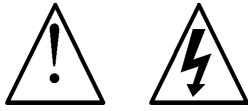


# iRIAA Filter





## **Warnings**

This product does not use any dangerous voltages.

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# 1 Before You Begin

## Description

The inverse RIAA Filter is a highly accurate reference for testing modern phono stages. It provides the inverse transfer function of the RIAA response and level shifting so that a line level signal is converted into exactly what a phono stage input expects. Separate output levels of  $-40\text{dB}$  and  $-60\text{dB}$  (referenced to  $1\text{kHz}$ ) accommodate moving magnet and moving coil stages, respectively.

The iRIAA Filter “half-kit” (for DIY) comprises a blank circuit board and these instructions. To complete the project, you must purchase additional parts from DigiKey ([www.digikey.com](http://www.digikey.com)). Total completed cost is about \$31 in parts.

You can optionally build this kit into a chassis of your own design.

## Features

- Reference accurate to within  $\pm 0.25\text{dB}$
- Two output levels ( $-40\text{dB}$ ,  $-60\text{dB}$ )
- Accommodates both  $50\text{-ohm}$  and  $600\text{-ohm}$  generators
- Two separate channels

## Tools

You will need a few basic shop tools (screwdriver, pliers, wire cutters, etc.) and a fine-tip soldering iron to build this kit.

# 2 Parts to Buy

## Parts List

The following parts should be purchased from [www.digikey.com](http://www.digikey.com).

Component	Qty	DigiKey	Reference Designators
1.8nF cap 2%	2	P3182	C1
5.6nF cap 2%	2	P3562	C2*
560pF cap 2%	2	P3561	C2*
60.4 1%	5	60.4XBK	R4
536 1%	5	536XBK	R3
1.37k 1%	5	1.37KXBK	R6
1.91k 1%	5	1.91KXBK	R5
42.2k 1%	5	42.2KXBK	R1
511k 1%	5	511KXBK	R2
RCA jack	8	CP-1402	

If you wish to build into a metal box, then substitute RCA jacks with #CP-1414 and add box #L150. Additional cost is about \$10. You will need wire to attach the panel mount connectors.

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# 3 Assembly

## Step by Step

Please follow this systematic procedure for assembling the circuit board. Make sure you have purchased all necessary components before you begin.

- ❑ Bend and form the leads on the resistors and install into their proper places. Solder in place and cut leads.
- ❑ Install the capacitors and solder in place. Cut leads.
- ❑ Install and solder the connectors.

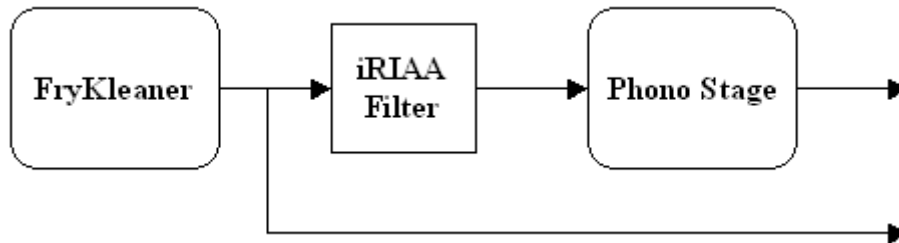
That's it for construction. However, there is one more recommended step, and that is to clean the flux and other surface contaminants from the board. To do this, soak the entire assembly in isopropyl alcohol. You can buy a bottle at any drug store. Soak for about ½ hour, and then use a paintbrush to dab in-between components scrubbing away any remaining residue. Use a strong fan (or leaf blower) to dry both sides. When finished, the circuit board will be shiny and clean. Cleanliness is key to eliminating leakage current paths that develop over time.

# 4 Connections

## Break-In

For break-in of phono stages, connect a line level signal source (CD player or FryKleaner) directly to the 50-ohm inputs. The  $-40\text{dB}$  outputs will mimic a stereo moving magnet cartridge and the  $-60\text{dB}$  outputs a moving coil cartridge. The output of the phono stage under test (PUT) should be a line level signal virtually identical to the original. If not, then there is a phase or frequency response aberration in the PUT.

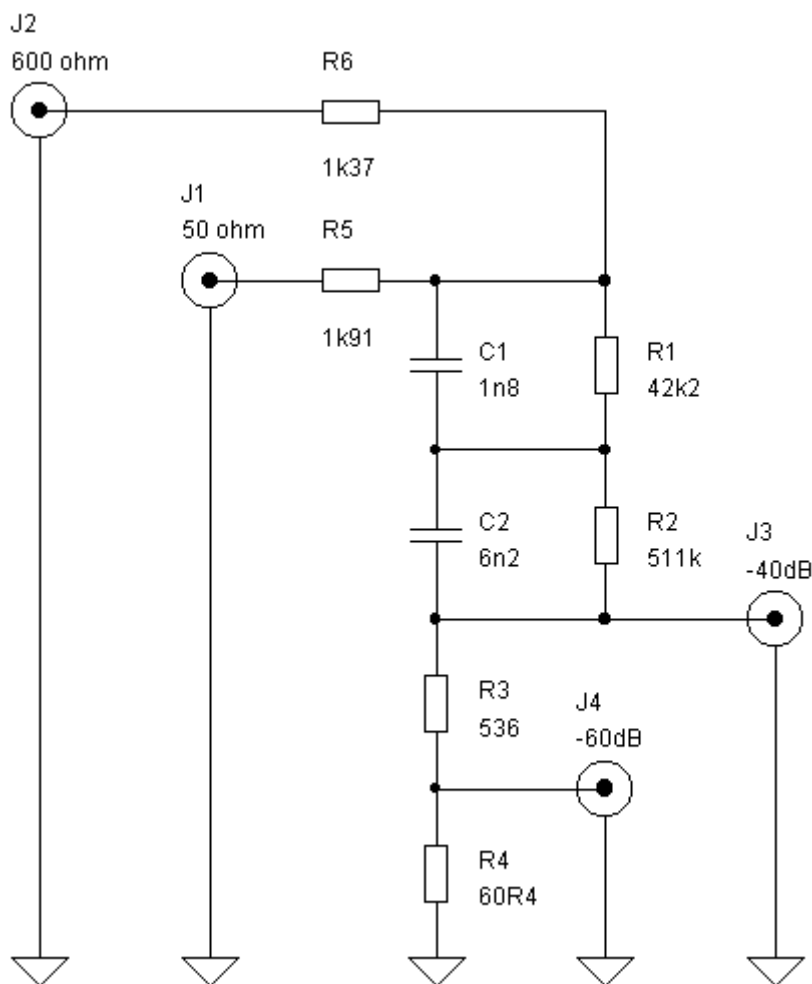
The 600-ohm inputs are added for convenience of older audio frequency generators. It is important to have the correct source impedance to get the 50kHz turnover frequency placed correctly. This is required for testing wideband phono stages.



# 5 Specifications

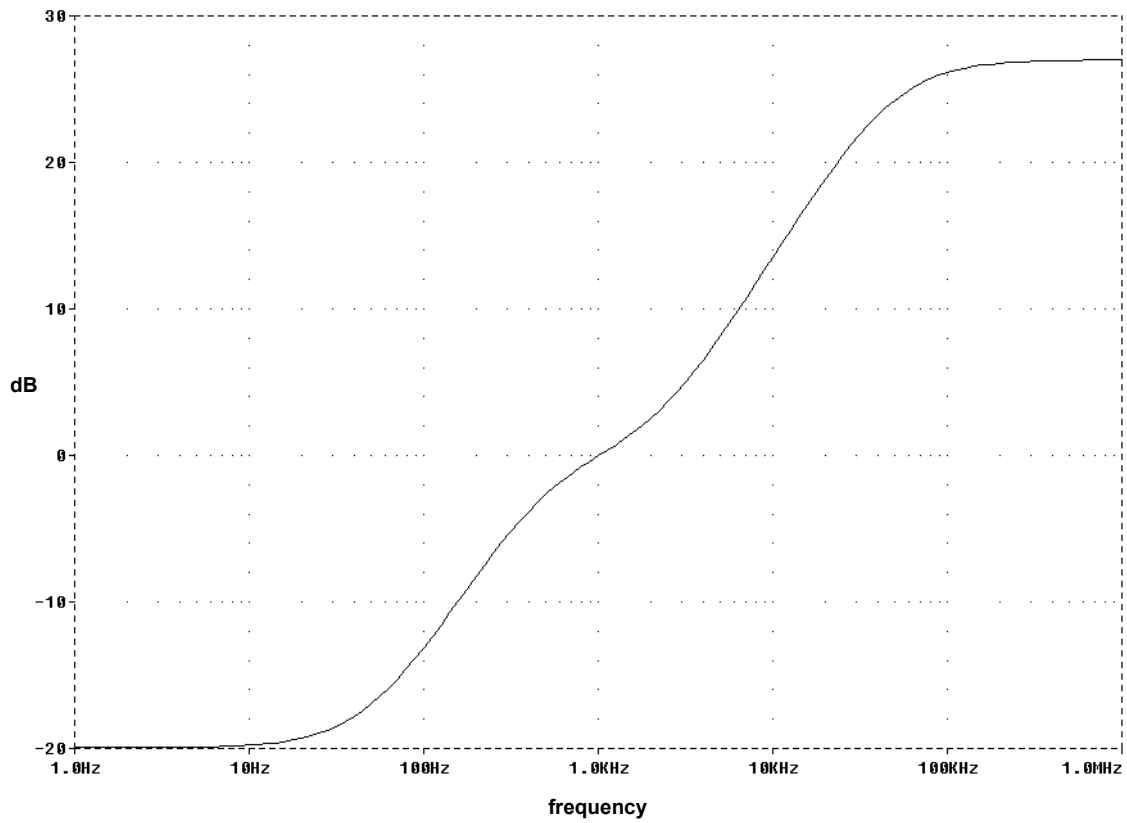
## Schematic

This filter has two identical channels. Note, C2 is a combination of both 5n6F and 560pF capacitors.



# Frequency Response

Each channel matches the ideal inverse RIAA transfer function (with corner added at 3.18us) to within +/-0.25dB. The following table gives exact theoretical values.



Frequency	dB	Frequency	dB	Frequency	dB
10.00	-19.74	223.9	-7.43	5012	8.18
11.22	-19.70	251.2	-6.64	5623	9.04
12.59	-19.64	281.8	-5.88	6310	9.92
14.13	-19.58	316.2	-5.15	7079	10.81
15.85	-19.50	354.8	-4.46	7943	11.72
17.78	-19.40	398.1	-3.81	8913	12.64
19.95	-19.27	446.7	-3.20	10000	13.56
22.39	-19.12	501.2	-2.63	11220	14.48
25.12	-18.94	562.3	-2.11	12590	15.40
28.18	-18.72	631.0	-1.63	14130	16.31
31.62	-18.46	707.9	-1.19	15850	17.23
35.48	-18.16	794.3	-0.77	17780	18.10
39.81	-17.80	891.3	-0.38	19950	18.96
44.67	-17.40	1000	0.00	22390	19.80
50.12	-16.93	1122	0.38	25120	20.61
56.23	-16.41	1259	0.77	28180	21.38
63.10	-15.84	1413	1.17	31620	22.11
70.79	-15.22	1585	1.60	35480	22.80
79.43	-14.55	1778	2.07	39810	23.44
89.13	-13.83	1995	2.57	44670	24.02
100.0	-13.09	2239	3.12	50120	24.54
112.2	-12.31	2512	3.72	56230	25.01
125.9	-11.51	2818	4.36	63100	25.43
141.3	-10.70	3162	5.05	70790	25.78
158.5	-9.88	3548	5.78	79430	26.09
177.8	-9.05	3981	6.55	89130	26.35
199.5	-8.23	4467	7.35	100000	26.57

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# 6 Warranty & Service

## Warranty

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## Service

Refer to Chapter 4 for troubleshooting information. If the problem persists, contact Hagerman Technology for service at <http://www.hagtech.com>.

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