

Preface

The scope of more intelligent and higher data rate wireless connectivity in the coming decades continuously push the performance envelope of wireless circuits and systems. Higher integration level, more functionality, less cost and lower power are the obvious goals. For the radio front-ends, inductorless broadband solutions possess the highest potential to economically realize low-power multi-standard solutions in nm-length CMOS technologies. The rapid downscaling of transistor sizes and gate-oxide thickness, however, involves rapid reduction of supply voltage for reliability. This fact, in addition to the changed device features such as lower intrinsic gain and linearity, urges for more feasible techniques from different dimensions, such that the performances can be aligned continuously with the expectation from the global wireless chip industry.

In this book, high-/mixed-voltage analog and RF circuits are investigated as the prospective solution for the next generation of wireless products in nm-length CMOS technologies. The content starts by overviewing the design considerations, pros and cons of high-/mixed-voltage circuits before describing three tailor-made circuit designs targeting the mobile-TV applications. Mobile TV is recognized as one of the key functions of handheld devices such as smart phones.

The first design is a 90-nm CMOS ultra-wideband low-noise amplifier with mixed-voltage ESD protection for handling the full-band of mobile TV. The second is a 90-nm CMOS high-voltage-enabled mobile-TV RF front-end with TV-GSM interoperability. The third is a 65-nm CMOS mixed-voltage unified full-band mobile-TV receiver front-end averting any external balun, while measuring favorably performances with respect to the state-of-the-art.

Most techniques are generally extendable to different types of wireless systems in ultra-scaled CMOS technologies.

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for Nanoscale CMOS

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