

# High-end / reference quality POWER AMPLIFIER modules

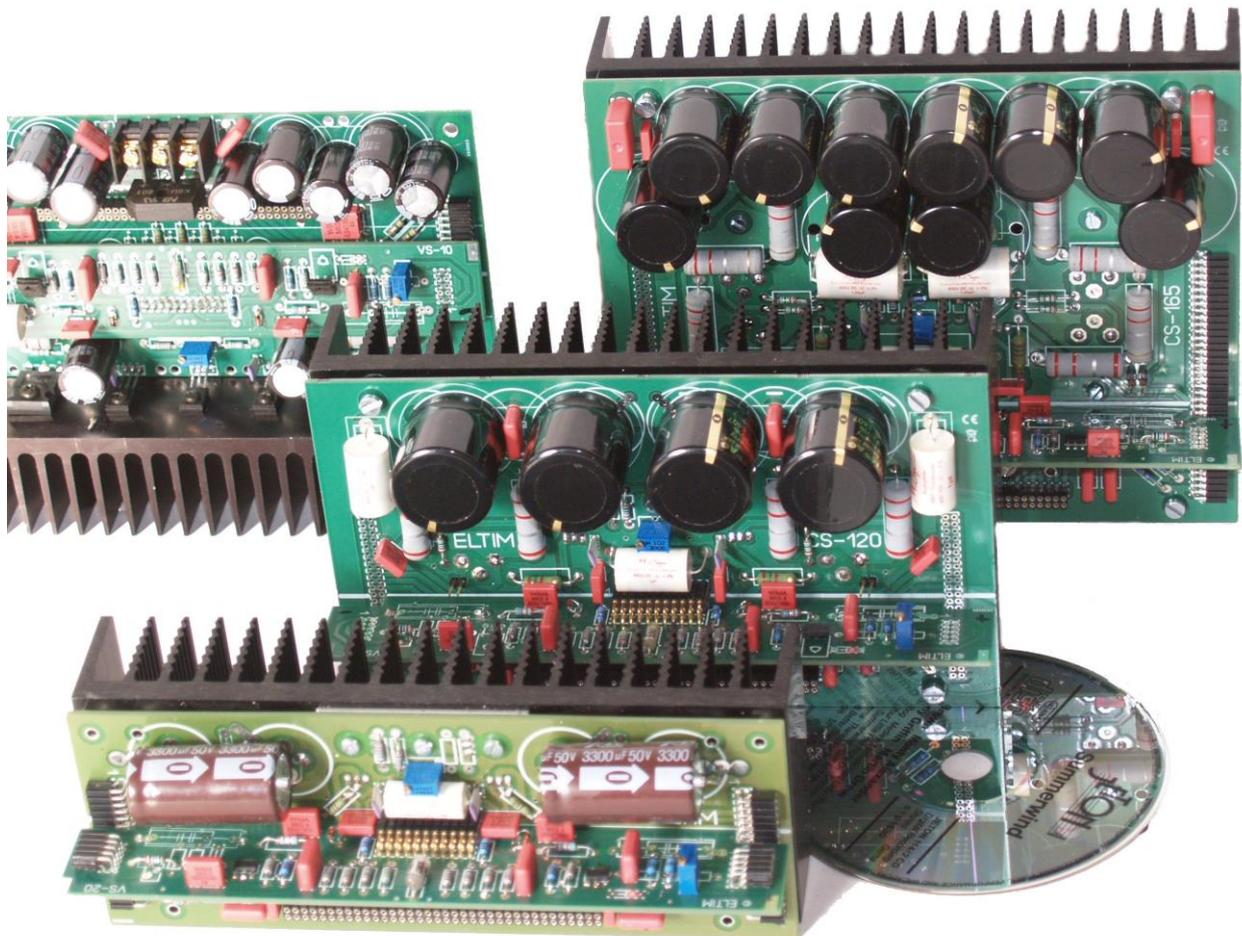
In brief

updated January 29<sup>th</sup>, 2015

**ELTIM**  
**AUDIO**

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We noticed that about all amplifier designs are built in a similar way; all separate PCB's hooked up with a lot of wire. We believed that due to a different construction and symmetrical layout of the electronics the sound would improve. With better we mean a more reliable amp with more natural sound. And it does, as [is recognised by several audiophiles](#) by now....



The whole idea was to develop an easy to fit amplifier module range making it possible to fit in any amplifier system for every need from reference quality to rugged PA-applications. To fill this working field, the design must be as rigid and temperature stable as possible as well as being capable of driving the most difficult loads. Our designs are fully symmetrically designed, electronically, PCB-layout AND mechanically.

In order to make this wide range possible we needed (and wanted) to use high power Hexfets for rugged applications and unique EXICON lateral Mosfets for true high end applications. Despite it's fantastic tube-like sound, fast Hexfet and Mosfet designs mostly are compromised due to a poor PCB layout and limited power capabilities. We made the PCB's symmetrical also by using human common sense and "old school" handwork. Takes time (read: money) though....

We believed we could improve the sound even more by using better components as you see everywhere else.

The picture at former page shows four different models; different in size and power supply capacitors used. With these, one can build a number of different amplifiers.

A fully equipped ELTIM amplifier (dual mono) looks f.e. like this:

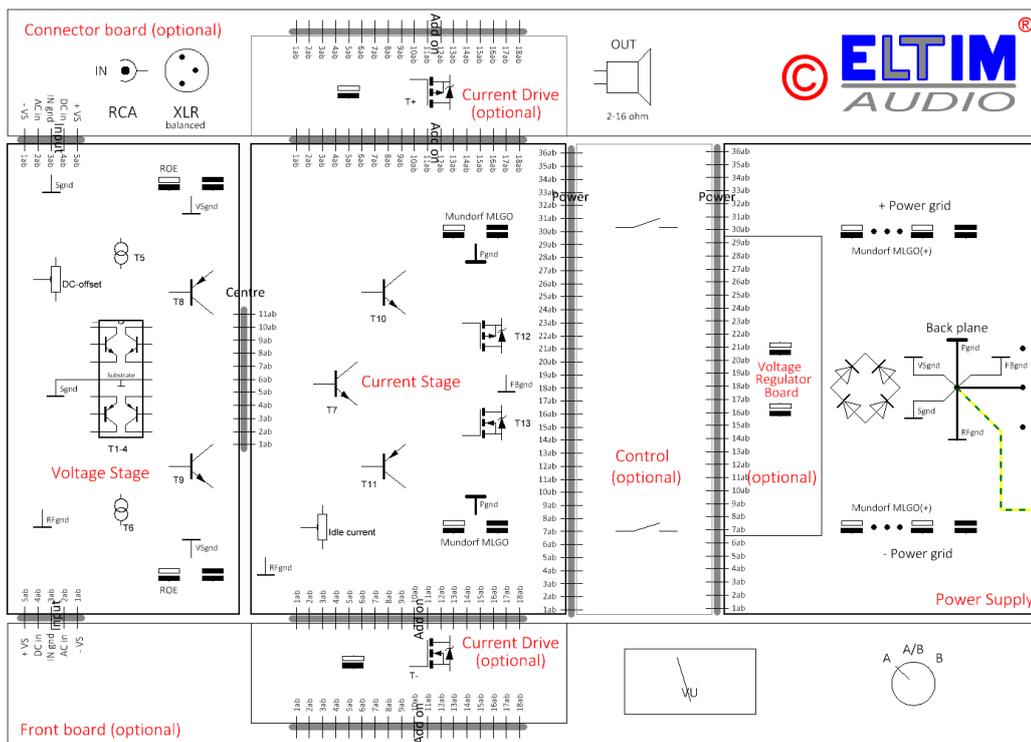


**Very first custom built ELTIM A3300 HRQ model.**

You don't need to be that technical to recognise that this indeed looks different than about all amplifier designs available today. Everybody will notice that there is about NO wiring, cause of Electromagnetic Interference (EMI) and lack of speed and pace and rhythm. Also a powerful bass punch has to suffer due to too long leads from where the power is (capacitors) and where it has to be (power transistors). With our designs all is located as close to each other as physically possible and connected by wide copper tracks and high quality gold plated beryllium copper connectors.

By connecting a number of different modules a complete High-End or even Reference Quality power amplifier comes alive:

### ELTIM Amplifier modules layout



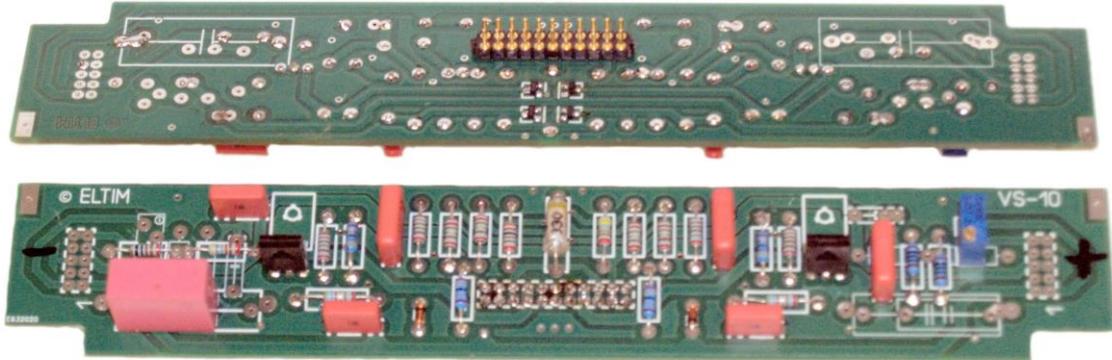
At following pages we give some brief info about these modules.

## Voltage Stage modules

The input module is as we called it the Voltage Stage module.

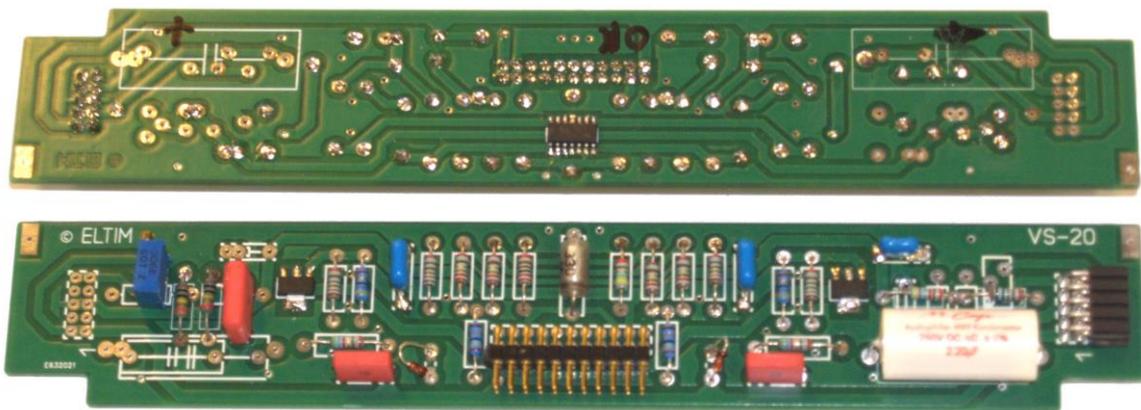
These modules are stack- or L-mounted to our Current Stage modules by a 2x11 pin connector. Only together they form a working amplifier module. By the way: all connectors both rows are paralleled.

**VS-10** For lower costs and/or high power purposes we made the VS-10 version, based on regular (SMD) transistors:



The input circuit is formed by a group of 4 SMD transistors positioned within 1 cm<sup>2</sup> of each other, making sure that they maintain at the same temperature. This prevents temperature “drift” of the amp.

**VS-20** version is using special input transistor mirrors. You have to look for the T1-T4 couple in the picture below, since it is a very small SMD component. This rare, exactly symmetrical 4-transistor array with a grounded substrate in SMD format is used in order to obtain a perfect symmetrical layout on this small 3,5cm wide board. While grounding the substrate of this chip, noise, RFI, etc. at the lowest (unmeasurable) possible level. “Of course” you will find it exactly in the centre of this board:



As a matter of fact: you can place a calling GSM phone directly on the PCB without hearing the dut, dut, dudut.

## VS-modules input circuit/DC-level control

All VS-modules have a DC- and AC-input. While using the AC-input, signal flows through a reasonable high quality MUNDORF MCap250-2,2uF.

The idea of the DC-input is that you could use an external and large high-end cap outside of the VS-board, f.e. a Mundorf Supreme capacitor or even leave it out if your preamp already has an output capacitor.

We provide special input boards where even the largest (f.e. Mundorf SUPSGO) fits.

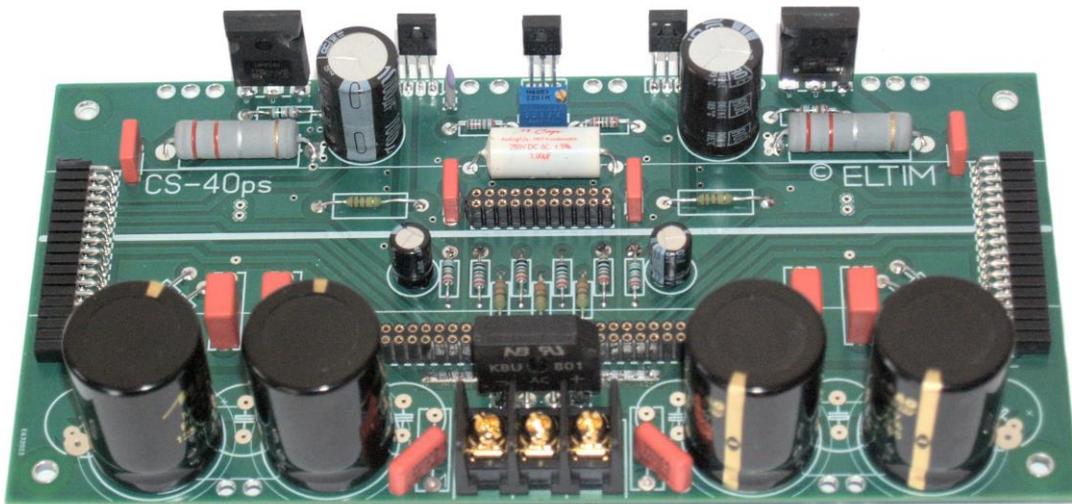
You can also connect a DC-Servo circuit to the DC-input. This circuit keeps the average DC-level of the speaker line at 0Vdc regardless temperature caused shifts, altering of components, etc.

At one side of any VS-module the Audio input circuitry is fitted (horizontal mounted parts, right in the picture), on the other side the DC-control circuit (vertical mounted parts, left in this picture) find it's place. Both circuits fit on either side of the VS-pcb's. F.e in the VS-10 module above it is the case.

## CURRENT STAGE Modules

The power delivered to the speakers comes from our Current Stage boards, processing large currents. This one is driven by the former mentioned Voltage Stage modules via the centre 2x11-pin connector. Depending on the model there are only some “slight” differences in the number of parts and their values. About all are equipped with some Power Supply capacitors very close to the Hexfets/Mosfets for better impulse response. Speaker leads can be connected to the left and/or right connectors. The true power comes from a separate Power Supply board. We have stack-mounted as well as regular L-mounted versions available. You also could make a “hardwired” Power Supply yourself. A Power Supply is connected by the long horizontal connector.

### CS-40ps



**CS-40ps** (HE version) with integrated Power Supply, for L-mounting to any cooling surface as commonly used. Only with this module the long horizontal connector could fit a protection or a voltage regulator board.

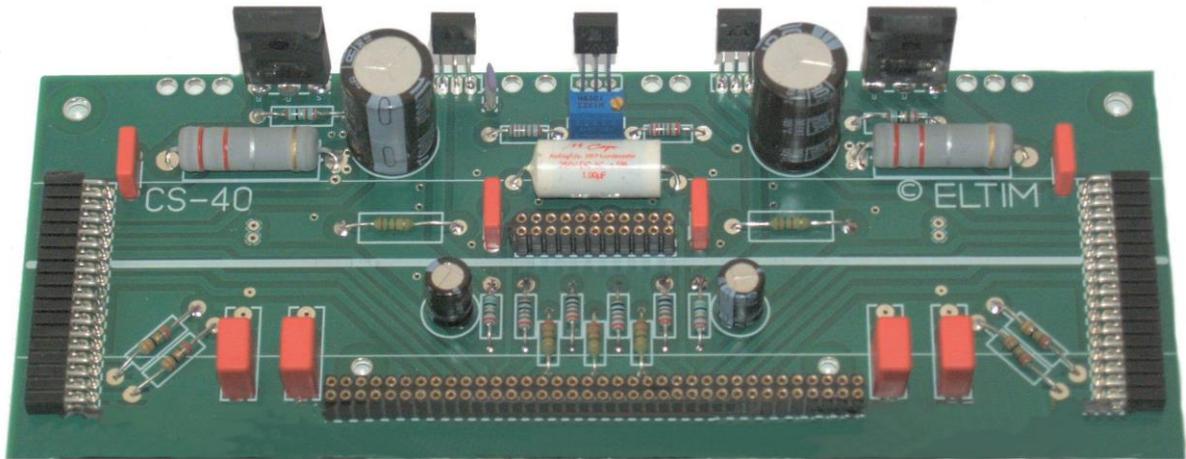
While using this CS-40ps module, an amplifier can be built in the most simple way:



**Example of our very first custom built A 2280 RQ amplifier.**

Just connect one or two transformer(s) and the input/output connectors with some short leads. Since the customer of this amplifier just needed little power for his high efficient speakers, this MODU Slimline cabinet gives sufficient cooling to do the job. Of course these CS-40ps modules also fit in f.e. the MODU Pesante Dissipante cabinets with way larger cooling profiles. The most easy layout stays similar as in the picture above.

## CS-40



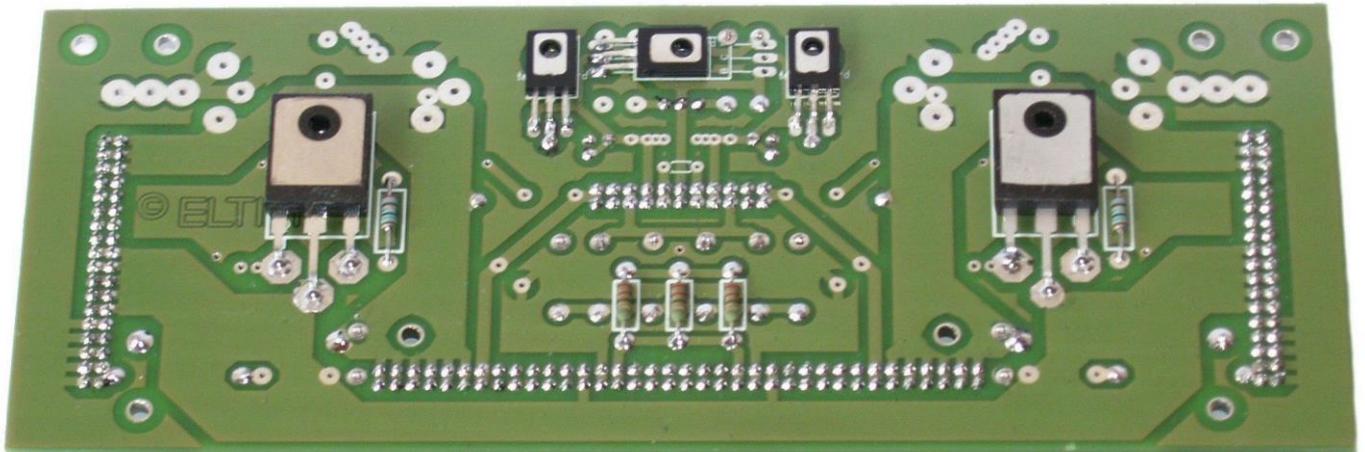
[CS-40](#), fits in any cabinet, L-mounted to any cooling surface.

This PCB comes closest to about all amplifier PCB designs we have seen in the past 40 years: Transistors at one side while using a separate power supply. BUT: also here the input part is separated (not shown here) and f.e. our PS-80 power supply module could be mounted on top, resulting in just and only transformer wiring.

This board could also be used for huge amplifiers (2kW+/2ohms). Then the two power transistors are not mounted and replaced by some wiring or a PCB leading to as much power transistors as you like..... In that case the huge power and speaker currents are fed/drawn directly from these transistor banks.

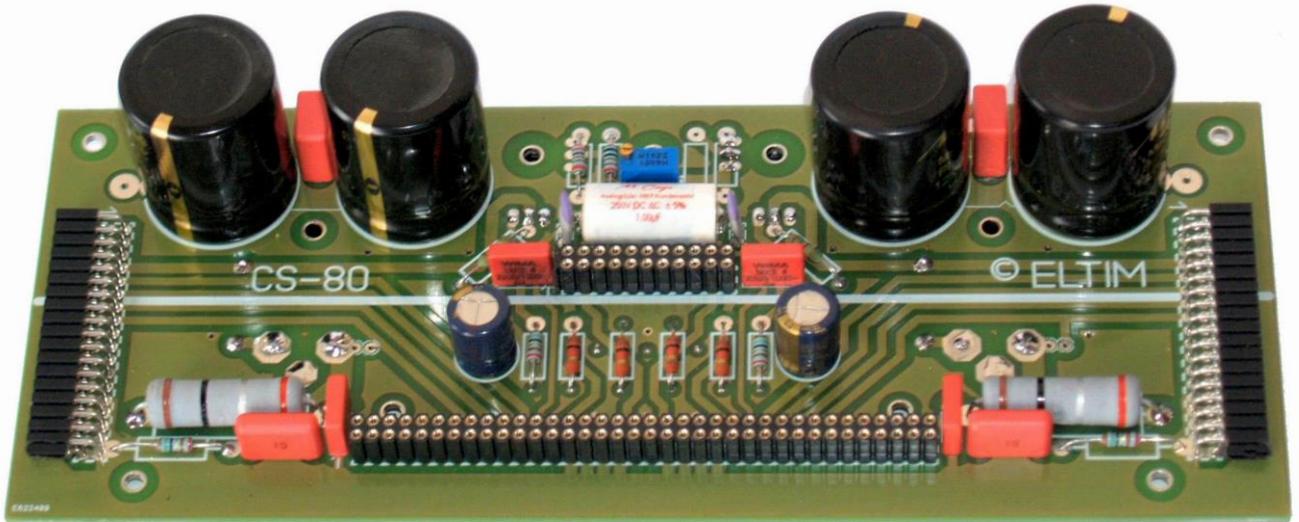
### **ELTIM stack mounted amplifier modules.**

Quite unusual are following boards, fitting flat on the backside of a heat sink. Probably this isn't done by others due to the heat exchange between the heat sink, PCB and components. However, our CS-80 (picture) f.e. becomes only hand warm while producing quite some power. Besides that, the capacitors are 105° types (MLGO 125°). We also use highest quality FR4 boards which are double sided, with soldering masks and printing on both sides and tinned for easy and reliable soldering.



CS-80 back side view.  
Mounting directly to a heat conducting element/surface.

## CS-80



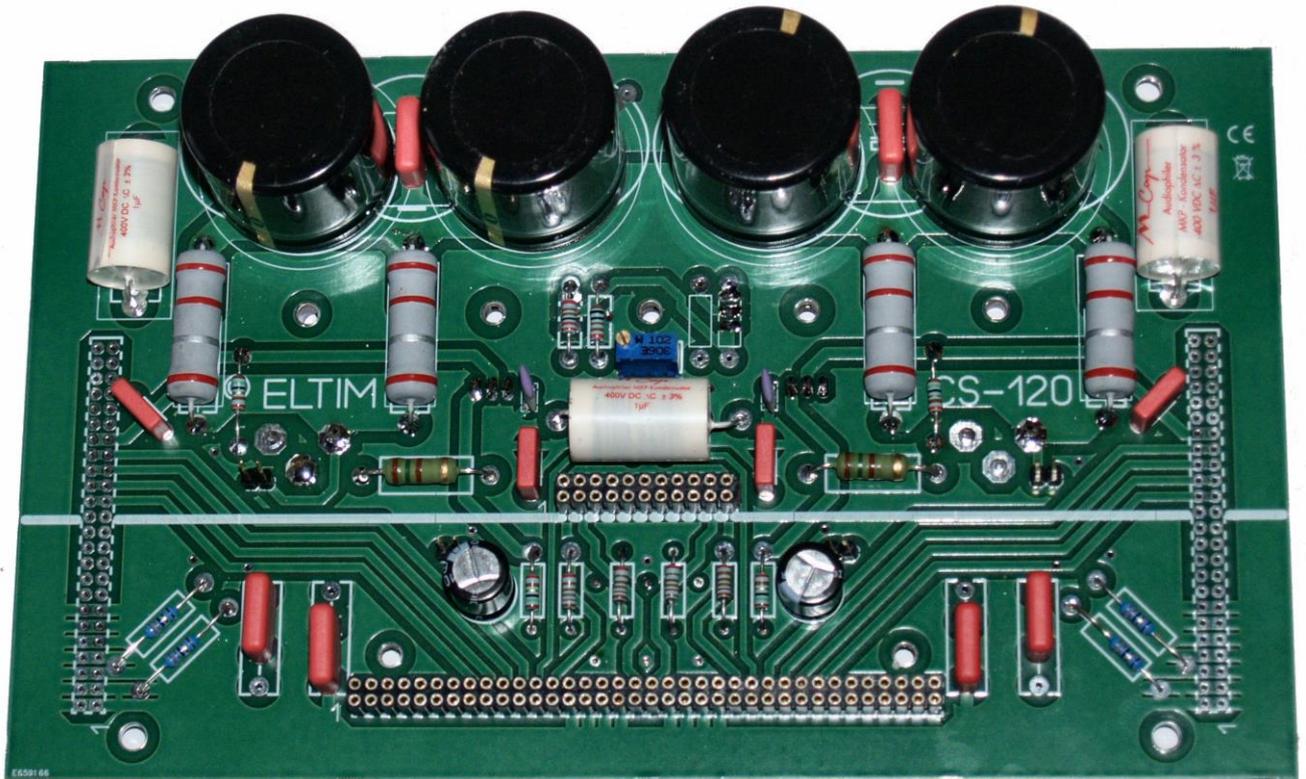
[CS-80](#) (HE version), fits flat on a heat sink.

Power supply PS-80 is stacked or some other Power Supply L-mounted to the bottom connector.

With this module you could build any “common sense” (50-150W/8 ohms) amplifier you want.

An extra CD-80 add-on module (see below) adds an extra power transistor pair, increasing performance.

## CS-120

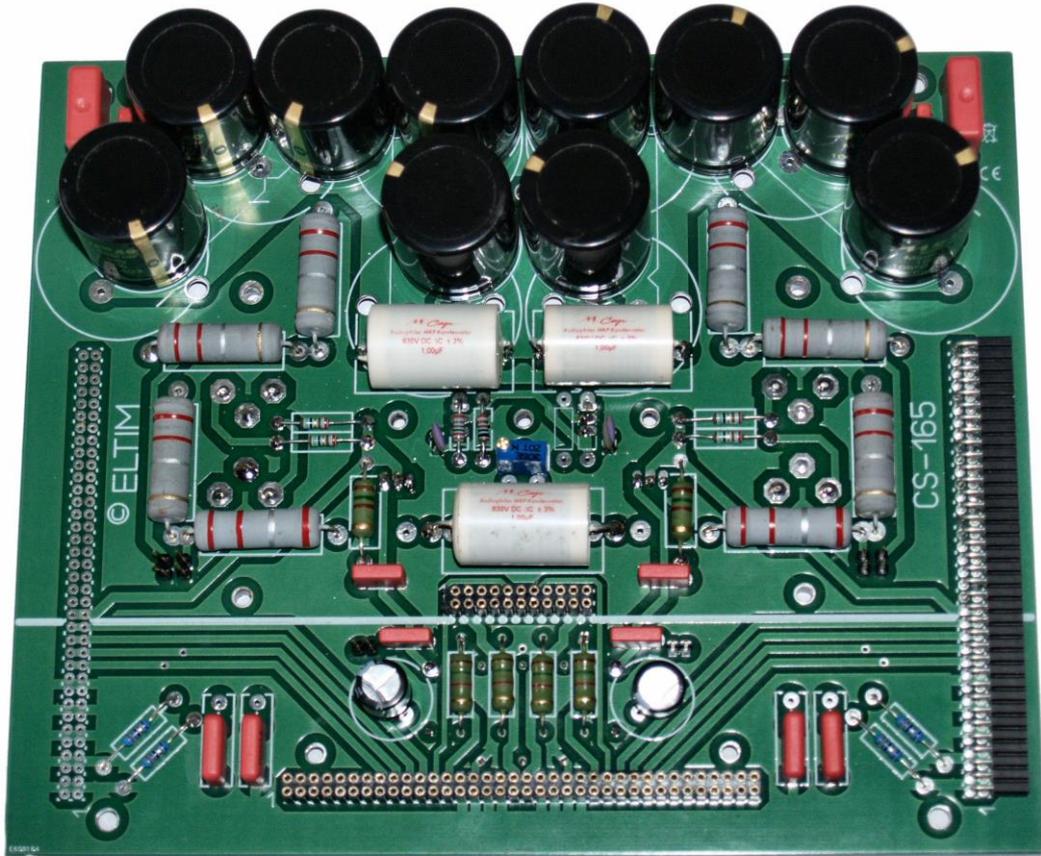


[CS-120](#) (HE version) fits flat on a heat sink.

Power supply PS-80 or PS-120 is stacked or any other Power Supply L-mounted to the bottom connector.

Basically it is the same as the CS-80 module. Due to the extra PCB space some larger capacitors can be mounted and we could use 4 instead of 2 power resistors, resulting in a better “punch” and performance.

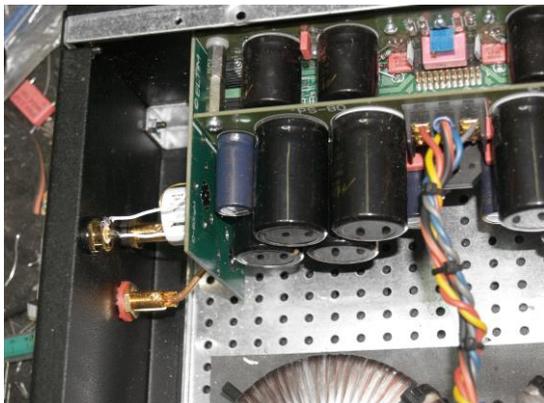
An extra CD-120 add-on module (see below) adds an extra power transistor pair, increasing performance.



**CS-165**, (HP version) top of our range model fits flat on a heat sink. Basically it is similar to a CS-120 module, but due to the larger PCB area, we could use TWO pairs of power transistors on this board and some more power capacitors. Even better “punch” and performance. Theoretically, with two extra CD module pairs (see below) left and right of this module, this one could draw about 16A from your 230V net, converting it into true High End 2kW+ power in bridged mode.....

**Add-on Hexfet/Mosfet modules.**

In order to increase rated power drive and/or spread the dissipated heat more, an extra transistor pair(s) can be mounted left and right of the CS-boards. Mounted to any of these CS-modules will about double the damping factor as well as the driving current capability. With this add-on the length of the modules will be 300mm, height and depth stays the same. Left and right of the PCB's you see a connector where on both sides an extra HEXFET PCB of 5cm wide can be mounted in order to fill a 400mm (or even with a double pair a 500mm) cabinet. Left and right there is still 5cm space left then for mounting connectors, etc.



**Add-on Input / Output modules**

We built our modules in a way that while assembled they form a quite compact and solid block of electronics. Input and output connectors (also leading some other signals and voltages) can be used to wire the input/output connectors directly to these modules.

In order to keep the clean design intact, we also provide so called IO-boards. These boards can be stacked to either side of our other modules. Doing so, you just need to bring a short solid wire from these boards to the input- and speaker terminals at the backside. Nice and clean.

We have them available in two versions; one where just an RCA inlet and a pair of speaker terminals can be connected. The other type fits a balanced XLR connector, followed by the best balance to line driver we could find, using the unique and patented [InGenius™](#) technique.

## Production

All our modules are completely soldered by hand, noticeable by the shiny soldering's. A soldering like this lasts forever. On request we can use any other soldering than regular tin, for example MUNDORF Silver/gold solder. Since we assemble them ourselves we even could use the special components you prefer.

We always produce in quite small amounts, so new ideas can and will be implemented fast.

In our ready built modules we have made some choices already and mounted capacitors we believe fit best.

## Kits

We also provide these modules as DIY kits. In those kits all components, PCB, connectors, etc. are in the kit, **EXCEPT** the Power Supply capacitors. In order to give you and us most freedom of choice we made our PCB's in a way that one can use cheaper/smaller versions as well as the high-end MUNDORF MLGO 10mm pitch capacitors (16.000 hours), or the more common (7,5mm) quality types, like Panasonic FR series with a lifespan of about 10.000 hours.

For this freedom of choice we do NOT supply power Supply capacitors in our kits. Doing so allows you to decide the total price and quality level of your amplifier, since the price of the caps used define for a large part the total price. Voltage rates and quality of these caps are also playing a significant role in the capabilities and lifecycle of your amplifier, so make your own choices -)

Besides our favourite MUNDORF MLGO types, we have several other types in our program, f.e. the next best PANASONIC FRA models. For low cost purposes we also have some axial types, 105°.

We also have other very interesting, rare, audiophile chips, transistors and passive components available in [our webshop](#). We provide f.e. [EXICON](#) Mosfets (specifically designed for the highest quality analog amplifiers), [THAT](#) audiophile analog (!) IC's, [MUNDORF](#) power supply capacitors, crossover components and Air Motion Transformers (AMT's), [Audio Technology](#) and [VOXATIV](#) drive units, [PURESONIC](#) connectors, and many more nice and sometimes hard to find DIY stuff..... -)

## Ready built

We decided that we offer ready built amplifiers as well. Actually we already have built some, see above.

They all are bespoke amplifiers, so we make them (completely by hand) the way you want them, of course within the parameters and possibilities of the modules and your wallet.....

Since our modules have a wide variety, we can build lots of different models. In order to give you an idea about pricing, we have listed some models under [Equipment](#) in our website.

If you decide for a hand build amp, we [will discuss](#) with you how we have to make it (which modules and cabinet to use) or order one of the examples listed.

You can also give us your own ideas and we will try to implement it.

Delivery takes about 3-4 weeks after your payment is received.

## Sound quality

Our first amplifiers run for months now as you would use it yourself without any problems.

We (and others) have listened to different bespoke amps, all sounding amazingly clean and natural.

They all came to the same [astonishing conclusion](#): These amps sounds better than about all the high-end stuff they listened to so far with great pleasure. Nicer, warmer (tube like) 3D, solid bass, no sharp s and t sounds f.e.

One word came up all the time: **EMOTIONAL**. That's exactly what we wanted to achieve -)

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