

## DDR DIPOLE DESIGN

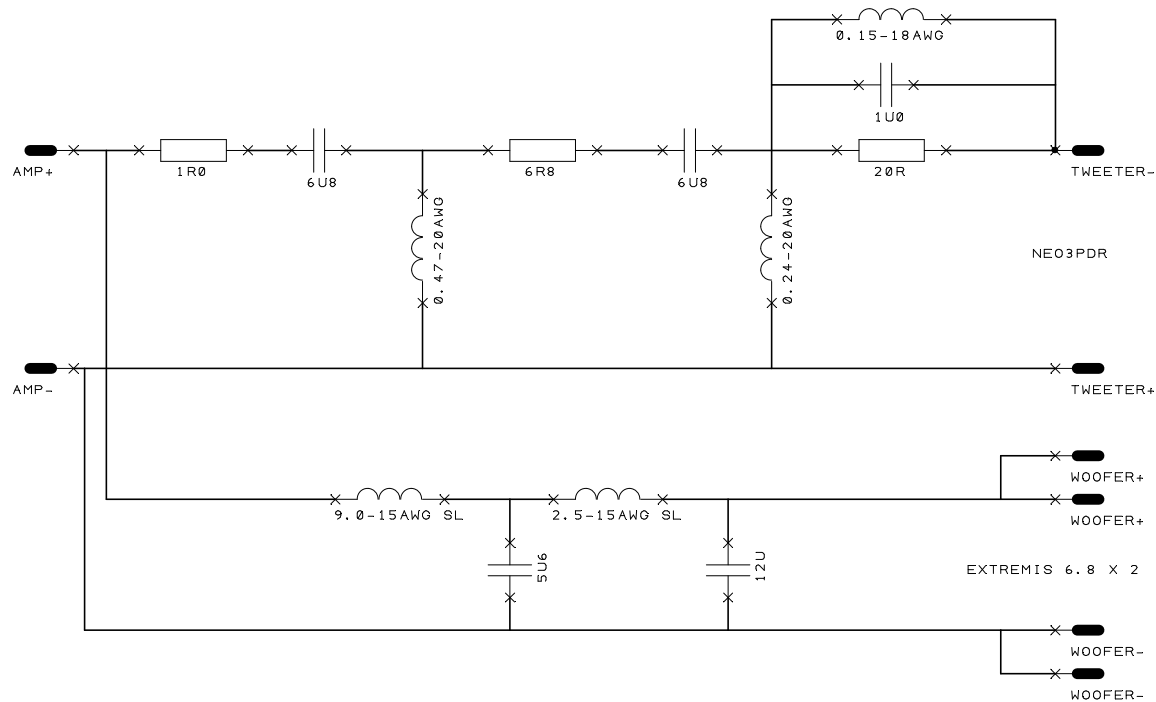
This dipole design utilizes a single 12" wide, 48" high flat baffle, a single Bohlander Graebner NEO3PDR tweeter, and a pair of Adire Audio® Extremis 6.8™ midwoofers. Nominal system efficiency is 80 dB, with a rated audio bandwidth of 70 Hz to 20 kHz.

**COMPONENTS REQUIRED:**

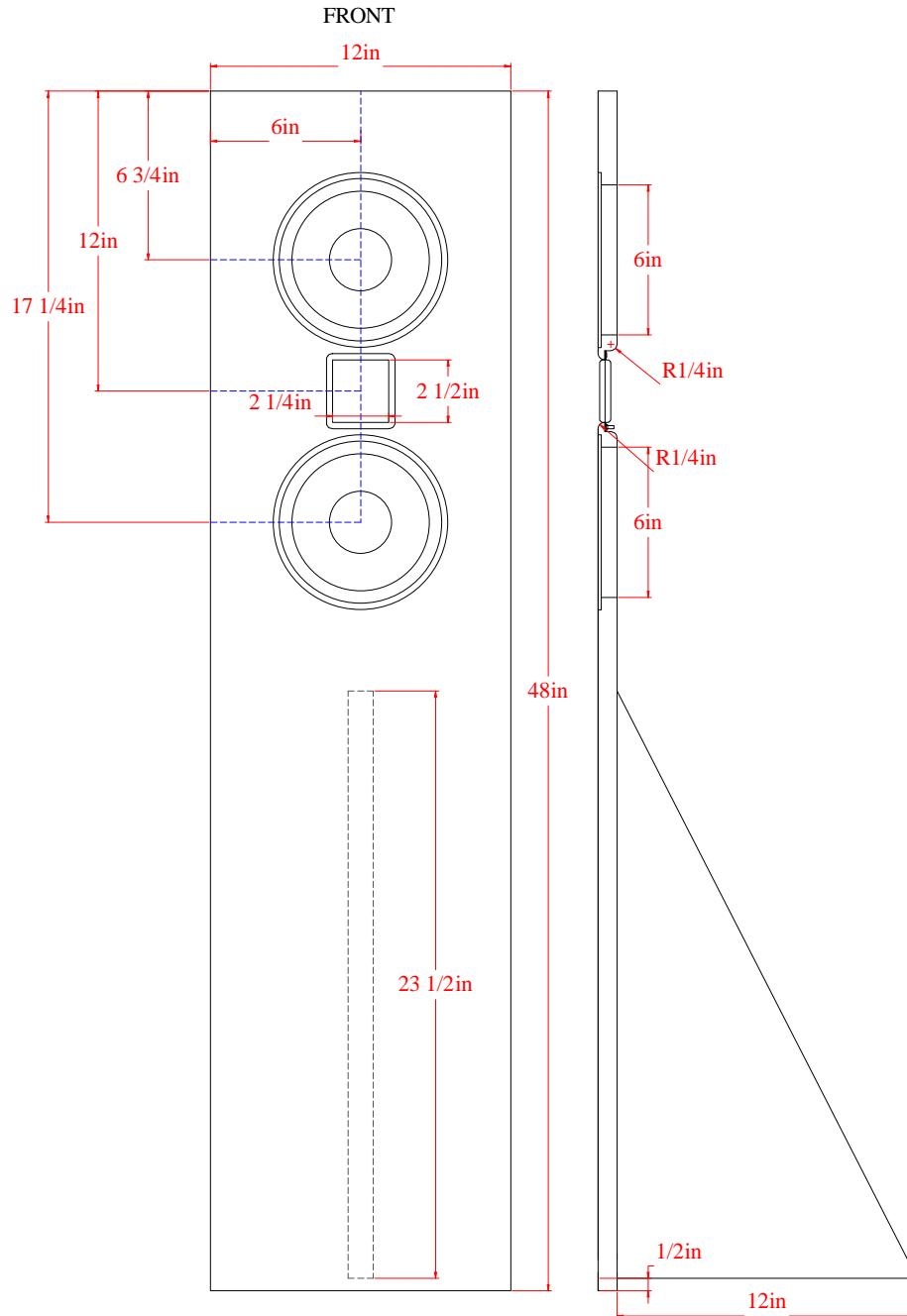
2 QTY 1.0 OHM 10W RESISTOR	TWEETER XO
2 QTY 6.8 OHM 10W RESISTOR	TWEETER XO
2 QTY 20 OHM 10W RESISTOR	TWEETER XO
2 QTY 1.0 UF POLY 250V CAPS	TWEETER XO
2 QTY 5.6 UF POLY 250V CAPS	WOOFER XO
4 QTY 6.8 UF POLY 250V CAPS	TWEETER XO
2 QTY 12 UF POLY 250V CAPS	WOOFER XO
2 QTY 0.15 MH 18 AWG AIR CORE INDUCTORS	TWEETER XO
2 QTY 0.24 MH 20 AWG AIR CORE INDUCTORS	TWEETER XO
2 QTY 0.47 MH 20 AWG AIR CORE INDUCTORS	TWEETER XO
2 QTY 2.5 MH 15 AWG STEEL LAMINATE INDUCTORS	WOOFER XO
2 QTY 9 MH 15 AWG STEEL LAMINATE INDUCTORS	WOOFER XO
2 QTY NEO3PDR TWEETERS WITH REAR CUPS REMOVED	TWEETER
4 ADIRE AUDIO EXTREMIS 6.8 MIDWOOFERS	WOOFERS

Resistors, caps, and aircore inductors are available from a variety of sources. The steel laminate inductors are available from Madisound (<http://www.madisound.com>). The NEO3PDR tweeters are available from Parts Express (<http://www.partsexpress.com>). The Extremis 6.8 midwoofers are available from any Adire Audio dealer.

**CROSSOVER DESIGN:**



The crossover is a 6<sup>th</sup> order Linkwitz Riley alignment, with a crossover frequency of 1800 Hz. The tweeter polarity is reversed relative to the woofers. 14AWG or better cabling is recommended for all connections between the crossover and the drivers.

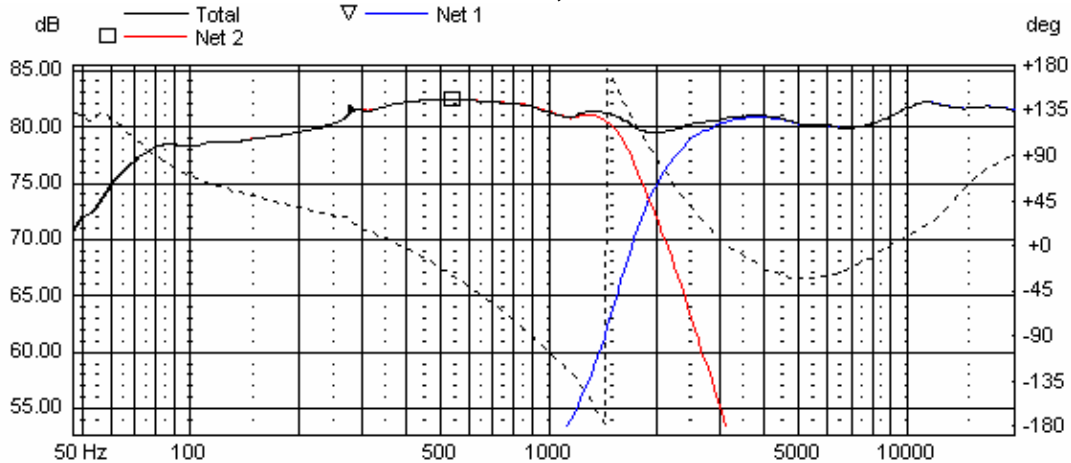
**BAFFLE DESIGN:**

The baffle is 48" high, 12" wide, 3/4" thick. The tweeter is recessed half-way through the baffle, with a 1/4" roundover on the front and rear of the cutout.

Enough empty baffle space is available below the midwoofers that a subwoofer can be incorporated directly into the design. A sideways-mounted dipole 15" or ported 10" front-firing woofer is recommended.

Barring the use of a subwoofer down below, we recommend a single piece of wood mounted behind the baffle for support. With the recommended 1/2" spacing from the baffle bottom, the panel will be tilted back approximately 2.3 degrees, which will provide mechanical stability.

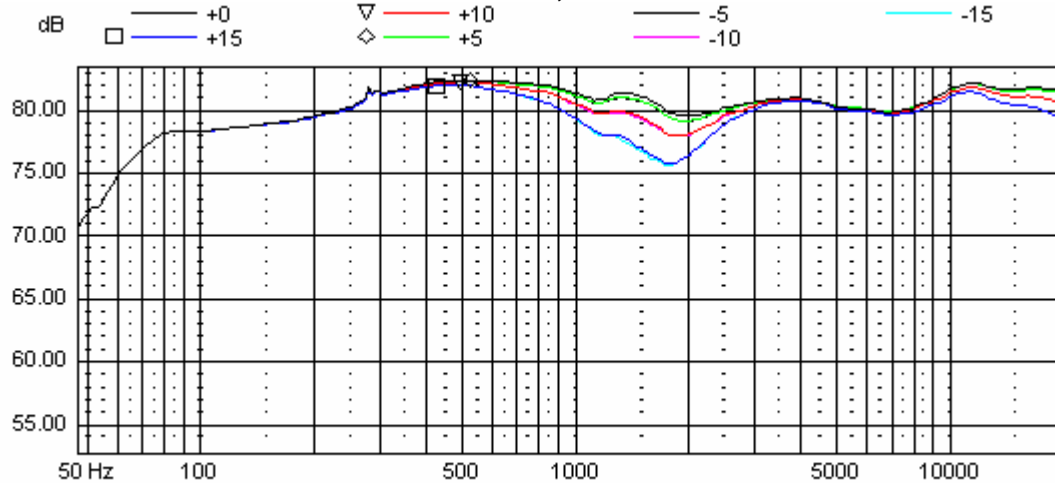
**ANECHOIC SYSTEM FREQUENCY RESPONSE, ON TWEETER AXIS:**



The system is  $\pm 3$  dB from 70 Hz to 20 kHz, providing low enough extension for proper integration with any subwoofer system.

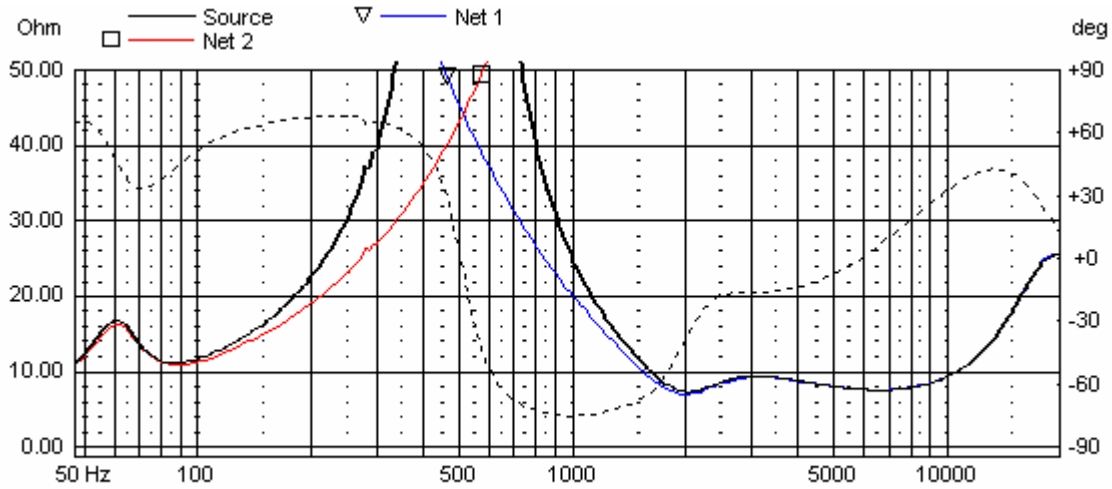
The system is nominally 80 dB efficient; 100W amplification is recommended for most playback situations.

**ANECHOIC SYSTEM FREQUENCY RESPONSE, VERTICAL OFF-AXIS:**



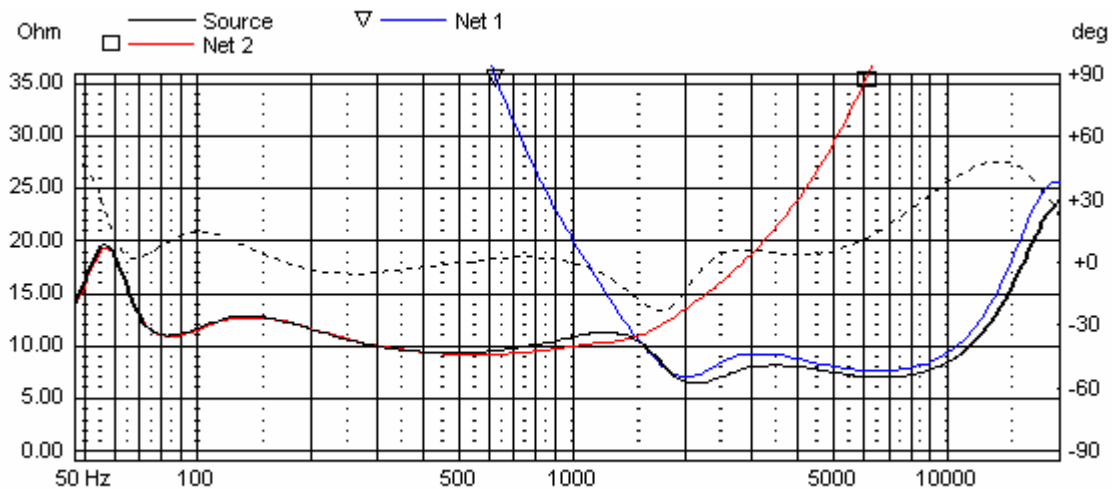
Vertical dispersion is well controlled; the center 20° of output is within 1 dB of nominal on-axis response. Going out to a 15 off-vertical axis response results in a 3 dB dip between 1000 and 2500 Hz. This corresponds to the seated-to-standing height of a typical adult male at a distance of approximately 9 feet; listening at a distance of 12 feet will result in very little audible change between a seated and standing position.

**SYSTEM IMPEDANCE:**



System impedance is very benign; the minimum is at 2 kHz, with a value of 7.2Ω. This would be a very easy load for nearly any amplifier capable of providing the recommended 100W of power into an 8 Ω load.

The impedance peak at 500 Hz rises to a maximum of 150Ω; if you desire to attenuate this peak, then a series RLC network placed across the input to the woofer network is recommended. This should consist of a 100 resistor, 100 μF capacitor, and 1.0 mH inductor (any size) in series, across the amplifier outputs. This will lower the impedance to 12Ω maximum and 7Ω minimum between 100 Hz and 10 kHz, as shown:



**LISTENING IMPRESSIONS:**

The dipole is very clean and open, with little coloration. The NEO3PDR output is considerably cleaned up without its rear cup, and provides a true dipole radiation pattern which is an ideal response for this design.

Bass is extremely extended considering the simplicity and narrow dimension of the baffle. In-room extension to 60 Hz is audible and tactile. For most music a subwoofer is not required nor desired; smaller vocal or jazz recordings are reproduced with plenty of heft in the low end, and cohesion is maintained by forgoing the use of a subwoofer.

The measured front and rear frequency responses are extremely close, and evidenced by the strong “out of phase” cancellation effect one gets when listening centered front-to-back on the side of the speaker. Much more pronounced than most dipole speakers. Most likely attributable to the very open rear of the Extremis (providing near-equal frequency response front and back) and the true dipole nature of the uncupped NEO3PDR.

Overall this speaker is quite free from audible distortion or a forward sound. A slight depression in the total radiated power between 1 and 3 kHz eliminates the forward sound that is often present in speakers. Able to play most music with considerable authority and output. Ideally placed 4-5 feet from the front wall for a very spacious, deep, and involving soundstage.

Music used for evaluation includes selected tracks from The Holly Cole Trio (I Can See Clearly Now, The Tennessee Waltz), Dire Straits (Fade To Black, Brothers In Arms), Michael Kamen (Don Juan Di Marco, Highlander), Tony Bennett (Steppin Out), Alison Krauss (The Boy Who Wouldn't Hoe Corn, The Lucky One), Diana Krall, (Peel Me a Grape, Danny Boy) Andrea Bocelli (Mattinata, Sogno), Pink Floyd (Comfortably Numb, The Great Gig in the Sky), Cowboy Junkies (Mining For Gold) and Rod Piazza & The Mighty Flyers (Ghosting).