



# Design of CMOS Millimeter-Wave and Terahertz Integrated Circuits with Metamaterials

*Hao Yu, Yang Shang*

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Along with numerous opportunities in communication and imaging applications, the design of emerging millimeter-wave (mm-wave) and terahertz (THz) electronic circuits and systems in CMOS technology faces new challenges and requires new devices. **Design of CMOS Millimeter-Wave and Terahertz Integrated Circuits with Metamaterials** provides alternative solutions using CMOS on-chip metamaterials. Unlike conventional metamaterial devices on printed circuit boards (PCBs), the presented CMOS metamaterials can be utilized to build many mm-wave and THz circuits and systems on chip.

Leveraging the authors' extensive expertise and experience with CMOS on-chip metamaterials, this book shows that with the use of metamaterials, one can realize coherent THz signal generation, amplification, transmission, and detection of phase-arrayed CMOS transistors with significantly improved performance. Offering detailed coverage from device to system, the book hereby:

- Describes integrated circuit design with application of metamaterials in CMOS technology
- Includes real CMOS integrated circuit examples and chip demonstrations with measurement results
- Evaluates novel mm-wave and THz communication and imaging systems under CMOS-based system-on-chip integration

**Design of CMOS Millimeter-Wave and Terahertz Integrated Circuits with Metamaterials** reflects the latest research progress and provides a state-of-the-art reference on CMOS-based metamaterial devices and mm-wave and THz systems.

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