The trend toward high power density, high operating frequency, and low profile in power converters has exposed a number of limitations in the use of conventional wire-wound magnetic component structures. A planar magnetic is a low-profile transformer or inductor utilizing planar windings, instead of the traditional windings made of Cu wires. In this paper, the most important factors for planar transformer (PT) design including winding loss, core loss, leakage inductance, and stray capacitance have individually been investigated. The tradeoffs among these factors have have to be analyzed in order to achieve optimal parameters. Combined with an application, four typical winding arrangements have been compared to illustrate their advantages and disadvantages. An improved interleaving structure with optimal behaviors is proposed, which constructs the top layer paralleling with the bottom layer and then in series with the other turns of the primary, so that a lower magnetomotive force ratio $m$ can be obtained, as well as minimized ac resistance, leakage inductance, and even stray capacitance. A 1.2-kW full-bridge dc–dc converter prototype employing the improved PT structure has been constructed, over 96% efficiency is achieved, and a 2.7% improvement, compared with the noninterleaving structure, is obtained.