Abstracts

Improvement of the quality factor of RF integrated inductors by layout optimization (Jan. 2000 [T-MTT])

J.M. Lopez-Villegas, J. Samitier, C. Cane, P. Losantos and J. Bausells. "Improvement of the quality factor of RF integrated inductors by layout optimization." 2000 Transactions on Microwave Theory and Techniques 48.1 (Jan. 2000 [T-MTT]): 76-83.

A systematic method to improve the quality (Q) factor of RF integrated inductors is presented in this paper. The proposed method is based on the layout optimization to minimize the series resistance of the inductor coil, taking into account both ohmic losses, due to conduction currents, and magnetically induced losses, due to eddy currents. The technique is particularly useful when applied to inductors in which the fabrication process includes integration substrate removal. However, it is also applicable to inductors on low-loss substrates. The method optimizes the width of the metal strip for each turn of the inductor coil, leading to a variable strip-width layout. The optimization procedure has been successfully applied to the design of square spiral inductors in a silicon-based multichip-module technology, complemented with silicon micromachining postprocessing. The obtained experimental results corroborate the validity of the proposed method. A Q factor of about 17 have been obtained for a 35-nH inductor at 1.5 GHz, with Q values higher than 40 predicted for a 20-nH inductor working at 3.5 GHz. The latter is up to a 60% better than the best results for a single strip-width inductor working at the same frequency.

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