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Ascend Sierra Ribbon Tower Featuring Our Custom RAAL 70-20XR Ribbon Tweeter

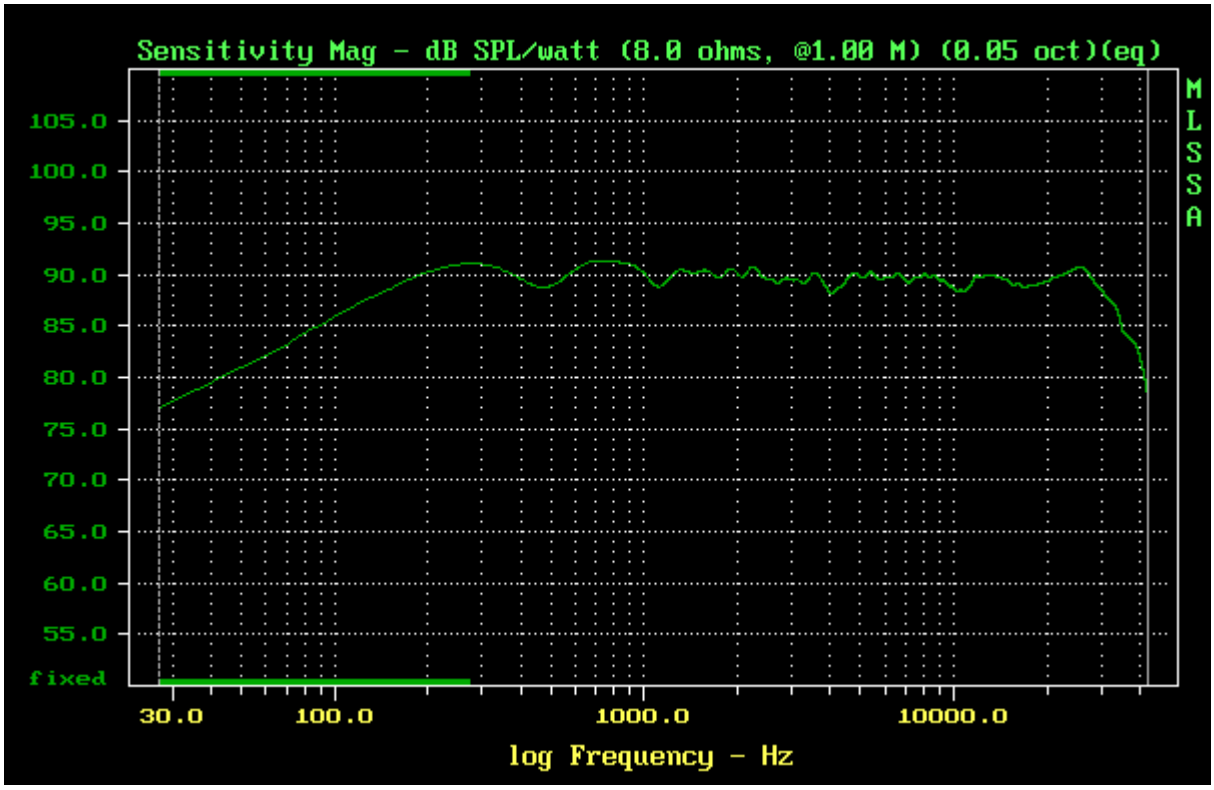
Upon extensive evaluation, we have found several key performance factors that clearly detail what makes our custom RAAL ribbon tweeter audibly distinguishable from quality dome tweeters. What follows is an objective study of our results.

The Sierra Tower combined with this ribbon tweeter results in a loudspeaker capable of remarkable accuracy in several key factors:

1. Extremely flat on-axis response with extended highs. The measurement below is a remarkable +/- 1dB from the critical lower midrange up to 30kHz!
2. Accurate off-axis response free of bloom
3. Lower stored energy and faster decay times when compared to our NrT dome

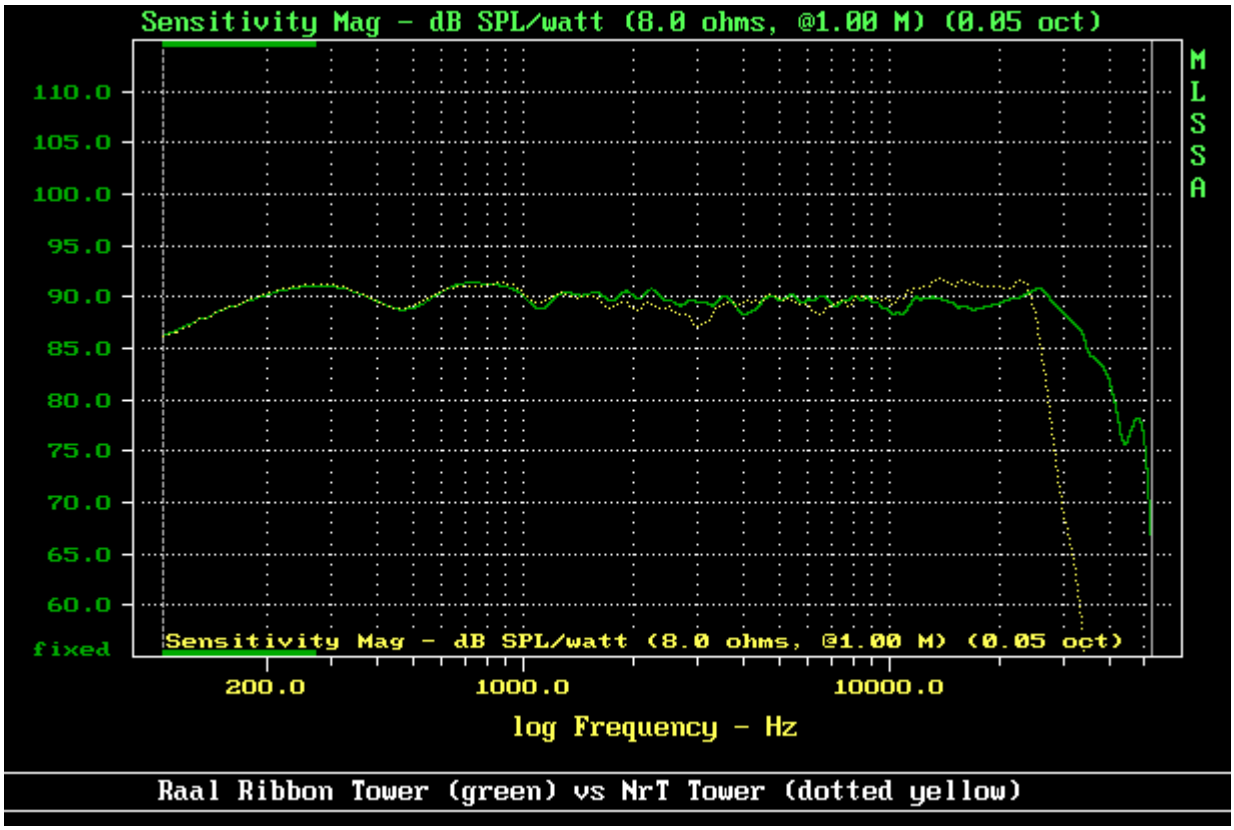
Anechoic Frequency Response Measurement:

Below is the anechoic frequency response measurement of the Sierra Tower with RAAL ribbon tweeter upgrade. Microphone distance is 1 meter with calibrated sensitivity. Note: due to the measurement technique, the response below 250Hz is invalid, as represented by the above and below horizontal green bars.



Notice the extreme linearity which translates to a response of +/-1 dB throughout the critical midrange and high frequency response. High frequency extension is superb, with an upper response limitation of -3dB at 32kHz and -10dB at a remarkable 40kHz.

Below is the response comparison between our stock Sierra Tower and the Sierra Ribbon Tower



Notice the difference in extension as well as the improvements in linearity.

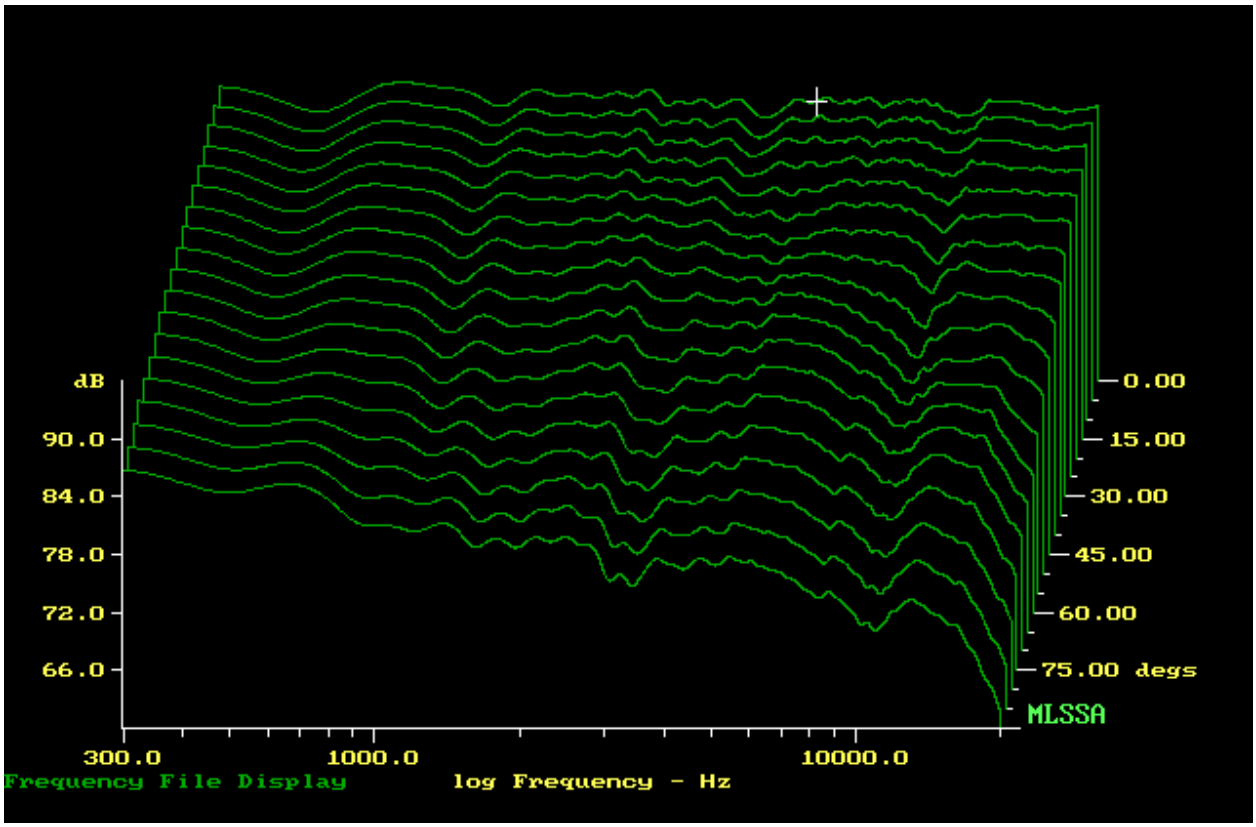
However, the real performance advantages of this tweeter can not be represented with basic on-axis frequency response measurements.

Polar Response:

It is in this area where this tweeter was most surprising. In general, ribbon tweeters have been criticized for their off-axis performance thus usually requiring the listener to sit directly in the "sweet spot" for the best performance. Our polar response measurements clearly indicate that this is not the case with this particular tweeter. Horizontal off-axis performance is excellent and in combination with our dedicated midrange driver and optimized crossover, the midrange and high frequency performance remain remarkably linear with uniformly decreasing spl as frequency rises. In other words, the frequency response of the speaker remains consistent at even extreme off-axis angles and the result is a more accurate in-room response as we hear a combination of both the direct-sound and off-axis sound of the speaker.

You will also note that there is no indication of tweeter bloom at any off-axis angles.

The below polar response shows the horizontal off-axis frequency response curves of the Sierra Ribbon Tower from 0 (on-axis) through 90 degrees off-axis in 5 degree increments. Microphone distance is 1 meter.

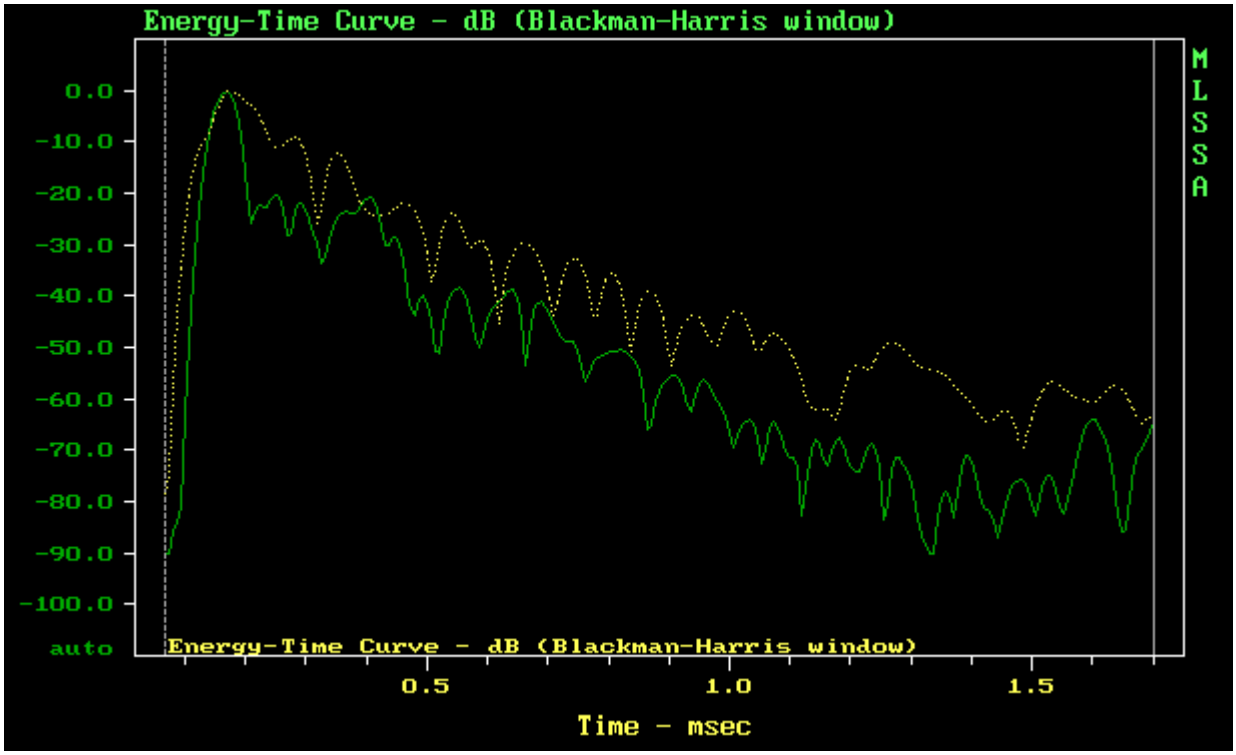


This is truly a remarkable polar response! I will share a quote from the designer of this tweeter:

"I'm really glad that you have noticed that! You are the second person that ever noticed it and gave some significance to it...I strongly believe that a speaker must have the same impulse response in all directions, to have the room reflections excited equally, if different, the brain will not connect the room response as belonging to the direct sound and assign it the role of noise that needs to be filtered out."

Stored Energy and Decay Time:

This is another area where our ribbon tweeter shows it prowess. The below energy-time curve measurement compares the stored energy and how fast it dissipates between our ribbon tweeter and NrT. To obtain the most accurate measurement, microphone distance is at 1 inch and centered on the tweeter axis. The ribbon tweeter is represented by the green trace while the NrT is the dotted yellow trace.



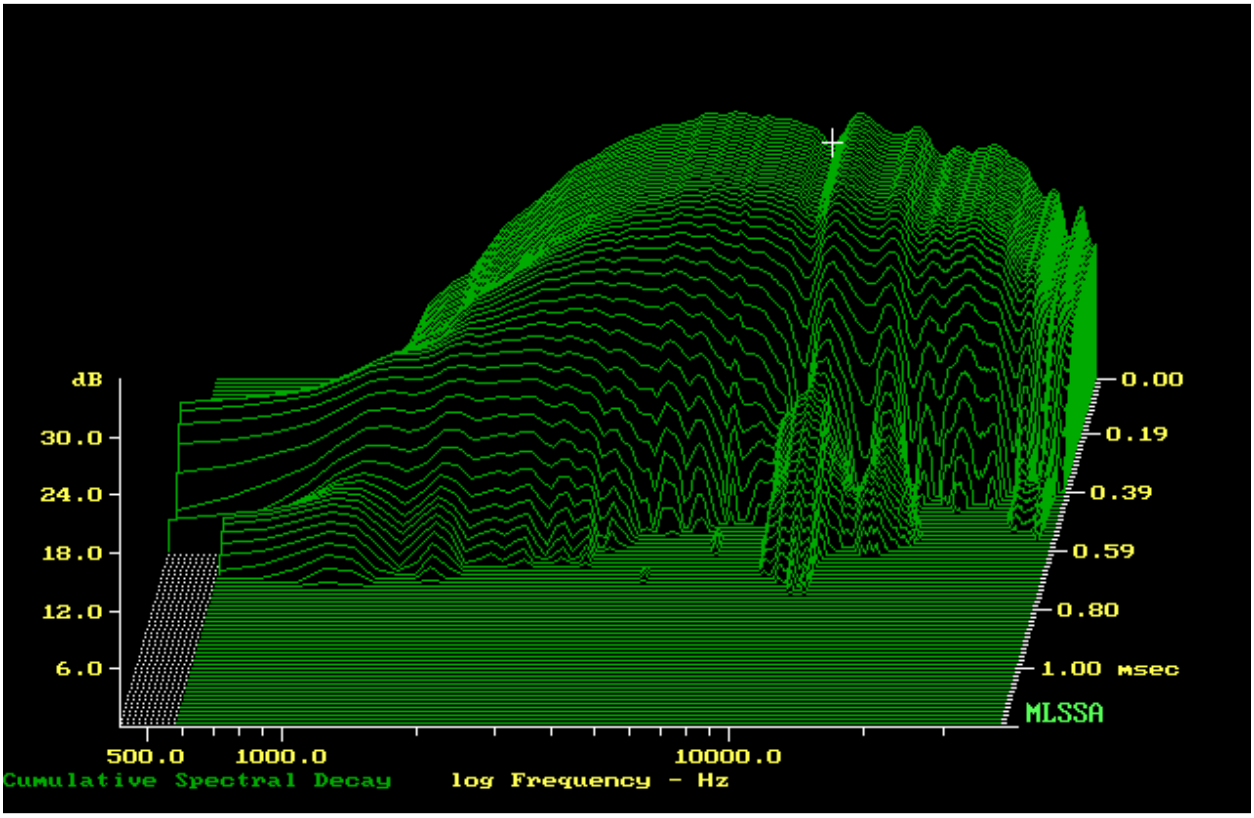
The initial impulse is indicated on the Y axis at 0dB. Notice that within 0.1 milliseconds the energy of the ribbon tweeter almost instantly drops by 25dB and while the NrT exhibits fantastic performance for a dome tweeter, it can not keep up with the ribbon. At 0.1 msec, the ribbon has approximately 10 times less energy.

The clearest visual representation of just how quick the ribbon tweeter is can be seen in the cumulative spectral decay graphs.

Cumulative Spectral Decay:

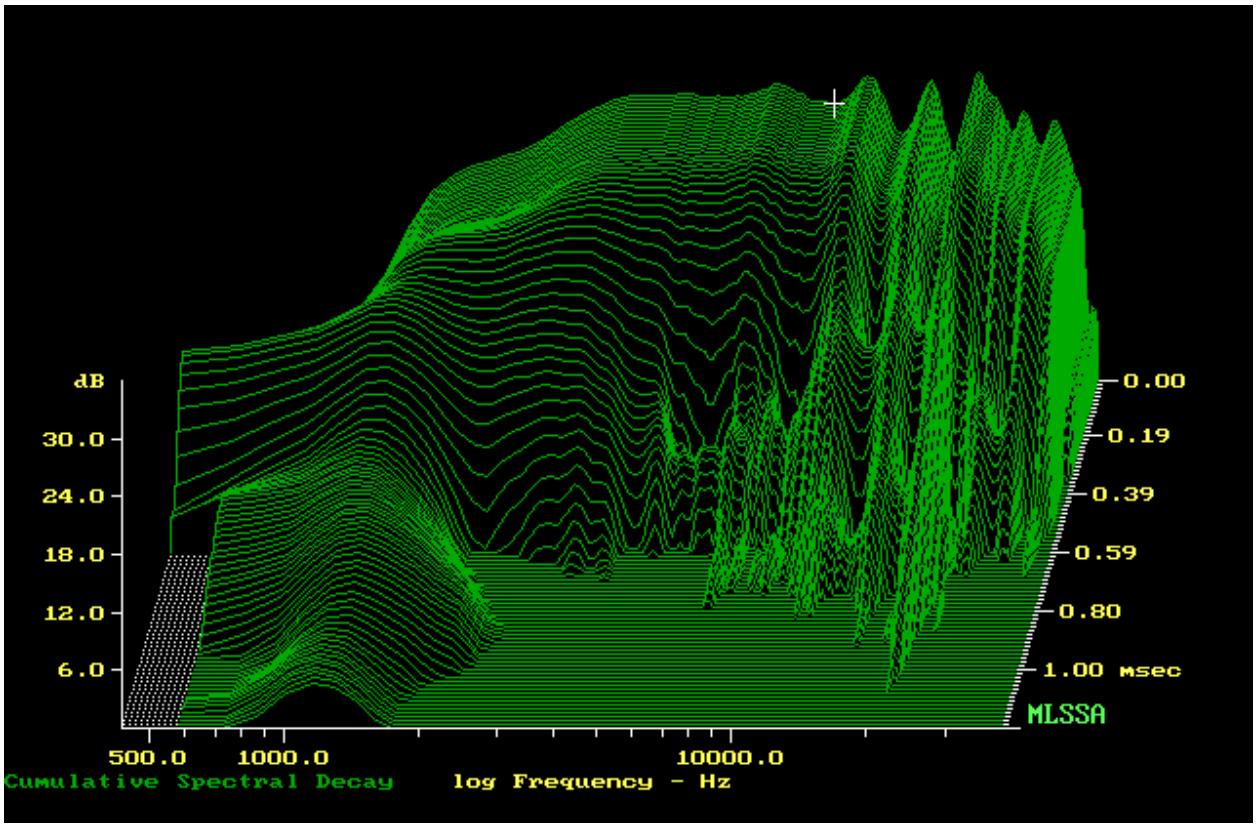
This measurement is similar to the energy time curve but displays a 3 dimensional view such that we can examine the decay time with reference to frequency. It is an exceptional tool to reveal transient accuracy and indicate various problem areas with respect to resonance and stored energy.

Ribbon Tweeter CSD



Notice that nearly all energy from the tweeter is fully dissipated between 0.39 msec and 0.59 msec. Nearly equal decay time throughout the full bandwidth of the tweeter results in a more cohesive and detailed performance, closer to how sound is produced in nature. For example, a 2 kHz note dissipates at nearly the same time as a 30 kHz note. I believe that it is this remarkable transient "speed" and uniform decay times that correlate to listeners describing the ribbon sound as being more delicate and transparent.

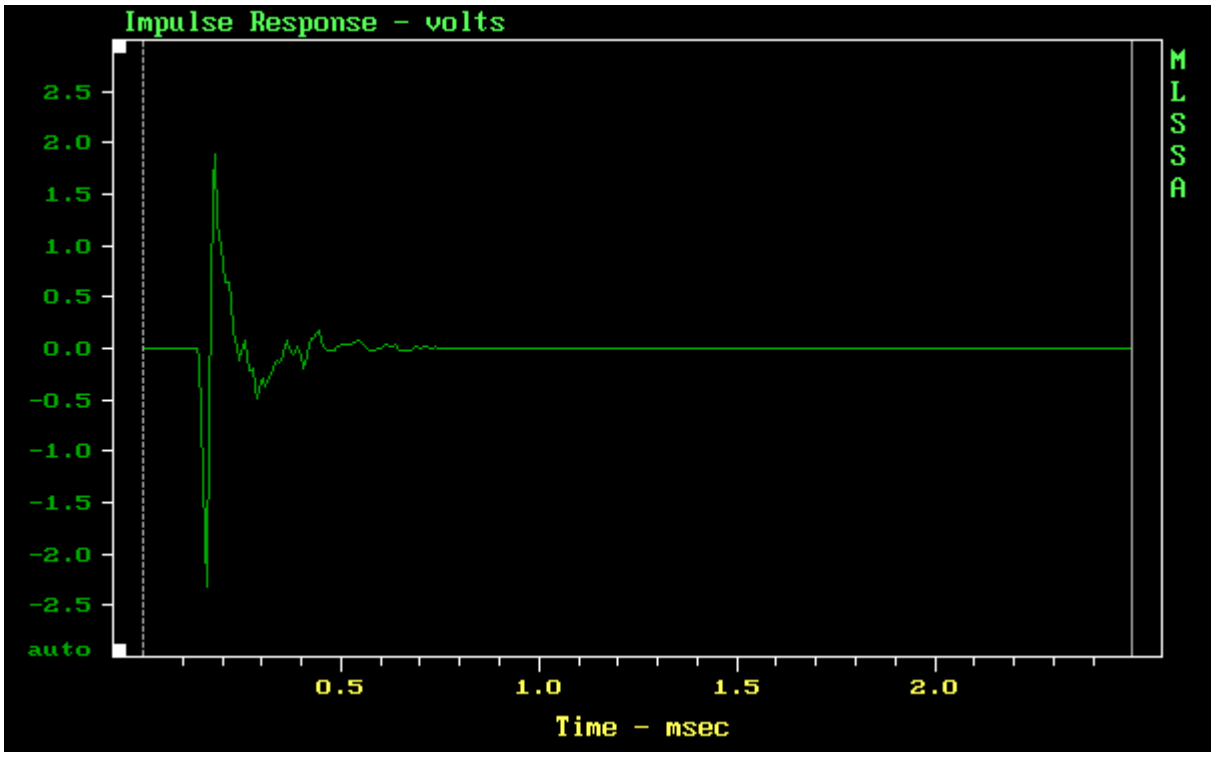
NRT CSD



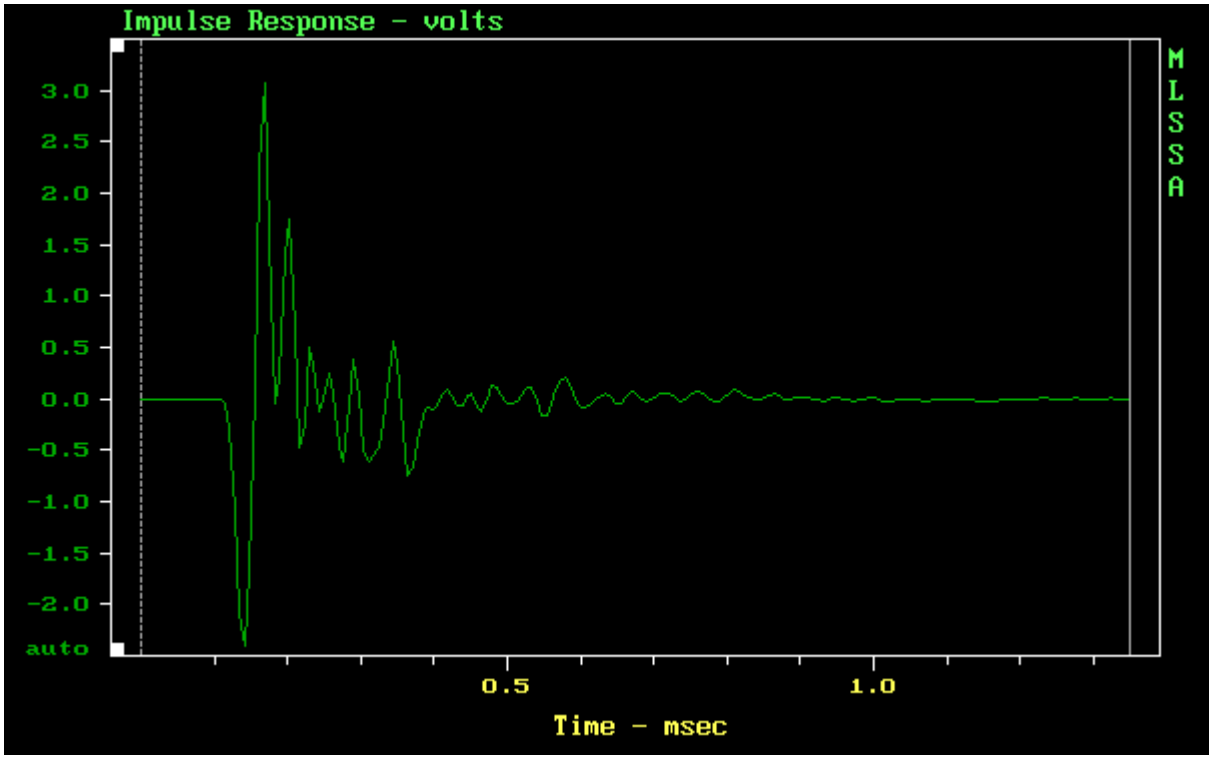
This is an exceptional CSD response for a dome tweeter but decay times are not nearly as uniform as the ribbon.

Impulse Response:

Ribbon Tweeter impulse response

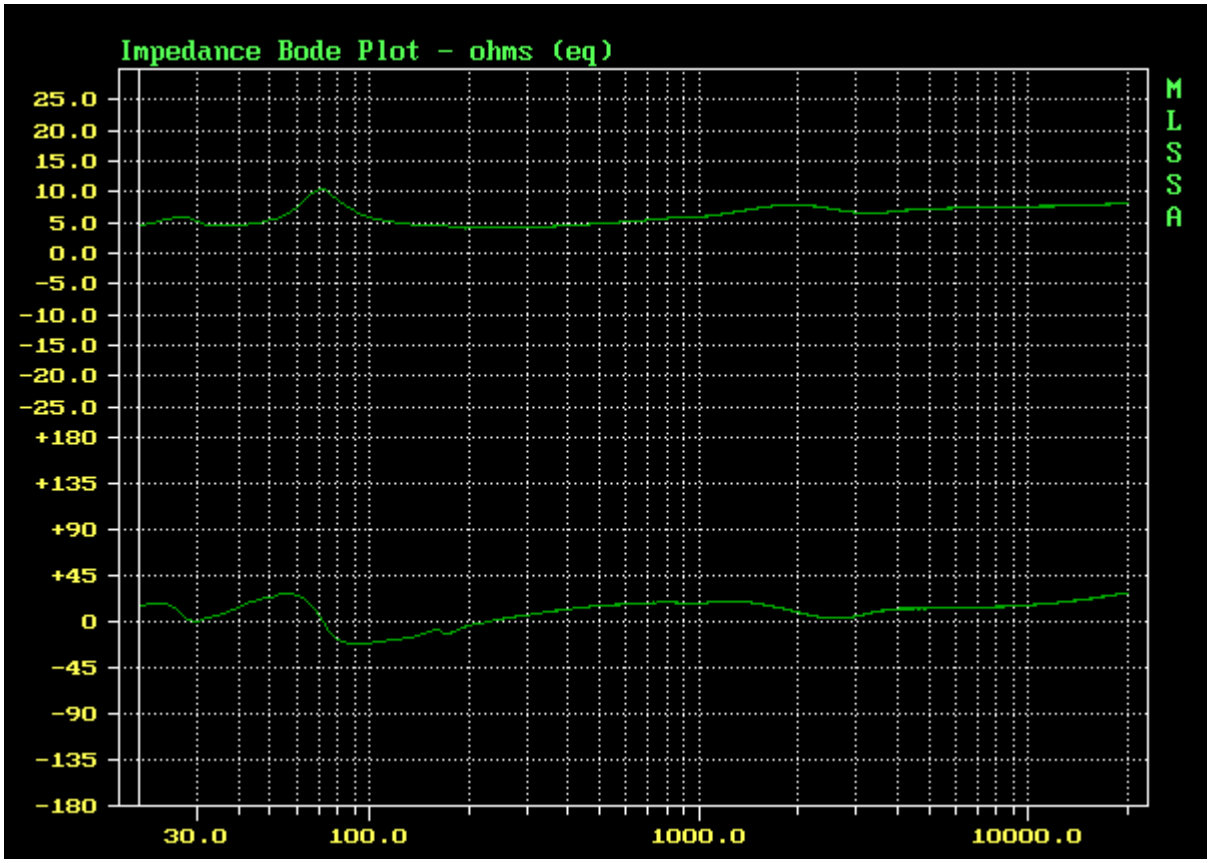


NrT impulse response



Impedance and Electrical Phase:

The impedance response is clean and free from resonances while the electrical phase response is extremely linear with very mild phase angles. The Sierra Tower with RAAL ribbon is an easy load for any decent receiver or amplifier.



Sierra Ribbon Tower Specifications:

Typical In-Room Frequency Response	34Hz - 32kHz ± 3dB
In-Room Sensitivity	93dB @ 2.83v / 1 meter
Frequency Response (Anechoic)	41Hz - 32kHz ± 3dB
Sensitivity (Anechoic)	90dB @ 2.83v / 1 meter
Minimum Impedance	4 ohms
Impedance Compatibility	recommended for 8 ohms and lower rated amplifiers
Minimum Recommended Power	25 watts
Maximum Continuous Power*	300 watts
Maximum Short Term Peak Power*	500 watts
Cabinet	Exclusive V-LAM™ construction featuring vertically laminated bamboo. Bass reflex via flared rear port tube. Isolated sealed internal midrange chamber.
Dimensions H x W x D**	43" x 7.5" x 10.5"
Weight (each)	49 lbs each
Shipping Weight (each)	55 lbs each
Tweeter (featuring custom RAAL 70-20XR)	(1) 20mm wide pure aluminum ribbon tweeter with custom designed face plate and amorphous core transformer.
Midrange Woofer	(1) 5.25” mineral-filled polypropylene cone woofer featuring an underhung voice coil with neodymium magnet system, vented pole-piece, vented spider and aluminum phase plug.
Woofer	(2) Proprietary 5.25” long throw mineral-filled polypropylene cone woofers. Features non-resonant cast aluminum frame, copper shorting rings, low-inductance motor assembly, vented pole-piece and vented spider.
Connectors	(2) gold plated all metal 5 way binding posts.
Warranty	7 year parts and labor
*Unclipped peaks	**Grille Off