



Small Antenna Handbook

By Robert C. Hansen, Robert E. Collin

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Now in an completely revised, updated, and enlarged Second Edition, *Small Antennas in Portable Devices* reviews recent significant theoretical and practical developments in the electrically small antenna area. Examining antenna designs that work as well as those that have limitations, this new edition provides practicing engineers and upper level and graduate students with new information on: work on improving bandwidth using spherical helix dipoles; work on electromagnetically coupled structures; exact derivation of the Q for electrically small antennas for both the TE and TM modes; and a new simplified Q formula.

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Small Antenna Handbook By Robert C. Hansen, Robert E. Collin Bibliography

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Editorial Review

Review

“It could be used in a graduate course in statistics, or by statisticians who want to learn the reasoning behind the Bayesian methods.” (*IEEE Electrical Insulation Magazine*, 1 May 2013)

From the Back Cover

Uniquely explains in detail how small antennas work and ways to improve their performance

This book addresses the recent significant theoretical and practical developments in the electrically small antenna (ESA) area. Examining antenna designs that work as well as those that have limitations, it offers the latest information on electromagnetically coupled structures and improving bandwidth using spherical helix dipoles, the exact derivation of Q for electrically small antennas for both TE and TM modes, a new simplified Q formula developed by the authors, and discussions of metamaterials and computer model accuracy for ESA.

The book begins with detailed electromagnetic derivations of Chu and Thal Q formulations, formulas for Q when U or E cores are used, and effects of loss on Q . It also includes a treatise on bandwidth and matching, and Foster's reactance theorem, as well as up-to-date coverage of canonical antennas: dipoles, loops, self-resonant ESA, PIFA, and dielectric resonator antennas.

Just as this book offers the concrete facts on relevant developments in the field, it also clears up confusion regarding findings that have not turned out to be useful. Presented here are antenna ideas that are clever but with performance numbers that are poor, as well as eighteen more antenna ideas that are simply not to be believed. The book concludes with recent data on the use of self-resonant elements in superdirective antennas and new delay line data on superconducting antennas.

Each chapter features extensive references and an author list. In addition, helpful appendices cover a world history of ESA, antenna terms important to ESA, a paper on NIM shells enclosing an ESA dipole, and analytical errors associated with perfect lenses and sub-wavelength focusing. *Small Antenna Handbook* is ideal for practicing engineers in the telecommunications and national defense areas, as well as for upper-level undergraduate and graduate students.

About the Author

Robert C. Hansen, PhD, DEng, has had a long and distinguished career in the aerospace industry. Beginning in 1949, he held key posts in a number of leading aerospace companies, including The Aerospace Corp., STL, Inc. (now TRW), and Hughes Aircraft Co. He is a Fellow of IEEE and IEE and is a member of the National Academy of Engineering. Since 1971, Dr. Hansen has been a consulting engineer for antennas and systems-related problems.

The Late **Robert Collin, PhD**, taught at Case Reserve Western University, where he was chairman of the Department of Electrical Engineering and Applied Physics. He was an invited professor at Pontifical Catholic University of Rio de Janeiro; Telebras Research Center, Brazil; and Beijing University, China. Dr. Collin was the author or coauthor of five books and more than 150 technical papers.

Users Review

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