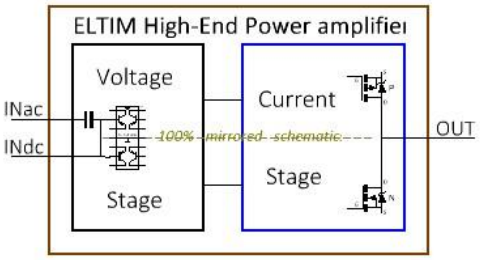
ELTIM® High-End amplifier modules

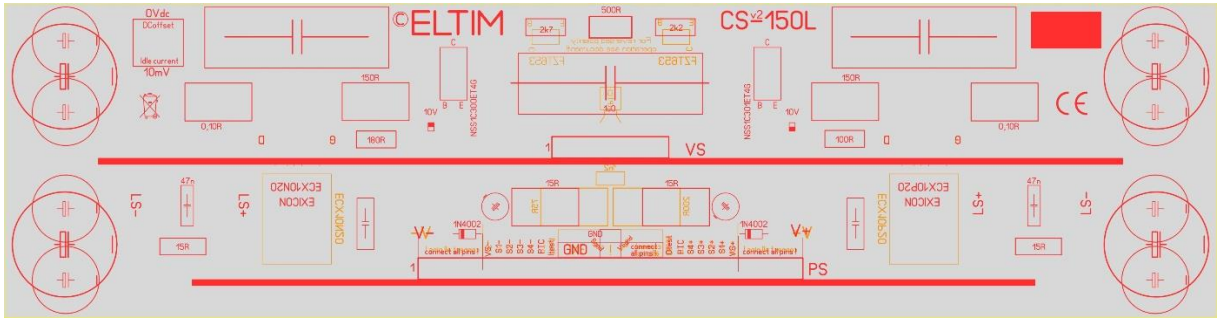
CS-150L v2 Current Stage module

Updated: August 6th, 2025

With ELTIM High-End amplifier modules we split up the amplifier schematics in a Voltage Stage (VS-module) processing the small input voltages and a Current Stage (CS-module) which processes the large and transient rich speaker currents. While doing so, the PCB layouts can be made way simpler, symmetrical, and designed for their specific task. F.e. CS-modules have unusual wide tracks. Due to this totally different and symmetrical design of our schematics and PCB layout with unusual wide tracks, they sound “tubelike” clean, yet have better and deeper control over your speaker system compared to most other amplifier designs as noticed immediately after the first bass drum or guitar note you hear.



Both a VS-module and a Power Supply (PS) module are connected by high quality milled headers, no wiring!



CS-150L (V2) module with one pair of 8A EXICON Mosfets. Size 290x75mm.
Expected rated power: 150Wrms. Successor of our respected CS-80 module.
Actual V2 model significantly changed compared to prototype v1 and alignment test points addded.

2x four NICHICON UKA High Audio Grade 1500uF/50V or 2x two MUNDORF MLGO 2200uF/63V electrolytic capacitors are mounted most close to the Mosfets, assisting our PS-2 or PS-3 Power Supply module or your own PS.
On topside there is also space to add two significant MKP capacitors over the power rails, improving sound quality.

It fits nice in MODU (Mini) Dissipante 300x80mm cabinets or larger and can make around 150Wrms in these cabinets.

There is no space to mount chassis plates in 80mm MODU (Mini) Dissipante cabinets. Then you need a higher cabinet.

CS-150L fits the flanks (and slides) of MODU Slimline 350x80mm. You do not need to drill holes in the flanks!

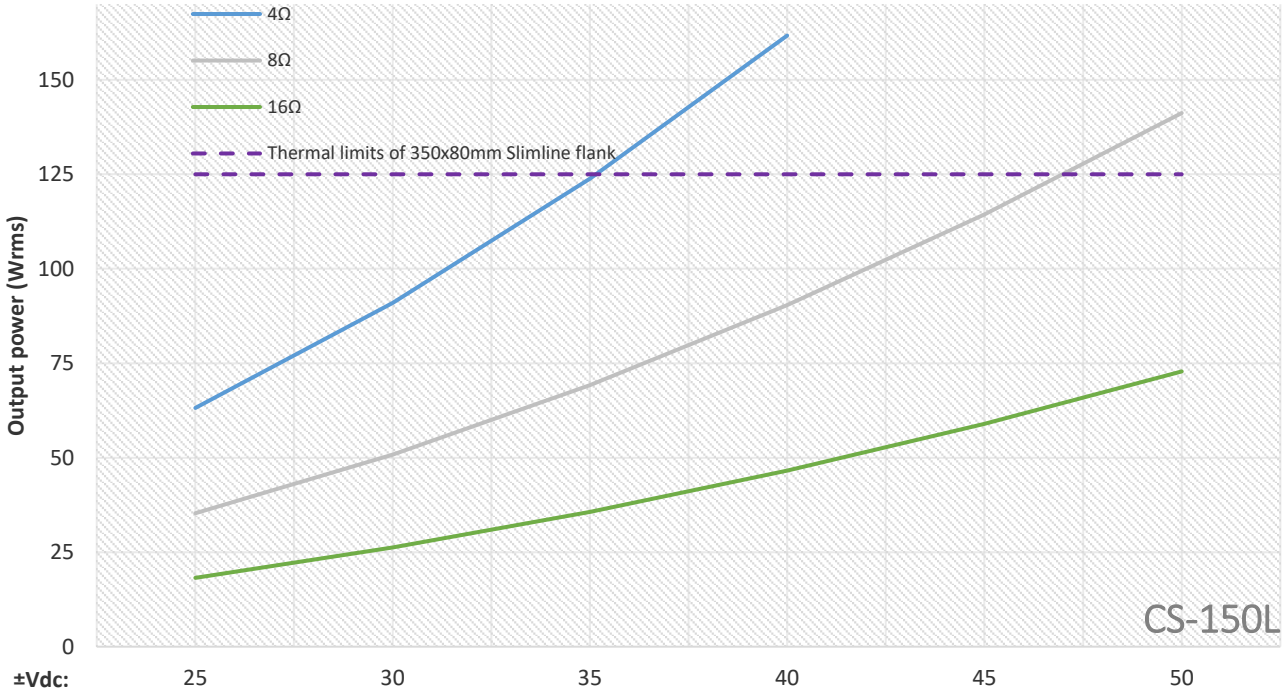
The output power in a Slimline is limited to around 100Wrms due to the flanks heat dissipation limits.

You could use our PRE-230 preamplifier to give it two line and an MM/MC phono input.

CS-150L General technical specifications (still PRELIMINARY DATA):

Frequency range:	DC - >200kHz within ±0,1dB
Frequency limit (-3dB):	limited and defined by VS-module used: VS-10: 350kHz, VS-20: 450kHz, VS-50/60: 600kHz)
Frequency limit (-10dB):	700-900kHz (unlimited this CS-150 runs >2MHz….)
In > Out Phase shift:	-0,2º constant @ 10Hz - 18kHz, -3,6º@20kHz
Max. output current:	8A constant (dependent on the heatsink dissipation rate, for max. power < 0,75K/W!)
Distortion figure (THD):	< 0,0005% (1W/1kHz/8ohm) < 0,001% (80W/1kHz/8ohm)
Slew rate:	> 65V/uS (@ full power). Limited by RF-input filter on VS-module used.
Harmonics:	< -60dB, nonspecific
Noise floor:	<-120dB
Damping factor:	> 100
Input sensitivity:	1 Volt
Gain:	30dB (i.c.w. any required VS-module)
Input impedance:	10kOhm (other on request)
Output load:	4 – 16 ohms (see load graph)
Supply voltage:	±25 - ±40Vdc (4/8/16ohms load) ±25 - ±50Vdc (8/16 ohms load only!)
Max. output power:	160Wrms @ 4ohms (with ±40Vdc supply voltages). 140Wrms @ 8ohms (with ±50Vdc supply voltages, then 4ohms is not allowed!). 250Wrms @ 4ohms (bridged, with ±30Vdc supply voltages. 24A HEXFET version only!). 300Wrms @ 8ohms (bridged, with ±40Vdc supply voltages, then 4ohms is not allowed! 24A Hexfet version only!).
Dimensions:	290x75x42mm (fits a 300x80mm MODU heatsink with mounting braces). It also fits in the slides of a MODU Slimline 350x80mm flank, no drilling required !

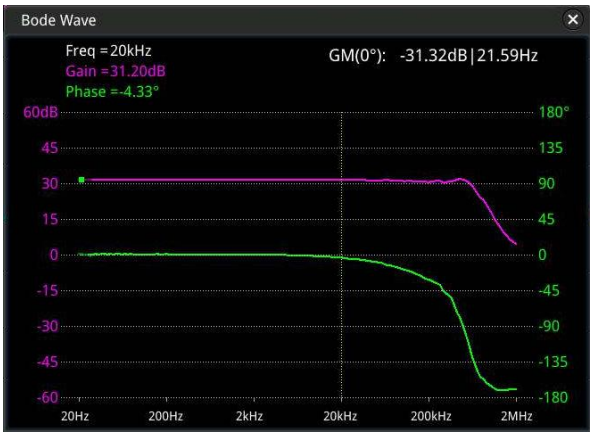
Output power versus ± Supply voltage diagram.



Calculated power with 8A EXICON lateral Mosfets. Select the supply voltage matching your power requirements.
With the power of 160Wrms @ 4ohms the max supply voltage is ±40Vdc. It produces 85Wrms @ 8ohms then. Only if you are sure you only use 8/16 ohms speakers, you can increase the supply voltage up to ±50Vdc where this CS-150 makes 140Wrms @ 8ohms only!

EXICON lateral Mosfets act about “clean” while overloaded, just flattening (=DC on woofers) the sine tops. Regular Mos/Hexfets tend to oscillate a bit then and also require more idle current than the EXICON Mosfets.

FREQUENCY and PHASE BEHAVIOUR (for now CS-250 with 2x 8A Mosfets shown, CS-150L is probably "faster")
In the Bode graph below we show the gain and frequency graph (purple) as well as the input to output transfer delay given in phase error degrees (green), representing the 3D staging quality. 30 measurements/decade.
The values of the yellow, dotted line at 20kHz are shown at left top.



The purple line in the picture is the frequency graph, straight as a ruler from DC to >200kHz.
The -3dB point is around 600kHz, -10dB around 900kHz and limited by us on VS-modules.
Without this safety (possible external caused oscillation) precautions CS-250 runs over 2MHz actually…….
It could work from DC up while using the INdc input at the VS-module.

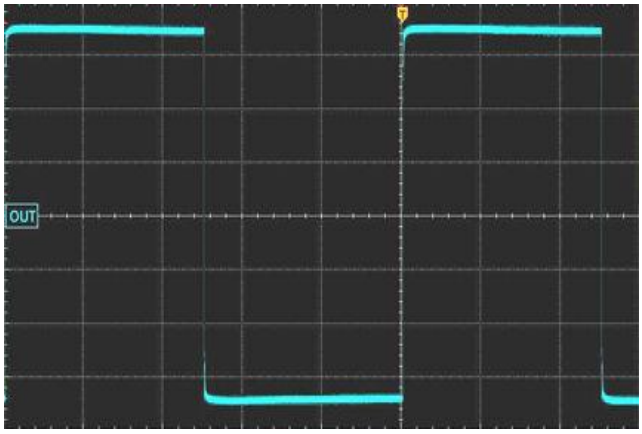
Very important, yet hardly ever shown is the green line representing the phase (=time delay) between the input- and output signal at different frequencies. This graph simply shows the staging (3D) performance. A flat line would be perfect.
Only with a very wide frequency range a power amplifier can show this nice time delay graph. Very narrowed designs like most class-D setups don't show this graph, because it will fall well inside the audible range, looking and sounding worse.

While watching the measurement one can see at the oscilloscope (RIGOL MSO5000 series, all options) that the higher the measuring frequency the more the output comes behind the input signal.
The time shift difference in both signals is presented as the phase (difference).
In this CS-250 (+ modified VS-20) this error is a constant -0,2º in the audio band, only -4,3º@20kHz which is ignorable. To obtain this flat phase response, meaning that high frequencies require the same transfer time as low frequencies do, the frequency range must be at least 20x the audible band. So we did, is not easy.
Unlike as with most bandwidth limited systems you will not think all the time "*something is wrong here*" !
We all remember the "cold" sounding CD, right? We all hardly use them anymore but strange enough replace it by similar sounding Class-D, WHY ?! Instead, with our amps you will enjoy your music as it should be.

STEP RESPONSE
To present "fast" instruments like cymbals, triangle, bells, snare drums, etc. correctly, the step response needs to be as vertical as possible. Basically, this is easily done, but mostly the vertical graph as shown below shows "overshoot" (passing the horizontal line) and "undershoot", making it a "tssjj" like sound as, sorry to say, we hear about everywhere today. Some even believe it must be that way. With us you hear those difficult instruments as if you were standing next to it, as it always should be.

The impulse response with a 1kHz/150mV square wave input signal is "by the book", no over- nor undershoot.

With the extremely wide frequency response of 600kHz, preventing over/undershoot is very difficult to achieve and mostly simply accepted as "typical" amplifier sound.
The "speed" of the vertical incline is measured in V/us.
With us >65V/us @ full power, being >3x faster than the best quality opamps used in studio mastering sets.

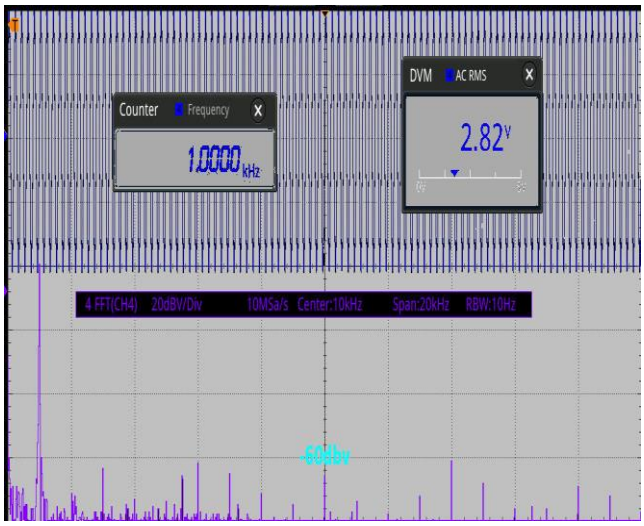


*Some still believe that our amps are ac-coupled, which is not the case. Our amps run from **DC**-600kHz if INdc on VS-module is used.*
This graph also demonstrates its DC capability. An ac-coupled design can never show a true square waved signal since it ONLY has dc-components (top and bottom horizontal lines) in it. AC-coupled systems would show a more triangle shaped falling line!
While not understanding our schematics they believe that the capacitor over the idle current network is ac-coupling both (symmetrical) top and bottom parts of our amplifier. This is not the case; you could even let it out as we did more than once while testing.
It only has a stabilising function, increasing the sound quality. A better capacitor gives a better result.

HARMONICS

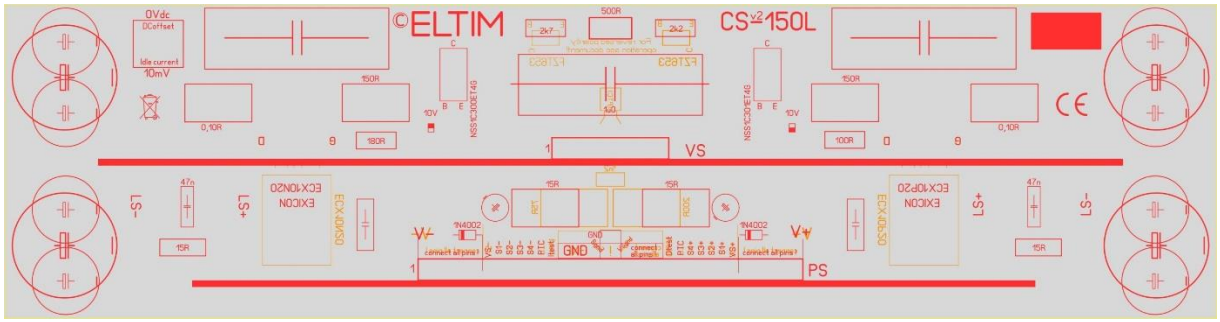
Harmonics are frequencies of multiple base tone made by the circuit itself and can be represented in an FFT (Fast Fourier Transfomation) diagram.
Their effect on the experienced sound is part of many discussions. Fact is that this combination of added tones partly gives the amplifier its “sound character”. The less harmonics it produces, the cleaner the sound.
Most “solid state” amplifiers (transistors) produce significant sized odd harmonics, experienced as “cold”.
Tube and Mosfet based amplifiers (like ours) mostly produce even harmonics, experienced as “warm”.

With our amps there are hardly noticeable harmonics.



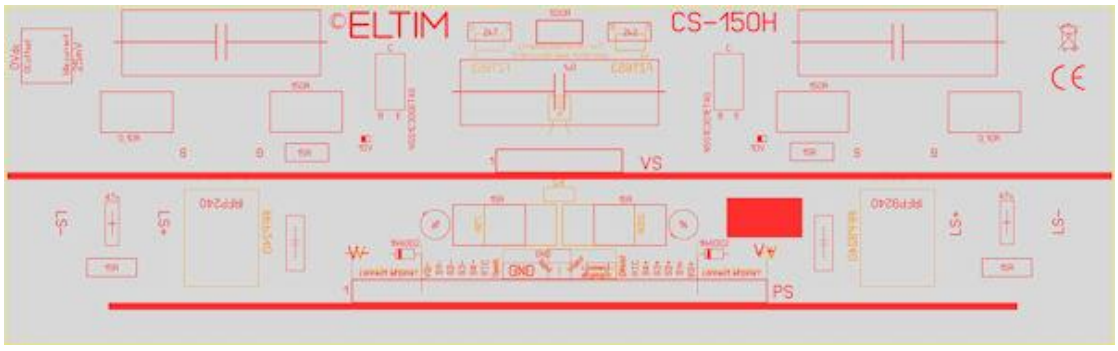
1kHz sine wave input tone (left peak) with the resulting multi frequency harmonics peaks in purple @ 1W output.

FFT transformation shows that the only few harmonics are way below audible level, <<65dBv. All are similar in size, nonspecific present and way below critical level.
The largest one is the second harmonics, 2kHz @ -60dB.
Second harmonics (as many tube amps show) are experienced as pleasant. Most solid state systems show an as unpleasant experienced third harmonics (so 3kHz) here.
The noise floor is < 120dB and cannot be heard at all.



New V2 EXICON Mosfet version with special (SMD) multi-base driver transistors and test connector

TIP:



CS-150H, economic Hexfet version with way cheaper Power Fets and resistors.
It lacks the electrolytic supply capacitors as well.

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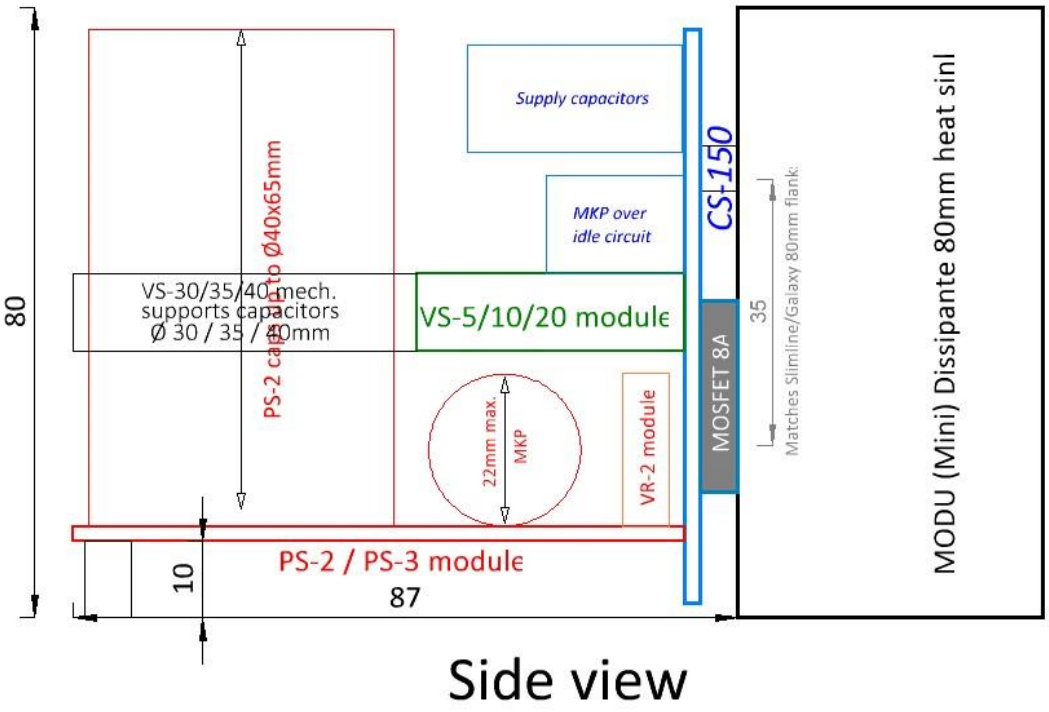
Full scale (1:1) view of a CS-150L / VS-xx / VRxx and PS-2/3 combination:



Scaled 1:1 if your printer is set to 100%

In blue the CS-150 mounted to a 80mm high heat sink like in MODU 2U (Mini) Dissipante cabinets.
There is NO space to mount a chassis plate in 80mm high versions!

In green we show a connected VS-5, VS-10 or VS-20 input stage module.
In black the VS-30/35/40 input module. In v2 version also VS-50 fits.
They are the same as VS-20 (green), but are “stretched” in length,
allowing for Ø30, Ø35 or Ø40mm holes exactly surrounding the
large supply capacitors on the PS-2 or PS-3 power supply modules.
Largest fitting capacitor size is Ø40x65mm.
While doing so, these large and heavy capacitors are mounted free from vibrations
and mechanical stress to especially their soldering’s, being limited to about zero then.
If your amp is transported a lot, we recommend this option to prevent “cold” soldering’s!

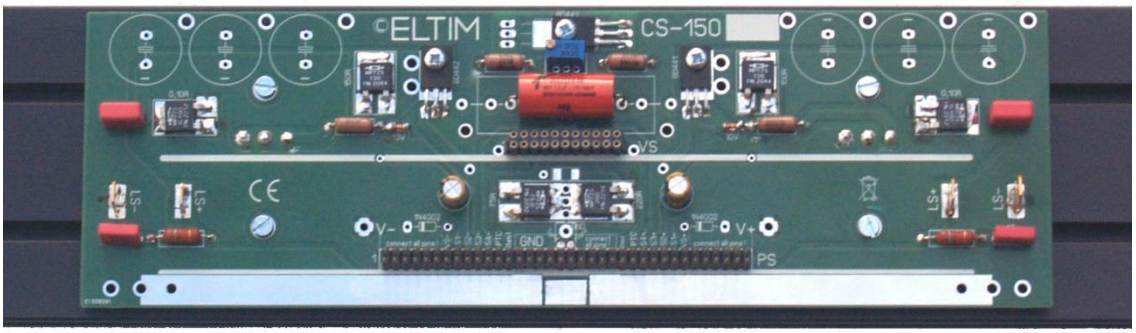
In orange we show the position of a VR2-30 Voltage Regulator module mounted on our PS-2 or PS-3
power supply module, providing regulated ±30Vdc voltages to VS-xx.
This module is required while operating at > ±35V i.c.w. VS-20, also improving sound quality.

VERSIONS

In our new 2025 series CS-modules we introduce three quality levels, using different quality parts, resulting in sound differences and (as always) a serious price difference…. Sorry.
F.e. EXICON Mosfets cost about 10x more than IR Hexfets, DALE resistors 35x of regular MOX.

CS-150	**H**	**L- HE**	**L- REF**
Power Mosfets	1 pair IR HEXFETS IRFP240/IRFP9240 12A/200V, TO247	1 pair EXICON lateral Mosfets, ECX10N20-W6 / ECX10P20-W6, 8A/200V, TO247	
Electrolytic capacitors	Not possible	8x NICHICON UKW 1500uF/50V, 105º Audio Grade	4x MUNDORF MLGO 2200uF/63V, 105º High Audio Grade
Idle current capacitor	PANASONIC ECW	MUNDORF MCAP400	VH-Audio ODAM300
Power resistors	8x BOURNS PWR163, 5%, low induction	8x BOURNS PWR163, 1%, low induction	8x CADDOCK MP725 1%, induction free
Other resistors	Standard MOX 0,6W, 1%	DALE RN60D, 1%, military grade	
PCB	Eurocircuits (EU), FR4+, double sided 2x35um, tin plated (or better) solder isles		
Solder	Any lead-free solder	MUNDORF MSOL.SG Sn95,5Cu0,7Ag3,8Au	MUNDORF MSOL.SUP Sn88,6Cu1,8Ag9,5Au0,1

We produce completely by hand in our NL based shop, so we can mount other parts if you like.
Just mention it in the comment line of the order form or send an email.
We will respond with a modified offer.



CS-150 (v1 test version shown, completely revised in v2) exactly fits the flanks of 80mm high MODU Slimline/Galaxy 280/350mm deep variants. Picture is just to show mounting in Slimline flanks.
For mounting we use 4x M3, fitting the slides of the profiles, where no drilling is required!
Due to the lower heat dissipation of these flanks, power is limited, see graph.
The back side mounted Mosfets also act as 5mm distance holders.
At the 2x11 pin centre connector fits one of our **required** VS-modules.
At the 2x 36 pin bottom connector fits one of our Power Supply modules.

We make *MUSIC* again, not just **power**

"LESS IS MORE!"

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