

Re: Custom transformer

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- *From:* Tim Wescott <tim@xxxxxxxxxxxxxxxxxxxx>
 - *Date:* Sun, 21 Dec 2008 14:49:19 -0600
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On Sun, 21 Dec 2008 20:25:30 +0100, David Bourgeois wrote:

Hi,

I just built the ESR meter described at <http://ludens.cl/Electron/esr/esr.html> and wired a small 400:20 transformer. As expected, it doesn't have the theoretical 20:1 ratio at 50kHz. As I'm building that meter to repair my oscilloscope, I can't --yet-- look at the square wave but using a true rms multimeter, I have a ratio of 36:1.

Would you have any pointer where I could learn on construction of real transformers and their loss? I've read that an iron core would have too much loss at 50kHz, I just would like to understand why. My transformer's core is made of these "E" shape stacked metal sheets so I guess it's an iron core.

Thanks,
David

I don't know if there is one unified source -- there's a bit of black art to the whole magnetics thing. The ARRL has some good publications if you want to build transformers at RF, I would expect that a good book on switching power supplies would devote a good bit of text to magnetics, but I don't know if there's One True Book.

In your case, yes, stacked steel laminations count as "iron core". You have a better chance of the thing working well if you took the core from an audio transformer rather than a power line transformer, but AFAIK laminated steel cores aren't the good choice for switching supplies -- the problem is eddy currents, which get worse the thicker the laminations are (who eddy is, and why his currents cause problems, is a mystery that you may be able to clear up with some Googling).

The number of turns you are using is alarming -- one of the sources of loss in a transformer is inter-winding capacitance; you may be running afoul of this. Checking the voltage ratio with a sweep source, and doing

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some leakage inductance and parasitic loss measurements, may illuminate some problems without resort to an O-scope.

But your best bet is probably to just chuck the thing and get some ferrite E-cores, and rewind the transformer. See if you can find the Amidon website and puzzle through what it has to say on the subject; you may find what you need there (and be able to buy some cores).

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