



# Digital Circuit Boards: Mach 1 GHz

By Ralph Morrison

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**Digital Circuit Boards: Mach 1 GHz** By Ralph Morrison

**A unique, practical approach to the design of high-speed digital circuit boards**

The demand for ever-faster digital circuit designs is beginning to render the circuit theory used by engineers ineffective. *Digital Circuit Boards* presents an alternative to the circuit theory approach, emphasizing energy flow rather than just signal interconnection to explain logic circuit behavior.

The book shows how treating design in terms of transmission lines will ensure that the logic will function, addressing both storage and movement of electrical energy on these lines. It covers transmission lines in all forms to illustrate how trace geometry defines where the signals can travel, then goes on to examine transmission lines as energy sources, the true nature of decoupling, types of resonances, ground bounce, cross talk, and more.

Providing designers with the tools they need to lay out digital circuit boards for fast logic and to get designs working the first time around, *Digital Circuit Boards*:

- Reviews in simple terms the basic physics necessary to understand fast logic design
- Debunks the idea that electrical conductors carry power and signals, showing that signal travels in the spaces, not the traces, of circuit boards
- Explains logic circuit behavior through real-time analysis involving the fields and waves that carry signal and energy
- Provides new information on how ground/power planes work
- Outlines a software program for solving energy flow in complex networks

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### Editorial Review

#### About the Author

**Ralph Morrison** is a consultant and lecturer in the area of interference control and electronics. He has thirty years of design and consulting experience, was president of Instrum for more than a decade, and has authored *Noise and Other Interfering Signals*, *Grounding and Shielding in Facilities*, and *Solving Interference Problems in Electronics*, all from Wiley.

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