

# Simple Accurate Expressions for Planar Spiral Inductances

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- [inductance\\_expressions.pdf](#)

We present several new simple and accurate expressions for the inductance of square, hexagonal, and octagonal spiral inductors. We evaluated the accuracy of our expressions, as well as several previously published inductance expressions, in two ways: by comparison with 3D field solver predictions, and by comparison with our own measurements, and also previously published measurements. Our simple expressions match the field solver inductance values typically within around 3%, about an order of magnitude better than the previously published expressions, which have typical errors around 20% (or more). Comparison with measured values gives similar results: our expressions (and, indeed, the field solver results) match within around 5%, compared to errors of around 20% for the previously published expressions. (We believe most of the additional error in the comparison to published measured values is due to the variety of experimental conditions under which the inductance was measured.) Our simple expressions are accurate enough for design and optimization of inductors, or circuits incorporating inductors. Indeed, typical process variations yield variations in inductor impedance on the order a few percent, about the same accuracy as our expressions, so 'more accurate' expressions are not really needed in practice.

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