# EMI Filter for Audio Equipment

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# Problem Statement

- During amateur radio transmission, our audio equipment would pick up the transmission, especially during CW operations
- Design and installation of simple Pi (C-L-C) network filters in the input of the stereo equipment solved the problem

# Schematic (Need 2 Channels for Stereo)

Filter Circuit Board Components
Shown Inside Dashed Lines
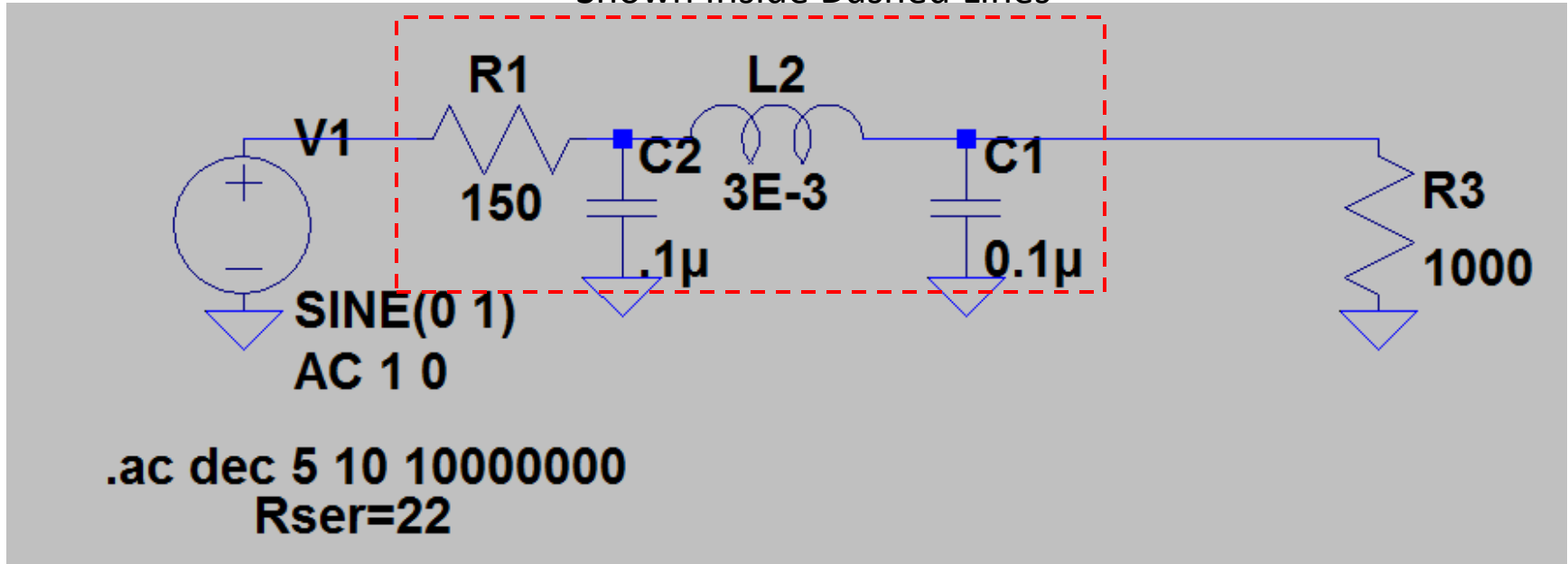


SPICE Model Created Using Ltspice IV

L2 Uses Amidon Core, Type FB-73-2401,
$A_L$=2500, 35 turns of magnet wire,
approximate inductance calculated is 3 mH

# Formula for Calculating Inductance

$$N = 1000\sqrt{\frac{\text{desired 'L' (mh)}}{A_L\ \text{(mh/1000 turns)}}}$$

$$L\text{(mh)} = \frac{A_L \times N^2}{1{,}000{,}000}$$

$$A_L\text{(mh/1000 turns)} = \frac{1{,}000{,}000 \times \text{'L' (mh)}}{N^2}$$
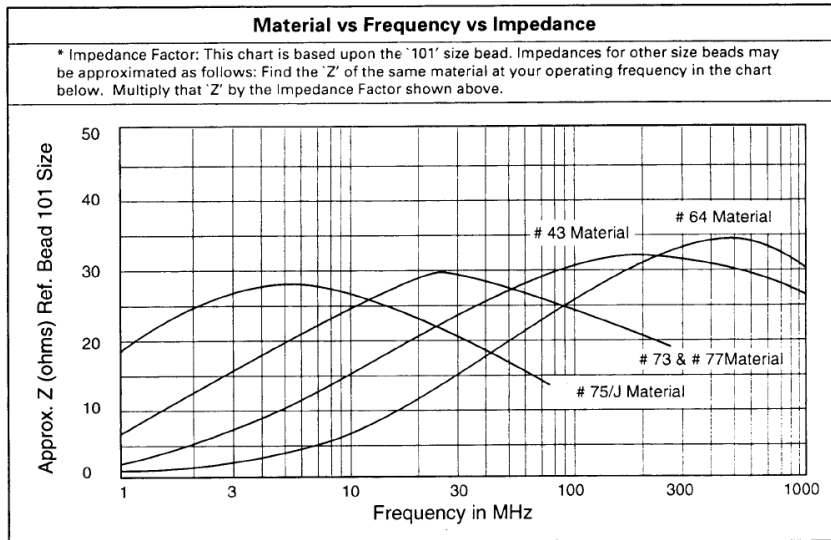
N = number of turns      L = inductance (mh)      $A_L$ = inductance index (mh)/1000 turns)
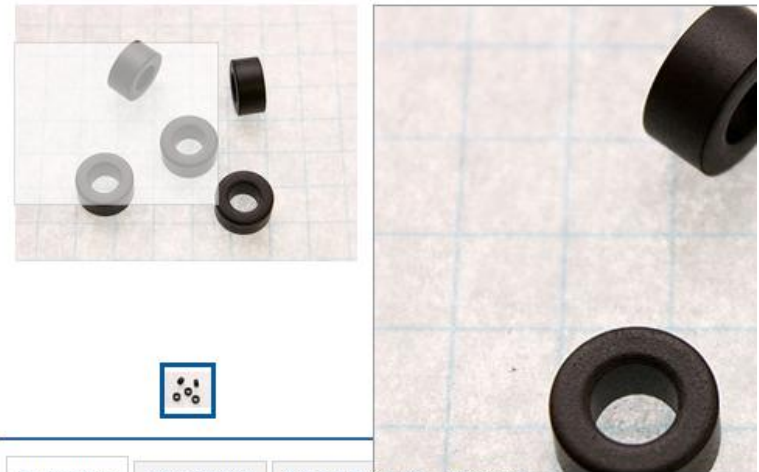
# Ferrite Cores Used

**Ferrite Core Characteristics and Source:**
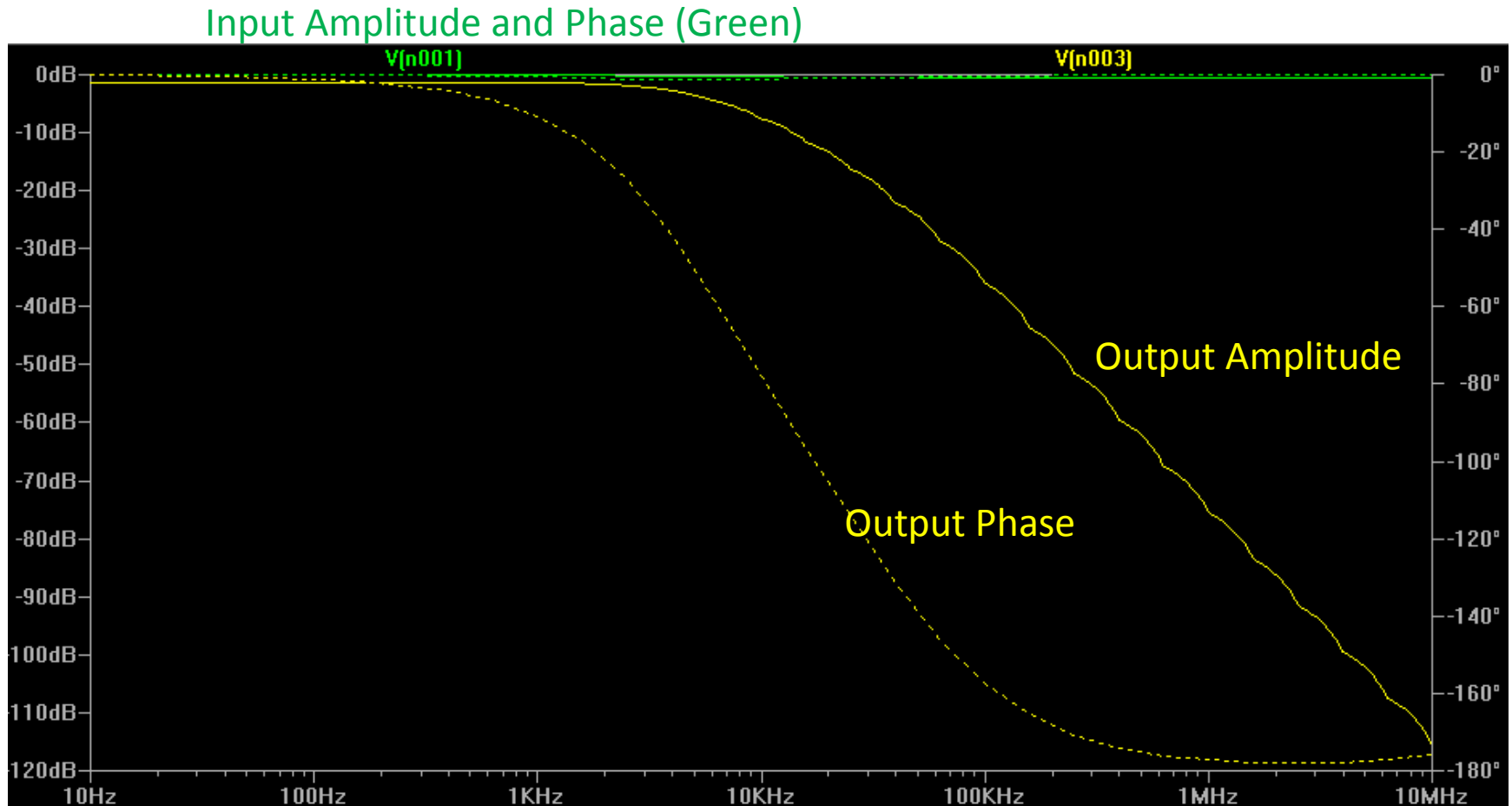
http://www.amidoncorp.com/fb-73-2401/



FB-73-2401



Description | Other Details | Similar Products | Reviews

Product Description
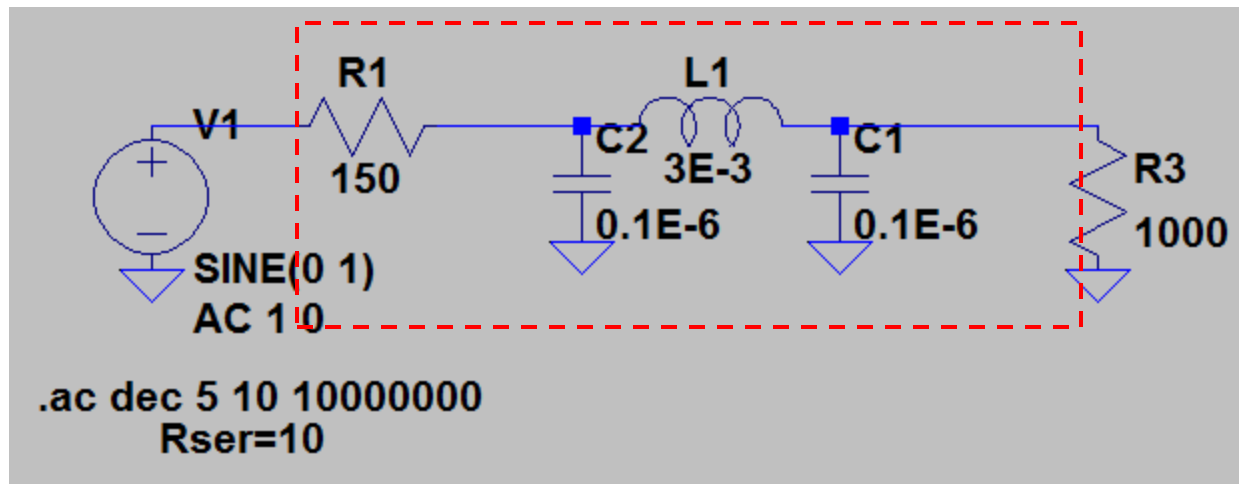Permeability 2500

ID: 0.197
OD: 0.380
Height: 0.190

# Bode Plot of Pi Filter In/Out Response



Input Amplitude and Phase (Green)

V(n001)  V(n003)

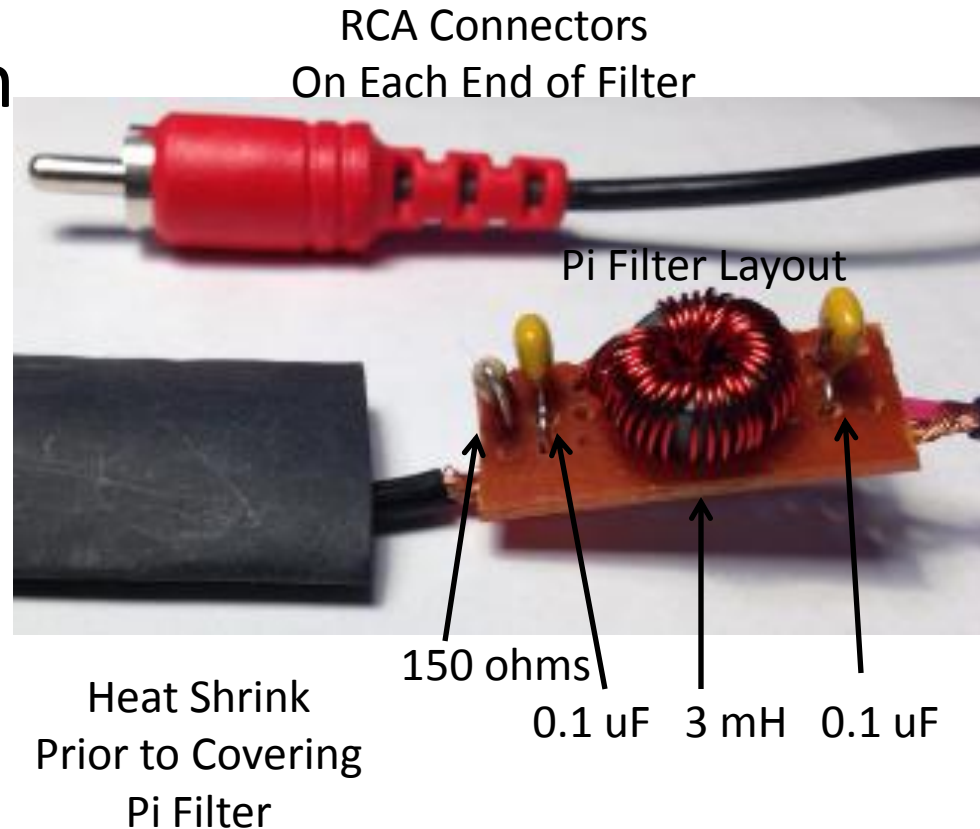Output Amplitude

Output Phase

# Subwoofer EMI Filter

- Same Pi Network Filter Used for Subwoofer

Filter Circuit Board Components
Shown Inside Dashed Lines

# Woofer Channel EMI Filter

- Filter EZ Construction Technique

- Cut One RCA to RCA Plug Cable in Half

- Insert Pi Filter with Heat Shrink Cover

RCA Connectors
On Each End of Filter

Pi Filter Layout

Heat Shrink
Prior to Covering
Pi Filter

150 ohms

0.1 uF   3 mH   0.1 uF

# Bode Plot of Pi Filter In/Out Response



Input Amplitude and Phase (Green)

Output Amplitude

Output Phase