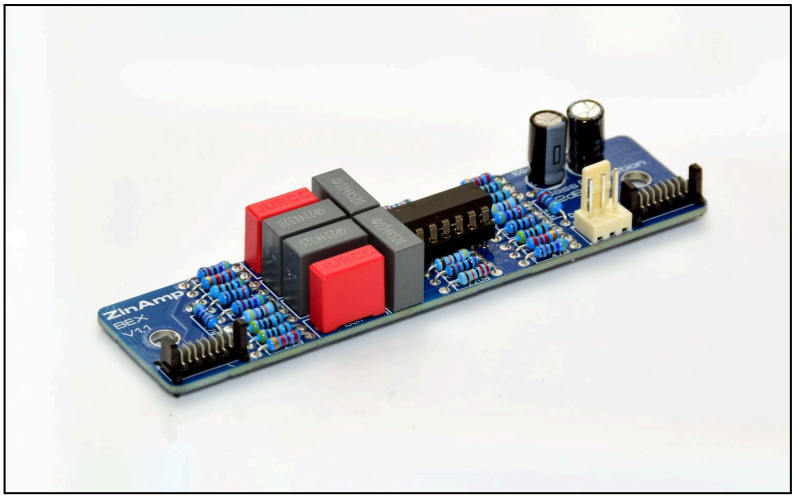
ZinAmp
Beautiful sound, for people who love music

Datasheet B-EX - Bass Extender

Application & Purpose:
A single module with dual function:

First is a bass-enhancement filter that increases bass response, starting at 150Hz and increasing to its maximum at 30Hz. Max increase is 15dB, controlled with a pot.

Second, a low pass filter curtails the signal below 20Hz to ensure no over-excursion of the woofer.



Specification:

PCB Dimensions	104mm x 26mm x 1.6mm
Channels	Two (stereo)
Max LF Response	+15dB at 30Hz - variable with a pot (0-15dB) Can be increased to 20dB with a component swap
Frequency Response	Overall Range: 10Hz - 30kHz
Input Impedance	470kΩ
Devices	BC337 and BC327 transistors - or similar
Output Impedance	< 300Ω
Supply Voltage	-10/+10v to -15/+15v DC (regulated power supply module available)
Idle Supply Current	approx 10mA
THD	Typically < 0.003%

Details:
Small speakers and those in sealed cabinets can often have a disappointing bass response. Response can be 5-10dB down at 100Hz and 10-15db down at 50Hz. This is due to the amount of 'energy' required to generate bass notes and how this energy is dissipated in the physical confines of a loudspeaker driver in an enclosure

Research by Siegfried Linkwitz demonstrates that it is possible to correct this drop in low-frequency response by boosting the signal progressively as frequency drops. Mr Linkwitz published a model for correcting bass-driver behavior based on thiele-small parameters of the driver and volumetric data of the enclosure. From this model, it is possible to define the exact component values required to achieve an almost flat response to frequencies as low as 30Hz, although some drivers achieve this more easily than others.

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The BEX module recreates this effect with a more general set of values that create a very usable filter curve for a wide variety of drivers and enclosures. The amount of bass enhancement can be ‘dialled-in’ with a 50k or 100k pot, or the pot eliminated entirely for a full bass-enhancement of 15dB.

Limitations:
Enhancing bass response requires **a lot of power f**or anything more than normal levels of listening. In an 8mx8mx3m listening space, you probably need about 75W to achieve a 15dB enhancement at normal listening levels without clipping. For this reason we do not recommend this module for use with amplifiers of less than 75W as the risk of clipping in the bass-frequencies exposes your amplifier and speakers to risk of damage.

Eliminating the Need for a Sub-woofer:
If your bass drivers are in the region of 8” diameter, have a sensitivity of 88dB or more and can handle peak power of more than 70W, then you maybe able to achieve a bass response similar to that of having a sub-woofer in your system. Some people prefer the simplicity of not having a sub-woofer and this module is perhaps aimed at that cohort.

Warning High Volume can lead to clipping:
As you increase the volume of your amplifier, this module continues to drive your power amplifier and woofers harder and harder. This may lead to one or more of the following effects:

1. Your amplifier is being driven hard and may get warm or blow a fuse or an output device.

2. Your speaker voice coils may begin to get warm and if they overheat, will short which may damage your amplifier.

3. Your amplifier may clip at low frequency, exacerbating both 1 and 2 above.

4. Your woofers may reach their excursion limits and begin to make physical noises like rattling / clattering

These effects are all avoidable if you listen to music at ‘normal’ listening levels. Cranking it up increases the risk of damage! These risks can be avoided with more power and drivers with a larger max excursion value (Xmax).

General Rules:

1. Every 6dB increase in loudness requires 2x the driver excursion and 4 times the power

2. Every octave lower you go requires 4x the excursion and 16 times the power!

Setup and Usage:

With a ZinAmp Pre-Amp module - the simplest and most typical use-case for this module is with a ZinAmp pre-amp. The module shares power from our SSD Pre-Amp module and the audio is connected via a ribbon cable to the pre-amps EQ connector. The signal from the pre-amp is then routed via the BEX module and back to the pre-amp to its follower stage and onwards to its output.

ZinAmp's preamps feature an EQ toggle switch. The BEX module replaces this switch.

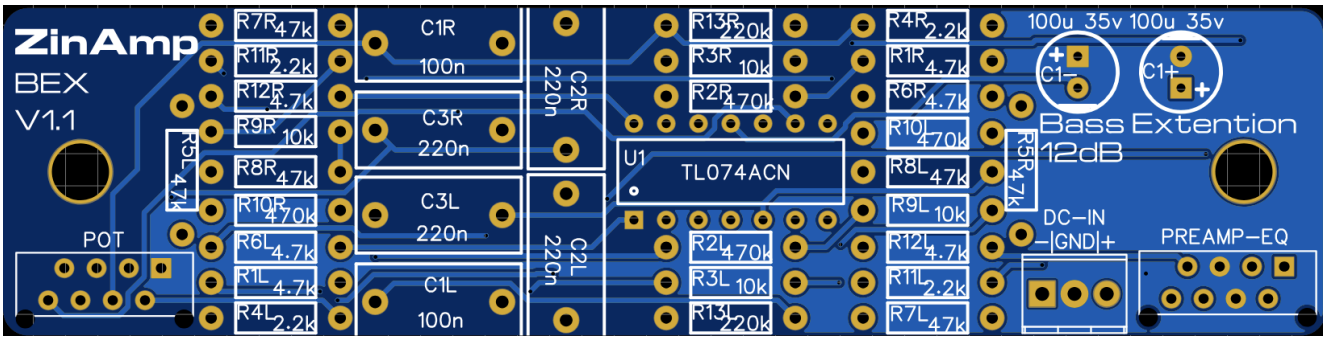
Without a ZinAmp Pre-Amp module - the B-EX module can be installed anywhere in the signal path that is upstream of the power amplifier. We recommend a volume control of some sort - generally upstream of the B-EX module.

Control Pot:
An optional pot can be connected to the BEX module to control the amount of bass enhancement. Without the pot, the enhancement is on full at 15dB at 30Hz. Different pot values can be used to achelive the following:

- 200k Pot: Max 15dB
- 100k Pot: Max 12dB
- 50k Pot: Max 10dB

ZinAmp make and sell a PCB with a pot mounted on it for this purpose and the module can be purchased with or without it.

Bare PCB:

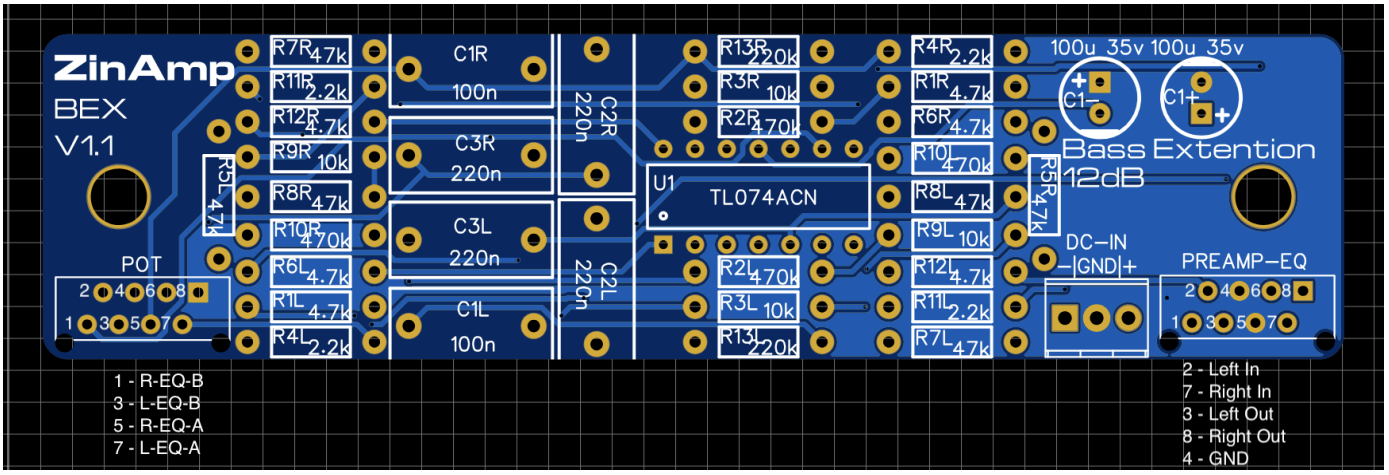


Connections:

If you **are** using a ZinAmp **preamp module**, connect as follows:

Pre-Amp	**B-EX**	**Vol-Pot**
DC-OUT	DC-IN	
EQ-SWITCH	PREAMP-EQ	
	POT	SEL-TO-VOL

If you are **not** using a ZinAmp **preamp** then see below for a pin-by-pin annotated view of the B-EX board:



DC-IN - connect negative pole to “-” ground to “GND” and positive to “+”
POT - For a stereo / 2-gang pot, connect as follows:

- L-Wiper to L-EQ-B
- R-Wiper to R-EQ-B
- L-Track-start to L-EQ-A
- R-Track-start to R-EQ-A

Note: Track-start is the terminal on the pot that is zero-ohms from the wiper when the pot is fully counter-clockwise. Track-end is the other end of the track and is not connected.