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Submicron CMOS Process; 2.2 Fully Digital Control of Oscillating Frequency; 2.3 LC Tank; 2.4 Oscillator Core; 2.5 Open-Loop Narrowband Digital-to-Frequency Conversion; 2.6 Example Implementation; 2.7 Time-Domain Mathematical Model of a DCO; 2.8 Summary; 3 NORMALIZED DCO; 3.1 Oscillator Transfer Function and Gain; 3.2 DCO Gain Estimation 3.3 DCO Gain Normalization 3.4 Principle of Synchronously Optimal DCO Tuning Word Retiming; 3.5 Time Dithering of DCO Tuning Input; 3.5.1 Oscillator Tune Time Dithering Principle; 3.5.2 Direct Time Dithering of Tuning Input; 3.5.3 Update Clock Dithering Scheme; 3.6 Implementation of PVT and Acquisition DCO Bits; 3.7 Implementation of Tracking DCO Bits; 3.7.1 High-Speed Dithering of Fractional Varactors; 3.7.2 Dynamic Element Matching of Varactors; 3.7.3 DCO Varactor Rearrangement; 3.8 Time-Domain Model; 3.9 Summary; 4 ALL-DIGITAL PHASE-LOCKED LOOP; 4.1 Phase-Domain Operation 4.2 Reference Clock Retiming 4.3 Phase Detection; 4.3.1 Difference Mode of ADPLL Operation; 4.3.2 Integer-Domain Operation; 4.4 Modulo Arithmetic of the Reference and Variable Phases; 4.4.1 Variable-Phase Accumulator (PV Block); 4.5 Time-to-Digital Converter; 4.5.1 Frequency Reference Edge Estimation; 4.6 Fractional Error Estimator; 4.6.1 Fractional-Division Ratio Compensation; 4.6.2 TDC Resolution Effect on Estimated Frequency Resolution; 4.6.3 Active Removal of Fractional Spurs Through TDC (Optional); 4.7 Frequency Reference Retiming by a DCO Clock; 4.7.1 Sense Amplifier-Based Flip-Flop 4.7.2 General Idea of Clock Retiming 4.7.3 Implementation; 4.7.4 Time-Deferred Calculation of the Variable Phase (Optional); 4.8 Loop Gain Factor; 4.8.1 Phase-Error Dynamic Range; 4.9 Phase-Domain ADPLL Architecture; 4.9.1 Close-in Spurs Due to Injection Pulling; 4.10 PLL Frequency Response; 4.10.1 Conversion Between the s- and z-Domains; 4.11 Noise and Error Sources; 4.11.1 TDC Resolution Effect on Phase Noise; 4.11.2 Phase Noise Due to DCO Dithering; 4.12 Type II ADPLL; 4.12.1 PLL Frequency Response of a Type II Loop; 4.13 Higher-Order ADPLL; 4.13.1 PLL Stability Analysis 4.14 Nonlinear Differential Term of an ADPLL

Sommario/riassunto

A new and innovative paradigm for RF frequency synthesis and wireless transmitter design Learn the techniques for designing and implementing an all-digital RF frequency synthesizer. In contrast to traditional RF techniques, this innovative book sets forth digitally intensive design techniques that lead the way to the development of low-cost, low-power, and highly integrated circuits for RF functions in deep submicron CMOS processes. Furthermore, the authors demonstrate how the architecture enables readers to integrate an RF front-end with the digital back-end onto a single silicon die
