Subject: Received Grid-Chokes
Posted by Damir on Fri, 16 Dec 2005 16:51:01 GMT
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Just received one pair of grid chokes, AMCC 8 amorphous C-core, 1700H/8kOhms/15mA, 6x5,5x4 cm specifications. Manufacturer is AE-Europe from Netherlands, they had one pair in stock and I got them in a week. Chokes don`t have "legs" or similar way to fix them to chasis, must invent something... The nice factory price of 60 Euros (~$71) per pair exactly was doubled at the end, by addition of various taxes, postages and bank provisions... Listening test coming (not so) soon...

Subject: sweet...
Posted by PakProtector on Fri, 16 Dec 2005 21:52:54 GMT
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Hey-Hey!!!,Mine look quite similar. I have a longer and narrower window. I am setting up the lab to measure the impedance across frequency. I had each half broken into two coils to reduce the end-to-end capacitance. The longer window was to achieve that division.I am also waiting for a few folks to bring the comparitive samples. I ran the 'scope through Cal. What a PItA, and it was OK...and within specification(for an older 100 MHz Tek). The VOM was quite simple by comparison...:)I too need a means of mounting them. I think some Cu buss bar bent to shape over the core and bolted to a thicker piece of Cu will do it. Cu gets pretty hard when worked, no?Looking forward to hearing your impression of the amprphous. That material is VERY nice, even compared to some other exotics. I may try some 7% Si lamination. I know a source, and it ought to be relatively simple to get the core free. Higher perm, and lower loss than 3.5% Si.cheers,Douglas

Subject: Re: sweet...
Posted by Damir on Sat, 17 Dec 2005 14:33:43 GMT
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I found a simple solution, little PCB board and strip of rubber between the choke and PCB. Mounting screws M3 through little 3/8" round rubber washer, between the chasis and PCB...P.S. Direct measuring with capacitance-meter gives horrible ~700pF winding capacitance (not real, I hope:-), haha...

Subject: Re: sweet...
Posted by PakProtector on Sat, 17 Dec 2005 14:51:07 GMT
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Hey-Hey!!!,I don't remember if Cw goes with the square of turns like the L, or directly proportional to turns along with DCR. Must consult the text. Are those center tapped, or one long winding? AND they carry DC?cheers,Douglas

Subject: Re: sweet...
Posted by Damir on Sat, 17 Dec 2005 15:47:13 GMT
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Two coils, connected in series (connected together are both beginning of the windings, close to the core). Two "outside" ends are choke`s two terminal. We have center tap connection, see the pictures.Data - all I know, 1700H/15mA/8k, I measured 7,8k.

Subject: I love an elegant solution…John (nt)
Posted by Forty2wo on Sun, 18 Dec 2005 23:41:52 GMT
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boo

Subject: Re: sweet...
Posted by MQracing on Mon, 19 Dec 2005 15:10:53 GMT
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Hi Damir:Congrats on your purchase... I hope you enjoy them.Out of curiosity... did the manufacturer provide you with any of the following data?1) what is the max operating level? i.e., what magnitude of ac signal volts and at what frequency was this unit designed for?2) I think you've already said that the winding capacitance was not specified. 3) what is the leakage inductance?4) there is a mention of "15ma"... but it is unclear whether this is a spec for a dc current or an ac current.5) is this unit airgapped to carry unbal current? Was the 1700 henry number specified with any unbal dc current component across the windings? At what frequency and signal level was that inductance measured at? 6) do they provide a measurement of the incremental L? If so... at what signal level and frequency?7) Do they provide a measurement of harmonic distortion? On another note; here's an observation I made from the photos... that I have never seen before on a trans...notice how the lamination does not fill the "core area" of the

bobbin? It looks like too large a bobbin was used for this size c-core and you end up with a large void (unfilled core space)... i.e., that the stack height of the bobbin has not been filled by magnetic core material.I realize that the core they used is an off-the-shelf part number (i.e., a stock premade core)... but it looks like the wrong bobbin was used on this core. As I recall the manufacturer of this core does offer specific bobbins for their different size c-cores... I wonder why the coil manfuacturer did not use the right size bobbin.In case you don't see what I am saying.... look at the picture on the left and then look at the left coil... see that large empty space? Never seen that before on an audio trans.Do you think this empty space would have any effect on performance?Just wondering.msl

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Posted by MQracing on Mon, 19 Dec 2005 15:10:53 GMT
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Subject: Re: sweet...
Posted by Damir on Mon, 19 Dec 2005 20:15:46 GMT
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I just E-mailed to the manufacturer, asking for details, and I hope that I`ll have some answers soon.

Subject: Re: sweet...
Posted by MQracing on Tue, 20 Dec 2005 00:05:05 GMT
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Hi Damir:Now... ya made me feel bad. I posted the questions not expecting you to email AE and ask for all that info. It was a rhetorical device... hoping to show the range of performance variables and notions that goes into a design. And calling into question the myopic focus on some very small subset of these expanded parameters.I'd bee surprised if they answered all of them... and I wouldn't expect them to... they do have a right to treat much of that information as proprietary design information. Interestingly, you felt comfortable enough to make the purchase decision without having this info. If I may ask... and not putting you on the spot... if this info were deemed to be vital... how did you make a positive purchasing decision? On what basis did you say... hey... I spend my bucks and get a choke from this company?In the seventeen years of building tranneys... I have never had anyone ask me for the winding capacitance of any transformer we make. And we sell to a host of professional designers who have built scores of products over the

years... and to many thousands of diy end users.Personally I think this whole issue of winding capacitance and leakage L is a tempest in a teapot. And I tried to illustrate this by posting a two part example of how focusing on any one or two parameters could lead to mischief when I put up the examples of transformer A and transformer B.What I have always found is... the best way to get service or information of this type is to contact the manufacturer privately and ask if this information might be available. Explain to them your need for the info and your use of the info. If they say that it is proprietary... then my sense is always to respect that.Likewise... even if AE does provide you with some info... please be sure that it's ok with them to release it publicly... if they wish to treat this info as proprietary... that is well within their rights... and, I certainly don't want to do anything (or be demanding of information) that would vitiate that legitimate stance if that is how they would choose to respond.Though...darn... I am curious as to why they only filled up about half of the lamination stack in those bobbins.msl

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Subject: mounting brackets for AMCC 8 core assembly
Posted by MQracing on Tue, 20 Dec 2005 12:20:32 GMT
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Damir:The manufacturer of this core provides complete design data for mounting brackets for their units. www.metglas.com/products/page5_1_6_2_5.htmactually they offer two different plans... one of which is preferred as "minimum stress" on the core assembly and then an alternative design over the preferred method.msl

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Subject: OEM bobbins for AMCC 8 core assembly
Posted by MQracing on Tue, 20 Dec 2005 12:24:21 GMT
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I thought that Metglas offered bobbins for their off the shelf stock core assemblies. Here is the url for a properly fitted winding bobbin for that core assembly.www.metglas.com/products/page5_1_6_2_6.htmmsl

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Subject: an alternative design
Posted by MQracing on Tue, 20 Dec 2005 13:21:47 GMT
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Damir wrote::::Direct measuring with capacitance-meter gives horrible ~700pF winding capacitance (not real, I hope:-), haha...:::If the amount of winding capacitance concerns you here is an alternative design that you might want to consider.EI 625 x 1/2" stack12000 turns of #40 wirecalc self capacitance of approx. 68.6pfcalc L of approx. 1170 henriescalc L sub l of approx.

1.31 henriescalc flux density at 60vrms and 20 hz = 3101 gaussdcr of approx 3250 ohmsAt 100vrms and 20 hz the calc flux density would be 518 gauss.The inductance listed above assumes use of M6 core material. If you substitute 50% nickel this inductance figure will conservatively be increased to approx 1720 henries which is what your unit is listed at. If you substitute in 80% nickel core... then your L will be greater than the AE-Europe design.But no matter which core material is chosen... the winding capacitance is approx only 10% of the number you have listed above. And the winding resistance has been cut by close to 60 percent. and the flux density is even at 100vrms and 20 hz below the published sarturation induction for 80 percent nickel. And it would be easy to house this design in a channel frame which would provide a mounting mehtod straight from the manufacturer.Disscussion:What is intersting also in this design... is to take a look at what two "buzzwords" bought us... many folks go oow and awe at the prospect of a c-core and amorphous as a core material.But... first let us look at this from the vantage point of reducing Cw. the AMCC 8 core has a window length of approx 1.08". The winding length of the EI 625 bobbin is only .856". All other things being equal the shorter the winding length the less eff capacitance you will get. The EI 625 wins out here.Now... let's look at magnetic path length. The longer the path length the less efficient the core will be as an inductance producer all other things being equal. The AMCC 8 has a magnetic path length of approx 5.2" while the EI 625 has a magnetic path length of 3.75". Next: Gross core area comparison. The AMCC 8 has a gross core area of approx .28 sq in. The EI 625 on a 1/2" stack has a gross core area of .3125". This is as close to equaling the gross core area btwn the two candidates as possible if we stick to widely available bobbins.Next: Net core area comparison. The AMCC 8 has a predicted net core area of approx .22 square inches. While the predicted net core area of the EI 625 by 1/2" core has a net area of .28 sq in. This is because the stacking factor of the AMCC 8 is only 79% while the stacking factor of the EI lamination is 90%. In other words you get more metal into the stack with the EI than you do the c-core made of amorphous strip. And this helps keep your flux density lower as well as increasing your inductance all other things being equal.This is why I recommend that you always reject "buzzwords" as indisputable guides to gaining a notion of quality. What this example also shows... is that, again, given a limited number of parameters to consider it is easy to "trump" any other design brought forth which has been designed to optimize a wider range of performance parameters.Designing to one or two or three isolated variables is trivially easy.msl

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Subject: Re: OEM bobbins for AMCC 8 core assembly
Posted by Damir on Tue, 20 Dec 2005 13:33:46 GMT
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Good info, thanks. I`m still expecting the answer from AE. I don`t know enough about transformers/chokes making, and can`t say is wider bobin then core some design choice that doesn`t "threat" the performance here, or is it a large mistake?!From this reason, I`d like to have a complete set of data...and good communication with manufacturer...and low price...and... About mounting this core/choke - I didn`t have experience with this core material before, very thin layers and mechanicaly fragile (core and winding). I think that rubber/plastic combination didn`t stress our sensitive choke too much... Unfortunately, I don`t have a measuring devices for thorough test...

Subject: Re: an alternative design
Posted by Damir on Tue, 20 Dec 2005 13:48:39 GMT
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Now, that`s a good info, thanks! Must find a time to read it more carefully...:-)About Cw - Cw=68pF is so good that I don`t have any "criticism" - even with "worst case" Rout=14k driver (pentode, cascode), we`ll get f-3 ~ 76kHz, good. Even if this figure is doubled (140pF), "good enough" f-3 of ~52kHz can be achieved with 300B tube...

Subject: Re: OEM bobbins for AMCC 8 core assembly
Posted by MQracing on Tue, 20 Dec 2005 13:53:00 GMT
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Hi Damir:Maybee they have something up their sleeves (i.e., a good "trick") re: use of the bobbin with much of the core area unfilled. Like I said... it caught my eye only because after 17 years of building and being around transformers I've never seen this done before...and... say it is something really trick... they may choose to come back and just say "we feel this is an advantage" and they may not want to offer any in depth explanation for their choice of designing on a physically larger bobbin than the core area itself requires.... if they do... again, in my opinion, we all must respect this decision if they consider their method or their design choices to be proprietary.though by conventional theory... they have made the "plate area" of the capacitors much larger with that extra mean length of turn that is not required by the core assembly. So my guess is that using the recommended AMCC 8 bobbin and keeping everything else the same would result in less winding resistance (dcr) and less capacitance (less surface area btwn the windings)...About mounting... your arrangement doesn't (on first blush) look like it would impart any unnecessary mechanical strain or stress on the core... when you house a unit this is one of the paramount considerations in choosing a mounting method. Your improvised mounting appears fine from this singular vantage point.you mention "low price"... this depends on a very wide range of factors... volume being often one of the key factors... take the alternative design I offered above... have Hammond build it in sufficiently large volumes and I'd bet that on M6 they would be less than $15 each. And for your $15 you'd get a method of mounting your transformer. In small volumes I would guess that the price would be some two to three times higher than the guess I've made above. Price also depends on a range of other factors... what materials are inside the transformer... what insulations (if any), what kind of magnet wire is being used, what kind of solder is being used to make internal connections... there are many other variables which could be juggled... to meet a low price point or a high performance level... it's the customers choice... msl

Subject: Re: an alternative design
Posted by MQracing on Tue, 20 Dec 2005 13:59:06 GMT
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It's yours Damir. Have somebody wind it and test it and see. It will get you close to the predicted numbers. And it is in the public domain as long as it is noted that it is not an approved design of our company (MagneQuest). But rather was offered as an excercise to show how Cw could be minimized in isolation by juggling a few different design parameters.that said... it's still a basic design... and could be tricked out much, much further though then we are likely to get into the territory of me not wanting to disclose any of our own proprietary design strategies, methods or goals.but for a free, give away design... it might not be horrible.msl

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Subject: what tube are you using?
Posted by MQracing on Tue, 20 Dec 2005 14:13:48 GMT
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Hi Damir:What tube are you using that has such a high Rout? I'm curious because I would like to run it through a program of mine and see what numbers I come up with.14K output impedance is probably one of the worst cases.... take the same Cw numbers and check it out if you were using say a 6C45pi or a 5687 tube as just two examples.Perhaps moreso in the case where you have an exceptionally high output impedance... you might need to concern yourself with Cw... but there are probably other factors in a trans design (i.e., a grid choke) that might be even moreso a limiting factor than the Cw. All other things being equal.... your going to need much more L to support that output impedance of 14 or 15K... as a general rule of thumb... the more L you need the more turns you need and the larger the core size you might need (core area contributes to L)... and all of these will contribute to having greater Cw.... but what choice do you have... if you skimp on L to keep the Cw low.... then the L will come and bite you in the butt performance wise... so it is always a trade off of factors that goes into a design.... not just simply some mantra of "keep Cw low"...As a bit of practical advice... correspond with and communicate with the magnetics provider of your choice... tell him your application... and ask him for his advice...as an example.... if you asked me if your application would be a good mate with our CT choke... I'd say no.... and NOT because the Cw is too high (it isn't) but because our design does not have enough L to provide a good loadline for a 14 or 15K impedance. So even though I might not disclose what our Cw is... I would know enough to recommend to you that you not use the particular part that we make.again... hopefully, this provides a richer and deeper context of circuit engineering than simply looking at just one variable and basing all notions of "goodness" on just a singular parameter.msl

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Subject: correction of a typo....
Posted by MQracing on Tue, 20 Dec 2005 14:22:45 GMT
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hopefully this was the only one...:::At 100vrms and 20 hz the calc flux density would be 518 gauss.:::should have read 5168msl

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Subject: if I may expand on a theme....
Posted by MQracing on Tue, 20 Dec 2005 14:53:02 GMT
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Grid chokes are NOT one size fits all.As I by example tried to point out in my previous post... different applications could very well require different grid choke designs...in much of the discussion we've seen so far as re: grid chokes it has been seemingly assumed that all grid chokes are all built for a universal range of applications.This is not the case... as the range or field of applications in vacuum tube audio can be so very wide... the best advice for any diy'er is to ask your magnetician... communicate with him\her and let them know what your doing. Then they can perhaps offer some constructive applications assistance.but... don't confuse the notion... that all grid chokes are designed to work in all applications... or at least not optimally.A grid choke for a source impedance of say 15K would be designed differently than a grid choke for a source impedance of 1.8K. And any testing that fails to take this into account also fails.msl

Subject: Re: what tube are you using?
Posted by Damir on Tue, 20 Dec 2005 17:21:50 GMT
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High-gm pentodes (say, D3a, E280F, E810F, EF184, 12BY7...) can be usable for single stage 300B driver with relative small anode load, say 8,2k-15kOhms. A=Ra*gm, and with Ra=10k and say, gm=5mA/V (possible with unbypassed Rk), we have A=50. But, internal anode resistance rp of the pentode is high, much larger then Ra - then our Rout = Ra // rp, and Rout ~ Ra - or 10 kOhms in this example.We can observe cascode like "quasy-pentode" without g2 current and less noise, but the same "problem" is present - large internal resistance. I tried 5687 tube here, see the "report" down low... For long time I experimented with various drivers, and best subjective performance/sound would be finally soldered in a nice box... Didn`t decide yet... P.S. Interesting comparison of various pentodes (and some triodes) can be found here:
http://www.pmillett.com/pentodes.htm

Subject: Re: an alternative design
Posted by PakProtector on Tue, 20 Dec 2005 23:43:40 GMT
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The whole goal of a choke is not just developing inductance. There are plenty of things amorphous, or nanocrystaline materials do far better than 3.5% Si or even 7% Si steel or some of the Ni alloys. These benefits are plenty of reason to listen to the buzz words you claim should be rejected. Let's look at what is in your catalog....looks like EI to me.cheers,Douglas

Subject: Received the response from AE
Posted by Damir on Wed, 21 Dec 2005 11:25:39 GMT
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Mr. Blaauw kindly reported me that they will let me know the technical data as soon as possible, probably second week of January (holidays).When I receive them, I`ll post the summary.

Subject: core geometries and materials
Posted by MQracing on Wed, 21 Dec 2005 13:20:01 GMT
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::::Let's look at what is in your catalog....looks like EI to me::::We stock a wide range of shapes and styles of core materials includingEE, UI, EI, F, L, single c-core and double c-core.Our inventory of core materials includes (but is not limited to) low nickel, high nickel, M6, M4, M3, M2, hi b, cobalt, etc.c-cores aren't magic... they're just another shape with their own range of pluses and minuses. From an economic point of view... they are often less expensive to build with than EI's... for that reason... some of our entry level transformers (where the labor costs of building with EI's is too high) may soon be built on c-cores. For example we have one prototype that has traditionally been built on an EI 100 by 1.25" stack... with the high labor costs of assembling the EI's, bolting them together for waxing, waxing them, cleaning them, taking the hardware out and cleaning it, cleaning the covers, painting the covers, and then installing the covers and putting the hardware back in... we've used up a ton of expensive north american labor. If we switch to a c-core... we put the two half c's together (they are already 'stacked') we place it on a mounting plate, we band it, impregnate it and ship it... much less expenditure of labor.No covers, no processing of covers, no painting of covers, no need for expensive brass hardware, no need to clean and reinstall this hardware, no cleaning of the lams and painting of the lams... it's huge labor savings to use c-cores...So even though the raw "unassembled" cost of the EI's in this 100 by 1 1/4" stack is less costly as a raw material... the assembled, ready to use c-core which may cost as much as 10 times the cost of the unassembled EI's... once you factor in all the labor components the c-core often comes out being the less expensive option to build on.And... one other point of potential interest... if we factor in craftsmanship... it takes a lot more skill to assemble a good quality stack using EI's than it takes to band together two halves of a c-core. But... as illustrated in the example above... when "keeping the cost low" is not the prinicpal driving force in a particular design... then the EI lamination shape still offers superior performance in many applications. msl

Subject: Re: core geometries and materials
Posted by PakProtector on Wed, 21 Dec 2005 20:32:49 GMT
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quote>>But... as illustrated in the example above... when "keeping the cost low" is not the prinicpal driving force in a particular design... then the EI lamination shape still offers superior

performance in many applications. 'many applications' is right up there with 'most people' and weather forcast generalizations. One can generalize into any result desired. Most people are guilty of it.cheers,Douglas

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Subject: Re: core geometries and materials
Posted by PakProtector on Sun, 25 Dec 2005 00:43:22 GMT
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Hey-hey!!!,The strip wound, cut core also offers the ability to size the winding area to a particular design requirement. The cut core also has no portion of the magnetic path going perpendicular to the grain orientation. One can also make more than 1 set of cuts in the core. Make the individual gaps smaller, and cut down on Iron(or what ever the alloy)losses.There are lots of other neat tricks...this is just a few from the front of the book.cheers,Douglas

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