Abstracts

Phase Noise Characterization of SAW Oscillators Based on a Newton Minimization Procedure (May 1991 [T-MTT])

D.P. Klemer, K.-M. Shih and E.E. Clark, III. "Phase Noise Characterization of SAW Oscillators Based on a Newton Minimization Procedure (May 1991 [T-MTT])." 1991 Transactions on Microwave Theory and Techniques 39.5 (May 1991 [T-MTT] (Special Issue on Directions in Design and Applications of Microwave Systems)): 883-889.

An iterative minimization technique is used to optimize the values of circuit and device parameters which determine the phase noise response of a voltage-controlled SAW-stabilized oscillator (VCSO). An expression developed by Parker is used to calculate the double-sideband phase noise to carrier ratio from circuit parameter values; good agreement between calculations and phase noise measurements is achieved by minimizing the squared error through the use of a steepest-descent/ Newton-Raphson minimization scheme. Less accurately known circuit parameters are thus optimized in an iterative fashion. Exact expressions for the elements of the Hessian matrix are need in the Newton-Raphson procedure, allowing for fast computations. Although this technique is primarily useful in the determination of circuit parameter values, it can also be used to develop an understanding of the effect of individual parameters on phase noise response (i.e., the sensitivity of phase noise characteristics to circuit and device parameter variations). Additionally it may be of use in the design of low-phase-noise oscillators by using desired (rather than measured) phase noise values in the objective function to be minimized.

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