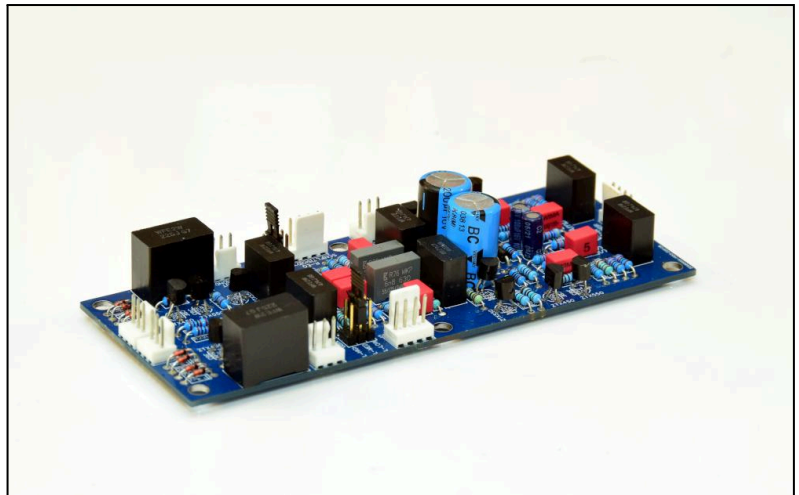


### Application & Purpose:

Exceptionally high quality stereo solid state pre-amp, featuring two complementary BJT pairs; one as a gain stage, the other as a follower. Achieves very low levels of THD < 0.005% mostly lower 2nd order.

Features a switchable EQ filter and jumper switches to select gain level.

Low output impedance to drive up to two power amps simultaneously.



*WARNING: High DC voltage device. Care must be taken to avoid fatal electric shock.*

### Specification:

<b>PCB Dimensions</b>	139mm x 56mm x 1.6mm
<b>Channels</b>	Two (stereo)
<b>Gain</b>	Selectable - low(6dB), medium(9dB), high(12dB)
<b>Frequency Response</b>	Overall Range: 10Hz - 30kHz Flat EQ Setting: gentle roll-off between 20 and 30kHz Dynamic EQ Setting: Slight boost to bass and upper-mids
<b>Input Impedance</b>	determined by volume pot - recommend 100-200kΩ
<b>Devices</b>	BC337 and BC327 transistors - or similar
<b>Output Impedance</b>	< 500Ω
<b>Supply Voltage</b>	-5/+5v to -24/+24v DC (regulated power supply module available)
<b>Idle Supply Current</b>	approx 80mA - both channels
<b>Earth Nets</b>	Power and Audio (separated by loop breaker)
<b>THD</b>	Typically < 0.005% - mostly lower 2nd order

### Details:

An exceptionally high-quality stereo audio pre-amplifier featuring two complementary BJT pairs; one as a gain stage, the other as a follower. Complementary pairs (or Sziklai pairs) exhibit very low harmonic distortion and can provide follow-on current sufficient to drive more than one power amplifier. This pre-amp can safely run two power amps with input impedances of 10kΩ each. Features a switchable EQ filter for either a Flat or Dynamic EQ response. Dynamic EQ is similar to a Fletcher-Munson loudness response, but less pronounced i.e. more subtle.

Jumper switches allow gain level to be selected; either low, med or high. Corresponding gain ratios are approximately 3, 4 and 5 respectively.

## **Setup and Usage:**

The transistors in this module generate a very small amount of heat, however no provision for heat-sinking is required. Simple ventilation is recommended.

Running this module in a sealed box with no ventilation may result in eventual device failure and thermal damage to surrounding components, but this is difficult to test and verify, so we recommend you do not attempt this.

No manual biasing is required. Biasing is preset and is voltage dependent. Ensure your power supply is providing  $-21/+21\text{v}$  DC with a tolerance of  $0.5\text{v}$  in either direction. Supply voltages outside of these tolerances may result in asymmetric clipping with very large input signals.

The rail voltages are somewhat higher than the largest signal a pre-amp would be expected to convey. This improves overall dynamics and device linearity. It also means the chance of clipping with normal audio signals is extremely remote!

Individual ground nets separate the audio and power grounds, eliminating hum. Power ground should make its own separate direct connection to the ground star or hub, definitely not to the Power Supply filter capacitors. Audio ground should make its own separate direct connection to the ground star or hub. The only place power and audio grounds should meet is at the ground star or hub.

## **EQ Switch - important**

If you are not using an EQ switch in your project, you will need to jumper (connect) the EQ terminals on your pre-amp, otherwise you will not hear any music. Connect the Sig pin to either the FLT pin (flat EQ) or DYN (dynamic EQ) on both the left and right sides of the PCB. Flat gives a flat frequency response, dynamic gives a slight bass and upper-mid boost; like a loudness setting, but more gentle/subtle.

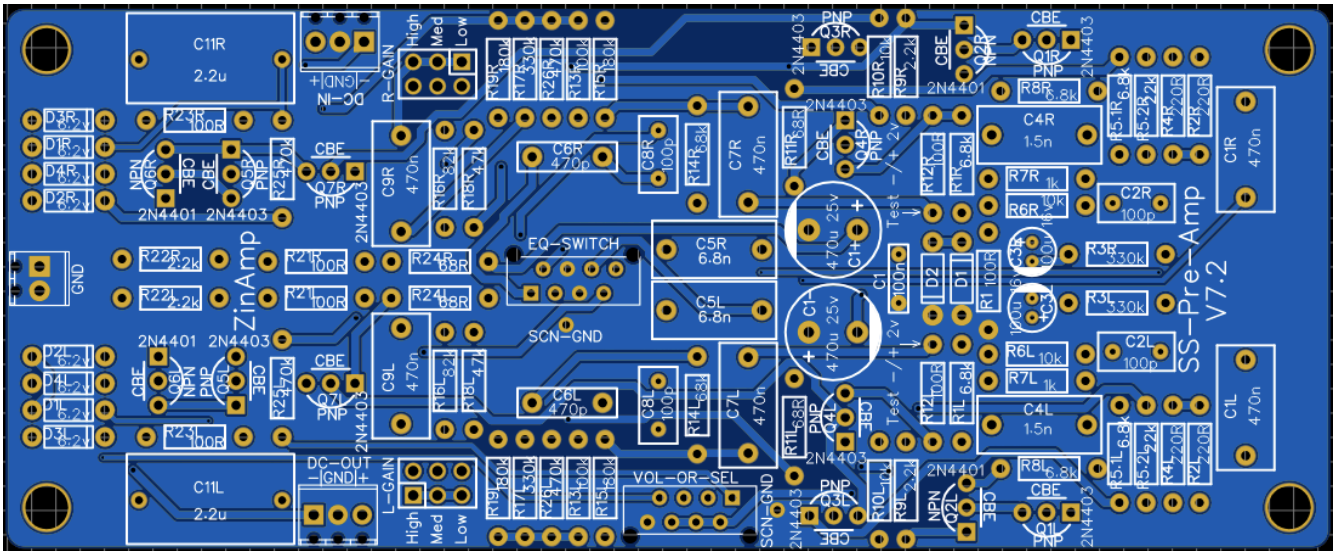
## **Volume Control:**

We generally recommend a volume pot of between 100k and 200k ohms and that this is placed before the pre-amp i.e. at its input. This is to ensure that any large line level signals - i.e.  $> 2\text{v}$  peak - do not result in clipping. Clipped signals can cause serious problems for a downstream power amplifier. Placing your volume control after the pre-amp means that if a very large signal were to enter the pre-amp, it could clip in the pre-amp which would sound terrible and potentially damage the power amp. However, if for any reason you 'need' to place the volume control after the pre-amp in your project, you can do this, but be aware of the clipping-risk of large signals to your downstream equipment.

## **Safety Note:**

This module runs with DC voltages that are close to  $42\text{v}$  between negative to positive rails. This is enough to give you a very unpleasant shock and possibly worse. Unlike AC current, DC is more dangerous when touched as you will tend to stick to it rather than be repelled from it as with AC. Before handling this module, switch off, disconnect the AC power lead and discharge the power supplies in your amplifier by placing a screwdriver across their discharge terminals for 10 seconds each. Check their respective voltages with a meter - if less than  $2\text{v}$ , this module is safe to handle.

## Bare PCB:



## Connections:

There are four sets of terminals on the PCB: DC-IN, DC-OUT, EQ-SWITCH and VOL-OR-SEL.

DC-IN and DC-OUT are linked in parallel and are used to chain-connect with a phono-amp or crossover. This requires a split rail supply min  $-/+5\text{vDC}$  and max  $+/-24\text{vDC}$ . Pins are  $-|\text{GND}|+$

GND is the Power Ground and is separated from the audio ground on the board. Do not mix these as doing so will form a ground loop which will result in hum.

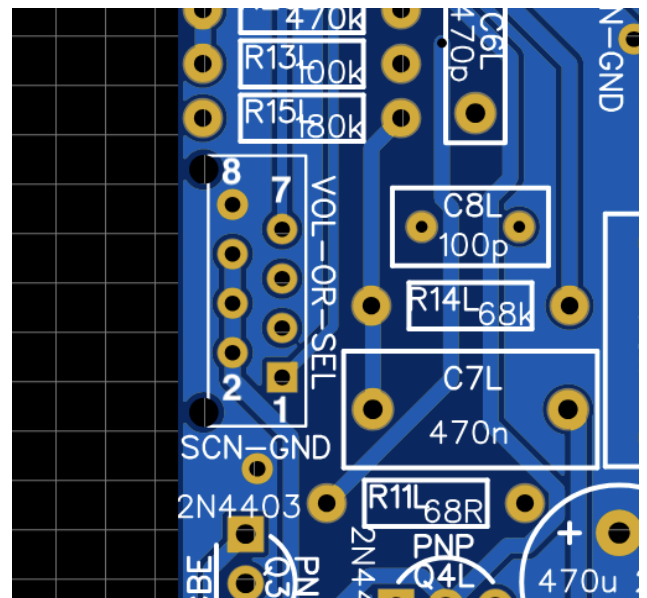
VOL-OR-SEL is for connecting a ZinAmp Volume Pot or Selector switch module. If you are connecting your own, see the pins by number section below

**Pins by Number** - note 3,4,5,6 are not marked but follow the same R-L pattern from bottom to top:

1. Left - OUT
2. Audio Ground
3. Right - IN
4. Audio Ground
5. Left - IN
6. Audio - GND
7. Right - Out
8. Power Ground

SCN-GND is connected to Power Ground and can be used to ground a cable screen. SCN is an abbreviation of SCN.

Note: do not let pin 8 touch any of the other ground pins i.e. 2,4 or 6 otherwise you will create a ground loop and you will hear hum.



## Parts List:

**Recent Changes:** Values of R17L, R17R, C9L & C9R and C5L & C5R have changed and may appear different on the PCB than in the parts list. The circuit has not changed. Please use the values in the parts list.

CONNECTORS: Both blank and ready-built PCB requires connectors be purchased and soldered on by the constructor. This is to give the constructor a choice of how they wire their own particular installation. Terminal block connectors are indicated in the list below in blue but can be swapped for equivalent 2.54mm pitch connectors e.g. Molex KK254 headers, which are provided to the constructor in self-wire kits.

Designator	Value/Spec	Qty	Manufacturer	Manuf Part	RS Part
R22L,R22R	1.5k	2	Vishay	MRS25000C1501FCT00	683-3219
C4L,C4R	1.5n	2	Wima	FKP2/1500/100/5	115-708
R19L,R19R,LR13L,R13R, R17L,R17R	100k	6	TE Connectivity	LR1F100K	125-1168
C1	100n	1	Epcos	B32529C1104K007	896-1339
C2R,C2L	100p	4	Wima	FKP2/100/100/5	484-1978
C8R,C8L	100p	2	Wima	FKP2/100/100/5	484-1978
R1,R12R,R12L,R21R,R21L,R23R,R23L	100R	7	TE Connectivity	LR1F100R	125-1155
C34L,C3R	100u 16v	2	Rubycon	16PK100MEFC5X11	763-9396
R5.2L,R5.2R,R6L,R6R	10k	4	TE Connectivity	LR1F10K	125-1164
R10L,R10R	15k	2	Vishay	MRS25000C1502FCT00	683-3055
R15L,R15R	180k	2	Vishay	MRS25000C1803FCT00	683-4174
R7L,R7R	1k	2	Vishay	MRS25000C1001FCT00	683-3165
R25R,R25L	1M	2	Vishay	MRS25000C1004FCT00	683-4159
EXT-R,EXT-L	2 Pole Terminal (self-wire only)	4	RS-PRO	790-1098	790-1098
R9L,R9R	2.2k	2	Vishay	MRS25000C2201FCT00	683-3449
C11L,C11R	2.2u	2	Panasonic	ECWFE2W225JA	105-1076
R5.1L,R5.1R	20k	2	TE Connectivity	LR1F20K	125-1166
R-OUT, DC-IN,L-OUT	3 Pole Terminal (self-wire only)	3	RS-PRO	790-1092	790-1092
L-LOW,R-LOW, L-HIGH,R-HIGH,L-MED,R-MED	3 Row Jumper	2	Harwin	M20-9980346	745-7046
R16L,R16R,R18R,R18L	39k	4	TE Connectivity	LR1F39K	148-871
R-EQ,L-EQ,A-IN	4 Pole Terminal (self-wire only)	3	RS-PRO	790-1102	790-1102
R26R,R26L,R3L,R3R	470k	2	TE Connectivity	LR1F470K	149-149
C7L,C7R,C1L,C1R,C9L,C9R	470n	6	Panasonic	ECWFE2W474P1	<a href="#">105-1083</a>
C6L,C6R	470p	2	Wima	FKP2/470/100/5	484-2016
R4R,R4L,R2R,R2L	470R	4	TE Connectivity	LR1F470R	125-1158
C1+,C1-	470u 25v	2	Nichicon	UVY1E471MPD	739-5285

D4L,D2L,D3L,D1L,D4R ,D2R,D3R,D1R	5.1v	8	Nexpera	BZX79-B5V1,113	508-359
D1,D2	50v 1A	2	Vishay	1N4001-E3/54	<a href="#">628-8931</a>
R24L,R24R	56R	2	Vishay	MRS25000C5609FCT00	683-4203
R1L,R1R,R8L,R8R	6.8k	2	TE Connectivity	LR1F6K8	148-691
<b>C5L,C5R</b>	6.8n	2	Epcos	B32621A0682J000	896-1568
R14L,R14R	68k	2	Vishay	MRS25000C6802FCT00	683-3957
R11L,R11R	82R	2	Vishay	MBB02070C8209FCT00	506-4784
Q1L,Q7R,Q3L,Q4L, Q1R,Q4R,Q3R,Q5L, Q5R,Q7L	BC327 or ZTX751	10	On Semi	BC32716 or ZTX751	<a href="#">761-9819 or</a> 295-523
Q2L,Q2R,Q6L,Q6R	BC337 or ZTX651	4	On Semi	BC33740 or ZTX651	<a href="#">761-3943 or</a> 295-501
L,R	Shorting Link	2	RS-PRO	251-8575	251-8575

Parts available from [RS Online](#). Also try [Farnell](#), [Mouser](#) and other online suppliers.

Parts from different manufacturers can be substituted where spec is sufficient

Supplier trading names may differ by country.