

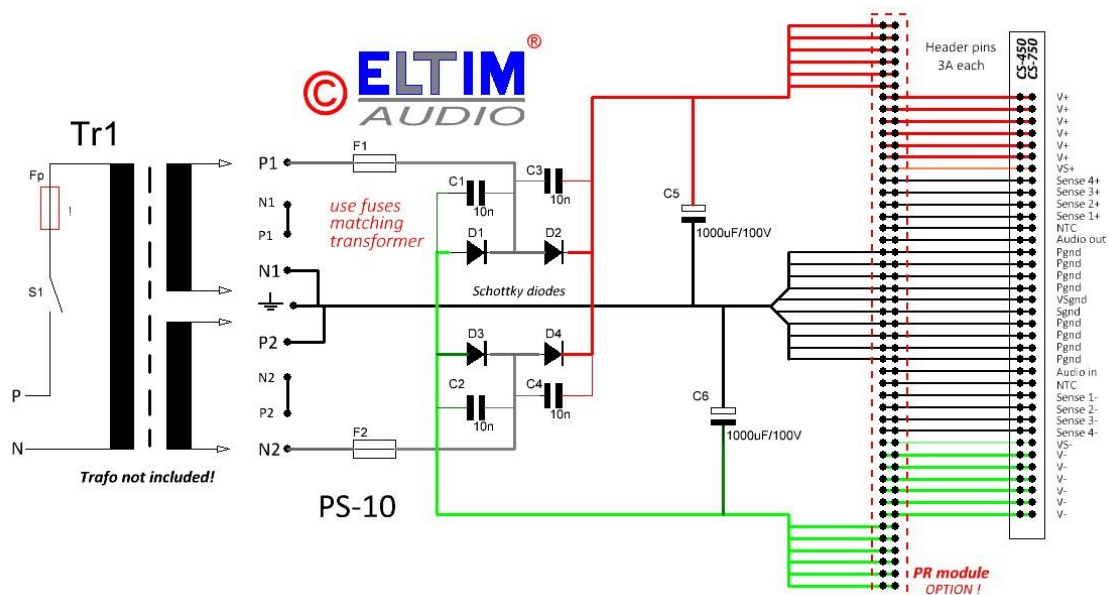
PS-10 Power Supply module

We designed this PS-10 for our CS-450 and CS-750 modules where they are L-mounted to. We took special care that it can deliver extremely high power for longer periods of time. Just add one large or two smaller suitable transformers to this pack to complete this Power Supply. Besides the transformer wiring, there is NO further wiring needed!

Schematically this is as any other regular symmetrical linear Power Supply module, with the exception that it exactly fits to our CS-modules. We use extremely wide tracks (95% of all double-sided surface actually) and we added some extra parts most linear Power Supplies lack, like caps and cooling around the rectifier diodes, being efficient and fast Schottky types.

This PS-10 Power Supply module highlights:

- Space saving, L-mounted construction in combination with any ELTIM CS- module.
- Gold plated, 2x36 pin (3A each) angled female header connector provides direct contact with CS-board.
- Gold plated, 2x 48 pin female header connector for mounting of a PR protection module.
- Push-in connector for connecting the secondary transformer(s) windings.
- Quality, covered fuse holders (max. 10A) in the transformer secondary power lines.
- Unusual wide copper tracks (7mm+ eq. 22A) on a double-sided (EU made) board for high power purposes.
- No wiring needed, except for transformer connections by high quality WAGO push-in terminals.
- Dimensions: 200x75mm (height depends on diodes heatsinks).



Rectifier bridge diodes

On a high-power supply like this, it is most important to reduce the dissipated heat as much as possible. We solve this by using large TO-247 Schottky rectifier diodes, mounted on heatsinks which are vented by 9x Ø4mm holes under each heatsink in the PCB, allowing a vertical air flow from under the PCB.

These types of diodes have a lower forward voltage than regular ones and so reducing losses. They also are “faster” than regular ones and can handle way higher inrush currents. As always should be, they are paralleled by 10nF MKP capacitors to reduce noise and HF.

Capacitors

On this ELTIM PS-10 Power Supply module only fit 2x Ø25mm [MUNDORF MLGO](#) 1000uF/100V electrolytic capacitors. There was space to do it, so we also made Ø18mm/pitch 7,5mm possible as well. They are just there for a proper startup of a possible connected Protection Module. The actual, high-capacity supply capacitors are on the CS-450 and CS-750 modules, possibly assisted (or even replaced) by chassis mounted capacitors like [MUNDORF MLHC](#) or [MUNDORF ESC](#) types. There are many more types to choose from. Please don't use the cheapest ones, nor N.O.S.....

Wiring

With this module, wiring is most easy. Just L-mount the module to about any ELTIM CS-module (except CS-35(ps) and CS-40/60ps) via the 2x 36 pin angled header connector and all required connections are made already.

Study the schematics and discover that the +V and -V are provided via 2x6=12 pins, which could carry 3A each. So, theoretically you could drain 36A over these contacts, which will never happen. Most impulse current will come from the CS-board connected electrolytic capacitors. Power ground even uses 2x 8 pins and there are also two pairs of pins for the VS-module: 2 pins for its supply ground and two pins for the input signal ground.

All three grounds meet at the centre tap earth connection of the PS-10 board for minimum hum and noise. Also, a lot of copper on the double-sided PCB is grounded. All our Power Supplies for ELTIM CS-modules are designed this way.

Transformer

Connect a double secondary windings transformer to the centred push in connector block, that's it. If a single transformer is too large you can decide to use two smaller ones instead, see more info at the end of this document.

Since our amps run in A/B setting, the efficiency is around 67% by definition. This means that your transformer needs to be able to deliver 150% of max. output power (rated in VA) if you intend to use it indeed at max power for long time.

One winding to the outer (large text) P1/N1 and the other one to P2/N2. You could earth the pack via the middle tap.

There is no further wiring needed, just connect a transformer to this ELTIM PS-10, input lines to a VS-xx and output lines to a CS-xx. All modules are directly connected by multiple pin headers without further wiring required, a clean amp without bundles of wires.

NOTE: if you don't measure V+ and V- voltages, reverse the connections of one of the sec. windings, then it will work!

If you connected the wrong way, the ac voltages are in counter phase and will cancel each other out due to this.

There are two fuse holders (F1/F2, 5x20mm) on board. Place two fuses, matching the connected transformer specs.

Don't forget to fuse the transformer at the primary side as well !

Protection module (optional)

You could add a Protection module (in development) at any time. This module is detecting all kinds of errors and disconnects this power supply from the amplifier module if something is wrong. This is a better way than just disconnecting the speaker, since obviously something is wrong with your amp. While doing so, there is also no distorting relay contact in the speaker line.

All (max. 8) source currents are measured (any fault Mosfet detected in fastest possible way), input signal compared to output signal, DC-output and clipping detected as well as overtemperature of both the interior and the heatsinks.

NOTE:

Do yourself and us a favour and do NOT use a switched mode power supply (SMPS) i.c.w. our High-End amps.

Our VS-xx/CS-xx amps won't perform at max. then and you could be disappointed, or even angry with us.

The worst chain in an audio circuit defines the quality of the total and in this case, it is an SMPS for sure!

So far, we have not seen an SMPS able to deliver the punch power we can make with these amps.

Nobody tells, but their impedance is rising with load frequency. Due to this, SMPS's

tend to let a linear amp sound "hissing (tsjjj...)" and with "screaming" cold highs.

Most class-D amps do that anyway, so there you wouldn't notice..... They only make power, ours also make music.

Do you believe SMPS is more efficient? An SMPS has around 70%, our linear ones around 95% efficiency!

Besides that, our linear versions last for at least 15 years, an SMPS maybe not even half of that.

With this knowledge: the advantage of higher efficient (@ full power only!) of class-D designs is completely destroyed while using an SMPS feeding it.... It only makes sense for compact/light designs.

A linear amplifier and linear power supply like this PS-10 together show a higher efficiency, especially for home use equipment where its not running at full power all the time!

And then we are not even talking about the difference in sound quality.

Class-D's don't need alignments and use cheaper parts, so cheaper to produce, more profit.....

So, what do you want? A switching amp with 85% and SMPS with 70% efficiency and average sound, or a nice, highest possible quality and fantastic built, long lasting linear amp

with efficiency of 67%, PS 95% and top quality sound? *Customers and reviewers say we are in top 10!*

Who are those? Mark Levinson, Bryston, McIntosh, Accuphase, etc. Oeps..... We need to check that -)

All we can say that our (now sold) Accuphase P-450 power amplifier is no match, even compared to CS-40ps.

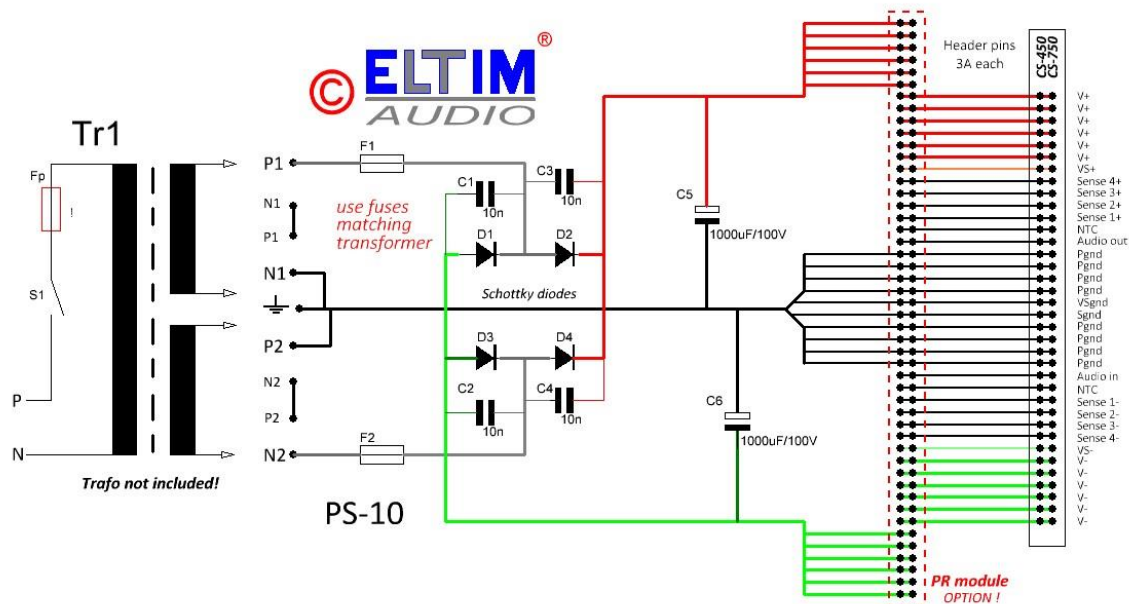
As my wife remarked: "P-450 sounds great, but yours make music".

***These designs are copyrighted by
ELTIM audio BV, Louis Timmers 2024 © PE1LTM***

www.eltim.eu

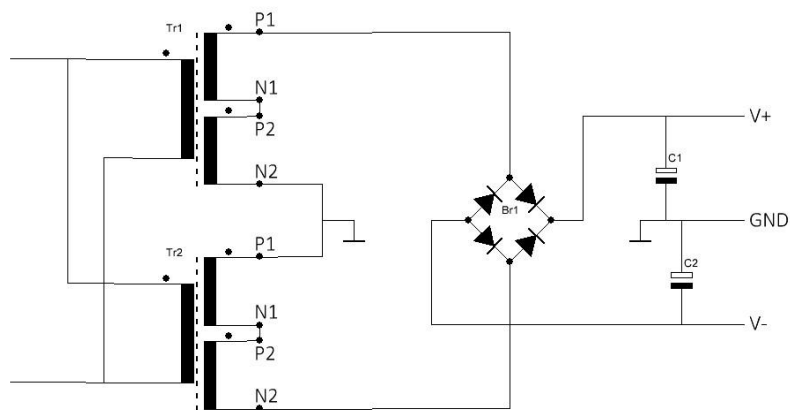
Transformer thoughts

A high-power supply requires a very large transformer. This could be connected to our PS-10 like this:

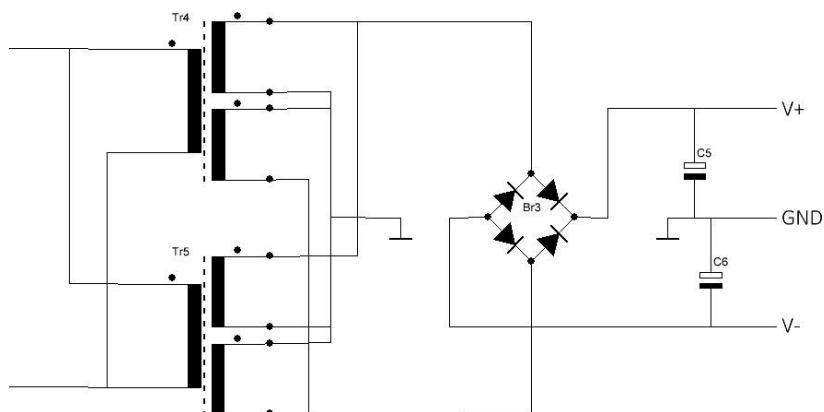


Unfortunately, there mostly isn't enough width available to mount those large sized transformers though.

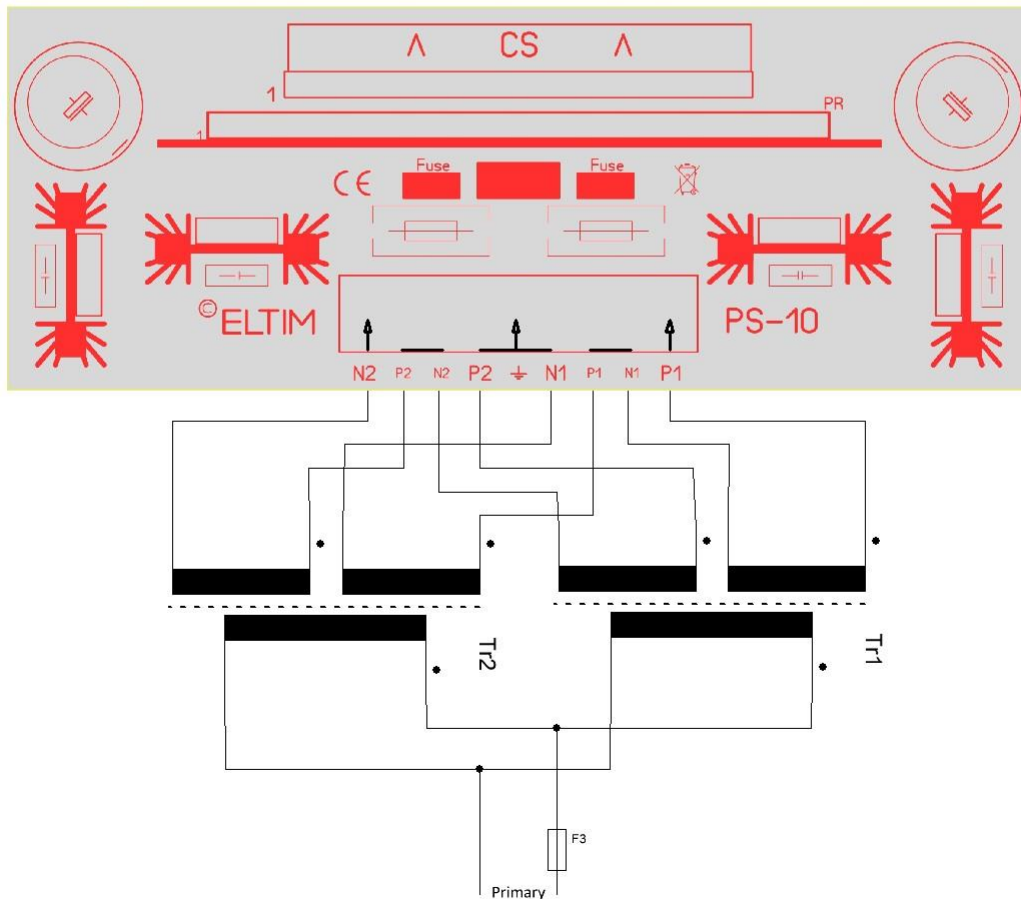
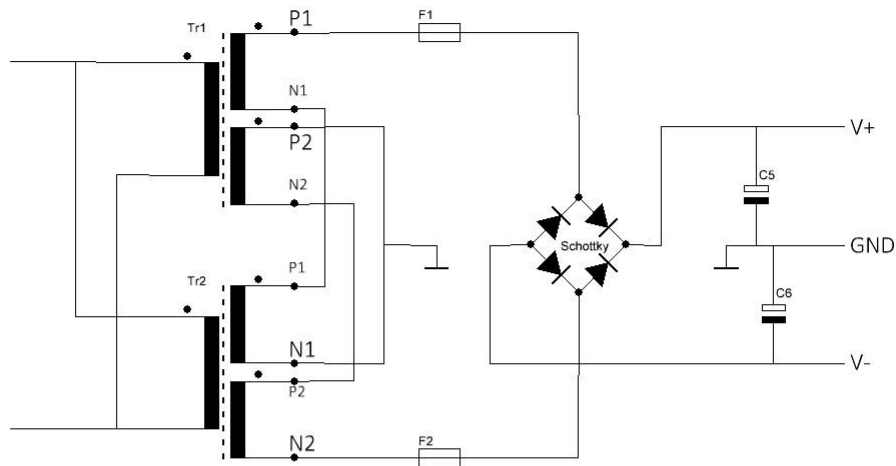
Some believe that two transformers connected as below will double the total load capacity of the transformers. Since the upper transformer only delivers power at the positive half sines and the bottom one only the negative half sines, this is NOT the case. You still have the power (in VA) of a single transformer, divided over two! Connection is like this:



Some believe that paralleling the secondary windings of the two transformers will do fine. Also that is not working properly. There is always a slight difference in output voltage and the transformer with the highest voltages will "lead" and supply most of the power. The other one is doing about nothing:



ELTIM PS-10 double transformer connections



One of the first and one of the second transformer secondary windings are connected in series.

For that P1/N1 and P2/N2 with smaller text are connected. (Single trafo uses large text connections only.)

The same for the other two windings. Only in this case both cores will be used at maximum all the time, despite slight differences in voltages, and you indeed double the transformers output as intended.

Of course, both transformers have to be of the same brand, type and voltage.

Another advantage is that you can use lower secondary voltage transformers, being better available.

F.e., if you want to supply $\pm 90\text{Vdc}$, you need two transformers of $2 \times 33\text{Vac}$ = in series $2 \times 66\text{Vac}$.

Another tip: It is always difficult to power up large power amplifiers due to the extreme inrush current caused by the transformer cores and high capacitance electrolytic capacitors. Simply put the primary windings in series for about a second and then parallel them > problem solved.

We plan to make a circuit for that mounted on the back of the IEC power inlet.