

Re: Spiral Strip Inductor

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- *From:* John Popelish <jpopelish@xxxxxxxx>
 - *Date:* Mon, 24 Oct 2005 22:00:48 -0400
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Gary Pace wrote:

"John Popelish" <jpopelish@xxxxxxxx> wrote in message
news:8--dnVMpaalRGsDeRVn-tA@xxxxxxxxxxxxxxxxxxxx

Gary Pace wrote:

Hi :

I take a strip of copper, width w and thickness t , wind a spiral coil of N turns with an inner diameter d_1 and an outer diameter d_2 (no iron, just plastic spacers and air).

Does anyone know a method (numerical or closed-form) for determining the inductance ?

There are a few Java calculators for spiral coils online, but it's not clear if they refer to wire or strip in a spiral.

Thanks
Gary

As long as the thickness of the coil (the width of the strip) is less than the inner diameter of the coil, it doesn't make much difference if its wire or strip.

Re: Spiral Strip Inductor

Thanks John.
That's not what I expected.
My thoughts went like this :

- I'm using 3" x 0.125" thick strip
- If I wound a spiral with 0.125" diameter wire I'd get a figure for L
- If I wound 24 of these (i.e. 3" wide strip) and connected them in parallel, but no magnetic coupling I'd get a really low L
- Obviously, when I stack these side by side, I get some coupling
- So the geometry of the strip really matters

It certainly does. Paralleling lots of wires that produce essentially the same field pattern produces essentially the same inductance, but with lower series resistance. The strip and the wire would produce essentially the same field if the inner diameter were (much) larger than the width of the strip (3 inches, in this case). This requirements means that the thickness of the pancake is small compared to the diameter of the coil, so the diameter dominates the field shape.

I tried to work it out from first principles (flux per amp), but university is just too long ago.

I had naively hoped that a quick Google would yield $L = \text{MagicFunction}(N, w, t, d1, d2)$

Good key words help.
<http://home.earthlink.net/~jimlux/hv/wheeler.htm>
<http://f3wm.free.fr/tesla/equations.html>