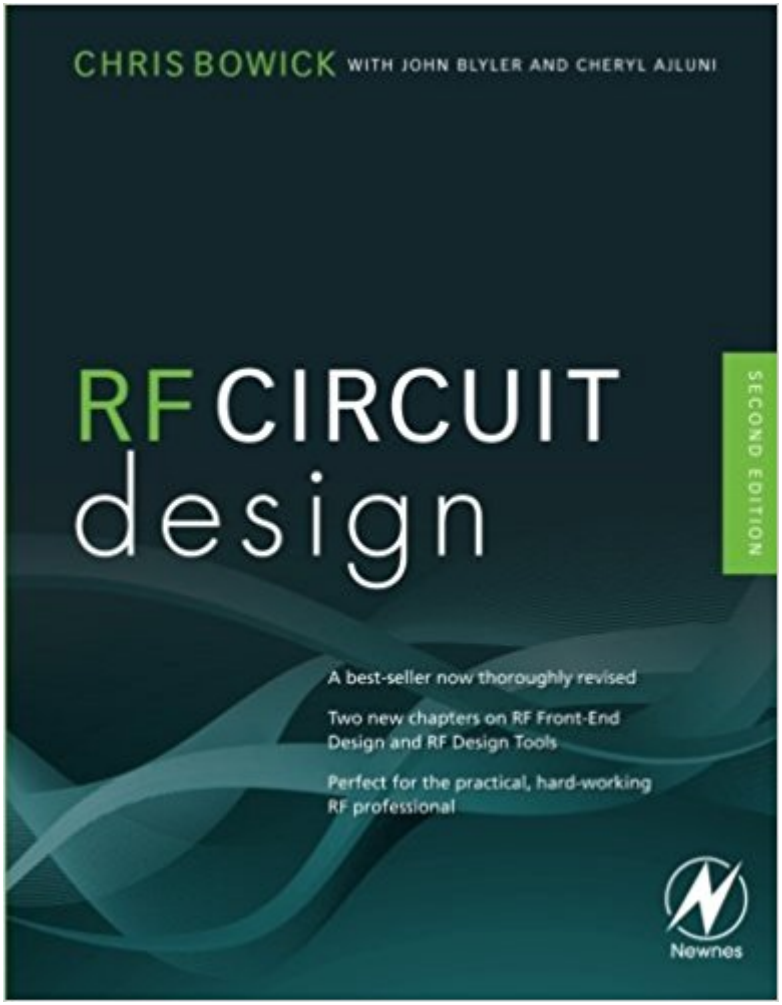
RF Circuit Design, Second Edition



Synopsis

ItÃ¢â ¬â„¢s Back! New chapters, examples, and insights; all infused with the timeless concepts and theories that have helped RF engineers for the past 25 years! RF circuit design is now more important than ever as we find ourselves in an increasingly wireless world. Radio is the backbone of todayÃ¢â ¬â„¢s wireless industry with protocols such as Bluetooth, Wi-Fi, WiMax, and ZigBee. Most, if not all, mobile devices have an RF component and this book tells the reader how to design and integrate that component in a very practical fashion. This book has been updated to include today's integrated circuit (IC) and system-level design issues as well as keeping its classic "wire lead" material. Design Concepts and Tools Include Ã¢â ¬Â¢The Basics: Wires, Resistors, Capacitors, Inductors Ã¢â ¬Â¢Resonant Circuits: Resonance, Insertion Loss Ã¢â ¬Â¢Filter Design: High-pass, Bandpass, Band-rejection Ã¢â ¬Â¢Impedance Matching: The L Network, Smith Charts, Software Design Tools Ã¢â ¬Â¢Transistors: Materials, Y Parameters, S Parameters Ã¢â ¬Â¢Small Signal RF Amplifier: Transistor Biasing, Y Parameters, S Parameters Ã¢â ¬Â¢RF Power Amplifiers: Automatic Shutdown Circuitry , Broadband Transformers, Practical Winding Hints Ã¢â ¬Â¢RF Front-End: Architectures, Software-Defined Radios, ADCÃ¢â ¬â„¢s Effects Ã¢â ¬Â¢RF Design Tools: Languages, Flow, Modeling Check out this bookÃ¢â ¬â„¢s companion Web site at: http://www.elsevierdirect.com/companion.jsp?ISBN=9780750685184Ã Â for full-color Smith Charts and extra content! *Completely updated but still contains its classic timeless information*Two NEW chapters on RF Front-End Design and RF Design Tools*Not overly math intensive, perfect for the working RF and digital professional that need to build analog-RF-Wireless circuits

Book Information

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Customer Reviews

I have read this book from cover to cover and I love it. The authors writting style is very easy to follow and most of the time the concepts are further explained with solved examples, which makes it easier to understand. However there are some times that concepts just mentioned and that leaves you wondering, but thats not very common in this book.Eventhough the cover says "thouroughly revised" there are still a lot of typos like duplicated words, and a few mistakes in the solved excercises, nothing really serious though. However there’s a reference to a data sheet in the first chapter that im still trying to find.I would say that you need prior knowledge to really understand this book, like electric circuits theory, BJT and FET transistor operation, biasing and transistor configurations, transmission lines, modulation and types of modulation (AM, FM,QAM, PSK, etc..), also knowing Matlab and a bit of feedback theory wouldnt hurt.Now I will try to give a very brief overview of each chapter, in my opinion, the meat of the book is in the first 6 chapters, the rest of the chapters are introductory at best, the last chapter on RF Design Tools is just out of my league. In general I felt that the book was a bit overcrowded with datasheets and tables as to "fill in" the space and make the book a bit thicker than it actually is, however its not just random data, since most of the time it is relevant to the subject in question.Chapter 1: Gives you the basics, but in a more realistic manner, meaning that you study how real inductors, capacitors and resistors work, along with their parasitic effects, and behavior at different frequencies, in contrast to the approach you usually learn in an electric circuits book using ideal components. It also explains how to calculate and build your own inductors, it reminded me of the book "The circuit designers companion".Page 19 makes a reference to some curves on a data sheet for a model BBR-7403 which im still trying to find (even online), if you know where to find it please let me know,Chapter 2: The book talks about resonant circuits and how to take into account the non ideal properties of inductors, which serves as an introduction for circuits used through out the book.Chapter 3: Covers filters, specifically passive filters, it starts using concepts from chapter 2 on resonant filters to develop simple 2nd order RLC filters, and ends up with multi order filters. It covers Butterworth, Chebyshev and Bessel filter design and characteristics.The design approach to develop such filters is extremely straightforward, the mathematical derivations are kept to a bare minimum, instead, tables are provided for the reader in a "color by numbers" approach in which you follow a certain

procedure to determine the order of the filter needed, and then you just look for the normalized component values on the table, making it extremely simple, however I believe it limits you only to the values presented on the tables.The author explains how the Butterworth tables are obtained when both the source and load impedance are the same, but he doesnt explain how the tables for uneven load and source impedance are obtained, which kinda disappointed me, the same case happens with the Chebyshev and Bessel tables, in which its left to the reader to find out how the tables were obtained. In my opinion there should be an appendix with the Butterworth, Chebyshev and Bessel mathematical derivations to fill in the gaps for those of us how would like to do more than just crunching numbers, in order to make our own tables for exact load to source impedance ratios as needed.Chapter 4: In my opinion this is the best chapter in the book, it covers impedance matching networks in depth, and provides you with several methods to calculate the correct answer using either analytical methods, or using the smith chart which is introduced in this chapter and used extensively in the rest of the book. It also provides matlab and other specialized software examples to calculate different parameters of matching networks.Chapters 5 and 6: Cover Y and S parameters, Chapter 5 gives you an introduction to transistors and an in depth explanation on what are the Y and S parameters, using 2 port network theory, it helps you determine several parameters using transistor datasheet, as well as the smith chart. It also teaches you how to determine S parameters from Y parameters. Chapter 6 works on the design using Y and S parameters, including stability using the Linvill, Stern and Rollet stabilitty factors (no derivations are presented), finding the optimum bias point, and optimizing the circuit to obtain maximum gain or a specified gain by using the impedance matching networks presented on chapter 4, or to stabilize an unstable circuit by means of such matching networks.These two chapers could be considered the most complex or math heavy chapters in the book, however no mathematical derivations are presented, but rather the final formulae. Again, the smith chart is the main tool to calculate the different parameters including stability circles. Everything is further explained by using the Matlab RF toolbox , and providing a design example at the end of chapter 6 using software tools.It should be noted that the before mentioned chapters cover only small signal. Also, eventhough the material is very well presented, it only really tells you how to bias a certain transistor, and not how a real amplifier works as a whole and how the different stages interact with each other, it doesnt provide a real life circuit of say a low noise amplifier. I think there should be a schematic of a real amplifier with a brief explanation and what each of the stages do, although I understand that an entire book could be made just on amplifiers.Chapter 7: This in my opinion is the poorest chapter in the entire book. It is 16 pages long, from which 4 are just datasheets. It barely covers amplification clases (A, B, C), but

the author just mentions them. Theres actually no power amplifier desing, but rather power amplifier characteristics, no biasing or configurations are actually explained but rather a block diagram approach is used. Instead, it covers how to match power amplifiers to coaxial lines using a Balun and how Balun's are made. The automatic shutdown circuitry explanation is only one paragraph long.I was very disappointed with this chapter, I understand that power amplification is a subject on its own, yet the title of the chapter is misleading, since no RF power amplifier design is actually covered, not even in the slightest way. The editor chose to advertise this chapter at the back of the book with stuff like "automatic shutdown circuitry" when the author barely mentions it in one paragraph, its misleading marketing.Chapter 8: This chapter covers a modern approach on RF front ends. Explaining briefly how demodulation works, superheterodyne recievers, and the parts of a common RF front end, again, in a block diagram level rather than in a circuit level. It covers key concepts like 1db Compression, third order intercept point, noise factor, sensitivity, selectivity, etc.. This is a very informative chapter, yet again, everything is left in as a basic introduction of concepts,Chapter 9: Presents different software tools and its application, it also comments on the real life stages of design of a product and what is covered in each stage in what the author refers to as the "design flow". PCB design, and and circuit simulation is covered in this chapter, aswell as the more industrial approach on product desing. It is a very interesting chapter and gives you a feel of how stuff is actually made, however most of the software and tools are just way out of my league since they are very expensive and tailored to RF professionals working in the field, yet if you are an RF professional, the information in this chapter is probably not enough.Several screenshots and graphs are provided, yet they are really hard to appreciate. The authors provided a website with all the smith charts in color, however I dont know why they didnt provide the screenshots as well...Overall I would say this is a great book, or a great introductory book to RF circuit design. I definitely enjoyed reading it and I learned a lot. One of the things I liked the most is that it is very straightforward yet it doesnt fall in the "cookbook" cathegory (with the exception of the Butterworth, Chebyshev and Bessel filter), so you do simple procedures, yet you get a good idea of whats going on. I love that modern software tools and techniques are incorporated into the book, and not just mentioned but actually explained.Its not a book for a hardcore academic, its a good introductory book for engineers, its definitely not a book for beginners. It kinda reminded me of the book "The Art of Electronics" in a way that the information is presented in a very practical way, and some rules of thumb or know values are used to solve problems, yet, it is easier to follow than The Art of Electronics.This book should be a must read for every engineer who wants to start a career in RF design.

I’m a mechanical engineer whose always been interested in learning more about electrical engineering. I wanted to understand how communications and RF circuits worked and possibly designing some remote controlled robot some day. I decided to start with this book since most reviews state that this is a great book to start.I like how this book takes small steps to show how circuits behave in the context of RF and how even the construction of certain components can impact the performance of a circuit. I mean, in DC circuits a resistor is a resistor and will always behave like a resistor, but I’m fascinated that a wire wound resistor could potentially behave more like an inductor at certain frequencies and so care must be taken when considering components. If I had bought a cookbook I’d have assumed I could buy any component and stick it on a bread board and have a radio controller in no time at all.I especially like seeing how it will prove a point with some simple step-by-step calculations. I’m amazed by how easy this book is to digest. When I first got this book I was hoping to learn how to attach an antennae to a circuit board and make it communicate with another circuit but I’m pleasantly surprised that I’m learning about good RF circuit design. I can’t wait to pick up an antennae design book.

Great book - I had the previous version from years ago and saw the author had updated it. Got a great price on as always

A classic covering all the basics in a good way with lots of examples.Unlike other books covering the basics, this one works with S-parameter, making the book just as current today as it was when it was written.

The first one was great. This is even better. Gives good info about latest EDA software products and applications. Some EDA programs mentioned are very inexpensive. Student version of MATLAB can be purchased for $99 and the RF toolbox for only $30 more. Very powerful. Also mentions SmithMatch from Microwave Software that also has a program called OptiMatch for optimization. I’m using MATLAB with RF toolbox to go through the problems in the book.

I really like this book and how it explains various subjects in RF in a practical and uncomplicated way. My only negative comment is that the Smith Charts are hard to read and the jpg’s provided on the companion site are not much better.

Best book purchased regarding RF Circuit design. Author easily explains everything from the basics through advanced topics in an orderly, planned tutorial-driven approach. Reading it is like a class in RF design with explained, detailed exercises, leaving nothing to guess. You will want to build these circuits just to see them work. Enthusiastically written which gives the reader confidence in RF circuit design and analysis.

We have used Chris’s book for training and refreshing engineers for years. We have literally worn the cover off and I can’t begin to tell you how many pages have been dog eared for future reference. The previous comments regarding "outdated" are, in my opinion, misguided since the focus of this book is more on the fundamentals and foundation of RF circuit design which HAS NOT changed since the first edition of the book was written. The information in this book is diverse and condensed very well. We haven’t purchased the 2nd edition yet, but likely will in the new year to replace our reference copy.If Chris’s book sounds too technical, you may want to start with Jon Hagen’s "Radio Frequency Electronics" or if you are more into the magnetics side of it try Jerry Sevick’s "Transmission Line Transformers". Lastly, if you need some general testing guidance, Joseph Carr’s book "Practical Radio Frequency Test & Measurement" will likely be of some benefit.Having worked with the industry leaders in this field, I can honestly say that Chris and his colleagues are among the best in the industry and Chris’s experience shows in the content of this very fine work.

Everybody Designs: An Introduction to Design for Social Innovation (Design Thinking, Design Theory) Microelectronics Circuit Analysis and Design