Abstracts

Analysis of current crowding effects in multiturn spiral inductors

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The effective trace resistance of a multiturn spiral inductor operating at high frequencies is known to increase dramatically above its dc value, due to proximity effect or current crowding. This phenomenon, which dominates resistance increases due to skin effect, is difficult to analyze precisely and has generally required electromagnetic simulation for quantitative assessment. Current crowding is studied in this paper through approximate analytical modeling, and first-order expressions are derived for predicting resistance as a function of frequency. The results are validated through comparisons with electromagnetic simulations and compared with measured data taken from a spiral inductor implemented in a silicon-on-sapphire process.

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