

## LinBout-2134 RCA line > balanced converter/buffer module

With this module we provide a tiny circuitry with a Line input which is converting this signal in two counter phase signals. It can be directly mounted in a panel with the single nut of the RCA connector mounted. It also fits a high quality MKP input capacitor.

- Convert your line input(s) to the better, balanced one(s) for internal use (ADC, DSP, etc.).
- Provide your electronics with a high quality input capacitor (optional).
- Obtain the correct signals required for operating a stereo amplifier in [bridged mode](#).
- Use it internally by wiring only or use a RCA chassis connector.

With a classy Burr-Brown 2134 dual opamp chip as we use here, we make a balanced signal for internal use. This is a most regular opamp circuit with an inverting and a non-inverting opamp as used in many professional equipment also. The [OPA2134](#) used is known as an audiophile IC.

### Purposes

This buffer module can be used to buffer a Line input signal and at the same time offer a balanced output signal for f.e. a ADC, DSP, etc. as often required. A balanced output means basically that one output (OUT+) looks exactly the same as the input, while the -OUT also looks the same, yet 180° mirrored.

The connected equipment only “sees” the constant buffer input impedance instead of the variable impedance of the potmeter or some electronics, which could result in a change of sound. Also possible interference has way less effects.



The very low output impedances of this circuit cause way lower hum, noise, crosstalk, etc. compared to higher impedance sources. The OPA2134 shows an incredible low 0,01 ohms actually.

Since the buffered signal is available in phase as well as in counter phase, you could also use it just for buffering (+OUT) or buffering/inverting (-OUT) the line input signal only.

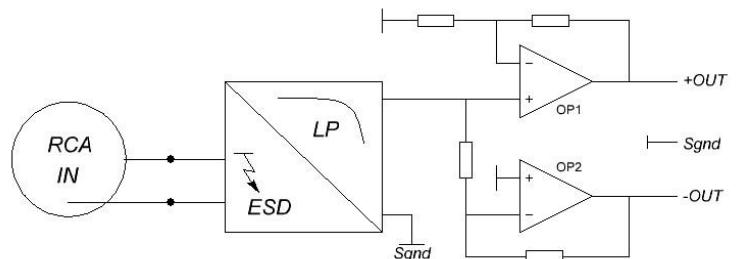
The available balanced signals can be used inside any electronic equipment, like a preamplifier, ADC or ADC. However, we guess it's mostly used in **bridged mode amplifiers**, as explained in the appendix below.

The tiny, 55x34x17mm PCB contains all the parts required. The input is at the top via a high quality RJ-140GT RCA connector. The two counter phase output signals are present at the centre bottom 6-pole screw terminal.

### Principle

The schematics of this module could come right from an “Opamp design book”, where an inverting opamp and a non-inverting opamp make this ELTIM LinBout-2134 line to a balanced buffer circuit. Please note that it does nothing more than this.

The dual Opamp IC is in a milled socket, so you could replace the OPA2134 by another pin compatible one or even use a [Burson dual](#).



We also have [special modules](#), especially made for processing balanced signals in optima forma.

## Input capacitor

In basic condition, we supply this module without an input capacitor. Just and only because there are more opinions about capacitor qualities than there are available. So, you can mount the one you believe is best. Some even don't require an input capacitor and save money that way. Mount 2,2 – 10uF. We saved a space over 10mm wide for this capacitor. Radial pitches of 15, 22,5 and 27,5mm fit. In the order procedure you can select some of the ones we think fit fine. Price is incl. mounting. The capacitor location is, resp. can be, shortcut at the backside via two solder pads in the middle. If there is no capacitor mounted with delivery, these are shortcut; if we did mount a cap, it is left open.

## Power Supply

There are power supply connections ( +12V and -12V) for use in low voltage applications below +/-13V. *Do not use higher voltages here, since these lines are paralleled by 15V Zener diodes which will draw severe currents otherwise!*

In a Power Amplifier there is mostly no low supply voltage available, so we arranged some extra's. Since this module will be used in bridged amps as well, higher PS voltages can be applied to the extra V+/V- pins in the range of  $\pm 18 - 75\text{Vdc}$ . These are then connected to the amps power supply rails. 15mA Constant Current Diodes (CCD) provide a constant current over this wide voltage range. Then 15V Zener diodes regulate the internal supply to  $\pm 15\text{Vdc}$ . 15mA flows into the IC, the other 5mA via the zeners.

More and more "all in one" class-D setups have symmetrical  $\pm 24\text{V}$  auxiliary supply voltages available. With the CCD's mounted in V+/V- lines, all works fine while connecting these supply voltages to V+/V-.

## Mounting

Standard we supply this module with a 2-pole screw connector. Then the module can be fixed with a single M3 bolt somewhere. Instead of that we can mount a professional RCA chassis connector: Just mounting this RJ-140GT into a chassis plate is sufficient. A drill hole of  $\varnothing 12\text{mm}$  is required. In fact, mostly you only need to exchange an existing RCA chassis connector by this module.



## Gain

The basic model comes with 0dB gain, special gain settings are optional, selectable while ordering. An input impedance of 100k is standard. You can lower it by mounting R1, being parallel to this 100k. So, if you mount 100k there, the input impedance will become 50k, etc. We could even mount other pin-compatible dual opamp types on request. For these modifications, use the comment line in our order form.

## Some figures

Input impedance:	100 kohms (lower on request)
Output impedance:	0,01 ohms
Max voltage swing:	V power supply -1,5V
Frequency range:	DC (or 10Hz/C2) - > 8MHz.
Slew rate:	> 20V/uS
Gain:	0dB
Distortion:	< 0,00008% THD
Noise figure:	< 104dBu
Power Supply voltage:	$\pm 4$ to 13V @ -12V and +12V connections (15mA) ( $< \pm 18\text{V}$ when zeners removed) $\pm 18-75\text{V}$ @ V- and V+ connections (20mA) Higher supply voltages possible with extra series resistors.
Dimensions	55x34x21mm (LxWxH)

You can [buy this device at our webshop](#) and via our dealers. [Dealer inquiries](#) are most welcome.

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[www.eltim.eu](http://www.eltim.eu)

We believe you can use this module in bridged mode amps, so some more info about that.

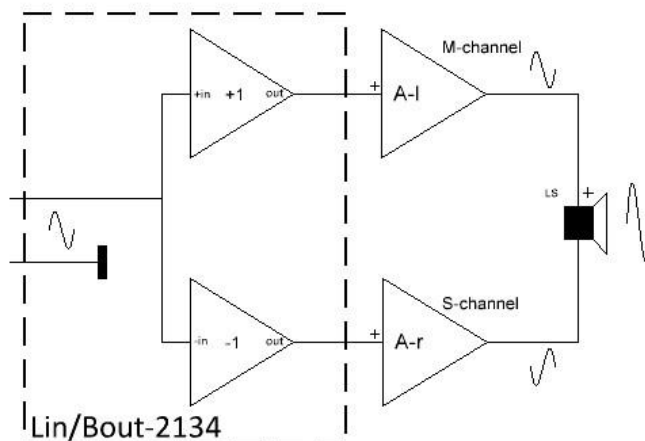
### Bridged mode amplifiers appendix

A specific way of rewiring a stereo amplifier, where theoretically about quadruple power is available, is called [bridge mode](#). Sounds good, yet that is theoretically only! This module provides the required signals.

While rewiring a stereo amplifier into a bridged mode version, the L side amp receives an exact copy, yet buffered, of the Line input signal. By feeding an inverted and buffered input signal to the slave (R) amplifier, the double output voltage is available due to this inverted signal and so (theoretically) also a double current is flowing. Then,  $P_{out} = 2 U \cdot 2 I$ , so quadruple power compared to a single amplifier. In practice the output will be less than this theoretical 4x figure due to extra losses and/or current limiting circuits. Of course, your Power Supply and Power Transistors have to be able to process this extra power. Due to the double amp in the speaker path instead of one, the damping factor will become half by the way.

While connecting this module as shown at right, this results in the required 180° phase shift between both amp outputs. While one output is going up, the other goes down in the same way. Due to this, the output voltage measured between both "hot" leads of the amps is about doubled. The modified stereo amp now becomes a monoblock amp with around 3 - 3,5x the power as a single channel would give.

Since the current about doubles as well, make sure that your PS and Power Transistors can handle this extra power !! In most cases it only works while connecting 8 ohms speakers in order to limit the current drawn.



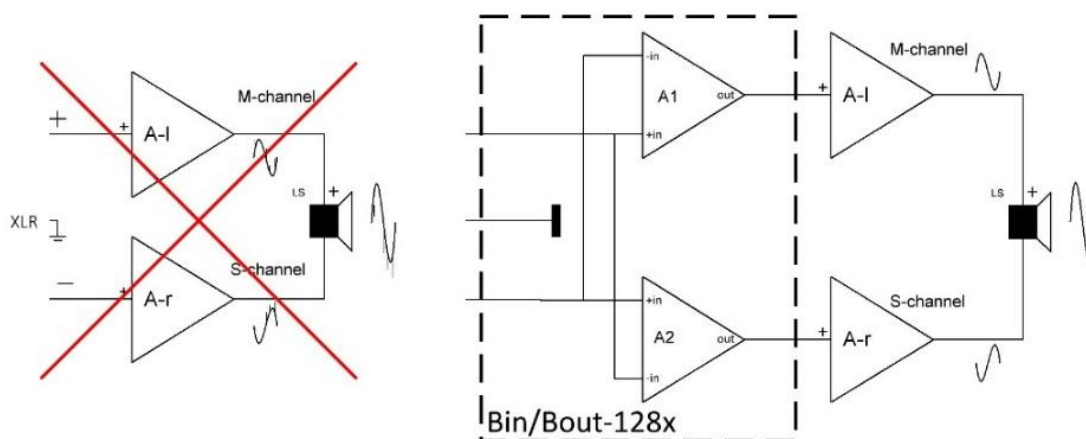
ELTIM Lin/Bout-3124 in bridge mode circuits

While using the ELTIM Lin/Bout-2134, wiring of a **bridged mode amplifier** becomes most easy, just mount the module at the location of one of the existing RCA inputs and connect both amps to the +OUT and – OUT outputs of this module. A single speaker is then connected between both + outputs of the amplifiers ! In this specific case the LS - connections of the amp are no longer used. Extract supply from the existing PS.

### NOTE regarding balanced inputs on bridged mode amplifiers

We have seen even High-End monoblocks, where a balanced input signal (already having a phase and counter-phase signal) is feeding both amps directly. This is totally wrong, since possible interference signals and unbalance in the lines simply are DOUBLE amplified ! These signals as well as unbalance in the signal input line are processed 100% by the amplifiers. Serious interference could cause the amp to clip as well.

If there is an unbalance, this will be amplified by your amp causing an off-centre position of your woofers in best case... Our [BinBout-128x](#) module will solve this problem in a way as it always should be done:



Common "Bridged" mode amplifier

ELTIM Bin/Bout-128x wiring diagram