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EMC for Printed Circuit Boards

Basic and Advanced Design and Layout Techniques

Keith Armstrong First published February 2007

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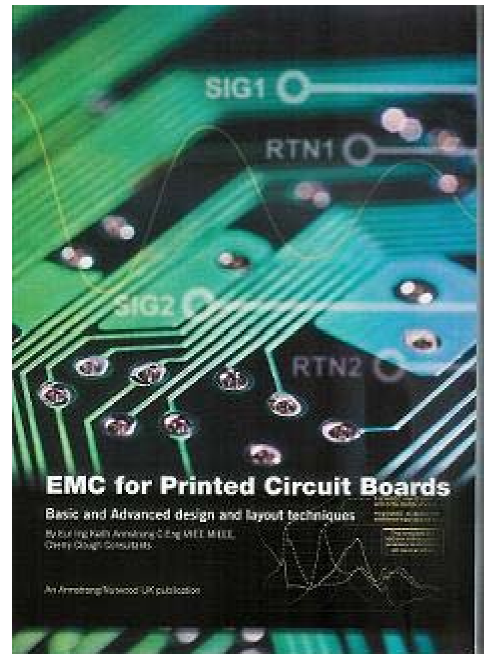

Overview, and complete list of contents

This book is for electronic circuit designers, as well as for PCB designers themselves, and has full-colour figures throughout.

All application areas are covered, from household appliances, commercial, industrial and medical equipment, through automotive to aerospace and military.

The techniques it describes help you to…

- Improve signal integrity (SI), signal/noise ratio (S/N), especially in mixed technologies
- Comply with EMC Directive, FCC, etc. with the lowest cost of manufacture
- Reduce the number of iterations of hardware and software to reduce time-to-market whilst also reducing financial risks
- Improve the reception range of co-located wireless voice or data communications (GSM, PCS, GPRS, EDGE, CDMA2000, UMTS, Bluetooth, Wi-Fi, UWB, etc.)
- Improve GPS or Galileo reception when using co-located antennas
- Save cost, size and weight by reducing (or eliminating) shielding/filtering of the overall enclosure
- Improve reliability, reduce warranty costs without adding significantly to cost of manufacture
- Use very high-speed devices, high-power digital signal processing (DSP), latest IC technologies (90 or 65nm), and/or latest packaging technologies (chip scale, flip-chip, micro-BGA, etc.)

Its eight chapters cover…

1) Saving time and cost overall
2) Segregation and interface suppression
3) PCB-chassis bonding
4) Reference planes for 0V and power
5) Decoupling, including buried capacitance technology
6) Transmission lines (and any traces carrying high-speed signals or noise)
7) Routing and layer stacking, including microvia technology
8) A number of miscellaneous issues (heatsinks, in-circuit testing, etc.)

This book describes the techniques, and when they are appropriate, in practical engineering language. It does not describe *why* they work in great detail, and only uses a few simple maths formulas where they are practically useful. However, these techniques *are* very well proven in practice and the reasons why they work *are* well understood.

The many web-based references lead to detailed explanations and mathematical foundations. It is difficult for textbooks to keep up to date with PCB technology and EMC techniques, which is why most of the references are conference papers and articles written during the last few years.

Although the subject is EMC, many of the techniques are essential for achieving good SI or S/N and such issues are often discussed – especially in the few areas where EMC and SI requirements could conflict.

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