Re: Groundplane in poweramplifier PCB design

Source: http://sci.tech−archive.net/Archive/sci.electronics.design/2006−04/msg02357.html

- *From*: kensmith@xxxxxxxxxxxxxx (Ken Smith)
- *Date*: Mon, 17 Apr 2006 02:27:06 +0000 (UTC)

In article <e1u6pvopt1@xxxxxxxxxxxxxxxxxxxxxxx>,
Wiebe Cazemier <halfgaar@xxxxxxx> wrote:

> On Sunday 16 April 2006 18:25, Ken Smith wrote:
>
> > There can also be thermal reasons for putting copper in. You can't ignore
> > these.
>
> For me, that's not an issue. The driver transistors will be fitted with
> internal heatsinks, and the output devices are connected through brackets to
> external heatsinks. Everything that needs cooling is taken care of this way.

Don't forget the thermal stabilization for the bias. The device(s) used
for this need to be at the same temperature as the power transistors.
Sudden changes in the output power can lead to sudden changes in device
temperatures so those components need to be on the heat sink if you aren't
using PCB copper to conduct the heat.

> > You want the extra copper as shielding. If you can arrange to effectively
> > have a thick shorted turn around the whole circuit, this will help to keep
> > AC magnetic fields from going through the PCB.
>
> Sounds like a good idea. Will do.
>
> Will it matter (much) BTW if that track has a gap in it?

Yes, it matters about any gap. Think of it this way:

When a magnetic line force passes through a conductor it makes a tiny
voltage right at the part it goes through. Any current that this voltage
may cause is always such that it opposes motion of that line of force.

Now imagine a ring of copper, with 101 lines of force going down through

the center of it. If any of these lines of force try to get away, they will cause a current in the copper ring that slows their departure. If you try to slip another one in, a current will be created to slow that down too.

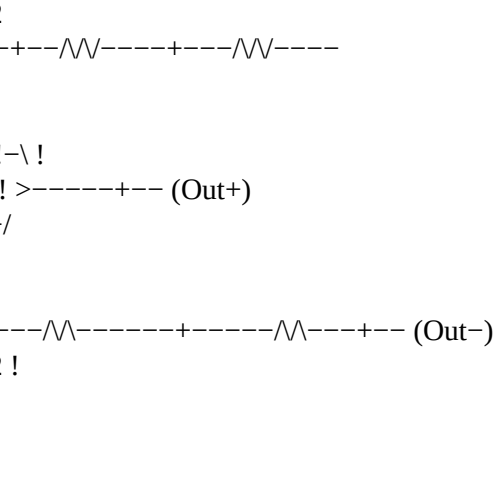
The result of this is that the magnetic field can't change as quickly as otherwise. This is how the copper reduces the high frequency changes in the field.

[...]

> What do you mean, the two sides of the speaker? The voltage feedback for the long tailed pair input stage is taken care of on the PCB, if that's what you mean.

Ideally, the power amplifier puts a controlled voltage onto the speaker. In real life, you are putting the voltage onto the terminals the speakers get wired to.

Lets say, your power amplifier has a pair of connections for the input signal on one side and another pair for the speaker on the other. (This would be a simple mono amp) You want the voltage on the speaker to be some number times the voltage on the input. You don't want any of the voltage drops in the internal wiring to get into the picture. Using an op−amp symbol in some ASCII art, I think makes the idea clear:



The two mystery components represent the wiring. If the R1's are the same and the R2's are the same, a voltage drop in the wiring won't change what gets applied to the speaker.

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kensmith@xxxxxxxxx forging knowledge

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